LAND USE AND MARKETING IN NORTH EAST THAILAND:

A CASE STUDY OF THE LAM PAO AREA

THESIS SUBMITTED FOR

THE DEGREE OF DOCTOR OF PHILOSOPHY

IN THE UNIVERSITY OF LONDON

MARCH 1974

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ABSTRACT

This study examines the process of agricultural development with particular reference to the interaction between land use and the market system. Agricultural change is seen in terms of increasing orientation towards commercialisation. The existing subsistence land use pattern has been gradually modified as a result of the farmers' response to stimulation of cash expectations by contact with the wider market economy. This response follows the two main lines of the expansion of production of a marketable surplus in the traditional crops, and the adoption of new land use elements which differ markedly from the established pattern. These trends are not necessarily mutually exclusive and may indeed occur together. The instability of the environmental conditions, the unpredictable nature of commodity prices, the weakness of the market system and the farmers' desire to continue to provide their basic subsistence needs, all act as constraints on the progress of agriculture towards highly commercialised and specialised production.

A combination of continued stimulation of farmers' cash expectations, the unreliable flow of income from farming and the government policy of heavy investment in rural infrastructure, which generates a large amount of unskilled labouring employment in the short term, may cause farmers to turn increasingly away from agricultural pursuits. Whether or not these farmers revert to agriculture as the mainstay of cash income once the employment in construction work ceases could have very significant implications for the future land use pattern of an area planned for modernised intensive agriculture.

UNITS OF MEASUREMENT USED IN THE TEXT

Rai	1600 square metres (0.16 hectares)
Ngaan	400 square metres
Waa	4 square metres
Khwien	2000 litres (normally 1000 kilograms of paddy)
Tang	20 litres (normally 10 kilograms of paddy)
Picul	60 kilograms

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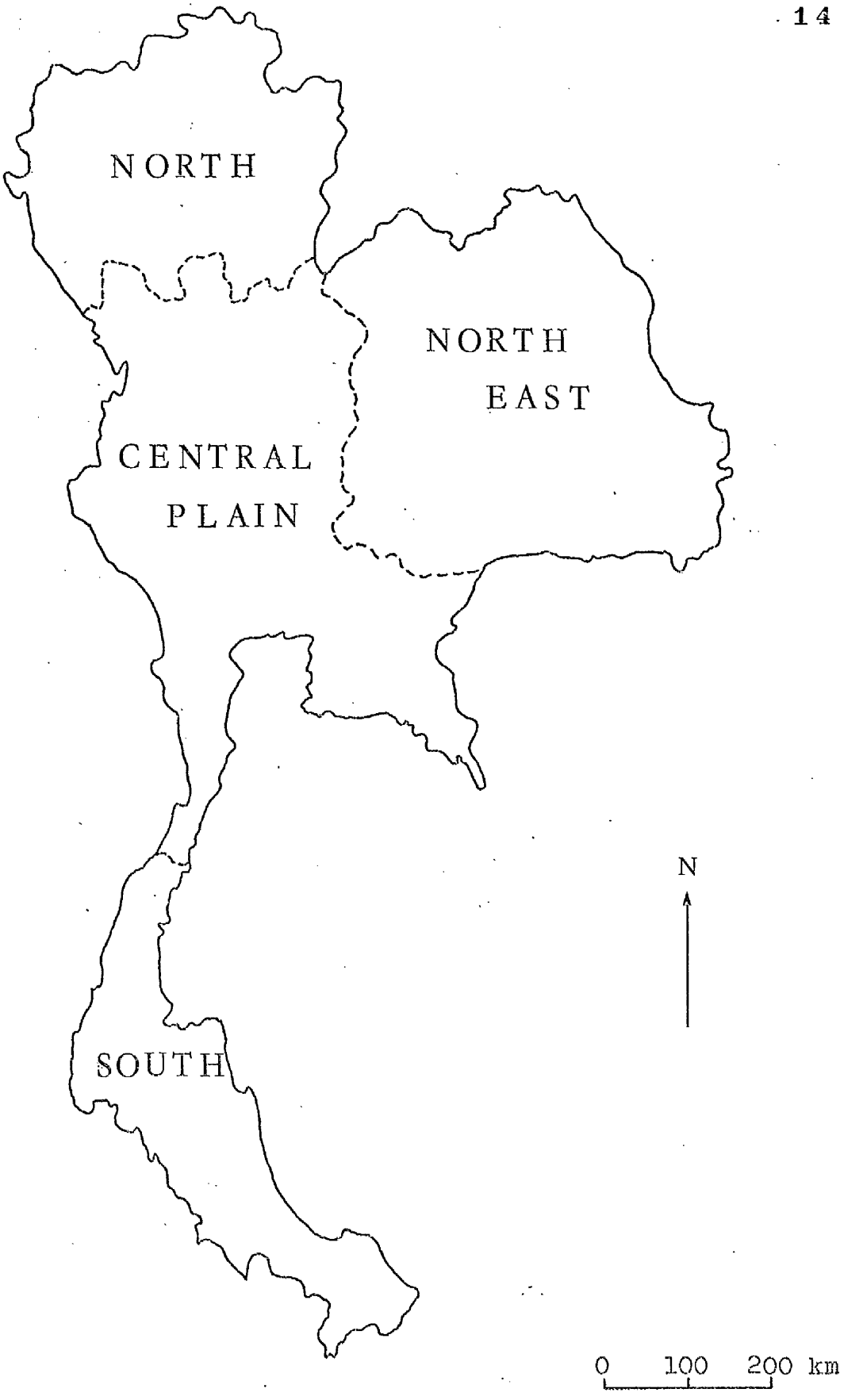
(North) Eastern Thailand has an area of about 65,000 square miles and consists of a huge shallow basin, encircled by hills. The basin is drained eastwards by the Mun and the Shi, which unite before joining the Mekong. Included in Eastern Thailand is also a strip of country between the Mekong and the girdle of hills just mentioned, and the whole region is bounded on the north-east and east by the Mekong itself, forming also the boundary of the kingdom. Most of Eastern Thailand has an indifferent soil and an adverse climate. Thin scrub jungle covers the slopes of the hills, huge swamps much of the low ground, at least during the rains - or dried-up wastes of grass and reeds in the hot season. 'A population of some million and a quarter, Laos, Siamese and Kambodians, that is, about 20 people to the square mile, inhabits this inhospitable land, wresting from the reluctant soil crops barely sufficient to maintain an existence which, passed amidst damp and mud for one half of the year and in a dry, hot and dust-laden atmosphere for the other, is one of the most miserable imaginable, more especially since this whole neighbourhood is peculiarly liable to the visitation of epidemics of diseases affecting both men and cattle' (Graham).

L.D. Stamp, "Asia", 11th ed., 1962, p.467, citing W.A. Graham, "Siam, a Handbook of Practical, Commercial and Political Information", 1st ed., 2 vols., 1912, p.9.



THE ADMINISTRATIVE REGIONS OF THAILAND (before 1970)

CHAPTER I

BACKGROUND TO THE NORTH EAST

The North East

The North East of Thailand forms a convenient unit of study; the fifteen changwats[1] which comprise the North East region for planning and administrative purposes coincide with the distinctive physiographic unit known as the Khorat plateau. Thus the North East constitutes a major region of the Thai kingdom on administrative, economic and physical grounds; indeed all work on Thailand has treated the North East or Khorat as a distinctive regional entity and one of the four basic regions.[2]

The North East comprises the largest of the four regions normally delimited, with approximately a third of the Thai population and a similar proportion of the area (table I.1). Only comparatively recently has the North East been fully incorporated into the Thai kingdom; its isolated position and the lack of natural water communications retarded development until the introduction of modern road and rail links. Culturally the region remains distinct from the rest of Thailand with considerable ethnic and linguistic affinities with neighbouring Laos.[3]

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1 Provinces containing 142 amphurs (districts).

2 R. Pendleton, "Thailand", 1962; C.A. Fisher, "South East Asia", 1964; D.L. Stamp, "Asia", 1962; E. Dobby, "South East Asia", 1958; T. Silcock, "Thailand Social and Economic Studies in Development", 1967; C. Zimmerman, "Siam: Rural Economic Survey", 1931; W.A. Graham, "Siam, a Handbook of Practical, Commercial and Political Information", first edition, 2 vols., 1912; J.C. Ingram, "Economic Change in Thailand, 1850-1970", 1971.

3 For an elaboration of this theme of the distinctiveness of the region, see: C.F. Keyes, "Isan: Regionalism in North East Thailand", 1965.

TABLE I.1

THE MAJOR REGIONS OF THAILAND

Region	Area		Population		%G.D.P.	%G.D.P.
	Sq.kilometres	%	Number	%	1960	1969
North East	170,006	33.07	8,991,543	34.2	15.9	15.2
North	70,189	13.65	5,723,106	21.7	18.0	16.8
South	103,579	20.1	3,271,965	12.4	14.1	12.5
Central Plain	170,226	33.1	8,271,302	31.5	52.0	55.4

Source: Area and Population from Statistical Year Book Thailand, Number 29, 1970-71; the population figures refer to the 1961 Census; G.D.P. figures from Regional Accounts Unit, National Accounts Division, N.E.D.B. and quoted by Phisit Pakkasem, "Thailand's North East Economic Development Planning: A case study in plannint", N.E.D.B./D.E.D., 1973.

The North East is the least developed and poorest region of the kingdom. The region has a disproportionately small share of the national income, and the lowest per capita income level of any of the four major regions[4] (table I.1). Not only are the regional and per capita incomes low but they also exhibit the lowest rates of growth, so that over the last decade the gap between the North East and the rest of the kingdom has steadily increased. Similarly the structure of the North East economy has failed to change in line with the Thai economy as a whole.

The North East economy remains heavily dependent on agriculture, a sector which has performed poorly over the last ten years in Thailand in general, but particularly in the North East. Here, agriculture has not been displaced by the new growth point sectors of services, construction, power generation, and light industry to the extent exhibited in the Thai economy as a whole.[5]

A variety of social, political, historical and environmental factors, which will be discussed in the sections which follow, may be seen to lie behind the continued backwardness of the North East economy and its failure to participate in the new growth processes evident in the Thai economy over the last decade. In general the North East has experienced a long period of neglect and has only had attention focussed on its problems in the last fifteen years. Platenius writes:

"Scarcity of natural resources is the principal reason why the North East has not reached the same degree of development as have the other regions of Thailand. The soils are poor in general, rainfall is sporadic and possibilities for irrigation are few. Until now no large mineral resources have been discovered which might lead to the establishment

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4 Phisit Pakkasem, "Thailand's North East Economic Development Planning: a case study in planning", N.E.S.D.B./D.E.D., 1973, no.1.

5 Ingram, op. cit., pp.220-236; L. Berger, Inc., "North East Economic Development Plan", 1971, p.I.1.

of industries. Potential for development of H.E.P. are large but the opportunities to use that power are few".[6]

Since Platenius summarised the area's economy thus in 1963, little has happened to alter the picture. The backwardness of the North East has long been recognised; Graham (1912), Stamp (1929), Pendleton (1930), and Zimmerman (1931) all stress the underdeveloped nature and environmental poverty of the region. This is also apparent in the central Thai attitude towards the region as a 'fringe' area almost beyond the pale.[7] The north-east Thai speaks a different dialect, differs in his dress, and in his preference for glutinous rice which is only eaten in Central Thailand in sweetmeats.

Apart from limited timber, salt and unexploited iron ore deposits in Loei, there are no important resources, although there are small and unexploited quantities of antimony, chromite, copper and precious stones.[8] Rice production dominates the land use of the region despite the fact that much of the land is marginal to paddy and could not in any case favourably compete with the commercial rice areas of the Central Plain. Soils are poor, and under the prevailing rain fed agriculture, the unreliable rainfall makes rice growing hazardous. Yields are both the lowest in the country, and total production the most unreliable. The agricultural sector thus fluctuates greatly from year to year in its contribution to the North East income - more so than in the Thai economy as a whole.

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6 H. Platenius, "The North East of Thailand: its problems and potential", 1963, p.i.

7 F. Cripps, "The Far Province", 1965, pp.1-4.
For a summary of similar views see R. Ng, "Rice cultivation and rural settlement density in North East Thailand", Tijdschrift voor Econ. en Soc. Geografie, vol.19, 1968, pp.200-210.

8 United Nations, "Atlas of Physical, Economic and Soil Resources of the Lower Mekong Basin", 1968.

A symptom of the lagging North East economy has been the increasing tendency for the region to become an area of net migration loss to the favoured changwats.[9] This tendency has developed particularly since 1960 with the improvement of communications with the Central Plain and Bangkok. Seasonal migration in search of dry season cash income has become increasingly apparent even from the remote parts of the region. Its incidence may be related to the success of the agricultural year; in years of adverse conditions and consequently poor harvest the numbers of temporary migrants are substantially greater.[10]

Recently, increasing attention has been focused on the North East both by the Thai government and by various international organisations.[11] A plethora of reports have been produced and investigations made, emphasising the problems of the region. Fears of 'communist infiltration' from Laos and incipient insurgency have been stimulants to the national and international concern with the North East. Nevertheless, despite the considerable volume of investment and effort that has gone into the stimulation of development here, "the solution of the North East 'problem' remains as elusive today (1970) as it did a decade ago".[12]

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9 R. Ng, "A Study of Recent Migration in Thailand", Journal of Tropical Geography, 31, 1970, pp.65-78.

10 There is no official record of temporary migration, and this information can only be obtained by surveys.

11 E.C.A.F.E., I.B.R.D., F.A.O., U.S.O.M., and A.D.B. (These abbreviations are Explained in Appendix I.1).

12 R. Ng, "Some land use problems of North East Thailand", Modern Asian Studies, no.4, part 1, 1970, pp.23-42, quotation p.23.

Historical Background

The North East had, until comparatively recently, been isolated from the main stream of Thai economic and political development. Physical separation by distance and the lack of communications with the Khorat plateau have clearly been important in retarding development, but it is important to appreciate the very different historical and cultural background compared with the rest of the country. The integration of the North East into the Thai nation and economy is really a story of the twentieth century.

In the several centuries preceding the thirteenth century, the Khorat Plateau was a part of the Ankor empire, and was populated by a predominantly Khymer speaking people. The rise of the Sukothai empire in the thirteenth century resulted in the take-over of the northern part of the plateau by this, the first of the Thai kingdoms. There is little evidence to suggest that there were appreciable numbers of Thai speaking people in the North East at this date.[13] The collapse of the Sukothai empire in the middle of the fourteenth century was followed by the rise of the Lao kingdom of Lan Chang, and the Thai kingdom of Ayuthia. These two political units were to remain significant in the fortunes of the North East until the eighteenth century.

Since Ayuthia was more concerned with consolidating control over the central and eastern areas of present day Thailand, it abandoned any claim to the Khorat region in favour of the Laos. During the years from the fourteenth to the seventeenth centuries, repeated migrations of Lao peoples into the Khorat plateau took place. "The areas bordering the Mekong river were more fully incorporated in the Lao kingdom while the

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13 Keyes, op.cit., p.4.

central areas of the plateau had little control exerted over them".[14] The Lao penetration resulted in the gradual submergence of Khymer culture and the spread of the Lao language over much of the plateau. There remains, however, even to the present day, some half million Khymer speakers in the region.[15]

There was some Ayuthian penetration, particularly after 1600, but this consisted of little more than the erection of forted and often moated outposts such as Nakorn Ratchasima. Both Lan Chang and Ayuthia, as long as they remained unified, had a common interest in maintaining the plateau as a wide frontier region between their territories. In the eighteenth and nineteenth centuries the plateau was repeatedly a battleground between them.

By the seventeenth century, only limited areas of the plateau had been incorporated into the Lao kingdom and none into the Thai. However, culturally, the area became more Lao. There were continued immigrations of Lao people from the fourteenth to the nineteenth centuries, some large enough to be well documented.[16] Keyes points out that the Lao culture showed a greater ability to absorb the Khymer culture than the Khymer the Lao.[17]

The period of anarchy and resultant division of Lan Chang in the eighteenth century was paralleled by the growth of the power of Ayuthia. These developments marked the beginning of Thai expansion into the region. A series of campaigns were fought against the Laos in the

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14 Keyes, op. cit., p.8

15 In the 1960 Census (Statistical Handbook of Thailand, 1965).

16 For example, a large migration of Laos from Vientiane to Kalasin in the eighteenth century. (Keyes, op. cit., p.8).

17 Ibid., p.8.

eighteenth and early nineteenth centuries, until the final defeat of the Laos in 1827 brought the whole of the plateau and the Vientiane area of Laos under Thai control, so that by 1867 Thailand had control of all of Laos to the north and east of Luang Prabang.[18] French penetration into Indo-China brought an end to the Thai-Lao conflict, and faced with fears of French influence beyond the Mekong, put pressure on the Thais to consolidate control of Khorat and remove influence from Laos.[19] With the treaty of 1893, Thailand relinquished any claims to territory beyond the Mekong.[20]

It is clear that a very large proportion of the North Eastern people have a culture which is closer to that of Laos than that of Thailand. The consolidation of Thai control over the North East and the interaction of North Eastern and central Thai has emphasised the common heritage and identity of the North East.[21] Thai control relied on the development of effective transport and communications. The general lack of water transport and the terrain of the plateau resulted in as many as three weeks being needed to travel from Bangkok to Nakorn Ratchasima before the rail link was opened in 1900,[22] reducing the minimum journey time to one day. In 1928 a railway was opened to Ubonratchathani, and in 1933 to Khon Kaen. By 1907 telegraph communications had been established with Nakorn Ratchasima, Ubonratchathani, Nongkai and Buriram. There was little road building until the 1940's, although some limited development began in the late 1920's.

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18 J.H. Cady, "Thailand, Burma, Laos and Cambodia", 1966, pp.63-64.

19 The present Thai-Lao border was established in a series of treaties with the French in 1888, 1893 and 1894.

20 G. Coades, "The Making of South East Asia", 1962, p.177.

21 Keyes, op.cit., p.13.

22 R.L. Pendleton and Sarot Montrakun, "Soils of Thailand", undated.

Improved transport and communications began to increase trade and other contact between the North East and the central part of the country. Keyes sees the increased contact as hardening the lines between the two areas, and promoting ambivalent attitudes.[23] The largely autonomous nature of the North East was gradually removed after 1920 with a series of reforms that placed the changwats of the region on the same basis as those elsewhere.

After the second world war, the area's backwardness has been made more apparent by attention focused on it. Beyond the environmental limitations, many in the North East consider that the Thai government has discriminated against the region.[24] What truth there is in these assertions is difficult to ascertain. From the 1950's, the government became concerned over the unrest in the North East, and considered that a policy of accelerated development would be at least part of the solution. Subsequent events in Vietnam and in Laos have reinforced the fears, but how far North East progress may be seen as political in origin this is not the place to consider.

The 1961 Five Year Plan for the North East was the first major measure aimed solely at the development of the region and not as merely part of an overall scheme for the country. A National Economic Development Committee for the North East was set up, but implementation was placed in the hands of separate agencies rather than the co-ordinating body. Development has emphasised transport, multipurpose dams and community development. Overall co-ordination has been lacking and the necessary detailed investigations and information for planning have been missing

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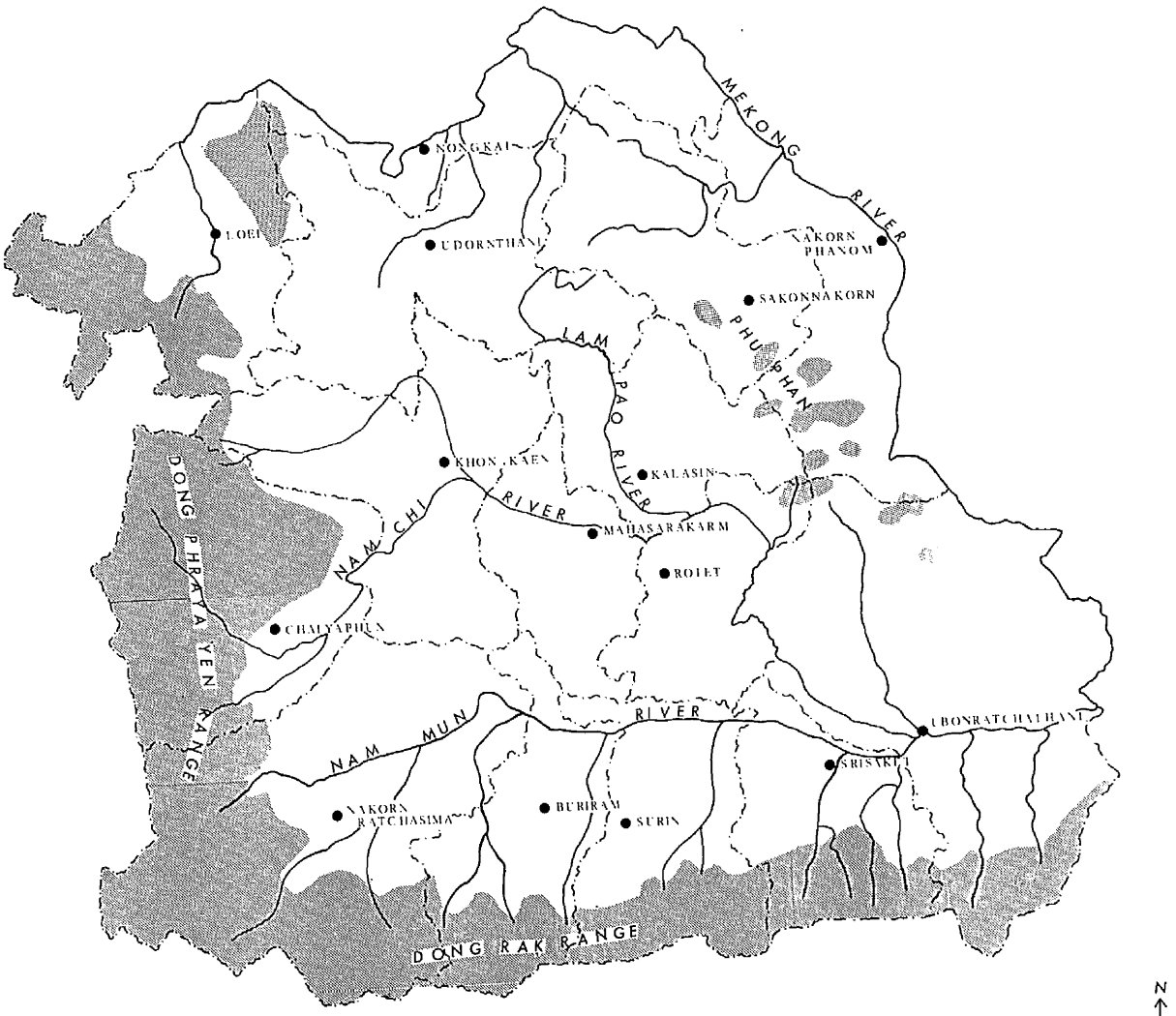
23 Keyes (op. cit.) elaborates these feelings between the Central Plain and the North East, and traces much of the neglect and lagging of the North East to these attitudes.

24 Keyes, op. cit., p.14.



Map I.1 Physical Background of N.E. Thailand

in many instances.

The North East remains culturally, ethnically, linguistically and historically distinct from Thailand as a whole, with more regional unity and distinctiveness than the other regions. Recent attempts at integrating the area have not yet succeeded in cutting across the very different historical experience of the region, reinforced as it was by a long period of isolation from the main line of Thai development.

Relief and Drainage

The surface of the Khorat plateau is gently undulating, and averages 140 metres in elevation. There is a general slope from the west to the south east, with the rivers deeply incised. In the west the plateau is bounded by the Dong Phraya Yen mountains and by the Dong Rak in the south, both reaching a maximum height of 500 metres.[25] To the east the boundary is the Mekong River, and in the south east where the Mun Chi joins the Mekong, the lowest elevations in the region are found, around 120 metres (see map I.1).

The gently undulating surface of the plateau is broken by long ridges, the most prominent of which runs north west from northern Ubon, along the eastern border of Kalasin, where it reaches its greatest height in the Phu Phan ranges, through Sakonnakorn and Udornthani to Loei. These higher areas are frequently areas of sparse settlement often with substantial areas of uncleared forest. The Phu Phan ranges in particular stand out as heavily forested, separating the densely settled area along the Mekong from changwat Kalasin in the central North East. On a larger scale, the ranges bordering the Khorat plateau to the south and west separate the North East from the more densely settled areas of Thailand.

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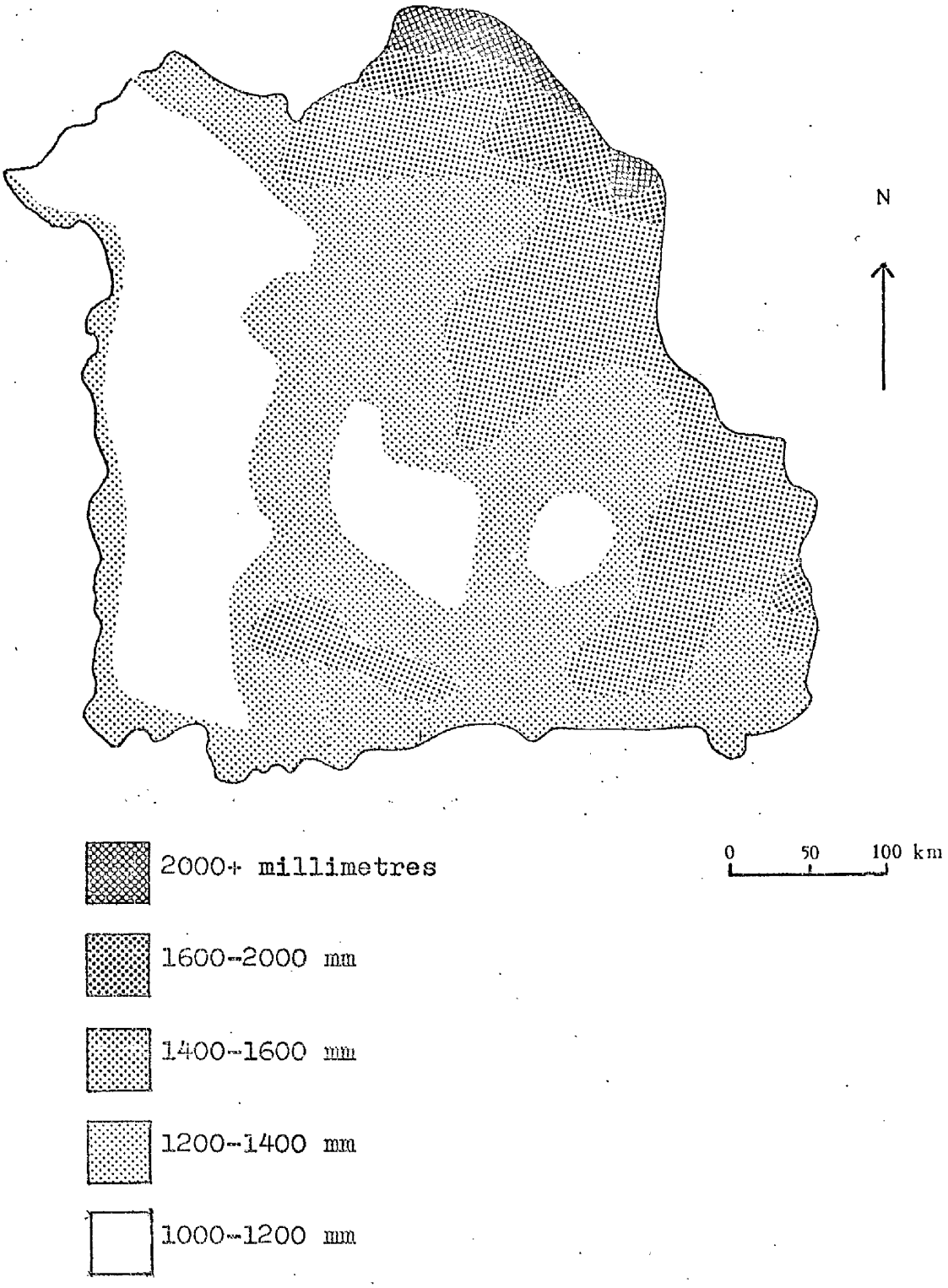
25 The Dong Phraya reach 800 to 1300 metres in individual peaks.

The steep scarps which face out to the west and south and the heavily dissected dip slope behind comprise an extensive area of few people, uncleared forest, and remanants to the hill tribes' shifting agriculture. These separating ranges contributed to the isolation of the region. There still remain serious problems of communications, especially along the eastern boundary of the plateau where the Mekong is unnavigable with shoals and rapids in the dry season and flooding in the wet. This situation may alter with the completion of the Greater Mekong Navigational Improvement Scheme.

The North East as a whole is drained by the Mekong, but there are two distinct sub-drainage systems. These are separated by the ridge already described. The area north and east of this divide, some third of the surface area, is drained by a series of small tributaries draining directly into the Mekong. South and west of the ridge, is the Chi Mun system, a major tributary of the Mekong.

The regimes of these tributaries, like that of the Mekong itself, are markedly seasonal, rising rapidly to flood level with the onset of the wet season in May or June, and falling slowly with the coming of the dry season from October-November onwards. There tend to be two main flood peaks, one in June-July and one between September and November. These peaks are a direct reflection of the rainfall pattern and indicate the rapid rate of runoff which is general, although there are some areas with poor drainage where water collects in 'Nong' depressions during the wet season, forming extensive, shallow seasonal lakes. During the dry season the rivers reach very low levels in their incised beds. The section of the Nam Chi that borders southern Kalasin rises 25 to 30 feet between May and August. Flooding is a serious problem over much of the low lying land, and is particularly severe in the southern areas drained by the Chi and Mun. It is hoped that flooding here will be controlled



Map I.2 The Rainfall of the North East

Source: A.S.R.C.T., 'The Seasonality and Intensity of Rainfall in N.E. Thailand,' 1967

by the completion of the Nam Pang Dam and the Upper Chi Dam.

Climatic conditions

There is a general lack of climatic information concerning North East Thailand; meteorological stations are few and only a limited number have records for as long as twenty years.[26] In general the climate may be classed as tropical monsoonal with four main seasons.[27]

1. The North East Monsoon, or cool season, from November to February; this is a period of generally dry, cool weather (13°C to 20°C).
2. The Spring Transition Season, or hot season, from March to May; this is the hottest part of the year with humidity increasing markedly from late April onwards (maximum temperature 29.9°C in April).
3. The South West Monsoon, or wet season, from June to September; this is cooler, with rainfall at a maximum in July and September. Rainfall is not continuous through the season, and 'windows' occur especially in the period between the two peaks.
4. The Cool Transition Season, generally in October, marks the end of the wet season and the onset of the drought.

The timing of the seasons varies from year to year, in particular the change from the N.E. Monsoon to the S.W. Monsoon in the March-May period. 1972 was a very late year, with the rain associated with the S.W. Monsoon not arriving until late July or early August. In contrast 1973 was an early year, with heavy rain in late April and early May. The cool transition was similarly late in 1972, when the rain continued into December.

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26 "The great variability of rainfall calls for a large number of stations and at least thirty years data, but only a few runs of figures are available for twenty years". (A.S.R.C.T., "Seasonality and Intensity of Rainfall in N.E. Thailand", Bangkok, 1967, p.3).

27 U.S.B.R., "Pa Mong Stage One Feasibility Study, Appendix VI", 1968, p.I.10.

Fig. I.1 Mean Annual Rainfall for amphurs Muang, Komalasai and Yangtalad (1952-69)

Source: Figures supplied by the R.I.D.

Temperature is relatively uniform throughout the year (Appendix II.1), and it is variations in rainfall rather than temperature which affect agriculture.[28] The water supply situation is the most significant environmental feature of the region.

While the average rainfall totals of the North East are not markedly lower than those of the rest of the kingdom, there is considerable intraregional variation (map I.2). Along the southern and western borders the rain shadow of the Dong Phraya and Dong Rak ranges produce the lowest totals in Thailand, around 1016 mm. per annum. In contrast the extreme north east of the plateau adjoining the great bend of the Mekong has totals well in excess of 2032 mm. and falls of 3937 mm. have been recorded in a single month.

Great variations in annual totals are common throughout the region, and the pattern for Kalasin for the period 1952 to 1969 may be taken as typical (figure I.1). The peaks of 1962 and 1966 were reflected in severe flooding in many parts of the North East; similarly 1956, 1962 and 1967 were years of severe drought. The standard deviation from the annual mean is of the order of 200 mm. and the coefficient of variability (100.SD/mean) is 15%, which is higher than other areas with similar climates, with the exception of northern Australia.[29]

Totals vary greatly over a short distance on the ground, as map I.3 shows. Rainfall is highly seasonal (figure I.2),[30] and occurs in two peaks, the first and smaller in May-June, the second and larger in

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28 Pendleton, op. cit., p.113.

29 A.S.R.C.T., op. cit., p.8 and R.O. Slayter, "Agricultural Climatology of the Katherine Area", 1960.

30 85% of the rainfall generally occurs in the six months from mid April to mid October. Light showers of rain can occur at any time of the year, (see figure I.2) but such rainfall is unreliable, ineffective and of little consequence for agriculture.

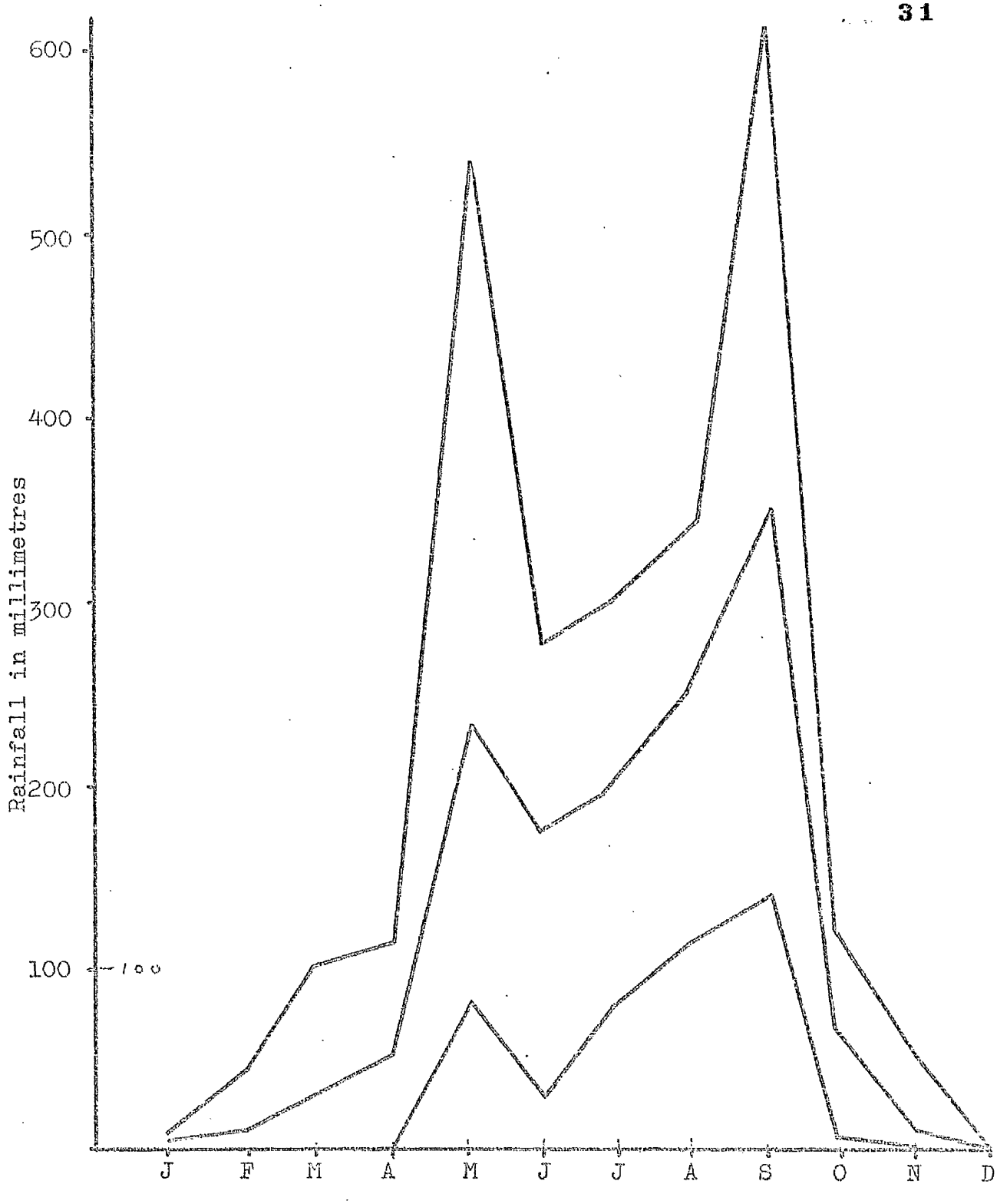

Fig. I.2 The Seasonal Pattern of Rainfall in changwat Kalasin: mean, maximum and minimum recorded per month, 1957-67

Source: Kalasin Changwat Data Book, N.S.O., 1968

August-September.[31] Monthly rainfall is very different from year to year, as the figure shows. The coefficients of variability in changwat Kalasin for the months are between 44% and 370%, with the greatest variability in the dryest months (Appendix II.2). The period of the main growing season from March to September has coefficients of variability ranging from 103% to 44%.

There is a close relationship between the agricultural year and the monthly rainfall. Rainfall in the March to June period is particularly important because it determines the date at which land preparation can begin. Coefficients of variability for these months are 103%, 61% and 54%. Field work in these crucial months in 1971, 1972 and 1973 has shown the importance of variations even between nearby villages.[32] (map I.3)

While the levels of production of rainfed crops must closely relate to the rainfall, the relationship is by no means as simple as the direct relationship Assen suggested.[33] A regression analysis on his figures shows that variation in rainfall could only provide 2.6% of the variation in the North East paddy production. It is clear that the distribution within the year is more crucial than annual total.

Even in normal years the water supply situation can be critical from December to May in many parts of the region, and even drinking water can become short, and in some cases must be carried two or three kilometres. At the other extreme the intensity of rainfall in the wet

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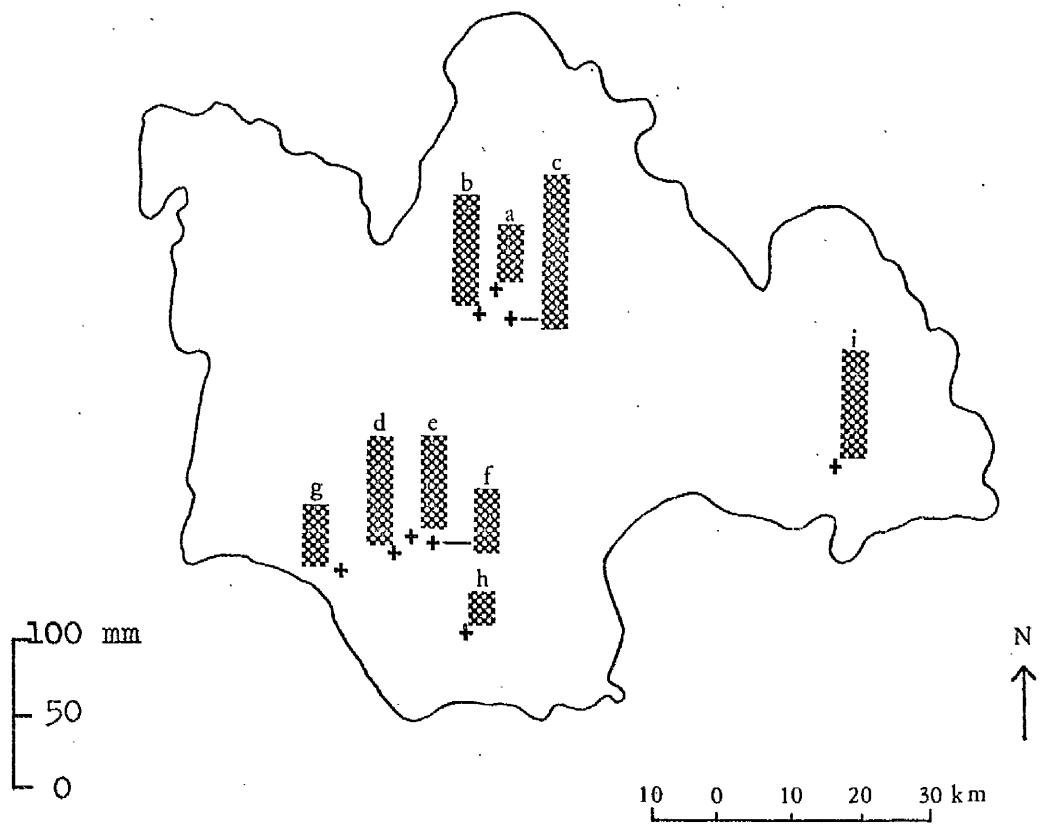
31 In 1966, the normal situtation was reversed, with a very high first peak and a very low second peak, causing early season flooding and crop loss, and late season water shortage.

32 The village of Ban Tum in changwat Kalasin was consistently without water until early June 1971, while surrounding villages had received sufficient by early May to begin land preparation.

33 J. Assen, "Field Observations on Agriculture in North East Thailand and Laos", 1968, p.15.



RAINFALL STATION	RAINFALL IN APRIL 1966, millimetres	MEAN RAINFALL FOR APRIL, 1952-69 millimetres	
a Sahatskan	40.8	56.1	
b Lam Pao Upper Dam Site	74.1	66.5	[1958-66]
c Lam Pao Lower Dam Site	136.3	83.6	[1963-68]
d Agricultural Station	71.0	86.8	[1965-69]
e Huey Sithon	65.6	78.4	[1957-69]
f Kalasin town	44.7	54.5	
g Yangtalad	26.0	69.4	
h Komalasai	11.9	71.6	
i Kuchinarai	76.2	59.5	

Map I.3 The Rainfall of Changwat Kalasin, April 1966

Source: Figures supplied by the R.I.D.

season can produce rapid soil erosion especially if exceptionally heavy falls occur before upland crops have established effective soil cover. This is a problem particularly associated with cassava.

The whole question of crop yields and rainfall is an area of investigation where as yet little has been done. Such investigations have foundered on the lack of data at a level low enough to be meaningful within the context of extreme local variations.

Vegetation and Soils

Comprehensive soil surveys of the North East are lacking, and despite soil surveying schemes dating back to 1960, as yet there is a shortage of information on soil fertility.[34] The prewar work of Pendleton remains the only comprehensive source, although it is deficient in details.[35] For specific areas, detailed reports have been prepared by government bodies.[36] None of these sources provide any comprehensive view of the soils. The dominant soil groups are:

The Khorat series are one of the most extensive soil groups in the North East, and one of the most infertile, with little variation in fertility.[37] Low inherent fertility has led to exhaustion and abandonment of land, especially in the changwats of Surin and Srisaket in the south.[38]

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34 J. Ingersoll, "The Social Feasibility of the Pa Mong Project", 1970, p.115.

35 Pendleton and Sarot Montrakun, op. cit.

36 The Ministry of National Development, the Land Development Department, and the R.I.D. In addition, the N.S.O. has published land capacity maps of certain changwats. For specific areas, especially irrigation schemes, detailed information, often of a high quality, has been produced. (see Chapter III for an examination of soils of the Lam Pao area).

37 Pendleton, op. cit., p.71.

38 Pendleton's investigation suggested that in some years as much as 60-70% of the paddy area was left uncropped (op.cit., p.73).

The Roiet series are less extensive but more important for cropping. In general these soils occur in depressions and valley bottoms and so they have water supply advantages over the Khorat series. While poor, they are nevertheless important paddy soils.

The Kula Ronghai find their greatest development in the centre of the plateau to the north of the Mun river. They are typical of low lying open forest with savanna-like vegetation and a tendency for large shallow lakes in the wet season. They are arid and infertile, and with this tendency to flooding are of little use for agriculture.

All the North East soils are sandy in texture, shallow in depth, and low in inherent fertility. Their porosity reduces the effectiveness of rainfall.[39] When the natural vegetation of open diptocarp forest is removed, erosion can be a serious problem. The Ministry of Agriculture considers that 37,700,000 rai out of 106,000,000 rai in the North East (37.56%) comprise soils "not recommended for cropping", which includes large areas of the Khorat series, because of low fertility and the danger of erosion.[40] Indications are that extensive clearance, especially of watershed area, has not only accentuated soil erosion but has increased the rate of run-off and therefore the flood hazard.[41] Increases in the rate of siltation have similarly produced a marked increase in flood incidence in parts of the Chi-Mun drainage basin.[42]

There is, however, no comprehensive data on soil erosion and

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39 Ibid., pp.71-2.

40 Ministry of Agriculture figures, quoted in R. Ng., op.cit., 1970.

41 Vira Poomvises et al., "Detailed Reconnaissance Soil Survey of the Lam Pao Irrigation Project", 1963, p.9.

42 Ibid., p.9.

the abandonment of land due to soil exhaustion. Many areas considered only suitable for shifting cultivation prior to 1960 have been cultivated continuously for fifteen to twenty years, growing kenaf, maize and cassava. In changwat Kalasin areas cleared on the generally infertile Khorat series have produced yields as high as 4,000 kg. per rai in the first year, while adjacent land used for kenaf for ten years produced only 1500 kg. per rai. However the lower yielding land does not show obvious examples of exhaustion or erosion except in a small number of cases where there has not been a good cover of vegetation at the onset of heavy rains.[43]

The North East paddy has in general been only poorly cleared, leaving large numbers of trees, stumps, and termite mounds, contrasting with the paddy fields of the Central Plain where such impediments have long been removed. Much of the North East has a pioneer appearance, and everywhere there is evidence of recent clearance. The impediments in the fields also reflect the extensive nature of the agriculture and that labour for clearing is only available in the dry season when the hard soil discourages such work. Removal of termite mounds, containing valuable amounts of calcium carbonate and spreading them on the acid paddy soils is a beneficial, if labour-intensive, task.[44] Many mounds are merely truncated so that the calcium rich soils can be used for chillies, tobacco or vegetables.

The soils of the North East are generally low yielding and many series are not suited to continuous cropping. Particularly on the

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43 An investigation of soil fertility decline with length of cultivation of kenaf and cassava in the Kalasin area is at present in progress in the Geography Department of S.O.A.S.

44 R.L. Pendleton, "The importance of Termite Mounds in Modifying Certain Thai Soils", Journal of American Agronomy, 34, 1942, pp. 340-4.

Khorat and some of the Roiet series, cultivation is not possible every year because of soil moisture deficiency. In many areas, land passes out of cultivation after only two or three years.

The progress of settlement and land clearance

Large scale settlement and expansion of the area under cultivation in the thinly peopled Khorat plateau dates from the 1830's. From this period onwards large numbers of Thai and Lao settlers moved into the region with official encouragment. After the treaties with France and the transport developments linking the area with Thailand, this movement became almost exclusively Thai. The large numbers of Lao settlers have left their mark in place names and cultural and linguistic traits.

Settlement moved first into and along the main river valleys, taking advantage of the most fertile and reliable land. Water supply and transport were also of importance in the early preoccupation with the alluvial river valley areas. Before the road network developed, much traffic flowed on the Chi and Mun rivers, and such centres as Roiet and Mahasarakarm owed much of their importance to their proximity to the river.

As population grew, the higher and less fertile areas of Khorat soil were cultivated. These areas are not only less fertile - they are also more susceptible to environmental hazard. Movement into the more marginal areas resulted in increases in the average size of holding to compensate for lower yields and as insurance against total crop loss. This pattern of expanding settlement has continued until the present day rather than responding to population growth by intensifying land use, the pattern more usually associated with Asian paddy.

Two factors appear to lie behind this local pattern. The unreliability of the North East already described makes the concentration of small holdings risky; at least extensive cultivation spreads the risk to some degree. Also important is the loosely structured Thai-Lao society, which places little constraint on mobility and migration.[45] There was no shortage of easily cleared open forest; consequently once settlements reached an unmanageable size in terms of the distance from the village to uncleared land which new households could take up, a new settlement would hive off. Figure I.3 indicates the general pattern; the paddy land nearest to the village was cleared first, pushing back the forest as the population grew. The narrow frontier area of higher land represented a zone of active and/or partial clearance. In this zone land was being cut from the forest to form paddy but it might well be used in a partially cleared state for grazing buffaloes or for small permanent or shifting areas of subsistence crops. The forest formed an important part of the village economy, supplying fuel, building materials, fruits, edible roots and game, and in many areas of the North East cash income from products such as lac.[46]

As well as these constraints on village size, there could be physical limits to the size of the village site, because of the proximity of village land. There is a tendency for the older villages to be more densely packed than the more recent. Sites tend to be built up rather than expanded, because of the selection of dry point sites, which are generally limited in extent, in the middle or one the edge of potential paddy land. Clearance outward from the village might well rapidly result

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45 J.F. Embree, "Thailand: a loosely structured social system". American Anthropologist, 52, 1950, pp.181-193.

46 Zimmerman, op.cit., p.72.

TABLE I.2(a)

REGIONAL LAND CLASSIFICATION. (PERCENTAGE)

	North East	North	Central Plain	South	Thailand
Farm Land	24.82	11.80	29.92	25.81	21.68
Forest and Grazing	39.91	65.38	46.53	53.34	51.50
Swamps and Lakes	0.37	0.20	0.08	1.42	0.40
Unclassified	34.90	22.62	23.47	19.43	26.40

Source:- Agricultural Census,N.S.O., 1963

TABLE I.2(b)

REGIONAL LAND USE

	North East	North	Central Plain	South	Thailand	
Holding Area	26,402,870	12,537,354	19,639,261	11,321,474	69,630,959	
Arable Land	21,817,373	10,884,576	16,379,143	3,783,427	52,637,052	
% Arable Land	82.6	86.8	83.4	33.4	75.6	
Paddy Land	16,158,100	7,569,288	12,943,936	3,245,622	39,916,949	
% Paddy Land	74.1	69.5	65.9	85.8	76.8	*1
Other Crops	5,659,273	3,315,288	6,695,325	537,805	12,720,103	
% Other Crops	25.9	30.5	34.1	14.21	24.2	

*1 In 1963 the Agricultural Census gave figures of N.E. 94.8%
N. 86.5%
S. 79.0%
C. 74.8%
Thailand 85.9%

Source:- Calculated from the Annual Report on Rice Production in Thailand, 1968, Ministry of Agriculture, and The Upland Crop Report. Division of Economics, Ministry of Agriculture, 1968.

in movement onto the higher or otherwise marginal land which restricted expansion and precipitated movement of some people to a new site before the distance factor became a constraint.

The hiving off of new settlements in many instances took place over only a few kilometres, perhaps only just beyond the area of the 'parent' village. There is evidence that some groups moved over two or three provinces to found a new settlement.[47] In changwat Kalasin the villages in the more recently settled areas of amphur Sahatskan in the north of the province still preserve links with villages in the earlier settled amphurs to the south.[48]

Sternstein has drawn attention to the remarkably even distribution of settlements in the North East.[49] Ng has analysed the settlement distribution and while showing that there are local variations in density his findings bear this out.[50] This even settlement pattern must be seen in the context of the process of land clearance and settlement creation that has operated locally. It seems likely that the fall in the average holding in the region is a reflection of the slowing of the process. The percentage of the land area under cultivation in the North East compares favourably with that of the other major regions, despite the poor conditions for agriculture (table I.2).

The process of settlement formation and land clearance has been affected since the mid 1950's by the incursion of new upland cash

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47 The linkages are preserved by dry season visiting, especially in connection with temple ceremonies in the village of origin.

48 The process of settlement development is not the subject of published work; N. Leffret, University of Colorado, has work in progress on regional linkages of villages.

49 L. Sternstein, "Settlement types in Thailand", Journal of Tropical Geography, 22, 1965, p.38.

50 R. Ng, op.cit., 1968.

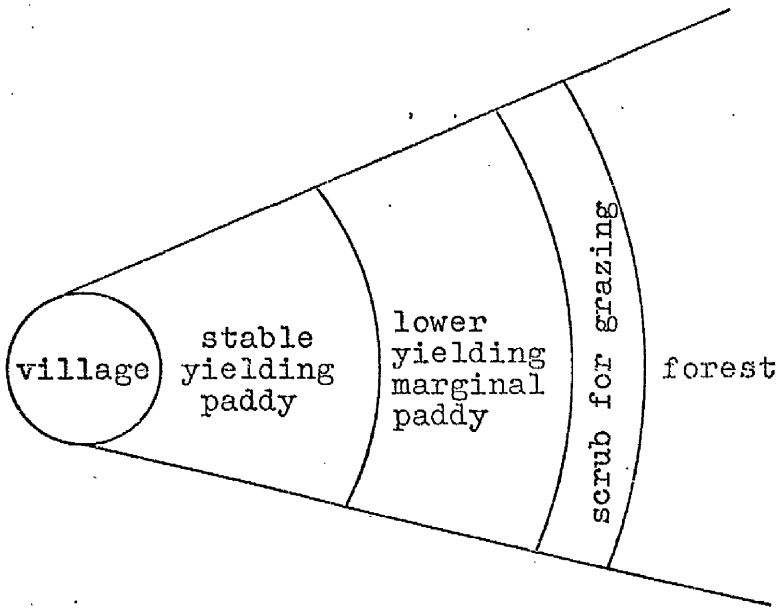

Fig. I.3 A Sectoral Model of Traditional Land Use (before the introduction of upland crops)

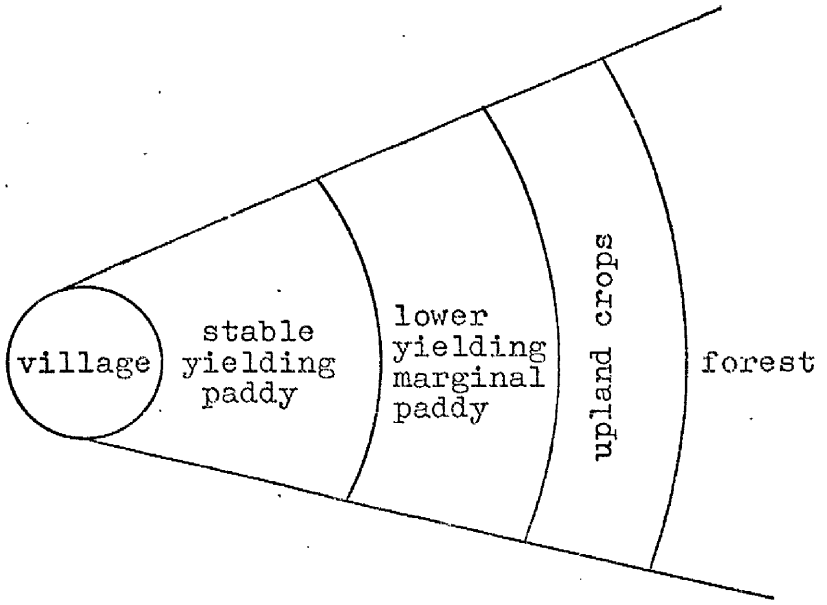

Fig. I.4 A Sectoral Model of Land Use after the introduction of Upland Crops

crops into the region. These crops have resulted in considerable clearance of land that would have been marginal for paddy. Thus the idealized village pattern shown in figure I.3 would exhibit a wider belt of permanently cultivated upland in place of the frontier region (figure I.4). This idealised pattern is modified on the ground, with upland cultivation taking place on ridges and isolated higher patches left uncultivated among the paddy fields, or on the side of the village where forested upland unsuited to paddy comes closest to the village, so that clearance for paddy may well continue on another side of the settlement. It is clear, however, that the introduction of upland crops radically changed the farmers' perception of the environment in terms of what constituted land worth clearing; previously negative areas separating settlements have become important parts of the village economy. Thus the cultivable land of the North East, in terms of farmers' evaluation, has been increased by the introduction of new crops at a time when the land potentially available for paddy was being rapidly diminished.

Agriculture

The dominance of paddy both nationally and regionally has been reduced by the introduction of new cash crops, particularly since 1945. Figure I.5 indicates the lessening dominance of rice in Thai agriculture from 1953 onwards; in 1947 paddy constituted 88.6% of cultivated land by area, by 1971 67.8%.[51] From 1963 to 1968 the area of paddy in the North East fell from 94.8% to 74.1%.[52]

Prewar, the main break in the overall pattern of rice

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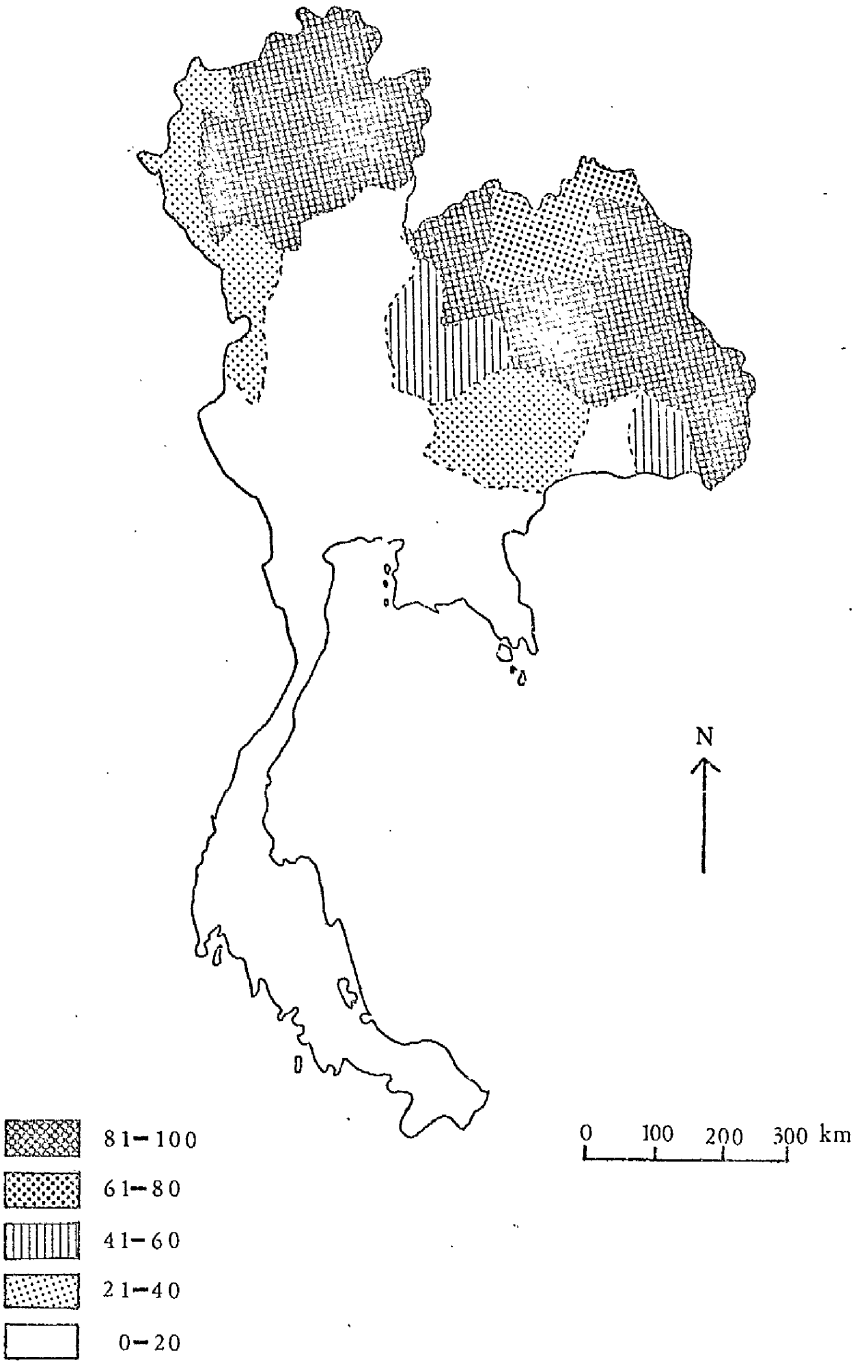
51 There are no comparable figures by region.

52 N.S.O., Agricultural Census, 1963, Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1968, and Upland Crop Report, idem, 1968.



Map I.4 The Percentage of Paddy Land Planted to Glutinous Rice in Thailand, 1968

Source: Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1968

dominance was rubber production in the south of Thailand. Since 1953, maize, kenaf and cassava have brought increasing diversity in the land use pattern. These new crops have been highly regional in their distribution, with maize in the north Central Plain and southern areas of the North, cassava in the South East, and kenaf in the North East. That this expansion took place on land unsuited to paddy is indicated by the fact that from 1953 to 1970 the area cultivated grew at 11.3% per annum, that under paddy by 5.9%, and that under other crops by 5.9%.[53]

Since 1947 when regional figures became available, the North East has had on average 36.28% of the Thai area planted to paddy and 28.78% of total Thai production (see Appendix III.1).[54] However, the North East place in the economy is complicated by the dominance of glutinous rice within the region. Only the North and the North East of the four major regions produce glutinous rice in any quantity (map I.4). (See Appendix III.2). The North East is in fact the major producer, with 70 to 80 per cent of the total Thai crop each year since 1947. Within the North East 65% to 75% of the paddy area has been under glutinous rice since 1947; in other regions it is a relatively insignificant proportion, with the non-glutinous varieties dominating.

Glutinous rice

The world and South East Asian insignificance of glutinous rice has resulted in its neglect by researchers.[55] The principal work

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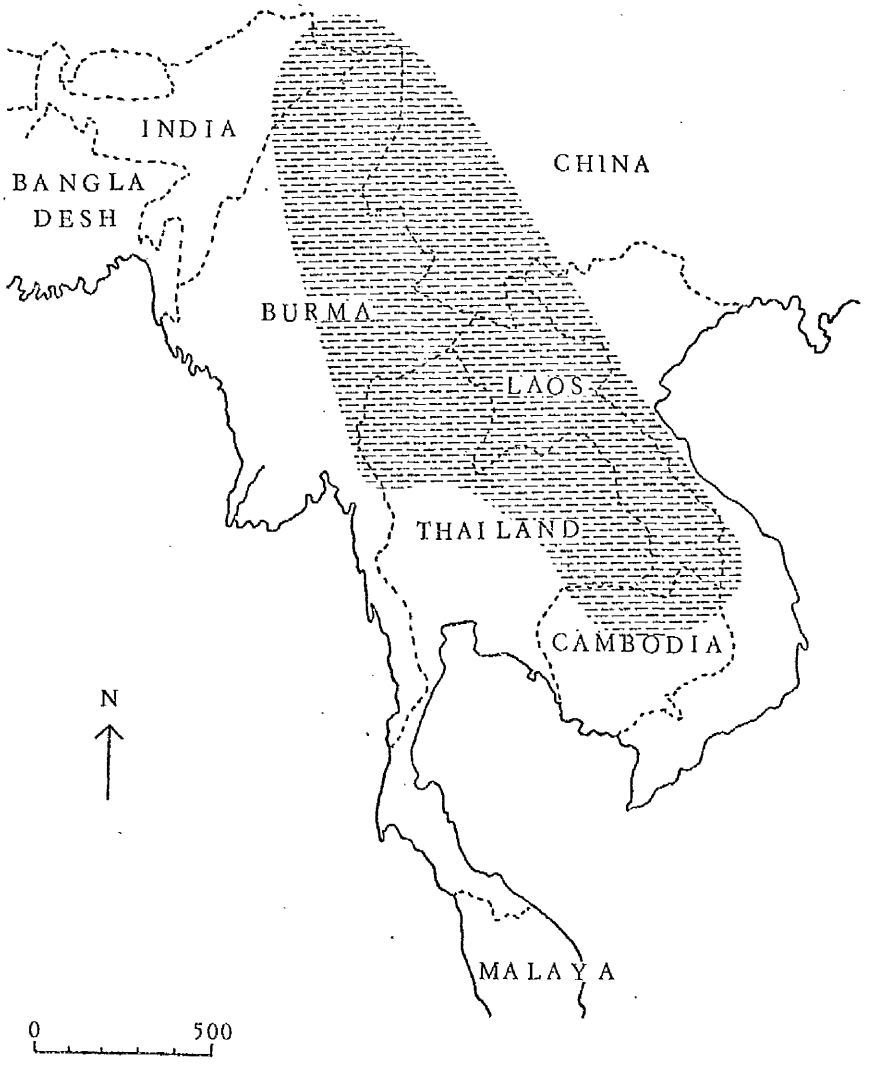
53 From 1953 to 1971, the total cultivated area grew by 53.82%, the area under paddy by 19.51% and the area planted to other crops by 400.87%. (Agricultural Statistics of Thailand, 1972).

54 In the North in most years 90% of the area is planted to glutinous paddy, but the area represents only 15-20% of the total planted to glutinous rice in the country as a whole.

55 H. Hamada, "Rice in the Mekong Valley", Tokyo, 1965, p.563.



Map I.5 The Glutinous Rice Zone of South East Asia

Source: T. Watabe, 'Glutinous Rice in Northern Thailand,' 1967

on the subject says:[56]

"In South East Asia glutinous rice forms a peculiar cultivation zone centering around northern and north eastern Thailand and Laos. This is a relatively wide belt ranging between latitudes 15° and 25° north. While glutinous rice is the principal staple food in its central area of cultivation the further one moves from this centre the less dependence (there is) on it as a staple".

Watabe's map (map I.5) illustrates the distribution of glutinous rice. There is a deficiency of information about the area planted in Laos (estimated by Watabe as 80%) and North West Burma. The reasons for the limited distribution of the crop are by no means clear. The zone indicated on the map has a tropical climate modified by altitude and latitude, resulting in a shorter growing season. Both De Young[57] and Dobby[58] consider that the short growing season resulted in the original choice of the more rapidly maturing glutinous rice.[59] Whatever the original reason for its selection, its continuance is largely due to dietary preference.[60]

Within the North East, the distribution of glutinous rice is extremely uneven, with a concentration north of the Mun river (map I.4).

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56 T. Watabe, "Glutinous Rice in Northern Thailand", 1967, p.7.

57 J.E. De Young, "Village Life in Modern Thailand", 1963, p.78.

58 Dobby, op.cit., p.94.

59 Prior to modern selective improvement of varieties, the non-glutinous strains had a longer maturation period, although today there are many non-glutinous varieties that mature faster than the glutinous.

60 "The difference between glutinous and non-glutinous rice is not a difference in amount of starch but rather in the type of starch. In non-glutinous rice the starch is 20% amylose and 80% amylopectin while in glutinous rice it is almost 100% amylopectin. The percentage of amylopectin determines the viscosity of the starch. Thus the high percentage of amylopectin gives glutinous rice its high viscosity when cooked and consequently its popular name of 'sticky rice'. It is not possible to distinguish between glutinous and non-glutinous by eye in the field prior to harvesting. However once harvested the glutinous rice takes on an opaque waxy appearance as it dries out while the non-glutinous rice remains more translucent". (Watabe, op.cit., p.9).

The changwats of southern and south western Khorat, particularly Nakorn Ratchasima, Srisaket and Buriram, produce predominantly non-glutinous rice. Further discussion of this will be undertaken in Chapter IV.

Paddy Production

From 1947 to 1965 North East paddy production grew at an average rate of 2.3% per annum, lower than the kingdom as a whole and the other regions except the South (table I.3). Not only did production grow slowly, but also irregularly (Appendix III.3), with a coefficient of variability in the growth rate of 21.5%, only approached by the North (20.7%).

In terms of area planted to paddy, the North East has grown faster (1.7% annually) than the country (1.5%) and the other regions. More striking is the difference in the growth in paddy holdings, 2.5% per annum in the region and 1.66% in the country. Not only has production grown slowly and irregularly, therefore, it has also been associated with an expansion of the paddy area rather than intensification. The more rapid expansion of holding than planted area suggests that large areas are not being regularly cropped. Slow and uneven growth rates in paddy production might well be expected given the unreliable and generally poor environment already outlined, but the interaction between environment and production is by no means a simple one.

In Thailand as a whole, there has been a steady expansion of paddy area and production, and a decline in yields particularly from the late 1920's until 1947.[61] (See Appendix III.4 and .5). The limited

61 V. Ruttan and A. Soothipan, (paper read at the Agricultural Economics Society of Thailand, undated, and summarised in Prince Sithiporn Kridakara, "Rice Farming in Siam", 1969, pp.166-8), divide the Thai rice yields into three periods: 1) rapid growth in output and area with little change in yield, 1907-21; 2) slow growth in production, rapid growth in area, declining yield, 1921/2-1946/7; 3) rapid growth in production, moderate growth in area, and rising yield, 1947/8-1963/4.

TABLE I.3(a)

REGIONAL GROWTH RATES IN PADDY PRODUCTION 1947-65

	North East	North	Central Plain	South	Thailand
Production	2.3%	4.0%	2.8%	2.1%	2.7%
Planted Area	1.7%	1.5%	1.5%	1.2%	1.5%
Holding Area	2.5%	1.4%	0.9%	0.8%	1.6%
Yield	0.9%	1.8%	-0.3%	-0.1%	0.9%

TABLE I.3(b)

REGIONAL VARIATION IN PADDY PRODUCTION 1947-65

	North East	North	Central Plain	South
Mean	2,207,000	655,700	4,007,600	745,200
Standard Deviation	454,000	64,400	692,000	154,500
Coefficient of Variability	215%	9.8%	17.3%	20.7%

Source:- Calculated from Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1947-1965

TABLE I.4

REGIONAL VARIATION IN PADDY YIELD

	North East	North	Central Plain	South	Thailand
Mean	176.833	302.333	262.625	245.333	219.833
Standard Deviation	26.4569	82.1597	35.4557	23.548	51.6887
Coefficient of Variability	14.96	27.17	13.50	9.59	23.51

Source:- Calculated from Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1947-1965.

See Appendix III, figure 3.

regional figures available suggest that initial expansion of paddy into the areas outside the Central Plain, that is, in the North and North East, resulted initially in higher yields, but later the falling average in the outlying regions reduced the figure for the whole kingdom. (Appendix III.6).

North East yields are by far the lowest in the kingdom; the reversal of the long term decline in yields since 1947 has done nothing for the relative position of the North East. Yields have increased in all regions except the North, which has grown faster, over the last twenty five years by a similar degree. Ruttan and Soothipan writing in 1965 concluded that:[62]

"It is not possible to present a definitive measure of the relative contribution of irrigation, natural damage, fertilizer and newer varieties to achieving higher yield ... the yield has risen in both irrigated and non-irrigated land in all regions in recent years. In the North East and the Central Plain, which account for more than 80% of total production it appears that a decline in natural damage is sufficient to account for most of the increase in yield of the last half decade".

Overall, they considered that fertilizer, insecticide, new varieties and irrigation had made little contribution to yield increases. The continuation of yield increases from 1965 to 1972 (excluding 1967-8 which experienced the worst drought of the century) argues against a series of fertile years as the explanation. Edwan Van Roy noted that the yield increases have taken place despite "most of the new land (opened since 1947) being of relatively low productivity".[63] In contrast, Prince Sithiporn Kridakara claims that the increase stems from the fact that "the land opened up for rice cultivation in recent years has not all been marginal land with low yields but on the contrary some have very high

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62 Ibid., p.167

63 E. Van Roy, "The Malthusian Squeeze", Bangkok Bank Monthly Review, Aug. 1967.

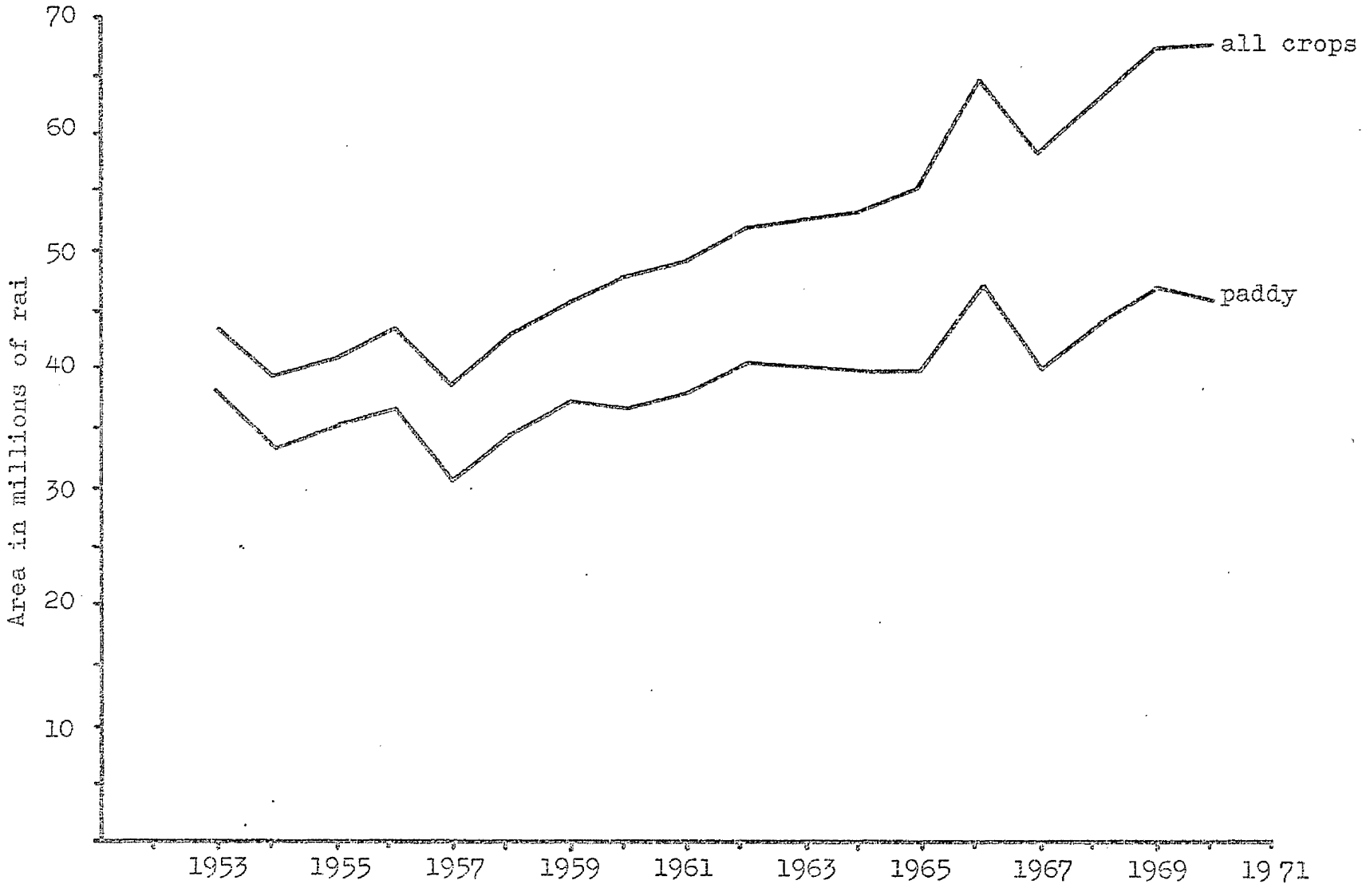

Fig. I.5 Total area cultivated and area planted to paddy, Thailand, 1953-70
Source: Agricultural Statistics of Thailand, Ministry of Agriculture, 1972

yields".[64] His arguments from Pitsaniloke and Pechabun do not seem to apply to the North East. Here, new varieties, fertilizers and irrigation must be important factors in yield increase, however it is clear that detailed regional analysis needs to be undertaken to understand the reversal of the trend.

While the rice yields of the North East have been consistently the lowest, they have not been the most variable (table I.4). The North has had the highest yields, but with a coefficient of variability of 27.17% it has also shown the greatest variation; the North East with the lowest yields has only 14.96% variability, only slightly more than that of the Central Plain. Overall the North East may be seen as a region of low but consistent rice yields; this is illustrated by the smaller impression made by the severe drought of 1967 compared to the North and the Central Plain (Appendix III.7).

The Central Plain on average experiences a higher percentage of crop loss than the North East, 8.71% as against 7.1% (figure I.6 and Appendix IV.1). In the fifteen years 1951-1965, only in three did the North East have the highest percentage of crop loss, while the Central Plain had the worst figure in ten, and the South in two (Appendix IV.2-7). In terms of the dominant cause of damage, the North East experienced eight years of flood and seven of drought; the South, not a major rice region, showed a similar split, but the North and the Central Plain were dominated by flood (table I.5). The equal numbers of flood and drought years emphasise the variable nature of the environment. Variation in the cause of damage, the incidence of crop loss, and the level of yields within the region are also high, but detailed work at an amphur level

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64 Prince Sithiporn Kridakara, op.cit., p.170.

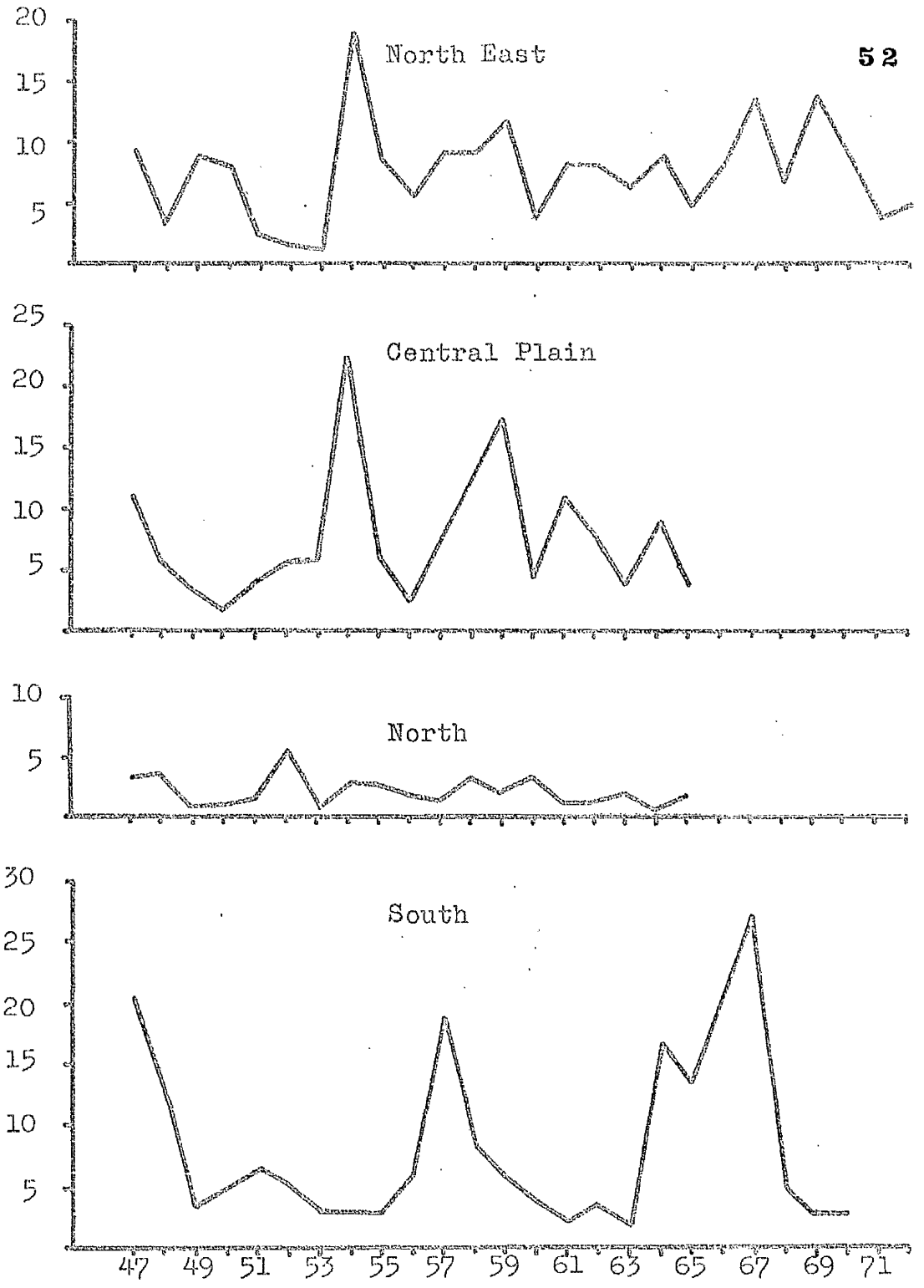

Fig. I.6 Percentage of Planted Paddy Area Lost, By Region (1947-70)

Source: Annual Reports on Rice Production in Thailand, Ministry of Agriculture, 1947-71

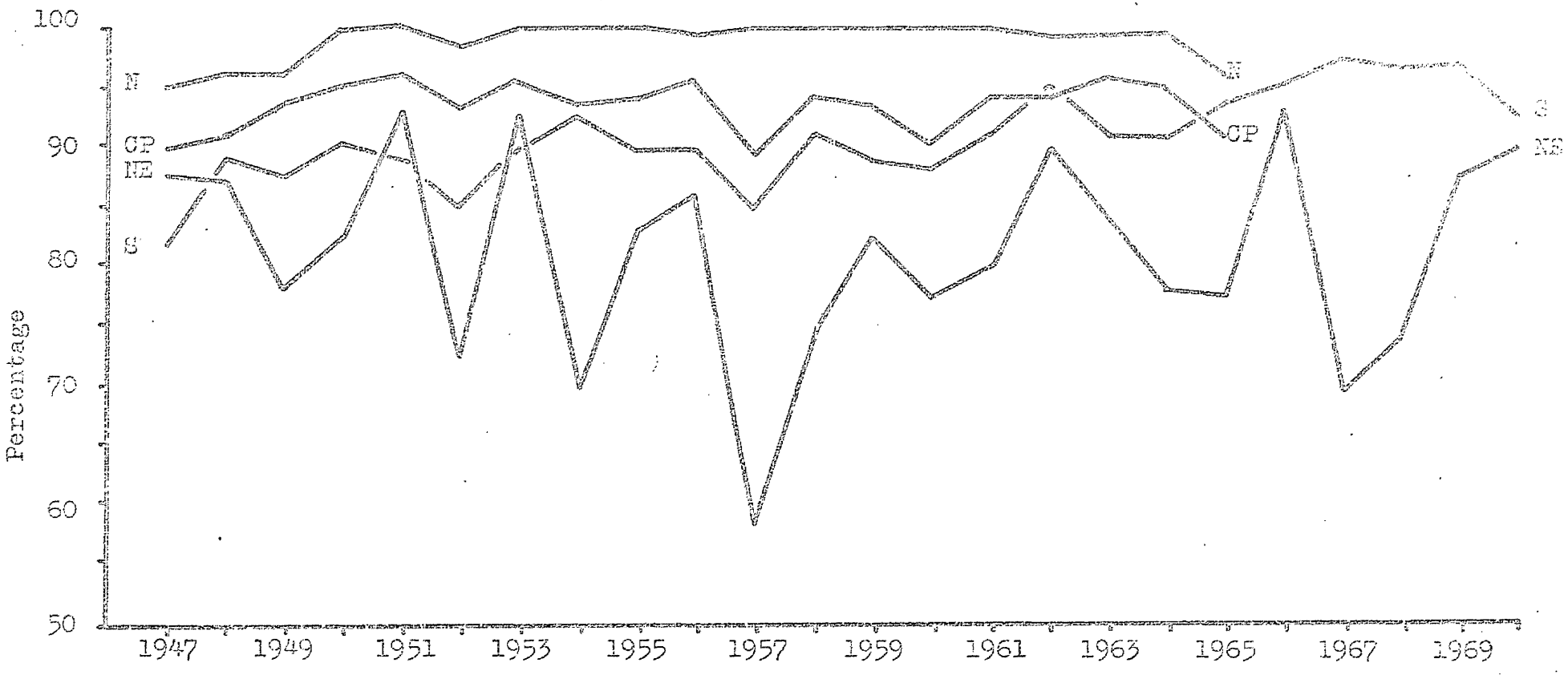

Fig. I.7 Percentage of Paddy Land Cultivated, by Region (1947-70)

Source: Drawn from data contained in the Annual Reports on Rice Production in Thailand, Ministry of Agriculture, 1947-71

N - North
CP - Central Plain
NE - North East
S - South

needs to be carried out.

The largest single cause of production fluctuation is the great variation in the area planted; this area is consistently a lower percentage than in the other regions (figure I.7 and Appendix IV.8). Pendleton observed that in many parts of the North East 60% to 70% of the paddy land could not be cultivated in any one year because of its marginal nature and the climatic conditions.[65] Flood or drought results in large unplanted areas; in the Central Plain more damage is experienced after transplanting, but in the more marginal North East climatic conditions rather than damaging the crop actually prevent it being planted. It is this fluctuation in planted area with climatic variations that is the distinguishing feature of North East agriculture and is the factor primarily responsible for variations in production and agricultural G.D.P.

The Economy of the North East

The poverty and relative backwardness of the North East have been frequently commented on by writers and visitors to the region since at least the turn of the century. Graham in 1912 described the region as "one of the most miserable imaginable".[66] Zimmerman in 1930 provided the first comparative data for assessing the relative poverty of the region.[67] As may be seen from table I.6, both in cash income and 'wealth' the North East was the poorest of the four regions with 29.74% and 18.88% of the Central Plain figures. However, before the appearance of the regional G.D.P. figures in 1960 more precise examination of the relative

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65 Pendleton, op.cit., p.73.

66 W.A. Graham, op.cit., p.9.

67 C. Zimmerman, op.cit.

TABLE I.5

DOMINANT CAUSE OF CROP DAMAGE BY REGION - 1947-1965

Dominant Cause of Damage	North East	North	Central Plain	South	Thailand
Flood	8	9	11	7	10
Drought	7	4	4	7	5
Other		2		1	
Total number of years	15	15	15	15	15

Source:- Calculated from Annual Report on Rice Production in Thailand, 1947-1965

See Appendix IV

TABLE I.6

REGIONAL LAND HOLDING AND FARM INCOME - 1930

	North East	North	Central Plain	South
Average Land Holding (Rai)	6.80	10.14	24.4	6.20
Average Family Cash Income (Baht)	83	176	279	126
Average Family Wealth (Baht)	460	1052	2436	897

Source:- C.C. Zimmerman, "Siam Rural Economic Survey", 1931, p.129 and Table II E-H

position of the North East than that shown by Zimmerman's figures is not possible. From 1960, N.E.D.B. produced detailed annual G.D.P. figures for Thailand by region and sector.[68] The latest published figures are for 1969, giving ten years of comparative data.

In 1960 the North East contained 34.28% of the Thai population but only accounted for 18% of G.D.P.; per capita income was only 51.7% of the national average (Appendix V.1).

The structure of the North East economy differs strikingly from that of Thailand, with primary production still accounting for 57.6% of G.D.P. as against 39.25% in the kingdom; of this agriculture contributed 52.7% (North East) and 33.54% (Thailand). Not only did the North East remain heavily dependent on agriculture, but within that sector 56.3% was contributed by one crop, paddy. Overall the North East economy relied for 24.31% of its 1960 G.D.P. on paddy.

The employment structure of the region, too, was dominated by the primary sector, although, as table I.7 shows, some swing away may be detected from 1954, the first year for which figures are available. Nevertheless, compared to the Thai economy as a whole, the North East has remained more heavily dependent on primary production, particularly of crops.

From 1960, the regional economy also grew at a slower rate than nationally (figure I.8 and Appendix V.2), so that the gap widened. In the decade 1960 to 1969, the North East's share of G.D.P. fell from 18% to 16.7%. Not only was the growth rate slower, but only the South, of the other regions, grew slower, and even here the growth was more consistent (Appendix V.2).

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68 All G.D.P. figures in this section are drawn or calculated, unless otherwise stated, from: N.E.D.B., "Gross Domestic Product of North East Thailand 1960-1969", Nov. 1970.

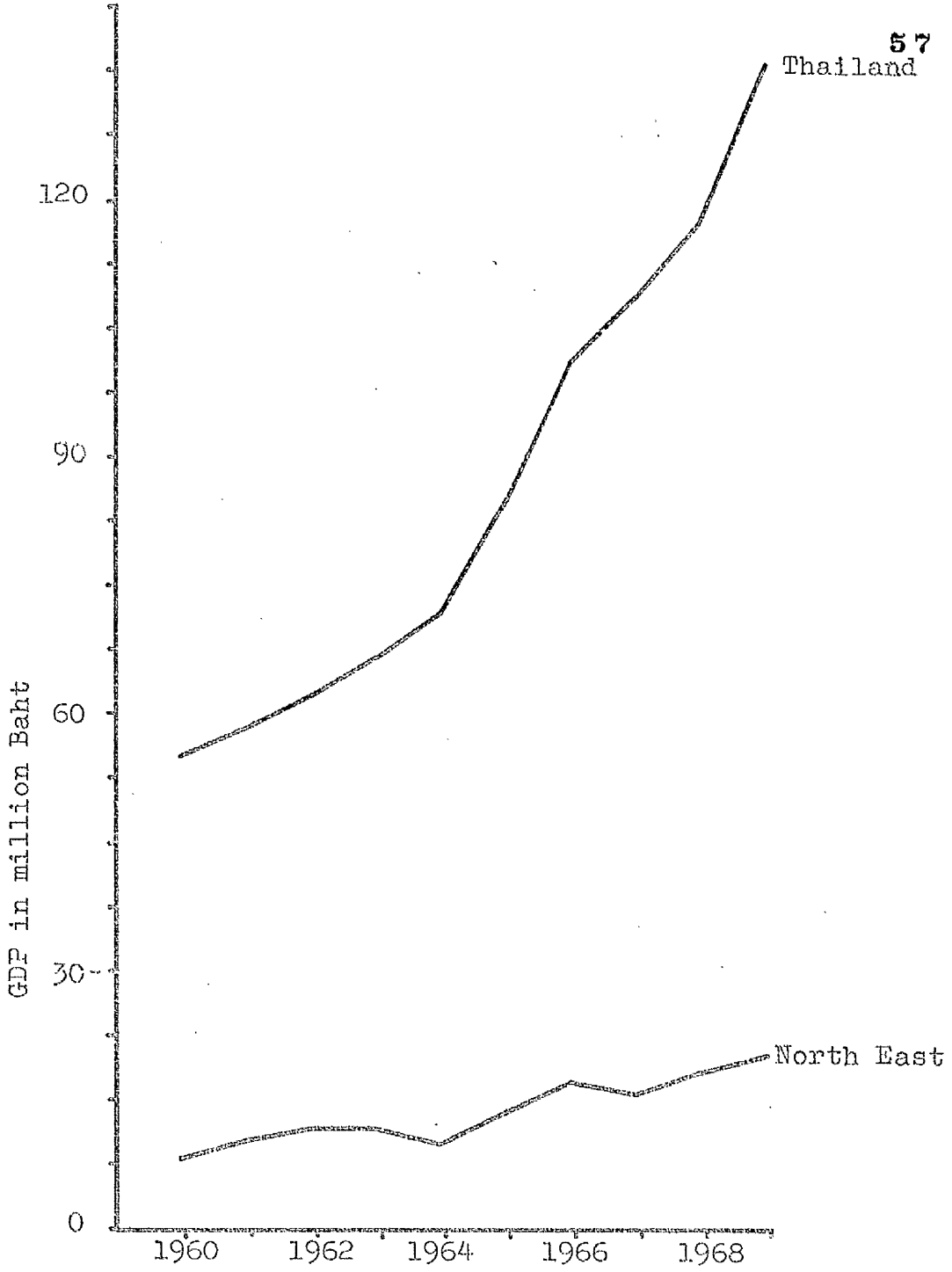

Fig. I.8 The GDP of Thailand and the North East (at constant 1962 prices) 1960-69

Source: Drawn from data contained in 'GDP of North East Thailand, 1960-69,' N.E.D.B., 1970

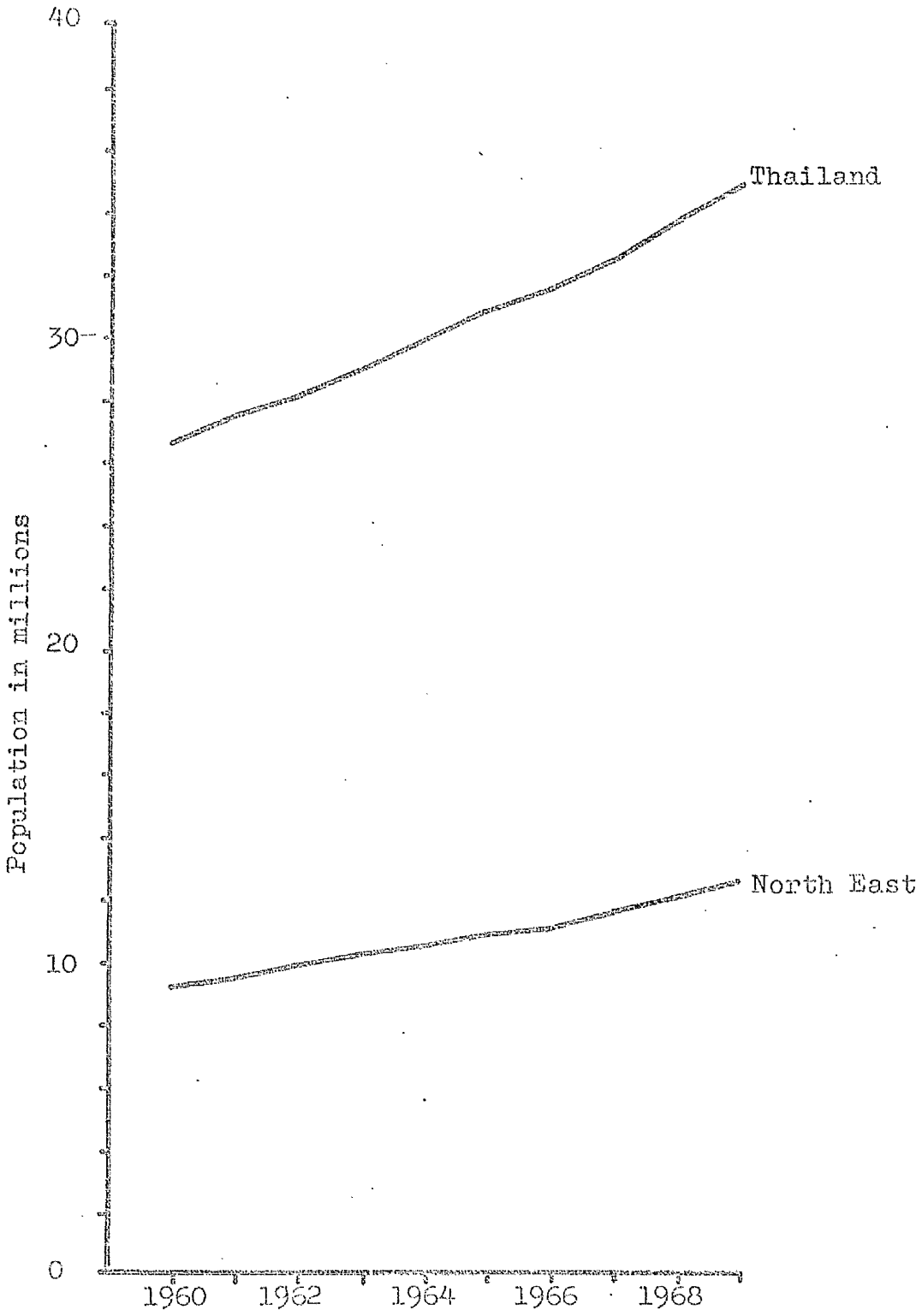

Fig. I.9 Population Growth, 1960-69, Thailand and the North East

Source: Annual Statistical Bulletin, Mekong Committee, 1968

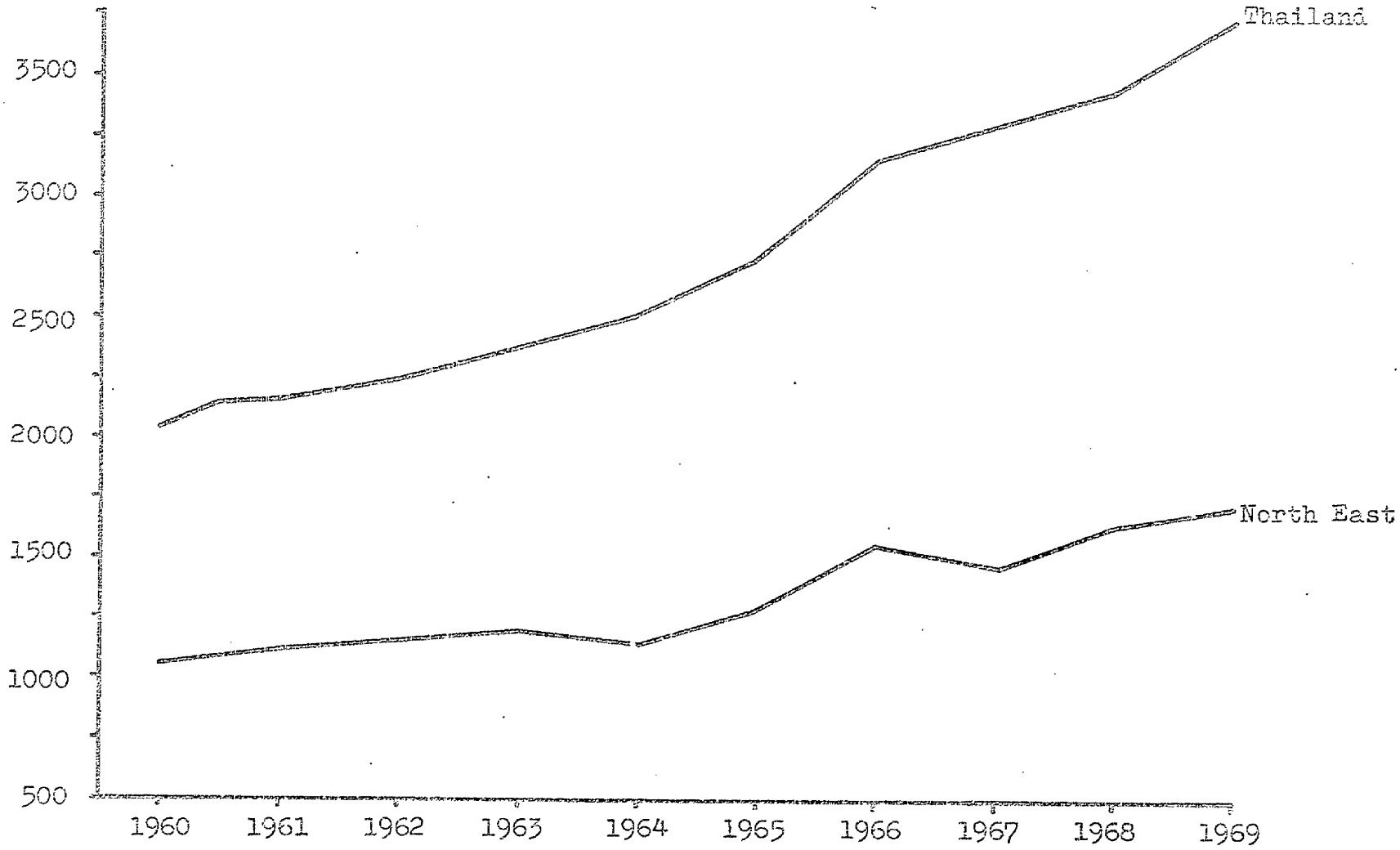

Fig. I.10 Per Capita GDP of Thailand and the North East, 1960-69 (at current market prices)

Source: Drawn from data contained in 'GDP of North East Thailand 1960-1969,' N.E.D.B., 1970

During the sixties, population growth, at 3.1% annually, was higher than the national rate of 2.9% (figure I.9). The combined effect of slower G.D.P. and faster population growth depressed still further the per capita income level. In 1960, North East G.D.P. per capita had been 1060 baht, 53.8% of the national average, and although by the end of the period it had reached 1700 baht it was only 48.49% of the Thai figure (figure I.10).

From 1960 onwards the North East received considerable government investment in an effort to accelerate the growth. Under the first Six Year Plan, 1961-1966, the region received 27.8% of the Development Budget and under the second, 1967-71 27.9%, a figure slightly less than the region's share of the population (table I.1). Fifty per cent of investment went into social infrastructure, particularly health, education and welfare. In view of the deficiency in social infrastructure, this was necessary, but such investment did not maximise regional income or employment effects.[69] Investment in transport and communications (respectively 32.6% and 34.2% of the two Plan Budgets) developed important infrastructure for development. In 1970, Wallace was able to conclude his survey of the North East transport network:[70]

"... the evidence appears to be convincing that transport ceased to constrain the economic development of N.E. Thailand generally, at some point in the decade of the 1960's".

The 16.7% and 14.4% respectively invested in agriculture has not as yet brought substantial gains to this sector. The heavy investment of 9.1% and 8.5% in irrigation must be seen as expenditure that will only bring long term returns, with completion of projects and full scale operation.

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69 Phisit Pakkasem, op.cit.

70 W. Wallace, "An Analysis of North East Thailand's Transport Network as a constraint to Economic Development", 1970, p.6.

TABLE I.7

NORTH EASTERN PERCENTAGE EMPLOYMENT BY SECTOR - 1954-1971

	Primary	Secondary	Tertiary
1954	88.0	2.6	9.4
1960	81.6	4.4	14.0
1966	79.8	6.0	14.2
1971	75.6	7.5	16.9

Source:- Fact Book on Man Power in Thailand, N.E.D.B., 1967.

TABLE 1.8

CHANGES IN SHARES OF NORTH EAST AND THAI G.D.P. 1960-1969 AT CONSTANT 1960 PRICES

	% G.D.P. in 1960	% G.D.P. in 1969	1960-9 Shift	% G.D.P. in 1960	% G.D.P. in 1969	1960-9 Shift
Crops	42.7	34.2	-9.3	28.3	21.2	-7.1
Livestock	9.6	9.0	-8.5	5.2	3.4	-1.8
Fisheries	2.0	2.0	-0.6	1.3	3.1	+1.8
Forestry	3.6	2.8	NO CHANGE	3.3	2.5	-0.8
Mining and Quarrying	0.2	1.2	-0.8	1.0	1.7	+0.7
Manufacturing	6.8	6.7	+1.0	13.0	16.4	+3.4
Construction	3.9	8.6	+4.7	4.8	6.7	+1.9
Electricity	0.2	0.6	+0.4	0.4	1.2	+0.8
Transport	3.2	4.0	+0.8	7.5	6.7	-0.8
Wholesale and Retail	13.2	14.3	+0.9	15.7	16.7	+1.0
Public Administration	4.3	4.4	+0.1	4.5	4.2	-0.3
Services	7.6	9.5	+1.9	9.6	9.9	+0.3
Banking	0.3	0.8	+0.5	1.9	3.6	+1.7
Ownership of Dwellings	2.4	1.9	-0.6	2.8	1.9	-0.9

Source:- Produced from 'Gross Domestic Product of North East Thailand 1960-69' Preliminary Report N.E.D.B. 1970.

The North East's share of investment was below its share of the population, and this in a region known to have a lower return on investment than elsewhere. The fifty per cent 'social capital' and infrastructure investment would not yield short term benefit, which was needed to enable the region to accelerate its growth to catch up with the rest of the kingdom. The North East thus continues to lag.

During the sixties the North East economy exhibited differential growth rates between the constituent sectors, and between these sectors and their counterparts in the Thai economy as a whole (table I.8). In general in this decade the Thai economy was shifting away from primary production, particularly crop and livestock production. The largest gain sectors were manufacturing, construction and financial services. During this period the North East paralleled the movement away from crops, with a decline of 8.5% (Thailand 7.7%). However, manufacturing increased its national share of the G.D.P. by 3.4%, but only half this in the North East. The slow rate of growth of the manufacturing sector here reflects the locational disadvantage for industry.[71]

In addition to the slow growth of manufacturing, the percentage of regional produce processed in the North East has fallen (table I.9).[72] Between 1962 and 1970 the percentage of North East livestock slaughtered within the region fell from 22.8% to 13.2%; in 1969 the North East produced 22% of Thailand's timber but only 4% of its timber products, the majority of wood being shipped to Bangkok for processing.[73] The 'pull' forces of the capital have worked against the development of even bulky product processing. In 1969 32.5% of the G.D.P. produced by the

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71 J.A. Cowan and R.S. Chalmers, "Economic Growth and Structural Change in North East Thailand", undated mimeograph, p.9.

72 Ibid., p.5.

73 Ibid., p.9.

manufacturing sector was accounted for by rice milling.[74] Such industry as has been located here is predominantly small firms; the 1964 Census indicated that only 0.25% of North East manufacturing establishments employed more than ten persons.[75] Only the gunny sack mills at Khon Kaen, Nakorn Ratchasima and Udornratchathani can be considered large, with the two latter employing over five hundred.[77]

Cowan and Chalmers' investigation of the North East economy revealed that manufacturing firms locating here had failed to grow at the same rate as similar concerns in other parts of the kingdom.[77] Thus although the region's manufacturing sector was geared to a low growth primary sector, particularly in agriculture and forestry which have performed less well here than in other parts of the state, there are also locational disadvantages relative to other areas. In Thailand as a whole, industry has been characterised by diversification and increasing dependence on imported raw materials, but in Khorat manufacturing has not diversified, and continues to rely on the limited raw materials locally available.[78] Despite the heavy government investment in infrastructure, industry has not been attracted. Observers in the North East have been increasingly pessimistic concerning the prospects for industrial development. Long considered that "the possibilities for expanding industrial development in the area seem extremely limited".[79]

In terms of sectoral growth rates the 'best performers' were construction, water and electricity supply, quarrying and to a lesser

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74 Thai Statistical Handbook, 1965, p.434.

75 Berger, op.cit., ch.III, p.1.

76 Ibid., p.1.

77 Cowan and Chalmers, op.cit., p.9.

78 Berger, op.cit., ch.III, pp.2-3.

79 J.F. Long et al., "Economic and Social Conditions among Farmers in Changwat Khon Kaen", Kasetsart University Economic Reports, No.22, 1963, p.14.

TABLE I.9

PRODUCTION AND PROCESSING IN THE NORTH EAST

	% of Total Thailand Production in the North East (1968)	% Processed in the N.E. (1968)
Livestock	34.0	10.2
Tobacco	16.0	4.1
Cotton	27.0	7.7
Kenaf	95.0	42.9
Sugar Cane	14.0	4.8

Source:- L. Berger Inc., "Agri-Business Promotion in North East Thailand", 1971.

extent transport and communications (Appendix V.3). All these were directly related to the government investment in infrastructure under the First and Second Development Plans. These 'growth sectors', though, only represented 14.4% of G.R.P in 1969, and the major elements of the G.R.P., crop production,,livestock, fisheries and forestry (representing together 48% of the G.R.P.) grew slower than in the kingdom as a whole and declined in their contribution to both Thai and local G.D.P., with the single exception of fishing, which maintained its position.

Cowan and Chalmers examined the economy using 'shift and share analysis',[80] and their findings reinforce the pattern outlined above. The changes in the contribution of the various sectors ('shifts') in their analysis can be seen in table I.8. Poor performance, according to Cowan and Chalmers, stems from rice, livestock, other crops and manufacturing, which, by growing slowly, resulted in a decline in the proportion of Thai G.D.P. produced in the North East.[81]

The rates of growth cannot be expected to continue, particularly in view of the reduction of the North East's share of the Third Plan Budget to 18%, and further reduction within the budget in the proportion spent on infrastructure (Appendix IV.4). Cowan and Chalmers' projections suggest that the poor performance of the region will continue, with the rate of growth falling further relative to the Thai growth rate.[82] They

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80 Shift and share analysis provides a convenient method of examining trends within an economy by looking at the contribution of individual sectors to the overall pattern of change. However, its use for more than purely descriptive purposes has been questioned. See in particular: F. Stilwell, "Further Thoughts on the Shift and Share Approach", Regional Studies, 4,4, 1970, pp.451-8; J.D. Paris, "Comments", ibid., p.491; and T.W. Buck, "Shift and Share Analysis - a guide to regional policy?", ibid.,pp.445-50.

81 Cowan and Chalmers, op.cit., p.11.

82 The growth rate estimated for the period 1970-6 is 4.9% per annum (ibid., p.13).

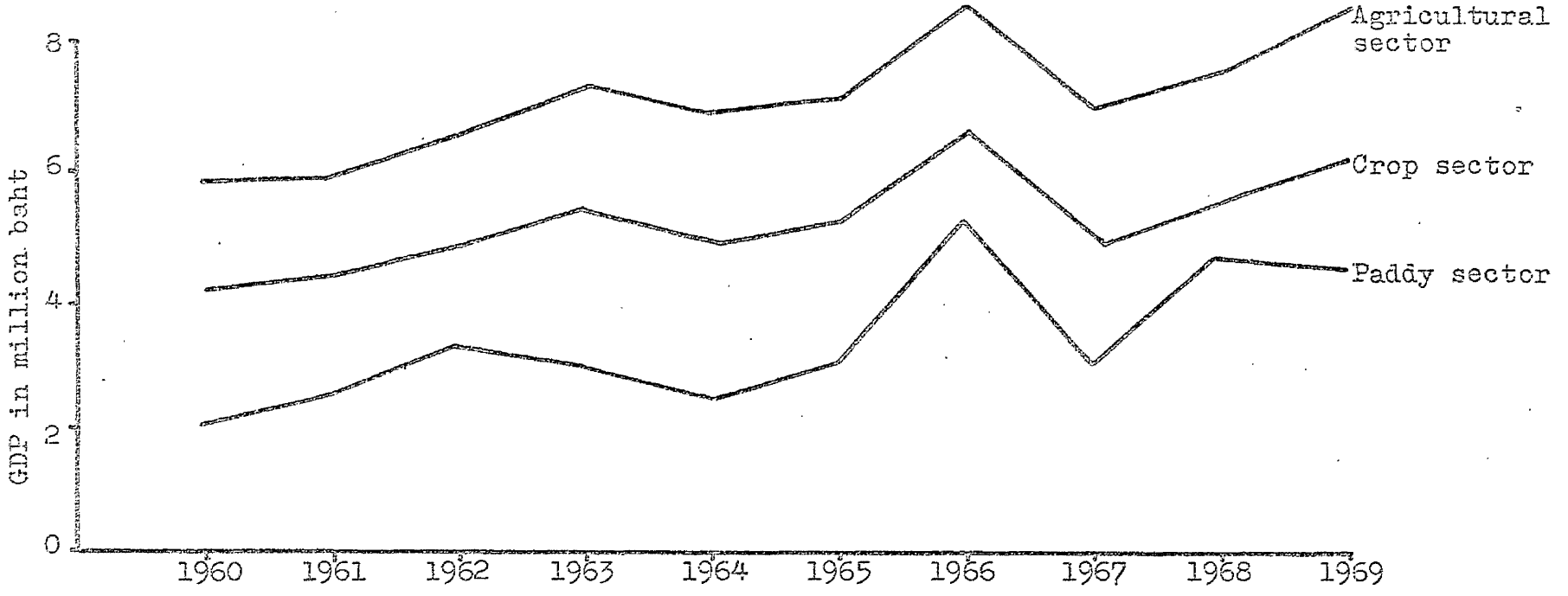

Fig. I.11 Fluctuations in the North East's Agricultural GDP, 1960-69

Source: Drawn from data contained in: 'GDP of North East Thailand 1960-1969,' N.E.D.B., 1970

see the weakness of agriculture as the key factor; "North East agricultural production is in crops with unfavourable access to markets and inputs and the sector has therefore grown more slowly than elsewhere in the kingdom".[83] The North East Planning Report similarly concluded that "production is entirely dependent on such unpredictables as rainfall and markets, particularly international, for its crops ... (thus) the annual growth rate of the North East economy has been very irregular".[84]

The Agricultural Sector

Against the background of the poor performance of the regional economy and the isolation of the agricultural sector as the weak point, it is convenient to examine the North East's agricultural sector.

Agriculture accounts directly for 75% of employment in the region; crop production alone, according to the N.E.D.B., occupying 60%, of which 35% is rice.[85] Between 1960 and 1969, agriculture declined in its share of the G.R.P. by nearly ten per cent, but continued to account for nearly half. The decline did not take place uniformly across the area. The overall decline was to some degree offset by increases in such changwats as Nongkai, Srisaket and Surin; here was a small expansion with the introduction of cash crops. In 1969, in eight of the fifteen changwats the agricultural sector accounted for over half, and in only two was it less than 40%. (Appendix V.5). Even the most highly industrialised changwat, Nakorn Ratchasima, relied on farming for 31% of its G.R.P.

Overall, like the Thai economy, Khorat's agriculture was dominated by rice in the 1960's, although crops like maize, kenaf and

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83 Cowan and Chalmers, op.cit.,p.11.

84 Berger, op.cit., Ch. I., p.8.

85 N.E.D.B. figures quoted in U.S.B.R., op.cit., p.II.69.

cassava increased from 1957 onwards, and despite "the unfavourable comparative advantage of the crop (in the North East) relative to the rest of Thailand".[86] Within the crop sector, rice in fact increased its share from 56.3% in 1960 to 64.2% (1969). This was a movement away from diversification, and further evidence of the weakening agricultural sector. (Appendix V.6).

The region's economy thus remains heavily dependent on agriculture, and within that sector on paddy. As may be seen from figure I.11, agricultural product has shown an uneven rate of growth, but paddy has fluctuated more. North East agriculture has fluctuated more than the country's; the percentage of national agricultural G.D.P. originating in the North East has varied from 20.9% to 28% In 1967, a year of widespread drought, the North East suffered proportionally more, and its percentage fell sharply (figure I.12).

In Thailand as a whole, agricultural G.D.P. has shown a very uneven pattern of growth (Appendix V.7), varying from 33% to -12.5% per annum; the figures for the North East are more variable still, and range from 44% to -43%. Thus the region's economy has rested on a sector demonstrably unreliable, and particularly erratic in the North East.

The region's agriculture is based on a poor and unreliable environment, so that expansion of the cultivated area has resulted in proportionally more marginal land brought into cultivation, compounding the uneven production levels and growth rates.

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86 Cowan and Chalmers, op.cit., p.11.

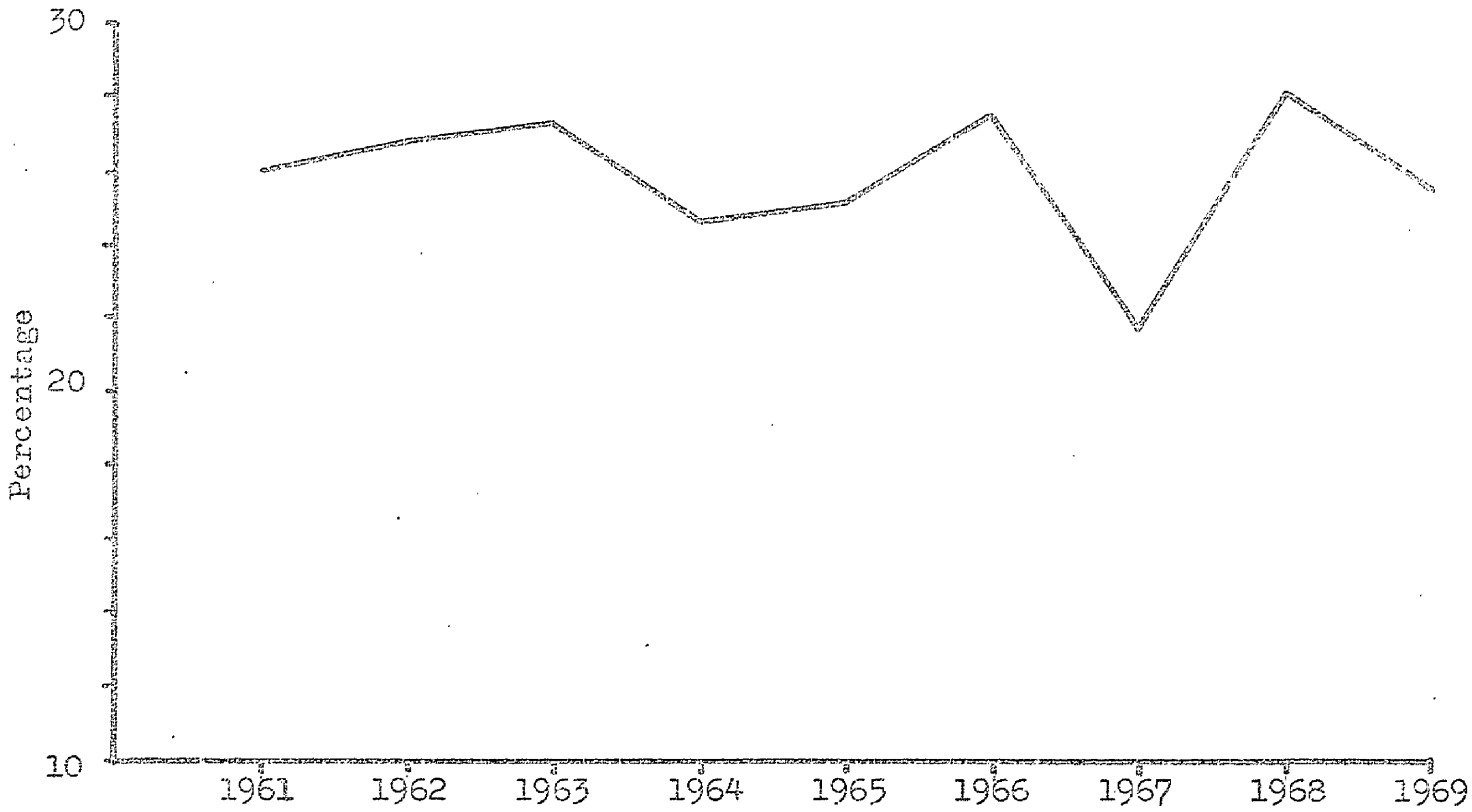

Fig. I.12 The Percentage of Thai Agricultural GDP Originating in the North East, 1961-69

Source: Drawn from data contained in 'GDP of North East Thailand, 1960-69, N.E.D.B., 1970

The Prospects for Agricultural Development

The preceding sections have emphasised the general backwardness and heavy dependence on rain fed agriculture in Khorat, causing violent fluctuations in the pattern of growth. Concern with the backwardness of the region was expressed as early as the 1920's,[87] but nothing positive in terms of development policy was initiated until 1950-55. As in Thailand in general, agricultural development was seen in terms of irrigation. In Central Thailand the beginnings of modern large-scale irrigation works were made before 1910.[88] Figure I.13 illustrates the late appearance of such investment in the North East compared with the other regions.

A beginning was made in 1951-56, with the expenditure of U.S. $27 million on some hundred small scale tanks.[89] Before this date, "public investment in the region was virtually nil".[90] By 1967, 144 of these tank projects were completed by the R.I.D.; they can provide water for 60,000 hectares. The R.I.D. has a goal of a thousand tanks for the North East.[91] Few of the completed tanks appear to function with any degree of success, and the estimate of 60,000 hectares is over-optimistic. In some cases, original design faults have resulted in too small a 'live' capacity for them to have any significance as a source of dry season irrigation water. Tanks of this type visited in 1970-1, 1971-2 and 1972-3 dry seasons were relegated to duck rearing and buffalo wallowing.

Larger tanks in changwats Mahasarakarm, Kalasin and Buriram

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87 See, for example, Graham, op.cit., p.9.

88 Ingram, op.cit., pp.82-84.

89 E.C.A.F.E., "Irrigation in the Mekong Basin", United Nations, 1973, p.12.

90 Ibid., p.12.

91 U.S.B.R., op.cit., p.I.5.

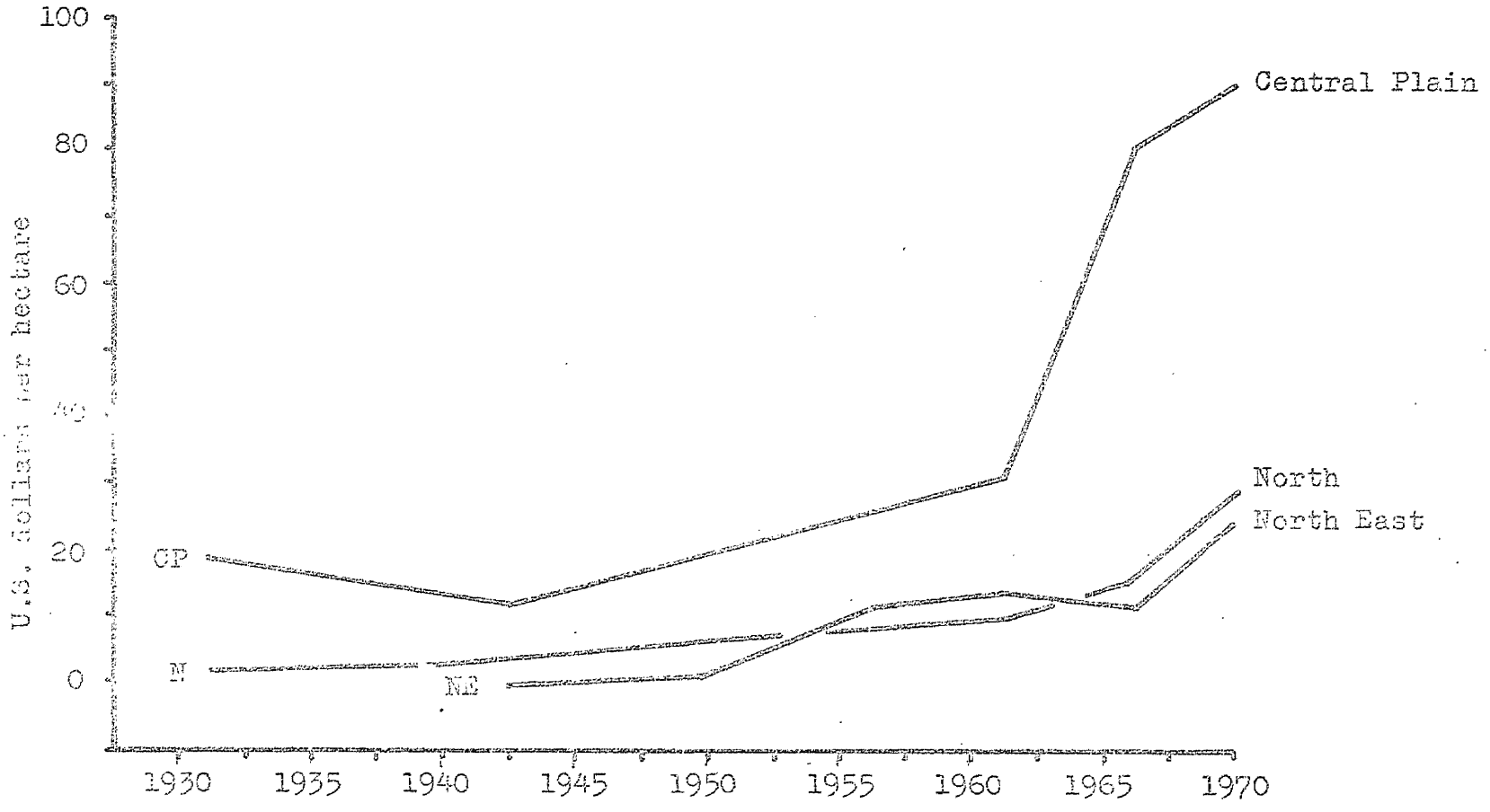

Fig. I.13 Investment in Irrigation Projects in the North, North East and Central Plain of Thailand, 1930-1970

Source: Drawn from data contained in: Mekong Committee, 'Irrigation in the Mekong Basin, a report by the Secretariat,' January 1973

which had concrete lined distribution systems were functioning only as supplementary sources in the wet season, either due to lack of 'live' storage capacity or failure of the farmers to adopt dry season cropping. There are at present studies in progress under the general direction of the I.B.R.D. to ascertain the potential of the tanks and to try to establish a policy for their revitalisation.

On a larger scale since 1950 investigation of the water needs and resources of the North East had led to the identification of the fourteen potential major projects (Appendix VI.81), with areas of at least 5000 hectares. In total these would irrigate 240,854 hectares on completion and produce secondarily 118 megawatts of power at a total investment cost of $162 million.[92] These tributary projects will be supplemented by 20,000 hectares of command area supplied by the main stream Pa Mong Project which will entail a dam across the Mekong some 20 kilometres upstream of Vientiane.[93]

There is, however, considerable confusion over the area potentially irrigable by the R.I.D. projects and that actually receiving water. The Mekong and the Pa Mong figures suggest a total of 300,854 hectares plus 20,000 hectares in the Pa Mong Project, however R.I.D. sources claim a potential of 420,000 hectares[94] and an area of 210,000 hectares at present (1970) able to receive irrigation water. A field survey in 1971 reported that the irrigated area was "considerably less ... than is shown by official figures".[95] The N.S.O. Crop Cutting Survey of 1968 indicated that only 5.1% of the North East paddy area was irrigated, some 144,000 hectares. Subsequent N.S.O. surveys indicate an

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92 Mekong Committee, "Tributary Projects in Thailand", 1970, p.1.

93 Ingersoll, op. cit., p.vi.

94 R.I.D., "Tables showing water resources in Thailand", Bangkok, 1970, p.25.

95 Berger, op. cit., Ch.II, p.26.

increase of 4000 hectares per annum, giving 160,000 hectares in 1972, only five or six per cent.[96]

During the period from 1960 to 1967, investment in North East projects absorbed almost 20% of the annual Thai budget of $1 billion. Berger estimated that 75% of the Ministry of Agriculture budget went to the R.I.D. in the period 1966-1971.[97] Since 1967 the R.I.D. budget has been cut back for reasons of economy and concern over the failure of irrigated agriculture to develop within the North East project areas.

The severe drought of 1967 revealed the limited impact that irrigation had made on the North East and underlined the need for further large-scale irrigation works if the aim of stabilising North East crop yields was to be realised. The 1967 Annual Report of the Bangkok Bank stated:[98]

> On all accounts, 1967 was a bleak year for agriculture as many crops were destroyed by the drought last year. The drought brought us to a realisation that our irrigation system is still inadequate, and that, despite half a decade of planning and infrastructural development, we have failed hopelessly to ward off any serious impact of natural calamity on agriculture".

Irrigation in North East Thailand presents considerable problems, and investigation of the policies necessary to get the irrigated agriculture functioning is necessary. There is at present an I.B.R.D. investigation, with a view to injecting funds into North East projects to improve the distribution system and stimulate the adoption of dry season irrigated cropping and stabilise wet season yields. That success can be achieved is demonstrated by the Lam Pra Plerng irrigation project which, in the 1972-3 dry season, suddenly produced 6,000 rai (960 hectares) of second crop rice, the largest development of second cropping

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96 N.S.O., "Annual Crop Cutting Surveys, 1968-72.

97 Berger, op.cit. Ch.II, p.24.

98 Bangkok Bank Review, Annual Report, 1967.

TABLE I, 10

EXTENSION OF THE NORTH EAST TRANSPORT NETWORK

	1965 (Km.)	1970 (Km.)
Rail	850	1,000
Roads		
Paved	500	2,832
Laterite (T.H.D.)	1,825	3,153
Laterite (Non-T.H.D.)	600	1,750
Other Laterite	400	795
	3,325	8,500
Tracks, Trails, etc.	14,000 km.	14,000 km.

Source:- W.M. Walllace, 'An Analysis of North East Thailand's Transport Network as a Constraint to Economic Development' June 24, 1970.

in the region.

While irrigation project development has been central to the plans for the area, there are a number of other projects and policies for the region which must be examined.

Transport and communications, the earliest development in the region, have continued to be the target for developmental policy since the war. Considerable effort has gone into the improvement of both inter- and intraregional linkages. International aid has been particularly evident in this sector, with the American financed 'Friendship Highway' the most notable of a series of roads constructed by Australian, New Zealand, British and American aid (table I.10).

In 1968 a 150 km. rail bypass of Nakorn Ratchasima was opened, the first rail construction in the North East since the 1920's. The changwats of Nakorn Ratchasima, Khon Kaen, Udornthani, Nongkai, Buriram, Surin, Srisaket, and Ubonratchathani are now directly linked by rail, that is, seven of the fifteen changwats.

As Wallace has pointed out: "The North East was poorly served by highways and roads until the ... 1960's".[99] The development of the Friendship Highway and its extensions from the late 1950's, and the construction of 1825 miles of laterite connections resulted in all changwats except Buriram, Surin and Srisaket having all-weather links with Bangkok. By 1970, all fifteen changwats were linked in all weathers, but there are still (1973) deficiencies in the linkages between parts of the region itself.[100] Wallace's findings, however, suggest that, despite remaining gaps, "transport ceased to constrain the economic development of North East Thailand generally, at some point in ... the 1960's".[101]

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99 Wallace, op.cit., p.3.

100 There is, for example, no direct link between Surin, Buriram, and Nakorn Ratchasima.

101 Wallace, op.cit., p.6.

A number of studies have emphasised the role of transport investment in opening up this area to agricultural development and effecting significant changes in the prevailing land use pattern. The Friendship Highway has been attributed considerable influence in this respect.[102] It is likely that the expansion of commercial farming into areas of subsistence farming has been facilitated by transport development.[103]

The original heavy investment in North East irrigation projects was based on the idea of double cropping of high yielding rice, and the hope that diversification of land use could take place on land marginal for rice. This relied on the continuing buoyant international market for rice. Changes in the outlook for the world market brought some modification to this. By 1969 we find such policy statements as:

> "double cropping of rice ... should be discouraged except in highly justified conditions. Moreover, the investment in large irrigation projects which aims only at increasing rice production should be given less emphasis due to the unfavourable outlook for the demand for rice on the world market".[104]

Considerable effort has been put into the experimentation with improved rice strains and of alternative crops that could be grown within the irrigated area as either a main or dry season crop. There are a number of experimental farms in the region almost exclusively concerned with the problem of irrigated crop production. Work has concentrated on the agronomic problems associated with the production of irrigated non-rice crops. Little overall success has been achieved in establishing new

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102 P.J. Rimmer, "Freight Transport in Thailand," Paper read at the Seminar on Contemporary Thailand, 6-9 September, 1971, at Australian National University, p.1.

103 See, for an elaboration of this view, Nit Jittasatra, "The Economic Effects of the Khon Kaen - Yangtalad feeder road in North East Thailand", Unpublished M.Sc. dissertation, Graduate School of Engineering, Bangkok, 1970; and W. Owen, "Distance and Development", 1968.

104 N.E.D.B., "Agricultural Development Strategy for Thailand", Dec.1969, p.11.

crops, particularly the peanut and soya bean, at the farm level. It is at this level of implementation that little research has been done. It is clear that the primary and essential research into crop diversification and its adoption at the farm level is a vital corollary to the investment in irrigation project construction.

Given that at present only five or six per cent of the cultivable land is irrigated, insufficient effort is concentrated on the solution to the "land-use problems of the non-irrigated and in general marginal areas for rice production. A limited amount of work at Nong Song (in Nakorn Ratchasima) has gone into improved kenaf and upland maize, and at Tha Pra (in Khon Kaen) into kenaf, but little has come of the work. The attempt to introduce the improved, high-yielding, short growing season 'Daisy' kenaf in 1971-2 met with little success due to the lower resistance of the strain to drought and insects, and farmers reverted to the hardier 'native' variety, Chinese kenaf, after one season.

Only at Saraphee (Nakorn Ratchasima) has a specific upland crop development programme been attempted. Despite encouraging reports no similar programmes have been undertaken.[105] A low cost self-help scheme was initiated in tambon Saraphee in 1965. The development concentrated initially on unirrigated cotton, vegetables, mulberry, water melon, and later cattle improvement. While there is clearly potential for low cost farm improvement, even those concentrating on individual farms, little has been accomplished as yet. Such low cost schemes where the farmer is given a choice and provided with extensive advice and materials on request seems preferable to large-scale effort entailing conversion of the farmers receiving aid without their relisation that

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105 K. Janlekha, "A Survey of Socio-economic Conditions in a Rural Community in North East Thailand", The World Land Use Survey Occasional Papers, no.8, 1968.

they need it.

In the non-irrigated areas, livestock, the second largest component of the agricultural sector, offers a major prospect. At present livestock rearing is very much a side-line, with almost every farmer raising two or three water buffaloes for draught, and perhaps pigs and chickens as well. These animals are a traditional aspect of the economy; the North East has long been a major source of draught animals for the more commercial rice producing areas of the Central Plain.

There is both debate and confusion over potential for livestock. Platenius, working from the agricultural census for 1963, classified 64,165 rai (61.5% of the North East) as "forest and grazing land".[106] Berger suggests a figure of 50,000,000 rai as potential grazing land, but gives no real indication of how realistic the estimate is.[107] The large areas of scrub or open forest on the plateau, for example in Khon Kaen changwat, seem to have potential for stock rearing; the environment is more favourable than that of northern Australia. However, as in Khon Kaen, these areas have been regarded as negative areas, avoided by settlement, so that they are remote from villages which might develop their potential. This type of consideration probably reduces the area potentially open to stock exploitation without large scale clearance and specialist stock rearing settlement. The New Zealand Project at Borabue which attempted this proved uneconomic, and while it illustrated the suitability of the environment for animals it is not envisaged as forming the model for further development. Attention is now focused on scrub improvement using stylo, guinea grass and burmuda grass rather than costly pasture development.

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106 Platenius, op.cit., p.108.

107 Berger, op.cit., ch.II, p.29.

There is a need for investigation of livestock potential, considering such factors as the local, national and international markets for Thai meat. The latter is restricted because of 'blacking' of Thailand as an endemic foot and mouth disease area. If disease-free zones could be set up, there might be Japanese demand. According to F.A.O. projections the internal Thai demand for meat should increase at 4 to 5 per cent per annum.[108] It is accepted that meat demand is highly income elastic, and demand should increase as per capita income grows.

At present (1973) I.B.R.D. and F.A.O. are drawing up plans for a large-scale joint investigation of the livestock potential and prospects for the North East. There are a large number of organisations involved in the stock development within the region, both Thai and international.[109] Despite the number of active interested bodies, the field is confused, particularly as regards marketing and the village level production.

The main prospects for agricultural development are thus: irrigation; transport developments, particularly of village roads; upland crop programmes; and livestock. Previous studies have seen the poor performance of the North East in terms of the environmental hazards and the failure of the farmers to develop. There have been few studies

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108 F.A.O. Year Book, 1969.

109 For example: Khon Kaen University Farm, in association with the Australian Colombo Plan and the New Zealand Colombo Plan; North East Agricultural Centre, near Khon Kaen, in association with Kentucky University; Commercial and village pig farms at Amphur Sampran, Nakorn Pathom;Nong Po dairy development program; Thai/Danish Dairy Scheme, Pakchong; Thai/Danish Farmer Settlement Scheme; Department of Livestock Development, livestock and forage stations at Tabhwong, Tha Pra, Mahasaraham, and Ubon; Community Development Department/New Zealand Colombo Plan Pasture Station at Borabue; Co-operative Development Department Livestock Co-operative; and village upgrading cattle programs at Ban Khwao and Ban Lao Na Du.

looking at the rationale behind the present land use pattern. The Experimental Farm findings and the farm plans produced by agronomists pay little attention to the nature of the local farm economy. It is clear that despite the 'failure' of the area's agriculture, over the last thirty years significant changes have taken place in the land use and farm economies, which have not, to date, been examined in detail. Investigations of the processes that have operated and are operating may well give insight into the failure of the sector to accelerate its rate of development, and point the way to informed policies for the future.

The present study is an attempt to examine the nature, weaknesses, and reasons for the slow and uneven growth of the North East's agriculture, by reference to a small scale study. In particular the marketing aspects of the agricultural economy will be examined, to consider the fluctuations engendered by the market system in conjunction with the environmental fluctuations already outlined.

CHAPTER II

AGRICULTURAL CHANGE AND RURAL DEVELOPMENT

It is evident from the discussion of the economy and environment of North East Thailand in the preceding chapter that the agricultural sector is both crucial to the economy and the principal reason for the poor and uneven growth rates of the region. The problems of this sector are by no means unique to this region, and are shared by the agricultural sectors of many under-developed countries. Environmental poverty cannot be accepted as the complete explanation for a poorly performing agricultural sector, for there are many areas where the environment must be considered hostile, yet agriculture has performed well. Hodder has argued strongly against the equation of poverty of natural endowment with lack of economic development.[1] In North East Thailand, and many other parts of the world, the environment does constitute a problem for economic development, but there are a number of other factors that must be considered in determining reasons for the lagging of the sector and the policies necessary to stimulate advance.

Mosher has given as five main essentials for effective agricultural development: 1) efficient transport; 2) efficient market system; 3) new techniques; 4) access to supplies of new inputs; and 5) adequate incentive.[2] In addition he saw the provision of training, co-operatives and credit as applying important accelerators of the process.[3]

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1 W.B. Hodder, "Economic Development in the Tropics", 1970.

2 A.T. Mosher, "Getting Agriculture Moving", 1966, pp.9-10.

3 Ibid., p.8.

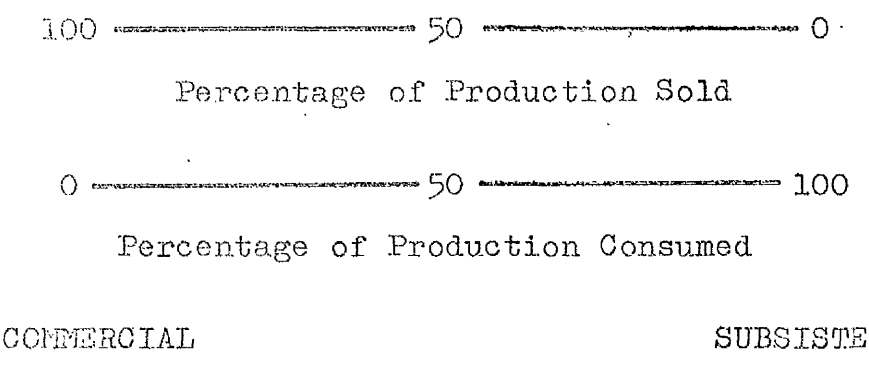

Fig. II.1 Wharton's Model

Source: after, C.R. Wharton, Jr., 'Subsistence Agriculture, Concepts and Scope,' in idem, ed., 'Subsistence Agriculture and Economic Development,' 1969, pp. 12-20

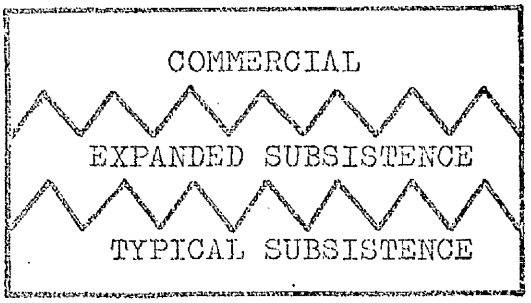

Fig. II.2 Penny's Model

Source: after, D.H. Penny, 'Growth of Economic-Mindedness Among Small Farmers in North Sumatra, Indonesia,' in Wharton, op. cit., 1969, pp. 152-61

Underlying all the writing on the development of agriculture is the implication that agriculture must "become less and less subsistence and more and more commercial, producing increasingly for the market".[4] Schultz has spoken of underdeveloped agriculture as "traditional agriculture" and considered the processes whereby it becomes "commercialised".[5] There are, though, many divergent views on the nature of underdeveloped agriculture, as well as the processes involved in its development.

The debate on the nature of subsistence agriculture dates back at least as far as Whittlesey in 1936.[6] In general, agriculture has been divided into subsistence, semi-subsistence, and commercial, on the basis of various criteria. Most have been variations on Whittlesey's dividing line between subsistence and commercial of fifty per cent of the crop sold; they have included: 1) 50% cash income from crop sales; 2) 50% of labour from non-family sources; 3) 50% of time or labour expended on crops produced for the market; 4) 50% of the inputs purchased.

More complex subdivisions, for example Symons' distinction between pure subsistence, subsistence plus earnings, quasi-subsistence with not more than 25% of working time devoted to cash crops, and semi-subsistence with 25-50% of time devoted to saleable crops,[7] have produced a plethora of alternative categorisations. Figures II.1 to II.3 illustrate the suggestions of Wharton, Penny, and Nakasima.[8] The Honolulu Seminar

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4 Ibid., p.6.

5 T. Schultz, "Transforming Traditional Agriculture", 1964.

6 D. Whittlesey, "Major Agricultural Regions of the Earth", Annals of the Association of American Geographers, 26, 1936, pp.199-240.

7 L. Symons, "Agricultural Geography", 1968, p.174.

8 C.R. Wharton, Jr., "Subsistence Agriculture, Concepts and Scope", in idem, ed., "Subsistence Agriculture and Economic Development", 1969, pp.12-20, reference p.13; D.H. Penny, "Growth of 'Economic-Mindedness' among Small Farmers in North Sumatra, Indonesia", ibid., pp.152-161, reference p.154; C. Nakasima, "The Economic Behaviour of Subsistence Farmers", ibid., pp.165-185, reference p.165.

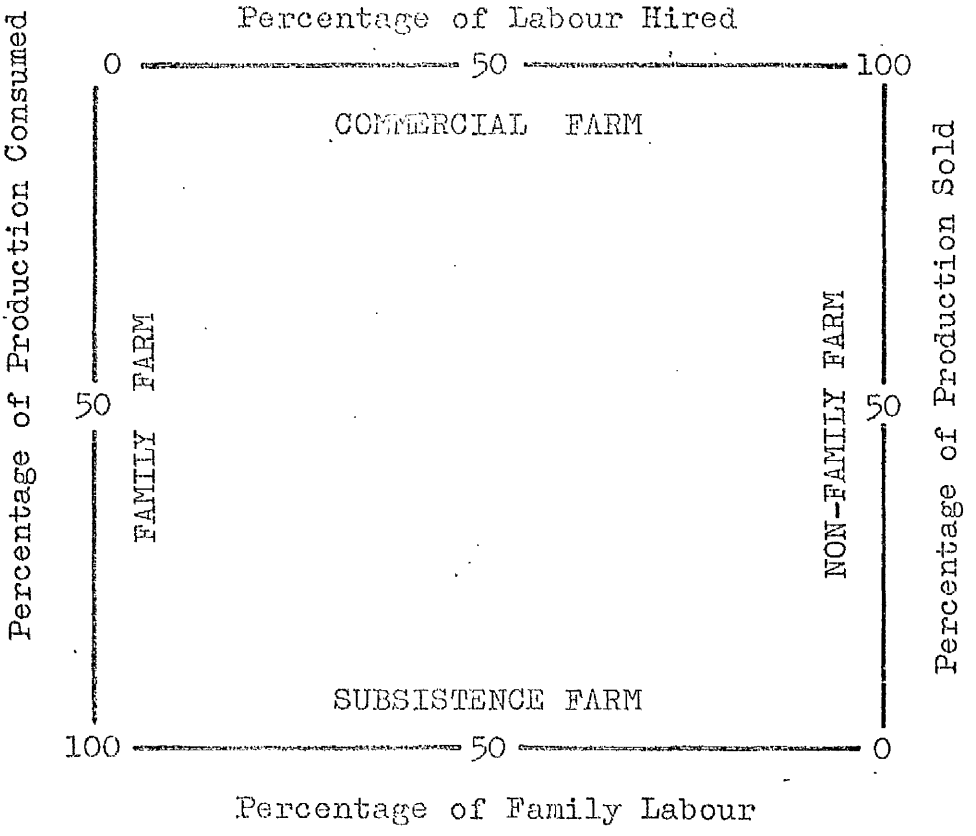

Fig. II.3 Nakasima's Model

Source: C. Nakasima, 'The Economic Behaviour of Subsistence Farmers,' in Wharton, op. cit., 1969, pp. 165-185

on Subsistence and Peasant Economies in 1965 effectively summarised the different viewpoints, and reveals the essential sterility of the debate.[9] Wharton's review of the concept of subsistence, concluding as it does that all farms lie on a continuum between "wholly subsistence" and "wholly commercial" sums it up.[10]

In studying agricultural development over time it is possible to see the progress of farmers from a subsistence situation to an increasingly market oriented one, but the drawing of any decisive magic line between the two economies tells us little, nor does it have any significance in the context of the development of the region's economy. Whittlesey was working on the establishment of criteria for classifying world agriculture and as such performed a valid task. in the context of examining the problems associated with a particular situation, little help is derived from such a typology of farms; the principal concern must be the processes.

The development of agriculture from the traditional self-sufficient agriculture to commercial, market-oriented production, in the South East Asian peasant farm context, may be examined most conveniently in five main stages which highlight the processes. The distinctive characteristics of the stages appear on figure II.4, but many elements can be seen to change in the form of continua rather than steps. The relationship between the stages is shown in figure II.5. In essence, the process is seen as one in which the land use and farm economy become increasingly attuned to, and dependent on, the market forces.

The 'traditional' stage (figure II.4) may be modified by the inclusion of a small element of surplus production which results in

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9 These papers are published in Wharton, op.cit.

10 Wharton, op.cit., pp.13-14, and idem, "The Economic Meaning of Subsistence", Malayan Economic Review, 8, 2, 1963, pp.46-53.

	TRADITIONAL	EXPANDED TRADITIONAL	MODIFIED EXPANDED	MODIFIED INNOVATORY	COMMERCIALISED
Ia PRODUCTION	Geared to household needs; some years deficit, some surplus	Expansion of production; larger, more regular surplus		New land use pattern	Geared to the market, with land use specialised
Ib Food Needs	All produced on farm or in the village →	Basic foods increasingly purchased →			All basic foods purchased
Ic Non-food needs	Produced on farm or in the village →		Increasingly purchased →		All purchased
IIa MARKET INVOLVEMENT	Barter →		Increasing involvement →		Full; all produce is sold
IIb Disposal of surplus	Barter, and store to even out good & bad yrs →		Increasing percentage sold →		All sold
IIc Cash Income	None	Increasingly regular and a larger percentage of the total value of production			Regular; used to buy all needs; 100% of value of production
III Farm Inputs	Family; may be supplemented by mutual help →	Hired labour and new inputs increasingly important →			
IVa RISKS	Environmental	Environmental and economic	Less environmental and more economic		Economic
IVb ADAPTATION TO THE ENVIRONMENT	May be poor because of need to provide a wide range of needs →				Maximum adjustment consonant with the market forces

Fig. II.4 Features of Agricultural Change

irregular cash sales, and the availability of small high value goods, such as gold or jewellery. A form of sterile saving may be present, with these items purchased both as an indication of wealth and also as a form of insurance against years of severe crop loss, when they can be easily converted into cash. Such practices are firmly established in the traditional society, and cannot in themselves initiate development.

The transition to the situation called here 'expanded traditional' is characterised by the incursion of a marketing system to absorb surplus production, and retail outlets for new consumer goods which replace and supplement the products of traditional handicrafts. The traditional production system is stimulated by this dual penetration of a distribution system for consumer goods and a collection system for farm produce, bringing in their wake new cash 'needs'; their interaction may be conceptualised as circular (figure II.6). In principle, there is a larger and more regular surplus created for the market, without any fundamental changes in the traditional agricultural practices. The lessening of self-sufficiency, however, results in a decrease in the variety of crops and activities geared to the satisfaction of subsistence wants, and resources will be released to aid in the expansion of those elements of the traditional economy which are being encouraged by the market economy.

From a situation of expansion of the traditional agriculture, two lines of development are possible. Either the traditional sector continues to expand, steadily displacing the traditional elements not in accord with the market forces, and being steadily modified by new techniques, varieties of seed, and non-farm inputs, or alternatively new crops are introduced which result in fundamental changes in the traditional land use patterns. Both the 'modified expanded' and the

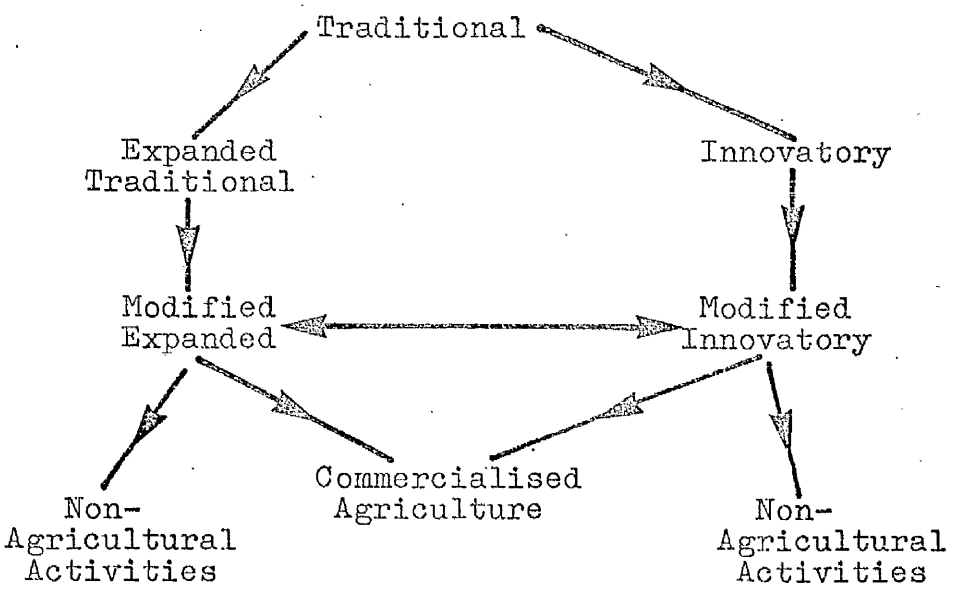

Fig. II.5 Lines of Agricultural Change

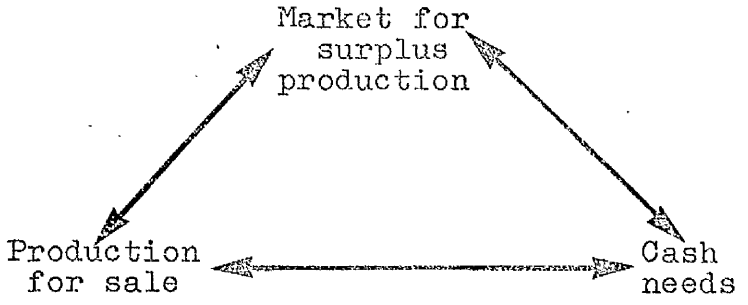

Fig. II.6 The Stimulus of the Market

'innovatory' forms arise from continuation of the stimulation at work in the original expansion.

Given that the basic elements of the traditional farming economy were well in accord with the environmental conditions, and the market for the crop(s) is stable, continuation along the lines of the original expansion will result in a steady increase in cash income and increasing movement away from the ancillary subsistence activities; farmers will become increasingly involved with, dependent on, and responsive to, the market. However, if the main traditional element is not able to produce the increase in cash income necessary for the new forms of consumption, because it is unsuited to the environment, market, or prevailing technology, only more radical changes will enable development to proceed. It may be that because of adverse conditions very little actual expansion takes place in the traditional crops even at an early stage, and radical innovations are important at an earlier stage in the sequence.

These two stages are not mutually exclusive, and innovatory elements may be grafted on to a slowly modifying traditional agriculture. The balance between the modified and innovatory sectors will depend on the relative degree of adjustment of the sectors to the market, environment and technology. If neither is well-adjusted, the dual nature of the system will continue, development will be slow, and a stage of specialised agriculture will not be reached. The introduction of, for example, new cash crops that are adapted to the market and the local conditions will result in rapid displacement of the traditional sector, relegating it to the subsidiary role of providing the basic food element for the household, and later displacing it altogether.

The adjustment of the land use by the market forces and technical developments should result in a better attunement to the

environment, and farmers should become less vulnerable to environmental variations. Investment in irrigation and flood control schemes, which result in a lessening of the exposure to hazards, accelerates the adoption of a market-oriented outlook. As long as crop production can be adversely affected by the environment, farmers will be reluctant to become heavily involved in production for the market, particularly since involvement in the market probably brings the hazard of economic fluctuations. Where farmers are faced with uncertain crop production and uncertain crop markets, the dual production system of traditional and innovatory forms is likely to continue.

The stimulation of cash needs, with a failure of the production and/or the market to make possible the satisfaction of these needs by on-farm production, will result in farmers seeking other non-farm sources of income, as the broken line on figure II.5 illustrates. Infrastructure investment, in irrigation schemes and roads, while aiding in the development of agriculture, by lessening dependence on the environment, bringing new outlets for sale and new retail outlets for consumer goods, also provides the opportunity for off-farm work on the construction schemes or by improving transport facilitates migration, seasonally or permanently, in search of off-farm income. A failure of the 'modified traditional' or the 'innovatory', or of the combined, dual situation to provide the desired cash income will result in turning to alternative sources of money. Because of the lag between infrastructure investment and its full functioning, there is likely to be a strong movement towards off-farm income sources, and once farmers have become accustomed to supplementing farm production by off-farm work they are less likely to revert to agriculture as a sole source of income once the infrastructure is completed.

In this study consideration is given to the process by which agriculture becomes increasingly oriented to the market, seeing agriculture as exhibiting greater or lesser degrees of responsiveness to the market forces, rather than offering definitions of 'subsistence' or 'commercial'.[11] This follows Hunter in his assertion that "the degree to which market forces have penetrated any area and the scale upon which they operate will be crucial factors in almost any question of agricultural development".[12] Underdeveloped agriculture is characterised as having little concern with production for the market, limited modern contacts, and poor levels of education. Our understanding of such agriculture is still inadequate for the formulation of policies to promote development.[13]

Morgan and Munton have written of the market as "undoubtedly one of the most potent factors in agricultural production".[14] But, as Abbott has pointed out, the vital role of marketing has only been recognised over the last fifteen years.[15] It has been increasingly recognised that "an efficient marketing system is of critical importance to a country under all conditions and at each stage in its development".[16] In 1969, the report of the A.D.B. Asian Agriculture Survey stressed very strongly the importance of developing marketing, both in terms of disposal of agricultural surplus and of rural markets for industrial goods, as a stimulus to agricultural development.[17]

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11 Spencer and Stewart have seen the economic processes as being changes in the "product orientation" and "dispositional processes". J.E. Spencer and N.R. Stewart, "The Nature of Agricultural Systems", Annals of the Association of American Geographers, 63, 4, 1973, pp.529-544, reference p.542.

12 G. Hunter, "Modernising Peasant Society", 1969, pp.91-2.

13 Mosher, op.cit., p.6.

14 W.B. Morgan and R.J.C. Munton, "Agricultural Geography", 1971, p.72.

15 J.C. Abbott, "Marketing Problems and Improvement Schemes", F.A.O. Marketing Guide, No.1, 1966, p.1.

16 Ibid., p.1.

17 A.D.B., "Asia Agricultural Survey", 1969.

Since the mid fifties, a large number of studies of marketing systems in both developed and underdeveloped countries have appeared.[18] While the underlying importance of an efficient marketing system is recognised, there is continuing debate over the relationships involved.

There is no clear cut answer to the problem of whether markets develop to dispose of agricultural surplus, or the development of a market will stimulate the creation of such a surplus, or land use changes which will result in new crops being produced for sale. Case studies suggest that both have occurred. In Uganda, subsistence banana producers who produce a surplus in good years are unable to market this surplus, because of the lack of a market system; that is, here, the surplus has not stimulated the growth of a market.[19] On balance, the penetration of the market economy, with its associated incentives, into a previously subsistence area, is likely to stimulate the development of surplus of traditional crops, and/or the introduction and production of new crops. The question however remains whether the market economy was attracted to the area by the availability of an initial surplus, or the area had a potential for a new cash crop, or the area was a potential market for industrial goods, or a combination of these.

Much work has gone into the attempt to quantify the relationship between farmers and market forces in agriculture at all stages of development. This work has resolved itself into a debate over supply-response and two schools of thought have emerged. Traditional-underdeveloped-semisubsistence-peasant agriculture is either posited as being constrained by traditional forces and values which, while allowing production for the market, preclude contraction or expansion of

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18 See: R. Bromley, W.B. Hodder and R.H.T. Smith, "Market Place Studies: a world bibliography", forthcoming.

19 Wharton, op.cit., p.6.

production or changes in land use in response to market forces, or it is seen to produce a considerable degree of response. Elaborate statistical analysis has been used by a variety of researchers in the field to produce evidence for a substantial responsiveness to market forces. Behrman has listed the large number of instances where evidence for elastic supply situations has been found for a variety of crops, and indicates the main contributors in the field.[20]

Drawing on such evidence, Schultz has asserted that the debate over supply response is "substantially settled".[21] Similarly Wharton maintains that "the overwhelming evidence indicates that subsistence and semi-subsistence farmers do in fact respond to economic incentives".[22] However, as Krishna has pointed out, there is still "a widely prevalent notion that peasants in poor countries do not respond, or respond very little, or negatively, to price movements".[23] All recent work has concentrated on proving, by the use of increasingly sophisticated techniques, that farmers do respond to market forces. Studies showing, or attempting to show, the opposite viewpoint, are apparently not forthcoming.[24]

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20 J.R. Behrman, "Supply Response in Underdeveloped Agriculture", 1968, pp.17-19.

21 T.W. Schultz, "Production Opportunities in Asian Agriculture", paper presented to the symposium on "Development and Change in Traditional Agriculture: focus on South East Asia", Michigan State University, June 20, 1968, cited by P.F. Bell and J. Tai, "Markets, Middlemen and Technology; agricultural supply response in the dualistic economies of South East Asia", Malayan Economic Journal, vol.14, no.1, 1969, pp.29-46, reference p.29.

22 C.R. Wharton, Jr., "Risk Uncertainty and the Subsistence Farmer", ibid., cited p.30.

23 R. Krishna, "Farm Supply Response in India-Pakistan; a case study of the Punjab Region", The Economic Journal, 73, 1963.

24 J.H. Boeke, "Economics and Economic Policy of Dual Societies, as exemplified by Indonesia", 1953, argues for the resistance of traditional society to economic forces, but there appear to be no recent quantitative approaches to this question that argue against elasticity of supply in underdeveloped agriculture.

Bell and Tai have criticised such work on supply response in terms of its application of western developed price theory to very different situations in areas of underdeveloped agriculture in general and of South East Asia in particular.[25] They conclude that the "existing statistical estimates of supply response are not good measures, being based on an inaccurate theoretical conception of agricultural relations in South East Asia..."[26] In the same paper, serious criticism is made of the techniques, data and conclusions of the studies. Krishna, in spite of the number of studies he has himself made, was expressing doubts over many of the techniques in use and the lack and poor quality of the data inputs as early as 1963.[27] In any study of supply response the non-price variables that affect supply must be fully understood and specified if meaningful results are to be obtained. Krishna emphasises this point, saying that "the more correctly we are able to specify the relevant non-price variables, the more significant are the net regression coefficients we get".[28] It is clear that failure to take account of, for example, environmental fluctuations, can completely obscure any supply response exhibited by the farmers in question. Many economists and econometricians have detailed the importance of market and non-market variables in determining variation in yields, inputs, area planted, and output. However, as Krishna has pointed out:[29]

> "The arguments between the protagonists of the price variables and the non-price variables ... appear to be barren and superfluous. In the context of ... supply response the net effect of price variables can be properly measured only if the non-price variables determining supply are well and properly specified, and vice versa".

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25 Bell and Tai, op.cit.

26 Ibid., p.30.

27 R. Krishna, op.cit.

28 Ibid., p.486.

29 Ibid., p.487.

In the last analysis, by examining the way farmers respond to market forces one is attempting to understand the whole decision-making process as it operates at the individual farm level. The studies of supply response in essence are looking at, and trying to explain, the aggregate decisions of a large number of farmers over a large number of years. It is interesting to note that Krishna concluded that "the problem of supply response can be better studied at the micro level with the use of household farm data".[30] Farming decisions are the result of the interaction of a large number of factors and as Ginsberg has recently said, "few economists have been prepared to deal with the host of variables that are present in the peasant decision taking model".[31] The cultural setting within which the peasant farmer makes his decisions is seen by Ginsberg as constituting a "fuzzy environment" which because of its complexity cannot be analysed with the range of techniques available.[32]

Despite these problems and the lack of suitable techniques, some insight into the complexity of the decision making model of peasant cultivators was given by Gould's simplified two crop analysis using linear programming.[33] In work still in progress, Ng is able to show that more complex and realistic analyses of farmers' reactions are possible

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30 R. Krishna, "Agricultural Price Policy and Economic Development", in H.M. Southworth and B.F. Johnston, "Agricultural Development and Economic Growth, 1968, pp.497-540, quotation pp.516-7.

31 N. Ginsberg, "From Colony to Nation: Geographical Perspectives on Patterns and Policies", Annals of the Association of American Geographers, 63, 1, 1973, pp.1-21, quotation p.3.

32 Ginsberg draws on the work of Bellman and Zadeh, which stresses the inability of "classical mathematical techniques" to deal with such complex systems as that of the peasant farmer. (R.G. Bellman and L.A. Zadeh, "Decision Making in a Fuzzy Environment", Management Science, 17, 1970, pp.3141 to 3164; L.A. Zadeh, "Towards a Theory of Fuzzy Systems", Report no.692, Berkeley Electronic Research Lab., 1969, pp.469-70.

33 P.R. Gould, "Man against his Environment: a game theoretic framework", Annals of the Association of American Geographers, 53, 1963, pp.290-297.

using the Simplex method of linear programming.[34]

Behrman produced an exhaustive study of supply response in Thailand at a macro level. His estimates of supply elasticity were made at the changwat rather than the national or regional level, and made use of a Nerlovian Supply Response model. Behrman concludes that "the results of this study very strongly support the hypothesis that farmers in economically under-developed countries respond significantly and substantially to economic incentives".[35] His study concentrated on four crops, maize, kenaf, cassava and rice, all crops which expanded in this area considerably over the last fifteen to twenty years; in the cases of maize, kenaf and cassava this expansion was from virtually nil since 1950. Behrman wished to establish quantitative proof of the response to market forces commented on by various authorities on Thailand, notably Brown and Platenius.[36] Others have seen the Thai farmers as exhibiting what Wharton referred to as "human inelasticity".[37]

Behrman's work is open to all the criticisms of supply response studies in general, and Bell and Tai particularly criticised it on the grounds that "the extremely high coefficients are partly explained by the crop and partly by the estimating technique".[38] It is important to

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34 R.C.Y. Ng, in work in progress in the Department of Geography of the School of Oriental and African Studies, making use of price, labour subsistence demands, cash needs, and probability of wet or dry years, has shown the allocation of resources to cassava, kenaf, and rice, using farm data for North East Thailand.

35 Behrman, op.cit., pp.2-3.

36 L.R. Brown, "Agricultural Diversification and Economic Development in Thailand: a case study", Foreign Agricultural Economics Report no.8, Regional Analysis Division, Economic Research Service, U.S. Department of Agriculture, 1963, cited by Behrman, op.cit., p.5; H. Platenius, "The North East of Thailand: its problems and potentialities", N.E.D.B., Bangkok, 1963.

37 C.R. Wharton, Jr., "The Inelasticity of South East Asian Agriculture: Problems of monoculture export dominance", Thai Agricultural Economics Society, Bangkok, 1962.

38 Bell and Tai, op.cit., p.32.

note the rapid growth of the crops studied by Behrman, and little work, if any, has appeared on the processes at work in this expansion beyond the fact that there was an export market for them. Throughout the period 1958-63, the prices of kenaf, rice, cassava and maize remained high, and there was a rapid increase in the area cultivated; there is no evidence of downward elasticity in the period after 1963.

There is in Thailand, as Krishna has pointed out in a more general context, both a need for, and a lack of, detailed farm level studies of how farmers react.[39] While macro studies such as Behrman's give some insight, they have serious weaknesses and leave us with little additional understanding of processes on which policies for development could be based.

Much of the discussion in this chapter has centred on the responsiveness of the farmers to market forces. The studies cited implicitly assume farmers who have some contact with the market economy. What is lacking is any consideration of the process by which they come to have initially any, and later increasing, contact with the market economy. Whatever the nature of the processes involved, two lines of development are apparent. As Hunter has pointed out, the introduction of "very limited cash cropping within a subsistence orientated system is a first step".[40] Secondly, the occasional surplus produced by a subsistence system may be tapped and, given the appropriate incentives, the farmers stimulated to attempt to create a more regular surplus. This expansion of the production of the basic subsistence crop is well illustrated by rice in South East Asia. Myint describes the development of peasant exports as "one of the best documented parts of the process of economic

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39 Krishna, 1963, op.cit., p.486.

40 Hunter, op.cit., p.92.

change in the underdeveloped world".[41] This documentation is, though, at the national level rather than at that of farm reactions.

In both instances what Boeke has termed a "dualistic economy" tends to result.[42] This dualism, as originally conceived, consisted of enclaves of western capitalism co-existing with a large traditional agricultural sector. In the South East Asian case, the incursion of either line of development outlined above has been via the development of an export market for agricultural produce which predated and by-passed the development of an internal market in agricultural produce. At the fram level it is possible to see a dual economy with a dual role for the farmer, and is a likely component of the model of agricultural development outlined above (see figures II.4, II.5 and II.6). In the case of the Malayan rice and rubber small holder, the farmer is within the subsistence system and in the international market economy. There is a shortage of studies dealing with the farm situation in such cases; the processes whereby the new cash crop is inserted and how it relates to the traditional crop, are undocumented.

Boeke, writing of the wider Indonesian economy, saw the western capitalist state as merely co-existing with the traditional and not stimulating development within it.[43] In contrast, Fei and Ranis see the western capitalist sector as stimulating the traditional sector, resulting in development and integration.[44] Myint has drawn attention to the expansion of traditional subsistence crops, particularly rice in South East Asia and cocoa in Ghana, into export crops, as taking place without any stimulus of development of technique.[45] Thus even when the

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41 H. Myint, "The Economics of Developing Countries", 1964, p.38.

42 Boeke, op.cit.

43 Ibid.

44 J.C.H. Fei and G. Ranis, "Agrarianism, Dualism and Economic Development", in Adelman and Thomas, eds., "The Theory and Design of Economic Development", 1966.

45 Myint, op.cit.

export sector penetrates through the traditional crop rather than a new cash crop, there may be little stimulus to technology. Examination at a low level within the agricultural sector, especially at the farm level, has not been apparent. We know little of how the dual sectors within agriculture interact, and whether the market oriented sector stimulates change in the traditional, or the two remain discrete systems.

Bell and Tai have stressed the role of middlemen in linking the traditional and market economies.[46] In particular in the South East Asian context they stress the role of the Chinese. The middlemen's role has been neglected, though clearly in supplying consumer goods and farm inputs, money lending and the transmitting of market information, they are of considerable importance.[47] Any understanding of farmers' decisions and the processes operating in the agricultural sector at the farm level necessitates a full understanding of the market system. It is necessary also to understand the marketing margins and regional disparity in farm gate prices in assessing the farmers' response to, and integration with, the market.

A fundamental weakness of studies such as Behrman's is that the prices used are not the farm gate prices, but the Bangkok wholesale prices.[48] Without an insight into the market system, market margins, and chain of relationship between Bangkok and the farm, it is dangerous to relate farmers' reaction to wholesale price movements in the capital city. There is no guarantee that the variations in export or wholesale prices will be passed on to the farmer, much depending on the 'perfection' of the market operating. There is a very basic deficiency in our knowledge

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46 Bell and Tai, op.cit.

47 Ibid., p.35.

48 Behrman, op.cit.

of the marketing system in peasant farming. Limited studies in Thailand have been made of the rice market and to a lesser extent cash crops and livestock.[49] But these do not integrate in any way and relate to the farm economy. Data on the marketing channels, from the farm and middlemen levels, are scant, and it is by no means clear whether the farmers are cheated by the market chains in general and the middlemen in particular, a belief exemplified by government statements.[50] The suggestions of cheating range from the use of non-standard weights and measures, to the exertion of monopsonistic powers which create a buyer's market that, with middlemen performing moneylending functions, restricts the farmers' possible range of outlets.

Lack of market information and pressing need for cash may well cause the farmer to accept a lower return for his crop than were he better informed, and could store his crop until a more favourable price prevailed. Local observers have seen the lack of storage facilities as a principle reason for a predominance of sales in the immediate post-harvest period.[51] The settlement of debts at this time, and the need for cash to travel and make purchases during the dry season when they are inactive on the land, seem to be of great importance in the determination of the size of these initial sales. However the whole question of storage

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49 The main ones are as follows: Ministry of Agriculture, "Marketing Margins and Marketing Channels of Major Agricultural Commodities in the North East Region of Thailand, 1963-4", 1964; idem., "Report of the Study of Market News Systems in the North East", 1965; Chaiyong Chuchart, "Production and Marketing Problems affecting the expansion of corn growing in Thailand", Kasetsart University Economics Papers No.8, 1962; idem., "An Economic Study of the Production and Marketing of Thai kenaf", A.S.R.C.T., 1967; idem., "Production and Marketing Problems affecting the expansion of kenaf and jute in Thailand", Kasetsart University Economics Papers, no.7, 1962 (in Thai); D. Usher, "The Thai Rice Trade", in T.H. Silcock, ed., "Thailand: Social and Economic Studies in Development", 1968.

50 M.R. Chakthong Thongyai, then Minister of Agriculture, reported in the Bangkok Post, 26 April 1969, said: "Middlemen must be eliminated to improve the living condition of the farmers ... Middlemen have caused economic instability among farmers".

51 For example, Khun Charoon, Chief Agricultural Extension Officer, Nakorn Ratchasima Changwat, 1972.

and timing of sale is not well-documented in Thailand. Consideration of the stage and sale pattern brings into focus the problem of on-farm consumption, for it is not clear what proportion of paddy is retained for household use and how much for sale. To date there has been no satisfactory study of the disposal pattem of Thai paddy. The two Ministry of Agriculture studies, one made in 1964 and one in 1970, provide little real insight. Field work in 1970-1 and a preliminary survey of paddy marketing suggested that the Ministry surveys were not only inadequate in detail but incorrect in such basic items as per capita paddy consumption (see chapter V).[52]

In this study, an examination is made of the North East's agricultural sector at the farm level in an attempt to understand more fully the problems of agricultural development in the region. The intention is to investigate the evolution of the present pattern of farm economy and land use and to examine in detail the interaction with the market economy. While it is possible to examine the present situation as a static phenomenon, more insight is gained by looking at the system as an evolutionary one. The agriculture of the North East, in spite of its poor performance, has not been static; considerable changes have taken place over the last fifty years, and particularly over the last twenty.[53] Examination of the processes of change that have operated and are now operating in the region give valuable guidance in the selection of policies which will stimulate further change in desired directions, as

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52 Ministry of Agriculture, "The Demand for Rice for Domestic Consumption", 1970; idem., "A study of rice production and consumption", 1964.

53 J. Ingersoll, 1972, personal communication

insight into the raison d'être for the present agriculture.

This type of study necessitates the collection of detailed farm level data that lays emphasis on the relationship to the market. In addition, details of the market system from both the viewpoint of the buyer and the seller are needed, in a form that can be related to the farm data. These types of data are not available in a usable form from secondary or official sources for North East Thailand.

A number of small surveys conducted by E.C.A.F.E., A.S.C.R.T., the Ministry of Agriculture, and R.I.D. in various parts of the North East over the last decade provide valuable ancillary data, but do not provide the detail or related marketing information necessary.[54] In the main, these surveys were done for particular short-term purposes, and are not related to the purposes of this study.[55] Prior to the mid-1950's, there is little of any note, and the most useful document is Zimmerman's 1930 survey, containing as it does information on land use, farm economy and farm relationship to the market.[56]

The studies of marketing channels listed in footnote 49 are of considerable use, although also dated and not related to the farm level situation. Usher's study of the rice marketing chain is the most useful and probably the most accurate.[57]

In terms of the background statistics of agriculture, Thailand does not suffer from a shortage; indeed in some instances there are almost too many. However, there is a general lack of co-ordination of

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54 For example: Chamlong Tothong, "Bench Mark Socio-economic Survey of Nong Wai irrigation area", 1969; J. Pilgrim, "Report on a study of the Lam Pao Irrigation and self help resettlement Project areas", 1971; R. Ben-Nun, "The Lam Dom Noi, Lam Nam Pao and Ubolrat Self Help Settlement Projects", 1971; J. Assen, "Field Observations on Agriculture in North East Thailand and Laos", 1968.

55 For example, Ben-Nun's survey of resettlement areas (op.cit.)

56 C. Zimmerman, "Siam: Rural Economic Survey", 1931.

57 Usher, op.cit.

statistical collection and much useful data are lost through aggregation or remain unpublished. The basic data collecting technique used by the Ministry of Agriculture for more than forty years works through the administrative hierarchy. Village headman are supplied with annual questionnaires which ask information on crop area, production and damage, and the number of livestock. These figures are forwarded to the Tambon seat and then to the Amphur, where they are aggregated before being passed to the Changwat, which again aggregates them before passing the information on to Bangkok; it is published either on a changwat, regional, or national basis.

Thus data below the changwat level are not readily available and can only be obtained by direct contact with the Amphur offices. Aggregated data collected in this way inevitably contains a considerable error margin. Any figure, as well as being aggregated two or three times, is likely to have been hand copied a similar number of times. Examination of individual changwat data frequently reveals serious omissions.[58] In the last analysis, much depends on the energy, efficiency and knowledge of the individual village headmen. Each has to be able to estimate the various areas of crops and the number of livestock.[59] The village returns obtained in the course of this study appeared to be at least of the correct order, but the abilities of the headmen concerned were of a fairly high order.

In spite of these weaknesses, cautious use can be made of the low level statistics. It is, though, a neglected side of investigations

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58 In 1972, the amphur figures for changwat Kalasin indicated no crop damage in amphur Yangralad, while conversations with the amphur Agricultural Officer and village headmen suggested that flood damage had been considerable in that crop season.

59 Until 1973, when retirement at sixty became obligatory, headmen were likely to reach an age when their efficiency in returning estimates was likely to be impaired.

in Thailand and surprisingly few people, even Thai officials, are aware of the type of data that can be made available if one goes to the Amphur level.

This well-established pattern of statistical collection was severely questioned, following the publication of the 1963 Agricultural Census. Some examples of the discrepancies between the Census figures and the Ministry of Agriculture figures are shown in table II.1. Thus for the areas of the major upland crops, the Census produced figures that were on average 44.39% of those collected in the traditional way.[60] Silcock's examination of the Census and Ministry figures led him to conclude that in the light of export figures, the Census was more reliable.[61] Concern over these discrepancies and the realisation of the need for reliable figures for the Development Plans caused the introduction of various sample-based Crop Cutting Surveys by the N.S.O. and later the Ministry of Agriculture Division of Agricultural Economics and the N.E.D.B. Ingram, however, expresses considerable doubts that the sample-based surveys are any more accurate than the traditional hierarchical data-collection methods. Indeed, he goes so far as to suggest that the traditionally collected figures may represent the picture more reliably in some instances.[62] It is highly likely that the sample sizes used in the crop cutting surveys are too small to yield good results other than at the national level.

The most serious indictment of Thai statistics is the uncertainty over rice production, the country's major export. Since 1965, the N.S.O. has published rice figures that are in the region of a

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60 Behrman, using probability, compared the 1963 Census with the Ministry of Agriculture figures (op.cit., pp.209-10).

61 T.H. Silcock, "Economic Development of Thailand", in idem, op.cit., pp.25-30.

62 J.C. Ingram, "Economic Change in Thailand, 1850-1970", 1971, p.242.

TABLE II.1

A COMPARISON OF AGRICULTURAL STATISTICS (FOR 1963)

Crop	Agricultural Census (a)	Ministry of Agriculture (b)	(a) as a % of (b)
Cotton	16,970	41,580	40.81
Kenaf	60,000	134,000	44.77
Tobacco	14,000	48,000	29.16
Soyabeans	15,000	30,000	50.00
Caster Beans	17,000	44,000	38.63
Chili	10,000	73,000	13.69
Groundnuts	38,000	67,000	56.71
Cassava	945,000	2,076,000	45.52
Total	1,115,970	2,513,580	44.39

Source: J.C. Ingram, "Economic Change in Thailand, 1850-1970", 1971, p.240.

TABLE II.2

RICE PRODUCTION FIGURES (in thousands of metric tons)

	Ministry of Agriculture	N.E.D.B.	N.S.O.
1958	5,570	6,478	
1959	7,053	8,285	
1960	6,770	7,873	
1961	7,834	9,058	
1962	8,177	9,591	
1963	9,279	9,856	
1964	10,029	10,800	
1965	9,558	11,070	
1966	9,218	11,070	13,500
1967	11,975	12,900	11,190
1968	5,595	10,700	12,499
1969	10,772	N/A	13,410
1970	13,346	N/A	13,270

Sources: Annual Report on Rice Production in Thailand, Ministry of Agriculture; Crop Cutting Surveys, N.S.O.; N.E.D.B. estimates quoted by Ingram, op.cit., p.242.

million tons a year higher than those of the Ministry of Agriculture. Similarly, the N.E.D.B. has produced production estimates working from export figures and estimates of national consumption (table II.2).

For development planning, discrepancies of this magnitude in the basic crop and export of the kingdom are serious. In any analysis of the North East, where environmental hazard produces striking variation in crop production, one has to consider fluctuations closely to ascertain whether they are due to statistical inaccuracy, difference in collection methods, or to actual changes in the production of the crop.

Price information at the farm, regional and Bangkok levels was of considerable importance to the present survey. The only published source at the farm level is that compiled by the Ministry of Agriculture's Market Section of the Division of Agricultural Economics. This is produced annually and only gives average monthly farm prices for the kingdom as a whole, which is of little consequence for analytical purposes. These figures are, however, collected on a monthly basis by means of questionnaires asking about the prices of 118 agricultural products which are distributed to leaders of farmers' groups.[63] This process gives an uneven coverage of the kingdom, for these groups are by no means uniformly distributed and it is not clear whether all the groups both receive and return these forms. In spite of the opinion current in the N.S.O. and the N.E.D.B. that the Ministry of Agriculture farm gate prices are highly inaccurate, an opinion based on the published aggregate figures, the individual changwat figures examined are found to be of the right order.[64]

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63 Farmers groups are organised by the Ministry of Agriculture for extension purposes; they are small in scale, normally being confined to farmers in a single village.

64 These hand-written returns were made available at the Ministry of Agriculture in 1973, but in a form that would take considerable time to decipher and copy. At present the aggregation of the data negates its usefulness.

In January 1972, the Department of Agricultural Extension (part of the Ministry of Agriculture) undertook a national farm commodity price survey, limited to a small number of key crops. The figures were collected weekly by the Agricultural Department of each changwat and were in effect the average prices offered by merchants and millers in the changwat seat itself. This survey was initiated because of the concern over the low rice prices of 1971, and it was thought desirable to monitor them. The realisation that rice prices were rising again resulted in the discontinuation of the survey in June 1972. No organisation or publication of this six-month study has appeared although some of the hand-written returns were made available to the author in June 1972.

Bangkok wholesale and export prices for almost all the major agricultural products are readily available from the various commodity reports.[65] Glutinous rice presents the only major problem in that regular Bangkok wholesale prices are not regularly available; export prices are, however, given in the Bangkok Bank Monthly Review. This deficiency of Bangkok price information for glutinous rice is a reflection of the crop's relative lack of export importance.

It is a reflection of the vertical organisation of Thai administration and the lack of horizontal contacts between ministries and even between departments within the same ministry, that duplication of data collection can take place. The Marketing Section of the Division of Agricultural Economics was apparently unaware that the Department of Agricultural Extension was collecting price data in 1972. Similarly the Livestock Report produced by the Division of Economics in 1970 was not known to the Livestock Department. There is, then, in general, a shortage

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65 The Monthly Reviews of the Bank of Thailand give monthly commodity prices for the last twenty years.

of knowledge about what is collected and where it is held, in part the result of a lack of a co-ordinating statistical office.

The data that appear in the Thailand Statistical Handbook are not necessarily the best available. In the case of rainfall, the R.I.D. with some 1300 rainfall stations, gives a better coverage than the figures obtainable from the Meteorological Department, which has only 71, one for each changwat.

Data deficiencies made it necessary for a detailed farm level socio-economic and land use survey to be made with additional survey work on the marketing chain and relationship of the farm to the market. The opportunity to aid the collection of, and to utilize the results of, such data came from involvement in the S.O.A.S. Lam Pao Land Use Project in the period 1970 to 1973. This ongoing five-year project organized under the auspices of E.C.A.F.E., S.O.A.S., and O.D.A., aimed at monitoring changes in land use and socio-economic conditions with the introduction of irrigation into an area of rainfed cultivation. The project was financed by the O.D.A. and forms part of British aid to E.C.A.F.E.; S.O.A.S. supplied the staff and handled the data processing.

The basis of the survey was the selection of seven villages representing the different proposed irrigation zones of the Lam Pao irrigation area in changwat Kalasin (map III.2). A detailed description of the study area and the villages is contained in chapter III.

It was envisaged that the villages, other than one already receiving irrigation water at the onset of the project in 1970 (Ban Na Chuak Nua) would gradually receive irrigation water over the five years. Thus villages with irrigation water, about to receive water, and without any immediate prospect of receiving water, could be studied simultaneously. While this has been achieved in principle, the speed of development of the irrigation scheme has been slower than anticipated, due to the

reduction of the R.I.D.'s budget since 1970. As a result by the fourth fieldwork season of 1973-4 only three villages (Na Chuak Nua, Ban Tum and Fai Taek) will be receiving dry season water, and in 1972-3, Na Chuak Nua was still the only one of the seven receiving water. A large area is, however, benefitting now from supplementary irrigation in the wet season in Na Chuak Nua and Fai Taek. In these selected seven villages a detailed questionnaire covering social, economic and land use aspects of the farm economy was administered to a 30% random sample.[66] Over the three years so far completed, thirty farms have been included in each year's sample; they will be removed from the random sample in year four to form case-studies. The increase in the size of the sample from 238 in 1970-1 to 243 in 1971-2 and 258 in 1972-3 is a reflection of village growth and the establishment of new separate households.

The field work period each year lasted from February to July. With the completion of the rice harvest in January, or in late years such as 1973, in February, one is able to collect data on the previous farm year in the traditionally slack period of the dry season. Early field work in December-January encountered difficulties in that farmers had not completed their harvesting. For the study of marketing an earlier survey would miss the peak sale period of January to March and present considerable analytical problems. There are also practical aspects of the timing; in the period between the two crop seasons, farmers are not occupied with farm tasks and are available for questioning; all the villages, too, are accessible by road at this time.

Additional data were derived from group interviews with farmers,

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66 The co-operation of R.I.D. in supplying one of their trained enumeration teams each year made possible the collection of detailed information for a sample of this size. All questions were checked in the field with both interviewer and interviewee present, to ensure a high level of data reliability.

and individual interviews with key villagers, for example headmen, vice-headmen, school teachers, abbots, and leaders of farmers' groups and co-operatives.[67]

In addition, land use and land tenure mapping has been carried out, using aerial photographs on the scale 1:3000 and 1:7000. This information as well as supplementing the questionnaire data provides reliability checks on the basic land use and land-holding questions.

In the chapters which follow, basic land use and socio-economic data were drawn from the main questionnaire survey conducted in 1970-1, supplemented where necessary by information from the 1971-2 and 1972-3 surveys which have not yet been fully analysed. Investigation of marketing practices and marketing channels in the study area was investigated by means of thirty detailed structured interviews with farmers and followed up by interviews with groups of farmers, headmen, vice-headmen, leaders of farmers' groups, and village school teachers. Village, amphur and changwat based merchants were identified and located by means of information obtained in the villages, there being no official registration of such activities. Use was made of the Changwat Industrial Register and the returns of the Changwat Taxation Department to locate rice mills, cassava chipping mills and slaughter houses, and to establish the capacity and annual turn over. The owners or operators of these processing plants in changwat Kalasin and adjacent Khon Kaen, where most of the produce from Kalasin goes, were interviewed. Information was obtained on areas, timing, and channel of purchase; milling ratios; annual capacity; channels of sale; and price levels. It must be

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67 The most crucial of these interviews were recorded by means of a cassette tape recorder and later translated by members of the team or Thai research personnel in the Geography Department at S.O.A.S.

emphasised that the whole question of profit margins and processing costs proved extremely difficult, and is outside the scope of the present study.

The size of the marketable surplus, particularly with regard to rice, could not be ascertained from the basic questionnaire because of the complexity of rice disposal by the farm. As a result, a 10% sample survey of the seven selected villages was made in 1971-2 to establish the level of household consumption and the level of marketable surplus prevalent in the study area. On the basis of this survey, relevant questions were added to the main questionnaire in 1972-3 and a more comprehensive 30% sample obtained.

The pattern, availability and cost of transport for village produce was established by interviews with farmers, headmen, and owners or operators of trucks, buses and pickups in the area. Use was made of maps made available by the R.I.D. to make a survey of the road surfaces, particularly in view of the wet season impassibility of certain roads.

Important background information and statistics were obtained from District and Changwat Agricultural Officers, who were generally well-informed about details of farming and the villages of the study area. Officials of the R.I.D. at Lam Pao, because of long contact with the area, were able to supply valuable information on physical background and settlement patterns as well as on irrigation. Statistical information was collected from sources in changwat Kalasin and in Bangkok.[68]

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68 These included: Changwat Kalasin Agricultural, Taxation and Industrial Registration Departments; the offices of amphurs Muang, Komalasai, and Yangtalad; the Ministry of Agriculture Divisions of Marketing and Agricultural Economics, Rice and Livestock Departments, and the Department of Agricultural Extension; the Bank of Thailand; the Royal Irrigation Department; the National Economic Development Board; and the National Statistical Office. Other sources of information included the Associated Scientific Research Council of Thailand; the International Bank for Reconstruction and Development, Bangkok Regional Office; Mekong Committee personnel and library.

The problems associated with the background statistical data have already been discussed, but there are additional problems in using and collecting field data, principally concerned with measurement, both of production and of area.

All measurements of production were given by farmers in terms of volume, the main units being the tang (twenty litres) and the khwien (2000 litres). However it is by no means certain that these units are fully standard. The only extensive survey of tangs and khwien was that by Zimmerman in 1929-30. The author's impression is of only a small variation in the units used in the study area, but confusion is caused by the use of the large tang (30 litres), as well as the ordinary tang. The use of 'peeps', converted twenty litre petrol cans, gives an important element of stability not present when Zimmerman did his work. The major problem is the conversion of units of volume to weight; for paddy the Thai convention is 10 kilograms to the tang, and 1000 kilograms for the khwien. However, fertilizer and manure present more difficult problems and a conversion factor has to be estimated for each case.

The normal measurement of area is the rai, of 1600 square metres; it is divided into four ngam or quarter rai of 400 square waa. Cross checking of the areas given by the aerial photograph survey was found necessary because some farmers had little clear idea of the size of their holdings. Rice seed bed areas were the least reliable figures because of the small areas involved and the difficulty of checking.

Labour inputs have been calculated in man-days, with no attempt made to standardise beyond the reported number of labour units involved and the total number of days reported for the activity.

Other notes on data problems, particularly under-enumeration, are contained in footnotes in appropriate places in the succeeding text. Overall informant reliability appeared of a high order, as indicated by the cross-checks made and the overlaps for 1971-2 and 1972-3.

CHAPTER III

THE STUDY AREA

Location of the study area

The Lam Pao Irrigation Project area which comprises the study area lies wholly within changwat Kalasin (map III.1), containing the majority of amphurs Komalasai, Muang and Yangtalad.

Kalasin is located at the geographic centre of the North East, and is generally typical of the region as a whole. Kalasin is at or near the regional average in terms of population density, settlement, climatic conditions, agriculture and economy (table III.1). The soils, topography and erosional history are typical, as will be discussed below. Kalasin is slightly drier than the North East as a whole, but is typical of the central part of the area. Rice yields are marginally above the regional average and per capita income somewhat below. With 97.0% of the paddy land planted to glutinous rice, the changwat is well above the regional average of 69.1%; however, the North East is typified as a region of glutinous rice production, and only the changwats of the south west (Chaiyaphun, Nakorn Ratchasima, Surin, Buriram and Srisaket) are significant producers of non-glutinous, and lower the regional average; the average for the other ten changwats is 89.7%.

While Kalasin is well served by road links, it is not located on the main Nongkai-Udornthani-Khon Kaen-Nakorn Ratchasima-Saraburi artery of trade and movement, nor the railway; it is thus more typical of the region as a whole, which is not markedly influenced by the heavy north-south trade movement or the traffic and employment generated by the

Map III.1 The Location of the Study Area

TABLE III.1

THE CHANGWATS OF THE NORTH EAST

Table III.1a	1969 GDP per capita +4	1960-9 Rate of growth of GDP +4	1960-9 Rate of growth of GDP per cap. +4	Average household size +2	Population growth (% rate) +2	Average holding size +1	Population density (sq.km.) +2
Kalasin	1345	11.4	7.7	6.6	2.99	20.4	68.25
Khon Kaen	1417	8.7	5.2	6.0	1.96	21.5	74.12
Chaiyaphum	1528	9.6	6.1	5.7	2.55	19.7	42.88
Nakorn Phanom	1420	12.2	8.7	5.7	2.53	12.8	55.76
Nakorn Ratchasima	1787	11.1	7.5	7.1	3.52	23.6	67.13
Buriram	1154	6.4	3	6	3.17	26.5	64.92
Mahasarakarm	1606	10	6.4	6.4	2.08	24.5	103.66
Roiet	1177	8.1	4.6	6	4.45	23.1	26.42
Loei	1742	10.2	6.3	6		8.1	
Srisaket	1018	12.2	8.4	6.4	2.77	19.8	87.7
Sakkonakorn	1743	11.9	8.3	6.0	4.43	19.4	55.35
Surin	1347	15.3	11.5	6	2.53	23.3	79.55
Nongkai	2631	8.9	5.1	5.9	5.58	17.3	51.51
Udornthani	1917	9.4	5.8	6.2	4.16	23.3	55.03
Ubonratchthani	1235	7.3	5.2	6.1	2.73	23.6	52.44
NORTH EAST	1477	9.4	6.7	6.2	2.95	21.6	68.96

Table III.1b	% of popln. agricultural +2	% area cultivated +1	Rural density per land cultivated +2	% land planted to rice +1	% paddy land glutinous +3	Paddy yield (kg.per rai) +3
Kalasin	93.0	19.0	2.43	96.6	97.0	184
Khon Kaen	85.0	28.0	2.35	94.8	79.6	169
Chaiyaphum	91.0	17.0	1.96	94.2	45.2	337
Nakorn Phanom	87.0	11.0	4.12	96.8	97.3	189
Nakorn Ratchasima	87.0	26.0	2.58	85.6	16.9	222
Buriram	88	30	2.58	92.5	18.9	166
Mahasarakarm	92	40	2.25	96.6	89.6	119
Roiet	93	45	2.26	97.5	92.4	127
Loei	90	4.0	3.63	95.7	99.7	355
Srisaket	94	31	4.06	96.4	35.7	131
Sakkonakorn	88	20	4	97.9	97	204
Surin	91	33	2.21	96.4	4.5	112
Nongkai	79	10	3.53	95.6	78.7	211
Udornthani	86	21	2.98	96.2	75.2	218
Ubonratchthani	88	27	2.04	96.2	93.8	143
NORTH EAST	88.7	23.8	2.8	94.8	69.1	175

Sources: +1 Agricultural Census, N.S.O., 1963. +2 Population Census, N.S.O., 1970.
+3 Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1965.
+4 N.E.D.B., "Gross Domestic Product, North East Thailand 1960-69", 1970.

American Military Bases at Nakorn Ratchasima and Udornthani.

The selection of the Lam Pao area permits examination of firstly the problem of agricultural development within the North East in the context of a highly representative area, and at the same time of the impact of irrigation, the main stimulus to development supported by the Thai Government and the International Agencies within the region.

The Lam Pao Irrigation Scheme

The Lam Pao scheme is the largest of the North East tributary irrigation projects discussed in chapter I. The scheme combines irrigation and flood control and it is hoped to add power generation capacity in the region of 104 million kilowatt-hours at a future date.

Initial work on the project began in 1949, with construction work on the 7.9 kilometre earth filled dam beginning in 1963 and reaching completion in 1968. The distribution system is being developed in two stages, stage one comprising 16,000 hectares and stage two 36,000. Completion of the distribution system has been severely retarded by reductions in the R.I.D.'s budget. Completion date was scheduled for 1972 in 1970,[1] and in 1972 the date was shifted to 1974;[2] at the time of writing, the Right Bank stage one is still not complete, and much of stage one Left Bank and stage two is still at the planning stage.

The completion of the dam and the diversion of the Lam Pao river is expected to reduce the incidence of flooding in the immediate flood plain area. Construction of drainage channels in the vicinity of the Lam Phan flood plain south of the Kalasin-Yangtalad road (map III.2) was begun in 1972, aimed at carrying off the extensive flood water from

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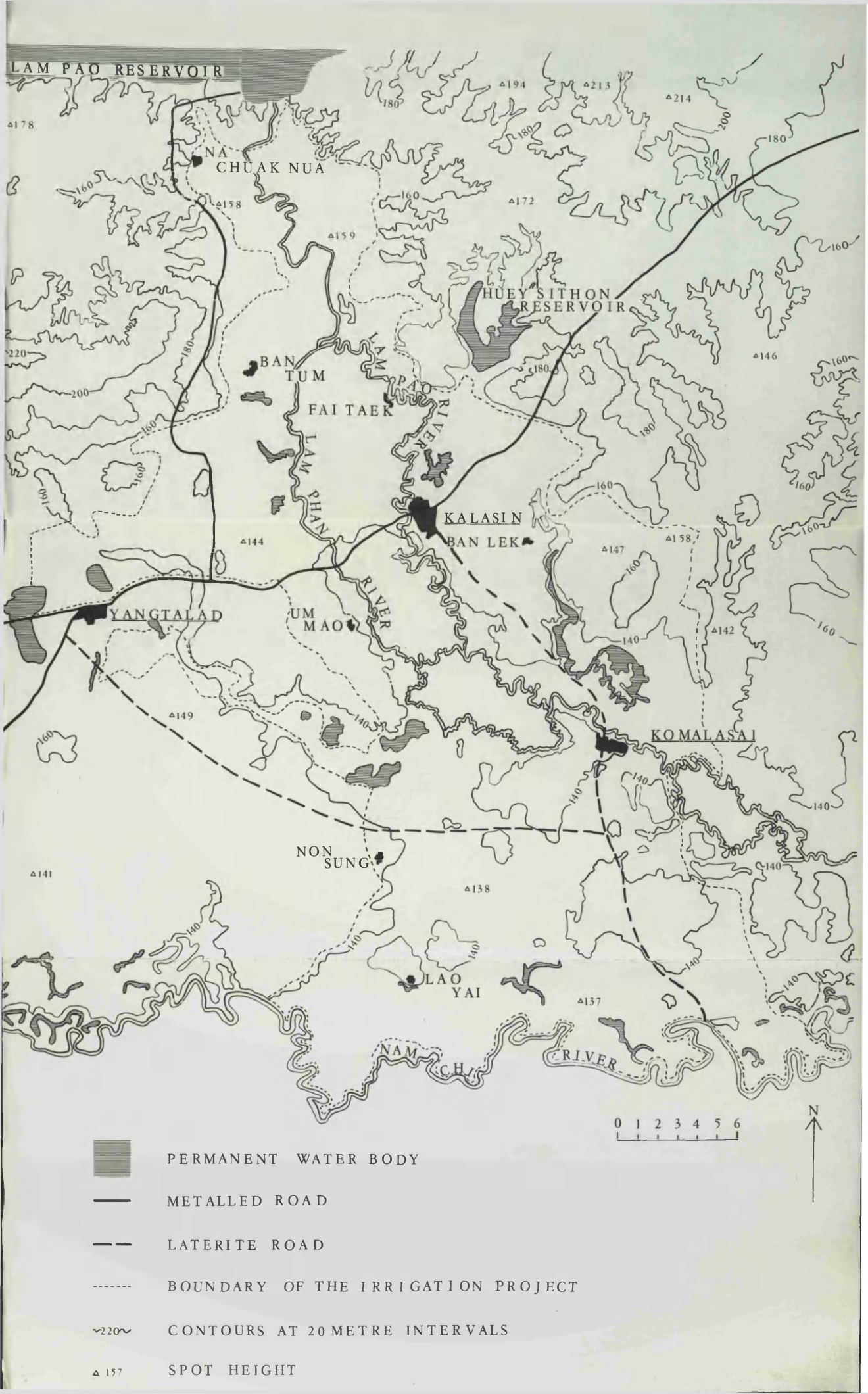
1 Social and Economic Studies Division, Mekong Committee, "Brief Description of the Lam Pao Project", E.C.A.F.E., Bangkok, June 1970, p.2.

2 Agricultural Statistics of Thailand, Ministry of Agriculture, 1972, p.136.


LAM PAO RESERVOIR
NA CHUAK NUA
BAN TUM
FAI TAEK
LAM PAO RIVER
HUEY SITHON RESERVOIR
LAM PHAN
KALASIN
BAN LEK
YANGTALAD
UM MAO
RIVER
KOMALASAI
NON SUNG
LAO YAI
NAM CHI
RIVER
0 1 2 3 4 5 6
N
PERMANENT WATER BODY
METALLED ROAD
LATERITE ROAD
BOUNDARY OF THE IRRIGATION PROJECT
CONTOURS AT 20 METRE INTERVALS
SPOT HEIGHT

Map III.2 The Lam Pao Area

this area. However, a subsidiary scheme of embankment and drainage will be necessary to reduce the flooding of the lower Lam Phan and of the Chi, which affect large areas of the southern part of the project area.[3]

The Physical Environment of Lam Pao

Physically the study area is typical of much of the interior of the Khorat plateau. Relief is slight, with elevations varying from 130 to 170 metres above sea level. Despite the small range of height, the topography can vary markedly within a short distance, and the surface is broken at intervals by both permanent and seasonal 'nongs'. The area is primarily one of alluvial deposition, with the solid geology making little contribution to the land-forms; only near the dam site and in the valley of the Huey Sithon are surface outcroppings of the underlying Khorat sandstone to be found.[4] It seems likely that the Lam Pao area, like the plateau in general, has experienced three major erosion series now represented by three distinct terraces.[5] These three terraces, together with the alluvial flood plain area of the southern Lam Pao and Chi comprise the four physical elements of the study area. The middle terrace, an important geomorphological feature elsewhere in the Khorat plateau, is "less important in this area and may be altogether absent in the southern part".[6]

On physical grounds, the study area may be divided into two distinct parts. A line drawn east-west approximately two kilometres north of the village of Ban Tum divides the northern third from the southern two thirds (map III.2).

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3 Chang Nukoon, R.I.D. Canal and Maintenance Engineer, Lam Pao, personal communication, 1972.

4 Vira Poomvises et al., "Detailed Reconnaissance Soil Survey of the Lam Pao Irrigation Project", 1963, p.2.

5 Ibid., p.2.

6 Ibid., p.3.

The area to the north of this line has broken relief with elevations reaching 189 metres. Throughout this area the three erosion levels are evident. In contrast the area to the south is generally low lying, being composed of large areas of low terrace and flood plain. A series of low ridges and knolls, varying from 4 to 20 metres above the general level, criss cross the area and represent the earlier, higher terrace. Both the Lam Pao and the Lam Phan are incised to a depth of one to four metres into the surface. The only major relief feature in the south is the ridge which divides the lowlands around Yangtalad from the rest of the area. South of the Kalasin-Yangtalad road, relief is very slight indeed with large areas of level, unbroken, flood plain.[7]

Soils, like those of the North East in general, are poor, though there is considerable variety. The four physical elements noted above exhibit distinctive soil characteristics: the flood plain areas have mainly clayey sediments, with lightened textures or even sandy soil in the river levees; the lower terrace is very level and contains a number of old river beds and the soil is generally clay with occasional pockets of laterite; the middle terrace is extremely sandy, though there is much variation in its composition, it being, for example, much less sandy in the Huey Sithon area; the upper terrace is composed mainly of sandy clay or sandy loam with a distinct red colour due to weathering, although the surface is less red and rather more sandy.

The soils of the Lam Pao area may, for agricultural purposes, be divided into four main groups, flood prone paddy series, drought prone, upland, and a miscellaneous group of associations and complexes.

Flood prone paddy soils are represented by the Chiangmai,

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7 The main elements of this section are drawn from the soil survey (Poomvises et al., op.cit.), which does not cover the whole area, supplemented by field observations and information supplied by the R.I.D. engineers at Lam Pao.

Phimai, Sithon, Kalasin and Udornseries. The Phimai series occupies the majority of the low-lying alluvial land of the study area. It is at its most extensive in the flood plain area of the southern Lam Pao and the Chi, but also occurs in small pockets in the valleys of the small tributary streams. In general these soils are composed of heavy black clay with a high humus content. Although potentially the highest yielding paddy soils of the area, the poor drainage and the high incidence of flooding make them unreliable. In places the annual flooding is so serious that the land has never been cropped and elsewhere along the Lam Pao itself paddy land has fallen out of cultivation due to an increase in the incidence and intensity of flooding.[8] Flood control and drainage schemes will enable additional areas of this soil series to be cropped and stabilise the yields on the existing cropped land. It is hoped that the completion of the Upper Chi scheme will reduce the flood hazard in the near future, though a supplementary embankment, barrage and drainage scheme will be necessary to eliminate fully the flood hazard in the extensive flood plain of the southern Lam Pao and Chi.[9]

The natural levees of the Lam Pao and Lam Phan rivers are mainly occupied by the Chiangmai series. Close to the rivers, it tends to be sandy, becoming less sandy and even clayey away from the watercourses. However, while the soils of the series are considered to be generally of good quality, and with their location close to the water, they have been used for dry season vegetable cultivation, their wet season use is limited by the severe flooding to which they are prone from their location.

Of only limited importance is the Sithon series, occurring in the floors of narrow tributary valleys in the north of the study area.

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8 This increase in flood hazard is due to increased run-off rates resulting from clearance of upland areas, and silting of branches of the Lam Pao (ibid., pp.7 and 9).

9 Chang Nukoon, personal communication, 1972.

These soils are lighter in texture and colour than the Phimai soils, and though less fertile also produce good yields when not damaged by flood. The Kalasin series is also of little importance, and is found in the low-lying areas along the main rivers and tributaries. In general the soils are located in marshy depositions and are inundated for much of the year. In consequence the Kalasin soils, with limited use for paddy, are relatively unimportant for agriculture. While of limited areal extent, the Udon series is locally of great significance because it is saline to such a degree that it is unsuitable for cultivation. The largest area is north east of Yangtalad, but there are saline pockets throughout the area.

The drought prone paddy soils are represented by the Roiet and Ubon series. Of the two the Roiet is by far the more important, being widespread on the level land of the low terrace formations, and it is the main series to benefit from the Lam Pao irrigation project. Most of the soils have an ironpan layer which results in waterlogging during the wet season, although in the dry season they dry out to such a depth that little or no plant growth is possible without irrigation. The Roiet soils are almost exclusively planted to paddy and although of low inherent fertility, they are not prone to flood damage, and produce yields in the range 150 to 250 kilograms a rai.[10]

The more limited Udorn series is mainly located on the higher transitional area between the low and the higher terrace. Although planted to paddy, it is of low inherent fertility and frequently water deficient; crop loss from drought can be severe.

The upland soils in the study area comprise the Khorat and

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10 Estimated by Poomvises et al., op.cit. The average yield for the Lam Pao area is 259.7 kilograms per rai in 1971 (see chapter IV).

Yasathon series. The Khorat series occupies a major part of the high terrace and is found in the lower one in small pockets, where it is generally heavier and more fertile. In general the Khorat series is sandy and of low fertility. Little or no paddy is cropped on the soils of this series, and until the mid fifties large areas were covered with open forest and used only for shifting cultivation and buffalo grazing. From the late 1950's large areas were cleared for kenaf, though in some places soil exhaustion has resulted in the abandoning of land and a reversal to open forest.

The upper parts of the high terrace are occupied by the Yasathon series; these soils are mainly red-brown and fine in texture. In the main they are more fertile than the Khorat and are planted to upland crops. The large areas of open forest remaining are high and distant from the villages.

There are a number of soil associations and complex series in the study area, however only the Roiet and Phimai association and an alluvial complex containing elements of the Chiangmai, Phimai, Kalasin, Khorat and Roiet series occupy a significant area. The former covers a large area between the Lam Pao and the Lam Phan dissected by the migration of the branches of the Lam Pao, and the alluvial complex forms an intricate pattern in areas adjacent to the two rivers. The majority of this complex is very fertile, but its agricultural use is limited by its topography, for it is exposed to flood.

Settlement on the Lam Pao Area

The physical sub-divisions of the Lam Pao area are reinforced by the settlement history. In general settlement and land clearance has followed the North Eastern pattern outlined in chapter I, with the earliest settlements located on the lower lying and more fertile alluvium

and spreading onto higher, less fertile and less reliable land as the population pressure in the core area increased.

Three main phases of settlement may be distinguished in the Lam Pao area, each relating to its physical structure. The earliest cores of settlement were located on the fertile alluvial soils, but on land that was above the flood level. Dry point sites, often on the lower terrace with fertile and generally reliable yielding land represented the earliest stage of settlement. The north and central part appears important at this stage; villages as old as 150 to 250 years are found. Since the village sites tended towards the edge of the higher land, especially the sides of the valleys of the Lam Pao and Lam Phan, they also generally have access to large areas of upland and uncleared forest.

The second phase in the occupation of the land is represented by the movement onto the less reliable lands of the lower flood plain area. Frequently these secondary sites took up more fertile land, but it was less reliable. Villages in the very level Chi flood plain and along the courses of the two main rivers are of this type, usually between 70 and 120 years old. Dry point sites, often of very low elevation above the flood plain, typify these villages; forest and uncleared land is limited and in some cases non-existent, being found mainly on outliers of the lower or middle terraces. From 1850 onwards, large numbers of Lao settlers moved into Kalasin, and many of these people founded settlements on the lower flood plain. Evidence of these Lao origins is found in place names,[11] the tendency towards larger, extended families and the dialect.

Settlement on the higher, less fertile, drought prone and less reliable lands, especially in the north, formed a third phase. Movement

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11 Ban Lao means village of the Lao, Ban Lao Yai the village of the big Lao, and Ban Lao Deng the village of the red Lao.

here reflected a widespread exhaustion of the more fertile soils. Active clearance of land for paddy in the area north of Ban Chiang Ngam and the foundation of new villages occurred until as recently as 25 years ago, and the area still retains a pioneer character. This represents the final stage in the settlement development of the North East, as the clearance of the last small area of forest will halt the long-term pattern of expansion of the cultivated area to accommodate population growth. Flood control in the south may result in areas adjacent to the rivers entering cultivation, but overall future expansion of the area of fields will be negligible.

There are some signs of population pressure in the older, core villages, particularly where they have limited access to upland. Overall in the Lam Pao area only 1.07% of land is uncleared forest, and this is mainly in the northern tertiary settled area.[12] Some of the older villages and some of those established during the secondary phase had restricted paddy land, and are now also suffering from population pressure. In general, though, there is little sign of this pressure, either in small holdings or fragmentation, and even the land that has been longest established as paddy field still retains many trees and ant hills, remnants of the clearing process.

Transport and Communications

Kalasin is served by metalled all weather roads that link the changwat seat with Khon Kaen in the west, Sakonnakorn in the north east, and Mahasarakarm in the south west. The Khon Kaen-Kalasin connection is by far the most heavily used and the most important for the economy of the study area, connecting as it does with the main artery of North East

12 Figure from the 1972 survey.

trade.

Prior to the building of the present road link in the late 1960's, there was no direct all-weather connection between Kalasin and Khon Kaen; the majority of traffic passed through Mahasarakarm. By 1968 the Kalasin-Khon Kaen traffic flow daily had exceeded 300 vehicles, the economic limit for a laterite road under the environmental conditions of the North East, and the present metalled surface was added.[13] A detailed study of the impact of the Khon Kaen road by Jittasatra indicated the economic advantage that has accrued to the area it serves. The penetration of the market economy has been aided, with increased contact, more retail outlets, and greater variety of consumer goods; the price levels received by the farmers have generally risen as transport costs have fallen and more merchants have come to buy and the amount of competition has increased.[14]

Within changwat Kalasin, all the amphur seats have been linked to Kalasin town by laterite all-weather roads. Yangtalad, because of its position on the route to Khon Kaen is connected by a metalled road. The roads to Sahatskan and Komalasai are of poor quality, and the former is under review by the A.R.D. for improvement and the latter is under reconstruction.[15] Yangtalad is linked to Roiet by a very high quality laterite road that has resulted in much of amphur Komalasai looking to Yangtalad as its service centre, rather than the amphur seat of Komalasai itself. Traffic from southern Komalasai flows to Kalasin via Yangtalad.

The lack of a bridge over the Lam Chi restricts contact between the villages of the southern part of the study area and Roiet, despite

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13 W. Smith, "Thailand: Transport Co-ordination Study Final Report", (draft) volume II, 1970, p.31.

14 Nit Jittasatra, "Economic effects of Khon Khaen-Yangtalat feeder road", unpublished M.Sc. dissertation, 1967.

15 Smith, op.cit, vol.IV.

the good quality roads and the regular bus service, as the clumsy ferry is a considerable bottleneck and effective barrier.

Within the study area there is a relatively dense network of dry weather, loose-surface cart tracks some 5 to 8 feet in width. These tracks, linking allthe settlements, have been cut haphazardly by the passage of khwiens (carts) and foot-traffic. Some tracks were developed as the land was cleared for cultivation, and others later. Examination of aerial photographs reveals where the roads and fields are in accord and where the roads cut across the field pattern, with farmers owning land on both sides.

The tracks vary greatly in quantity according to topography, soil type and the amount of maintenance. In the wet season many village tracks are impassable to vehicles for several months, though in the dry season few villages are inaccessible for three axle (ten ton) trucks. All seven selected villages in the study were served daily by pick ups and visited weekly by ten ton trucks to collect agricultural produce.

Village road repairing does take place, in some cases there is an annual 'Long Khaek' organised by the headman to repair the road. The very heavy rains of the wet season, coupled with the destructive nature of the iron rimmed wheels of the khwiens and the use of paddy soil as road repairing material, leads to rapid deterioration after repair. Roads on the sandier soils are generally of better quality and are more likely to remain passable throughout the year. In thesouthern part, the low ridges which comprise the remains of the upper terrace are characterised by three different land uses, settlement, roads, and upland crops; village roads as far as possible follow the higher areas, and where a village cannot be reached by an area of upper terrace, it is likely to be cut off in the wet season.

Improvements in the road system have been made recently under the auspices of the R.I.D., A.R.D., and the changwat authorities. The R.I.D. constructed an access road from the Yangtalad-Kalasin road to the dam site between 1955 and 1957, at first laterite but from 1969 metalled. This road cuts through an area of upland on the level of the middle or upper terrace with the paddy areas of the lowest terrace to the east. The new road was of importance in promoting the clearance of large areas of forest adjoining the road for kenaf between 1955 and 1963. Prior to the R.I.D. developments all the villages in the northern part of the study area were very poorly linked to Kalasin town. Since 1969-70, the changwat authorities have been willing to provide laterite and limited aid to villages to improve their roads. Um Mao and Ban Tum of the selected study villages have taken advantage of this, but the laterite surface has proved too thin, poorly compacted, and rapidly eroded by the passage of khwiens and the heavy wet season rainfall. In general at least four inches of laterite and preferably six inches are necessary to produce a lasting surface on paddy mud soil under the environmental conditions of the North East.[16] The village road surfacing examined in the study area seemed to be seldom more than one or two inches thick.

The R.I.D. has plans for a network of all-weather roads, running parallel to the main canals of the irrigation system, but as yet little has been done to execute these plans.

The wet season access to the villages is of considerably less importance than dry season. External contact and sales of farm produce are heavily concentrated in the dry season months of little active work on the land. During the wet season, farmers are preoccupied with growing the main crops, and little attention is given to links outside the

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16 T.E.T. Consultants Ltd., Personal communication.

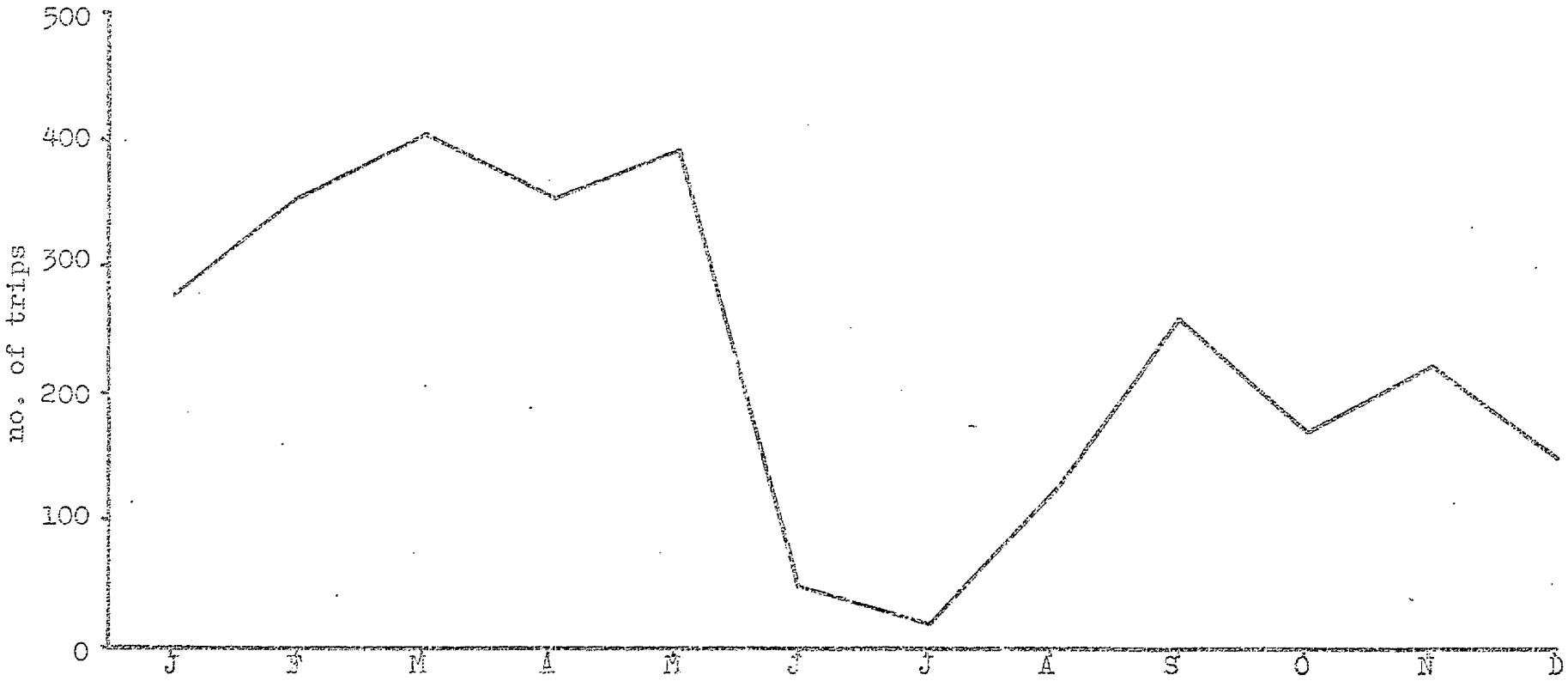

Fig. III.1 Trips to Kalasin town from the Lam Pao area by month (1971-2)

village. The marked fall-off in visits to Kalasin town during the wet season months is shown in figure III.1. Since access is good in the dry season, the transport of the Lam Pao area, like that of the North East in general, does not appear a constraint on development.

The Selected Villages

Seven villages were selected by the S.O.A.S. Lam Pao Project to represent the different physical, social and economic conditions prevalent locally, as well as the different stages of the irrigation scheme. One village had received water from the Lam Pao scheme in 1969 (table III.2), and the others were scheduled to receive water at different stages during the five years of the survey, from the 1970-1 to the 1975-6 crop seasons. Delays in the development of the distribution system have delayed the original programme.

The seven villages represent the different phases of settlement discussed above. Two villages are 150-200 years old, four 70-100 years, and one more recent, representing the primary, secondary and tertiary stages respectively. These proportions reflect the overall pattern of the Lam Pao area. Within these settlement classes, attention was given to size, location, ethnic composition, and socio-economic characteristics, so as to produce a set of study villages as fully representative as possible. Map III.2 indicates the location of the villages. Tables III.2 to III.5 summarise the main village characteristics and a brief description of each village follows.

1) Na Chuak Nua

This is the youngest of the villages, and represents the third phase of settlement, having been established some 25 years. It is situated in the higher and more broken northern sub-division of the study

TABLE III.2

VILLAGE CHARACTERISTICS

	Population	Area Cultivated	Age*1	Date of Scheduled Receipt of Water
Na Chuak Nua	124	2616.4	30-40	1969
Ban Tum	201	3477.1	200+	1971*2
Um Mao	112	2139.2	70-80	1972*2
Fai Taek	75	975.0	c.100	1972*2
Ban Lek	140	1946.0	200+	1974
Non Sung	124	2371.2	c.100	1974-5
Lao Yai	39	608.4	70-80	1975

*1 Estimated by village headmen

*2 All now overdue

TABLE III.3

LAND USE (% AREA)

	Field Crops	Orchard	House Plot	Garden	Fallow	Forest
Na Chuak Nua	79.69	0.16	2.44	0.16	14.23	3.30
Ban Tum	92.04	0.81	3.55	0.20	3.38	-
Um Mao	92.95	-	3.56	0.55	2.89	-
Fai Taek	80.89	10.43	4.72	0.59	3.35	3.35
Ban Lek	88.25	1.15	3.33	-	7.23	-
Non Sung	90.74	1.30	3.26	-	4.68	-
Lao Yai	88.53	6.66	4.88	-	-	-
Lam Pao Area	85.86	1.75	3.84	0.21	7.24	1.07

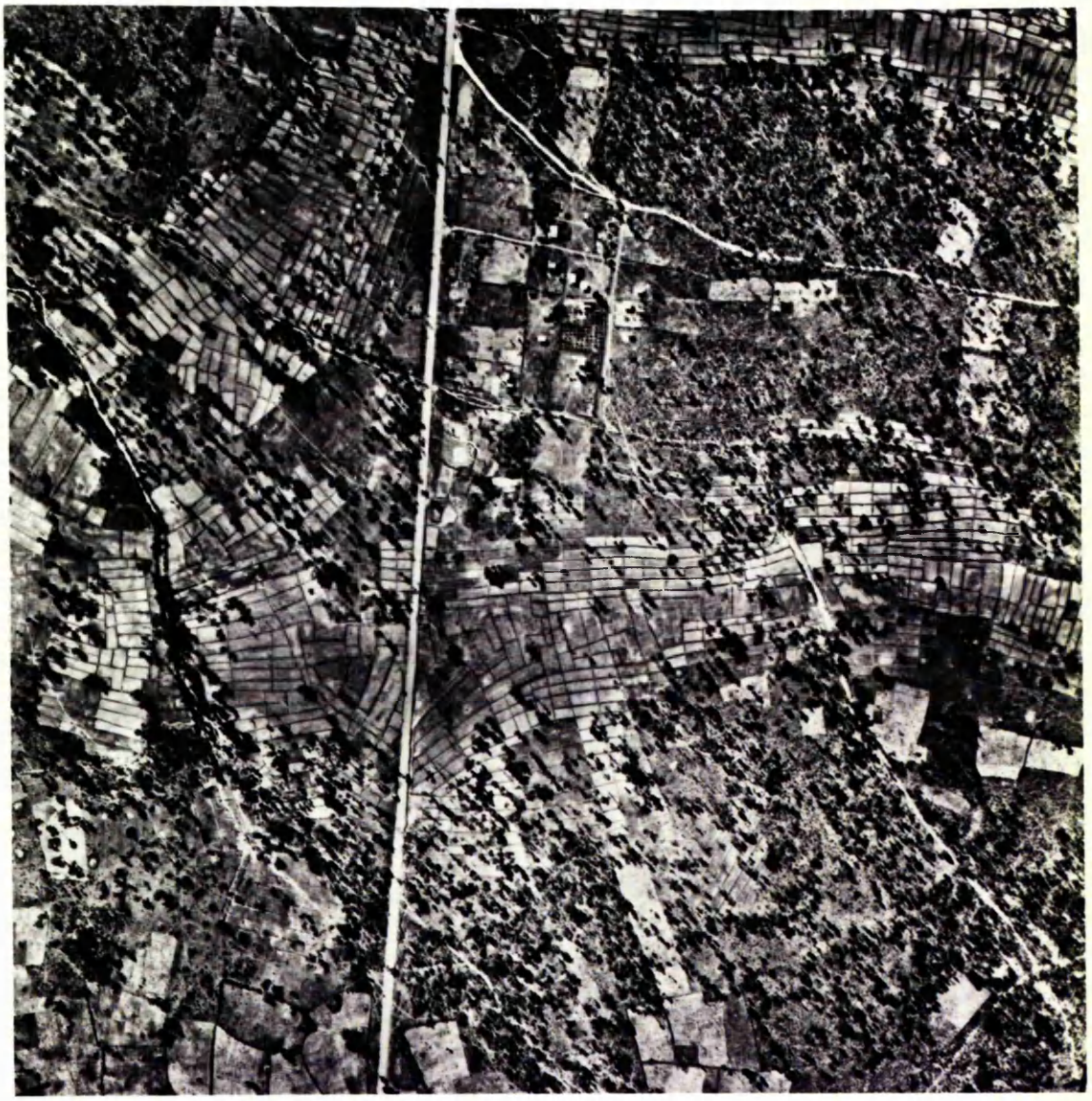

FIG. III.2 Forest, upland and paddy land in various stages of clearance along the R.I.D. access road to the west of Na Chuak Nua. This is the 'pioneer zone' of the study area with active clearance for upland and paddy

area, only four kilometres south of the Lam Pao dam site; it is thus the furthest from Kalasin town. Much uncleared forest is located close to the village and active clearance is still in progress, both for upland and paddy cultivation (figure III.2).

The village is on the Khorat soil series, with much of the paddy on the Roiet-Ubon series, and some on the lower part of the Khorat. Upland and uncleared forest represents the higher Khorat soil. In general, crop yields are lower in this area, with a tendency to drought damage rather than flood, though some of the low areas of Roiet soil are prone to flooding.

Na Chuak Nua was the first village to receive water, in the dry season of 1969-70. A limited area (100-200 rai) of vegetables, mostly cucumbers, have been cultivated, making use of the irrigation water. Some experiments with soya beans and peanuts were made in 1970-1, and the very disappointing results have discouraged any move towards more diverse cropping. The development of larger areas of second crop vegetables is limited by the size of the local market and the distance of the village from Kalasin market.

The average size of holdings is large, 21 rai, with a higher proportion of upland than in villages further south (tables III.3 and III.4). Per capita land holding, at 3.27 rai, and paddy holdings of 2.8 rai, are the largest of the seven villages, indicating the lack of population pressure here. Clearance of new land and the hiving off of new families on the traditional North East pattern, described in chapter I, may still be seen in the village. The small average family size (table III.4) reflects the operation of this process. There are few large extended families living together, and more small young households operate holdings. The proximity of the village to the headworks of the irrigation scheme increases the available off-farm employment, and makes

TABLE III.4

VILLAGE MAN/LAND RELATIONSHIP

	Holding (rai)	Family Size	Land Per Capita (rai)	Paddy Per Capita (rai)
Na Chuak Nua	21.1	6.4	3.27	2.80
Ban Tum	17.1	6.2	2.74	1.89
Um Mao	19.1	7.5	2.54	2.23
Fai Taek	13.0	7.1	1.83	1.46
Ban Lek	13.9	6.6	2.10	1.77
Non Sung	18.8	7.9	2.41	1.95
Lao Yai	15.6	8.3	1.96	1.33
Lam Pao Area	17.2	1.9	2.48	1.98

possible the existence of small young families supported by upland cultivation and wage labour for the R.I.D.

Overall the village strongly reflects the pioneer nature of the north of the Lam Pao region. The creation of new settlements has occurred even in the last twenty years. Investigation of a site on the aerial photograph revealed that a village hived off from Na Chuak Nua some twenty years ago, about three kilometres north, to farm land being cleared in the north. The settlement was subsequently abandoned, because of the banditry prevailing in the area, and the land cleared, stretching in long, sinuous strips, is operated from Na Chuak Nua itself.[17]

Clearance for paddy continues, and much of the paddy fields contain large numbers of trees, stumps, and ant hills.

The youthfulness of the village and the pioneer atmosphere is reflected in a lack of cohesion and cooperation, compared with the older villages further south. It is apparent that the headman has less knowledge of and control over the village than is usual in the traditional villages. There is a tendency, exaggerated by the off-farm work, for the headman and many of the villagers to have interests outside the village, which reduces the social cohesion and mutual help in harvesting.

Na Chuak Nua is 31.5 kilometres from Kalasin town, and the construction of the access road to the dam site by the R.I.D. resulted in contact with Kalasin town being by metalled road except for the last kilometre of dirt track, well-constructed, that joins with the access road. The village remains fully accessible during the wet season, because of the well-drained upland soils. Contact with Kalasin town is low, with only 1.35 trips a month per capita, a function of distance, presumably, as pick-up services are frequent along the access

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17 The name Na Chuak Nua is descriptive of this land holding pattern radiating northwards from the village, as Na means paddy, Chuak rope, and Nua north.

FIG. III.3 The large dry point site of Ban Tum surrounded by roiet paddy land some of which has been cultivated for over 200 years but still contains large termite mounds and trees

roads and a bus service runs regularly to Kalasin and Khon Kaen. 97.1% of trips are by pick-up, and 2.9% by bus and pick-up.

2) Ban Tum

This village contrasts strongly with Na Chuak Nua, being both the largest and the oldest of the seven. Clearance for paddy has come to a halt, and the majority of the upland has been cleared. Although large numbers of ant hills and trees remain in the fields, the length of cultivation is apparent in the cleaner and more complete clearance. The village dates from the primary phase of settlement, and is over 200 years old.

The village is located well to the west of the Lam Phan, on the edge of the valley, giving easy access to huge areas of upland and virgin forest on the western side of the valley. Ban Tum has the largest upland holdings of any of the villages, land unsuited to paddy and not occupied by other settlements. The majority of the upland was cleared during the last fifteen years, and little remains uncleared near the village. Some upland holdings are as much as 6 kilometres from the settlement.

A per capita land holdings figure of 2.74 rai is second only to Na Chuak Nua, however the length of the settlement and the clearance earlier of all the land suitable for rice makes the per capita paddy holding only 1.89 rai. The high figure for the total holding reflects a large area of land suited to upland crops.

The village itself is sited on an outcrop of Khorat which forms a dry point site amidst the Roiet soils (figure III.3). Ban Tum paddy is almost exclusively on Roiet soils, well drained by the large nong to the south. Surrounding the nong there is a belt of highly fertile Phimai soil, prone to flood. In general, however, Ban Tum is

TABLE III.5

DISTANCE TO KALASIN (Distance in Kilometres)

	Distance	Metal	Good Laterite	Poor Laterite	Track
Na Chuak Nua	31.5	30.50	-	-	1.0
Ban Tum	25.5	24.0	-	1.5	-
Um Mao	7.0	4.5	-	2.5	-
Fai Taek	7.5	1.5	-	-	6.0
Ban Lek	4.5	-	4.5	-	-
Non Sung[1]	24.0	-	22.5	1.0	0.5
Non Sung[2]	37.0	18.0	17.5	1.0	0.5
Lao Yai[1]	30.0	-	22.5	1.0	6.5
Lao Yai[2]	43.0	18.0	17.5	1.0	6.5

[1] via Komalasai
[2] via Yangtalad

TABLE III.6

EXTERNAL CONTACT - PERCENTAGE EVER VISITING

	Khon Kaen	Nakorn Ratchasima	Bangkok	Central Region	Northern Region	Southern Region
Na Chuak Nua	65.7	17.1	22.9	5.7	8.6	2.9
Ban Tum	52.6	21.1	31.6	8.8	5.3	1.8
Um Mao	51.4	28.6	22.9	-	-	-
Fai Taek	60.0	24.0	28.0	12.0	4.0	-
Ban Lek	42.9	21.4	26.2	21.4	7.1	-
Non Sung	63.6	24.2	39.4	21.2	3.0	3.0
Lao Yai	90.9	54.5	72.7	72.7	9.1	-
Lam Pao Area	56.7	23.9	30.7	14.3	5.0	1.3

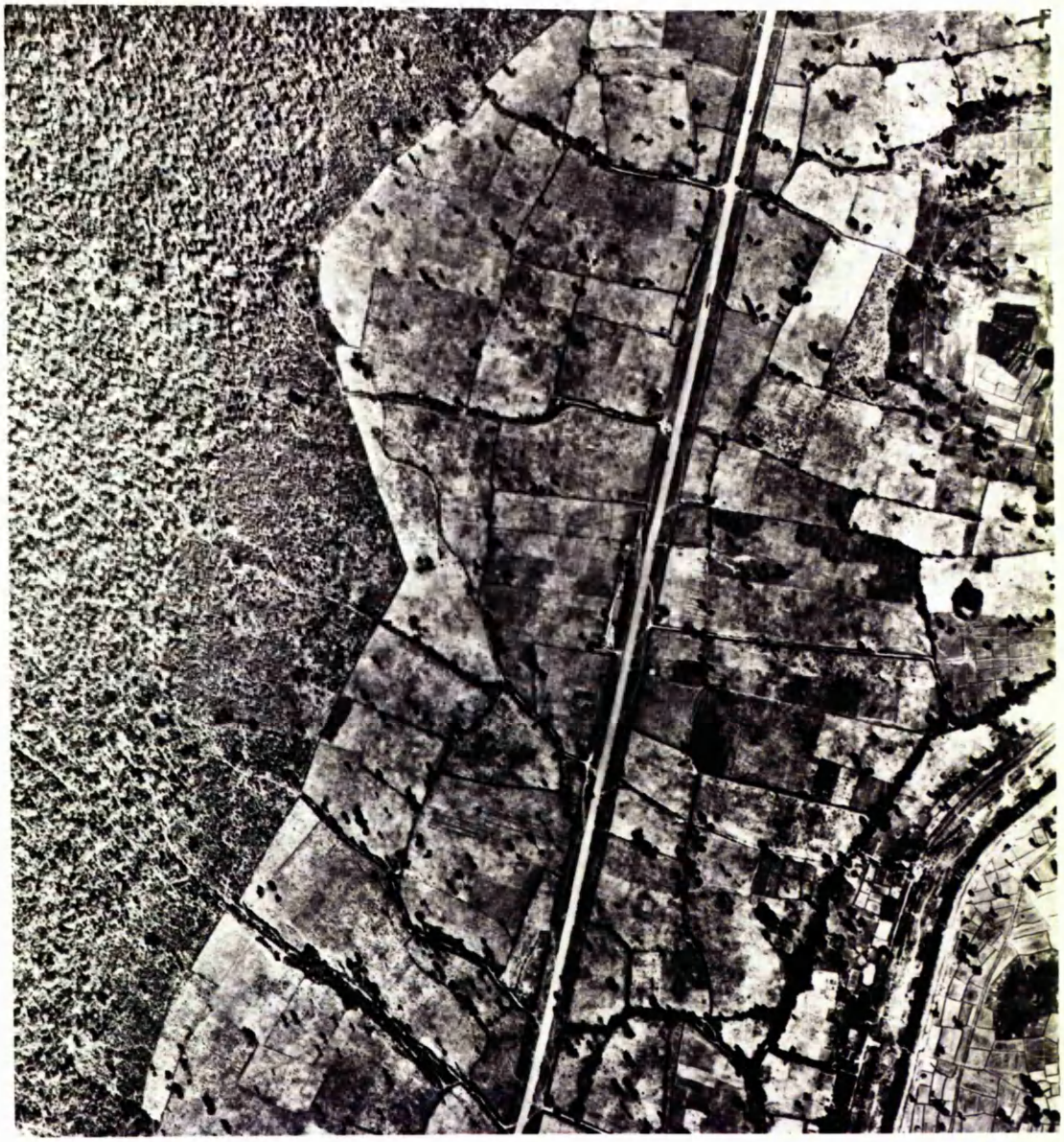

FIG. III.4 The right main canal (right hand corner of the photograph) follows closely the division between paddy and upland to the west of Ban Tum. Access to the upland plots is provided by the R.I.D. road. The limit of upland cultivation is clearly marked in the west by the large area of uncleared forest

more prone to drought than flood, although there are pockets of potentially floodable land in lower lying areas to the north east and north west. To the east, the paddy limit appears to conform closely to the junction of the Roiet and Ubon/Khorat soils. The break in slope at the soil junction is now followed by the main canal of the irrigation system. Cutting of the village land by the canal has emphasised the land use differences exhibited by the two soil types. Almost the entire area beyond the canal is given over to upland cultivation (figure III.4). The village has the highest per capita holding of non-rice in any of the study villages, and the access road has meant that this land could be opened up.

In contrast to Na Chuak Nua, although the family size is not the largest found, the presence of extended families, mutual help, and a feeling of village cohesion and firm control by the headman suggest a more traditional and less individualistic social structure. The headman is able easily to assemble a large village labour force to improve and maintain the road. Credit and co-operative organisation have made less headway here, and the headman is both more conservative and sceptical of the benefit to the villagers which would accrue from participation in such institutions. Overall there is more concern with the village, demonstrated by the importance attached to village festivals and ceremonies.

As in the case of Na Chuak Nua, contact with Kalasin town is increased by the R.I.D. road, but in spite of the efforts of the villagers, the link road to it is in a bad state of repair, and deteriorates rapidly during the wet season. During the height of the wet season, the village may not be accessible to motor vehicles for two or three days at a time, but the 1.5 kilometres to the R.I.D. access road can easily be walked. Contact with Kalasin town is greater than at Na Chuak Nua, with an average of 1.89 per capita trips per month; transport is similarly by

FIG. III.5 The site of Um Mao with the R.I.D. tank to the east and the Lam Phan to the east. An earlier village site may be discerned to the south of the present one. Between the present site and the Lam Phan there is an area of swampy forest, part of which is reserved for burial purposes. The absence of paddy bunds on the levees of the Lam Phan reflects the fact that wet season cultivation is precluded by flooding

pickup and bus.

Irrigation will raise the yields on the paddy land to the north and west of the village, which has a tendency to drought. In addition, because of the considerable scale of the distribution network, off-farm income will be generated which may result in a breaking down of the traditional cohesive village society.

3) Um Mao

The village of Um Mao is sited close to Kalasin town on a dry point on the immediate flood plain of the Lam Phan. It represents the second phase of land occupation, when the fertile but flood prone lands closer to the rivers were settled. There is a shortage of land at a high elevation suitable for non-paddy crops, consequently the villagers are heavily dependent on their rice.

The site is on a small outlier of Khorat soil; an earlier village was located abouth half a kilometre to the west, and the move made after a disastrous outbreak of 'plague'.[18] (Figure III.3). The land between the village and the Lam Phan is Phimai and alluvium complex of various types, potentially fertile but with yields considerably cut by annual flood damage. Land on the immediate levees of the Lam Phan is used for vegetable growing in the dry season, but because of the floods is not used in the wet season. The outcrop of Khorat occurs at the junction of the Phimai and alluvial soils with the Roiet. To the east of the village there is a large area of paddy on level Roiet soil which, although less fertile than the Phimai in the west, is less prone to flood.

The R.I.D. constructed a shallow tank in 1963 to provide irrigation water for the drier Roiet soils. While the tank holds water throughout the dry season, it is too shallow to provide dry season irrigation; it is important for supplementary water in the wet season

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18 As reported by the village headman.

for a large area of the Roiet series, and has reduced drought damage in dry years and also permits earlier planting.

Contact with Kalasin town is easy and frequent, and results in off-farm work and vegetable sales in the market; per capita trips to the changwat seat average 3.58 a month. There is a regular bus service nearby, as the Kalasin to Khon Kaen road passes within two and a half kilometres; 14.7% of trips are by bus, the remainder by pick-up. The laterite crowned village road remains passable throughout the wet season, but the thin layer of laterite is deteriorating.

Land for upland crops is very limited, except close to the village where farmers have made high levels of income from intensive planting of chillies, vegetables and peanuts on plots of one to three rai.

External contact is very important; there is a team of professional house-builders resident in the village, who work over a large area of the North East during the dry season. Their presence in Um Mao is evident in the number of very elaborate houses here. It is one of the most prosperous villages of the study area, with increasing proportions of off-farm income in recent years. Agriculture, and particularly rice, remains dominant, however. In the future, flood prevention and land drainage are likely to stabilise yields more than irrigation can, although the drier land to the west served by the existing tank could benefit from the Lam Pao irrigation water.

4) Fai Taek

Sited in an area of confused geomorphological and soil features close to the Lam Pao, Fai Taek was settled in the secondary stage over a hundred years ago. Unlike the other villages of this phase which resulted from in-filling between the original settlements close to the rivers, Fai Taek does not suffer extensively from flooding. The village

itself has a dry point site at or near the junction of the Phimai and Roiet soil types and amidst the abandoned meanders of the Lam Pao. Flooding may well have been more prevalent in the past, before the course of the river changed and the Lam Pao dam reduced somewhat the flow into the old channels.

The pattern of land-holding is complex, with settlement between the old meanders. The fertility of the soils is high, and yields are higher here than in any of the other villages studied. Land is in short supply, with holdings of 1.83 rai per head, and paddy holdings of 1.46 rai. No land remains for potential paddy. The tree-fringed abandoned meanders are not cultivable and are swamps in the rainy part of the year that do not fully dry out at any time.

The shortage of land in the vicinity of the village has led to a large number of farmers holding land two to five kilometres away. In particular the lack of upland has resulted in the acquisition of an area of land some five kilometres to the west. Some land is rented from neighbouring villages, and there is more renting and joint cultivation within the village than in the other six villages selected.

In effect, the village of Fai Taek has outgrown its original site in spite of its small size of only 75 families. The village site itself is extensive, and could contain a much larger number of houses; the houses are surrounded by plots of suan that represent 15.74% of the total village land holding. These plots are used largely for fruit for sale in Kalasin town.

Fai Taek is only 7.5 kilometres from the town, but six kilometres consists of an extremely bad track which is generally impassable from May to September. Contact with Kalasin is, though, the most frequent of any of the villages, averaging 8 trips per month per person. The very poor nature of the road is reflected in the high

percentage of trips by foot or bicycle, 24% and 28% respectively; only 48% of trips are by pick-up, the lowest incidence in the villages studied.

The land pressure results in a high incidence of off-farm work, reflected in the large number of trips to Kalasin town. Work can either be found there or at the F.A.O. farm at Huey Sithon. In addition, Fai Taek has the highest incidence of absentee household members, with 28% of families reporting at least one member away. The supplementing of income by remittances is of greater importance here, too. The fabric of the village community may be seen as already deteriorating under the pressure of land shortage, low income from crop sales, and proximity to the town. The headman's authority appears to be low, and little of the traditional cohesion of the village community remains. Irrigation will bring some prosperity to the farmers with larger holdings, especially if the road is improved. The village is in an excellent position to develop as a vegetable producer for the Kalasin market, given the rich soil and the location.

5) Ban Lek

Ban Lek is similar in age to Ban Tum and also represents the primary stage of settlement, but, on the eastern side of the Lam Pao valley, it does not have access to a large area of upland. The core of the village paddy land lies between the village site and a large nong to the south west; the limited extent of this most fertile and reliable paddy land has led to expansion to the east onto land of poorer quality with a high salt content. The existence of a large area of saline Udorn soil, affecting ten per cent of the land badly in dry years, means that population pressure is greater than suggested by the figures for holdings of 2.1 rai and paddy land of 1.77 rai per capita.

The village is generally poor, with considerable need to

supplement farm income by other work in Kalasin town, or by remittances. Temporary or permanent migration in search of work is a well-established pattern even more prevalent in recent years. Traditional activities survive here, notably the production of salt from the area of saline soil, using evaporation. Despite the proximity of Kalasin market, $4\frac{1}{2}$ kilometres, the village is self-sufficient in salt, and exchanges or sells salt to a number of neighbouring villages. This traditional dry season activity has been gradually declining in the North East except in very poor, isolated and particularly salt-rich areas.

Not only is Ban Lek the closest village to Kalasin, studied, it is unique in its connections entirely by a good quality all-weather laterite road. Contact is frequent, with trips per capita 5.7 per month. As in the case of Fai Taek, proximity results in the use of bicycles; 7.1% of trips are by bicycle. The good road and the frequent pickup services, however, mean that 92.9% of trips are by pick-up.

6) Non Sung

Non Sung is located on the edge of a ridge of the high terrace, overlooking an extensive area of fertile alluvial and Phimai soils of the Lam Chi flood plain. The village is about a hundred years old, and dates from the early part of the second phase in the cultivation of the area, when the first movement was made onto the Chi's lower flood plain.

The paddy land is very level indeed (figure IV.2), and prone to inundation in most years; a large nong south of the village accentuates local flooding problems but provides sites for early rice seed-beds and an important contribution to the village economy in the form of fishing. The ridge of high terrace contains a large area of uncleared forest which is generally unusual in the southern part of the study area. However, the soils of the ridge are mainly Khorat of

extremely low fertility, and where cleared for upland crops in the last ten to fifteen years have produced low yields, so that since 1970 many plots have been abandoned. The very severe flooding of the rice fields, which may well have increased in recent years, has resulted in a number of farmers clearing land on the edge of the high terrace for paddy, which despite its low fertility is more reliable than the lower land with higher fertility.

Holdings are generally large, and the village mean is the third highests of the seven villages (table III.4), but the tendency towards large extended families (table III.4) depresses the per capita land holding to 2.38 rai, slightly below the average for the seven villages and fifth in terms of the village means. The figure for paddy of 1.98 rai is more favourable, and is only exceeded by Na Chuak Nua and Um Mao.

Extended families and an elaborate system of mutual help ('long khaek') remain important features in this village; as well as mutual organisations for paddy cultivation twice a year, the whole village cooperates to fish the large nong, types of organisation once more common in the North East.

24 kilometres from Kalasin via Komalasai, and 37 kilometres of better road via Yangtalad, provide two routes. The very bad road between Komalasai and Non Sung, plus the existence of regular bus services from Roiet to Yangtalad, mean the majority of journeys take place via the longer route. 9.4% of the trips to Kalasin are by bus, the remainder by pick-up. Contact with Komalasai tends to be related to official business with the amphur seat rather than sales or purchases. The proximity of Non Sung to the Yangtalad-Roiet rail road, 1½ kilometres, the generally good laterite link to the Nong Peng tambon seat and the short and well-drained track from Nong Peng result in the village being

FIG. III.6 Site of Lao Yai on a ridge of high terrace overlooking a nong and the flood prone paddy land of the Chi flood plain to the south. The large suan plots which surround the houses and adjoin the village make the layout of the village difficult to discern from the photograph

easily reached all the year.

Nevertheless, Non Sung shows the lowest per capita incidence of trips to Kalasin town of any of the villages, 1.3 per month, reflecting the contact with Yangtalad, as an alternative to Kalasin, and the village's more prosperous agriculture and low level of off-farm work. In contact outside the changwat, the village shows a similar trend to the Lam Pao average (table III.6).

Overall, then, Non Sung is relatively prosperous and oriented towards crop production with rice dominant. Paddy land is highly productive but unreliable, so that rice is stored to even out fluctuations in production. This village will benefit from the embankment and flood control in particular, which will stabilise production on the lower lying land.

7) Lao Yai

The physical site of Lao Yai is similar to Non Sung, although the area of high terrace is less extensive (figure III.6). The village is 70 to 80 years old, and represents the later stages of the settlement of the flood plain areas, when the least reliable land was taken up.

The paddy land is extremely low-lying, and proximity to the Lam Chi presents a more serious flood problem than at Non Sung. Soil fertility is high, with a high percentage of rich black Phimai, potentially the most fertile of the region's soils. Paddy yields reach 800 kilograms per rai, as against a local average of 259.7 kilograms. Crop loss from flood is severe, and on average two out of three years experience serious crop loss. Unlike Non Sung, there is little higher, more reliable land that can be cultivated, as the higher terrace is less extensive and rises sharply from the flood plain and only a narrow fringe of higher plots exists.

This is the smallest of the seven villages, with only 39 families and 608.4 rai of cultivated land (table III.2). Holdings are smaller than at Non Sung, averaging only 15.5 rai and families, with an average size of 8.3 persons, the largest of the seven villages. In consequence per capita land holding, 1.96 rai, is lower than anywhere except Fai Taek. In paddy holding, the village has the lowest found in the area, 1.33 rai. The size of the per capita holding is to some extent off-set by the inherent quality of the soil, in spite of its susceptibility to flood.

The village is typified by large suan plots around the houses or adjacent to the village, which comprise 11.54% of the village land. (Here and in Fai Taek, these garden plots are significantly larger than in the other villages). Unlike those of Fai Taek, however, the gardens of Lao Yai are utilised for a wide variety of subsistence crops, cotton, kapok, maize, peanuts, chillies and mulberry, for use within the village; although some kapok is sold to the market, the major part of the crop is used by the farmers for making cushions and mattresses.

Ethnically, the village is distinctive, for it represents the villages founded by the Lao migrants during the late nineteenth century. The large extended families, the dialect and many cultural traits in village life distinguish this village from the others chosen for study.[19]

This is the most isolated of the seven villages, with a $6\frac{1}{2}$ kilometre track connecting with the Roiet-Yangtalad road, seldom impassable except for a few days at a time in the wet months. Relatively little traffic flows along this track. Pick-ups do serve Lao Yai in the dry season, but a large number of people walk to the main road to catch buses; 18.2% of trips to Kalasin town were of this type, the remainder were by

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19 For example, this is the only village studied where the 'wow', a bow like musical instrument is found.

pick-up. As at Non Sung, contact via Komalasai is limited, and most contact with Kalasin takes place via Yangtalad, which siphons off some of the Kalasin trade. With monthly trips to Kalasin averaging out at only 1.4 a head, there is little more contact than was noted at Non Sung. However, in terms of contact outside the area Lao Yai has the highest of any of the villages (table III.6). This is largely the result of the very unreliable land and general poverty of the village. Temporary migration in search of work during the slack dry season, or for longer periods in years of disastrous flooding, is a normal pattern.

Lao Yai is by far the poorest of the selected villages, and exhibits subsistence traits, particularly in the wide range of crops grown for household consumption and handicrafts which have disappeared in the more developed villages. As at Non Sung, the Lam Pao Irrigation Project will bring its greatest advantage by reducing damage rather than by providing irrigation water. Stabilising yields will create a very rich rice producing area in the southern part of the study area.

CHAPTER IV

THE SUBSISTENCE BASIS OF THE ECONOMY

In 1930, Zimmerman described the North East as a region in which the transition from subsistence to commercial farming was beginning to take place.[1] However, as his analysis shows, the region was at that time markedly a subsistence one, with the land use and farm economy dominated by glutinous paddy production for domestic consumption. Supplementary activities included the cultivation of cotton, mulberry, vegetables, tobacco and fruit, fishing, salt making, and the collection of forest products. A variety of domestic handicrafts thrived, notably the weaving of cotton and silk cloth, and the making of mats and baskets. Some cash income was derived from the sale of occasional surplus, lac collected from the forest, and livestock.

Livestock exports from the North East to the Central Plain were already well established by the time of Zimmerman's survey, and the rice market had begun to penetrate along the line of the railway and into the changwats of the southern edge of the plateau.

This pattern observed in the late 1920's may be seen as the traditional stage of the model outlined in chapter II, but containing within it the elements of expansion and change. Since 1950 the highly subsistence economy has been increasingly modified by the acceleration of the penetration of the market economy, accompanied and stimulated by the development of transport and the introduction of new cash crops.

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1 C. Zimmerman, "Siam Rural Economic Survey", 1931, p.173.

TABLE IV.1

% LAND USE 1970-1

	Glutinous Paddy	Non-Glutinous	Maize	Kenaf	Cotton	Fruit	Veg	Mulberry	Other
Na Chuak Nua	82.9	0.4	-	16.8	-	-	-	-	0.2
Ban Tum	68.5	0.3	-	31.0	-	0.1	-	-	0.1
Um Mao	88.2	3.9	-	5.5	0.1	0.2	0.9	0.1	0.9
Fai Taek	80.4	1.5	-	3.6	-	5.0	0.5	-	0.2
Ban Lek	81.6	1.7	-	13.7	0.2	0.4	-	-	-
Non Sung	70.4	2.8	-	15.5	-	-	-	-	-
Lao Yai	70.4	12.8	1.6	14.0	0.6	0.6	-	-	-
Lam Pao Area	79.4	2.0	0.1	17.3	0.1	0.5	0.2	0.1	0.2

TABLE IV.2

% OF FARMERS GROWING SPECIFIED CROPS

	Glutinous Paddy	Non-Glutinous	Maize	Kenaf	Cotton	Fruit	Veg	Mulberry	Other
Na Chuak Nua	97.1	5.7	-	52.9	-	-	2.1	-	2.9
Ban Tum	100.0	1.8	-	89.5	-	5.3	-	-	-
Um Mao	100.0	8.6	2.9	28.6	2.8	20.0	11.4	-	-
Fai Taek	100.0	4.0	4.0	40.0	-	24.0	12.0	-	4.0
Ban Lek	100.0	4.8	-	42.9	2.4	7.1	-	-	-
Non Sung	100.0	18.2	-	75.8	6.1	12.1	-	3.0	3.0
Lao Yai	100.0	27.3	27.3	81.8	9.1	18.2	-	-	-
Lam Pao Area	99.6	7.6	2.1	59.2	2.1	10.5	5.0	0.4	1.25

TABLE IV.3

GLUTINOUS RICE: AREA AS % OF TOTAL HOLDING (Percentage Distribution)

Upper Class Limits	0	30	40	50	60	70	80	90	100
Na Chuak Nua	2.9	5.7	2.9	2.9	2.9	17.1	17.1	11.4	37.1
Ban Tum	-	-	1.8	10.5	15.8	36.8	10.5	14.0	10.5
Um Mao	-	-	2.9	2.9	2.9	5.7	14.3	11.4	60.0
Fai Taek	-	4.0	-	12.0	8.0	8.0	8.0	12.0	48.0
Ban Lek	-	-	2.4	-	9.5	7.1	16.7	11.9	52.4
Non Sung	-	-	-	6.1	6.1	9.1	24.2	30.3	24.2
Lao Yai	-	9.1	-	-	9.1	18.2	36.4	18.2	9.1
Lam Pao Area	0.4	1.7	1.7	5.5	8.4	16.4	16.0	15.1	34.9

However overall, the process has been slow and all the elements that Zimmerman writes of are still present in the region. Only the collection of lac as a source of cash income has largely vanished, a reflection of new sources of cash income and extensive clearing of the forest as well as a poor international price for the product with competition from synthetic lacquers.

The continued dominance of paddy production in the North East economy as a whole was outlined in chapter I. Ng has seen this continuing emphasis on glutinous paddy production as a reflection of orientation away from production for the market.[2] In this chapter, the place of paddy production, particularly the glutinous variety, will be examined in terms of the land use and farm economy of the study area.

The land use of the Lam Pao study area in the 1970-1 crop season is summarised in tables IV.1 and IV.2. Field work in the succeeding crop year and the land use survey made of Na Chuak Nua and Ban Tum in September 1971 confirmed the pattern in these tables.

Overall, 81.6% and 81.27% respectively of the area was planted to paddy in 1970-1 and 1971-2; of this 97.79% and 91.74% were glutinous.[3] In terms of the number of farmers cultivating the various crops, 99.57% and 98.35% of farmers grew paddy. There is some inter- and intra-village variation in the degree of the dominance of paddy, and in particular of glutinous varieties, with Ban Tum showing the lowest percentage of land planted to paddy (68.5%) and Um Mao the highest (92.1%). Overall 34.9% of farmers planted all of their land to glutinous, and only 8.9% planted less than half; even Ban Tum, with its low percentage of land

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2 R. Ng, "Rice Cultivation and Rural Settlement Density in North East Thailand", Tijdschrift voor Econ, en Soc. Geog., vol.19, 1968, pp. 200-210.

3 The implications and significance of the changes in land use exhibited between these two rice varieties in the 1971-2 crop season will be discussed in chapter V.

under paddy had only 12.3% of farmers planting less than 50% glutinous rice (table IV.3).

It is unusual to find farmers in the North East not growing any paddy. Those who did not were not planting potential paddy land to other crops - they had no land suitable for rice cultivation. These non-rice growing households fall into three main categories: sons-in-law who have recently set up a separate household and have cleared or been given an upland plot, supplementing their income by off-farm work which may in part take the form of helping fellow villagers with rice cultivation in return for payment in kind;[4] families with specialised full-time non-agricultural activities, for example village rice-milling; and in villages close to Kalasin town which were also suffering from land shortage, particularly Fai Taek, where farmers are found without rice land, and derive their income from working in the town and intensive cultivation of fruit and vegetables for the changwat market.

In general there is no evidence of a long-term movement away from rice growing. Unless farmers had given up active participation in rice cultivation for a more profitable non-farm activity, for example, rice milling, those without rice land would acquire it if they could. Young men with upland plots only who worked for the R.I.D. at Lam Pao expressed a desire to buy paddy land with their savings. Farmers who had given up paddy land, for example a rice miller at Ban Tum, retained an interest in the land so that at least sufficient rice was grown for household consumption without recourse to purchase. There is thus in the area still a very heavy emphasis on producing one's subsistence rice requirements, even amongst households who have ceased to farm

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4 This is especially apparent in Na Chuak Nua, which had much uncleared upland, and because of its proximity to the Lam Pao dam site, offering plentiful off-farm work.

TABLE IV.4

THE COSTS OF PURCHASED AND FARM PRODUCED PADDY

PADDY PRODUCTION COSTS PER RAI (in baht)

Labour Rate Per Day *	7 Baht	15 Baht	20 Baht	22 Baht
Labour input (8.2 days)	57.4	140.4	164.0	166.7
Cash input	15.2	15.2	15.2	15.2
TOTAL COST PER RAI	72.6	155.6	179.2	181.9

PRODUCTION COSTS PER KILOGRAM (in baht)

(assuming average production per rai is 259 kilograms, milling costs on average 1 baht a tang = ten kilograms = and the milling ratio is 50%)

Labour Rate Per Day*	7 Baht	15 Baht	20 Baht	22 Baht
Labour	0.25	0.60	0.69	0.70
Milling	0.10	0.10	0.10	0.10
TOTAL COST OF PADDY	0.35	0.70	0.79	0.80
TOTAL COST OF MILLED RICE	0.70	1.40	1.58	1.60

COST OF PURCHASING A KILOGRAM OF MILLED RICE IN THE MARKET (in baht)

1970	1971	1972
2.6	3.5	4.6

COST OF PURCHASING A KILOGRAM OF MILLED RICE IN THE VILLAGE (in baht)

	1970	1971	1972
Cost of paddy	0.50	0.80	1.20
Milling Charge	0.10	0.10	0.10
Cost of Rice	1.10	1.70	2.50

* These labour rates are based on the prevailing rates for work within and outside the village; 7 baht is the repayment for a day's work in the village, 15 for a day's labouring outside, and 20 and 22 baht the wages of junior and senior guards at the R.I.D. at Lam Pao.

actively. This is reinforced by the evidence that the young families with a farm economy centring on cash cropping of kenaf and off-farm work endeavour to save money to buy paddy land.

Farmers are reluctant to be placed in the position of purchasing paddy with cash income derived from off-farm work or the sale of other crops. The economic rationale which lies behind this attitude is explained in table IV.4. Estimates of paddy production costs vary in the analysis from 0.25 baht to 0.7 baht, depending on the value placed on labour. It is clear that even at the highest wage rate prevailing in the area, the cost of home-produced milled rice is substantially below the prevailing price of milled rice in the local market.

The summary of land use presented in tables IV.1 and IV.2 shows the cultivation of very small vegetable, fruit, cotton, mulberry and tobacco plots to meet subsistence needs of the villages. There is considerable variation between the villages in the amount of garden cultivation of this type still practised, and the extent of handicrafts. In general the more accessible villages, and thus those with the most reliable source of cash income, show the lowest incidence of these subsistence practices. The remote village of Lao Yai, in which almost every household still produces cotton and/or silk for cloth made in the village, is significant in this respect. In contrast, households interviewed in Na Chuak Nua and Ban Tum explained how in the past they had grown cotton for home-made cloth, but now the upland was planted to kenaf and cloth could be cheaply bought in Kalasin market.

Similarly, the production of tobacco as a dry season crop on the paddy has, according to the farmers, declined in recent years in favour of commercially produced cigarettes. This is a process that Zimmerman observed in many parts of Thailand and in the Nakorn Ratchasima

TABLE IV.5 GLUTINOUS RICE : PLOT SIZE (RAI) PERCENTAGE DISTRIBUTION

Upper Class Limit	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	70.0	Mean
Na Chuak Nua	2.9	2.9	34.3	22.9	14.3	5.7	0.0	8.6	5.7	17.9
Ban Tum	0.0	8.8	52.6	17.5	8.8	7.0	0.0	5.3	0.0	11.7
Um Mao	0.0	2.9	31.4	20.0	20.0	8.6	0.0	8.6	8.6	16.7
Fai Taek	0.0	36.0	28.0	16.0	8.0	4.0	8.0	0.0	0.0	10.4
Ban Lek	0.0	14.3	42.9	14.3	19.0	7.1	2.4	0.0	0.0	11.7
Non Sung	0.0	18.2	27.3	15.2	12.1	6.1	9.1	9.1	3.0	15.4
Lao Yai	0.0	18.2	36.4	27.3	18.2	0.0	0.0	0.0	0.0	11.0
Lam Pao Area	0.4	12.6	38.2	18.1	13.9	6.3	2.5	5.0	2.5	13.7

area of the North East (the most accessible part) in 1930.[5]

Thus although the area remains dominated by paddy, other subsistence characteristics of the farm economy have declined and are only present to any degree in the less accessible areas.

Land Holding

The considerable variation in the size of the total land holding both between and within villages was noted in chapter III; as may be seen from table IV.5, there is great variation in the paddy holdings, with a range from 5 rai to over 70 rai. The villages can be divided into two groups, with Lao Yai, Ban Lek, Fai Taek and Ban Tum having small rice holdings (11.0, 11.7, 10.4 and 11.7 rai averages) and Um Mao, Non Sung and Na Chuak Nua larger (16.7, 15.4 and 17.9 rai). Other than in Na Chuak Nua, and to a lesser extent Non Sung, there is little more paddy land that could be brought into cultivation, a symptom of the end of the extensive frontier attitude which previously prevailed in the North East's agriculture.[6] Population growth will be unable any more to result in the clearing of more land; new families will have to acquire all their land by inheritance, renting, or purchase. The small amount of renting and land purchase evident in the past may well increase drastically in the future.

The aerial photograph (fig. IV.1) shows the nature of the Lam Pao paddy land and indicates that while there is little forest that could be cleared for paddy production, the land at present cultivated is by no means fully cleared. Even in the case of Ban Tum, where paddy close to the village must have been cultivated for 200 years, there are

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5 Zimmerman, op.cit.

6 See chapter I.

FIG. IV.1 Small and irregular paddy fields in an area of broken relief north east of Ban Tum

very large termite mounds and considerable numbers of trees in the fields. The removal of such features of the paddy awaits a more intensive level of agriculture. As long as there has been more land available to clear, the farmers have not devoted themsleves to clearing the existing land fully, whereas in the Central Plain "where it is believed that anthills and tree stumps were once as numerous as they are in the North East, these interruptions have long since been eradicated under a mild degree of population pressure".[7] It is probable that between five and twelve per cent of the surface of the North East paddy is occupied by such impediments.[8] The removal of the obstacles would involve considerable labour; in the dry season when the labour is available the hardness of the land makes the task difficult, and once the rains start the field is either planted, or the labour is fully occupied on other parts of the holding. The termite mounds are sites for field houses, and, truncated, plots for chillies and vegetables, as described in chapter I. Farmers say that the trees are "good" for the paddy; this probably reflects the variety of uses to which the farmers put them rather than a belief in the beneficial effect on the rice itself.[9]

The unreliable environmental conditions of the North East, outlined in chapter I, result in few farmers willingly having one plot of homogeneous land. In wet years, low-lying land is either unplantable and inundated, or else subject to extensive loss or damage. Similarly,

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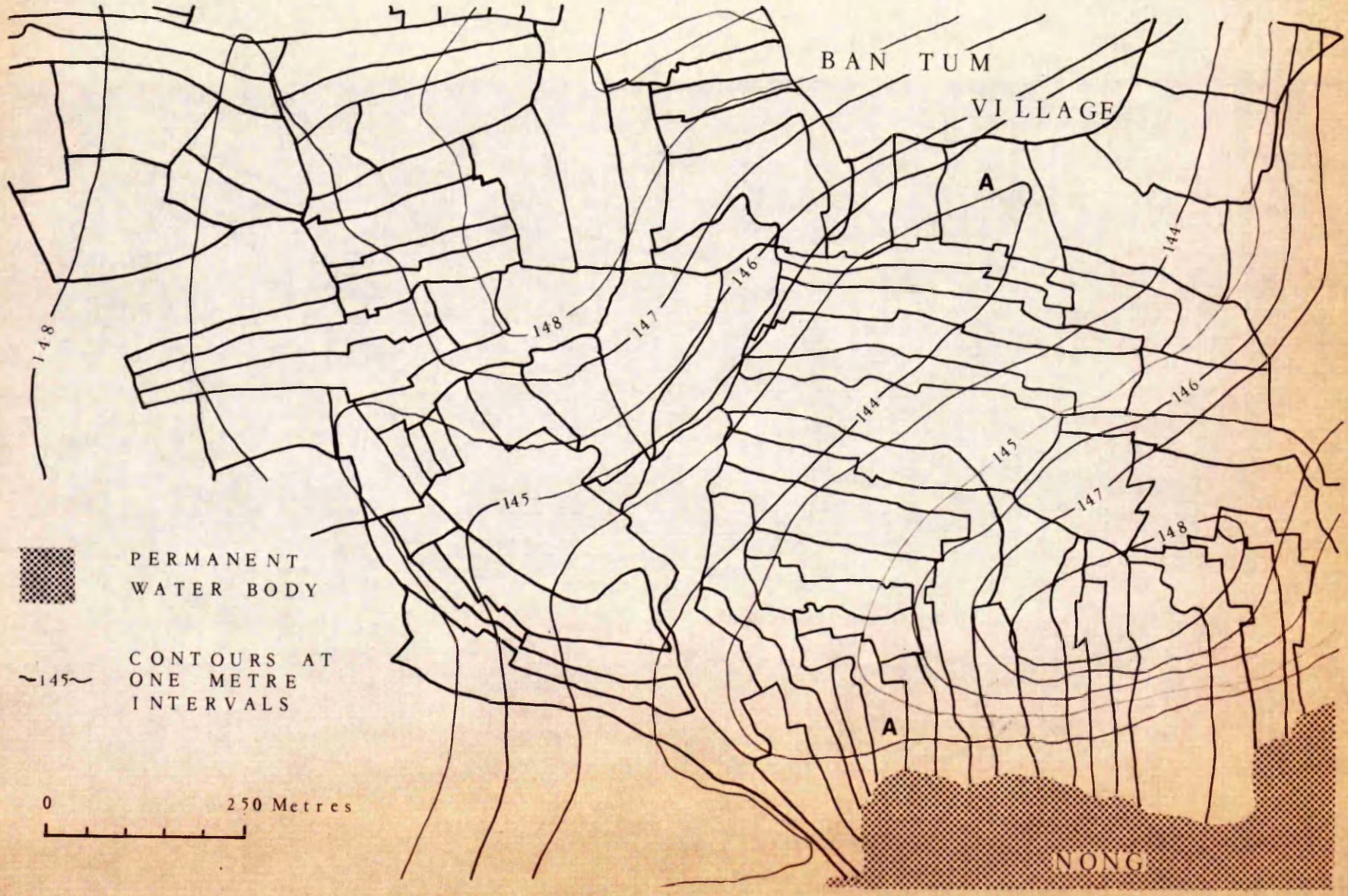
7 R. Ng, "Some Land Use Problems of North-East Thailand", Modern Asian Studies, No.4, Part 1, 1970, pp.23-42, reference p.33.

8 Farmers are likely to regard trees highly because of a variety of uses only affecting indirectly the paddy production; the small addition to organic matter in the soil is less important, but probably balances out its shade and physical presence as factors influencing yield. Trees are important for shade in the fields, and for timber and fuel.

9 The small amount of additional organic matter derived from the trees is likely to be outweighed in importance by the reduction in production due to the loss of area and the shading of the crop.



Map IV.1 The Pattern of Paddy Land Holding at Ban Tum

in dry years high plots will be prone to drought, or may be too dry to plant. This accounts for the large area left unplanted each year in the region (chapter I).

In general, therefore, individuals either hold two or three plots or one plot which contains a variety of land.[10] Map IV.1 illustrates the spreading of risk by holding paddy land in different topographical situations. The long narrow plots with frontage on the nong cross the contours at right angles and run back onto the higher land near the village. In some instances such long narrow strips contain the complete range from marshy nong to high uncleared forest. Farm TA0 on this map has one plot adjacent to the nong, clearly land prone to flood in wet years, and one higher plot close to Ban Tum itself.

The pattern of fragmented land holding is thus very closely related to the topography of the area. Chamlong, in his investigation of the Nong Wai area of changwat Khon Kaen, came to similar conclusions:[11]

> "land fragmentation ... helps minimise the risk due to natural hazards. Under primitive farming conditions where farmers have to depend so much on nature, it is a good policy not to place all the eggs in the same basket".

The spreading of risks is achieved both by holding different types of land, and by holding an area larger than would be necessary to meet household requirements.[12] Farmers however feel it necessary to retain and to cultivate where possible a larger area than appears

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10 H Demaine and C. Dixon, "Land Tenure Patterns and Agricultural Development in North East Thailand: a case study of the Lam Pao irrigation scheme in changwat Kalasin", Journal of the Royal Siam Society, Vol.60, part 2, 1972, pp.45-60, ref. p.54.

11 Chamlong Tothong, "Benchmark Socio-economic Survey of Nong Wai Irrigated Area", United Nations, Bangkok, 1968, p.10.

12 On the basis of the yields prevailing in 1970-1, 54.9% of farmers had on average 4.44 rai, or 24.69% of their holdings as land surplus to their household needs, and the surplus area varied from 5.8% to 85.8% of the total holding.

necessary, to ensure as far as possible that except in the most unusual years they will produce sufficient rice for the household. Thus in favourable years a farm may have a considerable surplus, which could be sold or otherwise disposed of, but may well be retained in the rice barn as insurance against total failure in the following year. In the villages on the Chi flood plain, Lao Yai, Non Sung and the neighbouring settlements, large stocks of rice are held to even out the good and bad years. Up to two years' rice may be held in store by the villagers of Lao Yai, as one good harvest, like that of 1971-2, gives enough rice for two bad years. Floods caused very poor harvests in 1967-8, 1968-9, 1969-70 and 1970-1. Farmers interviewed spoke of two, three and in some cases four years of almost total crop loss. The traditional pattern has been for consumption needs to be met by rice purchase, selling livestock and sending the younger members of the household to seek work as far away as Bangkok. The headman of Lao Yai maintained that most people could store enough rice for one year of complete loss, and many for two. The extremely good years following the four bad ones show how a good harvest can be used to spread over ensuing years of poor or indifferent production.

The differences in topography between the various plots are also reflected in the cultivation practices. Low-lying plots, such as those adjacent to the nong at Ban Tum (map IV.1) or its counterpart at Non Sung are prized as sites for the location of early seedbeds. These plots may be used for the cultivation of seedlings, later transplanted onto higher fields, although as seedbeds they may be too wet to plant at all in many years. Farmers are willing to use such plots as seedbeds even if they are a considerable distance from their main rice fields and the village. The low-lying areas can be cultivated earlier, often with a longer stalked rice with a slower rate of maturation.

Plots on higher sites will be planted later, after sufficient rain has fallen to soak the soil and make planting possible; this may be a shorter stalked rice which matures more quickly. Thus advantage of the varied topography can be taken to stagger the planting and harvesting labour demand peaks, a goal also encouraged by the selection of rices with different maturation times. Such use of local rice varieties as a response to the requirement of staggering the labour use and different water conditions poses problems for the introduction of improved, higher yielding rice strains, which are of standard height and maturation period.

The low-lying plots, especially in the flood prone lands of the Chi flood plain, exemplified by the villages of Lao Yai and Non Sung, are likely to lose between one and three crops out of four from flooding. The vulnerable plots are often planted at a lower intensity, even in some instances with the seed broadcasted rather than transplanted. These lowest plots, although on very fertile alluvium, and potentially higher yielding than the upper ones, cannot be guaranteed to produce a good crop, therefore farmers cannot rely on them for household rice. Many are planted to non-glutinous rice now, intended for sale, while the main subsistence crop of the locally favoured glutinous type is planted on higher, lower yielding, but more reliable land.[13] Farmers would prefer to have low yielding but reliable land rather than high yielding land that may not produce sufficient rice for consumption every year. Where there is no alternative to relying on such unreliable land, storage is needed to even out one year's 'bumper' harvest over one or

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13 In Non Sung, one farmer had actually given his high-yielding unreliable plot to his younger brother and had cleared himself a new lower-yielding plot from the forest. There is some possibility of the plots becoming more flood prone in recent years, as clearance produces more rapid runoff.

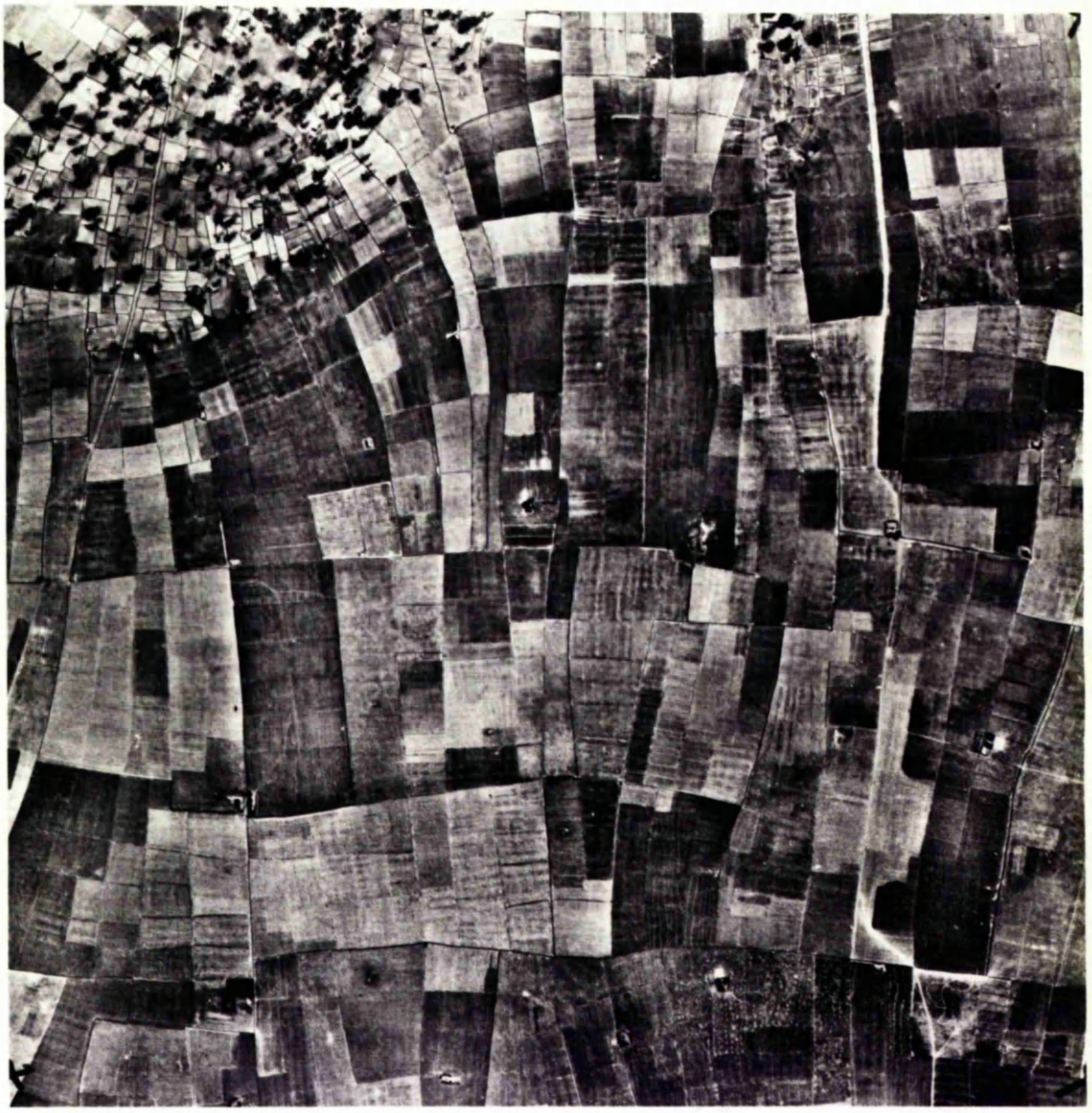

FIG. IV.2 Large and more regular paddy fields of the Chi flood plain south of Non Sung

two years with mediocre, or even no, harvests. Clearly the farmers concerned are not happy to do this, and place a low evaluation on land which, if an effective flood control programme for the Chi could be implemented, would be very rich indeed.[14]

The necessity for water control in paddy production is reflected in the sub-division of individual plots into fields (figure IV.1). In general three to four fields per rai is normal, that is, 400-500 square metres per field, but this varies considerably with local topography. The level lands of the Chi flood plain (figure IV.2) have clearly much larger fields than the sloping areas in the north of the study area (figure IV.1). The bunds are not only more numerous in areas of greater slope but also more massive and consequently absorb more construction labour initially and in maintenance. It is the subdivision into fields that will raise problems in this region, rather than the fragmentation of holdings into several plots.

Chamlong, in his survey of Nong Wai, found that "practically no-one has ever complaint (sic) about the fragmentation of land holding during the interview".[15] The holding pattern will, however, constitute a problem for the introduction of irrigated agriculture. In Na Chuak Nua, a number of problems have already made themselves felt.[16] Field work in the Lam Pra Plerng irrigation area in changwat Nakorn Ratchasima early in 1973 stressed the problems of water control and organisation that stem from the traditional land holding pattern, and emphasised the need for re-organisation to take place once the need for insurance against

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14 Completion of the Pa Mong Project and the Upper Chi scheme might aid this, but the need for a supplementary barrage and embankment is also apparent. (Chang Nukoon, R.I.D. Canal and Maintenance Engineer, Lam Pao, personal communication).

15 Chamlong, op.cit, p.10.

16 Demaine and Dixon, op.cit., pp.56-7.

TABLE IV.6

MANNER OF ACQUISITION OF PADDY PLOTS

	Purchase	Inheri-tance	Rent	Free Use [+1]	Cleared	Other
Na Chuak Nua	24.53	67.92	-	1.89	5.66	-
Ban Tum	10.59	85.88	-	2.35	-	-
Um Mao	5.26	89.47	-	5.26	-	1.18
Fai Taek	4.71	61.90	23.81	9.52	-	-
Ban Lek	6.67	86.67	3.33	3.33	-	-
Non Sung	10.42	83.33	-	6.25	-	-
Lao Yai	15.38	84.62	-	-	-	-
Lam Pao Area	11.32	81.45	2.20	3.77	0.94	0.31

[+1] Farmers who possess land they cannot cultivate on occasion allow it to be used free of charge by friends or relatives; this may occur in particular when the land is owned by an elderly household head who can no longer work all his land, and he permits his son-in-law to do so.

environmental hazard of the traditional kind ceases to be necessary.[17]

The lack of potential paddy land still under forest and the gradual cessation of the practice of cutting more paddy from the forest is emphasised by the manner of acquisition of the land presently held (table IV.6). In the sample, no paddy land was acquired by clearance, though in Na Chuak Nua and Non Sung two or three cases were encountered in the course of land tenure surveying. Paddy land is mainly inherited. The drying up of the sources of new paddy land in the area makes purchase more important, and prices of paddy land appear to be rising, although evidence on this point is scanty.

Renting of land is not a characteristic of the North East. Free use and joint use of land is much more prevalent than any form of renting, either for cash or kind payments.[18] Fai Taek, with its shortage of land, has a higher incidence of renting, free use and shared cultivation than the other villages. In the more commercially developed areas of the Central Plain, renting has become extremely widespread and it may be expected that the development of irrigation and more commercial agriculture will produce a similar situation in the North East.[19] In Buriram in the southern North East there has been a recent increase in renting, associated with merchants acquiring land from unrepaid loans and renting it out, but at present this is atypical of the region as a

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17 These conclusions were drawn from a preliminary survey of the irrigation project conducted in March-April 1973 for the I.B.R.D.

18 Paddy land is normally rented in kind rather than money, and the level of rent open to adjustment in view of the yield, but in general constituted half the crop. Ng, working in Huey Sithon, found that rent in kind for paddy land predominated, and that it averaged 35-45% of production. (R. Ng, "The Socio-economic Conditions in Huey Sithon", 1972, p.10).

19 In the Central Plain, the development of commercial rice production has been associated with a decline in owner-occupied farming, with land passing into the hands of merchants and large farmers, who rent it out. It may be that this pattern will be followed in the North East as more commercialised farming develops.

whole, although a possible direction that might be taken.

In general there is no legal proof of land holding, and few farmers have title deeds of any sort. There are three types of title deed, which are, in descending order of legality:

1) A title deed issued by the Land Development Department is the most legally perfect title to land. The lengthy process of registration accounts to some extent for the very small percentage of land registered in this way.

2) The N.S.3 title deed, issued since 1954, enables the farmer to register the fact that he is actively cultivating the land and publicly gives notice of the fact. This deed is in effect a negotiable certificate.

3) The S.K.1 title deed can be obtained by registering the fact that the land is held at the Amphur Office. In theory the land cannot be sold or mortgaged without one of the other deeds.

It is expected that the number of farmers with title deeds will increase with the spreading of rural credit facilities and irrigation. Until recently only Land Development Deeds and N.S.3 deeds were acceptable for loans or mortgages from the various government co-operatives. However now the Thai Farmers Bank is also taking the S.K.1 deed into account, in view of the difficulty of obtaining more legal deeds at short notice.[20] The Land Development Department in 1972-3 stepped up its programme of surveying and registration, making use of headmen to carry out the necessary measurements of the plots during the dry season. Farmers are reticent about title deeds, partly because they

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20 Thai Farmers Bank, Kalasin Branch, personal communication, 1972.

feel they ought to have one.[21] Thus it is difficult to collect statistics on title deeds. Chamlong found similar problems in Nong Wai and in consequence dropped the question on tenure from his questionnaire.[22]

The title deeds that were examined during land tenure mapping were in many cases so roughly drawn as to be meaningless for determining e ither the shape or the size of the land concerned. It is clear that the resultant problems for reorganisation of holdings and compensation when irrigation is introduced into the villages will be considerable. It may be seen that the farmers'present lack of concern over land titles reflects a low level of commercial outlook which is in the process of changing.

Rice Types

Grist says:

"The varieties of cultivated rice are legion and the variation of characters exhibited by them enables the crop to be grown with success over a whole range of climatic and cultural conditions".[23]

A basic distinction in rice varieties is made between glutinous and non-glutinous, and in the context of the study area this is by far the most significant division. The dominance of the glutinous variety in the study area and in Kalasin itself has been noted already. Variations between the amphurs and individual villages are shown in

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21 A survey of Huey Sithon area in 1972 suggested that 28.9% of farmers had title deeds, 46.1% had NS 1 deeds, and 25% had S.K.1 deeds (Ng, 1972, op.cit., unpublished report, prepared for F.A.O., December 1972, p.11). These figures cannot be used to indicate the situation in Lam Pao area because of very different conditions. The F.A.O. Pilot Farm Project has undertaken land reorganisation and this has resulted in farmers in Huey Sithon being forced to obtain some form of land title. With the progress of irrigation in Lam Pao a similar expansion is expected in the acquisition of deeds.

22 Chamlong, op.cit., pp.8-9.

23 D.H. Grist, "Rice", 1968, p.81.

TABLE IV, 7

% OF PADDY LAND PLANTED TO NON-GLUTINOUS RICE

	1970-1		1971-2	
	Sample Villages	Amphur	Sample Villages	Amphur
NA CHUAK NUA	0.5	YANGTALAD 8.0	4.5	YANGTALAD 7.9
BAN TUM	0.4		4.6	
UM MAO	4.2		14.2	
FAI TAEK	1.8	MUANG 1.1	1.3	MUANG 2.3
BAN LEK	2.0		1.5	
NON SUNG	3.8	KOMALASAI 16.3	20.2	KOMALASAI 29.2
LAO YAI	15.4		36.3	
LAM PAO AREA	2.21		8.3	

TABLE IV, 8

IMPROVED RICE VARIETIES

Varieties recommended for use in the North East Region by the Rice Department include:

Glutinous	Non-Glutinous
Khi Dom Yai	Khaw Dok Mali
Sanphatong	Leaung Yai
Kam Pai	

Source: Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1965, p.108.

table IV.7. (In chapter V the implications for commercial orientation of the two rice types will be discussed). However in all villages the glutinous rice remains dominant.

The table tends to underestimate the production of non-glutinous rice because virtually every farmer grows a few kilograms in the corner of one of his glutinous plots. This small amount is necessary for the preparation of various confectioneries for household consumption.[24] The areas and quantities concerned are too small to measure with any degree of accuracy and farmers do not seem to be able to specify the small amount very precisely.

The local varieties of both glutinous and non-glutinous rice are what may be termed 'broad spectrum' rice.[25] They are resistant to drought and flood and produce yields, admittedly low yields, under adverse conditions. Seed selection is practised, in so far as farmers select the best looking seeds from the threshing floor and make certain that no non-glutinous seeds get mixed with the glutinous. In some instances a farmer may obtain seed from a friend or neighbour who has a crop that impresses him.[26] The local varieties are very resistant to blast and other rice diseases, and also tend to have long stalks and do not lodge easily. Farmers normally used two or three varieties of glutinous rice, most of which were well-established seeds known and used by their parents.

The local varieties are collectively referred to as 'khaw tamadar', literally, ordinary rice, which covers a multitude of sub-types. Watabe distinguished an early and late group of glutinous varieties,

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24 Confectionery, 'kannom', is an important part of the Thai diet.

25 R. Hill, personal communication, 1973.

26 J. Ingersoll, "Notes on North Eastern Rice Stations and Cultivation", 1972, p.26.

TABLE IV.9

PERCENTAGE USE OF NEW RICE VARIETIES

	1970/1	1971/2
Na Chuak Nua	20.0	8.11
Ban Tum	47.36	68.33
Um Mao	45.71	68.75
Fai Taek	24.00	26.09
Ban Lek	45.23	95.24
Non Sung	51.51	95.59
Lao Yai	54.54	100.00
Lam Pao Area	37.6	65.43

Note: The difference between the two years reflects the acceptance of Sanphatong as "local". In 1970-1 the question asked about "new varieties"; in 1971-2 "new, for example Sanphatong or Kam pai".

the former maturing in 135 days or less and the latter in 165 days or more.[27] Locally, varieties are divided into early, medium and late or heavy, medium and light varieties, which reflect the yield and length of maturation.[28] These variations between the local varieties give an added insurance factor in producing the household needs under a variety of conditions as well as helping to disperse the labour peaks. Farmers may well plant two or three different varieties on the same plot, perhaps to take account of topographical variation within the plot, but also to allow for environmental variations. This is borne out by farmers who reported planting the different varieties not in any ordered manner, nor in the same way every year. In a wet year, some performed better than others, thus three varieties, one of which performed best under wet, one under average, and one under dry conditions would reduce the risks of total loss.

Long stalked varieties up to two metres in height are valued for planting on land that floods deeply, and these are the most difficult to replace with improved varieties. Salt resistance is high in local strains, and in villages such as Ban Lek, where salt deposits present problems for rice cultivation, the introduction of newer varieties on all the land is problematic.

Over the last decade, improved varieties of glutinous and non-glutinous rice have made considerable headway in the study area and the North East in general. Table IV.8 indicates the varieties recommended for the North East by the Ministry of Agriculture. Two varieties, Sanphatong and Kam Pai in particular have spread widely in the area. As may be seen from table IV.9, the majority of farmers are

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27 T. Watabe, "Glutinous Rice in Northern Thailand", 1967, p.

28 Ibid., p.44.

now growing one of the improved varieties on at least some part of their holding. These new varieties were promoted by the Agricultural Extension and Rice Departments. In general, these types were introduced to a few farmers and, because they were successful, spread by impressing other farmers, who usually obtained the seed from those already growing them, or in a few cases direct from the Agricultural Extension Office.[29]

Sanphatong is the most widely used and most favoured of the improved strains by farmers in this area. It has a good taste, and is generally resistant to drought and disease. The greatest weakness of the variety is its susceptibility to drought in the September-October period just before the harvest. Rice millers and traders pay a premium to farmers for Sanphatong because of its good reputation for taste and the long even grains which are more acceptable for milling than the shorter, rounder, often longer and more uneven, local rices. Sanphatong does not lodge easily and responds well to fertilizer, which the local varieties do not. Kam pai is less successful, although potentially high yielding, as the longer, coarser grains are not highly regarded by either farmers or merchants.[30] Since Kam Pai has long stalks, up to two metres, and grows fast, it is planted on low, flood prone land, particularly in Ban Lek.

Despite the successful adoption of improved varieties, farmers retain some local varieties for planting under particular conditions of flood or drought. In addition, some are retained for taste. Small quantities of the black glutinous rice are still grown, because of its

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29 Ingersoll, op.cit, pp.26-7.

30 Under North East farm conditions, the Rice Department gives mean yields of 301 kilograms per rai for Kam pai and 246 for Sanphatong. (Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1965, p.108).

highly prized eating qualities, and in spite of difficult cultivation and very low yields.

The adoption of improved types reduces the insurance against risk and the spreading of the labour peaks. However, the increased yields and improved nature of the grain are clearly important factors in the farmers' minds. The percentage of farmers growing them, shown in table IV.9, may well be an underestimate because over the last decade Sanphatong in particular has become 'local' in the opinion of many farmers.[31]

The small areas of non-glutinous rice have shown similar tendencies to be planted to improved rices. Khaw Daeng ('red rice'), has been displaced by Lueang Yai 11 and Khaw Dok Mali where the rice is being grown for sale. Millers and merchants again offer a high price for this variety (see chapter VIII).

The changes in the rice types grown in the area have taken place only within the limits of the farmers' desire to ensure the level of production. Further changes to higher yielding varieties would produce serious problems of land use practice and reduce the reliability of production. In the Lam Pra Plerng Irrigation Project area of Nakorn Ratchasima, the problems associated with the introduction of R.D.I., a high yielding, non-photosensitive, 120 day, non-glutinous variety suitable for second cropping, were found to be numerous. Its shorter stalks preclude planting on land that floods deeply. It is less resistant to disease and this necessitates treatment of the seed with copper sulphate to prevent blast, and frequent spraying with insecticide. While all the signs were that the second crop area of paddy was going to

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31 The tabulation is based on a question which asked about local and improved varieties without specifying which strains came in each category.

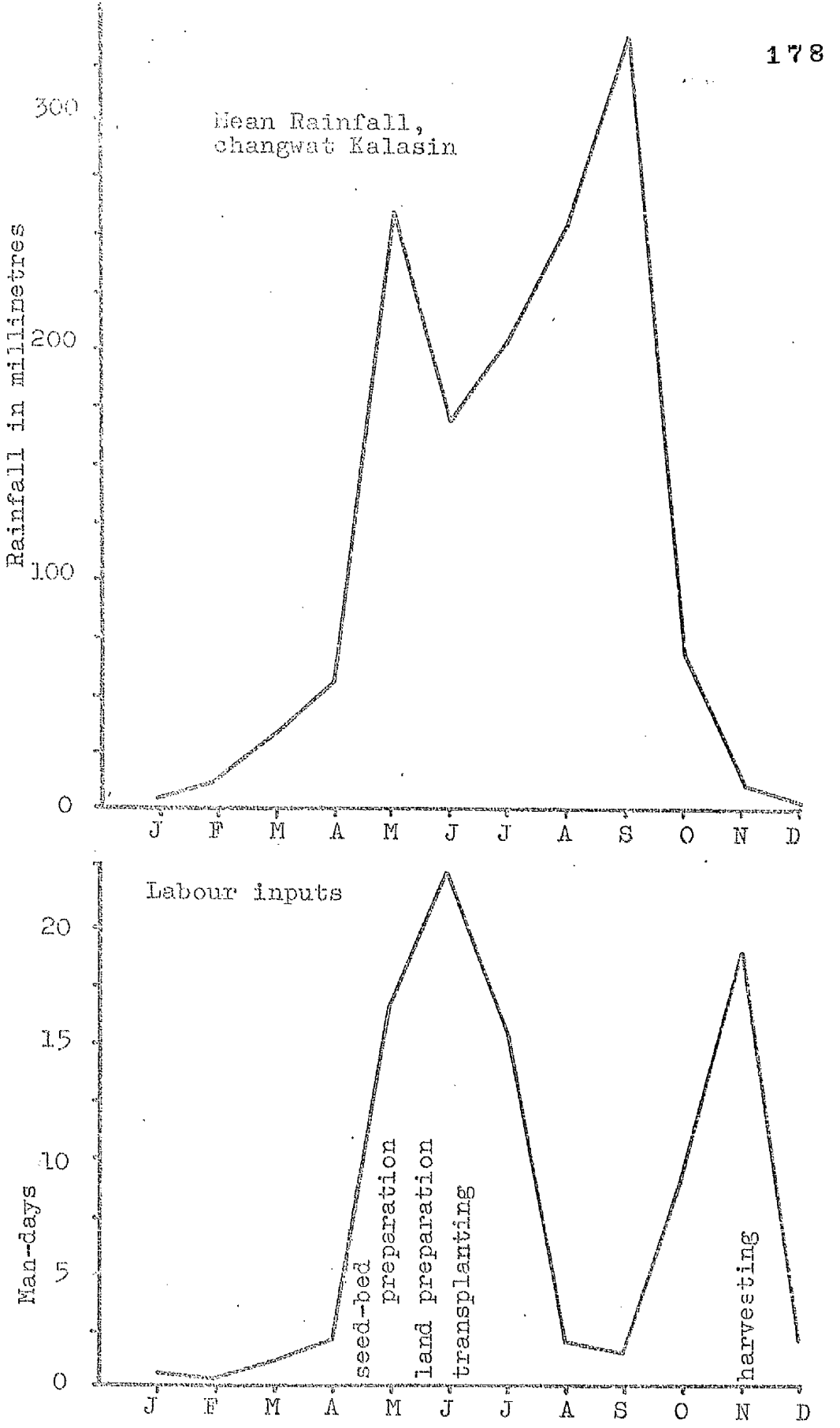

Fig. IV.3 The Rice Year and the Rainfall Pattern

produce the 400-500 kilograms per rai yields predicted under irrigation conditions,[32] the farmers were well aware of the shortcomings of the variety compared to the local types.[33] Such higher yielding varieties are good for commercial production and frequently have a good export market, but where farmers are still concerned with household consumption they seldom find them to their taste.[34] The development of high yielding varieties necessitates irrigation, land levelling, and good water control, combined with a very much higher level of inputs than at present is generally the case. Overall the problem is a dual one of greater control of the rice environment and the cultivation of a more commercial outlook among rice farmers. However, traditional kinds, with their superior taste, are likely to remain part of the farm economy, even if they are merely retained for on-farm consumption.

Rice Planting Cycle

There is no apparent difference in the cultivation patterns or in the timing of the farm year between the improved and native varieties of paddy in the study area. Under the conditions of rainfed agriculture prevailing, the timing of farm activities is closely related to the monthly rainfall pattern. The relationship between the average rainfall pattern, and the main tasks, measured in man-days per month, is shown in figure IV.3.

Seedbed preparation takes place just before or at the start

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32 Compared to North East rice yields of less than 200 kilograms/rai on average.

33 Field work in the Lam Pra Plerng Irrigation Project area of changwat Nakorn Ratchasima in 1973, for the I.B.R.D.

34 In the Central Plain, R.D.I. is grown as a second crop for sale as an export crop but on the local market commands a lower price than the local or other improved varieties such as Lueang Yai 11.

TABLE IV, 10

DATE OF PADDY LAND PREPARATION
(% of farmers)

Month	Not Ploughing	April	May	June	July	August
NA CHUAK NUA	2.9	2.9	68.6	25.7	0.0	0.0
BAN TUM	0.0	3.5	49.1	35.1	12.3	0.0
UM MAO	0.0	2.9	65.7	25.7	5.7	0.0
FAI TAEK	4.0	0.0	36.0	52.0	8.0	0.0
BAN LEK	0.0	0.0	38.1	57.1	2.4	2.4
NON SUNG	0.0	3.0	66.7	30.3	0.0	0.0
LAO YAI	0.0	9.1	72.7	9.1	0.0	9.1
LAM PAO AREA	0.8	2.5	54.6	36.1	5.0	0.8

TABLE IV, 11

DATE OF PADDY TRANSPLANTING
(% of farmers)

Month	Not Planting	May	June	July	August	September	October
NA CHUAK NUA	2.9	8.6	48.6	37.1	2.9	0.0	0.0
BAN TUM	0.0	1.8	24.6	45.6	17.5	8.8	1.8
UM MAO	0.0	2.9	42.9	42.9	11.4	0.0	0.0
FAI TAEK	0.0	4.0	20.0	48.0	28.0	0.0	0.0
BAN LEK	2.4	14.3	19.0	59.5	2.4	2.4	0.0
NON SUNG	0.0	9.1	57.6	33.3	0.0	0.0	0.0
LAO YAI	0.0	18.2	54.5	9.1	18.2	0.0	0.0
LAM PAO AREA	0.8	7.1	35.3	43.3	10.5	2.5	0.4

TABLE IV, 12

DATE OF PADDY HARVESTING
(% of farmers)

Month	Not Harvesting	October	November	December	January	February
NA CHUAK NUA	2.9	8.6	68.6	11.4	8.6	0.0
BAN TUM	0.0	12.3	64.9	21.1	1.8	0.0
UM MAO	0.0	22.9	62.9	8.6	5.7	0.0
FAI TAEK	0.0	24.0	48.0	24.0	4.0	0.0
BAN LEK	2.4	26.2	59.5	9.5	2.4	0.0
NON SUNG	0.0	21.2	75.8	3.0	0.0	0.0
LAO YAI	27.3	18.2	54.5	0.0	0.0	0.0
LAM PAO AREA	2.1	18.5	63.4	12.6	3.4	0.0

of the first rainfall peak in May or June; the lag between the rainfall peak and the main period of land preparation and transplanting reflects the accumulation of soil moisture necessary to enable the paddy soil that has been baked hard during the dry season to be broken up and prepared for transplanting the rice seedlings. Figure IV.4 gives the processes involved in paddy cultivation and indicates their relative timing in the 1971-2 crop season.

There is some variation in timing between the study villages, suggesting local varieties in rainfall, soil and water economy (tables IV.10, IV.11 and IV.12). Even within the same village, timing will vary in response to soil, topography, and the rice type planted. In 1971 there was a tendency to later transplanting in Ban Lek, Ban Tum and Fai Taek, and earlier transplanting in Non Sung and Lao Yai; these differences were paralleled by differences in harvesting date (table IV.12). These differences are largely those of topography, with high drought prone land in Ban Lek and Ban Tum, and lower lying flood prone land in Non Sung and Lao Yai, but intra-village variation tends to blur these distinctions between the villages.

In chapter I the highly variable nature of the precipitation of the North East was noted. Local variations are important in explaining timing differences between the villages, but variations between years in the timing of the peaks of rainfall result in marked shifts in the overall pattern of the rice year. In the study area the later onset of the wet season in 1971 resulted in a general shift of a month throughout the year, compared with 1970.

In 1973, the village of Na Chuak Nua planted paddy a full month earlier than the other villages, because of the early reception of supplementary irrigation water in that year which enabled cultivation to begin earlier in spite of the lateness of the season and the delay in the

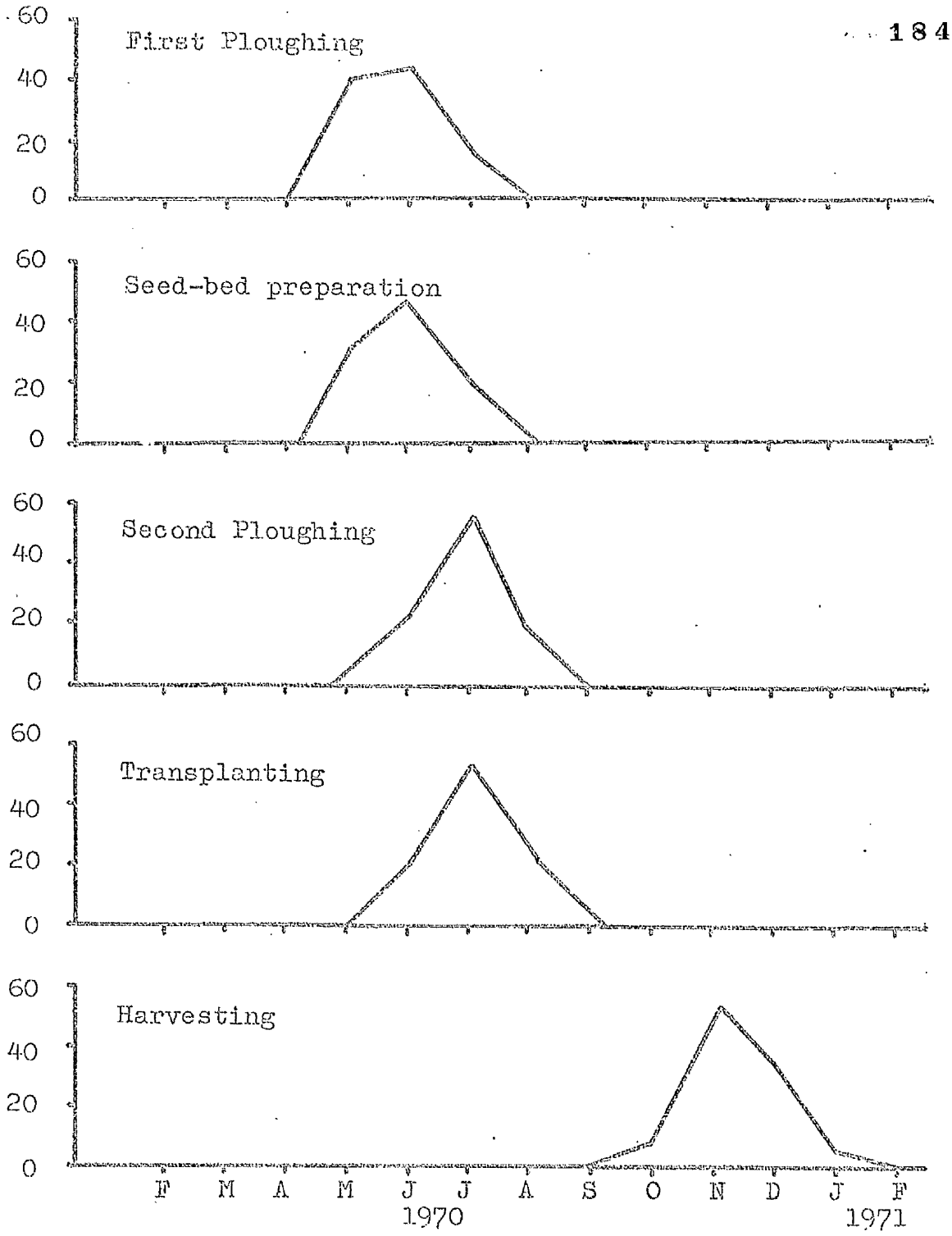

Fig. IV.4 The Rice Year - the percentage of farmers engaged in the major activities of paddy production in each month

rice year in the rest of the area. The availability of supplementary water in the months from May to July will stabilise the timing of the farm year as well as lessening the area unplantable because of drought, or lost because of drought in the later months (July to October). This stabilising is vital for the development of dry season irrigation and second cropping. In years such as 1972-3, very late occurrence of the rains resulted in farmers without supplementary water still transplanting in September. The consequent harvesting in late February or even March would seriously interfere with any double cropping on the paddy land. The use of supplementary irrigation water in Na Chuak Nua resulted in generally earlier harvesting and so no delay in the planting of the 100-150 rai of second crop vegetables on the paddy. Elsewhere the lack of stability in the timing of the year's activities has little if any effect on the very small area of vegetables and tobacco planted in the paddy fields during the dry season. However late harvest does cut into the time available for traditional dry season activities - visiting, festivals, house-building and land clearance - and for off-farm work either in the area or through temporary migration to another part of the kingdom.

Cultivation Practices

The cultivation of paddy in the study area follows closely the pattern observed elsewhere in the North East.

Normally the fields are ploughed once sufficient rain has fallen to soften the soil. There is no mechanical ploughing, all being done by means of a wooden plough and either one or two water-buffalo. At the time of the first ploughing the dykes and bunds are put into a state of full repair to facilitate water control later in the season. A second ploughing takes place normally when the first rainfall peak

arrives in June or July; the thorough soaking of the paddy allows the soil to be fully broken up and levelled with a harrow. The second ploughing and harrowing is normally rapidly followed by transplanting, indeed it is not unusual to see harrowing at one end of a plot and planting at the other if sufficient labour is available. In years when either time or labour is short, due to the late arrival of the rains or a reduction in the labour supply, farmers will omit the harrowing and sometimes even the second ploughing. The failure to level the ground completely before transplanting results in poor water control and generally uneven growth and lower yields.

The timing of the seedbed preparation is critical, as the bed has to be established so that the seedlings are ready to transplant as soon as the arrival of the first rainfall peak has allowed full preparation of the paddy fields. Misjudgement or the delaying of the rainfall peak can lead to the seedlings not being ready, or, more likely, too mature. A number of farmers in 1972 had to establish a second seedbed because of the late arrival of the rains in that year; this was particularly apparent in Na Chuak Nua amongst those with plots at a higher elevation that needed rather more rain before they could complete their land preparation.

There is some variation in the practices of seedbed cultivation. Overall in Lam Pao, ratios of seedbed to paddy area transplanted varied from 4 to 11, with a mean of 8.9, large plots having a marked tendency to proportionately smaller seedbeds, although rounding of the very small units involved confuses the pattern. Watabe, working on glutinous rice in North Thailand, found ratios in the range 16 to 26; rather higher, in an area of more intensive rice cultivation.[35] Normally seed was soaked

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35 Watabe, op.cit., p.61.

for two days before being broadcast onto the prepared seedbed surface. Glutinous rice was seeded at approximately 7 kilograms per rai. Farmers speak generally of 'one tang per rai of seed', which suggests 10 kilograms per rai, but the difficulty of measuring the size of seedbeds, normally given in 'ngaan' (400 square metres) or 'waa' (four square metres) gives a considerable margin of error to estimates of both area and seedbed ratios. Watabe found North Thai seed applications to fall in the range 4.5 to 10 kilograms per rai.[36]

There appears to be a tendency for farmers to over-seed. The issue of improved seed by the Agricultural Extension staff in the Lam Pra Plerng area in early 1973 resulted in farmers using ten kilograms per rai in spite of the official recommendation that five was sufficient. Non-glutinous rice seeding levels were as much as 50% lower than glutinous planted by the same farmer. In general the seeding of non-glutinous at 4 to 5 kilograms per rai appears to reflect the local lower evaluation of the crop and the lower level of intensity with which it is cultivated. Non-glutinous seeding for similar varieties, for example Lueang Yai 11 and Khaw Dok Mali in Nakorn Ratchasima, which is predominantly a non-glutinous eating area, was of the order of 8 to 10 kilograms per rai.

Seedlings are left in the bed commonly for 35 to 40 days, with extreme cases of 25 and 44 days. Farmers claim that the extreme upper limit is 60 days for glutinous rice; Watabe quotes an example of 110 days from Phrae in North Thailand.[37] The drying out of the seedbed can prolong the period by a few more days but in general farmers agreed that over 60 days and the seedbed is wasted, and another one has to be

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36 Ibid.,

37 Ibid., p.65.

established. After 35 to 40 days the seedlings are considered too long for successful transplanting and have their tops cut off, producing an even length of approximately half a metre. Neither the cutting of the tops nor a long period of up to 60 days in the bed is considered by the farmers to affect yields.

Farmers attach great importance to the care taken in preparing the seedbeds; the majority apply considerable quantities of natural fertiliser to the plots. This use of straw, buffalo manure and wood ash on glutinous rice seed beds conflicts with Watabe's findings. He observed no instance of fertiliser application on glutinous seed beds in North Thailand.[38] On the other hand, Fronda and Bau[39] both cite examples of fertiliser use, the former referring to Thailand in general, the latter to Saraphee in Nakorn Ratchasima. Grist considers that in tropical areas as a whole fertiliser application on seed beds results in over-development of the seedlings and a weakening of the plants.[40] Excessive length in seedlings after only 35 or 40 days in the bed is a problem in both North and North East Thailand, but in one heavy fertiliser application is observed, and in the other it is apparently absent.

The transplanting of the seedlings is by far the most labour intensive operation of paddy cultivation. In the study area all the glutinous rice was transplanted, and examination of official figures for the North East suggest that this is true of the whole region.[41] The

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38 Ibid., p.63.

39 F.M. Fronda, "Thailand Farming", Philippine Journal of Agricultural Economics, 36, 4, 1952, p.191; and D.H. Bau, "Agricultural Economic Survey of Saraphee District", 1951, p.20.

40 Grist, op.cit, p.117.

41 Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1965.

broadcast sowing of non-glutinous rice was, however, concentrated in both Non Sung and Lao Yai on particularly low and unreliable plots. Broadcast sowing reduces labour inputs in paddy by at least a third; it is, however, by no means a common practice in the North East even for non-glutinous rice.

With the completion of transplanting, labour input in paddy falls to a low level until the harvest. Some 15.6% of farmers weed their paddy, about a month after transplanting; after this date the depth of water and the rapid growth of the paddy combine to suppress weed growth. Weeding involves either hoeing between the plants or trampling the weeds underfoot. Excessive weed growth only appears where water supply in inadequate or water control poor due to incomplete levelling of the field before transplanting.

The high temperature of the dry season combined with the habit of burning the rice straw in the paddy field is likely to inhibit weed growth in the early weeks before transplanting.[42] Where paddy fields do not fully dry out during the dry season, weed growth is likely to constitute a problem both for land preparation and during the early period of growth; farmers in irrigation areas who do not plant a dry season crop but whose fields remain wet due to seepage from their neighbours' irrigated fields are likely to suffer in particular from weeds. In general, though, weed growth is not a problem in the North East.[43]

Ideally the standing water in the paddy is drained off up to a month before harvest to allow drying and ripening of the rice; the degree to which this is done depends on the individual practice of the

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42 Watabe, op.cit., p.71.

43 Ibid., p.70. Watabe reaches a similar conclusion for North Thailand.

TABLE IV, 13

% PADDY HOLDING PLANTED (Glutinous Rice)

	1970-1	1971-2
Na Chuak Nua	85.47	82.83
Ban Tum	100.00	95.56
Um Mao	100.00	94.41
Fai Taek	90.00	97.30
Ban Lek	100.00	92.61
Non Sung	99.35	96.66
Lao Yai	100.00	86.67
Lam Pao Area	96.35	92.19

farmer as well as on the physical nature of the plot. All harvesting is done by hand, the paddy being cut by means of a small sickle some half a metre below the head.

A threshing floor is prepared using beaten mud on a dry site as near to the paddy field as possible. If the paddy is still wet it may be left in the field in bundles to dry out for two or three days before threshing. There are some regional variations in threshing practices; in the study area and much of the North East the bundles of paddy are beaten against two upright bamboo poles, the grain being collected from the beaten mud floor and transported to the rice barn by khwien. Buffalo and cattle will be allowed to graze on the rice straw during the early dry season, the remaining stubble being burnt off late in the dry season before the onset of the early rains.

Planted Areas and Crop Damage

In chapter I the marked annual variation in the level of paddy production in the North East region was related to variation in the area planted, stemming from the prevailing environmental conditions. As may be seen from table IV.13, all the villages in the study area planted at least 80% of their holdings in both crop years recorded, overall 96.35% and 93.19% respectively of the total holding. Neither of these years was particularly unfavourable to paddy production during the early months of the year; in 1970-1, flooding affected the southern villages especially, but occurred in the period after transplanting and thus while it reduced production had no effect on the area planted. In 1971-2, the later onset of the rains and the generally drier conditions did result in some reduction in planted area so that all the villages except Fai Taek showed reductions of 2.64% to 13.33% from the previous year.

However, it is clear that in years when prolonged drought or severe flooding occurs in May-June, very large reduction in the area planted can occur.

The area left unplanted in any one year must be seen as representing the area unplantable given the prevailing environmental conditions of the North East. There is little evidence of a concept of economic marginality operating in the study region, with the area under the crop fluctuating with the expected demand for the crop. The existence of areas of unplantable land indicates the operation of the system of holding a variety of land as an insurance discussed above. In a limited number of instances, farmers planted a smaller area of land than they could under the conditions of the year, due to a shortage of labour because of illness, death or migration, or in the case of families that are usually labour deficient the inability to acquire supplementary labour through traditional mutual help organisation or by hiring. The existence of off-farm labouring opportunities has resulted in a reduction of the supply of hired workers for agricultural work, something particularly noticeable in Na Chuak Nua with its large holdings, small families and also proximity to the Lam Pao dam site.[44] Overall, however, this non-environmental cause limiting the percentage planted is of little significance.

In 1970-1, although over 96% of the paddy land was planted, some 33.3% of the planted area was damaged by flood, drought, disease, insects or other pests. The area affected varied from 71.8% in Fai Taek to 16.2% in Non Sung (table IV.14); the incidence showed similar variation with overall 54.2% of farmers experiencing some degree of damage, ranging

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44 The R.I.D. at Lam Pao pays 20 to 22.60 baht a day; transplanting rice in Na Chuak Nua in 1971-2 paid 6 or 7 baht, harvesting 7, and ploughing between 5 and 7 baht.

TABLE IV.14

AREA DAMAGED AND % UNPLANTED GLUTINOUS RICE, 1970/1

	% of farms with damage	% of planted area damaged	Mean area damaged (rai)	% of holding unplanted
Na Chuak Nua	48.6	29.6	4.5	14.38
Ban Tum	52.6	16.2	1.9	13.58
Um Mao	60.0	25.7	4.3	15.56
Fai Taek	60.0	37.2	3.5	32.25
Ban Lek	71.4	33.3	3.9	33.94
Non Sung	33.3	26.1	4.0	8.50
Lao Yai	45.5	71.8	7.9	40.0
Lam Pao Area	54.2	33.3	4.4	16.66

TABLE IV.15

DAMAGE BY % CAUSE, 1970/1

(Glutinous Rice)

	Drought	Flood	(Flood/Drought)	Insects	Other
Na Chuak Nua	42.8	38.0	(80.8)	19.1	-
Ban Tum	62.6	12.1	(74.7)	9.6	15.7
Um Mao	13.9	55.2	(69.1)	20.6	10.3
Fai Taek	67.3	21.8	(89.1)	5.5	5.5
Ban Lek	40.6	27.7	(68.3)	22.9	8.8
Non Sung	42.8	50.0	(92.8)	7.2	-
Lao Yai	14.3	85.8	(100.0)	-	-

from 71.4% in Ban Lek to 33.3% in Non Sung. The extent of the damage varied markedly, with Ban Tum reporting damage on 52.6% of the farms but only 16.2% of the area being affected (table IV.14); in contrast the 33.3% of farmers with damage in Non Sung resulted in 26.1% of the area damaged.

The severity of crop damage may be gauged from the amount of planted area not harvested. Overall about 17% of the planted area was totally lost, and a similar percentage partially lost but still harvestable. Lao Yai was by far the most severely affected with 40% totally lost, and a further 31.8% affected.

Damage was predominantly caused by drought and flood (table IV.15), with insects, disease, pests and animals of less importance. The lack of disease damage indicates the resistance of both local and introduced varieties used in the area. While birds, rats and field mice take a toll from the crop, they are present everywhere and are not normally reported as damage. Only crabs were seen as a particular problem in the saline soils of Ban Lek; a number of farmers were experimenting with various 'crustacides' such as Poseidon.

Flood or drought accounted for between 69.1% (Um Mao) and 100% (Lao Yai) of the damage. As noted in chapter III, villages and soils may be classified into drought and flood prone, although it must be remembered that because of the variety of land held within the village, drought and flood can occur on different plots held by the same farmer, or on different parts of a single plot. Lao Yai and Non Sung, situated on the low-lying lands of the Chi flood plain, and Um Mao on the flood plain of the Lam Phan, stand out as flood prone villages. Elsewhere there is a tendency to drought. (Fai Taek, although located close to the old watercourse of the Lam Pao, has its paddy land at a slight elevation and is thus less prone to flood than its position suggests).

TABLE IV 16

% OF PLANTED AREA HARVESTED (1970-1)

	Glutinous	Non-Glutinous
Na Chuak Nua	85.62	100.0
Ban Tum	86.32	100.0
Um Mao	84.44	69.23
Fai Taek	77.65	80.00
Ban Lek	76.06	57.14
Non Sung	91.50	100.00
Lao Yai	60.00	31.50
Lam Pao Area	83.33	68.29

At Ban Lek, the drought damage was compounded by the salinity of the soils. In wet years the salt is leached away, but in dry years it remains at or near the surface and reduces yield considerably. The headman estimated that about 100-150 rai of the village paddy land had a high degree of salinity, that is, 7-10% of the paddy holding. Ban Lek also suffers flooding from the nong close to the village, and the plots closest to it suffer damage in all but the driest years in spite of the planting of the long stalked rapidly growing rice varieties such as Kam Pai.

The tendency to plant non-glutinous rice on the most unreliable land is illustrated by the much greater percentage damage experienced by the crop. Some 68.29% of non-glutinous rice area was harvested compared to 83.33% for glutinous. In 1971-2 the drier conditions resulted in 90.67% of non-glutinous and 92.19% of glutinous harvested. In Lao Yai, the non-glutinous rice suffered particularly badly, and less than a third was harvested (table IV.16), reflecting the practice of planting the non-glutinous rice on the lowest and most vulnerable land.

Ban Tum, with its nong, and a general north-south slope of the land surface, had well drained land with drought more of a problem than flood except in patches of less well drained land to the north and in the immediate vicinity of the nong, and thus a low incidence of damage.

The generally more favourable environmental conditions in 1971-2 are reflected in the lower overall incidence of crop loss (table IV.16). Only Na Chuak Nua, due to its proneness to drought in a dry year, suffered more than in the preceding year. Overall only 7.81% of the planted area was damaged for glutinous, and only 9.33% non-glutinous. Lao Yai experienced only 13.33% damage, in marked contrast to the previous year.

TABLE IV 17

'NORMALITY' OF PRODUCTION (Glutinous Rice)

	'Normal'	1970-1	1970-1% of normal	1970-1 Production as % of 1971-2
Na Chuak Nua	3652.4	3373.2	92.35	117.51
Ban Tum	2633.5	2186.4	83.02	120.66
Um Mao	3588.8	3166.3	88.22	116.83
Fai Taek	3166.7	2638.9	83.33	136.96
Ban Lek	2269.2	1719.2	75.75	91.93
Non Sung	3805.1	3188.1	83.78	117.64
Lao Yai	3500.0	2141.7	61.19	203.68
Lam Pao Area	3061.2	2552.2	83.33	124.32

Thus it seems probable that the farmers not only inflate the figure, but also inflate it in proportion to the previous harvest.

The gains in crop production between the two years were not evenly distributed among the villages (table IV.17). Lao Yai experienced the most striking change, with the absence of flood damage more than doubling production. A similar lack of damage in Fai Taek resulted in an increase of 36.96%. Only Ban Lek had a worse year, due to drought compounded by salinity.

Labour Input

Discussion of the labour input raises questions of measurement, and in this study the unit used throughout has been the man-day, while no attempt has been made to standardise this unit by measuring the number of hours worked.

There is considerable variation in the level of labour input per rai in total and by process, both between villages (table IV.18) and between individuals (Appendix VI). To some extent, these differences reflect interpretations of the term 'man-day'; the length of time spent on any one process appears to increase with the time available and in fact the work done in a day declines. The early arrival of the rains may well be reflected in more leisurely land preparation, while a year of late rain may be accompanied by more rapid land preparation to compensate for the fewer days available.

Several farmers explained long periods of time spent on land preparation in terms of the age of the labour force, that is, a large proportion of elderly or very young and inexperienced workers. Differences in soil and distance of the plots from the village are also contributory factors. Heavy soil is likely to result in a higher level

TABLE IV.18

MAN-DAYS PER RAI BY PROCESS FOR GLUTINOUS RICE CULTIVATION

	Preparation	Planting	Weeding	Harvesting	Hired Labour	Total
Na Chuak Nua	2.2	4.1	1.7	3.2	1.6	11.6
Ban Tum	2.2	3.1	1.1	3.1	3.5	13.5
Um Mao	2.3	3.6	1.4	3.3	1.7	10.9
Fai Taek	3.8	4.2	1.8	4.7	4.4	19.4
Ban Lek	2.8	3.7	0.8	4.1	1.6	12.3
Non Sung	2.1	3.6	0.5	3.6	3.1	12.6
Lao Yai	2.9	4.5	1.0	6.2	-	11.7
Lam Pao Area	2.61	3.82	1.18	4.03	1.3	12.1

TABLE IV.19

PERCENTAGE OF LABOUR INPUT BY PROCESS FOR GLUTINOUS RICE

	Preparation	Planting	Weeding	Harvesting	% Total Labour devoted to paddy
Na Chuak Nua	19.64	36.60	15.17	28.57	73.8
Ban Tum	23.15	32.63	11.57	32.63	56.3
Um Mao	21.69	33.96	13.20	31.13	90.9
Fai Taek	18.30	28.96	12.40	32.41	74.7
Ban Lek	24.56	32.45	7.01	35.96	85.3
Non Sung	21.42	36.72	5.10	36.73	78.9
Lao Yai	19.86	30.82	6.84	42.46	76.2
Lam Pao Area	22.42	32.81	10.13	34.62	75.1

of input in land preparation, similarly plots at a distance from the village appear to have a large number of man-days spent in cultivation because of the inclusion of travel time in the working day.

However there are definite indications that some variations reflect levels of intensity of cultivation. In particular there is a marked decline in intensity as the holding increases in size. Smaller paddy holdings and villages such as Fai Taek, where per capita holding is small, have significantly higher level of labour input, both overall and by individual process.[45]

Labour inputs are by no means evenly distributed between the processes of cultivation; transplanting and harvesting absorb respectively 32.81% and 34.62% of total family labour input in paddy (table IV.19). In addition, labour is hired, or obtained through mutual help groups from neighbours and relatives.[46] 10.7% of the labour used in paddy cultivation was hired (table IV.18). The incidence of labour hire for paddy cultivation varies from a quarter in Ban Tum to none in Lao Yai. Overall it comprises a quarter of the total cash expenditure on paddy cultivation; in Fai Taek just over half of total cash inputs are for hired labour. Lao Yai utilises no paid labour in paddy, a reflection of the very unreliable land cultivated in the village, so that a return on any cash outlay cannot be guaranteed (table IV.20).

Hired labour is used for all processes, but predominantly for harvesting and transplanting. 3.8% of farmers hired labour for first ploughing, 3.5% for second ploughing, 13.2% for transplanting, 0.3% for

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45 Giving a correlation of -0.37, significant at the 99.9% level, between plot size and labour input per rai.

46 The groups are termed 'long kheaks', and are a traditional part of the village economy. Farmers help each other at transplanting and harvesting times in a reciprocal manner, in return for food, drink, and entertainment.

TABLE IV.20

GLUTINOUS RICE -
CASH INPUT PER RAI

	Insecticide		Fertilizer		Hired Labour		Total
	Baht	%	Baht	%	Baht	%	
NA CHUAK NUA	1.8	(13.38)	5.7	(42.37)	5.95	(44.23)	13.45
BAN TUM	2.3	(7.95)	13.6	(47.02)	13.02	(45.02)	28.92
UM MAO	1.8	(3.56)	12.9	(61.37)	6.32	(30.06)	21.02
FAI TAEK	5.5	(17.97)	8.7	(28.43)	16.40	(53.59)	30.60
BAN LEK	1.7	(7.24)	15.8	(67.37)	5.95	(25.37)	23.45
NON SUNG	1.1	(4.10)	14.1	(52.74)	11.53	(43.13)	26.73
LAO YAI	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0
LAM PAO AREA	2.36	(12.42)	11.8	(62.10)	4.84	(25.52)	19.00

The large areas of land damaged or totally lost through environmental hazard, plus the variation in area planted because of the unreliability of rainfall in the planting months, lead to uneven and uncertain paddy productions. Farmers cannot rely on the level of production of the traditional sector of the economy. Variations in planted area of paddy must be seen as a result of the environment, and not the farmers' response to external factors such as demand for the crop. Such uncertainty must be seen as resulting in a strong disincentive to intensify production and adopt new techniques.

Reliability of Production

In general, paddy production under the prevailing rainfed conditions is unreliable. To many farmers, some land that cannot be planted due to flood or drought, an element of crop loss and damage, are normal occurrences. In Um Mao, many farmers considered that the flood damage that they experienced in 1970-1 (55.2% of the village as a whole) was normal. Answers to the question "What production do you expect in a normal year?" were not wholly satisfactory. Farmers tended to over-estimate their 'normal' production, giving the production in years with no damage, but clearly damage usually is experienced.

With this qualification in mind, in 1970-1 some 83.33% of 'normal' production was achieved overall. As may be seen from table IV.17, this varied from over 90% in Na Chuak Nua to 61% in Lao Yai. There is, as one would expect, a general relationship between the percentage of normal production achieved and the degree of crop damage experienced, and the amount of land unplantable.

1971-2 was a markedly better crop year than the preceding one, with average production some 28.28% above. However farmers still returned a figure that suggested that the production was only 83.48% of the usual.

weeding, and 10.4% for harvesting. Similarly, the labour of neighbours and relatives was extensively used for the communal processes of harvesting and transplanting; 13.2% of farmers had help from neighbours to transplant and 12.3% from relatives, 15.7% had help from neighbours for harvesting and 10.4% from relatives. Any additional labour for weeding or ploughing had to be hired and could not be obtained from mutual help groups (Appendix VI.14, 15 and 16).

Overall 75.1% of total farm labour goes into paddy cultivation, 72.9% into glutinous cultivation and 2.2% into non-glutinous. In terms of the individual villages the labour devoted to rice varies from 56.3% (Ban Tum) to 90.9% (Um Mao) (table IV.19) reflecting strongly the degree of concentration on rice indicated by the land use (table IV.1).

The use of additional workers reflects a deficiency in family labour, or a wish to intensify production; the latter is particularly important in Fai Taek, where, despite the low labour-land ratio, an extra 29.3% of labour is hired. Hiring compensates for loss through death, illness, migration, or marriage. The supply of labour affects the intensity of production as well as the area planted. In general in the risky North East conditions, farmers opt for reducing the intensity of production rather than the area planted wherever possible. In Na Chuak Nua and the villages close to Kalasin town, the availability of off-farm employment opportunities results in a reduction in the surplus village labour for hire within the village agriculture; this situation is likely to worsen in the future.[47]

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47 Off-farm employment will be discussed in chapter IX.

Cash Inputs

Cash inputs in paddy cultivation comprise expenditure on insecticides, fertilizer, and hired labour. Table IV.20 indicates the total level of cash inputs per rai and the importance of each of these three constituent items.

Overall, cash inputs are dominated by fertiliser, 62% of the total cash input in paddy, as against 25.5% for hired labour and 12.4% for insecticides. In Ban Tum, Um Mao, Ban Lek and Non Sung, fertiliser is the dominant cash input; in Na Chuak Nua and Fai Taek more money is spent on hiring workers. Lao Yai uses no cash inputs of any sort in growing paddy.

84.6% of total cash inputs are devoted to paddy cultivation, 83.3% to glutinous and 1.3% to non-glutinous. The smaller percentage of inputs for non-glutinous than the percentage of land planted to the crop (2%) reflects the less intensive cultivation of the variety, compared with glutinous, which occupies 79.6% of the land but 83.3% of the inputs.

In terms of total expenditure, other than Lao Yai, the only village that differs substantially from the rest is Na Chuak Nua, where the larger holdings appear to relate to an overall lower level of intensity of cultivation measured in cash inputs.

The use of hired labour was discussed in the preceding section. The other chief uses of cash in agriculture, fertiliser and insecticides, are dealt with here.

Artificial fertiliser is applied to the paddy after transplanting by 52% of the farmers in the survey area, but this practice is not uniform in all the villages (table IV.21). There is also a marked tendency for the use to vary inversely with the size of holding.[48] Na

48 Significant at 99.9% level.

TABLE IV.21

FERTILIZER USE (Kilograms per rai)

	% Using Any Fertilizer	0-5	5-10	10-15	15-20	20+
Na Chuak Nua	12.2	33.3	38.9	16.8	5.6	5.6
Ban Tum	62.2	15.2	45.7	17.4	4.3	17.4
Um Mao	69.4	20.6	17.6	29.4	20.6	11.8
Fai Taek	59.3	25.0	43.8	6.3	25.0	-
Ban Lek	47.9	11.4	20.0	20.0	20.0	28.6
Non Sung	85.7	27.8	19.4	30.6	16.7	5.6
Lao Yai	-	-	-	-	-	-
Lam Pao Area	52.0	19.8	25.8	20.3	14.8	19.2

TABLE IV.22

INSECTICIDE USE (Baht per rai)

	% Using Any Insecticide	1-4	4-8	8-10
Na Chuak Nua	12.2	100.0	-	-
Ban Tum	6.8	66.7	33.3	-
Um Mao	6.1	100.0	-	-
Fai Taek	14.8	50.0	25.0	25.0
Ban Lek	6.8	100.0	-	-
Non Sung	11.9	100.0	-	-
Lao Yai	-	-	-	-
Lam Pao Area	9.64	88.9	7.4	3.7

Chuak Nua, with large holdings, and little planting of Sanphatong, obtains good yields with local varieties and little fertiliser. In contrast, Non Sung, with a high percentage of Sanphatong and a more commercial outlook on rice production, has a high incidence of fertiliser use (by 81% of farmers).[49]

Fertiliser is sold in the village by rice dealers, often on credit against the crop. The lack of fertiliser use in Lao Yai is in part explained by the farmers' lack of confidence in the local environment, as well as the high inherent fertility of the soil.

Where fertiliser is used, it is usually applied at a rate of 10-12 kilograms per rai, though many farmers applying it at the rate of only 2 to 3 kilograms per rai probably achieve little by doing so. Application of the recommended quantities is governed by cost, the reliability of the land, and the current price of rice. Prices of 2 to 2.50 baht per kilogram in 1970-1, with recommended applications of 15 kilograms per rai, would involve the expenditure of 30 to 37.50 baht per rai. The expected yield increases for the North East soils are of the order of 100 kilograms,[50] however given the rice price that year of 0.50 baht per kilogram, the best farmers could hope for would be a return of 50 baht on their outlay for each rai. Given the extremely unreliable crop yields prevalent, there is thus little incentive for fertiliser use. In Lao Yai the particularly unreliable land makes the likelihood of return less, and this accounts for the fact that even those farmers with very small holdings do not use fertiliser there.

Higher rice prices of 0.80 baht a kilogram in 1971-2 and 1.2 baht in 1972-3 have clearly given more incentive to use fertiliser.

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49 Their more commercial outlook will be discussed in chapter V.

50 Prince Sithiporn Kridakara, "Rice Farming in Siam," 1969, p.19.

However there is neither any guarantee that the price will remain high, nor that the climatic conditions will not negate the effects of fertiliser. Farmers using fertiliser in the study area fall into two classes. Those who are growing rice for sale, that is, those aiming to produce a regular surplus, and those who, because of small per capita rice holding, are using fertiliser to boost an otherwise inadequate level of production. The former category are particularly evident in Non Sung, where relatively large quantities of fertiliser are applied to the more reliable glutinous rice plots. A similar situation is seen in Um Mao. In both these villages, paddy production forms by far the most important source of cash income; rice growing is seen as less of a subsistence activity here then elsewhere.[51]

In Fai Taek, a number of farmers are using fertiliser as almost a desperation measure to increase production, although sale of rice is a very insignificant part of the cash income.[52] It was clear from examination of individual cases that the cost of fertiliser was scarcely recouped in paddy produced at the current market price. It is likely, though, that the majority of farmers failed to achieve the maximum benefit by applying too little; 65.9% of those applying fertiliser applied less than the recommended 15 kilograms per rai. Application averaged 13.37 kilograms, and it is likely that under the conditions of the North East, little gain in yield would be made by these rates.

Insecticide is of marginal importance in the area on the whole; less than 10% of farmers use it (table IV.22), ranging from 5.4% (Ban Tum) to 14.8% and 14.3% (Fai Taek and Non Sung). Applications of

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51 In 1970-1, 51.8% of cash income in Um Mao and 33.9% in Non Sung was derived from rice sales; the average over the seven villages was only 15.8%.

52 See chapter IX.

insecticide cost on average only 2.37 baht per rai, with a range from 1 baht to 10; in general the amount applied is too small to produce any real effect.

Overall there is, as with labour input, a significant decline in the level of input of insecticide and fertiliser as the size of the plot increases.[53] The tendency towards extensive farming at a low level of intensity is still very prevalent, and it is the small holders who use the highest level of cash inputs and largest amounts of labour.

There is no statistical indication that the large plots contain a larger percentage of marginal land than smaller plots, and the damaged area and the percentage of the holding area planted do not bear any relation to the size of the plot. However these are not comprehensive indicators of the marginality of the land. Farmers cultivating more intensively can be typified as those with smaller per capita holdings, not cultivating the most unreliable land, with a tendency towards deficit production in terms of household needs which may be made up by heavier input[54] or a reliance on paddy as a source of cash income.

Variation in the level of cash input may be expected between years. The use of fertiliser, insecticide and hired labour necessitates the supply of the input and the cash to purchase it. As has been noted, the supply of hired labour is likely to suffer by competition from off-farm employment. A poor crop year, either in terms of low production or low prices, may result in a shortage of cash to purchase inputs, which will result in a lower level of intensity of production in the succeeding year.

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53 Significant at 99.9% level.

54 Farmers interviewed were in this situation, but there is no indication in the survey data. (See chapter V, for an analysis of surplus and deficit farmers.)

TABLE IV.23

GLUTINOUS RICE YIELDS (in kilograms per rai)

	1970-1		1971-2	
	Lam Pao	Official Tambon	Lam Pao	Official Tambon
Na Chuak Nua	266.2	187.9	224.7	145.9
Ban Tum	242.6	163.6	238.4	220.6
Um Mao	265.2	113.9	316.1	183.9
Fai Taek	301.2	189.9	313.1	189.8
Ban Lek	255.2	207.9	262.1	186.7
Non Sung	265.1	216.4	291.3	140.7
Lao Yai	212.2	256.7	330.2	125.8
Lam Pao Area	259.7	190.9	266.4	170.5

Source: Tambon figures from Agricultural Offices in Amphurs Komalasai, Yangtalad and Muang.

The Determinants of Yield

In chapter I, the paddy yields of the North East were described as low but more stable than those of Thailand as a whole. Changwat Kalasin, as was noted in chapter III, is at, or slightly above, the North East region average. However, considerable variations of both a spatial and a temporal nature are present in the Lam Pao study area, as in the North East in general. Table IV.23 indicates the variation in mean village yields between the two crop seasons studied, and illustrates that even within the same tambon there is considerable variation.[55] Table IV.24 further illustrates the yield variation between farmers within the villages studied in the 1970-1 season.

Variation in yields may be related to the different soil types and physical conditions of the Lam Pao area (outlined in chapter III) and to fluctuations in the quantity and distribution of rainfall within the area and between years. Attention was drawn in chapter III to the existence of flood and drought prone paddy soils in the study area, and to the general division of the villages into flood and drought prone categories. Under the drier conditions of 1971-2, the flood prone villages of Non Sung, Lao Yai and Um Mao had substantially higher yields than in the previous year. Similarly, Na Chuak Nua, prone to drought, experienced lower yields in the drier year than the wetter. The most striking difference between the two years was in Lao Yai, which increased its mean yield from 212.2 to 330.2 kilograms per rai; in 1970-1 the yield was depressed by 27.3% of farmers reporting total crop loss, but still

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55 The discrepancy between the official tambon figures and those for the Lam Pao sample villages reflects different methods of collection as well as actual intra-tambon differences. (See chapter II for details of the data collection methods employed in the survey and by the government agencies).

TABLE IV.24

GLUTINOUS RICE: YIELD (KILOGRAMS/RAI)

Percentage Distribution

Upper Class Limits	0.0	150.0	200.0	250.0	300.0	350.0	400.0	450.0	500.0	1000.0
Na Chuak Nua	2.9	8.6	20.0	17.1	17.1	8.6	11.4	0.0	8.6	5.7
Ban Tum	0.0	12.3	15.8	22.8	19.3	5.3	5.3	8.8	7.0	3.5
Um Mao	0.0	2.9	11.4	28.6	14.3	22.9	0.0	8.6	5.7	5.7
Fai Taek	0.0	4.0	12.0	12.0	16.0	8.0	12.0	8.0	12.0	16.0
Ban Lek	2.4	9.5	14.3	19.0	21.4	11.9	14.3	0.0	2.4	4.8
Non Sung	0.0	9.1	18.2	15.2	3.0	9.1	33.3	0.0	0.0	12.1
Lao Yai	27.3	0.0	0.0	18.2	9.1	0.0	18.2	9.1	0.0	18.2
Lam Pao Area	2.1	8.0	14.7	19.7	15.5	10.1	12.2	4.6	5.5	7.6

the village reported the highest percentage of yields over 500 kilograms per rai (table IV.24). In the study area as a whole in 1970-1 84.4% of the yields fell between 150 and 500 kilograms per rai, with only 7.6% below 150 kilograms and 8% above 500 kilograms.

For the study area as a whole the difference between the two years was slight, with mean yields of 259.7 kilograms per rai and 266.4, the drought and flood prone villages cancelling each other out to some extent.

In the absence of detailed information of the soil fertility and water supply situation of the farmers in the sample survey it is not possible to quantify the impact of the physical differences on yields. The percentage of the holding that was actually planted and the percentage affected by environmental damage provides some general indication of those farmers that were adversely affected by these conditions, as noted in the preceding section.[56]

The examination of cultivation practices, labour input and cash input, involved in the production of paddy in the Lam Pao study area indicated that there was considerable variation. While there are differences in physical conditions, location of plots, and labour inputs particularly, actual differences in the meaning of the units used explain some of the variation as was noted above. It was concluded in the previous section that there is variation in the intensity of production.

Examination of the determinants of yields was undertaken using correlation, linear regression and stepwise linear regression techniques.[57]

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56 These figures for damage are not comprehensive, as was noted in the preceding section, because farmers are likely to experience damage not regarded as abnormal by them. They do, however, provide the only available indication of rates of loss and damage.

57 Using the B.M.D. Package program on the University College London computer.

Data on damage and the levels of inputs, in total and by process, were tested against yields. The variables used, from the 1970-1 sample survey of Lam Pao, were:

X_1 size of plot

X_2 % planted)
) environmental variation
X_3 % damaged)

X_4 total labour input per rai

X_5 total cash input per rai

X_6 land preparation labour per rai

X_7 transplanting labour per rai

X_8 weeding labour per rai

X_9 harvesting labour per rai.

The inclusion of all the nine variables did not produce a significantly higher correlation with the dependent variable, yield, or a significantly higher degree of explanation than that given by the four variables, plot size, percentage of planted area damaged, cash inputs per rai, and total labour input per rai. The equation for these four variables is:

$$Y = 327.03 - 4.29X_1 - 2.6X_3 + 0.76X_5 + 6.26X_4$$

It is clear from the stepwise regression analysis and correlation that plot size provides the highest explanation of the variation in yield.[58] That the percentage area damaged is the second most important variable reflects the variability of paddy production in the unreliable

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58 The overall correlation is 0.6141. The individual correlations are:
X_1/ Y = -0.4410 (plot size / yield)
X_3/ Y = -0.43 (damage / yield)
X_4/ Y = 0.35 (total labour / yield)
X_5/ Y = 0.35 (total cash / yield).

climatic conditons; as a determinant of yield, labour input, fertiliser or insecticide use are also important. As was noted previously, there is no significant relationship between the size of the plot and the percentage affected by damage; large plots are no more susceptible to damage than small ones. Thus the negative relationship between yields and plot size cannot be explained in terms of damage. We have no information with which to test the hypothesis that the larger plots are of lower inherent fertility. It seems likely that the decline in yields with increased size of plots relates to the marked decline in cash and labour inputs with increase in plot size noted earlier.[59]

Repetition of the stepwise regression for farmers reporting entirely undamaged plots resulted in total labour input in ploughing and plot size providing a level of correlation and explanation that was not significantly less than that provided by all eight variables.[60] The result highlights the importance of adequate land preparation before transplanting. As noted earlier in the chapter, inadequate levelling of the paddy field results in poor water control and consequent uneven growth of the rice plant and a decline in yields. The decline in intensity of production with increase in the size of the plot is likely to be particularly important in the reduction of yields in respect of land preparation labour.

This analysis of yield determinants does not take account of the considerable variations in soil fertility and water supply, but it

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59 The correlations are:
plot size / labour input, -0.37; plot size / cash input, -0.26.

60 The equation is:
$Y = 235.99 - 2.15X_6 + 55.27X_1$
$X_6/Y = 0.58$ (land preparation/yield)
$X_1/Y = -0.36$ (plot size/yield)

is likely that under the conditions prevailing in the North East the fluctuation in environmental conditions tends to even out the differences engendered by variations in inherent fertility. Similarly, the marked differences in level of intensity of cultivation tend to have their effect on the level of yield masked by the damage and crop loss. From the examination of yields it is clear that where not adversely affected by environmental conditions, North East paddy does respond positively to labour and cash inputs, but given the prevailing conditions the choice of the farmers to cultivate large holdings containing a variety of land types, rather than smaller plots with homogeneous land intensively, is a rational one. The drying up of suitable reserves of uncultivated land that could be cleared for paddy is likely to result in increased population pressure and more intensive cultivation. The examples of Fai Taek and Ban Lek discussed in this chapter and in chapter III are forerunners of this process.

Given the relationship apparent from the regression equation, it is possible to predict the likely yield response to population growth in so far as that growth reflects itself in an increase in the agricultural labour force. If the agricultural labour force grows at 2% per annum and the area under paddy cultivation remains constant, the resulting yield increase from increased intensity and declining holding size would only be 0.81% per annum. Adoption of the fertiliser level recommended by the Ministry of Agriculture would result in an immediate increase of 8.9% on the basis of the relationship indicated in the equation. However, even these modest increases would only be achieved in years as favourable as 1970-1 and with a reduction in the size of holdings due to sub-division the existing system of multi-type land holding would be adversely affected; individuals would be faced with uncertain production levels, and the increase in yields would be offset

by the increased variability.

The reduced effectiveness of increasing inputs because of the environmental conditions is thus a disincentive to intensification. The traditional sector of the North East farm economy has been both extremely variable in production and low yielding, a situation that will continue as long as the region depends on rainfed agriculture. The initial step in the development of the traditional sector must be the stabilisation of yields by increasing control of the environment. It is in the light of this stabilisation, followed by increase of yields, that the heavy investment in irrigation projects has been seen as a solution to the North East agriculture's 'problems'.

A 50% reduction in the area damaged or lost may be expected with the introduction of wet season irrigation in the North East.[61] Under the conditions experienced in 1970-1, a reduction in damage and loss of 50% would increase yields by 7.36%; more significantly, the reduction of loss and damage would increase the effectiveness of labour and cash inputs. Assuming no change in the effectiveness of inputs, over the next five years the introduction of supplementary irrigation and the application of the recommended quantity of fertiliser would increase production by 17.31%, during which time population is predicted to increase by 15.92%. With rainfeeding, yields could only be increased at a maximum by 11.27% by intensification and reducing per capita paddy holding. Under rainfed agriculture, the population growth in the North East as a whole is likely to place increasing pressure on the traditional sector of the region's farm economy.

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61 Any predictions based on the regression equation assume that the relationships remain both constant and linear; under changing conditions of cultivation and environmental control, it is likely that these assumptions are unrealistic. In addition, given the changeable conditions, relationships established may not hold true from year to year.

CHAPTER V

THE EVOLUTION OF A SURPLUS ECONOMY

Historical Background to the Thai Rice Trade

Thailand has a long history of rice exporting, as the fertile flood plain of the Chao Phaya was able to produce a surplus easily. However, prior to 1855, exports were both small in scale, and irregular, tending to occur only in years of exceptionally good harvests.[1] The Bowring Treaty of that year opened Thailand to cheap foreign goods, especially cottons, which were to play an important part in the creation of a need for cash income among the rural population.

From the mid nineteenth century, the world market for rice expanded rapidly, both in the raw material exporting centres of South East Asia, especially Malaya, and in Japan and Europe, coupled with the development of cheap ocean transport. Van der Heide, writing in 1906, saw the changes in sea transport as the single most crucial factor in the development of the rice trade in Thailand.[2] Ingram sees the development of exports from Thailand as a classic case of response to market stimulation by the individual farmers with little effective government interference.[3] As figure V.1 shows, there was a steady rise in rice

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1 J.C. Ingram, "Economic Change in Thailand, 1850-1970", 1971, p.41.

2 J.H. Van der Heide, "The Economical development of Siam during the last half century", Journal of the Royal Siam Society, 3, 1906, pp. 74-101.

3 Ingram strongly supports the contention that expansion of the traditional sector of Thai agriculture is a response to stimulation of the farmers' cash income needs, in the manner outlined in chapter II. (Ingram, op.cit., p.43).

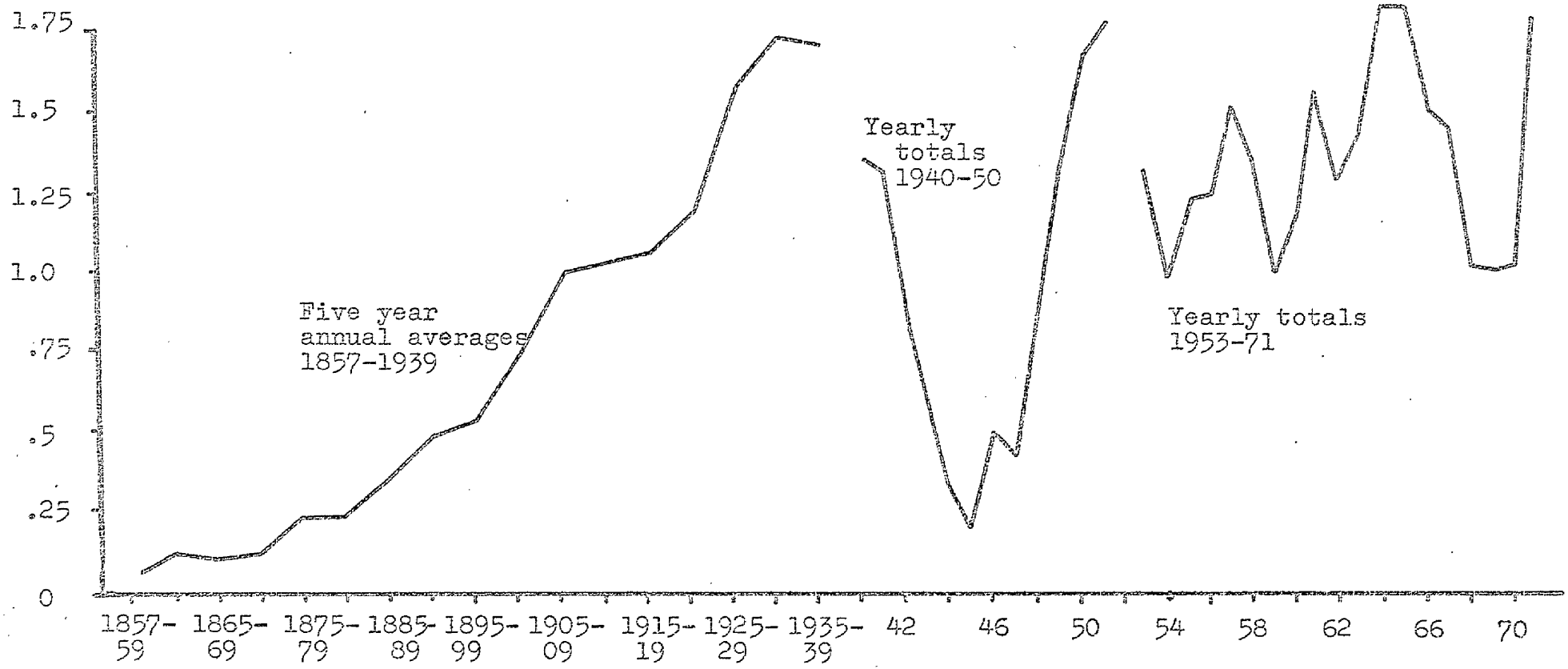

Fig. V.1 Total Thai Rice Exports, 1857-1971

Sources: (1857-1950) J.C. Ingram, 'Economic Change in Thailand, 1850-1970,' 1971;
(1953-65) Agricultural Statistics of Thailand, Ministry of Agriculture, 1972;
(1957-71) Bank of Thailand Monthly Reviews, Vol. XII,3, March 1972

exports from the 1850's onwards. This steady increase resulted from the expansion of the area cultivated in response to the stimulation of the market. Initially rice exports came almost exclusively from the flood plain area of the Chao Phaya river near to Bangkok, gradually spreading outwards along the waterway network of the Central Plain.[4]

By 1905, 840,000 tons were being exported from Bangkok, drawn almost exclusively from the Central Plain. In that year 7200 tons of paddy were coming from the North by river, and 120,000 tons by the recently constructed rail link to Nakorn Ratchasima.[5] Thus less than 2% of total exports came from the outlying regions, as the southern part of the North East contributed some 1% and the North rather less, 0.6%. Van der Heide drew attention to the very marked difference between the paddy holding per capita of the exporting areas of the Central Plain and the highly subsistence areas of the North and North East. In the rice exporting areas, the figure was 4 rai per capita, as against a little over one in the North East.[6] As Ingram points out, the division between the commercial Central Plain and the subsistence areas of outlying regions is clear in the early years of the twentieth century.[7]

The continued expansion of the world market for Thai rice, plus internal rail developments which linked Chiangmai in the North and Nongkai in the North East to Bangkok, saw steady expansion of the commercial production into the other regions. By 1925, the North East was sending 112,200 tons by rail to Bangkok, 7.3% of total exports; by 1935 the figure had risen to 303,600 tons, or 18.13%. Similar expansion

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4 T.H. Silcock, "Thailand", in R.T. Shand, "Agricultural Development in Asia", 1969, pp.103-139, reference p.118.

5 Van der Heide, op.cit., p.90.

6 Ibid., pp.94 and 91.

7 Ingram, op.cit., p.45.

took place in the North.[8]

As has been examined in chapters I and IV, North East and North Thailand are predominantly glutinous rice producing areas. This preponderance of a rice variety which has a limited national and international market must have retarded the penetration of commercial rice production into both regions. Prior to the extension of the North East railways, beyond Nakorn Ratchasima in 1930, the major part of the rice exported by the region must have been drawn from the non-glutinous area south of the Mun river. However, it is likely that the expansion of surplus production in the North East resulted in some changes in land use as well as extension on the paddy area. Unfortunately the scanty information for the years before 1947 on North East rice production does not give any guidance to the relative amounts of glutinous and non-glutinous grown in or exported from the region.

The development of rice production for the market in the North East region was marked by the establishment and expansion of milling facilities within the region. Before 1906 all the shipments to Bangkok were in the form of paddy.[9] By 1925, 10% of shipments were of milled rice, and by 1935, 42%.[10] There are no comparable figures available for the post-war period, but it is clear that by the mid-sixties only a small proportion of the rice was as paddy.[11]

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8 Similar expansion took place in the North, with 39,000 tons in 1925 and 78,000 tons in 1935; since considerable quantities must have been transported by river, the totals are probably much higher.

9 Van der Heide, op.cit., p.90.

10 Annual Report on the Administration of the Royal State Railways, 1936-7, pp.7-8, cited by Ingram, op.cit., p.47.

11 By 1966, only 18% of rice movements from the North East were by rail, thus even if full rail reports were available they would not give any real guidance as to the relative amounts of rice and paddy leaving the region. Analyses of the road movements in 1966 and 1968 suggest that all consisted of milled rice. (Wilbur Smith Associates, "Thailand Transport Co-ordination Study", 1970, vol.II.) Interviews with millers in 1971-2 in Kalasin and Khon Kaen indicated that very little unmilled rice left these two changwats.

TABLE V, 1(a)

NUMBER OF RICE MILLS AND THEIR CAPACITY IN 1964 BY REGION

	North East		North		Central Plain		South		Thailand
≤5 Kwien		%		%		%		%	
Number	648		1244		555		1071		3518
Capacity	1528	(13.7)	2802	(38.2)	1429	(3.2)	2201	(27.0)	7960
5-30 Kwien									
Number	430		223		1244		282		2179
Capacity	3920	(35.3)	2223	(30.3)	17736	(39.6)	2552	(31.3)	26431
30+ Kwien									
Number	85		33		227		25		370
Capacity	5665	(50.9)	2317	(31.6)	25408	(56.76)	3408	(41.3)	36986
Total									
Number	1163		1500		2026		1378		6067
Capacity	11113		7342		44761		8161		71377

TABLE V, 1 (b)

RATIO OF MILLING CAPACITY TO PADDY PRODUCTION. (1964)

	All Mills	Kwien/day 30+	Kwien/day 5-30	Kwien/day <5
North East	206.18	404.46	584.51	1499.52
North	145.52	461.12	481.64	381.30
Central Plain	113.74	200.3/	287.05	3562.71
South	91.63	219.42	293.02	339.75

Establishment of a network of commercial mills indicates that an area produces a large and regular surplus. From the 1920's an increasingly dense network grew up, first at the main collection centres along the rail line, such as Nakorn Ratchasima, Ban Phai and Khon Kaen, and later spreading out to the changwat seats and larger amphur seats increasingly far from the railways; the post-war road building has played a vital part in bringing large areas of the North East into the orbit of commercial production. The expansion of milling reflects not only the increasing size of the rice surplus, but also its stabilisation and regularisation.

Table V.1 indicates the North East's relatively poor position in terms of milling capacity and total rice production compared to the Central Plain and the North; it reflects a lesser commercial orientation. The North East has the highest ratio of milling capacity to production of any of the four regions, even taking into account that these figures must be qualified by the different scale of the region's mills. The small mills of less than 5 khwien (metric tons) per day capacity are mostly serving local needs and are located in tambon seats and villages, those from 5 to 30 khwien per day in larger centres, particularly amphur and small changwat seats, and the largest class of mills are usually found in major amphur and more especially changwat seats. The North East had in 1964 the least dense rice mill network, but over half the capacity was in the largest category of mills, suggesting that milling had developed for commercial needs and that milling for local consumption was less developed. In the Central Plain the small percentage of the capacity in the smallest category and the poor ratio of tambons to small mills reflects a highly commercial rice economy and the blanketing effect of the very dense network of larger mills, which therefore deal also in locally consumed rice.

TABLE V, 2(a)

COMMERCIAL MILLING NON-GLUTINOUS GRADES

100% White Rice

5% White Rice

10% White Rice

15% White Rice

20% White Rice

25% White Rice

Extra A1 Broken Rice

A1 Broken Rice

White Bran

Cargo Bran

TABLE V, 2(b)

COMMERCIAL MILLING GLUTINOUS GRADES

10% White Rice [Long Grain]

10% White Rice [Short Grain]

Broken

Note: 100% rice contains no broken grains, 5% and 10% rice contains 5% and 10% broken grains etc. Broken rice contains no whole grains. These grades are not exhaustive but represent those for which prices are quoted on the expert, Bangkok Wholesale and Provincial Wholesale markets.
The less sophisticated grading for glutinous rice reflects the lesser commercial importance of the variety, in addition the lack of any grade higher than 10% reflect the generally poorer milling qualities of glutinous rice.

The large commercial mills, that is, those over 30 khwiens a day capacity, will have milling ratios of 1.52 (65%),[12] and produce a wide range of milled rice classified into grades by the type of grain and the percentage of broken grains (table V.2). In general, the larger the mill the higher the milling ratio, and the greater the variety of products. Small village mills might produce only 100% broken rice, white rice and bran. Milling ratios vary with the age, state of repair and accuracy of adjustment of the machinery, but investigation suggests that the ratio can be as low as 45%, that is, 20% below that of the larger mills; 45-55% seems general in the mills of the Kalasin villages.[13] In general the village mills gave a 33% milling ratio by volume, that is, 3 tang (60 litres) of paddy produce one tang of milled rice, though in many instances the measure was not filled with the milled rice, suggesting an even lower ratio. One tang of paddy weighs 10 kilograms, and milled rice more, usually 13.9-16.3 kilograms, and this gives a milling ratio by weight of 46.4-54.3%.[14] It is likely that many village mills are deliberately poorly adjusted to reduce their efficiency. The millers take the bran, broken rice and husk as part of their payment, so the lower the efficiency, the larger the amount they acquire. In addition,

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12 The best milling ratio possible is 75%, rice husk contributing 20% and dust and dirt 5%, however in practice the highest Asian milling ratios are 70% for the very largest mills (over 100 metric tons a day capacity); these are only found in the major rice exporting ports such as Bangkok. (D.H. Grist, "Rice", 3rd ed., 1960, p.320).

13 Conversation and interviews with millers and Thai officials who had worked or lived in other areas of the North East confirmed these ratios for the region as a whole.

14 F.A.O., "National Rice Policies", 1970. This is confirmed by field estimates. There is considerable variation depending on the nature of the milling and of the rice type. The figure for Korea is 48%, Cambodia 46.4%, and Burma 54.33%.

charges of 0.50-1.50 baht for three tang prevailed in the Lam Pao area in 1971-3.[15] Assen, in 1969, found that the general milling charge in the North East was one baht a tang, markedly higher than that found in Lam Pao, or in changwat Nakorn Ratchasima.[16]

Normally village and tambon mills are only concerned with milling, indulging only rarely in rice trading. Millers frequently rear pigs as an additional source of income and a way of using the broken rice and bran, which is also sold in some villages to farmers with pigs, ducks or chickens. In some market gardening areas, husk is sold as a soil cover to reduce evaporation, and the main village use for bran is charcoal making.

The small village mill is largely a post-war development in Thailand, stemming as it does from the improvement in communications and the availability of small petrol and diesel engines and fuel. Large mills inevitably are steam powered, using rice husk and small amounts of coal. The large commercial steam driven mills spread first into the Thai rice surplus areas. They only grind paddy that they have purchased for re-sale, and they do not normally provide a milling service.

In changwat Kalasin there are eight mills that are classed for taxation purposes as commercial.[17] These are all driven by steam engines in the 30 to 85 horse power range. Three are located in Kalasin town, two are just outside, one in Yangtalad and one in Komalasai. One

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15 Villagers were found to take their paddy to the local mill in 'haap' (a carrying pole with two $1\frac{1}{2}$ tang baskets), as often as necessary, usually three times in two weeks, but this would vary with the size of the family. An average family of six would probably make some 70 trips to the mill during the course of the year to mill the 2000 or so kilograms needed for food. Thus 35 to 105 baht might be spent on milling rice for the household.

16 J.H. Assen, "Field Observations on Agriculture in North East Thailand and Laos", 1968, p.7.

17 Information from the changwat taxation office.

mill was established in Kalasin town in 1940, the rest between 1955 and 1960, suggesting this as the date at which Kalasin became incorporated fully into the North East commercial rice economy. Generally, the small village mills developed later, spreading out from the areas adjacent to the town with the source of fuel oils. In amphur Muang the oldest mill was registered in 1955, but most were built between 1958 and 1965.[18] By 1965 amphur Muang's eight tambons had 90 small mills; by 1972 107, and now only the smallest villages are without a mill. In general these mills have 10-15 horse power engines, with some as large as 24 horse power, mainly in the tambon seats. The more remote villages had their rice mills established most recently. In the tambons of Nong Peng and Kut Chong Chay in southern Komalasai, no mills were registered before 1967, and since then 19 have been established in Nong Peng and eight in Kut Chong Chay.[19] Mills are still awaited in the most remote villages, for example Lao Yai.[20] If the pattern found in Kalasin is similar to that of the North East as a whole, the present small mill to tambon ratio would be considerably higher now than was the case in 1964 (table V.1).

The development of village level 'service' milling has reduced the household labour expended on milling by hand, using variations on the pestle and mortar; the recent nature of the advent of mechanical milling is seen in the disused hand milling devices still remaining outside the majority of houses in the villages in the study area. In

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18 Amphur Muang Industrial Registration Office. The amphur office has been recently (1972) instructed to limit the further expansion of small village mills on the grounds of over-proliferation. Applications for licences to establish a second mill in a village are in particular subject to restriction. (Personal communication from the Agricultural Officer and Assistant District Officer in amphur Yangtalad).

19 Amphur Komalasai Industrial Registration Office.

20 This was the only village studied that did not have a mill when the study began in 1971.

TABLE V, 3

% OF PADDY AREA PLANTED TO NON-GLUTINOUS PADDY 1962-1970

	1962	1963	1964	1965	1966	1967	1968	1969	1970
Kalasin	3.0	3.5	3.8	3.0	2.9	3.1	4.8	3.4	5.4
Khon Kaen	18.1	18.9	20.6	31.0	11.4	14.7	14.7	12.5	26.0
Chaiyaphum	44.5	47.6	49.8	53.0	41.7	40.4	35.7	37.7	47.5
Nakorn Phanom	2.4	3.6	4.6	3.5	1.0	0.7	0.6	0.8	1.4
Nakorn Ratchasima	77.8	84.8	86.6	88.8	84.3	87.9	84.9	80.0	84.4
Buriram	65.3	73.5	77.1	70.5	65.2	75.3	71.0	78.7	73.2
Mahasarakarm	10.4	15.1	19.6	13.9	13.6	4.5	4.1	3.2	3.5
Roiet	5.3	11.3	7.8	7.8	8.0	9.5	8.3	9.9	37.4
Loei	0.5	0.6	0.4	0.4	0.0	0.0	0.0	0.8	0.9
Srisaket	62.2	61.3	72.5	64.2	61.9	57.8	57.8	56.8	54.6
Sakonnakorn	9.2	10.6	10.0	2.8	4.2	4.3	3.3	3.9	4.4
Surin	89.9	87.8	92.6	94.0	95.4	97.0	97.5	94.2	95.2
Nongkai	21.8	19.4	23.1	22.2	20.8	17.6	19.5	17.8	17.6
Udornthani	22.0	27.1	27.7	22.9	22.2	16.9	20.0	19.5	20.9
Ubonratchathani	6.4	7.1	7.5	6.2	4.2	5.0	2.9	3.2	5.1
North East	31.6	34.0	38.5	30.4	35.3	29.9	29.9	24.9	36.3

Source:- Annual, Report on Rice Production, Ministry of Agriculture, 1962-197o

the absence of any precise information, however, one is tempted to speculate on the higher nutritional value of the hand milled rice, since it is not polished to the extent that mechanically milled rice is, on the lower ratio of paddy to white rice and the use of all the waste for feeding chickens and ducks.[22]

The North East Rice Surplus

There is a paucity of information concerning both the present-day volume and origin of the rice exported from the North East; similarly we know little of the pattern of movement within the region itself. As was noted in the preceding section, both Ingram and Zimmerman have drawn attention to the relationship between the production of a marketable surplus and the growing of non-glutinous rice. It is unfortunate that we have no pre-war information on the proportion of glutinous and non-glutinous rice in the North East which would enable us to test the hypothesis that the production of an increasingly large and regular marketable surplus was accompanied by an increasingly large percentage of paddy land planted to non-glutinous rice. In the period since 1947 for which regular figures giving a breakdown of production are available, there appears to have been a slight rise in the percentage of the area planted to non-glutinous varieties until 1958, but since then the proportion has been generally stable for the region as a whole (table V.3).

There is a considerable intra-regional variation in the proportion of paddy land planted to non-glutinous (table V.3); it was

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22 There is no Thai work on this. See, however, Grist, op.cit., pp. 327-347 and C. Clark and M. Haswell, "The Economics of Subsistence Agriculture", 1964, pp.1-26 and 30-57.

from this variation that Zimmerman suggested the relationship between a greater degree of commercialisation of the rice economy and the production of non-glutinous rice (see map I.4). The production of non-glutinous rice is heavily concentrated in the changwats along the southern edge of the Khorat plateau, Nakorn Ratchasima (87.21% of the paddy area), Buriram (77.57%), Srisaket (62.17%), and Surin (96.78%), with a northward extension along the western edge of the plateau in Chaiyaphun (46.37%); in the other changwats of the North East, non-glutinousis less than 20% of the paddy area.

The changwats which are dominantly non-glutinous producers are also dominantly non-glutinous eating, and in this respect contrast strongly with the other areas of the North East. It was argued in chapter I that the original selection of glutinous rice for cultivation in the area of the Khorat plateau may well have been physical, although its continuation now must be seen in terms of cultural preference. Within the North East region the concentration in the south and the southwest areas of the plateau has been interpreted as reflecting the variation in the timing of the rainfall in the area generally to the north and east of the Mun river.[23] There is much debate and little real concrete evidence on the physical limitation to non-glutinous rice production, but what is very apparent is that those areas adjacent to the Central Plain are the most important non-glutinous producing areas of the North East. Despite the difficulty of communications across the ranges of the plateau edge, there was considerable contact between the areas of the northern Central Plain and the southern North East. The non-glutinous areas are more like the Central Plain in cultural and

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23 R.L. Pendleton, "Thailand", 1962, pp.127-8.

TABLE V, 4

DEFICIT AND SURPLUS RICE PRODUCTION CHANGWATS

	Platenius*1	Brannon*2	Behrman*3 1940/63	1965-1970*4 Min. of Ag.
Nongkai			Slight Deficit	Surplus
Loei	Deficit	Deficit	Deficit	Deficit
Udornthani			Surplus	Surplus
Sakkonnakorn		Surplus	Surplus	Surplus
Nakorn Phanom		Surplus	Slight Deficit	Slight Deficit
Kalasin			Surplus	Surplus
Chaiyaphun			Surplus	Surplus
Nakorn Ratchasima	Deficit	Occasional Deficit	Deficit	Slight Deficit
Mahasarakarm		Occasional Deficit	Slight Deficit	Small Surplus
Roiet		Occasional Deficit	Slight Deficit	Small Surplus
Ubonratchathani			Small Surplus	Surplus
Srisaket	Deficit	Deficit	Deficit	Small Surplus
Surin	Deficit	Deficit	Deficit	Surplus
Buriram		Deficit	Deficit	Surplus
Khon Kaen			Slight Deficit	Deficit

Source:

*1 H. PLATENIUS, "The North East: It's Problems and Potentialities", 1963, p.61.

*2 R. H. BRANNON, "End of Tour Report", U.S.O.M. 1963, pp.30-31.

*3 J. R. BEHRMAN, "Supply Response in Underdeveloped Agriculture" 1968, p.103.

*4 See text

linguistic features; although they contain small pockets of Isan speaking, glutinous rice eating people, but dominantly they were settled by people from the Central Plain, often under official encouragement, while the areas of the north and east experienced large scale settlement of Lao people.[24]

With the development of communications and trade in rice, the most accessible changwats which produced the more commercially acceptable rice were incorporated first, as Zimmerman noted, but the difference in the percentage non-glutinous area in for example Surin (96.78%) and Sakonnakorn (10.85%) cannot be taken as indicating highly commercialised and highly subsistence economies respectively. The percentage of paddy land planted to non-glutinous rice is an indicator of the status of the changwats which are surplus producers; production of a rice variety which has only limited farm use suggests an orientation to commercial production. In the glutinous eating areas of the North East non-glutinous rice is produced for the urban, inter-regional and intra-regional markets; (even in the most heavily glutinous eating areas of the North East, non-glutinous rice is eaten by a large percentage of the urban population).

Platenius suggested that the rice deficity changwats of the North East in the 1952-61 period were Nakorn Ratchasima, Surin, Srisaket and Loei.[25] Brannon produced a more elaborate classification: deficit, occasional deficit, and surplus (table V.4).[26] Neither Platenius nor Brannon give any real quantification to their categories, based as they are on extensive field experience rather than statistical sources.

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24 For details of the official encouragement of migration in the nineteenth century, see Ingram, op.cit., pp.76-78.

25 H. Platenius, "The North East of Thailand, its Problems and Possibilities", 1963, p.61.

26 R. Brannon, "End of Tour Report", U.S.O.M., 1963.

TABLE V.5

PER CAPITA PADDY PRODUCTION (Kilograms)

	1940-1963 Mean	1965	1966	1967	1968	1969	1970	1965-1970 Mean
Nongkai	264	327	69	403	554	476	336	361
Loei	187	195	239	35	230	248	219	194
Udornthani	347	356	413	170	428	439	361	362
Sakonnakorn	402	348	497	530	532	517	443	478
Nakorn Phanom	226	196	184	248	276	295	113	217
Kalasin	256	289	265	195	366	446	411	345
Khon Kaen	224	95	379	38	148	246	261	196
Chaiyaphun	307	342	528	311	412	294	519	401
Nakorn Ratchasima	191	181	313	127	215	306	309	242
Mahasarakarm	238	102	385	59	375	468	364	292
Roiet	234	229	323	134	211	479	368	291
Ubonratchatani	295	289	292	285	241	371	343	304
Srisaket	156	192	326	191	317	360	354	290
Surin	155	125	452	144	442	412	438	336
Buriram	191	87	436	235	183	560	855	393
North East	245	220	357	197	280	298	408	293

Source: 1940-1963: J.R. Behrman, "Supply Response in Under-Developed Agriculture", 1968, p.60.

1965-70: Calculated from paddy production figures contained in the "Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1965-1970, and population totals taken from the "Annual Statistical Bulletin", Mekong Committee, 1969, 1970 and 1971.

Behrman produced average per capita production figures for both rural and total changwat populations for the 1940-1963 period.[27] On the basis of these he considered that eleven of the North East changwats were "deficit or near-deficit" rice producers, and only four, Chaiyaphun, Ubonratchathani, Sakonnakorn and Kalasin, were truly surplus producers;[28] (table V.5 shows Behrman's per capita figures).

Behrman's classification is based on the rice consumption figures given by the 1962 Household Expenditure Survey conducted by the N.S.O. This survey gave a milled rice consumption figure of 139.5 kilograms per capita for North East towns, and 186.2 kilograms per capita for the rural areas.[29] The milled rice figures were converted to paddy equivalent using a ratio of 1.52 units of paddy per unit of milled rice, that is, a milling ratio of 65.8%.[30] The resulting conversion of the milled rice figures on this basis is a rural paddy consumption figure of 283 kilograms per capita, an urban figure of 212 kilograms, and an overall figure for the region of 280 kilograms. If these figures and the rice production figures are anything like correct five North East changwats, Nakorn Ratchasima, Buriram, Surin, Srisaket and Loei were heavily deficit for rice in the years 1940 to 1963. The accuracy of the Ministry of Agriculture rice production figures and the population figures must be questioned.[31] In addition, changwat level

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27 J.R. Behrman, "Supply response in under-developed Agriculture", 1968, table IV.2, pp.98-100.

28 Ibid., p.102.

29 N.S.O., "Special Family Expenditure Survey Report: Food Consumption in Thailand", 1964, table 3, p.11.

30 As noted in the preceding section, this is the normal ratio. Behrman cites the 1948 Annual Report to the F.A.O., Ministry of Agriculture, 1948, p.30.

31 See chapter II for a discussion of Thai statistics.

aggregation conceals much important local variation, for which comprehensive data are not available.

Table V.5 contains changwat per capita production figures for 1965-70, based on Ministry of Agriculture rice figures and United Nations population estimates based on the 1960 census. Examination of these figures using the Ministry of Agriculture criteria used by Behrman produces only seven changwats in the 'deficit or near deficit' class and eight in the surplus (table V.4). It appears that a number of changwats, notably Surin and Buriram, have changed their position between the two periods 1940-63 and 1965-70, from one of deficit to surplus. Only Khon Kaen appears to have moved from a situation of slight deficit to one of deficit. The general increases in rice yields and planted area that have taken place in the area during the 1960's may lie behind this general increase in the number of changwats producing a surplus. However, the comparison of the means for the two periods must be made with caution, as there is such a great difference in the number of years involved (25 years as against 6), and because of the assumption that the level of rice consumption has not changed. Any increase in the percentage of the total population in urban areas would reduce the overall per capita consumption because of the lower urban rates of rice consumption; however, in the 1960-70 period, the rate of urbanisation has been slow in the North East. In 1960, 3.49% of the population lived in urban areas, by 1968 this had fallen to 3%, and it is expected to reach 3.49% again in 1973.[32]

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32 L. Berger, Inc., "North East Thailand Recommended Development Budget and Foreign Assistance Project 1972-76", 1971, I, p.13. These figures may well be not strictly comparable; a fall in urbanisation seems unlikely, however a growth rate at the same rate as population growth is plausible, producing no increase in the percentage population in the urban areas between 1960 and 1973.

TABLE V, 6

POPULATION OF MAJOR URBAN CENTRES AND ADJUSTED CHANGWAT PER CAPITA PADDY CONSUMPTION

	Population	Per Capita Consumption
NAKORN RATCHASIMA	119,000	277.4
UBON RATCHATHANI	108,000	272.2
UDORN THANI	61,000	279.1
KHON KAEN	48,000	279.6
NONGKAI	32,000	278.1
MAHASARAKARM	23,000	280.1
SURIN	21,000	281.1

Source: Population figures from the projections of the 1960 Census contained in the "Annual Statistical Bulletin", Mekong Committee, 1971, p.7.

The revised Changwat per capita consumption figures are based on the figures of 212 kg. for urban dwellers and 283 kg. for rural dwellers given by Pensri Pitaksakorn "Special Family Expenditure Survey Report: Food Consumption in Thailand", N.S.O. 1964.

For the changwats containing the main urban centres (table V.6), only Khon Kaen and Nakorn Ratchasima were in deficit. If the large urban population of Nakorn Ratchasima is taken into account, the consumption needs still average 277.4 kilograms per capita, leaving the changwat, with a production of 242 kilograms per capita, in deficit from 1965-70. For Khon Kaen, the reduction in consumption need resulting from consideration of the urban population, with a figure of 279.6 kilograms per capita, is still heavily in deficit with an average per capita production of only 196 kilograms. As may be seen from table V.6, the allowance of 280 kilograms per capita consumption need for the North East as a whole cannot be sufficiently reduced in any changwat on the basis of the urban population.

Examination of the overall per capita production for the North East on the basis of the per capita production figures (table V.5) suggests that on average during the 1940-63 period there was an overall deficit of 37 kilograms per capita; for 1960, this would mean an overall deficiency of 330,000 tons of rice for food alone. On the same basis, the region produced a surplus of 13 kilograms per capita from 1965-70, an average of 133,000 tons per annum.

Looking at the individual years with the same assumptions shows that 1965 and 1967 were deficit, 1968 balanced, 1969 a year of slight surplus, and 1966 and 1970 years of marked surplus. Figure V.2 shows the relationship between the production and consumption estimated for the years 1960-70. The cumulative deficit or surplus is shown in figure V.3, and indicates that the deficit years were not cancelled out by the surplus years until 1969. Thus the whole region was in deficit for paddy from 1960 to 1968 to the total of 0.725 million tons; the succeeding good harvests of 1969 and 1970 produced an overall surplus

over the eleven years of 1½ milion tons. Taking paddy production and consumption over these eleven years, the North East would have had an annual average surplus of about 136,000 metric tons a year, but this implies that the occurrence of a surplus is an unusual event in the region and that good years are usually cancelled out by bad years. This is not borne out by information available on the quantity of rice moving in and out of the North East. Interviews with millers and rice traders revealed that in the years in question only during the severe drought of 1967 was there a net movement of rice into the region; in 1965 there was a shortage of rice for export from the region, but not an absolute deficit.

There are not complete figures for rice movements from the North East; such figures as are available are only in general for single years and almost certainly incomplete. In the period 1953 to 1970 143,161 tons per annum of paddy equivalent was exported from Thailand, ranging from 99,961 tons in 1960 to 258,800 tons in 1953 and represented an average 8.23% of total paddy exports (Appendix VII.1); these figures must represent a proportion of the surplus production of the glutinous producing areas of Northern and North Eastern Thailand. Watabe concluded from his study of glutinous rice in Northern Thailand that "most of that exported (was) grown in the North East".[33] In a number of years the North East sold rice to the North.

The largest export market for glutinous rice from 1962 onwards has been Laos, taking 28.6% between 1960 and 1964 (Appendix VII.2). All the Lao exports originated in the North East except in the deficit year of 1967, and are exported overland via the crossings of the Mekong. Considerable quantities of glutinous rice are consumed within Thailand

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33 T. Watabe, "Glutinous Rice in Northern Thailand", 1967, p.12.

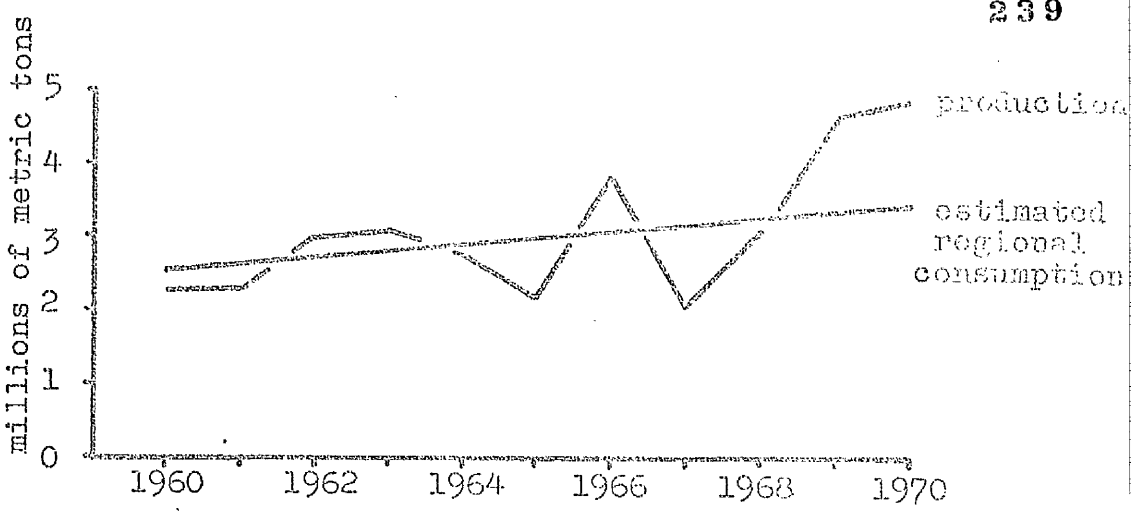

Fig. V.2 The Relationship between North East Paddy Production and Consumption (based on Ministry of Agriculture production figures, and an annual consumption of 280 kilograms per capita) 1960-70

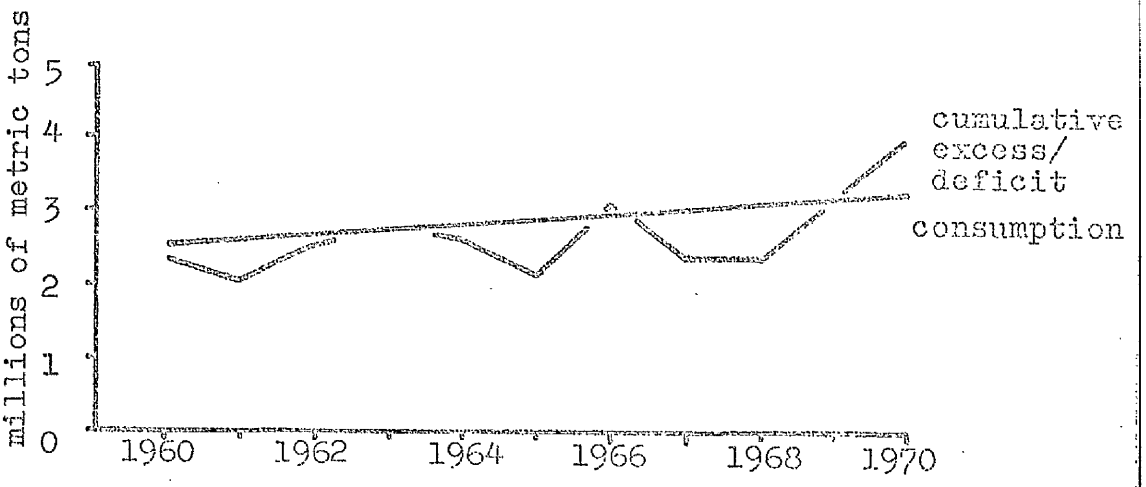

Fig. V.3 Cumulative Excess/Deficit of Paddy Production over Consumption in the North East, 1960-70

outside the glutinous producing areas. De Young estimated that during the 1950's, 300,000 tons of glutinous rice[34] were exported from the North East to other parts of Thailand.[35] Working from material contained in a survey of marketing channels in North East Thailand conducted by the Ministry of Agriculture in 1964, a figure of 548.697 metric tons of surplus paddy, that is, surplus to on-farm requirements, is reached for the North East as a whole. 46% appears to have been exported, 19% consumed elsewhere in Thailand, and 23% within the region (See figure VII.1). The most recent figures are those produced by the Transport Co-ordination Study for 1968; this gives a figure of 225,420 metric tons moving out of the North East by road, and a further 50,000 tons by rail. The majority of movements by both modes of transport were to Bangkok, although some 30,000 tons went direct to the North by road.[36] These figures appear to be almost exclusively for milled rice, giving a figure for paddy equivalent of 418,608 metric tons, excluding the direct exports to Laos. There are no published figures for Lao exports since 1964, but the general consensus of millers and merchants was that in recent years some 100,000 tons of paddy equivalent flowed into Laos from North East Thailand. The lack of any published figures by the Thai authorities reflects the fact that a large amount of rice crosses illegally to avoid the Thai rice premium and since 1971, the Lao import duty. Thus in 1964 and 1968, the years for which we have most complete data, the North East appears to have exported at least 400,000 tons of paddy equivalent, and neither year was a particularly abundant one (figure V.2), nor were they preceded by years

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34 De Young says 'rice', but this should perhaps read 'paddy'. (J.E. De Young, "Village Life in Modern Thailand", 1955, p.195.)

35 Ibid.

36 W. Smith/Lyon Associates, "Thailand Transport Co-ordination Study", vol.II, 1970, figs. 4.0 and 4.U.

of good harvests, with 1963 being only slightly better than 1964 and 1967 being disastrous. If we accept that the North East is normally a rice surplus region then we must consider whether production is underestimated, rice consumption is over-estimated, or both.

The doubtful quality of the Thai rice statistics was noted in chapter II. For the period 1967-70 we have the N.S.O. sample based estimates of rice production; these are 29.53% higher than the Ministry of Agriculture figures for 1967, 37.77% above for 1968, 4.3% below in 1969, and 10.5% below in 1970. For the four years 1967-70, the N.S.O. figures average 13.13% above the Ministry of Agriculture figures. The N.S.O. estimates give a one million ton surplus for 1968, double that calculated from the transport figures and the probable exports to Laos. A projection back of the N.S.O. average percentage increase on the Ministry of Agriculture figures corresponds more closely, but still does not give the impression of a sizeable surplus. Similarly, projecting back the 1967-8 difference (33.65%), seems to produce too large a surplus.

In the light of the doubts about the rice production, the classification of changwats into deficit and surplus (table V.4) must be seen as relative only, suggesting the likely sources of surplus rice and the relative importance of the changwats as rice producers. Viewed in this manner, Sakonnakorn and Chaiyaphun in the 1965-72 period were clearly major contributors to the surplus rice production of the area, while Khon Kaen and Loei, even if underestimated by a third, were unable to contribute significantly. Loei was the only changwat considered by North East millers and merchants to be deficit of rice in every year. The low per capita production figure for Khon Kaen is probably masked by the large volume of rice that flows into the changwat to the collection centres at Ban Phai and Khon Kaen, and a similar argument may

TABLE V, 7

PER CAPITA RICE CONSUMPTION FROM THE 1963 HOUSEHOLD EXPENDITURE SURVEY

	Urban	Rural
NORTH EAST	140.19	187.62
NORTH	158.81	185.02
SOUTH	126.98	159.64
CENTRAL PLAIN	117.68	166.24
THAILAND	122.7	177.8

Source: Pensri Pitaksakorn, "Special Family Expenditure Survey Report: Food Consumption in Thailand", N.S.O. 1964.

be applied to Nakorn Ratchasima.

Farm Level Surplus

The general poverty of information concerning the size of the North East rice surplus has been discussed already. Some general analysis of the regional rice production, and consumption relationship had already been undertaken, using the rural and urban consumption figures from the 1963 Household Expenditure Survey (summarised in table V.7). This is the only comprehensive survey, and for that reason was used in the analysis of Behrman and the discussion in the preceding section of this chapter. This section focuses attention on the farm level consumption of rice and the percentage of rice produced actually marketed by farmers.

The 1953 Survey of Agriculture indicated the proportion of rice consumed on the farm and the proportion marketed. As may be seen from table V.8, the North East stands out as the region with by far the most subsistence dominated production. Silcock considers that these figures are "of the right order".[37] The 1963 Household Expenditure Survey gives greater detail on the level of rice consumption and the regional and rural/urban variations that are present, but does not provide figures that are strictly comparable with those of 1953. Silcock's analysis of the 1963 figures suggests that overall only 50% of the crop was consumed, compared with 60% in 1953.[38] However it is clear from the regional per capita rice consumption figures (table V.7) that both rural and urban consumption is higher in the North East than

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37 T.H. Silcock, "The Rice Premium and Agricultural Diversification", in idem, ed., "Thailand, Social and Economic Studies in Development", 1967, p.236.

38 Ibid., pp.236-7.

TABLE V, 8

DISPOSAL OF PADDY BY FARMERS

Region	% Consumed	% Sold
NORTH	61.28	38.72
NORTH EAST	80.25	19.75
CENTRAL PLAIN	46.91	53.09
SOUTH	61.57	38.43
THAILAND	53.55	41.45

Source: Ministry of Agriculture Survey, 1953, quoted by T. H. Silcock, "Thailand Social and Economic Studies in Development", 1967, p.236.

elsewhere in the kingdom, reflecting lower incomes and a more traditional diet.

As was noted in the preceding section, the Household Expenditure Survey gave a rural consumption of 187.62 kilograms per capita per annum for the North East, or 283 kilograms of paddy equivalent (converted at 65%). However, as pointed out above, the village mills in the North East do not achieve anything like this 65% milling ratio. Table V.9 shows the paddy equivalent for 187.62 kilograms of milled rice at various milling ratios. If all the village mills operated at a 50% ratio, per capita paddy consumption would be 98 kilograms higher than the Household Expenditure Survey suggests. Since 96% of the North East population is agricultural and generally milling its rice at small village mills, the overall per capita consumption must be substantially higher than the level indicated in the preceding section, and this suggests that the North East rice production is even more seriously underestimated.

The 1963 Household Expenditure Survey is specifically for milled rice consumed in the home, and excludes seed and other farm or village uses. On the basis of the survey, daily per capita intake would be 514 grams. Two nutritional surveys, one conducted for the kingdom as a whole and the other in 10 villages in Ubonratchathani,[39] suggest respectively 400 and 524.6 grams of rice a day (table V.10). The Ubonratchathani figure produced by Anderson is very close to the Household Expenditure Survey. There is little against which to judge the daily per capita intake figures. Zimmerman in 1931 produced a similar regional breakdown of

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39 Interdepartmental Committee on Nutrition for National Defence, Nutrition Survey, 1960; M.M. Anderson (F.A.O. Nutrition Adviser to Thailand), "Summary Classification of Food Consumed by 10 villages in Ubon Province", (unpublished field progress report), 1962.

TABLE V, 9

THE EFFECT OF DIFFERENT MILLING RATIOS ON THE PADDY EQUIVALENT OF THE HOUSEHOLD EXPENDITURE SURVEYS PER CAPITA MILLED RICE CONSUMPTION FIGURES

MILLING RATIO (%)	MILLED RICE (Kg.)	PADDY EQUIVALENT	% INCREASE ON 283Kg.
66.29	187.62	283.0	
60	"	312.7	10.49
55	"	341.1	20.53
50	"	375.2	32.57
45	"	417.0	47.34
40	"	469.1	65.75

Source: Milled Rice figures from Pensri Pitaksakorn "Special Family Expenditure Survey Report: Food Consumption in Thailand", N.S.O. 1964.

TABLE V, 10

DAILY PER CAPITA FOOD INTAKE (IN GRAMS)

	Rice	Animal Products	Veg.	Fruit	Fats	Misc.	TOTAL
1960	400.0	68.0	82.0	6.0	1.4	27.4	584.8
1962	524.6	86.5	91.8	34.5	1.4	8.7	747.5

1930-1	Rice	Fish	Salt	TOTAL
North East	672	37	12	721.0
North	715	28	7	750.0
Central Plain	529	62	15	606.0

Source: 1960 'Independent Committee on Nutrition for National Defence, Nutrition Survey', 1960.

1962 M. M. Anderson "Summary classification of food consumption by households in ten villages of Ubol province: November 1961 - February 1963" (unpublished field progress report).

1930-1 C. C. Zimmerman "Siam Rural Economic Survey 1930-31", 1931, p.279. Table XII A.

rice intake and daily food consumption. His results (table V.10) stress the higher rice intake of the North East, though at that date it does not appear as high as in the North. Zimmerman's observations are of interest because they indicate that non-glutinous rice contains 2.4% more calories per unit by weight, which in part explains the higher per capita consumption of rice in the predominantly glutinous eating North and North East regions.[40] In the North East, Zimmerman's figures suggest a daily rice intake of 672 grams per day, or an annual figure of 228.85 kilograms of milled rice, against 191.48 kilograms of Anderson's 1961-2 survey, and the 187.62 of the 1963 Expenditure Survey.

Clark and Haswell give 210 kilograms per capita (575 grams) of unhusked grains as the absolute minimum grain intake, but they quote a considerable range of values and there appears to be a general lack of consensus on the subject.[41]

A fall in the daily rice intake in the 1930-61 period would seem reasonable in the light of the increase of meat and other elements in the diet (table V.10). The Anderson and Household Expenditure Surveys seem sufficiently close in time and findings to suggest some consensus. Since we have no more recent nutrition survey it is not possible to ascertain whether the daily rice intake has fallen over the last decade.

If we accept the 1963 milled rice consumption figure, the paddy equivalent must be inflated to take account of the lower village mill efficiency. It is, however, clear from field investigation that in the North East there are many non-food uses for rice that result in families retaining very large amounts of paddy for 'household consumption'.

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40 Non-glutinous rice was found to have 3620 calories per gram, and glutinous rice 3535 calories (Zimmerman, "Siam Rural Economic Survey, pp.280-1, Tables XII B and XII C).

41 Clark and Haswell, op.cit., p.59.

TABLE V, 11

% AQUISITION OF PADDY BY VILLAGE

	Production	Rent	Labour	Buffalo	Purchase	Gift/Loan	Store
Na Chuak Nua	98.36	-	0.60	0.30	-	0.60	-
Ban Tum	87.17	8.41	0.73	-	0.22	-	0.45
Um Mao	95.98	1.32	-	0.22	-	-	2.47
Fai Taek	74.39	15.10	-	0.47	9.20	-	0.81
Ban Lek	92.89	1.26	-	0.77	4.32	0.05	0.68
Non Sung	89.58	2.40	0.60	-	3.43	0.42	3.31
Lao Yai	76.90	5.33	1.79	-	15.07	0.69	-
Lam Pao Area	89.68	4.36	0.45	0.24	3.74	0.23	1.21

Two surveys were made in the Lam Pao area to try to establish the level of rice consumption and the importance of the various uses to which rice may be put in the household and in the village. The first survey was of 10% of the farmers in the seven villages, the second was a more comprehensive coverage of 30%.

Acquisition of Paddy

In 1973, a sample survey[42] of paddy acquisition and disposal revealed that while 93.3% of the farmers produced a crop of glutinous rice, this only accounted for 89.68% of paddy disposed of by farmers during the course of the year. Just over a quarter of the farmers (26.6%) acquired additional rice during the year. Table V.11 indicates the percentage sources of paddy disposed of by the households. Of that not produced on the farm in the 1972-3 crop year, 43.49% came from rent payments in kind, 4.48% from payment for labour, 2.39% from buffalo hire, 37.31% from purchase, 2.29% from gifts or loans, and 2.07% from paddy left in store from the previous harvest (table V.12). These methods of acquiring paddy are discussed individually.

Rent, Labour and Buffalo hire, paid in paddy: The main source of additional paddy, payment in kind, accounts for just over half (50.36%) of the additional paddy acquired in the villages. Of these payments, land rent is by far the most important. It is also by far the most complex. The term 'renting' has a wide variety of meanings within the local context, which fall into four main categories:

1) payment in rice or cash of a fixed amount for utilising land;

2) payment of 50% of the crop;

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42 A 30% survey of the seven selected villages was conducted in May 1973.

TABLE 12 (a)

PERCENTAGE OF FARMERS ACQUIRING PADDY IN THE 1972-3 CROP SEASON

Method of Acquisition	NA CHUAK NUA	BAN TUM	UM MAO	FAI TAEK	BAN LEK	NON SUNG	LAO YAI	TOTAL
Production	100.0	91.7	97.1	75.0	98.0	97.4	88.9	93.3
Rent	-	13.9	2.9	12.5	6.1	5.3	5.6	5.3
Labour	2.6	2.8	-	25.0	2.0	2.6	11.3	4.6
Buffalo Hire	2.6	-	2.9	-	6.1	-	-	0.4
Purchase	2.6	11.1	-	28.1	10.2	17.9	33.3	13.8
Store from 1971-2	-	2.8	5.7	3.1	2.0	2.6	-	2.5

TABLE 12 (b)

PERCENTAGE OF FARMERS DISPOSING OF PADDY IN THE 1972-3 CROP SEASON

Method of Disposal	NA CHUAK NUA	BAN TUM	UM MAO	FAI TAEK	BAN LEK	NON SUNG	LAO YAI	TOTAL
Sale	33.3	26.4	54.1	18.8	40.8	46.2	22.2	35.0
Store/Future Sale	35.9	29.2	42.8	40.6	53.1	51.3	38.9	36.0
Wat	76.9	68.1	71.4	56.3	89.8	82.1	61.1	73.9
Give Relatives	46.2	29.2	68.6	34.4	38.8	59.0	61.1	44.9
Feed Livestock	35.9	37.5	28.6	46.9	42.9	35.9	55.6	37.1
Consumption	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Seed								93.6
Rent				12.5			5.6	1.8
Labour	2.6		2.9	12.5		7.7		3.2
Buffalo Hire	12.8		2.9			2.6		3.5
Debt Repayment	2.6							0.7
Barter	5.1	13.9	8.6	15.6	12.2	33.3	22.2	15.2

3) share cropping, where the land owner supplied seed, buffalo and fertiliser, and takes a percentage of the crop, usually 50%;

4) joint cultivation where several families (four was the maximum observed in the study) cultivate land together, splitting the harvest between them; in this case the owner appears to get no additional payment. In some instances joint cultivation has replaced sub-division of a large holding on inheritance, and the actual ownership of the title deed is academic.

For the purposes of the study, only categories 1, 2 and 3 have been included in calculation of rent payments in paddy. However in practice the distinction between joint cultivation and rent payment can become blurred; in the majority of cases the labour input of the families involved relates to their share of the crop, although in some instances the actual owner put in a far smaller proportion of labour than the proportion of the crop that he received, and it is clear that an element of rent is present in the calculations; thus wherever the labour input of the owner is token, the share has been treated as a rent payment.

The most common form of renting in the study area was a payment of 50% of the crop, which is considered normal and just by all the farmers interviewed. Where instances of less than 50% were encountered, the renting was invariably between relatives and such practices were regarded by other farmers as being very generous indeed.

Overall in the study area 8.5% of farmers received payments for rent in the form of paddy, ranging from 600 to 4000 kilograms, and averaging 2021.74. Other payments in kind are relatively of minor significance.

Only 0.4% of farmers received payment in paddy for hiring buffaloes, the amount ranging from 100 to 600 kilograms and averaging

TABLE V.13a

ACQUISITION OF PADDY (in kilograms)

Method of Acquisition	Mean	Non-zero Mean	Minimum	Maximum
Production	3385.82	3658.24	300.00	13000.00
Rent	45.92	2590.00	1350.00	3900.00
Labour	15.60	880.00	400.00	2000.00
Buffalo hire	14.54	410.00	100.00	600.00
Rent	164.89	2021.74	600.00	4000.00
Purchase	150.11	1058.25	100.00	7200.00
Store from 1971-2	45.85	1293.00	500.00	4000.00

TABLE V.13b

DISPOSAL OF PADDY (in kilograms)

Method of Disposal	Mean	Non-zero Mean	Minimum	Maximum
Sale	502.34	1402.57	60.00	6100.00
Store or future sale	556.08	1340.29	100.00	7200.00
Gifts to wat	78.40	104.29	10.00	700.00
Gifts to relatives	223.09	495.35	10.00	3000.00
Livestock feed	83.67	212.57	10.00	7200.00
Consumption	2133.01	2133.01	600.00	6390.00
Seed	70.11	76.63	10.00	300.00
Debt repayment	+	200.00	200.00	200.00
Barter	40.99	289.00	30.00	1060.00
Buffalo hire	9.29	655.00	406.00	1220.00

+ Only one case.

410 kilograms. These were payments either for hire of buffalo for paddy ploughing or for haulage to transport paddy from the fields to the rice barn; the rent figures given may include the hire of a cart and driver.

Payments for labour in the form of paddy were received by 4.6% of the farmers, averaging 880 kilograms over the year and ranging from 400 to 2000. It is clear that these are formal payments, and additional rice may be acquired for assistance on the farm in the form of food, or masked in the form of gifts or loans.

Purchase: This is second only to payment of rent as a source of additional rice; 13.8% of farmers purchased paddy during the year, ranging in amount from 100 to 7200 kilograms, and averaging 1058.25 kilograms. In general all paddy purchases took place within the village, between farmers, and only where there was a severe shortage in the whole village will paddy be bought outside. Farmers, when hard pressed, will purchase milled rice from Kalasin or Yangtalad markets. The higher cost of milled rice as well as the transport discourage such purchases unless there is a serious shortage.

Gifts and Loans: These were found to be of little importance, only affecting 0.4% of the farmers and 2.29% of the additional paddy acquired by them. In view of the very much larger (44.9%) of farmers and 5.9% of the total rice disposed of in this way, this method of acquisition appears to be under-represented in the sample.

Store: 3.5% of farmers had rice in store from the previous year, ranging in quantity from 500 to 4000 kilograms, and averaging 1293. This represented rice surplus to the previous year's consumption and not disposed of by sale or other means.

Disposal of Paddy

Household consumption: Overall 56.53% of paddy was consumed as food by the households (Table V.14). Household consumption averaged 2133 kilograms and ranged from 600 to 6390 kilograms, giving an average per capita figure of 327.1 kilograms with a standard deviation of 94.1 (Appendix VII.8). While the questionnaire specified consumption, there was some variation in exactly what was included in this figure. As well as food for the family members resident in the household farmers also included in their consumption paddy used for: brewing 'sato' (rice wine),[43] feeding dogs;[44] feeding relatives who came on visits; feeding hired labour, friends or relatives who came to help with the harvest, which might involve feeding three or four extra persons for two or three months during the year; feeding members of the family resident in a separate household who came to eat with the family; daily offerings made to the village monks; and feasts and ceremonies including marriages or entrance to the monkhood.

The inclusion or exclusion of any of these other uses of rice makes a considerable difference to the level of consumption of individual households. Wastage appears to be high, particularly when entertaining guests; far too much rice is cooked, and is consequently wasted. The per capita figure will also be affected by the proportion of adults and young children in the household. Consumption data has been analysed on a per capita basis rather than making use of a more refined concept of 'eating units' which would make allowance for young children and aged household members, because such per capita figures would not then be

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43 Since 'home brewing' is illegal, information on the exact amount utilised for this purpose is not forthcoming.

44 A household with four dogs might well devote 500 kilograms of paddy to feeding them during the course of the year.

TABLE V, 14

% DISPOSAL OF PADDY BY VILLAGE

	NA CHUAK NUA	BAN TUM	UM MAO	FAI TAEK	BAN LEK	NON SUNG	LAO YAI	TOTAL
Sale	13.57	10.13	27.06	4.76	14.05	10.33	5.39	13.29
Future Sale/Store	10.65	8.48	15.03	14.04	14.77	24.89	12.04	14.25
Store		0.67		0.85	0.35	2.57	2.92	0.87
Wat	2.65	2.06	2.30	1.90	1.75	1.57	2.08	2.05
Give Relatives	6.51	5.56	8.58	3.48	5.89	4.37	5.97	5.90
Feed Livestock	0.91	1.53	1.09	2.35	0.69	0.67	18.17	2.31
Consumption	60.29	69.45	43.20	59.92	57.97	49.84	48.27	56.53
Seed	2.19	1.59	1.71	1.15	2.79	1.62	1.67	1.85
Rent				10.43			2.76	1.21
Labour	1.21		0.55			0.84		0.41
Buffalo Hire	1.45		0.19		0.5	0.33		0.38
Debt Repayment	0.12							0.01
Barter	0.21	0.48	0.25	1.08	1.19	2.93	2.48	1.08

See Appendix VIII, 3 to 10 for individual tabulations by village of the methods of disposal.

comparable with other studies carried out in Thailand.

As well as variations between families in what is included in the consumption figure, it is clear that there is considerable difference between rich and poor families. Richer families are likely to have more obligations and commitments, which it is difficult to reduce when the harvest is poor. In years of shortage consumption can be cut back to some extent by reducing waste and any of the factors listed above that tend to inflate the household consumption. By economising, per capita food consumption could be cut back to 200 to 220 kilograms per annum, but farmers did not feel comfortable having to manage at that level. In general they considered 250 to 450 kilograms per capita necessary for them to feel secure. Calorific need has little bearing on consumption, given the variety of uses and patterns associated with household rice use.

Sale: Household consumption of paddy for food absorbs by far the largest proportion of the crop overall in the Lam Pao area (56.53% in 1973). Sales in the January-May period accounted for 13.29%, store for future sales (in the period September to November) for 14.25% and store for future household needs for 0.87%. It is highly probable that some of the rice stored in 1973 for future sale will in fact be retained for household consumption if there is a poor harvest in 1973-4. Thus something less than 27.54% of the production was the potential marketable surplus (table V.14).

57.09% (161) of the sample either sold or stored rice for future sale; 17.73% (50) sold all their marketable surplus immediately after the harvest, 21.27% (60) retained all their surplus for sale later in the year, and 18.08% (51) both sold rice and stored some for later sale. As may be seen from table V.15, nearly two thirds of those storing and selling, store less than 60% of their surplus. However, overall rather over half of the potential marketable surplus was retained for

TABLE V, 15

% OF THE 1972-3 SURPLUS PADDY THAT WAS STORED OR SOLD

	NA CHUAK NUA	BAN TUM	UM MAO	FAI TAEK	BAN LEK	NON SUNG	LAO YAI	TOTAL
100% stored	35.0	38.7	31.0	64.3	35.5	35.7	50.0	37.3
90%						3.6		1.24
80%			3.4			10.7		2.48
70%		9.7			3.2	10.7		4.34
60%	9.5		3.4			3.6	25.0	3.1
50%	4.8	9.7	10.3	7.1	3.2	3.6	12.5	5.6
40%		3.2		7.1	19.4	3.6		6.8
30%	4.8		3.4		12.9			4.3
20%	9.5				3.2			1.9
10%			3.4	7.1	3.2			1.9
100% sold	38.0	38.7	44.8	14.3	16.1	28.6	12.5	31.5

N=161

sale later in the year.

Other uses: Some 15.06% of paddy is disposed of within the village for purposes other than household consumption. These are discussed separately (table V.14).

1) Seed: Just over two per cent of the total paddy crop is retained for seed, although there is some range in the application rate per rai (see chapter IV). In general there is a close relationship between paddy holding and seed consumption. The use of seed ranges from 10 to 300 kilograms per household, with an overall mean of 76.63 kilograms (table V.13 and Appendix VII.9).

2) Gifts to the 'Wat' (village temple or monastery): Three quarters of farmers gave donations to the wat during the course of the year, in addition to daily gifts of cooked food, including rice, to the monks. The donations of paddy take two forms - firstly ceremonies carried out during the course of the year at which most people make a gift of paddy or other goods, and secondly special events concerning the individual family, a wedding, funeral, or a member of the household entering the monkhood. Gifts range in size from 10 to 700 kilograms, and average 104.29 for those who gave. As may be seen from table V.13 (and Appendix VII.5), the general pattern of gifts is below 250 kilograms, the large ones indicating that the family has donated for some special purpose. Some investigation of donations to the wat in 1972 revealed two cases of gifts of 1,000 kilograms to acquire merit at the funeral of a parent. Overall 2.05% of paddy harvested was given to the wat.

3) Gifts to relatives: 44.9% of the families gave paddy to relatives who lived in separate households; many of these gifts were annual. 5.9% of paddy was disposed of in this way. The reasons for these gifts are not always clear, but the most usual explanations given were: poor related families may be supported by a larger, richer one (particularly

in the case of a widowed, divorced or deserted woman left with children and little or no land); a father may give rice to help feed the family of his married daughter which lacks paddy land; where the father or father-in-law has passed his land on to the next generation he may continue to live in a separate household and be given rice to support him; to prevent sub-division of holdings, gifts of paddy may be given annually to a household rather than part of the holding on inheritance. The whole question of gifts to relatives becomes complicated by the fact that they may conceal repayment of debts, actual loans, or payment for land or labour. However it is clear that such gifts make a considerable difference to the amount of rice disposed of by a number of households in the survey. Gifts were found to range in size from 10 to 3000 kilograms, averaging, for those that gave, 495.35 kilograms (table V.13 and Appendix VII.6).

4) Livestock feeding: 37.1% of the sample used paddy to feed animals, and this accounted for 2.31% of paddy production. As may be seen from table V.13, in general the amount of paddy fed to livestock was small, and 85.58% of cases less than 200 kilograms (Appendix VII.7). These are small quantities; less than a kilogram a day would feed the small number of chickens and ducks kept by most households.[45] The few cases of 1000 kilograms plus were all farmers rearing ducks on a commercial scale to sell eggs and birds. Duck rearing in the study area fluctuates inversely with the rice price; the very low price of 1971 resulted in many farmers purchasing ducklings to raise on their surplus paddy. Lao Yai has several farmers who specialise in ducks, and every year two in the sample buy rice for the purpose. In 1973, one bought 7,200 kilograms of low grade

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45 On average, a chicken or duck consumes 40 kilograms of paddy a year, indicating that most families kept less than 4 or 5 birds. (De Young, op.cit., p.100).

rice. In the area, duck eggs sell for 0.60 baht cash and chicken eggs for 0.40 baht; live ducks and chickens for eating fetch 12-15 baht and 9-10 baht respectively. Given that on average chickens lay 143 eggs a year and ducks 80, the return on a kilogram of paddy fed to poultry is of the order of 1.40 to 1.50 baht for egg sales alone.[46] There is no case in the sample of pig rearing using paddy, but the village rice millers rear pigs on rice bran and sell rice bran to other farmers within the village for the purpose, but only the millers keep pigs on any scale.

5) Barter: The exchange of paddy for fish, salt, fruit, vegetables, meat, cloth and tobacco remains a feature of the village economy. 15.2% of families engaged in some measure of barter during the year, and 1.08% of rice production was used in this way. On average 289 kilograms was exchanged, but the range was from 30 to 1060; most instances were below 200 kilograms (table V.13 and Appendix VII.10). Barter appears under-enumerated in that the majority of families, on detailed enquiry, are found to exchange small and unspecified quantities of agricultural products, including rice.

Deficit Production

Of the 26.6% of farmers who received additional paddy, 16.31% were short of rice to meet their household requirements with the current year's crop; in addition a further 2.83% of farmers became short of rice because of various commitments involving gifts or sale. Thus 19.14% of farmers were actually short of rice on the basis of their own farm production, and received extra to make up the deficit.

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46 Ibid., p.100.

TABLE V.16

PER CAPITA PADDY USE EXCLUDING SALE

	Kilograms per capita	% of amount used for food	% of 283 kilo-grams	% of total for disposal
Food	327.71	100.0	115.80	56.53
Food + Seed	338.48	103.3	119.60	58.38
Food + Seed + Wat	350.44	106.9	123.83	60.43
Food + Seed + Wat + Barter	356.77	108.9	126.01	61.51
Food + Seed + Wat + Barter + Livestock	370.21	113.0	130.82	63.82
Food + Seed + Wat + Barter + Livestock + Gifts	404.56	125.5	142.95	69.72
All Non-Sale Uses	416.39	127.1	147.13	71.73

TABLE V.17

PER CAPITA PADDY AND RICE CONSUMPTION, WITH DIFFERENT MILLING RATIOS

Per capita milled rice consumption		Paddy equivalent at different milling ratios				
		65%	60%	55%	50%	45%
1961	191.58	291.2	319.3	348.32	383.16	425.73
1963	187.62	288.64	312.7	341.12	375.24	416.93
Per capita paddy consumption		**Milled rice equivalent at different milling ratios**				
		65%	60%	55%	50%	45%
1973	327.71	215.63	196.63	180.24	163.85	147.47

Sources: (1961) M.M. Anderson, "Summary classification of food consumption by households in ten villages of Ubol province: November 1961 to February 1963", (unpublished field progress report), 1963.

(1963) Pensri Pitaksakorn, "Special Family Expenditure survey report: food consumption in Thailand", N.S.O., 1964.

(1973) Lam Pao Survey (see text).

Of these, 3.54% were able to meet the deficit from rice stored from the previous year, leaving 15.6% acquiring rice from external sources. In addition some 1.06% appeared to be deficit on their production and were either not receiving, or appeared to receive too little, to meet their needs. 7.46% were receiving additional rice surplus to their household needs, and which was stored, sold, or otherwise disposed of.

Per Capita Rice Use

The various per capita figures shown in table V.16, from the 1973 survey of rice consumption, generally bear out the findings of the smaller 10% survey conducted in 1972. A figure of 364.1 kilograms per capita, with a standard deviation of 100.1, was produced; this included seed, barter and gifts to the wat. This is only 2.05% higher than the 1973 figure, a discrepancy easily explained by the difference in the samples. A realistic figure for village needs appears to be that including food, seed, barter and gifts to the wat, rather than a straightforward food consumption figure.

The Lam Pao consumption figure and other surveys

The 1973 Lam Pao survey consumption figure of 327.1 kilograms per capita is only 15.8% higher than that given by the 1963 Household Expenditure survey assuming a 1.54 milling ratio. Table V.17 relates the Lam Pao findings to the 1963 and Anderson's 1961 survey via the various village milling ratios thought to prevail in the area. If the milling ratio is below 55%, per capita milled rice consumption is lower in the Lam Pao study than that found in the 1963 survey. A milling ratio of 56.52% gives an exact fit between the Lam Pao paddy consumption figure

and the 1963 milled rice figure.

In the absence of any overall survey of milling ratios, it is not possible to produce any generalisation for the North East as a whole, but observation in the Lam Pao area suggests a 50% milling ratio as normal and conversation with farmers and Thai officials suggests that the mills in the region as a whole did not produce higher ratios than those examined.[47] If one accepts the 50% milling ratio, it is tempting to suggest that in the ten years 1963 to 1973 milled rice consumption has fallen. With the general increase in per capita incomes and the further penetration of the market economy into the North East it seems likely that contribution of rice to total food intake may have decreased. The spread of mechanical milling into the North East villages during the 1960's, by introducing a higher degree of polishing, may well have reduced the food value of the milled rice.[48] Unless the consumption of milled rice increased, for which there is no evidence, after the introduction of mechanical milling, then its contribution to total claorific intake must have decreased. There is a great need for a comprehensive nutrition survey to see to what extent the increasing prosperity of the North East has been reflected in the diet.

Thus the actual consumption of paddy may well have fallen in the decade 1963-1973 by 12.8%, assuming a 50% milling ratio. But in

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47 Field work in the Lam Pra Plerng Irrigation area (Nakorn Ratchasima) in 1973 suggested a similar 45-55% range of weight and approximately 33% by volume. This is of interest because the rice milled was non-glutinous as opposed to glutinous in Lam Pao. Interviews with large commercial millers suggested that glutinous rice gave a lower ratio because it shattered more easily; this is not apparent in the less efficient village mills.

48 This was confirmed for the country as a whole by the F.A.O. Mission to Thailand in 1948 which concentrated on the difference between the nutritional value of mechanically and hand milled rice (F.A.O., "Report of the F.A.O. Mission for Siam", 1948, p.9.)

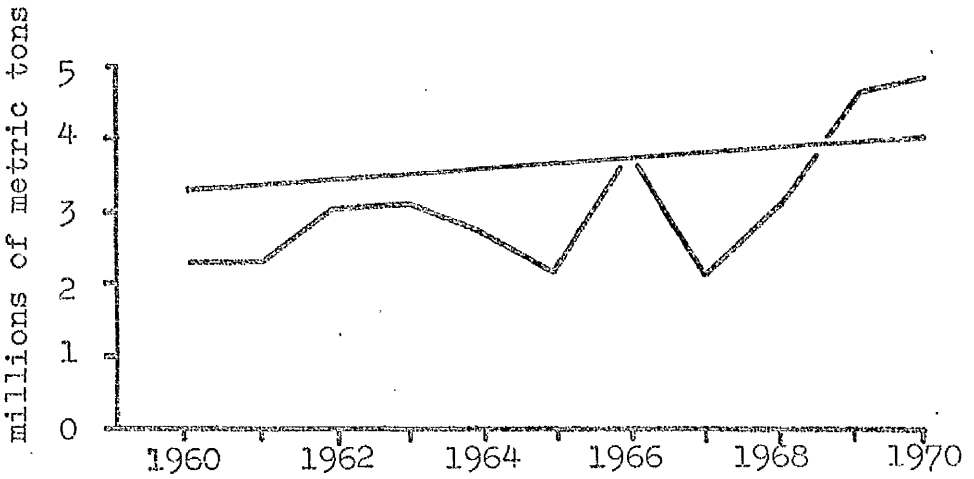

Fig. V.4 Estimated Paddy Consumption and Production, 1960-70

Sources: (production) Ministry of Agriculture; (consumption) Lam Pao survey

terms of nutrition it is likely that the contribution of rice has fallen rather more than this.

Setting aside questions of actual food intake and the milling ratios it is clear that on-farm use of paddy was very much higher than was suggested in the 1961 and 1963 surveys. Food intake alone accounted for 56.53% of the crop, while total farm uses disposed of 72.6%, that is, 47.13% more than the 283 kilograms suggested by the conversion of the 1963 survey by a 65.52% milling ratio. The most realistic figures for the Lam Pao area would appear to be 356.77 kilograms per capita for food, seed gifts to the wat and barter.[49]

An acceptance of the 1973 Lam Pao survey result in rural per capita paddy consumption being increased by at least 26.1% on the Ministry of Agriculture figures inflated by a 55% milling ratio would result in a 20.53% increase, 32.57% with a 50% milling ratio (table V.17). In both instances the rural North East paddy consumption has been severely under-estimated and in the light of the consistent rice surplus in the North East further weight is given to the argument that both the Ministry of Agriculture and N.S.O. production figures are severe under-estimates. On the basis of the Lam Pao consumption figures and the urban milled rice consumption figure from the 1963 Household Expenditure Survey (converted to paddy at the commercial rice milling ratio of 65.58%), a projected consumption total for the North East can be produced (figure V.4).

For 1968, the most recent year for which we have reasonably complete information, North East paddy consumption appears to have been

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49 Gifts to the wat are an essential part of village life, as indicated by the fact that three quarters of farmers made such donations, and very few farmers who had sufficient rice failed to give. Barter was included because although only 15.2% of farmers engaged in it, it is an important source of food for those making use of it, and, as was noted, this was an under-enumeration.

four million tons, and export from the region to have been at least 400,000 tons. Thus total production must have been at least 4.4 million tons, since none of the rice could have come from the previous year's harvest, since it was everywhere in the region very severely deficit in 1967. On the basis of these figures, the Ministry of Agriculture figure for the North East probably underestimated production by 37.5%, and the N.S.O. by 3.5%, respectively 1.2 and 0.15 million tons. For the North East the N.S.O. figures, although an underestimate, therefore appear the more accurate, which tends to argue against Ingram's assertion that the Ministry of Agriculture is more reliable.[50]

Glutinous Rice Surplus

In the 1972-3 crop season, 72.6% of the glutinous paddy crop of the Lam Pao area was disposed of within the village, leaving only 27.54% as a potentially marketable surplus. Of this only half (13.29%) was sold off by May (the date of the survey), the remainder (14.25%) being retained for later sale, probably in the September-October period just before the next harvest. Given the unreliable environmental conditions and the consequent fluctuations in the crop, farmers insure themselves against loss and shortage by retaining some or all their surplus until they are certain of the nature of the succeeding harvest. Thus the 14% of paddy labelled as 'future sale' will be only completely disposed of by sale if the harvest in the following year is sufficiently good to provide for household needs.

The size of the marketable surplus reflects the involvement of the area in production for the market in any year. Reference to table

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50 Ingram, op.cit., p.243.

V.14 reveals that Um Mao is the most commercial rice producing village in the 1972-3 season, measured in terms of the proportion of production counted as surplus. The relative proportions of rice sold, retained for future sale, and stored for future consumption reflects the reliability of the village land. In Non Sung and Lao Yai the high yielding but very unreliable land results in a low percentage sold in the early months after the harvest, and a significant proportion of non-sale store.

1972-3 appears to be a fairly normal year as regards the proportion of rice that was surplus and the proportion that was sold in the pre-May period. Examination of the 1970-1 data in the light of the consumption figures produced in 1972 and 1973 suggests an overall surplus of 25.58%. 1970-1 was a slightly poorer season than 1972-3. However, in 1970-1 the very poor market conditions for rice resulted in only 7.6% of rice being sold in the pre-May period, leaving 18% as store and potentially future sales. The evidence suggests that 1970-1 was atypical in this respect and that the 1972-3 situation was the more normal.

On the basis of these figures, the proportion of paddy produced in the study area that was intended for the market could be 6-8% higher than the overall regional figure produced from the Survey of Agriculture in 1953 and contained in table V.1.

Glutinous and Non-Glutinous Paddy

To produce a marketable surplus, the farmer must have rice land surplus to the production of his subsistence rice needs. In 1971 55.9% of farmers possessed surplus paddy land, averaging 4.44 rai, and a third of farmers (35.8%) could produce their own needs from 50% or less of their holding. As noted above, the possession of surplus land reflects the desirability of possessing a variety of land and a comfortable

safety margin to ensure sufficient production for household needs in years of adverse climatic conditions, rather than indicating an orientation to the market. The percentage of paddy that is marketed or intended to be sold, coupled with the percentage of the farmer's income derived from paddy sales, indicates the farmer's involvement in the rice market in any given year, and it is necessary to study an individual case over a number of years to determine that he is in fact a regular producer of surplus, who markets rice every year.

In a predominantly glutinous rice eating area, the growing of a quantity of non-glutinous rice, however, is an important indication of deliberate production for the market. By planting land to non-glutinous rice, which will not be used for household consumption, the farmers make the decision that the land is surplus to their needs. Within the primarily glutinous producing areas of the North East, non-glutinous rice is normally more readily marketable for both the changwat urban markets and for export from the region.

Prior to 1971, the differential between glutinous and non-glutinous prices had not been marked though it was clear that the non-glutinous was more easily marketed. The very poor rice market conditions of 1971 caused great difficulty for farmers trying to dispose of glutinous varieties, the export market for which had almost entirely dried up. Non-glutinous rice remained marketable in the study area; the price, although low, was some 16% above that for glutinous. As a result, in 1971 farmers planted the area they considered surplus to non-glutinous types. In the 1970-1 crop season, only 8.44% of farmers planted the variety, and in 1971-2 this had risen to 22.91%, and the total paddy area under non-glutinous rose from 2.21% to 8.26%.

The growing of non-glutinous rice, as noted in chapter IV, is particularly concentrated in the villages most heavily committed to rice

production, Um Mao, Non Sung and Lao Yai. These last two are located in amphur Komalasai, which is regarded by the Kalasin rice millers as the main source of surplus rice in the changwat. In 1970-1, 16.28% of the amphur was planted to non-glutinous rice, and in 1971-2, 29.19%. This pattern of planting surplus paddy land to non-glutinous was repeated throughout the North East, leading to fears among the exporters that there would be a shortage of glutinous rice for export.[51]

Surplus and non-surplus producing farmers

The detailed examination of the paddy production and disposal patterns of the Lam Pao area enables the characteristics of those farmers who produced a surplus to be analysed and compared with those of the farmers who broke even or were in deficit. Using the consumption figures from the 1972 and 1973 surveys, farmers were divided into deficit, balance, and surplus producers, and their land use and socio-economic characteristics were compared.

The dividing lines were: deficit, below 263.1 kilograms per capita, balance, 263.2-464.1, and surplus, above 464.6. These figures were chosen on the basis of the 1973 consumption figure of 364.1 kilograms per capita, which includes food, seed, small elements of barter and gifts to the wat;[52] the limits were drawn one standard deviation from this mean.

In the sample from the seven villages, 16.8% (41) of farmers were deficit, 26.9% (64) were balance, and 55.9% (133) produced a surplus.

Of the 41 farmers classed as deficit, 23 (56.1%) who came in the range 200-250 kilograms per capita, were probably able to manage without extra rice if forced to; the remainder were clearly in absolute

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51 Bank of Thailand, Monthly Review, February 1972.

52 Division of farmers on the basis of their status as paddy producers would produce the same division if the 1970-1 or 1971-2 figures were used.

TABLE V.18

GROUP MEANS FOR DEFICIT, BALANCE AND SURPLUS PADDY PRODUCERS IN THE 1970-1 CROP SEASON [+1]

Household size	6.5	7.2	8.4	
Holding size	19.8	12.8	11.3	
Paddy holding	17.0	9.8	8.5	
Per capita holding	3.1	2.1	1.3	
Per capita paddy holding	2.8	1.4	1.0	
% planted to paddy	85.9	76.6	75.2	+2
% holding planted	96.0	97.9	97.6	+6
% planted area lost	11.8	14.6	27.6	
Yield	311.8	314.8	258.6	+3
Labour input per rai	9.5	10.2	9.9	+6
Cash input per rai	19.9	17.9	16.7	
% labour in rice	79.6	73.0	76.3	+6
Value of production	6625.8	5407.3	3807.8	
Cash income	4481.9	3943.0	2946.3	
Per capita value	1019.4	751.0	453.3	
Per capita cash	689.4	547.6	350.0	
Cash income from crop sales	1090.6	653.6	653.7	+4
animal sales	958.2	688.2	555.7	
fish sales	91.3	94.9	58.5	+5
handicrafts	13.3	10.9	5.7	
off-farm sources	1962.2	1680.6	1055.2	
remittances	378.6	909.7	617.5	
% cash income from crops	24.3	16.6	22.2	
animals	21.4	17.5	18.9	+6
fish	2.0	2.4	2.0	+6
handicrafts	0.3	0.3	0.2	+6
off-farm sources	43.8	42.6	35.8	
remittances	8.4	27.1	21.0	

+1 All means significantly different at 99.8% level (Students 'T' test) unless otherwise stated.
+2 Only the surplus group has a significantly larger percentage planted to paddy.
+3 Only the deficit group has a significantly lower yield.
+4 Only the surplus group has a significantly higher income.
+5 Only the deficit group has a significantly lower income from fish sales.
+6 No significant difference.

deficit. No farmer in the 'balance' group sold rice, but four of the deficit farmers had placed themselves in this category by selling rice to meet urgent cash needs. Two of them were in serious deficit, with only 125 and 166.7 kilograms per head, and they would clearly have to borrow or buy rice later in the year.

Examination of the socio-economic and land use characteristics produced a generally clear pattern, a gradation particularly apparent with respect to family size and area of holding (table V.18). Surplus producers have holdings of 19.8 rai on average, 85.9% of which is planted to paddy, and families of 6.2 persons, giving a per capita paddy holding of 2.8 rai, as against 1.4 rai for balance and 1 rai for deficit households. The per capita holding figures are clearly the most important indicator distinguishing the three groups. The lower percentage of holding devoted to paddy by the balance group and the deficit group reflects the tendency of non-surplus producers to plant additional areas of subsistence crops, rather than a tendency to grow other cash crops.[53]

Deficit producers have significantly lower yields and a greater incidence of crop damage than the other two groups. This emphasises the importance of larger holdings in ensuring production under the prevailing environmental conditions. Farmers with low per capita holdings, even of land that is inherently fertile, and more intensively cultivated, have less insurance against unfavourable conditions. A similar percentage of damage for a farmer with a high per capita holding may still leave him in balance or even provide a surplus.

There is no apparent difference in the labour inputs either in total or in terms of the individual processes, indicating that intensity

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53 See chapter VI.

of cultivation does not differ, despite the marked differences in the per capita paddy holdings. This suggests that the larger families of the deficit and balance producers devote more labour to non-agricultural activities because the total percentage of labour involved in paddy production is similar for all three groups (table V.18). In terms of fertiliser and insecticide applications there is a marked fall-off in intensity, with surplus producers applying 19.9 baht per rai as against 17.9 baht for the balance producers, and 16.7 baht for deficit producers. The more certain production, the larger cash income, and more commercial outlook of the surplus producers are explanatory factors in this difference. Deficit producers are unlikely to have the necessary cash to buy fertiliser or insecticide and if the land is unreliable, partly because of its uniform nature, they will be unwilling to invest cash inputs even if they can afford them. It is clear that the use of cash inputs, particularly fertiliser, by deficit producers, was a 'desperation measure' undertaken to try and boost production on inadequate land, and a measure which could result in a vicious circle of debt to merchants and moneylenders and continued use of fertiliser to produce enough rice to pay the debts or to ensure household consumption so that money was not diverted from payment of past debts.

Income, measured in value of production and cash income, showed a marked gradation, with surplus producers having 1019.35 baht per capita, and per capita cash income of 689.37 baht on average, as against 751.01 and 547.63 baht for the balance producers, and 453.31 and 350 baht for the deficit. Surplus rice producers are by far the wealthiest group, indicating that the balance and deficit groups do not manage to compensate for the lack of paddy by developing other sources of income.

In terms of the composition of cash income, the surplus producers not only obtain a large income from crop sales, 1090 baht compared with 653.6 and 653.7 for the others, but also derive a larger percentage of their income from crops, 24.73% compared with 16.57% and 22.16%. Removal of the income derived from paddy sales reduces the disparity in crop income, with surplus producers obtaining 789 baht, balance 653.6 baht, and deficit 526.8 baht. This indicates both the more equitable distribution of other crops and the fact that there is no crop substitute for a lack of paddy income; surplus, balance and deficit rice producers are equally likely to grow non-rice crops.[54] Income from off-farm sources is of a similar order for surplus and balance producers, 43.88% and 42.62% respectively, but rather lower for deficit producers, 35.81%. However there is no significant difference in the incidence of off-farm work between the three groups. Cash income derived from remittances amounts to only 328.6 baht (8.44% of cash income) for surplus producers, 909.7 baht (22.07%) for balance and 617.5 baht (20.95%) for deficit producers. These poorer groups tended to supplement income by sending family members away, who remit money;[55] this also reduces pressure on the stored rice.

Rice surplus producers may be seen as the largest land holders, with large per capita holdings they are also by far the wealthiest of the farmers in the area. Deficit and balance farmers are smaller farmers, with lower per capita holdings, a tendency to less reliable land

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54 See chapter VI.

55 All income figures are for 1970-1, a year of low paddy price which resulted in a depression of farmers' cash income derived from paddy sales. The more detailed examination of income undertaken in chapter IV uses 1971-2 figures because of the more typical nature of that year and the more comprehensive figures for Lam Pao.

and lower yields, particularly in the case of the deficit producers.

On the basis of the examination of paddy holdings made in chapter IV, farmers with insufficient paddy are faced with the prospect of buying paddy at a high cost by comparison with the cost of paddy produced on the farm. Farmers with small holdings will, when possible, attempt to obtain new land by clearance, purchase, renting or temporary free use. Traditionally new land was easily obtained by clearing forest. The gradual drying up of the source of new paddy land in the North East will in the future result in a decline in the size of paddy holdings, which will put pressure for intensification of production; in the absence of greater environmental control, farmers with smaller holdings will find it difficult to assure a regular paddy supply. Stabilisation of yields is thus necessary not only to reduce fluctuation in the agricultural economy, but also to replace the insurance against natural hazard present in the traditional system of extensive cultivation, which will be eroded by population growth. Attempts to intensify cultivation on small holdings under the prevailing conditions could well be disastrous for the farmers concerned and result in many becoming heavily indebted; such intensification can only be seen as a desperate measure which will not contribute to agricultural development.

The 55.9% of surplus producers may be seen as farmers within the scope of the 'expanded traditional sector'; the dividing line is by no means sharp because under the unstable environmental conditions of the North East farmers move between the three categories. It has been emphasised both in the past chapter and the preceding one that the traditional sector is extremely unreliable in its production levels, and cash income from the expanded traditional sector can be extremely unreliable. Given the exhaustion of new paddy land in the North East, the movement of more farmers into the very large paddy holding group is

almost at an end. Without environmental control, only the largest farmers can produce regular surpluses, and the smaller holdings show a much more uneven pattern because of their more uniform land.

As was noted in chapter IV, continued expansion of the traditional sector's production will increasingly be possible only through intensification, without a greater degree of environmental control the surplus produced in the North East is likely to be steadily eroded by the growth of population more rapidly than production. A transfer to a 'modified traditional' situation with increased environmental control through irrigation, new techniques, and new strains of rice is necessary, but the adoption of new techniques and marked increases in productivity will not be possible under rainfed conditions.

Given these limitations of the traditional sector, farmers have increasingly sought alternative income sources, from off-farm work and remittances. Writers as far back as Zimmerman in 1931 have concentrated on the need for a non-rice cash crop for the North East that could be planted on the large area of land unsuited or marginal to rice, that is, some form of innovatory development in the agricultural sector.[56]

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56 Zimmerman, op.cit., p.294.

CHAPTER VI

THE INTRODUCTION OF CASH CROPS

In the last two chapters the continued importance of paddy production in the Lam Pao study area has been stressed. The penetration of the rice market into the North East brought no real change in the land use pattern. Until the 1950's only small patches of subsistence crops broke the pattern of paddy monoculture. Fruit, vegetables, tobacco and cotton were traditionally exchanged within the village; barter is still practised within the villages. These crops were not produced for the market except in the immediate vicinity of towns.

From the early 1950's, new forces began to operate on the land use of the North East with the expansion of crops primarily intended for sale. The 'new' crops were kapok, kenaf,[1] maize, water-melons and cassava,

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1 Kenaf is a low grade hard fibre crop similar to jute but of lower quality. During and after the second world war, jute fibre was in short supply, and in the search for substitutes kenaf was found the most important. Unlike jute, kenaf is tolerant of a wide range of physical conditions and is particularly resistant to drought. The crop will grow on soils of low fertility with low levels of cash and labour inputs, unlike jute which requires high fertility and adequate water. Kenaf suffers from root rot by contrast on waterlogged soil. There are two main species, Hibiscus cannabinus and Hibiscus sabdariffa, the former producing higher yields and better fibre, but less hardy, more demanding of soil fertility and moisture and more susceptible to damage by disease and insects. The majority of Thai kenaf is Hibiscus sabdariffa, the 'native' or 'Chinese' type. Kenaf is highly photosensitive and flowers when there is $12\frac{1}{2}$ hours'light. Small quantities of kenaf have been grown as part of the traditional village economy for ropes, mats and nets, but until recently there was no commercial production. Attempts to introduce the cannabinus variety and other higher yielding strains developed within Thailand have not been successful because of the adverse environmental conditions. (E.J. Sholton, "Kenaf in Thailand", 1968, pp.1-3; G.B. McFarland, "Thai-English Dictionary", 1954, p.514; R.H. Kirby, "Kenaf (Hibiscus cannabinus L.) "Fibres", 1949, pp.336-8, especially p.336).

Fig. VI.1 Area Planted to Kenaf in North East Thailand, 1952-70

Source: Agricultural Statistics of Thailand, Ministry of Agriculture, 1972

of which only cassava was totally new to the area, the others having been grown previously as small scale subsistence crops. Of the new crops, only kenaf has made a widespread impact on the North East and the study area.

Small quantities of kapok are grown around the houseplot in every village, the majority used within the village. Maize expanded into Nakorn Ratchasima and Chaiyaphun in the early fifties, but has since declined with the development of more favourable production areas in the north Central Plain. Cassava has only spread into the North East since 1970 and as yet is of little importance in the study area. This chapter consequently stresses the role of kenaf, the main cash crop at present grown in the area.

The Introduction and Spread of Cash Crops

In 1958, little more than 100,000 rai was planted to what could be termed 'cash crops' in the North East, and this consisted almost wholly of kenaf. In that year, some 25,000 tons of kenaf was exported from the region (figure VI.1 and Appendix XI.).

Sholton dates the beginning of "real commercial" kenaf growing from 1950, but the production at this date, 12,000 tons, seems scarcely to rank as one of "commercial importance to the North East region".[2] 1950 does mark, however, the start of a small but regular export of kenaf fibre from Thailand, and in this sense Sholton's choice of this year as the beginning of the commercial production in the area has some validity.[3] Nevertheless, prior to 1958, despite some official encouragement, the crop did not have a significant place in the land use or farm economy

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2 Sholton, op.cit., p.3.

3 Ministry of Agriculture, Agricultural Statistics, 1972.

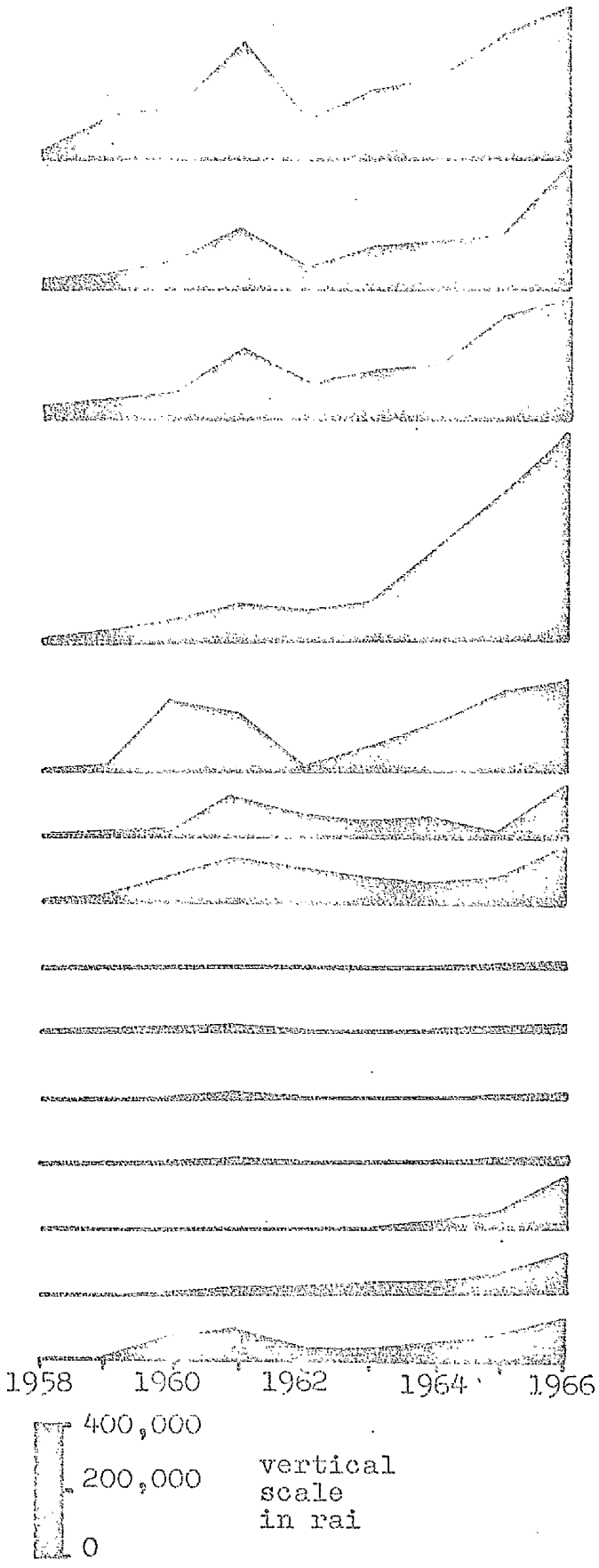

Fig. VI.2 Area Planted to Kenaf by Changwat, 1958-66

Source: E.J. Sholton, 'Kenaf in Thailand,' 1968

Note: See Appendix VIII.2

of the region. The construction of two Government Gunny Sack mills in 1953 and 1954 does not appear to have resulted in any great stimulation of the cultivation of kenaf. U.S.O.M., in the early 1950's, recommended the promotion of kenaf as a suitable cash crop for the North East and imported improved Cuban varieties of kenaf seed to replace the local strains, but met with little success.[4] It seems likely that kenaf was not very actively promoted by the Agricultural Extension Services during the 1950's despite a favourable attitude towards the crop on the part of U.S.O.M. and some quarters of the Thai government.

The real stimulus to the spread of kenaf came from 1958 onwards, with a series of very poor Pakistan jute crops and a very high level of world demand for jute and jute substitutes. As figures VI.1 and VI.2 show, the North East farmers' response to the high price levels were both rapid and spectacular, with the area planted increasing from 150,000 rai in 1958 to 1,700,000 in 1961.

The mechanism of the spread is not documented, but the evidence suggests direct promotion of the new crop by merchants who visited the villages, quoted prices, gave seed and advice, and assured farmers that they would collect the fibre from them. Once the crop was grown successfully and profitably by farmers in a particular area, it spread by diffusion through contact with friends and neighbours. The conclusion from interviews and discussion with farmers is that the merchants contacted a nucleus of farmers and the majority of the present growers acquired the idea, technical knowledge and seed from established growers. Exactly the same process was at work in Kalasin province in 1972-3 with the spread of cassava into the changwat. Merchants were

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4 U.S.O.M., "Kenaf in Thailand", 1956.

TABLE VI, 1

PERCENTAGE OF NORTH EAST KENAF GROWN IN EACH CHANGWAT 1958-68

CHANGWAT	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Buriram	1.39	0.59	1.48	8.96	13.59	5.19	4.59	0.41	4.91		1.93
Chaiyaphum	39.40	21.56	10.85	13.37	15.95	17.15	12.85	14.75	11.89		13.80
Kalasin	1.88	0.62	8.37	10.18	15.35	7.73	4.57	4.04	5.89		2.66
Khon Kaen	7.25	11.63	8.61	6.46	13.98	13.64	21.58	21.16	19.91	N/a	14.13
Loei	0.04	0.02	0.06	0.05	0.11	0.07	0.46	0.23	0.81		0.93
Mahasarakarm	18.88	50.19	17.96	21.63	17.61	22.89	19.2	18.74	14.01		12.87
Nakorn Phanom	2.02	0.20	0.08	1.98	1.73	1.22	0.72	0.77	0.99		2.29
Nakorn Ratchasima	21.54	12.59	11.09	12.26	8.4	13.01	12.22	8.63	11.95		3.83
Nongkai	0.20	0.07	0.02	1.53	0.33	0.54	0.18	0.18	0.05		0.18
Roiet	1.58	0.77	4.69	2.83	1.74	2.96	2.78	4.35	5.42		5.13
Sakkonakorn	0.20	0.07	0.99	0.54	0.47	0.14	0.07	0.22	0.29		0.02
Srisaket	1.84	0.92	9.66	6.12	4.98	3.37	4.19	4.21	4.03		13.81
Surin	0.35	0.09	0.03	0.11	1.72	0.18	1.9	3.09	5.73		1.12
Ubonratchasima	2.31	0.92	25.66	11.83	0.94	8.81	11.92	11.65	8.96		17.08
Udonthani	1.09	0.50	0.29	2.05	3.07	2.51	2.75	3.74	4.42		3.6

Source:- Calculated from figures given in E.J. Sholton, 'Kenaf in Thailand', p.43, 1968

visiting villages giving information on growing, prices and collection of the crop; interested farmers were contacting existing growers for cuttings and technical assistance.

The North East farmer has shown himself to be eager for additional cash income, and willing to adopt rapidly new crops if they can be shown to be profitable. It is significant that it should be merchants who are able to initiate the spread of new crops, rather than the Agricultural Extension Department. Encouragement of kenaf production and more recently of cassava has been undertaken by the Extension Department, but only after it was already spreading under the stimulus of the market via contact between farmers and merchants and among farmers.

The initial spread of kenaf was in changwats Chaiyaphun, Nakorn Ratchasima and Mahasarakarm. Figure VI.2 and table VI.1 indicate the growth in area on a changwat basis, and the changing position of producers in terms of the percentage of total area planted.[5] Ubonratchathani Buriram, Kalasin and Srisaket all showed marked upswings in the cultivation of kenaf between 1958 and 1960. Khon Kaen, although a sizeable producer in 1960, did not show much expansion until 1964. Udornthani and Surin were the latest developers, with accelerated growth only after 1965. The other changwats of the North East, Loei, Nakorn Phanom, Nongkai and Sakonnakorn remain insignificant producers, with less than 20,000 rai planted to the crop in 1968.[6]

The pattern of penetration of kenaf into the North East reflects to some extent the pattern ofppenetration of the paddy market,

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5 The figures for the percentage of cultivated area devoted to the crop are not available on a changwat basis.

6 There is no changwat level breakdown of kenaf production after this date.

TABLE VI.2

THE DOMINANT POSITION OF THE NORTH EAST IN THE THAI KENAF PRODUCTION, 1952-69

	% Area	% Production
1952	90	
1953	79	
1954	97	N/A
1955	98	
1956	97	
1957	98	97
1958	99	99
1959	98	98
1960	97	96
1961	96	95
1962	97	96
1963	96	97
1964	98	97
1965	N/A	
1966	N/A	N/A
1967	98	
1968	99	
1969	94	

Sources: Area (1952-66) and Production, E.J. Sholton, "Kenaf in Thailand", 1968, p.44.

Area (1967-69) Annual Statistical Bulletin, Mekong Committee, 1971.

that is, spreading in along the lines of communication into the south-west corner of the Khorat plateau and from there into the changwats of the central part of the plateau. To a large extent the changwats which have become large kenaf producers were those that in the late 1950's still had large areas of uncleared upland suitable for the fibre but unsuited or marginal to paddy. The lack of any long-term data on cultivated area and uncleared land precludes any detailed examination of the reasons for the differential degree of acceptance of kenaf amongst the North East changwats. Since 1958 the pattern of kenaf production has become less concentrated (table VI.1); in 1958, four changwats accounted for 86.55% of the area, and by 1963 the four leading producers only accounted for 58.82%.

Kenaf production has not developed to any significant extent in other parts of the kingdom. Since 1954, over 94% of the area planted to kenaf and over 96% of the total production has been in the North East (table VI.2).

Cash crops in the study area

In the study area, 17.2% of the holding area was planted to kenaf and 59.2% of farmers cultivated the crop. Other cash crops make little contribution. The variation in both the incidence and proportion of holding area planted to kenaf between villages (table VI.3) reflects the availability of suitable land. In Um Mao there is little land at a higher elevation that is suitable for non-paddy crops, while in contrast at Ban Tum there is a very extensive area of such land close to the village. In general, kenaf plots average 5 rai, and only 14.1% exceed ten rai, but 21.98% are less than two (Appendix VIII.2). In terms of percentage of holding, only 9.2% devoted more than 50% to kenaf and 10.63% of these were in Ban Tum; there was only one farmer with all

TABLE VI.3

KENAF IN THE STUDY AREA

	% Farms Growing	% Total Holding Area	Average Plot Size (rai)
Na Chuak Nua	51.1	16.8	6.9
Ban Tum	89.9	30.9	5.9
Um Mao	29.6	5.4	3.6
Fai Taek	40.0	12.7	4.1
Ban Lek	42.9	13.7	4.4
Non Sung	75.5	15.6	3.9
Lao Yai	81.8	14.1	2.7
Lam Pao Area	59.2	17.2	5.0

his holding planted to kenaf, in Na Chuak Nua (Appendix VIII.3).

Kenaf does not in general compete with paddy for existing cultivated land; kenaf is normally planted on land unsuited to paddy. However it is important to bear in mind that the distinction between paddy land and upland can be one of land use rather than elevation of physiography. The marked contrast in the appearance of kenaf land compared to paddy may be seen from the aerial photograph (figure VI.3).

In the study area, kenaf seems to have first spread in 1959-61, before which the majority of land at present under kenaf was forest. Very rapid clearance of forest took place from 1959-65 in all the sample villages that had forest holding remaining. Only in Um Mao was this process absent, because of the lack of land other than paddy land. Um Mao is the only village where kenaf is grown on potential paddy land.

It is probable that, as noted in chapter I, by introducing a new element into the traditional pattern of clearance and settlement, kenaf was planted on land that would otherwise have been cleared for high, marginal paddy cultivation. This is particularly evident in the higher areas west of the Lam Pao access road, where recent settlements have cleared land for kenaf, and, more recently, cassava which is sold to buy rice; without the cash crops, it is likely that these villages would otherwise have cleared the land for rice, although the land is marginal, low-yielding, and not always able to be cropped.

Within the study area itself, the farmers who adopted kenaf after 1959-60 were paddy farmers who had access to uncleared or partly cleared upland. They did not replace paddy by kenaf, but cleared new land and grew kenaf as an additional crop. The limited number of farmers who are solely dependent on kenaf cultivation are inevitably small young families with additional off-farm sources of income. They are usually sons-in-law who have either been given or have acquired through purchase

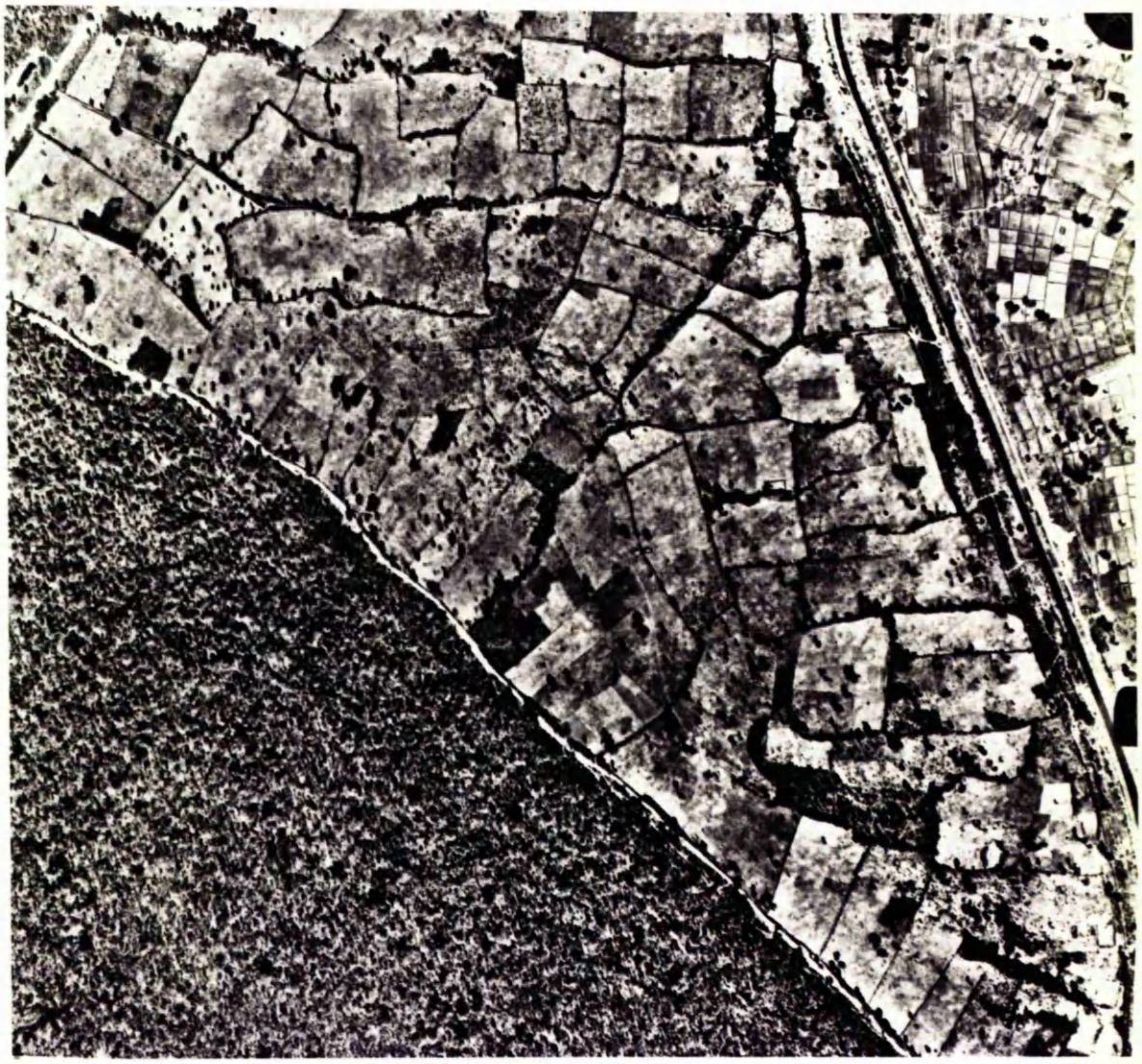

FIG. VI.3 Upland, forest and paddy at Ban Tum. The upland is easily distinguished from paddy land by the large fields and pock marked surface resulting from kenaf cultivation

or clearance an upland plot to provide some crop income for the household.[7] These types of families are most frequently found in Na Chuak Nua where there is still uncleared upland available and off-farm work at Lam Pao with the R.I.D. The process of separation off of new households may be more rapid in Na Chuak Nua for these reasons.

The dominance of clearance in the manner of acquisition of kenaf land, compared with inheritance for paddy land, indicates that new land is cleared for kenaf, rather than other crops displaced. The small amount of paddy land acquired by clearance reflects that the active clearance of paddy must have come to an end in the last generation, while for kenaf clearance is a feature of the present generation and only a relatively small amount has been inherited (table VI.4).

Cash Crops in the Farm Year

The overall pattern of the farm year is illustrated in figure VI.4. As with paddy, the timing of activities is closely related to the rainfall, and in 1971-2 kenaf, like paddy, was generally a month late in preparation and planting because of the late onset of the rains. Farmers attempt to begin land preparation as early as possible. The weed growth is cleared by hand before the rains start, any regeneration of the forest is checked, and if time and the labour force permit, some of the remaining trees and stumps may be burnt or removed. All the accumulated material is burnt and the ashes scattered on the plot. In general the first ploughing takes place after the rain has begun to soften the ground. Usually the plough is drawn by buffaloes, but in 1971-2 there

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7 In Thai-Lao society, land passes through the daughter to her husband.

TABLE VI.4

MANNER OF ACQUISITION OF KENAF LAND (%)

	Purchase	Inherited	Rented	Free Use	Cleared	Other
Na Chuak Nua	36.4	45.5	-	9.1	9.1	-
Ban Tum	20.7	41.1	-	6.9	31.0	-
Um Mao	33.3	33.3	-	25.0	8.3	-
Fai Taek	20.0	30.0	-	10.0	40.0	-
Ban Lek	15.0	47.4	15.8	15.8	-	-
Non Sung	11.8	73.1	-	15.4	-	-
Lao Yai	-	100.0	-	-	-	-

Note: See Table IV.6 for a comparison with paddy land

was an apparent increase in the hiring of tractors to plough the upland plots, enabling earlier ploughing.[8]

In the few cases of newly cultivated kenaf plots land clearance would start in January or February. Much of the remaining forest cleared along the dam access road in the last three years used tractors to break up the very hard soil, and the advent of tractors throughout the North East has accelerated the pace of upland clearance and incorporation into the cultivated area. Using buffaloes, farmers would have to wait until the rain thoroughly soaked the soil of newly cleared land before ploughing it, and by then they would want to start work on the existing fields, so that unless the rain began early, in March, the amount of new land brought into cultivation each year would be restricted. The date when land preparation can begin varies from year to year and village to village. Striking intra-village differences can be explained by farm management, labour supply, and off-farm commitments, but location of plots, soil type and above all the overall distribution of rainfall play an important part.

Land preparation in 1970-1 took place in all the sample cases between February and July, mostly in April and May (table VI.5). Only in Na Chuak Nua and to a lesser extent Ban Tum did preparation take place as early as February. The very large holdings in Ban Tum (table VI.3) would seem to be reflected in the long period of preparation; this was the only village where preparation lasted from February to July.[9] The small kenaf holdings of Fai Taek, Um Mao, and Lao Yai were all prepared

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8 The question of incentive to plant earlier will be discussed in chapter VIII and later in this chapter.

9 One of those preparing in August was a farmer who had prepared and planted half his kenaf in May, but had insufficient labour to complete the rest of the plot before the rice preparation, thus half the kenaf was prepared and planted after the rice harvest.

TABLE VI, 5

DATE OF LAND PREPARATION (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	2.0	3.0	4.0	5.0	6.0	7.0
Na Cuak Nua	48.6	14.3	20.0	14.3	2.9	0.0	0.0
Ban Tum	10.5	5.3	43.9	22.8	10.5	5.3	1.8
Um Mao	71.4	0.0	8.6	17.1	2.9	0.0	0.0
Fai Taek	60.0	0.0	8.0	24.0	8.0	0.0	0.0
Ban Lek	57.1	0.0	14.3	14.3	9.5	2.4	2.4
Non Sung	24.2	0.0	18.2	21.2	30.3	6.1	0.0
Lao Yai	18.2	0.0	18.2	36.4	27.3	0.0	0.0
Lam Pao Area	40.8	3.4	21.4	19.7	11.3	2.5	0.8

TABLE VI, 6

DATE OF PLANTING (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
Na Chuak Nua	48.6	8.6	11.4	22.9	8.6	0.0	0.0	0.0
Ban Tum	10.5	5.3	36.8	26.3	12.3	5.3	3.5	0.0
Um Mao	71.4	0.0	2.9	11.4	14.3	0.0	0.0	0.0
Fai Taek	60.0	0.0	4.0	24.0	8.0	4.0	0.0	0.0
Ban Lek	57.1	0.0	11.9	11.9	9.5	4.8	2.4	2.4
Non Sung	24.2	0.0	18.2	21.2	30.3	6.1	0.0	0.0
Lao Yai	18.2	0.0	9.1	36.4	36.4	0.0	0.0	0.0
Lam Pao Area	40.8	2.5	16.4	20.6	14.7	3.4	1.3	0.4

TABLE VI, 7

DATE OF HARVESTING (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	1.0	2.0	9.0	10.0	11.0	12.0
Na Chuak Nua	48.6	0.0	2.9	11.4	37.1	0.0	0.0
Ban Tum	10.5	3.5	0.0	28.1	45.6	10.5	1.8
Um Mao	71.4	0.0	0.0	14.3	8.6	5.7	0.0
Fai Taek	50.0	0.0	0.0	16.0	20.0	4.0	0.0
Ban Lek	57.1	0.0	0.0	14.3	14.3	14.3	0.0
Non Sung	24.2	0.0	0.0	33.3	39.4	3.0	0.0
Lao Yai	18.2	0.0	0.0	0.0	72.7	0.0	9.1
Lam Pao Area	40.8	0.8	0.4	19.3	31.1	6.7	0.8

in the March-May period, with the main body of work in April. Conversation with farmers and Agricultural Officers confirms that this was a typical year for kenaf, and 1971-2 was much later. Preparation after the rice harvest, reported by one farmer, is likely to be undertaken in the years of later rainfall. Yields of such late planted kenaf are lower, but at least some return is ensured.

Kenaf is planted as soon after preparation as the amount of rainfall permits. In most cases, planting is in the month of ploughing, and there is seldom more than a month between the processes. In some cases ploughing and planting took place at the same time, with the seed broadcast behind the plough and covered over with a hoe. The close relationship may be seen from a comparison of tables VI.5 and VI.6, and from figure VI.4. A lengthy delay results in weed growth and hardening of the surface, necessitating a second ploughing and weeding of the plot before the seeds can be broadcast and ploughed under or put in with a dibbing stick. The more efficient row planting is not seen outside experimental farms, although it makes for easier weeding and overall higher yields. The small holdings of Um Mao and Lao Yai again stand out very strongly with planting and preparation both being completed in March-April; for planting, the peak of activity is in May.

Kenaf plots are usually weeded about a month after planting when the plants are from 8 to 12 inches high. Normally only one weeding is necessary because as the kenaf grows the weeds are gradually shaded out.

Kenaf harvesting dates are less diverse than those of paddy, a reflection of the plant's sensitivity to photo-period. 85% of kenaf is harvested in September and October before the rice harvest. Ban Tum again exhibits a greater spread of dates than the other villages (table VI.7).

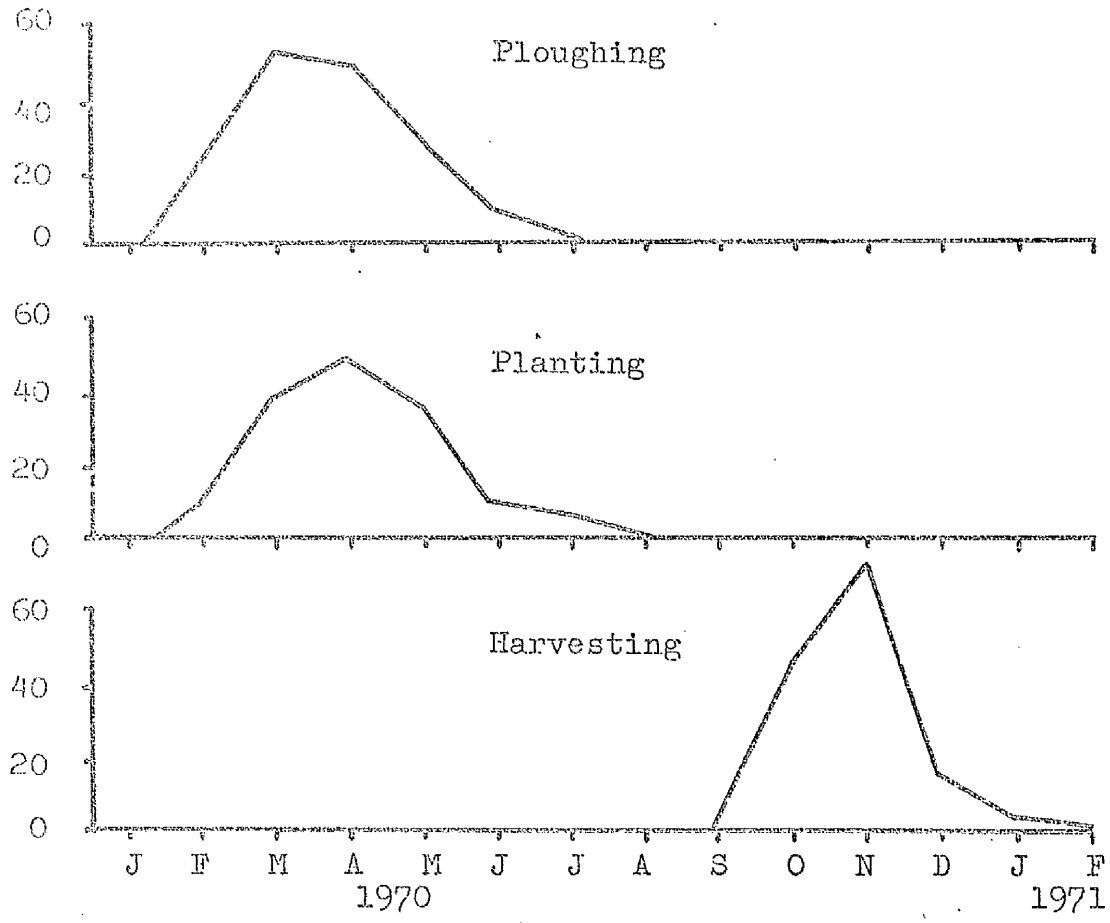

Fig. VI.4 The Kenaf Year - the percentage of farmers engaged in the major activities of kenaf cultivation in each month

Kenaf is either pulled up or cut off at ground level, the stalks are then left in the field for two or three days for the leaves to dry off. After drying the leaves are shaken from the plants and the stalks bundled and transported to the retting facilities. Retting for seven to ten days is necessary to enable the fibre to be removed from the hard inner core of the stalks. Inadequate retting results in the fibre being more difficult to remove from the stalk and reduced yield and quality. Kenaf is retted in a variety of places, ponds, ditches alongside roads, stream beds, and pits dug for the purpose. The earlier the harvest the more water there is available, and harvest as late as January or February means there is little water left. Retting in shallow and muddy water reduces the quality of the fibre drastically, though not necessarily the weight, because of the mud adhering to it. The bundles of kenaf are either tied or weighted down to keep them below the surface. After retting the fibre is stripped and dried in the sun for one or two days before being bundled into bales of approximately 60 kilograms ready for sale.[10]

Kenaf plots are normally cut in several stages so that retting can proceed at the same time. There are insufficient retting sites for all the crop to be retted simultaneously, unless the crop is very small. Leaving cut kenaf in the field for more than two or three days hardens the fibre and makes stripping difficult, reducing quality and quantity.

Variation in the Area Planted

As with paddy there is considerable variation in the area planted to kenaf from year to year (figure VI.1). Behrman, working before

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10 Sixty kilograms is a 'picul'.

1963, considered the fluctuation in areas of paddy and kenaf planted as a response to price fluctuations.[11] However, under the prevailing environmental conditions the area planted to any crop necessarily fluctuates. In 1970-1, a favourable year for kenaf, 4% of kenaf land was unplanted, although the percentage planted at Um Mao was only 86.84% (table VI.8).

Drought and flood can render a proportion of the kenaf land unplantable. In 1970-1, the 13.16% of holdings unplanted in Um Mao were a result of flooding on the low-lying plots. Although examination of the characteristics of kenaf and non-kenaf growing farmers and planting and harvesting dates led to the conclusion that there was no clash between the two crops, it is probable that prolonged drought in the March-June period may result in farmers not having time to plant kenaf before the heavy rains make paddy cultivation possible.[12] The farmers' desire to be self-sufficient in paddy, reinforced by the marked differential cost between home-grown and purchased rice (table IV.4) would result in the paddy being cultivated as a first priority should any choice in labour allocation have to be made. It is likely that farmers faced with insufficient time to plant kenaf in the pre-paddy preparation and transplanting period would attempt to obtain some kenaf production by planting at least part of the holding after the completion of the paddy transplanting.

A reduction in kenaf planted area may result from labour shortage. Farmers short of workers will cut back on kenaf labour rather

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11 Behrman's work is discussed in chapter II, and the question of North East farmers' price responsiveness is examined in chapter IX. (J.R. Behrman, "Supply Response in Underdeveloped Agriculture", 1968).

12 The whole question of North East crop production and rainfall variation needs serious investigation using rainfall and crop figures at the amphur level.

TABLE VI.8

PERCENTAGE OF HOLDING PLANTED AND DAMAGED

	% Holding Planted	% Planted Area Damaged
Na Chuak Nua	91.3	18.2
Ban Tum	100.0	7.6
Um Mao	86.8	37.0
Fai Taek	87.8	11.1
Ban Lek	95.3	15.9
Non Sung	100.0	42.0
Lao Yai	96.3	26.1
Lam Pao Area	96.0	17.5

TABLE VI.9

PERCENTAGE OF PLANTED AREA DAMAGED. KENAF

	Cause of Damage			
	Drought	Flood	Insects	Other
Na Chuak Nua	4.5	4.5	9.1	6.1
Ban Tum	12.1	0.0	8.6	8.3
Um Mao	0.0	16.7	0.0	20.0
Fai Taek	10.0	0.0	10.0	10.5
Ban Lek	10.5	0.0	5.3	19.2
Non Sung	3.8	3.8	53.8	11.1
Lao Yai	22.2	22.2	11.1	31.8
Lam Pao Area	3.01	2.9	14.34	10.7

See Appendix VII.5.

TABLE VI.10

KENAF PRODUCTION AS A % OF FARMERS' ESTIMATES OF 'NORMAL' PRODUCTION

	1970-1	1971-2
Na Chuak Nua	80.84	94.42
Ban Tum	86.01	132.29
Um Mao	149.20	165.46
Fai Taek	78.77	105.14
Ban Lek	69.95	117.89
Non Sung	46.38	60.23
Lao Yai	60.60	45.07
Lam Pao Area	77.19	114.57

than rice labour. The March-May period during which kenaf is planted is also a period during which off-farm employment or migration in search of work takes place; shortage of cash and/or the opportunity for profitable off-farm work can result in a reduction of labour supply. Unlike paddy there is no traditional system of mutual help with planting and harvesting, and consequently any deficiency in labour must be met by recourse to hiring. In Na Chuak Nua, the off-farm employment at Lam Pao has resulted in hired labour being both expensive and in short supply. Farmers with large holdings interviewed in 1971-2 complained that they were unable to hire laboureres to cultivate the entire holding. It may well be that in the labour supply situation in the March-May period there is an element of opportunity cost, with more labour available if the price of kenaf is thought to be particularly high.

Crop Loss

Like paddy, not only is kenaf production affected by the percentage of the holding planted, but also by loss or damage due to drought, flood, disease or insects. Overall 17.5% of kenaf planted area was affected to some extent by damage, and 37.6% of holdings experienced some (table VI.6). In Non Sung 42% of the planted area was affected, and 72% of holdings; in contrast, Ban Tum had only 7.6% of area and 25.4% of holdings affected. As may be seen from Appendix VII.5, damage in Ban Tum was in 53.8% of cases below 20% of the planted area; in Non Sung damage was not only more common, but in 44% of cases affected at least half the area.

As with paddy, the cause of damage is not simple to specify because farmers report several cases of damage for the same plot. In part variation in cause of damage may result from physical differences

within the holding, so that the same plot may experience flood in one part and drought in another. In addition, a holding may experience both extremes in the course of the growing season. Planting of kenaf in February or March in years when the early rains have been heavy enough to allow early planting may result in drought damage, because of a renewal of dry conditions between March and June. Later in the wet season a heavier first or second rainfall peak may result in flood damage on land already damaged by drought. A period of drought in March-June 1967 after heavy early rains had allowed kenaf planting to proceed caused severe crop loss.[13]

Table VI.9 indicates the percentage of planted area damaged by each cause rather than the percentage of total damage resulting from each cause. In the study area as a whole, the largest cause of damage was insects, which affected 14.34% of the planted area. This contrasts markedly with the pattern of damage associated with paddy cultivation (table VI.9). However, there is no uniform pattern over all the villages. Non Sung and Na Chuak Nua are the only villages where insect damage was the worst single cause. Ban Lek, Fai Taek and Ban Tum had significant amounts of drought damage; Um Mao and Lao Yai were affected by flood damage. The low elevation of Um Mao kenaf land makes it particularly susceptible to flood; at Lao Yai there is kenaf at a variety of elevations, resulting in flooding of the low plots and drought on the higher ones. Other causes which were most serious in Um Mao, Fai Taek, Ban Lek and Lao Yai are pests, disease and trampling by livestock, the most important of these being disease. Kenaf disease is mainly related to excessive moisture and takes the form of mildew and root rot often associated with nematoid infestations.

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13 Sholton, op.cit., p.135.

Size and Variability of Production

The average size of kenaf production is considerably smaller than that of glutinous rice, averaging 641.6 kilograms per grower as against 3517 kilograms for paddy. Just over half the farmers (52.2%) produced less than 500 kilograms, and only 12.1% produced more than 1500. Ban Tum was by far the largest producer, contributing 65.1% of the total kenaf production of the seven selected villages, and with an average household production of 1213.85 kilograms. This domination of the seven villages by one is not present for paddy cultivation. The larger size of average production in Ban Tum was a reflection of the high yield rather than of the larger size of plots. Na Chuak Nua, with the largest average holding size, a rai larger than at Ban Tum (6.9 compared with 5.9 rai), because of low yield, only averaged 563 kilograms per farmer.

The figures for 'normal' production are less satisfactory for kenaf than for glutinous rice. Overall in 1970-1, farmers reported that production was 77.19% of the 'norm', and for 1971-2 114.57%. Since yields were 48.2% higher in 1970-1, and 1971-2 was considered a poor year for the crop, the farmers' perception is clearly inaccurate.[14] Table VI.10 summarises the replies of the farmers.

Inputs and Cultivation Practices - Labour inputs

Total labour input per rai averages 14.78 man-days, suggesting that kenaf is slightly more labour intensive than paddy, which averages 13.45 man-days a rai. (Although analysis of yield determinants gives no indication of a relationship between yield and inputs, it is evident from

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14 This contrasts with their perception of paddy production which seems closer to reality (see chapter IV). This presumably reflects the farmers' greater familiarity with rice.

TABLE VI.11

COMPARATIVE LABOUR INPUT, PADDY AND KENAF

	Kenaf Labour/rai (a)	Glutinous rice Labour/rai (b)	(a) as a % of (b)
Na Chuak Nua	16.3	11.6	140.5
Ban Tum	21.3	13.0	160.8
Um Mao	10.5	10.9	96.3
Fai Taek	16.1	19.4	83.0
Ban Lek	10.9	12.3	88.6
Non Sung	12.5	12.6	99.2
Lao Yai	15.7	11.7	134.2
Lam Pao Area	14.8	13.5	109.9

See Appendix VII, 6

TABLE VI.12

CONCENTRATION ON KENAF (1970-1)

	% Land	% Input	% Labour
Na Chuak Nua	16.8	59.3	23.5
Ban Tum	31.0	20.1	43.3
Um Mao	5.5	2.3	6.4
Fai Taek	12.7	0.0	17.9
Ban Lek	13.7	8.9	13.3
Non Sung	15.5	4.9	20.7
Lao Yai	14.0	0.0	18.1
Lam Pao Area	17.3	14.6	23.2

tables VI.11 and VI.12 that the villages with the greatest concentration on kenaf have the highest labour input). The lowest input by area is in Um Mao where the crop is of little importance, and the lowest input relative to that of glutinous rice is in Fai Taek, a reflection of the very intensive paddy cultivation there rather than a particularly low level of intensity of kenaf production. As in the case of paddy cultivation there is considerable intra-village variation to which the same qualifications about measurement apply (see chapter IV and Appendix VIII6-10).

Kenaf, like rice, requires the greatest percentage of labour for harvesting, 32.25% of its total labour requirement. Land preparation and planting are less intensive for kenaf than for rice, and only absorb in total 42.73% (compared with 55.23% for rice). Kenaf is normally only ploughed once, and seed is then broadcast and turned in with a plough or hoe, while glutinous rice is normally ploughed twice and harrowed before the seedlings are planted by hand. Particularly striking is the difference in labour input for weeding, for kenaf 3.1 man-days a rai, 25% of the total labour, compared with 1.18 man-days, 10% of the labour used, for rice.

There are no available data giving a breakdown of kenaf harvesting by process; the figures include cutting, removal of leaves, bundling, transportation to the retting pit, retting, stripping, drying and re-bundling. Although a longer drawn out process, the Lam Pao data suggest that the labour input is very nearly the same as for paddy. The variation present in the labour input per rai by process is indicated in table VI.13.

As with paddy, the variation reflects different meanings of the 'man-day', as well as different labour input and different physical nature of the plots, requiring different amounts of labour. Farmers who

TABLE VI, 13

LABOUR INPUT PER RAI BY PROCESS, FOR KENAF CULTIVATION

	Ploughing		Planting		Weeding		Harvesting	
	mandays	%	mandays	%	mandays	%	mandays	%
Na Chuak Nua	2.8	24.8	2.9	25.7	2.8	24.8	2.8	24.8
Ban Tum	2.3	17.2	2.9	21.8	3.7	27.8	4.4	33.1
Um Mao	1.2	12.8	2.5	26.6	2.6	28.7	3.1	34.1
Fai Taek	3.5	21.7	5.2	32.3	3.0	18.6	4.4	27.3
Ban Lek	1.2	12.1	2.4	24.2	3.2	32.3	3.1	31.3
Non Sung	2.1	18.4	2.7	23.7	2.0	17.5	4.6	40.4
Lao Yai	3.4	21.7	4.4	28.0	2.4	15.3	5.5	35.0
Lam Pao Area	2.3	18.5	3.0	24.2	3.1	25.0	4.0	32.3

See Appendix VII, 7, 8, 9, 10

have plots at a greater distance may well have a larger number of man-days per rai because of the inclusion of the time travelling.

Unlike paddy, there is no significant relationship between plot size and total labour input or the inputs for the individual processes. Kenaf cultivation reveals more uniform intensity of cultivation with no decline with increased size of holding. The smaller size and range of size of kenaf holdings result in less variation in the size of holding per capita, which tends to more uniform cultivation practices.

Kenaf, like all the crops in the study area, is primarily cultivated by family labour. Overall 12.75% of kenaf farmers hire labourers in addition, slightly fewer than the 21% of farmers paying additional workers for glutinous paddy. In total, 4.78% of kenaf labour is hired, compared to 6.79% for glutinous rice. There is also some difference in the distribution of hired labour between processes (Appendix VII.12, 13). The highest incidence of hiring is in the weeding and harvesting periods, while for rice it is transplanting and harvesting for which family labour is inadequate.

Kenaf occupies very little additional non-family, non-hired labour, only 0.8% of farmers receive aid from neighbours and 1.2% from relatives to plant kenaf, compared with 13.2% and 12.3% for glutinous rice. 1.2% of kenaf farmers receive aid from neighbours and 2.4% from relatives for harvesting, against 15.7% and 10.4% for glutinous rice. This lack of labour from traditional sources emphasises the recent addition of kenaf cultivation to the farm economy and its function as a cash crop with the characteristics of commercial production.

Since only 59.24% of farmers grew kenaf, and planting and weeding normally take place well before preparation of land and transplanting of paddy, there should be a plentiful supply of hired village labour for

TABLE VI.14

% DISTRIBUTION OF CASH INPUTS BETWEEN THE MAIN CROPS

	Glutinous rice	Non-glutinous rice	Kenaf	Other
Na Chuak Nua	39.7	0.0	36.5	33.8
Ban Tum	79.9	0.0	20.1	0.0
Um Mao	92.8	2.6	2.3	2.3
Fai Taek	30.6	24.4	0.0	45.0
Ban Lek	90.8	0.0	8.9	0.3
Non Sung	91.8	3.3	4.9	0.0
Lao Yai	0.0	0.0	0.0	100.0 +1
Lam Pao Area	83.3	1.3	14.6	4.8

+1 This represents three farmers growing maize for household consumption on a total area of 2.7 rai. The total cash input for the three farmers is only 9.9 baht, and thus 3.6 baht a rai.

TABLE VI.15

COMPARATIVE CASH INPUTS (Baht/Rai)

	Glutinous rice	Non-glutinous rice	Kenaf	Other Crops
Na Chuak Nua	5.3	0.0	36.5	38.5
Ban Tum	16.8	0.0	9.3	0.0
Um Mao	20.4	12.9	8.0	7.8
Fai Taek	30.6	24.4	0.0	65.3
Ban Lek	90.8	0.3	8.9	0.0
Non Sung	13.4	13.8	3.7	0.0
Lao Yai	0.0	0.0	0.0	3.6
Lam Pao Area	15.2	8.7	12.5	2.04

kenaf. The traditional dry season activities of visiting, festivals and non-farm activities however reduce the availability of labour for kenaf. Interviews with farmers suggested that the hiring of labour had become both more expensive and more difficult in recent years, with the increase in jobs off the farm. Na Chuak Nua, in particular, has this problem, with the employment offered at Lam Pao by the R.I.D.; since 1972 the beginning of irrigation works at Ban Tum is creating the same situation.

Labour shortage for kenaf in Ban Tum and Na Chuak Nua is being met increasingly by the use of tractors. This was particularly evident in 1972-3 throughout Nakorn Ratchasima, Kalasin and Khon Kaen. Tractor hire enables a large area of upland to be prepared earlier, long before sufficient rain has fallen to permit traditional ploughing.

Inputs and Cultivation Practices - Cash Inputs

In the study area as a whole 14.6% of cash inputs are devoted to kenaf, compared to 83.3% for rice (table VI.14). Only in Na Chuak Nua does the percentage of cash input for kenaf approach that for rice. The pattern of cash inputs per rai suggests overall in the study area a relatively uniform cash input, with 15.2 baht per rai for rice and 12.5 for kenaf, but examination of the individual villages (table VI.15) indicates that this average is only achieved by the high level at Na Chuak Nua, where kenaf receives 36.5 baht per rai (compared with 5.3 for rice).

The constituent elements of cash inputs (table VI.16) contrast strongly with those for glutinous rice (table IV.20). 86.88% of the cash input for kenaf are composed of hired labour, compared with only 7.22% for rice. Glutinous rice cash inputs are dominated by fertiliser, 77.6% of the total. All the villages except Fai Taek and Lao Yai use cash

TABLE VI.16

THE COMPOSITION OF CASH INPUTS FOR KENAF (%)

	Insecticide	Fertilizer	Hired Labour
Na Chuak Nua	-	-	100.0
Ban Tum	3.2	3.2	93.6
Um Mao	22.5	35.0	42.5
Fai Taek	--	-	-
Ban Lek	-	-	100.0
Non Sung	-	-	100.0
Lao Yai	-	-	-
Lam Pao Area	8.6	12.7	86.9

See Appendix VII.14.

TABLE VI.17

KENAF YIELD (Kilograms per rai)

	1970-1	1971-2
Na Chuak Nua	112.0	94.42
Ban Tum	220.7	132.29
Um Mao	113.9	165.46
Fai Taek	152.1	105.14
Ban Lek	148.5	117.89
Non Sung	79.1	60.23
Lao Yai	78.3	45.07
Lam Pao Area	160.4	114.57

See Appendix VII.15.

inputs for kenaf cultivation, but only in Ban Tum and Um Mao do any farmers use insecticide or fertiliser on the crop.[15] In contrast, other than in Lao Yai all villages have insecticide and fertiliser inputs on glutinous rice, but only Ban Tum, Um Mao and Fai Taek make use of hired labour. As with labour input, there is no significant relationship between the size of the plot and level of cash input.

In 1970-1, only three farmers applied fertiliser to kenaf and only two, insecticide; farmers only use these inputs on paddy and vegetables. Work in the North East by Chuchart et al. in 1966-7 however indicated that 19.5% of kenaf farmers used fertiliser.[16] The changwats surveyed by Chuchart show a heavier emphasis on kenaf than is present in the study area, and 13.9% of farmers growing kenaf were specialising in it to the exclusion of rice.[17] In the Lam Pao sample only one farmer (0.7%) specialised in this way.

Despite the higher incidence of fertiliser use, the average yields indicated by Chuchart's survey are no higher than those of Lam Pao, in 1970-1, with an overall average of 157 kilograms per rai compared with 160.4 at Lam Pao; only Ubon with 231 kilograms a rai exceeds the Lam Pao figure.[18] However, comparison between isolated years is not altogether meaningful because of the fluctuation in conditions that occurs; 1966-7 was a favourable year for kenaf, unlike 1967-8, which was very poor indeed with severe drought.

As was noted above, the Ministry of Agriculture recommends a

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15 In Ban Tum 93.57% of cash input consisted of hired labour, 3.22% of fertiliser, and 3.22% insecticide; in Um Mao 47.3% was hired labour, 35% fertiliser and 22.5% insecticide.

16 C. Chuchart, N.L. Wake and S. Suthasathien, "An Economic Study of the Production and Marketing of Thai kenaf", A.S.R.C.T., Bangkok, 1967, table 23, p.37. This was a survey conducted in Chaiyaphun, Nakorn Ratchasima, Khon Kaen, Udornthani, Mahasarakarm and Ubonratchathani.

17 Ibid., fig.16, p.67.

18 Ibid., p.30.

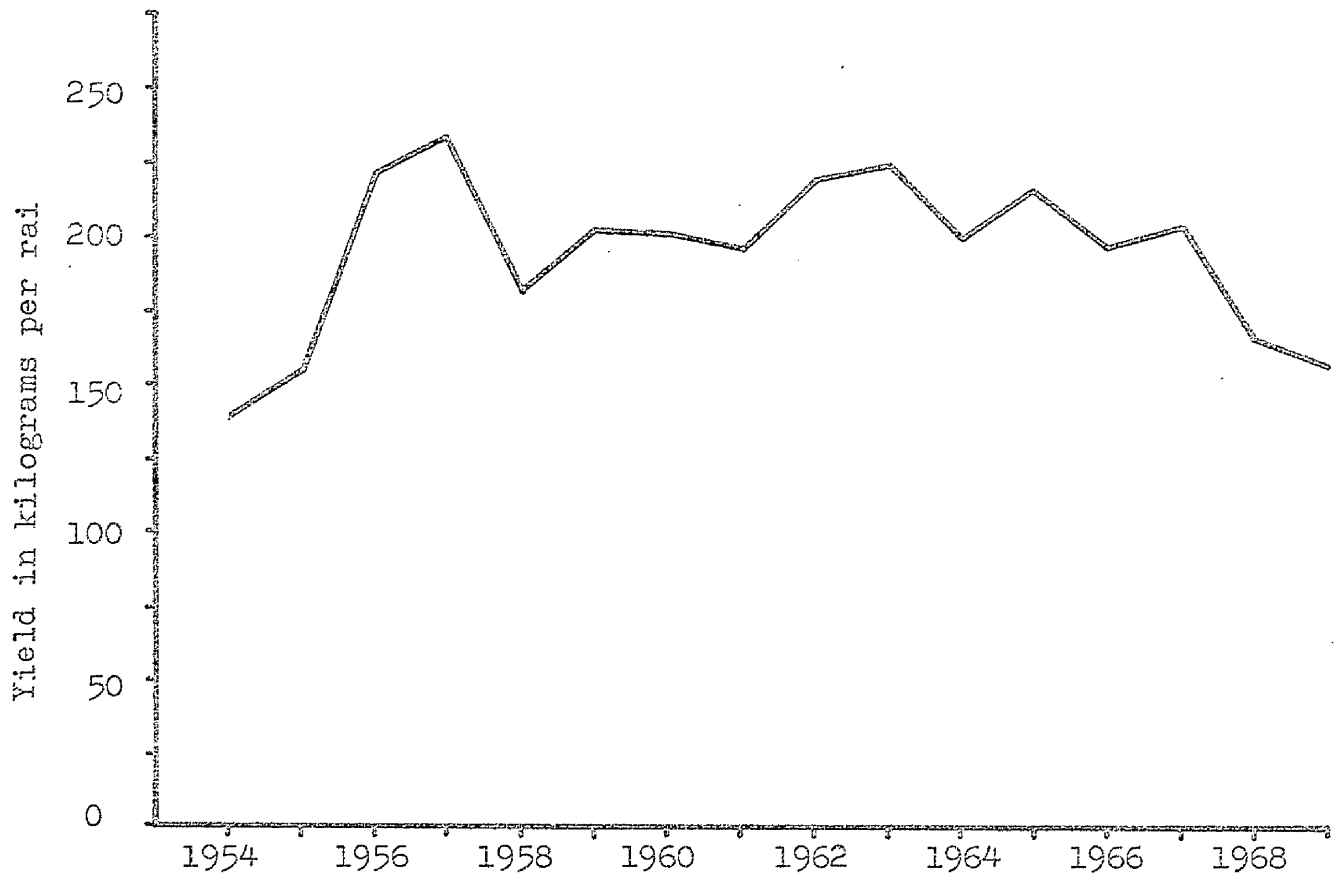

Fig. VI.5 North East Kenaf Yield, 1954-1969

Source: Upland Crop Reports, Ministry of Agriculture, 1954-70

40 kilogram per rai fertiliser input, which under North East conditions would produce a 25% increase in yields. On the basis of the Ministry's figures, the average Lam Pao yield would increase to 200.5 kilograms per rai with the use of the recommended quantities of fertiliser. The insertion of the recommended fertiliser input into the 1970-1 yield and kenaf prices indicates that little gain is achieved even allowing only a 2 baht per kilogram fertiliser price whereas many farmers paid 2.50 and even 3 baht.[19] The Ministry estimate suggested a 50 kilogram increase for 40 kilograms of fertiliser, so that the price of kenaf has to be 80% of the fertiliser price merely to break even, that is, between 1.60 and 2.40 baht depending on the cost of the fertiliser. There is little incentive for farmers to use fertiliser under the prevailing environmental and economic conditions affecting kenaf in North East Thailand.

The Long Term Trend in Yields

Figure VI.5 summarises the available information on long term yields for kenaf in the region; there appears to have been a general downward trend in regional yield averages since 1964. However, lack of detailed information prevents any investigation of the causes of the general fall.[20] The general downward trend may reflect the expansion of

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19 The Lam Pao (1970-1) yield was 160.4 kilograms a rai; the yield estimated with the recommended amount of fertiliser would be 200.5. The gross returns (at 1970-1 prices) would be 328.82 and 411.03 baht a rai respectively, but the inputs would be increased by 80 baht to allow for the fertiliser, making the total inputs at least 90.52 baht; net returns would thus be 316.82 or 320.50 baht a rai. Thus the use of fertiliser would only increase returns by, at most, 4.12 baht a rai.

20 Platenius and Long both concluded that the kenaf yields produced by the Ministry of Agriculture were extremely unreliable. Platenius suggested that the figures before 1961 were generally worse than those after 1963. The higher figures before 1961 may reflect these inaccuracies. (H. Platenius, "The North East of Thailand, its Problems and Potentialities", 1963, pp.58-63; J.F. Long et al. "Economic and Social Conditions Among Farmers in Changwat Khon Kaen", 1963, p.29).

kenaf growing onto increasingly less fertile and less reliable land in the same manner as paddy expansion was accompanied by a fall in yields. It is possible that the decline in kenaf yields may be due, at least in part, to soil exhaustion. In the North East in general, the upland soils, mainly of the Khorat series, are of extremely low inherent fertility. There is little information on how the soils respond to annual cropping of upland crops. Silcock maintains that "kenaf rapidly exhausts the soil and in several provinces farmers have had to move into new areas to find un-exhausted land".[21]

In the Lam Pao study area there is some evidence of soil exhaustion due to kenaf cultivation, particularly in Non Sung where yields were consistently very low in 1970-1 and 1971-2. Farmers interviewed spoke of the soil on their upland plots as exhausted, and in 1972-3 many were not planting kenaf, considering it not worth the labour input. As was noted in chapter III, the upland soil series are extremely variable in both texture and inherent fertility, and it is likely that some exhaust more rapidly than others under continuous cultivation. In the large area of kenaf cultivation at Ban Tum, some plots have a very 'patchy' growth pattern and there is a marked difference in the density of plant growth between plots. Initial work by the Lam Pao research team in 1971-2 suggested that there was a decline in fertility with length of cultivation, but this conclusion was tentative and awaits full analysis of soil samples and data on length of cultivation.[22]

Sholton has suggested that differential cultivation practices might affect the maintenance or decline of kenaf yields.[23] The cutting

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21 T.H. Silcock, "The Economic Development of Thai Agriculture", 1967, pp.79-80.

22 This work was undertaken by P. Stott, R. Bradnock and F. O'Reilly in the 1971-2 crop season.

23 Sholton, op.cit., p.181.

and stripping of leaves in the field results in the return of much organic matter to the soil. While this is the normal practice in the study area, in many parts of the North East kenaf is pulled up, leaving soil attached to the roots and depriving the soil of the organic matter contained in the roots and lower stalks.[24]

The climate of the North East is unfavourable to the maintenance of soil fertility on upland soils during the wet season unless they have a plant covering before the heavy rains set in. In most years kenaf is planted sufficiently early that there is a complete cover by the June-July period when the first rainfall peak begins. Farmers who for various reasons plant late may leave their fields open to gullying and washing out of plants because of insufficient cover. This phenomenon has been considered of more importance where farmers have planted cassava which is less likely to form a complete cover by the onset of the heavy rains.

The Determinants of Kenaf Yield

As with paddy yield, differences in soil fertility and physical nature and location of plots are of importance in explaining the different levels of yield found between villages and between farmers in the same village (table VI.17(a) and Appendix WDII.15). The wetter year 1970-1 gave higher village and Lam Pao total yield means than the drier year 1971-2, except in Um Mao where the lack of high land makes kenaf normally flood prone, so that drier years are more favourable. Overall in the study area wetter years result in higher kenaf yields, Um Mao being exceptional in its lack of any land that is really above wet year flood levels.

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24 Ibid. In addition the leaving of the root and soil on the kenaf impedes retting and stripping.

Analysis of inputs, plot size and damage was undertaken using correlation and stepwise regression analysis in the same manner as for paddy (chapter IV). Unlike paddy there is no pattern of declining yields or levels of input with larger plots, nor is there any relationship between inputs and yield. Despite the lack of relationships, there is more variation in kenaf yield than in paddy yield, with coefficients of variability of 67.55% and 46.29% respectively.

Kenaf yield is only strongly correlated with the area damaged, suggesting a greater dependence on the environment than is the case for paddy.[25] The general relationship between yield and percentage of planted area damaged may be seen from tables VI.17 and 8, where the very high yield of 220.7 kilograms per rai in Ban Tum is associated with the lowest percentage damaged in the seven selected villages of 7.6%. Interviews with farmers suggest that the amount of labour expended in weeding the kenaf is of importance in determining the level of yield, but there is no evidence in the sample data to support this. The 65.0% of farmers weeding had an average yield of 159.84 kilograms per rai, compared to the average of 160.4 kilograms; if allowance is made for damage and only the 61 farmers both weeding and suffering no damage are included, the mean only climbs to 169.5 kilograms a rai.

Work on experimental farms, particularly at Nong Sung in changwat Nakorn Ratchasima, has concentrated on the establishment of the degree of response of kenaf yield to fertiliser input, planting and harvesting dates and cultivation practices. The emphasis on the timing of the kenaf year stems from the photosensitivity of the crop. In the Lam Pao sample only three farmers used fertiliser on kenaf plots, so it was impossible to analyse the effect on yield. Work at the experimental

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25 -0.5810, significant at the 99.8% level.

station suggests that fertiliser application at the rate recommended by the Ministry of Agriculture would increase yield by a quarter, and indicates that weeding and thinning of plants is of great importance. As noted above, the analysis of the Lam Pao data did not confirm the importance of weeding and thinning is not undertaken, as the farmers believe that the more plants, the higher the yield. The findings at the experimental farm give support to thinning, as fewer larger plants will produce a higher yield.[26]

The majority of research in kenaf yields has concentrated on the effect of planting and harvesting dates. It is considered that not only the yield but the quality of the fibre is affected by the length and timing of the growing season.[27] Flowering does not occur until there is 12½ hours' daylight, and most authorities have agreed that the quantity and quality of fibre is at its maximum at this time.[28] Various research findings recommend that farmers should plant in the period early May to June 1st.[29] Work at the Nong Sung station in 1970 found that planting by April 1st maximised yields.[30] Table VI.18a summarises the experiments at Nong Sung in 1969-70, and shows the rapid fall-off in yields obtained when the crop is planted after mid-April.

Harvesting dates showed no significant difference in the level of yields achieved by harvesting between October 30th and December 4th.

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26 Sholton, op.cit., p.137.

27 C.C. Seale, J.B. Pate and E.O. Gangstad, "The Effect of Date of Planting and Age at Harvest on the Yield and Quality of Kenaf Fibre in South Florida", Turrialba, 4, pp.125-130.

28 Kirby, op.cit., pp.336-8.

29 For example, A. Kasipar, "Jute and Kenaf", Research and Experiment Division, Department of Agriculture, Technical Bulletin, 1967; P. Boonklinkajorn, P. Krittayanawach, N. Chomchalow and A. Kasipar, "Effect of Planting Date on the Yield of Kenaf", Thai Journal of Agricultural Science, 3, 1970, pp.43-54; Annual Report, Research and Experiment Station Division, Ministry of Agriculture, 1965, pp. 47-53.

30 Sholton, op.cit., pp.101-103.

The conclusion of the Nong Sung experiments was that yield was severely affected by late planting, but once the crop has flowered there is no gain in leaving the plant in the ground no matter what the planting date.[31] There is evidence to suggest that leaving kenaf in the field longer results in hardening of the fibre, greater difficulty in stripping the fibre and a general decline in quality.[32] Other work on harvesting dates conducted by A.S.R.C.T. at Nong Sung found that yield was maximised 195 days after a planting date of May 1st, that is, November 12th.[33] There is apparently some conflict over the harvesting dates and yield; if kenaf flowers when there is $12\frac{1}{2}$ hours' daylight, this would be in mid-September, but fibre yield appears to be maximised some 8 weeks after this. On this basis, assertions of fibre maximisation at the time of flowering are clearly incorrect. Sholton's conclusion that September to early October is the optimum harvest time appears too early in the light of the A.S.R.C.T. findings.[34]

Examination of the data from the Lam Pao sample revealed no relationship between date of harvest, date of planting, or length of growing season and yield. Planting date showed more variation than harvesting date (coefficients of variability 26.67% and 13.17%) which reflects the experimental findings that late or early planting does not result in a similar variation in harvesting. This is very unlike paddy, which has only 12.92% variability for transplanting, but 22.9% for harvesting, reflecting different varieties with different maturation periods. On average the kenaf in the Lam Pao area was planted in early

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31 Ibid., p.8.

32 Ibid., p.229.

33 Prapanon Boonklinkajorn and Prawit Krittayanawach, "Effect of Planting and Harvesting Times on the Yield of Kenaf", A.S.R.C.T., 1970.

34 Sholton, op.cit., p.137.

TABLE VI.18(a)

PLANTING DATES AND YIELDS: THE RESULTS OF EXPERIMENTS AT THE NON SUNG EXPERIMENTAL STATION, 1969-70

Planting Date	Yield (kilograms per rai)
February 16	324
March 1	322
March 16	320
April 1	332
April 16	330
May 1	273
May 16	261
June 1	231
June 16	184
July 1	113
July 16	107
August 1	76
August 16	57

Source: E.J. Sholton, "Kenaf in Thailand", 1968, p.103.

TABLE VI.18(b)

HARVESTING DATES AND YIELDS

Harvesting Date	Yield kg./rai
30th October	315.83
5th November	331.51
15th November	304.86
20th November	339.80
27th November	320.27
4th December	333.36

Source: Prapandh Boonlinkajorn and Prawit Kritt, "The Effect of Planting and Harvesting Times on the Yields of Kenaf", A.S.R.C.T., 1970, p.5.

April and harvested in late September. However, October was the main month for harvesting, with 52.5% of farmers harvesting then. 95.8% harvested between September and November (table VI.18), but 83.3% had harvested before November, that is, before the maximum fibre content, according to the A.S.R.C.T. findings.

A major problem with comparing farm data with experimental findings is the very great difference in conditions. Analysis of the Lam Pao data indicated that environmental damage was the significant factor in explaining yield differences. In addition the experimental findings discussed above are all for improved varieties rather than the native varieties prevalent in the North East; there is no indication that the native types are equally photosensitive. Sholton notes that North East farmers harvest before the flowering period which conflicts with the experimental findings and with the Lam Pao data.[35] Clearly much work remains to be done on the whole subject of yield of kenaf under North East farm conditions, and using the varieties normally grown by the local farmers.

Kenaf and the Rice Year

Table VI.19(a) and (b) gives the planting and harvesting dates of paddy and kenaf for the farmers growing both crops. In terms of planting, in the 1970-1 crop season 97.54% of kenaf was planted before the month in which paddy was planted, and only 1.63% was planted in the same month, with 0.81% after. At the very least, 81.14% of kenaf was planted more than a month before the paddy transplanting. With reference to harvesting, 80.83% was harvested before the month of paddy harvesting, 15.83% in the same month, and 3.33% after the paddy harvest. Of the 19

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35 Ibid., p.137.

TABLE VI.19(a)

KENAF PLANTING AND PADDY LAND PREPARATION DATES

Time of planting kenaf	% Farmers
After paddy land preparation	0.8
In same month	1.6
One Month before	16.8
Two months before	22.7
Three months before	35.3
More than three months before	2.4

TABLE VI.19(b)

KENAF HARVESTING AND PADDY HARVESTING DATES

Time of harvesting kenaf	% Farmers
More than 3 months before paddy harvest	2.1
Three months before	7.2
Two months before	29.8
One month before	60.8
In same month	15.8
After paddy harvest	3.3

N = 141, the farmers who planted both paddy and kenaf in 1970-1.

farmers harvesting both in the same month, all except one had small holdings between one and three rai; the other was a large plot of 10 rai.

Kenaf, unlike paddy, is all sold straight after the harvest. Where farmers are harvesting kenaf in the immediate pre-paddy harvest period they may not complete the retting, stripping, and bundling before the paddy is ready to harvest; this is indicated in the data by farmers with a harvesting date before the paddy harvest and a sale date after. Overall 4.98% of kenaf is left for sale after the rice harvest, including the 3.33% not harvested until after the rice. Only these less than five per cent of farmers who left kenaf unharvested or unsold can be seen to face any clash of interests. It must be emphasised that these figures, giving only the month of the activities, do not give precisely the relationship between the timing of the harvests, but they suggest that in the study area in 1970-1 there was no major clash.

Kenaf and non-kenaf farmers

Kenaf does not compete with paddy for land, but there is some doubt as to whether the growing of kenaf competes for labour or cash inputs, and whether the cultivation practices of kenaf-and-paddy growers differ significantly from those farmers who grow paddy only. Long, working in Khon Kaen, concluded that there was no evidence for competition or clashing of labour peaks.[36] In contrast, Chuchart et al. maintain that there is competition for labour, particularly at harvest time.[37] As noted above, the Lam Pao data confirms Long's findings (table VI.19). Examination of the socio-economic and land use practices of those growing both crops and those growing only rice was undertaken using chi square and 't' test statistics (Appendix VIII.16 and 17).

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36 Long et al., op. cit., p.42.

37 Chuchart et al., op. cit., p.2.

In terms of land use, there appears to be no significant difference between the two groups, other than a tendency for non-kenaf farmers to devote more cash inputs to paddy, 26.5 baht a rai as against 13.6 baht.[38] This may reflect a move on the part of farmers without kenaf land to invest more heavily in paddy production, but there is no significant difference in yields, production levels, value or percentage of paddy sold, or cash income from paddy sales.

Examining the paddy supply situation revealed that there was again no difference, and the pattern of balance, deficit and surplus producers was not different between the two groups.[39] Non-kenaf farmers do not substitute other crops for kenaf (Appendix VIII.18), they merely have smaller holdings, of which 91.7% is planted to paddy, compared to 69.9% for kenaf growers. In essence the basic difference between the two groups of farmers is that the kenaf farmers have acquired an upland plot. The conclusion is that kenaf fits easily into the existing pattern of paddy farming without disturbing either the land use or cultivation practices.

There are a number of important differences in the socio-economic characteristics of the two groups (Appendix VIII.18). Most striking is the tendency towards large family size among kenaf growers, averaging 7.3 rather than 6.5. This significantly larger family size may have enabled farmers to spare labour to clear kenaf land as well as cultivate it. Since in most of the study area, some upland is available for cultivation, it may have been the larger families who were able to obtain the land first, though the existence of the large families may merely reflect the larger holdings that can support more people purely by

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38 Significant at the 98% level.

39 There was no significant difference between the two groups of farmers in rice production (chi square 0.81, 2 degrees of freedom).

agriculture than can paddy farmers. However there is no difference in age or education of the household heads. Total family income and total cash income are very close indeed, but the sources of income differ. Both groups receive similar income from paddy sales, but kenaf growers obtain 69.4% of their income (value of production) from crops, while non-kenaf growers obtain only 47.4%. However, non-kenaf farmers make up the income from other non-crop sources, particularly off-farm work, which accounts for 27.3% of this group's income compared to 13.3%, remittances, 5.2% (kenaf farmers 3.9%), and livestock 16.6% and 11%. However, it is clear that the non-kenaf farmers depend mainly on off-farm income sources to supplement their cash income from the traditional paddy sector. In terms of per capita income, the non-kenaf farmers are significantly more prosperous than the kenaf farmers, with an average income of 904.60 baht, compared with 811.39 baht.[40] While kenaf growers may be seen as more dependent on agriculture, there is no evidence of specialisation in kenaf farming, that is, kenaf farmers are operating a dual farm economy comprising both the traditional paddy sector expanded to a greater or lesser degree, and an innovatory sector which has supplemented but not replaced the expanded traditional. Farmers unable to grow kenaf, because of the failure of the development based on the traditional paddy sector to yield sufficient income, turn to non-agricultural sources to supplement their income.

Prospects for cash crop diversification

As has been examined in this chapter, the expansion of cash crops in the study area, and in the North East generally, has been almost exclusively of kenaf. Maize, which spread into the changwats

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40 Significant at the 99% level.

of the south western part of the plateau has been largely displaced. Since 1971, some signs of diversification have been apparent in the region as a whole, though their impact in the Lam Pao area is small.

Since 1972, cassava has begun to spread into the Lam Pao area, initially moving into the upland areas surrounding the irrigation area, particularly into the re-settlement area to the north north east of the dam site. In 1970-1, two farmers in Ban Tum planted cassava, and their example was followed by others in the same village and in Na Chuak Nua in the succeeding year. These developments are too recent and on too small a scale for their effects to be analysed.[41] Cassava had spread by promotion of merchants and contact with existing growers, and there was no official encouragement before 1972. Once the crop began to spread, the Extension Service initiated a 'planned' expansion in 1972-3. The establishment of a small chipping plant on the Lam Pao access road in 1972 and in 1973 a small pellet mill in Kalasin town provided an important stimulus. Cassava has been spreading steadily in the North East since 1970, like kenaf moving into Nakorn Ratchasima and outwards from there. The main stimulus for expansion came from the exhaustion of new land in the traditional area of the south west, particularly Chonburi, and a decline in yields due to prolonged cultivation of cassava on the same land.

Cassava has a number of important attributes that make it particularly attractive to North East farmers. It is drought resistant and hardy, with few pests or diseases; total labour input is lower than for kenaf, involving no retting, stripping or bundling, so that the farmers interviewed in 1972 used only 7 man-days a rai. Planting dates are flexible, so the crop can be fitted in to the farm year; yields are

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41 Eight farms in the 1971-2 sample grew cassava, totalling 27 rai.

initially high on new land, and reach 1500 kilograms in the study area; prices at 0.30 baht a kilogram have been consistent over the last two years. There are disadvantages, notably the length of the growing period of ten to twelve months, and the problem of soil exhaustion and erosion stemming from the sparse vegetative cover and the demanding nature of the crop. Soil exhaustion is emphasised on land already planted to kenaf for twenty years.

In 1972, several farmers in Ban Tum were expressing interest in a rotation of cassava with an improved 120 day kenaf variety (Daisy) being advocated by the Extension Department; the flexible planting dates for the cassava would permit two crops in 12-13 months. The improved kenaf had proved unsuccessful, being very susceptible to drought, disease and insect damage. The farmers planting Daisy in 1972 without exception experienced disappointing yields and declined to plant the variety again. The variety met with similar failure throughout the North East in 1972-3.[42]

Concern over soil erosion and exhaustion resulted in the governor of Khon Kaen changwat attempting to ban the cultivation of cassava in 1971-2. Some plots at Ban Tum have suffered gullying and soil exhaustion speeded up by the crop on the soils of the Khorat series. Cultivation on the newly cleared Khorat soils of the Lam Pao re-settlement area has resulted in 4000 kilograms per rai yields, more than twice that produced on the Ban Tum land after 15-20 years of kenaf cultivation.

The yields and price levels prevailing for kenaf and cassava in 1971-2 in the Lam Pao area resulted in only a marginally higher level

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42 Personal communication from Dr. Roem Puanariksa, Agricultural Economics Officer, Social and Economic Division, Mekong Committee.

land during the dry season making use of water from the Lam Pao irrigation system. This second cropping consists almost exclusively of cucumbers, which are sold over a wide area. Investigation in 1971-2 and 1972-3 suggested that future expansion of dry season vegetables is limited by the size of the local market and the distance from Kalasin and Yangtalad markets. With the development of irrigation in the villages closer to Kalasin, the location of Na Chuak Nua is likely to prove a serious disadvantage for the existing area under second crop vegetables.

The Agricultural Extension Service and the F.A.O. at Huey Sithon have attempted to introduce peanuts and soyabeans into the area. Peanuts have traditionally been grown as a garden crop for the manufacture of sweets; small quantities produced in Um Mao are sold in Kalasin market. During 1970-1, an experimental plot of soya beans was established at Na Chuak Nua, and attracted interest from many farmers. However the crop was badly affected by insects and the yield disappointing. The F.A.O. farm has had serious problems producing soyabeans under experimental farm conditions due to difficulties in germination and insect damage. It was clear from interviews with farmers in 1971-2 that the poor results obtained from the Na Chuak Nua soyabean plot has reduced farmers' interest in the crop; none followed up the scheme by planting soyabeans. Concern was expressed by farmers, particularly the headman at Na Chuak Nua, over the lack of market outlets for soyabeans. There are no oil pressing facilities nearer than Nakorn Ratchasima, and no merchants in the area were prepared to deal in the crop. No help was offered by the Extension Department to find markets, and farmers felt that even if they were able to raise a crop they would have to bear heavy and troublesome transport costs. In 1970-1, the Ministry of Agriculture was quoting farm gate prices of 2 baht a kilogram, but farmers found this too low in view of the cultivation difficulties, the

the problem of sale and the cost of transport.

Peanuts are more easily grown in the study area, but the lack of oil pressing facilities or a market chain limits production. The farmers growing improved peanut varieties, particularly Giant Dixey, on the F.A.O. farm area are selling to sweet makers in Kalasin town. Peanut production in the Lam Pra Plerng Irrigation area, although nearer to Nakorn Ratchasima, was, in 1973, facing similar problems of marketing, the entire crop being sold to make sweets or boiled and sold from local shops.

The experiences with soyabeans and peanuts emphasise the importance of the existence of a market for crops in order to stimulate farmers to produce them. Kenaf and cassava spread in the North East under the stimulus of a buoyant market with little or no official encouragement; soyabeans and peanuts have failed to develop because of the lack of market, accentuated in the case of soyabeans by the agronomic difficulties.

Prospects for diversification of the cash crop sector are not good at present; kenaf is likely to remain dominant, with some switch to cassava. Many of the plots along the Lam Pao access raod which changed from kenaf to cassava in 1972 changed back again in 1973, apparently because of disappointing yield and return. A pattern of choice between the two crops in response to relative price levels may well result in future years.

Significance of Participation in the Production of Cash Crops

The planting of extensive areas of land to crops other than rice is a phenomenon of the years since 1958. Prior to this, North East land use and farm economy were dominated by paddy. While it is clear

of returns per rai for cassava.[43] However, the more stable cassava price levels and the more flexible nature of the farm year may produce long term advantages over kenaf that are not apparent from observation based on a single crop year.

Small quantities of fruit and vegetables were traditionally grown throughout the North East for household consumption and limited exchange within the villages. Urban expansion has resulted in the development of some areas of specialised production in the vicinity of large urban centres. There are a number of villages surrounding Khon Kaen where intensive vegetable cultivation takes place in the dry season on paddy land, and in many cases all the year round on land no longer planted to rice. In the study area, there has been no large scale development of vegetable or fruit production because of the small size of the Kalasin urban market. The villages close to Kalasin town, particularly Fai Taek and Um Mao, produce some fruit and vegetables for it. In Fai Taek the large suan plots surrounding the houses produce mainly for the market. Um Mao has small plots at a greater elevation devoted to peanuts, chillies, melons and various vegetables. During the dry season months, 9.4% of the village cultivate small vegetable plots on the levee of the Lam Phan; these plots are easily watered from the river in the dry season, but are flooded in the wet and are thus unsuited to paddy.

The main development of vegetables has been in Na Chuak Nua, where in the 1971-2 season 100 rai of vegetables was planted on the paddy

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43 The return rates per rai in 1972 based on yields, prices and cash inputs in 1971-2 were:

	gross	net
Kenaf	285 baht	273.5 baht
Cassava	300 baht	283.37 baht
Gain	15 baht	10.13 baht

that in the study area paddy remains the single most important crop, the spread of kenaf has reduced its dominance. Kenaf cultivation has brought a large area of previously uncultivated land into cultivation and a large number of farmers into the market economy. The very rapid spread of kenaf fits well into Myint's analysis of the adoption of cash crops by previously subsistence or semi-subsistence farmers. Initially production for the export market spread rapidly fitting easily into the traditional pattern of production. In essence farmers become involved in production for an export market on a part time basis, only contributing surplus labour and not bearing a great degree of risk. If the cash crop resulted in deprivation of the traditional production pattern farmers would be faced with bearing a high level of economic risk from the initial stage.[44]

In terms of the model outlined in chapter II, prior to 1958 farmers were making the transition from traditional to expanded traditional. The rapid spread of kenaf resulted in a pattern of innovatory and modified traditional developing in dual manner, neither sector being able to meet the full cash needs of the farmers. Under the stimulus of the penetration of the market economy, bringing new cash needs, farmers were finding that paddy alone could not provide a large and regular enough cash income. In part at least the rapid spread of kenaf into the North East must be seen in terms of the farmers' need for cash income. This is not to say that the farmers in the late 1950's and early 1960's would have adopted any crop promoted. As has been examined in this chapter, kenaf's important feature is that it does not compete with paddy for land or time, and fits easily into the existing farm economy. The suitability of the crop for the poor upland soils of the North East, coupled with the

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44 H. Myint, "The Economics of Developing Countries", 1967, p.45.

ease with which it could be adopted, is crucial in explaining its fast innovation.

The rate of adoption of the crop between 1958 and 1963 must be seen in terms of the preconditions, rather than used as a basis for planning the development of cash crop production. Kenaf has performed a very important function in the development of the region's agriculture, however there are important constraints operating on the North East farmer which limit his participation in cash crop production. The production of sufficient glutinous rice to meet all the household needs remains the first priority for farmers; where there is any conflict of interest, it is paddy that takes precedence. In chapter IV, the economic rationality of the continued emphasis on home produced paddy was noted. Given the unreliable North East conditions for crops which result in great fluctuations in yield and production levels, the unstable nature of the kenaf market (chapter VIII and Appendix XI.), and the economics of paddy production, it is rational to retain paddy production with kenaf as an addition, rather than specialising in kenaf.

On a similar basis, the low level of cash inputs applied to kenaf reflects the farmers' views on market and environmental uncertainty. Application of input to paddy, although it is open to environmental risk, and in 1970-1 to severe market risk, because of the semi-subsistent nature of the crop, remains acceptable to the farmers. Given the risks involved, farmers will not put a higher level of input into kenaf than absolutely necessary; the implications of this will be examined in chapter VIII.

At present there appears to be no major substitute for kenaf in the North East. The spread of cassava has provided an alternative and an element of competition for kenaf, but in the areas where kenaf is long-established, the low cassava yields severely lessen the competition.

Cassava is most competitive and has made most headway in the newly cleared upland areas, where yields are more than double those in areas of long kenaf cultivation. Expansion of fruit and vegetables is unlikely to disturb the pattern of paddy and kenaf, though in villages with access to a sufficiently large market, profound changes can and do occur, as at Ban Pak Kher in Khon Kaen. The new crops, especially soyabeans and peanuts, have not spread substantially as a result of growing problems and the lack of markets.

The innovatory sector of the North East farm economy is as mono-cultural as the traditional one; both remain highly vulnerable to climatic conditions and operate at a low level of intensity. Further development awaits a higher degree of environmental control than under rainfed agriculture. Under prevailing conditions neither the innovatory nor the expanded traditional sector can develop as a specialised sector, for neither is sufficiently strong.

Prior to the introduction of the innovatory sector, farmers could only produce additional income by expanding paddy production. The widespread development of an innovatory sector allows farmers to have two possible strategies for expanding their income. The cultivation of upland for cash crops has removed little potential paddy land from the possibility of expansion to meet population pressure; little upland at present cultivated could have supported more than marginal, low-yielding paddy production. In large areas of the North East the boundary between uncleared land and paddy is already close to the limit for rice. Severe population pressure and/or cash need could have pushed paddy clearance further onto the land used for cash crops now; in areas of current paddy clearance and kenaf production there is no conflict - the lower land is left for paddy.

CHAPTER VII

THE MARKETING SYSTEM FOR AGRICULTURAL PRODUCE

There is a large body of literature on the nature of market places and market systems[1] in the underdeveloped world; however there are few studies that give a theoretical or comparative basis, and most are highly descriptive.[2] Soloman, writing in 1948, stressed that:[3]

"... there appears to be little knowledge of what the actual market structure in backward regions is. Factual statements are confined to brief descriptions of marketing practices, incidental to a discussion of agricultural production; theoretical statements are confined to a trotting out of ancient precepts of locational theory which prove that markets are local rather than national, when transportation is bad".

Wharton, in 1962, in his examination of the role of middlemen in the marketing system of rural Malaya, complained of the lack of theoretical work.[4] Since Wharton, and more especially Soloman, wrote, a large number of studies have appeared, but still little comparative or theoretical has been produced.[5] The importance of marketing systems to agricultural development has been increasingly stressed since the late 1950's (see chapter II). As Mueller points out:[6]

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1 These terms are discussed in P. Bohannon and G. Dalton, "Markets in Africa", 1962, pp.1-2.

2 R. Bromley, B.H. Hodder and R.H.T. Smith, "Market Place Studies: A World Bibliography of Marketing", forthcoming.

3 M.R. Soloman, "The Market in Underdeveloped Countries", Journal of Marketing, vol.13, 1948, pp.519-541, quotation p.519.

4 C.R. Wharton, Jr., "Marketing, Merchandising and Moneylending: a note on middlemen monopsony in Malaya", Malayan Economic Review, vol.7, 1962, pp.24-44.

5 Bromley, et al., op.cit.

6 W.F. Mueller, "Some Market Structure Considerations in Economic Development", Journal of Farm Economics, vol.41, no.2, 1959, pp.414-425.

"Study of the market system becomes important as soon as a community rises above subsistence levels. The most unique feature of the early stage of economic development is the emergence of a market economy".

Skinner has elaborated this view:[7]

"Change which constitutes departure from the traditional system - which signals the onset of the transformation of a traditional agrarian society into a modern industrial society - can be ... profitably approached through the study of rural marketing. Basic alterations in the distribution of markets and the pattern of marketing behaviour provides a sensitive index of progress in modernisation".

Given the close relationship between development and the market system, it is important to stress again the paucity of a theoretical literature on the rural marketing system and the development of agriculture. Bohannon and Dalton have produced a useful classification of societies into 'market-less societies', in which the market plays only a peripheral part, and 'market societies', in which the market is of dominant importance.[8] Their classification is based on a study of African societies, but is clearly of wider application.

The market-less society has neither market place nor market system; the market principle, if it exists at all, is present in a few casual and interpersonal transactions.[9] These societies are highly subsistent, and the exchange that does take place is based on a wide variety of media, with exchange rates determined for individual transactions; frequently goods have a value placed on them that is determined by social rather than economic criteria.[10]

Peripheral market societies are characterised by the existence of a market place and the market principle operates, but "... the

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7 G.W. Skinner, "Marketing and Social Strucutre in Rural China", Part I, Modern Asian Studies, 1964, pp.3-43, quotation p.3.

8 Bohannon and Dalton, op.cit., pp.2-3.

9 Ibid., p.3.

10 Ibid., p.3.

subsistence requirements of the members of the society are not acquired, to any appreciable extent, in the market place or through the operation of the 'market principle'".[11] The traditional society is dependent on the market to provide luxury items beyond the subsistence basis of the economy, but removal of the market system would not result in major disruption of the rural economy.

In the third category of societies are those where the market has become dominant; the primary source of subsistence goods is the market, and the economy is completely dependent on the operation of the market.

The three categories are seen by Bohannon and Dalton as a continuum from non-market involvement to complete involvement in the market economy.[12] It is possible to see the three as stages in the process, but Bohannon and Dalton do not provide any mechanisms, and describe the three as static; no model or theory either of the relationship between development and market involvement or of the evolution of market involvement results from their work. There does not appear to be a case in the underdeveloped areas of Africa, South or South East Asia where the transition from stage one to stage two was made through indigenous development. Where full involvement with the market economy has developed, it has been through influence from western developed nations or colonisers. In South East Asia the development of 'dual economies' with a sector of peripheral market involvement and a sector of full involvement has come about in this manner.[13] An elaborate market system has developed to produce surplus production for

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11 Ibid., p.2.

12 Ibid., pp.2-3.

13 J. Boeke, "Economics and Economic Policy of Dual Societies as Exemplified by Indonesia", 1953.

the export market, but this system is an addition rather than an evolution from the pre-existing pattern of marketing.

In North East Thailand, peripheral involvement with the market has been long established in all but the most isolated villages. Within the traditional agricultural economy, exchange of small and irregular surplus production took place within the village and between neighbouring villages. From an early date daily and periodic markets existed in what are now changwat or even amphur seats. By the late nineteenth century, miscellaneous trade goods were flowing into the North East to the large market centres via a system of ox cart caravans.[14] Inter- and intra-village exchange of fish, salt, handicrafts, fruit, vegetables, tobacco and rice remains important in the North East and the market centres have become increasingly important for the disposal of surplus production and the acquisitinn of household goods. However, the market transaction has come to be almost exclusively in monetary terms, and even the village exchange is coming to operate on this market principle. Urban growth within the North East has resulted in the markets having a volume of exchange much greater than that generated by the meeting and mutual exchange of produce by a rural population; increasingly surplus has been produced and channelled to the urban market, transport development making the movement easier and the catchment areas larger.

In the Central Plain, the growth of Bangkok and from the mid-nineteenth century the export trade in rice, resulted in an elaborate rural market system for the collection of surplus rice from a large number of farmers. The relatively dense waterway network of the region enabled a large area to be tapped for its surplus, and large scale

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14 F. Cripps, "The Far Province", 1965.

organisation of marketing to develop before the coming of modern motorised transport. The expansion of demand plus the development of rail communications permitted the system developed in the Central Plain to extend into the North East, particularly from the 1920's onwards. Thus the North East marketing system for rice was imposed on the region as an extension of the existing system in the Central Plain. The main market centres developed as collecting points where they were served by rail, and later road, transport, but new centres grew up, for example Ban Phai near Khon Kaen, as collection points because of the railway. North East agricultural surplus has been tapped by a market system geared to export from the region in the same manner as Boeke saw the development of a colonial exporting system in the 'dual' economy of Indonesia.[15] Interviews with rice merchants and millers confirm that the North East is still looked on as a 'reserve' region where rice can be obtained when required, that is, a satellite of the Central Plain market system.

The North East farm economy is still in the peripheral stage of Bohannon and Dalton's model; farmers produce their basic subsistence needs and obtain additional luxury items from the market. However, the market principle is coming to dominate transactions and erode the traditional self-sufficiency. Farmers are becoming increasingly dependent on the market. The basic foods are still produced in the village, but many villagers are coming to have a level of expectation which involves many new items, while many traditionally produced goods, especially handicrafts, are now being purchased because there are more profitable uses for their labour.

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15 Boeke, op.cit.

The production of the main crops of the study area for the market has been examined in preceding chapters; the present chapter will examine the processes of sale and the general marketing system that exists for the two main crops, paddy and kenaf. Paddy marketing, because of its longer period of operation and elaborate nature, is considered first, and against this the more recent and less sophisticated kenaf market is compared. There is little available material on the marketing of North East crops; the limited number of studies conducted by the Ministry of Agriculture and A.S.R.C.T. do not provide details of sales at the farm level, but are concerned with the functioning of the market chain from the merchants' viewpoint rather than the farmers'. The market information collected in the course of the present study was oriented to the farm level, but was supplemented by reference to millers and merchants.

The Process and Pattern of Paddy Sales

The process and general patterns of sales for glutinous and non-glutinous rice are essentially similar. For both varieties of rice the market system is well-established, with the large commercial rice mills giving stability and permancence to the market outlets.

At the simplest level, rice sales take place within the villages between farmers who are respectively in surplus and deficit. This is a long-known practice, little more than the monetary equivalent of the village exchange and lending practices discussed earlier. Few farmers who are short of rice for household purposes or who require extra rice for livestock rearing obtain supplies from outside the village

unless there is a general village shortage.

The spread of the small village mills in the 1960's does not appear to have had any appreciable effects on the development of the pattern of rice marketing. In general the main elements were established before the spread of small village mills and few village millers deal in paddy and rice in any significant quantities.

Within the North East as a whole, the large commercial mills established individual catchment areas in which they are the dominant purchasers. It is clear from conversations with millers that they tend to confine their activities to their particular area and to purchase rice elsewhere only when they cannot obtain rice from their normal source. In the past, the catchment areas of the large mills were more clear cut, and the areal purchasing pattern relatively simple. The rapid improvement of road transport has made the pattern more complex with mills buying over a much wider area. The result is greater competition in the rice market, and a general evening out of farm gate prices. Millers interviewed in 1971 and 1972 considered these changes undesirable.

As noted in chapter V, relatively small amounts of paddy find their way out of the North East; the majority passes through the rice mills, whether for export, inter-regional or rural-urban movement. The mills purchase generally through intermediaries; the larger the mill , the smaller the proportion of rice bought directly from the producer. However, all millers interviewed stated that ideally they would like to buy all their paddy direct from the farms, on the grounds that this would give them more control of the quality and the price. All the larger mills operate their own trucks which collect rice. A small quantity of rice is brought to the mills by the individual farmers nearby, or from villages at a greater distance where farmers have co-operated to hire a truck to deliver their combined sales to the mills.

TABLE VII.1(a)

PLACE OF SALE - GLUTINOUS RICE (% OF SALES)

	Village	Kalasin	Yangtalad	Komalasai	Elsewhere in changwat Kalasin	Elsewhere in the North East
Na Chuak Nua	80.0	20.0				
Ban Tum	100.0					
Um Mao	20.0	75.0			5.0	
Fai Taek	100.0+					
Ban Lek	19.0	81.0				
Non Sung	88.2		4.8		4.8	
Lao Yai						
Lam Pao Area	57.7	39.2	1.0		2.0	

TABLE VII.1(b)

PLACE OF SALE - NON-GLUTINOUS RICE (% OF SALES)

	Village	Kalasin	Yangtalad	Komalasai	Elsewhere in changwat Kalasin	Elsewhere in the North East
Na Chuak Nua	90.0	10.0				
Ban Tum	85.9		14.2			
Um Mao	8.3	83.4			8.3	
Fai Taek		100.0+				
Ban Lek	100.0					
Non Sung	58.3		33.3		8.4	
Lao Yai	100.0					
Lam Pao Area	62.2	24.0	10.0		4.0	

+ In Fai Taek there was only one sale.

In the Lam Pao area some 39.2% of glutinous rice sales and 24% of non-glutinous (1972) were of paddy taken to Kalasin mills. In Um Mao, Fai Taek and Ban Lek, the sales were by individual farmers, while in the case of Na Chuak Nua the transport was organised by a group of farmers (table VII.1).

The millers' buying agents operate trucks, arrange sales, and collect paddy from the farmers. The agents are usually well-informed about the likely sources of paddy within the area, as they operate in the same villages every year. Because of the generally small size of sales (averaging 1370.62 kilograms in 1972) compared to the capacity of a truck (13,000 kilograms approximately)[16], a number of farmers have to be dealt with to obtain a load, and to avoid a delay millers also employ village agents to collect paddy for the purchasing agent. Village agents are normally full-time farmers who are well-known and trusted by the millers; they are informed of the quantity wanted and the price offered, they are given sacks, and they undertake the collection of paddy for the purchasing agent, who collects the crop and pays the farmers. Such village agents work for the same miller every year, informing him of the local supply situation and receiving payment for their services, usually on a commission basis. The village agents, however, rarely make the purchases themselves, nor does any advance of money pass through their hands; all millers interviewed maintained that such arrangements were extremely risky and troublesome. However, the millers bear the risk of giving out sacks (worth 14 to 15 baht each) to the village agents.[17] There are in fact some variations in the functions undertaken by the

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16 W. Smith Associates, "Thailand Transport Co-ordination Study", 1970, vol.1, p.261.

17 Since sacks hold some 70 kilograms, a large lorry load could consist of 150-200 sacks and the sacks for the load are worth 2100 to 3000 baht.

village agents, some clearly operating more as middlemen, purchasing rice from their own funds, and others using millers' cash advances, in both of which cases the agent profits from the price differential rather than obtaining commission.

Middlemen operate extensively in the rice trade; they are of different types and act at various levels. The smallest operators are village merchants who may purchase from only a dozen farmers, or who may buy from several dozen in more than one village. On occasions, such larger operations are carried out by several farmers in conjunction; this occurs in Non Sung, where four farmers buy rice with another farmer or middleman from the neighbouring tambon seat of Non Peng. Even the largest village merchants do not store paddy, but purchase from individual farmers and sell to larger middlemen and occasionally millers. Usually such village merchants have some relationship with the larger middlemen, readily apparent in the Non Sung/Non Peng group, who re-sell to a merchant in Kalasin town. The larger middlemen may advance cash against sales to the village merchants, and they in turn may give credit or sell fertiliser on credit to farmers in return for a commitment to sell their paddy.

The larger middlemen, based in the changwat or amphur seats, have storage facilities which enable them to buy in the period just after the harvest and store to sell in bulk to millers later in the year, when the price is usually higher. In general such middlemen do not deal solely in rice, they tend to handle a range of commodities depending on the prevailing market conditions. Kenaf, kapok and cassava are handled when they are profitable. It is from the middlemen, especially those selling agricultural inputs as well as purchasing produce, that much of the non-institutional rural credit is supplied. Interest rates are high (20% a month is common) but so are the risks for the middlemen. A common

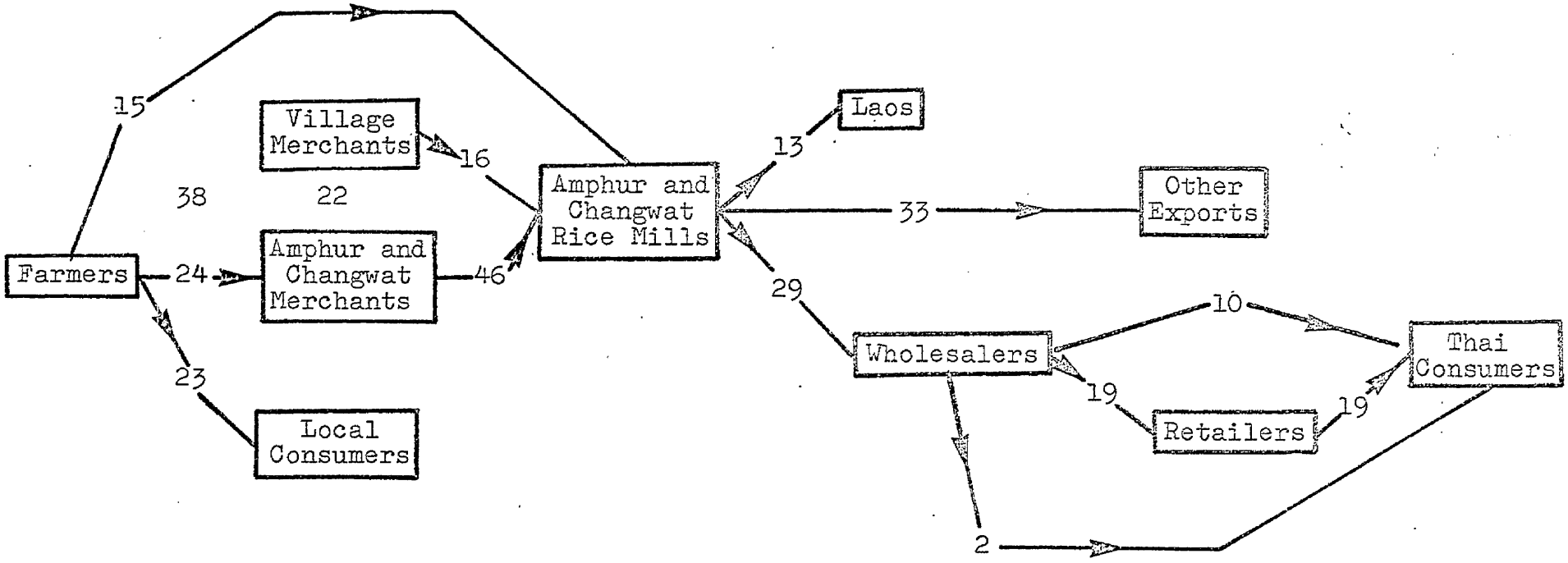

Fig. VII.1 Rice Marketing Channels in North East Thailand
(Figures represent percentage of production)

Source: Ministry of Agriculture, 'A Study of Marketing Margins and Channels of Major Agricultural Products and Livestock in Eight North East Provinces,' 1964

situation is the sale of fertiliser on credit in June-July for payment after the rice sales in January-February.

The 1964 Ministry of Agriculture Marketing Channel survey (figure VII.1) found that 49.35% of paddy went from farmers to the village merchants, who resold 42.1% to mills and 57.83% to amphur and changwat merchants. 31.16% passed from the farms direct to changwat and provincial dealers, and 19% direct to the mills. The re-sale by village merchants to millers is higher than that apparent in Khon Kaen and Kalasin, but the Ministry of Agriculture Survey is not directly comparable because it does not define the channels clearly. There is some seasonal variation in the mills' sources of paddy; in the November to February period, millers purchase 80-90% from the villages via agents, and only 1-2% direct from the producers; this percentage of direct purchase may be larger in the smaller mills.[18] Later in the season the majority of the rice will be purchased from the middlemen.

The Timing of Sales

There are two main periods of rice sale, December-May and September-October. In general, the first, directly after the harvest, is the larger, with a smaller sales peak in the months just before the following harvest. For glutinous in 1972 and 1973, approximately half the marketable surplus was disposed of in the first period, the second peak being reduced by those farmers who anticipated a poor succeeding harvest and had to retain part or all the rice intended for later sale for household consumption. Under the poor market conditions of 1971, only 40% was sold immediately after the harvest, leaving a larger quantity

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18 The mills in Kalasin with a capacity of 50 metric tons a day were found to purchase more rice direct from the farmers than those with a capacity of 80 metric tons a day in Khon Kaen.

for the second period of sale, when, farmers hoped, the price would have risen. The timing of sales will vary with the timing of the agricultural year, thus in 1971 the sales peak was nearly a month earlier than in 1972.

Non-glutinous rice is almost all disposed of in the period after the harvest, and none is stored unless it is used for livestock feed, as is apparent in Lao Yai; a small quantity is kept for seed and sweet making. On farm storage facilities make the keeping of two varieties separate extremely difficult. In a purely glutinous eating area the only incentive to store would be to wait for a better price, or as a form of saving.

Millers in both Khon Kaen and Kalasin purchased 40% of their glutinous rice and 60% of their non-glutinous rice in the immediate post-harvest period, acquiring the balance later in the year, principally from middlemen. It is apparent that middlemen purchase non-glutinous rice after the harvest, and sell it later in the year. The more reliable market for non-glutinous rice makes this a better proposition than glutinous rice, though some glutinous is stored by middlemen in the same way.

In the more commercially developed rice economy of the Central Plain, farmers sell 70.5% of their surplus paddy crop in the months immediately after the harvest, retaining 25% for sale later in the year.[19] This retention has been seen by Krisanamis as a reflection of a commercial outlook among the region's farmers, who store until September-October when prices are normally higher.[20] However, in view of the

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19 Udhis Narkswasdi, "Farmers' Indebtedness and Rice Marketing in Central Thailand" (in Thai), 1964, especially p.43.

20 P. Krisanamis, "Paddy Price Movements and their effects on the Economic Situation of Farmers in the Central Plain of Thailand", 1967.

comments on variability of production, yield and crop loss, (chapter I) it seems highly likely that here, too, rice is stored until the next harvest is certain.

In general farmers sold paddy at once to repay debts (including for agricultural inputs bought on credit), to purchase consumer goods, to meet various household expenses, or for travel and entertainment during the dry season. Storage facilities are seldom too small for farmers to retain all their paddy for sale later in the year. Rice barns vary greatly in size between farms, reflecting the anticipated harvest, but only where a farmer has a very large quantity stored from the previous year would he be forced by lack of storage space to sell. Narkswasdi's survey of the Central Plain produced similar conclusions; 79.43% of the farmers interviewed sold paddy because of 'urgent need of money' and 6.85% gave the reason as lack of storage space; farmers with over 40 rai, and particularly over 100 rai, reported difficulty in storing.[21] The whole question of timing of sale and returns will be examined in chapter VIII.

Place and Channel of Sale

In general there is little variation between glutinous and non-glutinous varieties in either the point where sale took place or the channel through which it was disposed. Dominantly, paddy sales take place within the village of origin, but there are some important village differences, which reflect the location of the village in relation to Kalasin town. Overall 57.7% of glutinous and 62.2% of non-glutinous sales take place within the village (table VII.1). From the more distant

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21 Narkswasdi, op.cit., p.130.

villages of Na Chuak Nua, Ban Tum, Lao Yai and Non Sung 80-100% of sales are within the village; in the villages of Ban Lek, Um Mao and Fai Taek, close to the urban market, there was a tendency for farmers to take rice direct to a merchant or miller (table VII.2). The lack of any sales to the amphur seat of Komalasai is a reflection of the submergence of the subsidiary centre by the dominance of Kalasin itself, and the more important amphur seat of Yangtalad. The existence of a good all-weather laterite road connecting the latter to Roiet channels trade from the southern part of Komalasai through Yangtalad. Between Kalasin and Komalasai the direct road link is very poor indeed, and as a result the Kalasin millers and merchants use the indirect route through Yangtalad to purchase rice from amphur Komalasai. Thus the most important surplus paddy producing amphur in the changwat has an amphur seat which has a limited function as a collection point for produce.

The sales from Non Sung and Um Mao to elsewhere in the changwat are in fact going to resident merchants in nearby tambon seats. In both villages the tambon seat is close, and lies between the village and the main road.

The breakdown of sales channels (table VII.2) indicates the confusion stemming from the existence of various kinds of village merchants. The overall sale of 11.34% to neighbours is indicative of the village sale of rice, but also contains an element of sale to farmer/merchants. The majority of sales are to the merchants in the village rather than direct to merchants from outside. In Ban Lek the large percentage of sales to outside merchants is a function of the village's proximity to the group of middlemen who have their warehouses along the Ban Lek to Kalasin road, some two or three kilometres from the village. Sale direct to rice mills in Kalasin is again a result of proximity, and is particularly common in Ban Lek and Um Mao.

TABLE VII.2(a)

CHANNEL OF SALE - GLUTINOUS RICE (% OF SALES)

	Neighbour	Village Merchant	Outside Merchant	Village Rice Mill	Kalasin Rice Mill	Consumer	Other
Na Chuak Nua	20.0	40.0	20.0		20.0		
Ban Tum	22.2	77.8					
Um Mao	5.0	5.0	15.0	10.0	65.0		
Fai Taek	100.0+						
Ban Lek		4.8	61.9		33.3		
Non Sung	5.9	76.5	17.4				
Lao Yai							
Lam Pao Area	11.3	38.1	23.7	2.1	24.7		

TABLE VII.2(b)

CHANNEL OF SALE - NON-GLUTINOUS RICE (% OF SALES)

	Neighbour	Village Merchant	Outside Merchant	Village Rice Mill	Kalasin Rice Mill	Other
Na Chuak Nua	30.0	20.0	30.0	-	10.0	10.0
Ban Tum	-	75.0	25.0			
Um Mao	8.3	-	16.6	8.3	66.8	
Fai Taek	-	-	100.0+	-	-	
Ban Lek	-	-	100.0	-	-	
Non Sung	8.3	41.7	33.4	-	8.3	8.3
Lao Yai	-	50.0	33.3	-	16.7	-
Lam Pao Area	10.0	32.0	30.0	2.0	22.0	2.0

+In Fai Taek there was only one sale.

TABLE VII.3

AVERAGE SIZE OF GLUTINOUS PADDY SALES (Kilograms)

Na Chuak Nua	1325.0
Ban Tum	1227.8
Um Mao	1752.5
Fai Taek	425.9
Ban Lek	1052.4
Non Sung	1482.4
Lao Yai	-
Lam Pao Area	1370.0

Sales to neighbours tend to be smaller averaging 951.8 kilograms; many are in the 200-500 kilogram range.

Volume of sales varies considerably between villages (table VII.3), with the largest in Um Mao. There is also some variation between size of sales in accord with place and channel of sale. Those within the village tend to be smaller (averaging 1006.2 kilograms as against 1824.31), but this tendency is emphasised by the number of farmers in Um Mao who sell outside the village.

Pattern of Rice Movements

North East paddy has local, changwat, regional, national and international markets, which means extremely complex paddy movements and marketing. Figure VII.2 summarises the relationships in the paddy/rice marketing system of the Lam Pao area. The place of the region in the Thai rice economy, as noted in chapter V, is poorly documented. Figure VII.1 provides some indication of the pattern of disposal of North East surplus, but it is by no means a comprehensive picture.

As was discussed in chapter V, within the North East region itself there is clearly a pattern of movements between deficit and surplus areas, as well as rural urban movements which will vary from year to year with variations in the levels ofproduction of the individual changwats. Loei is considered by millers and merchants as the only changwat of the region regularly in deficit. However even after inflation of the per capita production figures by use of the N.S.O. figures, Nakorn Phanom, Nakorn Ratchasima and Khon Kaen appear to be also deficit changwats. The deficits of Khon Kaen and Nakorn Ratchasima would be hidden by the role of both changwats as major collection centres serving wider areas.

There is some variation in the volume and direction of North East rice movements each year, particularly in response to the relative levels of production in the North and North East. In most years some

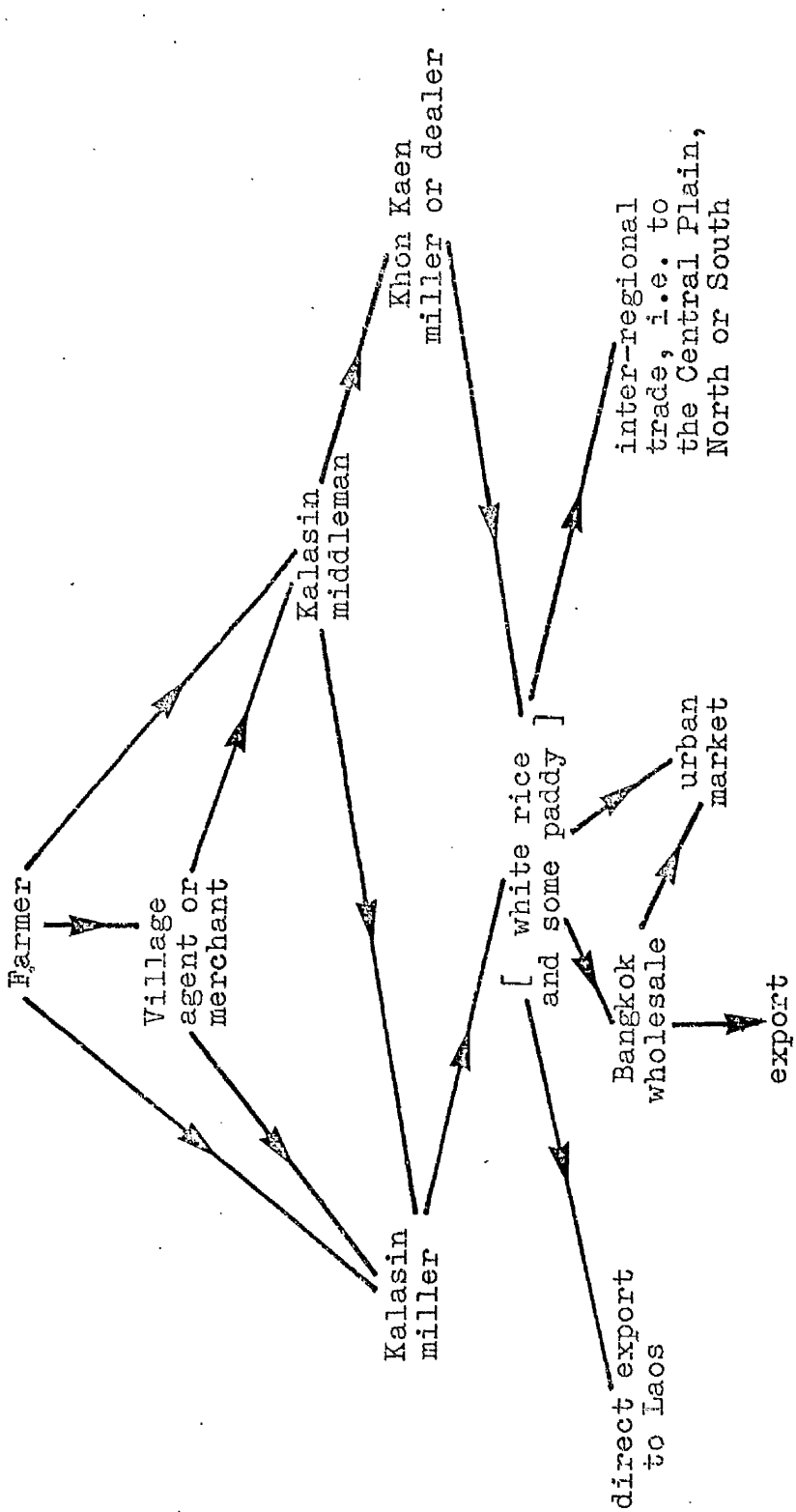

Fig. VII.2 Channels of Paddy Disposal in the Lam Pao Area

glutinous rice goes from the North East to the North; in years of low production in the North, such as 1972, the quantities would be higher than the 60,000 tons for 1968. Similarly, in years of low North East production, glutinous rice is brought in from the North, but this is rarer, and the only year in which this occurred since 1960 was 1967. A limited direct trade between the North East and the South occurs, usually when other markets for the region's rice are restricted. It is not possible to ascertain the percentage contribution of the North East to the total movement of rice to Bangkok because of the lack of comparable figures for the water-borne trade of the Central Plain.

The Marketing of Cash Crops

Little kenaf is retained by the growers in Lam Pao (2.5%). Small quantities are used by farmers for ropes and nets, and some poor quality fibre remains unsold; in 1971 one farmer interviewed was left with 25 kilograms in this way. A limited area of kenaf is also left unharvested in the fields until February or March to produce seeds. With these exceptions, other than in years of unfavourable market conditions such as 1962 and 1968 the entire crop is sold as soon as the harvesting, retting, stripping and bundling is completed. In those two years, the very poor market for the fibre resulted in many farmers either not harvesting at all or leaving bundles of stripped fibre to rot.

As was noted in the preceding chapter, the kenaf harvest for the majority of farmers predates the rice harvest. Similarly the bulk of sales fall in the pre-rice harvest period. However a number of farmers harvest the crop before and leave the cut fibre in the fields until after the rice is harvested, when they are free to devote their time to retting, stripping, bundling and selling the kenaf. Others are

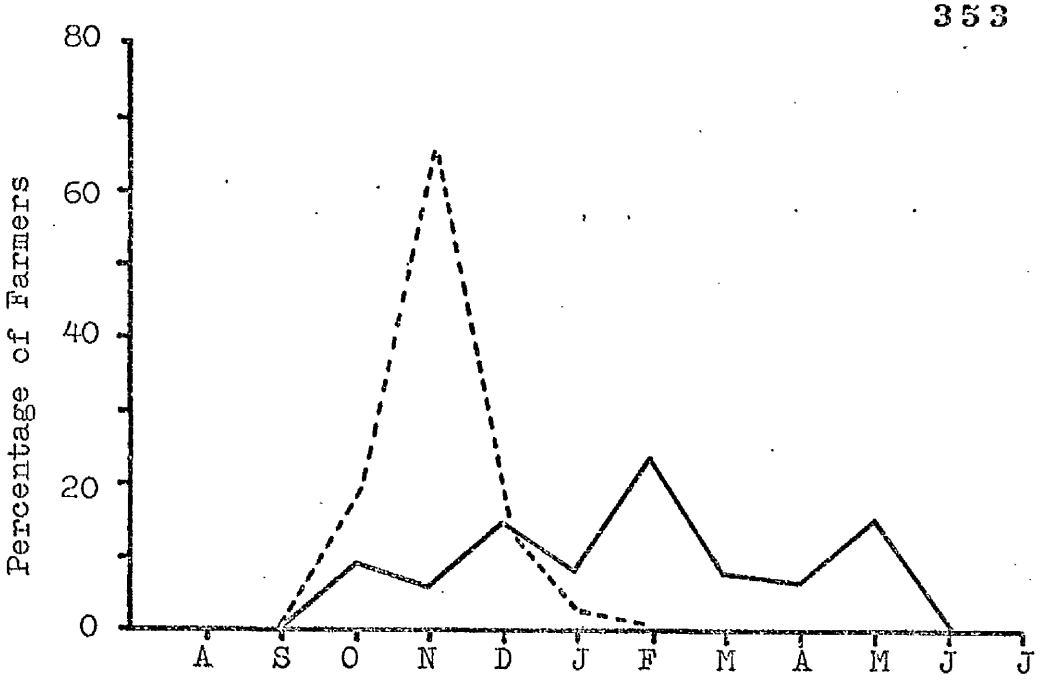

Fig. VII.3 The Timing of Harvest and Sale of Glutinous Rice (1970-71)

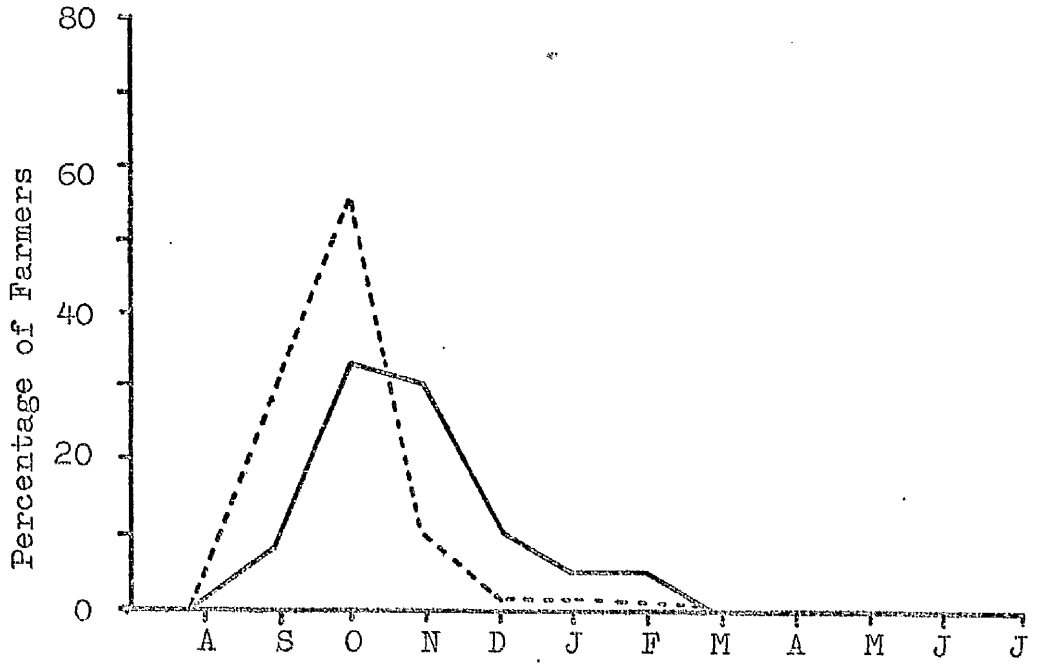

Fig. VII.4 The Timing of Harvest and Sale of Kenaf (1970-71)

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——— SALE

forced to leave the crop uncut in the field until after the rice harvest. In 1971 5.04% of kenaf was left until after the rice harvest before it was sold, and the timing of kenaf sales is clearly dependent on the timing of the farm year in general. The timing is much simpler than for rice (figures VII.3 and VII.4). In 1970-1 harvesting began in September and was accompanied by sales, with the entire harvesting and selling completed by February. The rice timing is more diffuse, with pre-harvest sales, few sales during the main period of the harvest, and intermittent sales from December to May. These differences reflect the difference between a semi-subsistence and a cash crop, but also farmers, even if they do not immediately need the cash from the kenaf sales, sell because they lack facilities for storage, and the fibre is likely to deteriorate very rapidly if retained. Excessive drying will reduce the weight and fibre quality; unsuitable storage facilities could lead to damage from excessive moisture if the crop was stored through the wet season.[22]

Overall in the Lam Pao area kenaf is more frequently sold in the village than is rice; some 77.7% of kenaf sales take place in the village, compared to 57.7% of glutinous rice and 62.2% of non-glutinous (table VII.4). Only in the villages of Um Mao, Fai Taek and Ban Lek (close to Kalasin town) is any kenaf sold in the town. The very bulky nature of the retted fibre discourages farmers from taking their produce to the merchant. However, unlike rice sales, arrangements are made direct with Khon Kaen by large producers, groups of farmers and village-based merchants, and trucks are hired for the purpose. Direct sale to Khon Kaen cuts out the Kalasin merchants and is likely to lead to a higher farm gate price.

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22 The price incentive to store crops is examined in chapter VIII.

TABLE VII.4

PLACE OF SALE OF KENAF (% of Sales)

	Village	Kalasin	Yangtalad	Elsewhere in Changwat Kalasin	Elsewhere in the North East
Na Chuak Nua	71.4	-	-	-	28.6
Ban Tum	98.2	-	1.8	-	-
Um Mao	57.1	42.9	-	-	-
Fai Taek	71.4	28.6	-	-	14.8
Ban Lek	33.3	51.9	-	-	-
Non Sung	90.0	-	5.0	5.0	-
Lao Yai	83.3	-	16.7	-	-
Lam Pao Area	77.7	13.2	3.5	3.5	2.8

TABLE VII.5

CHANNEL OF SALE OF KENAF (% of Sales)

	Neighbour	Village Merchant	Outside Merchant	Other
Na Chuak Nua	9.5	52.4	33.3	9.6
Ban Tum	7.1	82.1	8.9	1.8
Um Mao	14.3	-	71.4	14.3
Fai Taek	25.0	50.0	12.5	12.5
Ban Lek	3.7	18.5	77.8	-
Non Sung	30.0	55.0	15.0	-
Lao Yai	-	16.7	66.6	16.7
Lam Pao Area	11.0	53.8	31.7	3.0

Village merchants play a more significant role in the marketing channels of kenaf than rice (table VII.5). The proportion of village merchants in the kenaf trade is thought to have increased as the awareness of the profitability of trade in the crop grows. Chuchart found in 1961 that 31.7% of the dealers in kenaf were village merchants; the follow-up survey of the same area of the central part of the North East by Chuchart et al. in 1968 indicated that 59.6% of traders were of this type.[23] It appears that in the early period of kenaf marketing the large merchants who re-graded and re-baled the kenaf for dispatch to the exporters and gunny sack mills were purchasing direct from the farmers; in the 1961 survey 27.2% of traders purchasing from farmers were large merchants, and in 1968 only 4.8%. The small provincial and district buyers were respectively 33.4% and 30.8% in the two years, indicating that their position remained relatively unchanged. Therefore it seems likely that the larger merchants have moved the collection of the fibre down to the village level merchants from whom they can obtain relatively large quantities without dealing with a number of small producers (table VII.6).

Details of the village kenaf merchants were found hard to obtain; they were unwilling to disclose quantities handled as well as price of sale or purchase. Some operate on a very small scale indeed; one dealer in Fai Taek grew 700 kilograms himself and purchased 2000 more; he sold the combined total to a Kalasin merchant who visited the village. In contrast the large dealer in Ban Tum dealt with 33,000 kilograms in 1971, selling half to Khon Kaen and half to Kalasin. He grew an additional 2000 kilograms himself.

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23 C. Chuchart et al., "An Economic Study of the Production and Marketing of Thai Kenaf", A.S.R.C.T., 1967, p.81.

TABLE VII.6

TYPES OF KENAF BUYER WHO PURCHASED FIBRE FROM FARMERS IN 1961 AND 1966 (% OF SALES)

	1961	1966
Village merchant	31.7	59.6
Amphur merchant	33.4	30.8
Provincial baling plants	27.2	4.8
Others[+1]	7.7	4.8

+1 Includes gunny sack mills and village money lenders.

Source: Compiled from data contained in C. Chuchart et al., "An Economic Study of the Production and Marketing of Thai kenaf", A.S.R.C.T., 1967, table 39, p.44 and figure 30, p.81.

All the villages have at least one person dealing in kenaf in this way. Fai Taek has two, and Ban Tum and Na Chuak Nua have four each (1971). This list is not complete, and the merchants are by no means comparable. In Non Sung the village merchant dealt in Non Peng, the tambon seat, although his family lived in Non Sung. There were a group of villagers who worked with him to collect rice and kenaf which he sold to a middleman in Kalasin. The group also dealt in fertilizer, sold within the village on credit.

In the villages with little kenaf, espceially Um Mao and Lao Yai, the one farmer in each village did nothing more than collect the produce from other producers, to make a larger sale to a merchant visiting the village. In Na Chuak Nua, Non Sung and Ban Tum, the distance from town and larger scale of the kenaf cultivation resulted in more active village dealers who arranged transport to and sales in Kalasin or Khon Kaen. There were two small merchants in Na Chuak Nua who mainly collected from neighbours, in one case 4000 kilograms, and resold to a merchant who visited the village, and in these instances no prior arrangement was made with the merchant. In general the earlier season sales were made to Khon Kaen and the later ones to Kalasin, probably reflecting the smaller quantities of kenaf reaching the large changwat markets in the early months from September to November, as well as the generally higher grade of kenaf produced at this time of year. As the harvest season progresses, the market becomes flooded and the quality declines, partly because of the shortage of good retting water. The high percentage of sales to merchants from outside the village in Ban Lek and Um Mao reflects a tendency for sales to take place in nearby Kalasin (table VII.5). In Lao Yai the small number of growers results in dependence on outside merchants to purchase; in the main these were

merchants resident in surrounding villages rather than large merchants from Kalasin.

The role of village merchants in the kenaf trade is necessitated in part by the large number of small sales; 48.2% of sales are less than 300 kilograms, compared to glutinous rice, where over half are more than 1000 kilograms. In both rice and kenaf the village merchants and/or agents for millers and merchants provide a service by assembling produce into quantities large enough to warrant the attention of the town dealers. With respect to glutinous rice, the general size of sales is large, and since almost every farmer grows the crop, merchants have little difficulty in collecting a truck load. The smaller size of individual kenaf sales, plus the fact that only 60.03% of farmers grow it, makes for difficulty in assembling a load. In addition it is extremely unusual for those selling rice to dispose of it in more than one sale during the main period from January to March (though they may well sell more in September or October); kenaf is often harvested and processed piecemeal, and may be sold as it is ready. Many large sales recorded are in fact composed of several smaller collections, further reducing the size of each collection, and emphasising the need for village merchants. In 1971, 25% of farmers selling kenaf sold more than once, but the sales are not separated by more than a month normally, although there are some instances of sale before the rice harvest and a second sale later.

The kenaf trader showed marked differences from the rice merchant. Interviews with village rice merchants and millers confirmed the existence of relatively permanent arrangements within the rice market. Since millers have to give village merchants or agents rice sacks, they are risking several hundred baht a lorry load, and in consequence they deal with the same people at village level each year. In contrast kenaf is sold in bundles, no such risk is borne by the middle-

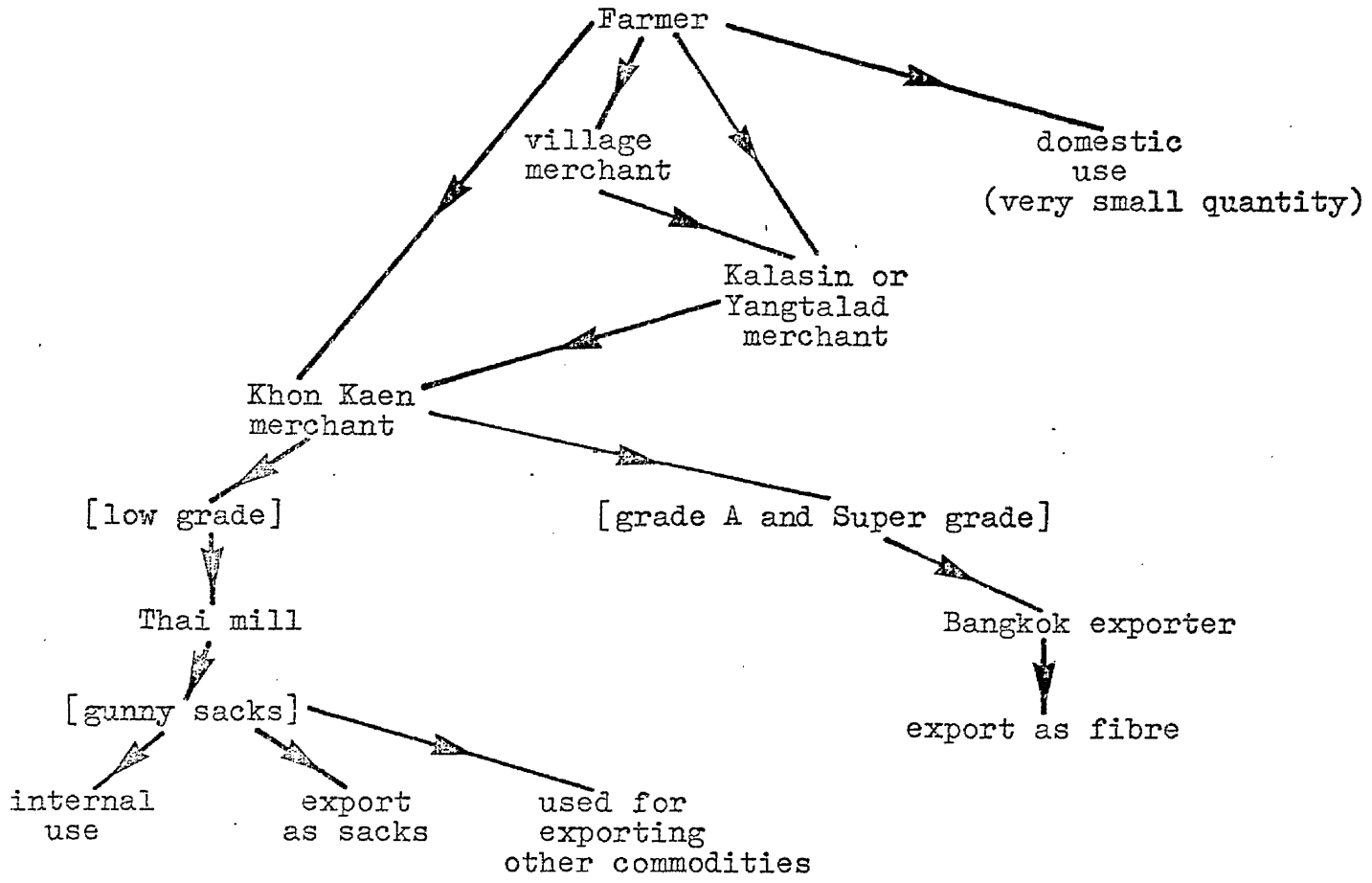

Fig. VII.5 Channels of Kenaf Disposal in the Lam Pao Area

men, and they are prepared to deal more freely with the village merchants. Entry into the kenaf trade in the village is thus easier than for rice. This ease of entry typifies the kenaf trade; many of the large merchants in Kalasin had other activities to turn to if the kenaf prices are low. Very few middlemen dealt only in kenaf, the majority dealing also in kapok, rice or cassava, depending on the prevailing market conditions.

Kenaf is treated by farmers and dealers alike as a much less permanent commodity than rice. In years of poor price, farmers will leave the crop unharvested, avoiding a very labour intensive process, and both village and changwat merchants move out of the trade. Middlemen not only withdraw or reduce their participation in the trade but do not speculate in years of poor market; they buy and sell immediately in case retention results in a loss due to falling prices. Figure VII.5 summarises the general relationships in the kenaf market system of the Lam Pao area.

Cash Crop and Rice Markets

Unlike the rice market, the kenaf market did not penetrate the North East to take advantage of the existing surplus in a long-established crop, and thus stimulate that surplus to become both larger and more regular. In the case of kenaf, the penetration of the market resulted in the production of a new crop. Farmers adopted the crop initially because merchants were coming into the region, offering high prices for kenaf and giving advice on cultivation and seeds. By the late 1950's, the penetration of the market economy, bringing consumer goods, was stimulating the cash needs of the region's farmers. Kenaf, by fitting so easily into the existing pattern of land use and farm practices, particularly the timing of the processes, met and further stimulated the cash need. We have in these two crops examples within the same region of the two forms of commercialisation discussed in chapter II. The rapid

expansion of kenaf in the region may be seen as a reflection of the expanded traditional sector of the agricultural economy to provide sufficient cash income.

As was discussed in chapter V, the rice trade had a long period of development in the Central Plain of Thailand before it extended into the North East, consequently from its introduction into the region the system of rice marketing was well developed; in contrast kenaf marketing grew up in a haphazard manner, in a space of three or four years. It is not surprising that both on the side of the producers and the buyers, there is less sophistication in grading, quality and manner of purchase. Kenaf is sold in bundles of approximately 60 kilograms,[24] with farmers having little in mind except the weight of the bundles. They do not have the same appreciation of the nature and quality of the kenaf that they have for rice.

The rice market system has a network of commercial rice mills throughout the Khorat plateau which give a firm basis to the commercial rice economy of the region. The small baling plants and warehouses of even the major kenaf merchants in Khon Kaen, Nakorn Ratchasima or Udornthani do not provide a comparable air of permanency. Similarly, rice has a firmer basis of local, regional and national demand, with only 15-17% of the total crop being exported, while kenaf is heavily dependent on the international market with 75-80% of fibre exported (Appendix XI).[25]

In both the rice and kenaf trades there are a number of small scale part-time local traders, and Dewey has seen:[26]

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24 One picul.

25 The figures for 1968 are 18.18% (N.E.D.B.), 17.58% (Ministry of Agriculture), and 15.77% (N.S.O.) (calculated from J.C. Ingram, "Economic Change in Thailand 1850-1970", 1971, p.242).

26 A. Dewey, "Capital, credit and saving in Javanese marketing", in R. Firth and B.S. Yamey, eds., "Capital, Saving and Credit in Peasant Societies", 1964.

" ... the proliferation of traders as a result of the technical underdevelopment of the economy, the unemployment and under-employment which makes self-employed labour cheap, the ease of entry into ... trading, and the need to attract many small individually owned amounts of capital to finance these operations in performance of which self-employed labour cannot be substituted for capital and other factors of production".

In addition the small size of the individual surplus production is important in the proliferation of the small traders. The rice trade, with its larger and more stable organisation, has fewer small traders and less fluctuation in their numbers. Entry into the rice trade, even at the village level, is more difficult than for kenaf. The less well-organised, more recently developed and smaller scale of the kenaf trade enables change and greater ease of entry than is possible for rice.

It is clear that the organisation of the North East agricultural market system is basically similar and comparable to other so-called peasant export economies of South East Asia, where a market system has been imposed on a traditional agricultural economy to tap surplus from expanded traditional or innovatory sectors, where each producer creates a very small amount.[27]

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27 Boeke, op.cit., and Bohannon and Dalton, op.cit.

CHAPTER VIII

PRICE LEVELS

The level and reliability of cash income derived from agriculture depends on the size of production, its regularity , the percentage sold and the price obtained. Production levels, the uncertainty of production in the North East and the determination of the marketable surplus have been considered in earlier chapters. Here the price levels and market conditions for the crops of the region are considered, with the level of return obtained by the farmers.

There has been little work to date on the price levels of agricultural produce in Thailand; most studies have concentrated on the relationship between the prevailing internal level of prices and the export price.[1] Only Krisanamis[2] and Narkswasdi[3] have worked on price levels in relation to farm conditions and neither of these studies made use of the actual prices at the farm level, but used the Bangkok wholesale price movements. There has been no significant work on the determination of the farm gate price and little on the relationship between farm and Bangkok prices. Zimmerman in 1930 produced regional comparisons of the percentage of the Bangkok price paid to farmers.[4] More recently, Silcock has examined the percentage on a very limited basis for

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1 C. Chuchart and S. Tongpan, "The Determination and Analysis of Policies to support and stabilise Agricultural Prices and Income of the Thai Farmers", 1965.

2 P. Krisanamis, "Paddy Price Movements and their Effect on the Economic Situation of Farmers in the Central Plain of Thailand", 1967.

3 U. Narkswasdi, "Farmers Indebtedness and Rice Marketing in the Central Plain of Thailand", 1958, (in Thai).

4 C. Zimmerman, "Siam Rural Economic Survey", 1931, pp.186-193.

non-glutinous rice,[5] and Usher has looked in some detail at the costs and 'mark ups' involved in the purchase of paddy by millers in the Central Plain, and its subsequent milling and exporting.[6]

Price Information

Monthly Bangkok wholesale and export prices for non-glutinous paddy, milled rice and kenaf are available since 1960.[7] For glutinous paddy and milled rice there are no continuous runs of published figures, reflecting the lack of importance of the variety in the Thai trade.

There is a general lack of farm gate price information for Thailand as a whole. This is not to say that such information is not officially collected; since 1963 the Ministry of Agriculture Division of Marketing has collected monthly returns from leaders of farmers' groups for a variety of agricultural commodities.[8] The farmers' groups are by no means evenly distributed across the kingdom, and it is clear from examination of their returns that many fail to complete the forms sent to them, or fail to return them at all. However, these returns may provide an indication of the prevailing level of prices in the country. Unfortunately these monthly returns are only used to produce national monthly averages with no regional or changwat breakdown. Average monthly price levels for the North East and for changwat Kalasin were made available by the Division of Marketing. Considerably more data, enabling a more complete analysis of regional and changwat differences in price levels, are hoped to be obtained at a later date for a more detailed

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5 T.H. Silcock, "The Economic Development of Thai Agriculture", 1970, pp.17-20.

6 D. Usher, "The Thai Rice Trade", in T.H. Silcock, ed., "Thailand Social and Economic Studies in Development", 1967, pp.207-230.

7 See Bank of Thailand Monthly Reviews, 1960-70.

8 Normally for 118 commodities, ranging from fish to waterbuffalo.

TABLE VIII.1

COMPARISON OF 1972 KALASIN CHANGWAT FARM GATE PRICE INFORMATION FROM THE DEPARTMENT OF AGRICULTURAL EXTENSION AND THE DIVISION OF MARKETING

(Baht per ton)

(a) GLUTINOUS PADDY

	Agricultural Extension	Division of Marketing	Agricultural Extension as a % of the Division of Marketing
January	646.25	640.0	100.97
February	734.1	725.0	101.25
March	782.5	633.0	123.61
April	748.1	-	-
May	807.5	662.5	121.86
June	888.0	738.27	120.28
Mean	782.74	679.75	115.15

(b) NON-GLUTINOUS PADDY

	Agricultural Extension	Division of Marketing	Agricultural Extension as a % of the Division of Marketing
January	693.8	690.0	100.55
February	723.3	800.0	90.41
March	676.3	722.92	93.55
April	718.8	-	-
May	754.2	655.0	115.7
June	850.0	774.82	109.7
Mean	736.1	728.34	101.1

(c) KENAF

	Agricultural Extension	Division of Marketing	Agricultural Extension as a % of the Division of Marketing
January	2860.0	2860.0	100.0
February	2770.0	2000.0	138.5
March	3180.0	2310.0	137.61
April	3140.0	-	-
May	3250.0	2520.0	89.26
June	3130.0	2800.0	111.76
Mean	2880.0	2690.0	107.0

Source: Ministry of Agriculture, Department of Agricultural Economics, Division of Marketing, and Department of Agricultural Extension.

separate study of prices.

A valuable check on the farm gate prices supplies by the Division of Marketing was provided by a six-month survey of the weekly prices in changwat seats collected from January to June 1972 by the Department of Agricultural Extension.[9] These prices were collected from changwat merchants and millers once a week and the average prices forwarded to Bangkok. Since these were the prices quoted in the changwat seats, they would be expected to be above the prices collected by the Division of Marketing in the villages scattered throughout the changwats. These figures have not been processed in any way, but those for changwat Kalasin were made available by the changwat Agricultural Office. Examination of the returns suggested that the omissions were greater than in the Division of Marketing figures.

The Lam Pao price levels collected in 1970-1 and 1971-2 could not provide a usable run of price data, but did provide important information on the level of returns obtained by farmers selling to different agencies in different locations and at different times of the year. This could only be obtained from a detailed farm economy survey. In addition the Lam Pao prices could be used to check against the figures provided by the two official bodies.

As may be seen from table VIII.1, the Department of Agricultural Extension price levels for glutinous rice, non-glutinous rice and kenaf are of the same order as those of the Marketing Division, though generally slightly higher; glutinous rice prices 15.2% higher, non-glutinous 9.7%, and kenaf 7.0%. This difference may reflect the location and position in

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9 This survey was initiated to provide additional information on the very low rice prices in 1970-1; the official reason for discontinuing the collection was the rising prices again, but the incomplete nature of the figures may well have played a part.

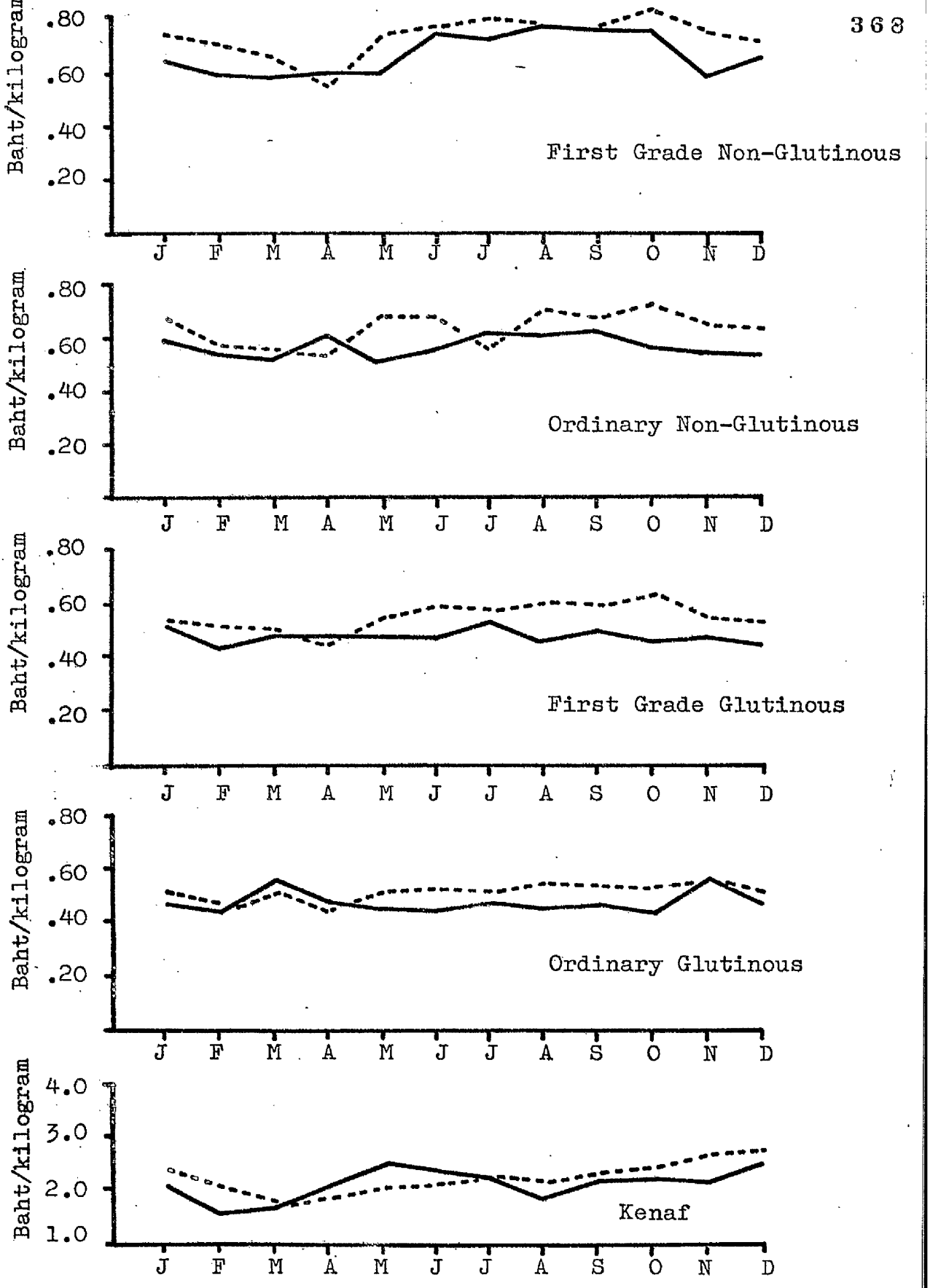

Fig. VIII.1 National and Kalasin Farm Gate Prices by Month (1971)

Sources: (Kalasin) Agricultural Office, changwat Kalasin; (Thailand) Ministry of Agriculture, 'Prices of Agricultural Commodities,' (in Thai) 1972

TABLE VIII.2

LAM PAO AND MINISTRY OF AGRICULTURE PRICE LEVELS

1970-1

	Lam Pao	Division of Marketing	Lam Pao Price as a % of the Division of Marketing
Glutinous paddy	0.53	0.52	101.97
Non-glutinous paddy	0.70	0.72	97.22
Kenaf	2.03	N/A	

1971-2

	Lam Pao	Division of Marketing	Dept. of Agricultural Extension	Lam Pao as % of Division of Marketing	Lam Pao as % of Dept. of Agric. Extension
Glutinous	0.63	0.71	0.78	94.92	80.76
Non-Glutinous	0.71	0.60	0.74	118.50	95.94
Kenaf	2.14	2.69	2.88	79.55	74.30

Note: These prices are averages for the September-April period in each year.

Source: Ministry of Agriculture, Department of Agricultural Economics, Division of Marketing and Department of Agricultural Extension.

the market chain, one being at village level and the other in the changwat seat.

Table VIII.2 makes a similar comparison between the Marketing Division price levels for Kalasin and the 1970-1 and 1971-2 Lam Pao figures. The North East regional farm gate averages produced from the Marketing Division price returns are a closer fit to the 1970-1 Lam Pao figures. The kenaf prices are the least satisfactory, with the Lam Pao figure being only 79.55% of the Ministry price level; however, the mean prices given by the Ministry and the Department of Agricultural Extension are unweighted to compensate for uneven distribution.

The changwat Kalasin price levels produced by the Ministry of Agriculture and the overall Thai and North East figures from the same source are compared in figure VIII.1 (see Appendix IX.1 and 2). Kalasin farm gate price levels for 1971 are at least 83.25% of the national average, the closest being 92.57% for ordinary grade glutinous rice. Kalasin mean monthly prices for non-glutinous and glutinous paddy were generally closer to the North East average (figure VIII.1 and Appendix IX.1). On the basis of annual average prices, Kalasin ranged from 101.4% in 1969 to 89.58% in 1970 of the regional glutinous price, and from 91.91% (1970) to 97.26% (1972) for non-glutinous rice.

Long Term Price Movements - Paddy prices in the post war period

World rice shortages in the immediate post war period resulted in a period of buoyancy for the Thai market, which continued until 1954. The failure of important pre-war surplus producers, notably Burma and IndoChina, to regain their former position as rice exporters, combined with the boom period of the Korean war, kept demand for Thai rice at a high level. As may be seen in figure VIII.2, the ending of the Korean

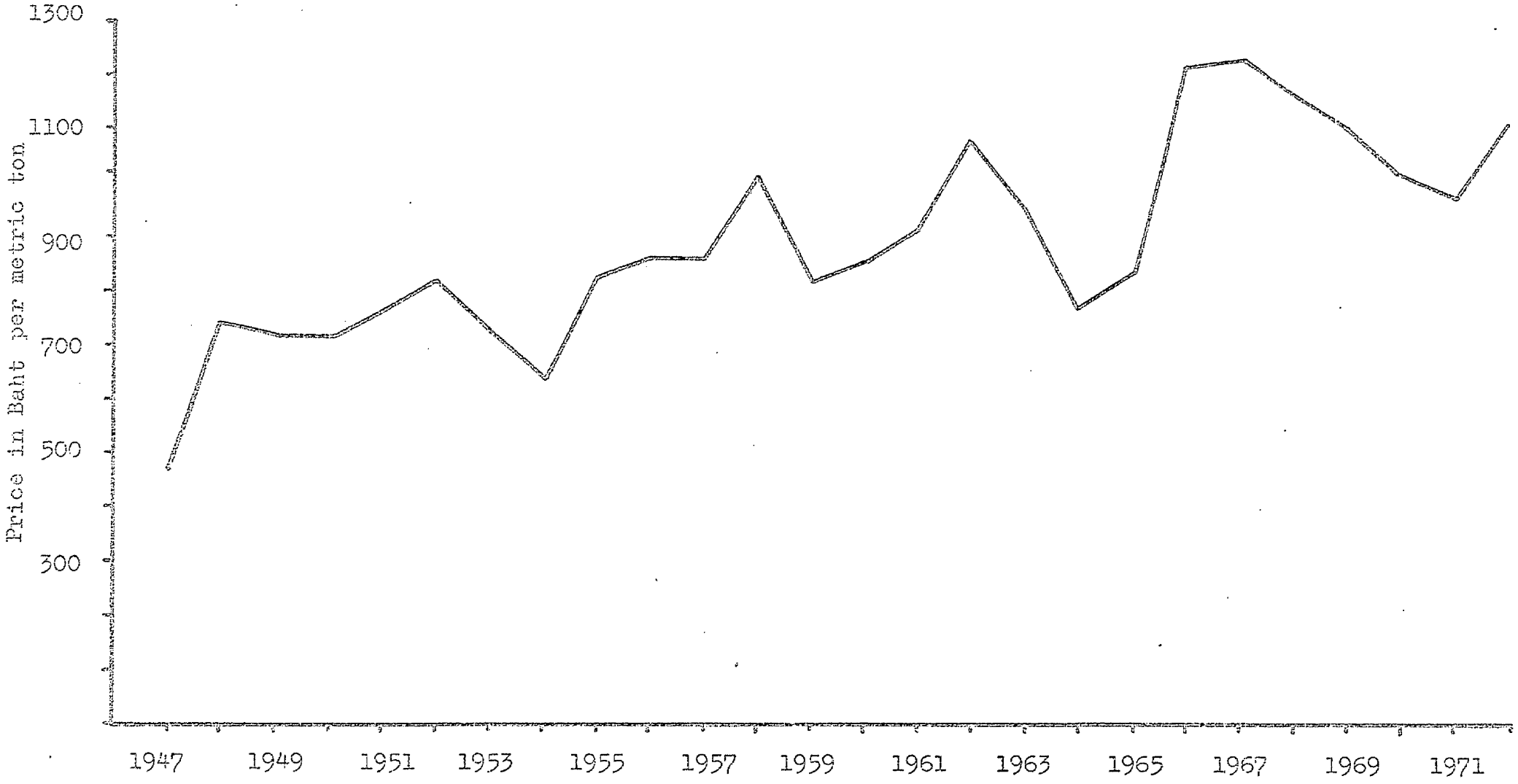

Fig. VIII.2 Bangkok Wholesale Price of Paddy (average of grades 1, 2 and 3) 1947-72

Source: Ministry of Agriculture, for 1947-71, and Bank of Thailand Monthly Review, 1972

war in 1953 and the subsequent depression in commodity prices resulted in a fall in the demand and consequently price levels for Thai rice. Thailand experienced considerable difficulty in selling rice in both 1953 and 1954.[10]

From 1947 to 1954, rice exporting was exclusively in government hands; as long as the market remained buoyant the government was able to sell rice, but under conditions of contracting markets the Government Marketing organisation lacked the commercial contacts and expertese to sell rice.[11] A reversion to a system of private exporting under general government control was instrumental in re-vitalising the trade. The long-established rice exporting firms, predominantly Chinese, had long experience in selling rice and the necessary commercial links in South East Asia to negotiate sales under difficult conditions; the Thai government did not have this. From 1955 until 1964, paddy and rice prices reamined relatively stable, but in 1964-5 a series of very good South East Asian harvests resulted in a very steep fall in the internal price levels of Thai rice (figure VIII.2). Farmers experienced considerable difficulty in selling rice at any price, and demands were made by farmers' groups for a government Price Support System.[12] A recovery of the level of international demand for Thai rice brought a price rise in 1966 and saw relatively stable price conditions until the 1969-70 crop season.

Over-supply of paddy amongst Thailand and the other exporting countries of South East Asia began to manifest itself in 1970. The

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10 T.H. Silcock, "Outline of Economic Development 1945-63", in idem., ed., op.cit., 1967, pp.1-27, reference p.17.

11 Ibid., p.17.

12 Prince Sithiporn Kridakara, "Rice Farming in Thailand", 1969, p.20. The 1965 Price Support scheme is discussed in chapter X, together with the whole question of government involvement in internal marketing of agricultural produce.

situation was worsened in the succeeding, 1970-1, crop season by a very good harvest in Thailand and most Asian countries.[13] Many traditionally deficit countries were becoming increasingly self-sufficient and Thailand was faced with a contraction of her long-established Asian markets. In addition, a number of Asian importers have turned to non-Thai sources, and in some cases transferred their imports to lower grade rice. Hong Kong reduced its overall level of rice imports by 5% in 1971, and also further reduced the share of Thailand by taking 10,000 tons from Burma;[14] Indonesia ceased to import Thai rice in 1970, taking supplies from the U.S.A. under long-term credit agreements.[15] South Vietnam's deficit is being increasingly supplied by the U.S.A., which has a considerable volume of surplus rice.[16] The fear of American and Japanese 'dumping' of rice at low prices on the South East Asian and world markets has unsettled the Thai trade.[17] In Europe the Thai market has been steadily eroded by American rice; in 1957, 52,000 tons of Thai rice were exported to the Netherlands, and by 1971 this had fallen to 1,505 tons, with the balance coming from the U.S.A.[18] At the end of 1971 there was an estimated 1 or 1½ million tons of rice for which no export market could be found, and rice prices had reached the lowest level since 1964-5.[19] (Figure VIII. 2). In 1971, the outlook for Thai rice exports was very black indeed; the F.A.O. considered that "the world rice market is likely to remain depressed by over-production for the next 3 to 4 years and current rice trade problems are likely to persist and could worsen in the medium term

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13 F.A.O., Rice Report, 1971.

14 Bangkok Post, June 22nd, 1971.

15 Idem, May 10th 1971.

16 Ibid.

17 Ibid.

18 Ibid.

19 Bank of Thailand, Annual Report, 1971.

ahead".[20]

A number of measures were initiated by the Thai government to revitalise the rice exports of the kingdom and alleviate the internal marketing problems; farmers, as in 1964-5, were unable to find a buyer for paddy even at the low prices prevailing.[21] A government scheme for promoting new export markets was embarked on, making use of long-term credit and barter agreements. Several agreements were negotiated, notably with the Philippines, for the supply of 50,000 tons on credit, with a twelve year repayment plan.[22] Agreement was reached with the Japanese to supply rice to Indonesia under a long term Japanese-Indonesian agreement.[23] A further measure was the removal of the rice premium on all grades of rice in May 1971, to make Thai rice cheaper on the international market, increase the internal farm gate price and stimulate exports. There has been no investigation of the effect of the removal of the rice premium on either internal or external rice markets. The export price of Thai rice did fall (figure VIII.5), but whether this stimulated exports, given the depressed market, is open to question. The re-vitalisation of the Thai rice export market came in 1972 with poor harvests in Asia in general and an increased level of demand for Thai rice which continued in 1973, enhanced by a poor Thai harvest. From 1972 prices showed a marked upward trend again.[24]

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20 F.A.O., Rice Report, 1971.

21 The 1971 quota and price support system is discussed with that of 1964-5 in chapter X.

22 Financial Post, Bangkok, May 1971.

23 Ibid.

24 Bangkok Post, April 7th, 1971.

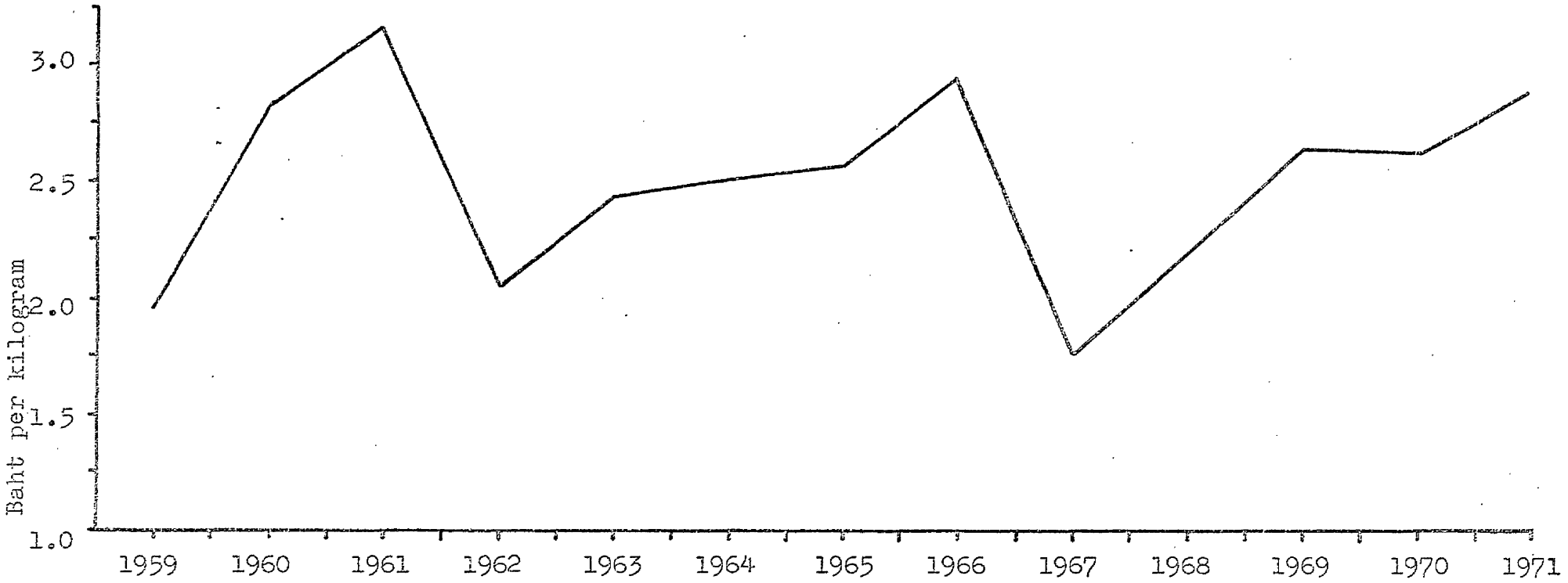

Fig. VIII.3 The Average Bangkok Wholesale Price of Kenaf, 1959-71 (an average of grades A, B and C.

Source: Bangkok Bank Monthly Reviews, 1959-71

Long Term Price Movements - Kenaf

Kenaf has only been of importance as an export crop in Thailand since the mid fifties, and, as noted in chapter VI, the level of demand has varied inversely with the level of production of Pakistani jute (see Appendix XI). There have been two years of low demand for Thai kenaf, 1962 and 1967, both characterised by low prices (figure VIII.3). The severe drought in 1967 reduced North East Thai output and in consequence prices were less depressed than they might have been.[25]

Long Term Price Variability

Since 1960, the two basic crops of North East Thailand, rice and kenaf, have experienced two periods of depressed prices, and the Bangkok wholesale prices reveal similar degrees of variability. Since 1960, paddy prices have a coefficient of variability of 18.62% and kenaf of 17.82%. The lack of any regular quotation for glutinous rice either at the wholesale or export level prevents detailed examination of the long term price trends. However, average North East farm gate prices over the five years 1967-71 exhibit a variability of 17% for non-glutinous and 25.3% for glutinous rice. Thus despite the more local nature of glutinous rice and its limited participation in the international market it has shown rather more variability than the non-glutinous type.

For non-glutinous rice it is evident that the North East farm gate price has not shown greater variability than the Bangkok wholesale price. For kenaf, the lack of any long run of farm gate price figures prevents any comparison. In the absence of evidence to the contrary, an assumption of comparable levels of instability for kenaf and non-glutinous

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25 E.J. Sholton, "Kenaf in Thailand", 1968, p.396.

rice, and greater instability for glutinous, may be reasonable. This lends additional weight to the argument of comparable levels of instability in the expanded and innovatory sectors of the North East farm economy outlined earlier in the light of uncertain levels of production.

The Rice Premium and its Effects on Price Levels

The reintroduction of private rice trading in 1955 was accompanied by the establishment of a premium paid by exporters, in effect an export tax levied at a rate per ton, varying with the grade of rice or paddy and published regularly by the government. Appendix IX.3 contains a summary of the premium levels from 1956 until 1970. The rice premium, as well as providing an important source of revenue for the Thai government, could be used to adjust internal supply and demand to the international demand. In theory, raising the premium discouraged exports, and lowering it encouraged them. For the period 1955-71, the internal level of rice prices were kept below the prevailing international price by the amount of the premium. The merits of the system have "been the subject of vigorous and sometimes heated ... debate, both inside and outside of the government ... for Thailand the rice premium controversy has been comparable in importance and scope to the Corn Law controversy in England in the first half of the nineteenth century".[26]

The confusion of individual researchers is illustrated by Wagner and Tongpan who said that "prior to starting this research we thought the premium was good. At the time this research was begun, we thought perhaps it should be abolished altogether. After a year of

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26 Ingram, op.cit., p.244.

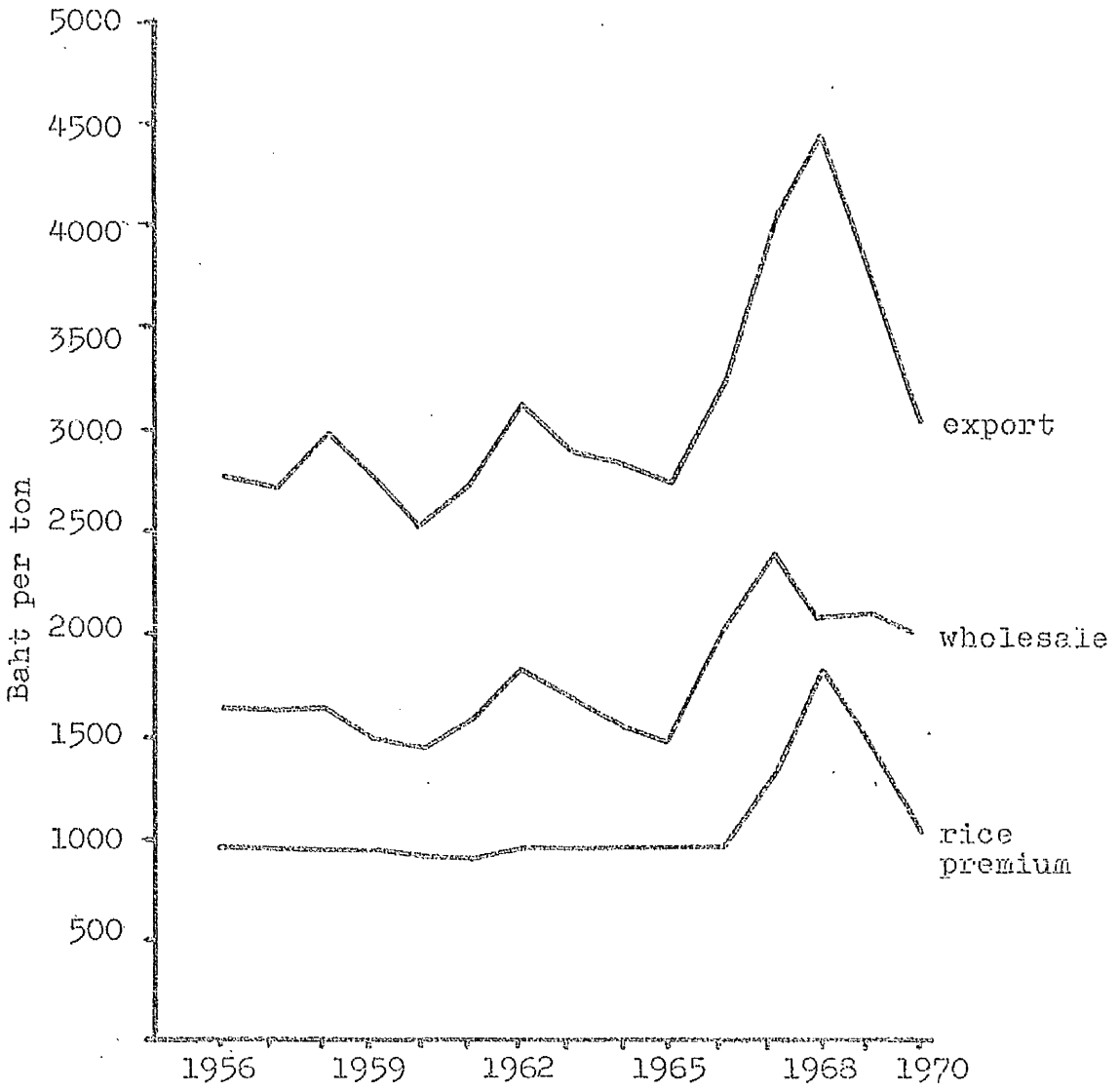

Fig. VIII.4 Five Per Cent Broken Non-glutinous Rice, Export, Wholesale and Premium Rates

Source: J.C. Ingram, 'Economic Change in Thailand 1850-1970,' 1971, Chart V

serious and more or less continuous research on the subject, we feel very strongly that more research is needed".[27]

It is beyond the scope of this thesis to examine the economics of the rice premium in detail but it should be borne in mind that the internal level of rice prices has been depressed below the international level by the premium (figure VIII.4 and Appendix IX.3). In so far as the market chain for paddy would pass on the increase in the Bangkok wholesale price, the farm gate price has also been depressed by the premium. Much debate has centred around how much of the price increase stemming from the removal of the premium would reach the farm. The official viewpoint has been that the middlemen would absorb the price increase, and the farmers would obtain little or no benefit.[28] Ingram and Prince Sithiporn provide an extensive summary of the literature on the rice premium, and both conclude that the consensus of opinion outside the government is that the premium's removal would result in a substantial increase in farm gate prices.[29] Silcock, while agreeing that the removal of the premium would increase farm gate prices, sees the depressing effect of the system on paddy prices as an important stimulus to agricultural diversification.[30]

The premium could be used as a control to prevent excessive exports driving up the internal rice price, however "it is clear that the rice premium was not used systematically to counteract or otherwise respond to changes in world rice prices".[31] Many of the changes in the

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27 M. Wagner and S. Tongpan, "Structure of Thai Rice Prices", mimeo, 1965.

28 Prince Sithiporn, op.cit., includes a selection of official government statements on the rice premium (pp.59-187).

29 Ingram, op.cit., pp.259-261.

30 T.H. Silcock, "The Rice Premium and Agricultural Diversification", in idem, ed., op.cit., 1967, pp.231-257.

31 Ingram, op.cit., p.247.

TABLE VIII.3

FARM GATE PRICE OF NON-GLUTINOUS AND GLUTINOUS PADDY AS A % OF THE F.O.B. EXPORT PRICES OF THE 10% MILLED RICE OF THE TWO VARIETIES (1970-71)

		Glutinous			Non-Glutinous			
		F.O.B.	Farm Gate	%	F.O.B.	Farm Gate	%	
	Jan.	2497.50	682.0	27.30	2997.00	869	28.99	
	Feb.	2600.52	708.0	27.22	2952.95	853	28.88	
	March	2353.44	665.0	23.25	2803.92	840	29.95	
1	April	2153.44	651.0	30.23	2754.40	815	29.53	
9	May	2103.36	648.0	30.80	2701.08	831	30.76	
7	June	2048.77	640.0	31.12	2698.38	849	31.46	
0	July	2091.60	637.0	30.45	2739.00	860	31.39	
	Aug.	2040.98	620.0	30.37	2787.68	879	31.53	
	Sept.	1987.60	641.0	32.24	2732.95	859	31.43	
	Oct.	1940.25	588.0	30.30	2736.25	832	30.40	
*1	Nov.	1842.23	542.0	29.42	2698.38	793	29.39	
	Dec.	1792.08	486.0	27.11	2638.34	814	30.85	
1	Jan.	1851.48	490.0	26.47	2627.10	645	24.55	
9	Feb.	1812.60	466.0	25.70	2517.50	628	24.94	
7	March	1762.60	482.0	27.34	2366.92	602	25.43	
1	April	1763.30	456.0	25.86	2166.34	595	27.46	*2
	May	1511.10	527.0	34.87	1862.58	690	36.92	
	June	1662.21	545.0	32.78	1964.04	732	37.27	
	July	1611.52	548.0	34.00	2014.40	723	36.33	
	Aug.	1603.94	526.0	32.79	2013.20	743	36.90	
	Sept.	1611.07	544.0	33.76	2121.34	713	33.84	
	Oct.	1559.10	553.0	35.46	2078.80	727	34.97	
	Nov.	1506.26	491.0	32.59	2025.66	690	34.06	
	Dec.	1591.80	534.0	33.54	1963.22	669	34.07	

*1 Removal of premium on exports of glutinous rice to Laos

*2 Removal of premium on all rice exports

Sources: (Farm gate prices) Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture
(Export prices) Bangkok Bank, Monthly Review, 1970-72.

1955-1971 period are by no means fully explicable in terms of any adjustment.[32] Only in 1967 when the severe drought threatened an internal rice shortage did adroit use of the premium take place to lower exports and prevent shortages and steep price rises in the country.

The rice premium was removed from glutinous rice exports to Laos in November 1970 and from all grades of rice in April 1971. In September 1972 the premium was re-imposed on 100% and 5% rice and in June 1973 on all grades of paddy. To date no investigation of the effect of the two year period of trading without the premium has appeared. As may be seen from figure VIII.5, the removal of the premium brought the Bangkok wholesale price into line. The trend in decline of export prices continued after the removal of the premium in April 1971, but Bangkok wholesale prices rose, whereas under the premium they had fallen with the export price. There was also a movement upwards of the North East average farm gate price for glutinous and non-glutinous paddy (Appendix IX.1 and 2). Removal of the premium on glutinous rice in November 1970 appears to have had no effect on the percentage of the F.O.B. price obtained by the farmers (table VIII.3). However the removal of the premium on all other grades in April 1971 resulted in an increase in the percentage of the export price obtained by farmers for both glutinous and non-glutinous rice (table VIII.3), an increase of 9.01% in the farm gate share for glutinous and 9.46% for non-glutinous. For non-glutinous rice the Bangkok wholesale price was 52.89% of the export price for 10% rice before the premium was removed and 82.16% after, an increase of 23.17%; the farm gate price however only increased by 9.46%, suggesting that 13.71% was absorbed by the market chain. It is clear that considerably more investigation of the impact of the premium removal is necessary, but

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32 Ibid., pp.244 and 247.

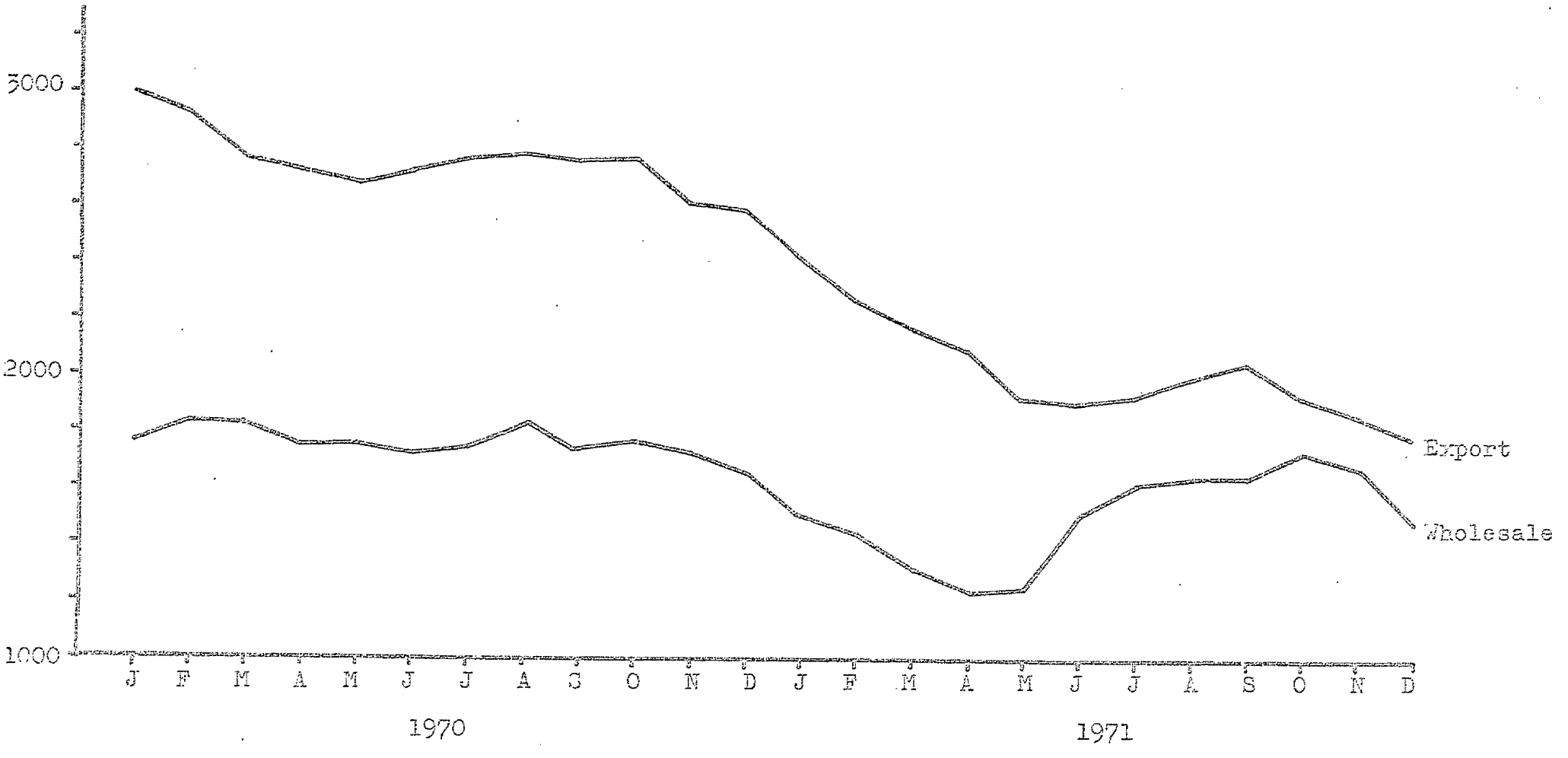

Fig. VIII.5 Export (F.O.B.) and Bangkok Wholesale Prices, ten per cent milled rice (in baht per ton)

Sources: (wholesale) Bank of Thailand, Monthly Reviews, (export) Bangkok Bank Monthly Review

this brief discussion suggests that the farmers did receive an increased share of the export price, contrary to the official government views and in support of the conclusions of Ingram, Prince Sithiporn and virtually all economists who had speculated on the subject prior to 1971.[33]

Seasonal Price Fluctuations

Paddy prices, although affected by the level of international demand and the size of the harvest in any given year show significant seasonal variations.[34] The only study made of seasonal price movements is that by Krisanamis for Bangkok and the Central Plain.[35] In general paddy prices on the Bangkok market fall sharply in the December to February period, with the arrival of the new crop on the market (Appendix IX.4). A general rise occurs through the wet season, with no fresh supplies on the farms. A peak is reached between August and October, that is, in the period before the new rice comes on to the market. A subsidiary period of declining prices can occur around July with the arrival of the second crop on the market. The impact of the second crop varies greatly in this respect in accordance with its volume.

This general pattern is disturbed by the variations in the level of international demand during the year, and the irregular arrival of foreign orders to exporters. The timing of the peaks and dips of the price levels is also influenced by the timing of the harvest.

The very poor rice market conditions of 1970-1 affected the seasonal movements, the seasonal fall continuing until April when the

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33 Prince Sithiporn in his survey of the literature could only find two N.E.D.B. papers that suggested that the farmers would not benefit from the removal of the premium (op.cit., p.59).

34 These are available in the monthly commodity reports of the Bank of Thailand, 1960-73.

35 Krisanamis, op.cit.

TABLE VIII.4

SEASONAL FARM GATE PADDY PRICE DIFFERENTIAL IN THE NORTH EAST

	Month of highest price	Difference between January and highest price (baht per ton)	January Price as a percentage of highest price
GLUTINOUS PADDY			
1967	August	378	68
1968	August	132	88
1969	October	44	95
1970	February[+1]		
1971	October	54	88
NON-GLUTINOUS PADDY			
1967	September	363	70
1968	August	80	92
1969	September	59	94
1970	August	8	99
1971	August	98	86

+1 The highest price was reached in February, thereafter the price fell steadily throughout the rest of the year.

lowest price since 1964 was recorded. The removal of the rice premium on the low grade rice and all grades of glutinous in November 1970 has no apparent effect on price levels, a very steep decline appearing from that month. Removal of the premium on all grades of rice in April 1971 was followed by a steep climb in price levels though how far this was due to the actual removal and how far to seasonal effects awaits fuller investigation. The large second crop in 1969 and 1970 may be noted on the price curves as causing a marked drop in prices, but in 1970 the arrival of a large second crop in July and August compounded the fall generated by the lack of an international market, and accentuated the fall that lasted from August until April 1971.

Farm gate prices in the North East for both glutinous and non-glutinous paddy closely follow the pattern of Bangkok wholesale prices from 1967 to 1971 (Appendix IX.5 and 6). Except for 1970, when prices fell throughout the year, farmers received a better price if they sold in the August-October period than in the months immediately after harvesting. Other than in 1970, farmers retaining paddy through the wet season would expect to achieve a higher level of return. The variation for glutinous paddy was rather higher than for non-glutinous. If 1970 is exluded, gains of 5% to 32% for glutinous paddy and 4% to 30% for non-glutinous paddy might be expected (table VIII.4). Storage loss under village conditions through the wet season may however wipe out the apparent increase in return, as losses over the year of 8% to 12% are considered normal,[36] and the majority of this loss would take place in the wet season. Storage from February to September could therefore be expected to result in a 4% to 6% loss in paddy stored on the farm; this level of loss would remove most of the glutinous price gain for 1969, and

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36 D.H. Grist, "Rice", 3rd edition, 1959, p.29.

TABLE VIII.5

SEASONAL VARIABILITY OF PRICES

	GLUTINOUS PADDY		NON-GLUTINOUS PADDY		KENAF	
	Standard Deviation	% Coefficient of Variability	Standard Deviation	% Coefficient of Variability	Standard Deviation	% Coefficient of Variability
1969	60.3	6.9	72.3	7.6	278.3	15.8
1970	24.8	4.2	92.8	11.2	271.3	16.0
1971	24.2	4.9	57.6	8.7	591.0	31.4
1972	38.9	4.6	124.4	14.6	794.5	31.0

Source: Calculated from data contained in the 'Bank of Thailand Monthly Review', 1969-72.

for non-glutinous in 1968, 1969 and 1970. In the study area farmers do not generally retain non-glutinous paddy for sale in the August to October period because of problems in storing two varieties of rice and because the non-glutinous cannot be used for household consumption. As was examined in chapter V, about half the glutinous paddy surplus is retained for later sale. A number of farmers said they would be able to sell in September when prices were higher, but all were storing mainly against future harvest failure. This contrasts with the findings of Krisanamis in the Central Plain where 30% of farmers retained paddy for sale specifically when the price was higher.[37] This reinforces the view that the North East is a very much less commercially oriented rice producing area than the Central Plain, but it must be stressed that the North East farmers are aware of the possibility of getting a better price by retaining the crop even if they do not in fact keep paddy for that purpose.

Seasonal kenaf prices show more variation than those of paddy at the farm gate, and overall a far less easily defined pattern. Table VIII.5 indicates the coefficients of variability for glutinous rice, non-glutinous rice, and kenaf in changwat Kalasin between 1969 and 1972; it is clear that kenaf has been consistently the most variable on a seasonal basis. The monthly Bangkok wholesale kenaf prices do not show a discernible pattern.

To clarify the seasonal pattern, a three month moving average was used (Appendix IX.7). In 1969-70 a peak of 2 baht a kilogram was reached in July, with the price steadily falling until October. Prices rose again during the period of the paddy harvest, reaching a second and

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37 These findings are based on Bangkok wholesale prices not farm gate. (Krisanamis, op.cit.).

higher peak of 2.10 baht in February. In contrast the 1970-1 crop season revealed a period of high prices in the August-November period with a steady fall from November onwards. For 1971-2, prices rose steadily from August until a peak was reached in October which was followed by a steady fall. 1972 showed a peak in July similar to 1969-70, followed by a slight fall in September and a steady rise to a second peak in December.

Interviews with farmers and middlemen suggested that the highest prices are normally paid in September, with a fall off as the main body of kenaf comes on to the market; in some years of high demand a second peak may develop after the paddy harvest when merchants are seeking kenaf to fulfil orders. It is clear that the price data for the four years 1969-72 only fit this pattern very generally, and for 1969-70 and 1971-2 there is little similarity. Fieldwork and interviews in 1972-3 reinforced the previous statements by farmers and middlemen, indicating differentials of up to 1 baht a kilogram for kenaf between September and October. Farmers considered that an early planting date and consequent early harvest, possibly before flowering and the period of fibre maximisation,was worthwhile in terms of the price differential. Observations in 1973 suggested that the hire of tractors to plough the land earlier had increased and was in some measure a reflection of the particularly large variation between the early and late prices in the previous crop year.[38] Since kenaf is not stored on the farm, as lack of storage space and the rapid deterioration in quality that would take place precludes this, the effects of the seasonal price variation must be in

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38 In September 1972, prices in the Ban Tum and Na Chuak Nua area were as high as 3.70 baht a kilogram, compared to 2 to 2.50 baht in October and November.

TABLE VIII.6

FARM GATE PADDY PRICES AS A PERCENTAGE OF BANGKOK WHOLESALE PRICES (1929-30)

	GLUTINOUS		NON-GLUTINOUS	
REGIONS	1929	1930	1929	1930
North East	35.51	34.38	51.24	60.88
North	50.80	49.53	54.63	64.20
Central Plain	-	-	81.75	83.17
South	-	-	80.22	84.46

	GLUTINOUS		NON-GLUTINOUS	
NORTH EAST CHANGWATS	1929	1930	1929	1930
Ubonratchathani	43.39	39.93		
Khon Kaen	40.45	53.06		
Nongkai	35.48	38.31		
Udornthani	27.79	38.31		
Khon Kaen	42.93	37.24		
Sakonnakorn	27.38	33.24		
Nakorn Phanom	29.60	31.51		
Nakorn Ratchasima			50.13	60.89

Source: C. Zimmerman, 'Siam Rural Economic Survey', 1931, pp.186-93.

the timing of the farm year.[39]

Bangkok wholesale prices and farm gate prices

The generally similar pattern of price movements, both long term and seasonal, exhibited by kenaf and non-glutinous paddy in the Bangkok wholesale market and at the farm level may be noted from figures VIII.2 and 3. Comparison for glutinous paddy is not possible due to the lack of any comparable run of Bangkok wholesale or export prices for the crop.[40] It is clear that there is a considerable differential between the two price levels, made up of transport costs, handling charges and middlemen's profits. Zimmerman's 1929-30 survey suggested that there was considerable regional variation in the proportion of the Bangkok price received by farmers.[41] For the North East, Zimmerman's figures suggest that farmers received on average 50.13% (in 1929) and 60.89% (in 1930) of the Bangkok non-glutinous price, and 35.51% and 34.86% of the Bangkok glutinous price. There was considerable variation within the region itself (table VIII.6), with the more remote changwats of Udornthani and Sakonnakorn receiving respectively only 27.79% and 29.38% of the Bangkok wholesale price for glutinous.

The North East stood out as the region with consistently the lowest proportion of the Bangkok price reaching the farmers. Zimmerman's regional price levels are summarised in table VIII.6; the very large percentage (83.17% in 1930) received by farmers in the Central Plain

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39 For kenaf the price information is less good, being only available for the Kalasin area, as the aggregate figures for the 15 North East changwats are not available.

40 Table VIII.4 suggests, on the basis of a comparison of F.O.B. export prices and farm gate prices, a generally similar percentage was obtained by the North East farmers.

41 Zimmerman, op.cit., pp.181-2.

contrasts with the North East and the North. Zimmerman saw the regional variation in farm gate price as a function of transport costs.[42] This view was reiterated by Silcock in 1966, stressing the importance of a degree of monopsony in reducing the proportion of the Bangkok price received in remoter areas.[43] It is important to stress that the amount of competition in the rice trade was greatest in the 1930's in the most commercially oriented rice growing areas of the Central Plain. The further from Bangkok, the greater the transport costs, the less commercial the rice growing, and the less perfect the market became. Before the large scale development of road transport in the post war period, the Central Plain area, because of its extensive network of waterways, had an advantage over the outer regions of the country in the supply of bulky commodities such as rice to the Bangkok market that was greater than that of simple distance to the capital.

Silcock suggested that in 1966 the proportion of the export price of rice obtained by farmers was probably the same as in 1930, the effects of the transport differential and imperfection of the market being replaced by that of the rice premium.[44] However he does not produce any farm price information to support this, and since Zimmerman's prices were wholesale rather than export the comparison is not entirely meaningful. Usher, also in 1966, working with Bangkok wholesale rice prices, suggested that the North East farmer received 71% of the Bangkok price, the Northern farmer 74%, and the Central Plain farmer 79%. However, Usher used farm gate prices (from an unspecified source) for paddy, and Bangkok wholesale prices for a variety of different grades of

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42 Ibid., p.181.

43 Silcock, 1970, op.cit., p.2.

44 Ibid., p.19. Silcock assumes that Zimmerman's wholesale prices were the same as the export prices at this period.

TABLE VIII, 7

% OF BANGKOK WHOLESALE PADDY PRICES AT SELECTED MARKETS 1960-1970

	NORTH		NORTH EAST		CENTRAL PLAIN	SOUTH
	Chiang Mai	Lampang	Nakorn Ratchasima	Ubon	Nakorn Sawan	Nakorn Si Thammarat
1960	84.5	66.1	83.35	77.1	67.0	74.7
1961	90.9	73.2	91.9	83.4	85.3	79.6
1962	90.4	76.2	94.3	83.6	95.7	85.2
1963	88.4	77.3	94.1	82.6	93.0	82.0
1964	96.2	87.5	93.1	92.3	94.1	84.6
1965	102.4	78.9	87.9	79.9	104.5	93.1
1966	115.7	83.7	97.0	74.9	87.8	79.8
1967	121.5	100.6	97.3	90.9	92.6	90.0
1968	99.6	93.7	99.7	91.7	94.5	101.9
1969	88.6	91.7	93.0	92.3	98.6	81.9
1970	92.0	90.3	88.1	82.3	96.2	92.8
Mean	97.29	75.6	92.7	84.6	91.75	85.96

Source:- Ministry of Agriculture, Division of Marketing.

milled rice.[45] Since paddy is normally purchased at the farm gate in two grades, ('good' and 'ordinary'), and is later graded into three paddy classes, or milled into a wide variety of rice grades which show markedly different price levels,[46] comparison of milled rice of different types and paddy is problematic. With this qualification, and the present lack of a complete coverage of farm gate price levels, Usher's findings may be taken as an indication that the regional differentials have reduced since 1930.[47]

The only source of comparison of price levels on a national scale is the average wholesale paddy price prevailing at selected changwat centres, collected by the Ministry of Agriculture. There is considerable variation (table VIII.7), but Nakorn Ratchasima, in the North East, with an average of 92.7% of the Bangkok price between 1960 and 1970 is comparable to Nakorn Sawan in the Central Plain. The more remote nature of Ubonratchathani, despite its rail link, explains its average of 84.6% of the Bangkok price.

When a comparison is made of the Ministry of Agriculture aggregate non-glutinous farm prices for the North East and the average wholesale price of paddy in Bangkok for the period 1967-72, during the whole of the period the percentage never fell below 70% and averaged 87.17% (Appendix IX.8).[48] The weakness of the data used, which has been noted, must be borne in mind, as must the possibility of farm and Bangkok

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45 100% non-glutinous for the Central Plain, 5% long grain glutinous for the North, and 10% long grain glutinous for the North East. (Usher, op.cit., p.222).

46 For the period 1960-67, 100% rice was generally 10% above 10% rice, and 5% rice 8% below.

47 Regional farm gate price information is not at present available in a useable form.

48 The average non-glutinous paddy farm gate prices in the North East for the four years from 1969 to 1972 as a percentage of the Bangkok wholesale prices were 93.13%, 80.65%, 78.35% and 81.03%.

prices being out of step. In August 1968 the farm price was 100% of the Bangkok price; the fall in prices of 20 baht a ton in Bangkok was not registered in the North East farm prices. Since little rice is sold in August, North East farm gate prices must be somewhat speculative. For the period 1969-72, price details for Kalasin province suggest a similar, though slightly lower, percentage of the Bangkok wholesale price. This lower figure may well stem from the fact that Kalasin is not a large producer of non-glutinous, and is further from the Bangkok market than the main North East non-glutinous producing changwats.[49] From 1969-72 Kalasin non-glutinous prices averaged 91.91% - 97.26% of the North East average annual farm gate price.

The overall farm price level for non-glutinous (only available for 1971) suggests that in the kingdom as a whole, farmers were paid 81% of the Bangkok paddy price, slightly more than the North East average of 78.35% and Kalasin's of 71.45%.[50]

For kenaf, the farm price data has not been aggregated by region and is only available for certain changwats. The annual averages of the percentage of the Bangkok wholesale price in the changwat were 66.04%, 68.98%, 64.65% and 60.5% from 1969-72. The overall Ministry of Agrciulture farm gate/Bangkok price relationship averages 77% for 1971.[51] Kalasin farm gate prices are 83.25% of the national average (in effect the North East average, since 96% to 98% of the crop is in this region), a

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49 It is probable that for many North East changwats the non-glutinous price returns are limited or even non-existent due to the small quantity of the crop grown.

50 The average non-glutinous paddy farm gate prices in Kalasin as a percentage of Bangkok wholesale prices for the four years 1969-72 were 82.6%, 76.42%, 71.45% and 77.44%. (Ministry of Agriculture, Commodity Prices, 1972).

51 Sholton considered that the farmers received 67.7% in the 1963-4 crop season. (op.cit., p.368).

reflection of distance and lack of large regional merchant facilities in the town itself, which results in all the fibre being carried to Khon Kaen for regrading and baling.

Kalasin farmers received 83% to 92.57% of the national (in effect, North East) average farm gate price, which suggests that the 100 kilometre separation from the major collecting centres at Khon Kaen and Ban Phai on the main North East-Bangkok trade artery results in a reduction in price levels by 11% to 16%, compared to the regional average.

Kenaf farmers receive a markedly lower proportion of the Bangkok wholesale price than do paddy producers. For neither commodity is any processing involved, though both crops are graded as they move along the market chain. Paddy is re-bagged and kenaf bundles are opened, the fibre sorted and rebaled; although rebaling kenaf is more complex than grading and re-bagging rice, neither operation can be classed as processing. The next section examines the composition of the differential between the farm and the Bangkok wholesale price.

Factors in the Price Differential

A proportion of the Bangkok wholesale and North East farm difference in price is made up of the transport cost. Details of these costs are difficult to obtain, in view of the increasing tendency for rice merchants and millers to use their own trucks. Quoted truck transport rates vary greatly from firm to firm, and from commodity to commodity. The most recent comprehensive information is for 1968. A rate of 55 baht a ton was charged by the E.T.O. for rice carried from Ban Phai to Bangkok, and 60 baht a ton between Khon Kaen and Bangkok. In the same period the kenaf rates were 50 and 40 baht respectively (table VIII.8). There are no comparable figures for Kalasin, but the

TABLE VIII.8

EXPRESS TRANSPORT ORGANISATION (E.T.O.) FREIGHT RATES

From	To	Commodity	Date	Cost per truck[+1]	Cost per ton[+2]	Cost per ton[+3]
Khon Kaen	Bangkok	Kenaf	November 1968	500	50	38.5
"	"	Rice	March 1969	550	55	42.3
"	"	Rice	" "	600	60	46.2
Ban Phai	"	Kenaf	October 1968	400	40	30.1
"	"	Kenaf	November 1968	500	50	38.5
"	"	Rice	December 1968	550	55	42.3

+1 These figures are for trucks licensed to carry 9,900 kilograms.

+2 Assuming a load of 10,000 kilograms per truck.

+3 Assuming a load of 13,000 kilograms (the average load found from an examination of weigh bridges.

Source: W. Smith/Lyon Associates, "Thailand Transportation Coordination Study", 1970, vol.I, pp.360-2 and vol.II, p.261.

TABLE VIII.9

PRIVATE FREIGHT RATES

From	To	Distance (kilometres)	Cost per ton[+1]	Cost per ton[+2]	% increase on the Khon Kaen-Bangkok cost
Khon Kaen	Bangkok	484	1100	1500	-
Yangtalad	"	541	1500	1800	12.7
Kalasin	"	553	1700	1900	38.5
Komalasai	"	565	1700	1900	38.5

Source: Wilbur Smith Associates, "Thailand Transport Coordination Study", 1970, Vol.I, Appendix 7C, p.7, C5.

+1 Assuming 10,000 kilograms per truck.

+2 Assuming 13,000 kilograms per truck.

private trucking price levels survey in 1968-9 for general commodities (table VIII.9) suggests a sharp rise in costs for places off the main route. If these figures are correct, the changwats located away from the main artery (Nakorn Ratchasima-Khon Kaen-Udornthani-Nongkai) are at a serious disadvantage. Availability of more comprehensive farm gate price data should make possible an analysis of the effect of such transport differences on the proportion of the farm gate prices obtained by farmers.

The sharp rise in costs beyond Yangtalad (table VIII.9) may well reflect its importance as a junction point with traffic passing from Khon Kaen to Kalasin or to Mahasarakarm.

Interviews with millers in Khon Kaen in 1971-2 indicated that they were sending increasingly smaller amounts of rice by rail. Information for 1968-9 confirmed this, suggesting that 20% of the rice moving from the North East region went by rail and 80% by road. The greater flexibility of road transport offsets the generally lower rail costs. Comparative rail/road transport costs are difficult to obtain, but the Transport Coordination Study (1969) gave rail costs from Bangkok to Khon Kaen as 15% below road.[52]

Assuming that the private trucking rate percentage increases shown in table VIII.9 apply to the E.T.O. paddy and kenaf movements, kenaf would cost 61.22 baht per ton and paddy 53.27 baht to transport from Kalasin to Bangkok. The difference between Bangkok and Kalasin prices for 1969, being the nearest year to the trucking figures (December 1968) was 193.8 baht for non-glutinous paddy and 916.3 baht for kenaf.[53] For paddy, 31.6% of the difference is accounted for by the transport

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52 W. Smith/Lyon Associates, "Thailand Transport Co-ordination Study", 1971, vol.II, p.260-1.

53 In 1970, 1971 and 1972 the differentials were respectively 246.5, 247.7 and 134.3 baht for non-glutinous and 816.2 and 1019.3 baht for kenaf (1972 figures not available for kenaf).

costs, but for kenaf only 5.9% (1969). Thus not only do kenaf farmers receive a lower percentage of the Bangkok wholesale price, but a larger percentage of the difference is absorbed by the market chain in the form of regrading, rebaling and middlemen's profits.

Examination of changwat wholesale prices suggests that for glutinous paddy there is a 28.1% increase on the farm gate price, for non-glutinous 24%, and for kenaf only 6.6%. Usher found that average middlemen's expenses in purchasing, transporting and reselling paddy to millers and changwat merchants was 46 baht a khwien, and the profit margin 10 baht.[54] Using Usher's figures, Ministry of Agriculture changwat wholesale prices, and the transport rates current in 1969, it is possible to produce some rough allocation of the difference between Bangkok and Kalasin. This assumes that Usher's 1968 costs and 1968 transport costs were at a comparable level in 1971. Of the 248 baht difference between the Kalasin farm gate price for non-glutinous paddy and the Bangkok wholesale price in 1971, middlemen's expenses and profits accounted for 22.6%, those of the Kalasin wholesaler 32.3%, Kalasin to Bangkok transport 24.7% and the expenses and profits of the Bangkok wholesaler 10.4%.

There is a lack of information on kenaf middlemen's expenses and profits, but in 1971 farmers received 64.99% of the Bangkok wholesale price, transport costs accounted for 1.8% and the farm gate/provincial wholesale price 5.1%; in terms of the farm gate/Bangkok price differential, 14.7% was absorbed between the farm and the provincial market and 5.22% by transport, leaving 80.8% for costs (excluding transport) between the changwat and Bangkok, in regrading, baling and

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54 Usher, op.cit., p.210.

profits.[55]

Variations in the Price Obtained by Farmers

The general level of prices prevailing in any one year is a result of the working out of the level of production and demand, modified by the operation of the rice premium, seasonal variations in the rice supply, and, particularly for glutinous rice, the local supply. However it is clear from the Lam Pao data (tables VIII.10 and IX.9 and 10) that there is no uniform price obtained by farmers for kenaf or rice.

In chapters V and VII the differences in timing, direction and channel of sales for both paddy and kenaf were examined; similarly in chapter IV the differences in paddy varieties, both glutinous and non-glutinous, were noted. Here the significance of these differences in explaining variation in the price levels obtained will be examined.

There is some variation in the average prices of the three crops between the seven villages studied in the Lam Pao area (table VIII.10), which are more marked for paddy than for kenaf, suggesting that inter-village differences are less important for the fibre. Regrouping the villages in terms of proximity to Kalasin town[56] produced differences significant at the 99.9% level for paddy, implying that the two distant southern villages and the three villages close to the town received significantly higher prices than the two in the northern group. Similar regrouping for kenaf produces differences not statistically significant

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55 The difference of 1020 baht a ton between the Bangkok wholesale and farm gate prices is made up as follows:
Bangkok wholesale price: 2912.30 baht
Provincial wholesale price: 2420 baht
transport: 53.27 baht
farm gate price: 1892.87 baht.

56 Na Chuak Nua and Ban Tum; Non Sung and Lao Yai; Ban Lek, Fai Taek and Um Mao.

TABLE VIII.10

VILLAGE PRICE MEANS 1971-2 (Baht per kilogram)

	Glutinous Paddy	Non-glutinous Paddy	Kenaf
Na Chuak Nua	0.57	0.63	2.21
Ban Tum	0.65	0.55	2.17
Um Mao	0.62	0.65	1.91
Fai Taek	0.60	0.45	2.40
Ban Lek	0.69	0.60	2.19
Non Sung	0.68	0.64	1.93
Lao Yai		0.70	2.05
Lam Pao Area	0.64	0.63	2.14

There are inter-village differences for non-glutinous and glutinous paddy significant at the 98.0% level and differences for kenaf significant at the 90.0% level (from chi square test).

TABLE VIII.11

THE COSTS OF A FARMER IN UM MAO IN SELLING 1000 KILOGRAMS OF PADDY TO A RICE MILL IN KALASIN TOWN (1972)

Visit to Kalasin to arrange the sale and collect 14 sacks ..... 4 baht

Visit to Kalasin to deliver paddy and collect payment ..... 4 baht

Transport of paddy at 2 baht a sack ..... 28 baht

TOTAL 36 baht

INCOME from selling 1000 kilograms in the village ..... 603.20 baht

INCOME from selling 1000 kilograms to the mill ..... 655.50 baht

GROSS GAIN 52.30 baht

NET GAIN 16.30 baht

(chi square 90% level), again suggesting less variation for the crop.

Particularly striking is the low glutinous price in Na Chuak Nua, the lowest of any of the seven villages. That this low price is not merely a function of the village's distance from Kalasin (31.5 km.) is shown by the high price in Non Sung (37.0 km.) and Lao Yai (43.0 km.). As noted in chapter IV, Na Chuak Nua has the lowest percentage of paddy land planted to the improved varieties. Interviews with the millers indicated that a premium was paid for certain strains, Sanphatong (glutinous), Lueang Yai 11 (non-glutinous), and Khaw Dok Mali (non-glutinous); the existence of a price differential between 'ordinary' paddy and certain improved types was confirmed from the Ministry of Agriculture Farm Gate Price Data and those collected by the Department of Agricultural Extension. Overall, millers were offering a premium of 6.6% in the years 1967-72 for improved glutinous and 8.14% for improved non-glutinous. While it is likely that the existence of these price differentials affects the price received, it is not clear whether small merchants operating in villages always give the full benefit to the farmers, particularly where relatively few are growing the new strains. In some instances reducing or ignoring the price differential may be used to increase the middlemen's profits.

Further interviews with millers and merchants in Kalasin and Yangtalad indicated that certain areas of the changwat were regarded as major sources of paddy, for example Komalasai, and were consequently visited by a large number of merchants, while others, for example Sahatskan in the north, were not seen as important areas of surplus paddy and were visited by few merchants. Non Sung and Lao Yai are in an area considered to have high grade glutinous and non-glutinous paddy. Na Chuak Nua, in contrast, is on the edge of the Sahatskan area where the

paddy surplus is small, less reliable, and generally low grade glutinous. The degree of competition present is likely to reflect the reputation of the area as a surplus rice producer, thus areas with a poor standing in the eyes of the merchants are likely to receive lower prices because fewer come to buy.

The tendency for farmers in the villages close to Kalasin town to sell outside the village was noted in chapter VII. For non-glutinous and glutinous paddy (Appendix IX.11 and 12), the difference between sales inside and outside the village is significant at the 98% level (chi square), but for kenaf is not significant (Appendix IX.13). For glutinous, an overall mean price differential of 52.33 baht a ton is paid for sales in the village and sales in Kalasin town. However, as may be seen from the example given in table VIII.11 for Um Mao, the net profit after transport and expenses have been deducted is small. Given the prevailing transport costs within the study area and the time and difficulty involved in arranging sales, there is a gain of only 2.7% from the sales overall, even in a village as close to Kalasin as Um Mao, while from Non Sung and Lao Yai, the cost at 5 baht a sack could be prohibitive. In 1970-1, with the very poor market for rice, farmers were experiencing great difficulty in selling rice at any price, and they were willing to arrange sales outside the village, even from Na Chuak Nua. In that village, a group of farmers hired a truck to transport their paddy to the mill for sale.

The findings of the price survey conflict with statements by Kalasin millers that they do not pay a lower price when they purchase in the villages. However it seems clear that the farmers generally receive a lower price, possibly because the millers' agents adjust village prices and reduce the price paid to the farmer. Sales within the village to neighbours fetched an average price of 58.5 baht, to a village

merchant 62.27 baht, and to an outside merchant 66.32 baht. Sale to the Kalasin rice mills produced a mean price level only marginally above that obtained by sale in the village, and below that from sale to merchants outside. A similar pattern is observed for non-glutinous rice, but for kenaf there is no such pattern.

The Lam Pao sample of rice and kenaf sellers is too small to establish a monthly pattern, and no significant differences were found between the months of sale that could be used to test the seasonal pattern indicated by the Ministry of Agriculture Farm Gate Survey.

The size of the individual sale appears to influence the price level for kenaf and non-glutinous, but not glutinous, paddy. Sales of over 300 kilograms of kenaf and 500 kilograms of non-glutinous rice fetched a significantly higher price than sales of less (chi square, at the 99.9% level). The smaller size and lower incidence of kenaf and non-glutinous production results in merchants dealing with a larger number of farmers than would be the case for glutinous rice, and the task of contacting the farmers is therefore greater, so that the merchants pay a premium for larger quantities.

Kenaf in general exhibits little significant variation in price between villages, channel of sale, or location of sale; only the volume sold gives any real differentiation. In contrast both types of paddy show significant variations between villages, and location of sale, and only the less important non-glutinous variety shows variation due to the size of the sale. Unlike kenaf, both types of rice have different prices paid for quality, giving an incentive to the production of certain types. For all three crops there is no significant difference in the prices received by farmers from different channels of sale, other than those, already noted, connected with location (Appendix IX.14-16).

Price Incentives for Quality

In both kenaf and rice, the stages of the market chain are characterised by increasingly complex grading and subdivision of the product. Paddy is generally purchased at the farm level at two prices, ordinary and best grades, the best grade normally representing a higher price paid for named improved varieties. For glutinous the variety most sought by merchants in Sanphatong, while for non-glutinous Khaw Dok Mali and Lueang Yai 11 are particularly valued. At the changwat level, the paddy is usually graded into I and II, although occasionally a 'special' grade will be distinguished.[57] In Bangkok, special, I, II and III are normally quoted for the wholesale and export markets. Rice merchants and millers interviewed in Kalasin town were able to name the varieties for which they gave a higher price, similarly both the Department of Agricultural Extension changwat price survey indicated the level of differentiation between 'ordinary' and 'best grade' paid by changwat purchasing agencies. Farmers in general are well aware of the premium placed on the 'best' paddy, but it is by no means certain that when they sell to the village merchants and middlemen who resell to the millers they receive the full benefit of the premium.

Kenaf is purchased at the village level as a virtually homogeneous commodity; farmers seem to have little idea of qualitative differences in the crop.[58] Only one farmer interviewed in 1971 stated

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57 Ministry of Agriculture, Commodity Prices, (in Thai), 1972.

58 Chuchart et al. asked farmers to grade their kenaf into A, B and C and concluded that farmers' ideas varied. The lack of any real terms of reference for the farmer and his fairly recent contact with the crop make it difficult for him to grade his crop on anything approaching a comparable basis. The study concluded that "farmers mainly sell their kenaf as 'mixed' graded". ("An Economic Study of the Production and Marketing of Thai Kenaf", A.S.R.C.T., 1967, pp.12 and 34).

that his kenaf fetched a low price because it was poor. Merchants are likely to make rough adjustments for quality, though this is as much for the amount of mud and stones bundled with the kenaf to increase the weight as for fibre quality. Small provincial centres such as Kalasin have merchants who either sort into 'good' and 'less good' fibre for re-sale to the large buyers in Khon Kaen, or in some cases merely re-sell the fibre in the form it was purchased. None of the Kalasin merchants went in for the complete grading into super, A, B, C and cuttings, as was undertaken by the large buyers in Khon Kaen. The majority of kenaf is fully regraded at major North East collection centres (such as Khon Kaen or Nakorn Ratchasima), before forwarding to the Thai Gunny Sack factories or the Bangkok wholesalers and exporters; relatively little is sent to Bangkok in an ungraded or partially graded condition. This contrasts with paddy, which is only fully graded when it reaches the Bangkok market.

At the farm level, the non-glutinous price differential varied from 45.27 to 75.20 baht a ton from 1969-72, averaging 8.14% (table VIII. 12). During the same period the glutinous differential varied from 2.29 to 70.63 baht a ton, averaging 6.60%. The very low differential of 2.29 baht (less than 0.5%) in 1971 was a reflection of the lack of market for glutinous of any sort, and the large differential of 71.40 baht (12.22%) for non-glutinous suggests that merchants were only prepared to purchase high grade rice, and that at a price which, compared with other years, was very low indeed. In essence the differential in 1971 was a result of there only being a market for high grade, non-glutinous paddy.

The Department of Agricultural Extension survey suggested differentials in January-June 1972 in Kalasin town itself of 80 baht (10.5%) for glutinous, and 56.30 baht (7.7%) for non-glutinous, which compares favourably with the 1972 differentials in table VIII.12.

TABLE VIII.12

NORTH EAST FARM GATE PRICE DIFFERENTIAL FOR FIRST GRADE AND ORDINARY PADDY

Non-glutinous paddy

	First grade	Ordinary	% differential
1969	950.05	875.06	8.62
1970	822.03	776.76	5.82
1971	655.66	584.12	12.22
1972	851.96	776.94	9.67
	819.93	753.22	8.14

Glutinous paddy

	First grade	Ordinary	% differential
1969	866.14	803.73	7.73
1970	585.42	538.38	8.73
1971	485.84	483.55	0.47
1972	828.18	757.55	9.32
	691.40	645.80	6.60

Source: Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture.

TABLE VIII.13

% EXPORT OF KENAF FIBRE BY GRADE 1965 and 1966

Grade	1965	1966
Super	0.15	0.38
A	30.78	38.07
B	34.34	33.81
C	34.73	27.34

Source: Ministry of Economic Affairs, quoted by C. Chuchart et al., "An Economic Study of the Production and Marketing of Thai Kenaf", A.S.R.C.T., 1967.

Fig. VIII.6 Farm Gate Prices of First Grade Paddy, Changwat Kalasin, 1969-72

Source: Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture

However, there was also a range of price levels even within the grades, normally of the order 20 to 50 baht a ton.[59]

The differentials between rice types are well known to farmers and it is clear that the success met by the Extension Department and Rice Department over the last ten years in introducing improved varieties has owed much to the price premium. In this context the failure of the improved glutinous variety Kam pai to spread may be seen in terms of the general reluctance to purchase it expressed by rice millers. The long-even sized grains of Sanphatong, plus its good eating qualities, make it highly desirable as a rice for milling and for disposal on the wholesale and export markets. Kam pai, producing large and less elongated grains, is considered less desirable for milling and sale. Farmers spoke of the poorer eating qualities of Kam pai, which, although less important for the commercial export market, has clearly been a factor in its lack of success.[60]

In the Bangkok wholesale market, the two grades of paddy become four. The price levels and differentials for the years 1960-72 are given in figure VIII.7; special grade has been priced 23.3% above grade III, grade I 8.25% above grade III, and grade II 2.38% above. Without information on the proportions of various grades obtained from paddy purchased at the two farm gate prices, it is not possible to determine the additional profit made by subdividing paddy into more grades. Nevertheless the amount of special grade is very limited, which

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59 Department of Agricultural Extension, weekly price levels, Jan-June 1972.

60 In this context, R.D.I., a non-glutinous variety, is said to be inferior in flavour to local varieties, but commands high prices in many parts of the Central Plain because the even long grains mill well, that is, a small percentage of broken grains are produced, and it sells well on the export market.

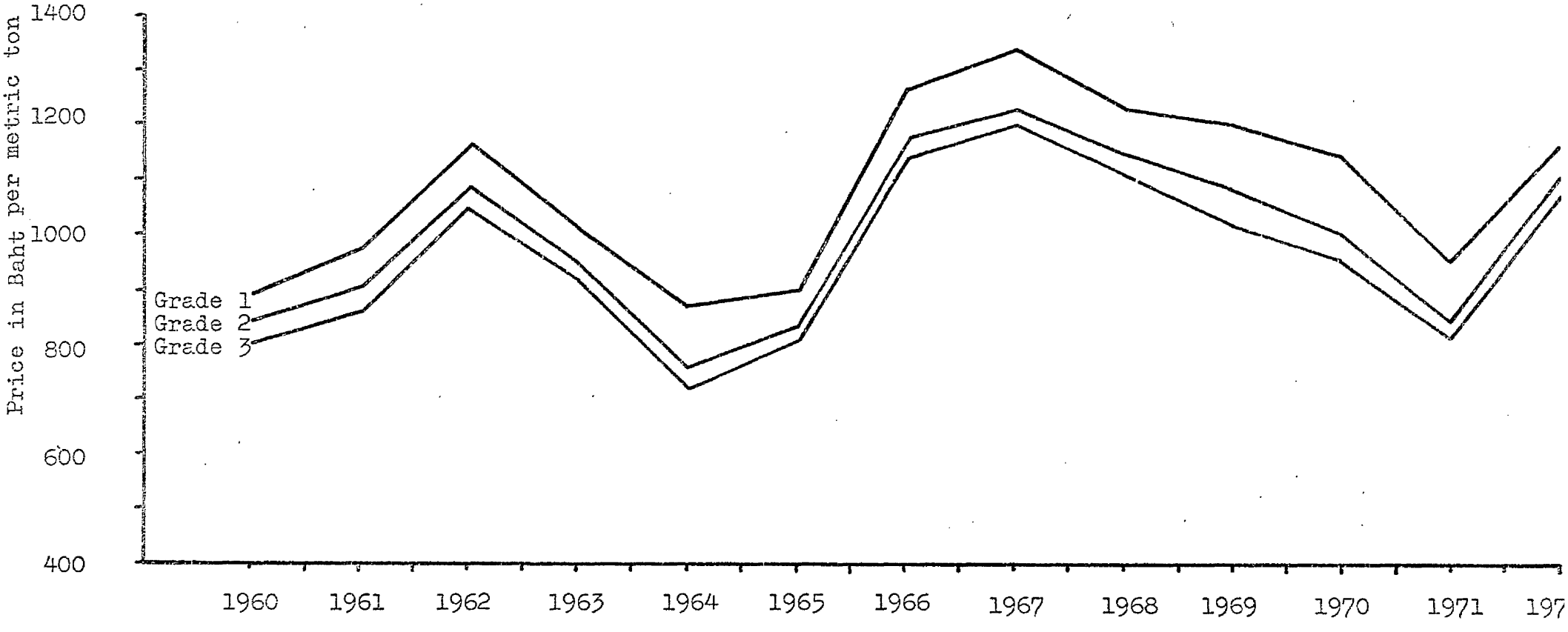

Fig. VIII.7 The Differential Paddy Prices for Grades 1, 2 and 3 (1960-72)

Source: Bank of Thailand Monthly Reviews, 1960-72

TABLE VIII.14

% GRADED FIBRE PRODUCED FROM UNGRADED FIBRE (1966)

	Nakorn Ratchasima	Udornthani	Udornthani	Mean
Super	1	-	5	2.00
A	30	20	50	33.33
B	30	40	30	33.33
C	30	20	10	20.00
Cuttings	-	15	5	6.66
Loss	9	5	-	5.00

Source: E.J. Sholton, "Kenaf in Thailand", 1968.

This is based on interviews with three graders and is their estimates of the amount of each grade produced from ungraded fibre.

TABLE VIII.15

MIDDLEMEN'S SELLING PRICES FOR GRADED FIBRE 1966-8 (baht per kilo)

1966

	Nakorn Ratchasima	Udornthani	Udornthani	Mean	% Difference
Super	3.85	-	-	3.85	
A	3.50	3.60	3.70	3.60	6.94
B	3.20	3.20	3.20	3.20	36.80
C	2.60	2.50	2.50	2.53	2.60
Cuttings	-	1.80	1.90	1.85	3.60

Grade A/C Difference = 42.29

1967

	Nakorn Ratchasima	Udornthani	Mean	% Difference	
Super	2.70	2.50	2.60		
A	2.30	2.00	2.15	20.93	
B	1.90	1.40	1.65	30.30	
C	1.30	0.95	1.13	46.01	Grade A/C
Cuttings	-	0.65	0.65	73.48	Difference =
					90.26%

1968

	Nakorn Ratchasima	Udornthani	Mean	% Difference	
Super	2.05	2.00	2.02		
A	1.60	1.80	1.70	18.82	
B	1.10	1.40	1.25	40.00	
C	0.75	0.85	0.80	56.25	Grade A/C
Cuttings	0.55	0.55	0.55	63.63	Difference =
					113.5%

Source: E.J. Sholton, "Kenaf in Thailand", 1968.

is why its price is not always quoted, and the variation of 8.25% between the three grades compares favourably with the farm gate variation of 8.14% between the two grades, which suggests that merchants do not derive any substantial benefit from the increase in the number of grades.

The purchasing of kenaf at a single price offers no incentive comparable to that in the rice market for the production of higher quality fibre.[61] Although four grades are recognised, in practice the majority of the kenaf is graded in A, B and C, with relatively small amounts in the super grade,[62] or tangle and cuttings. The proportions indicated in table VIII.13 are of the same order as the proportions quoted by merchants as being derived from the ungraded fibre purchased by farmers (table VIII.14).

Table VIII.15 indicates the considerable range in selling prices of kenaf purchased as 'mixed grade' by dealers and regraded for sale to gunny sack factories and Bangkok exporters. The range between the regraded prices appears to have varied with the overall price level; in 1966, a year of high prices, the difference between A and C grades was only 42.29%; in 1967 and 1968, years of low demand, the difference reached 90.26% and 113.5%. In years of low demand and plentiful supply, exporters are reluctant to buy anything but the best grades, and in years of high demand almost any quality will be acceptable and the price differential is reduced. Sholton's survey is by no means fully satisfactory on purchasing and selling prices for mixed and graded fibre by merchants.[63] In 1966 his figures suggested that merchants purchased

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61 Price variations of 0.20 baht during the buying season 1967-8 in changwat Nakorn Ratchasima, with the prices from 1.80 to 2.00 baht, were dependent on quality and variation in the Bangkok wholesale price, according to merchants in 1968. (Sholton, op.cit., p.32).

62 Only 0.38% of exports in 1967 were of this grade.

63 One of Sholton's cases would produce a loss if the purchase and selling price quoted are correct. (op.cit., p.345).

TABLE VIII, 16

GROSS PROFIT OF A KHON KAEN MIDDLEMAN ON GRADING AND RE-SALE OF 1,000 KILOGRAMS OF KENAF FIBRE IN 1966

Cost of purchase of 1000 "mixed" fibre at 2.53 baht per kilogram	=	2530 baht
Re-sale of 10 kilograms of 'Super' Grade at 3.85 baht per kilogram	=	38.5
Re-sale of 300 kilograms of 'A' Grade at 3.60 baht per kilogram	=	1080.0
Re-sale of 300 kilograms of 'B' Grade at 3.20 baht per kilogram	=	960.0
Re-sale of 300 kilograms of 'C' Grade at 2.53 baht per kilogram	=	759.0
Re-sale of 90 kilograms of 'Cuttings' at 1.85 baht per kilogram	=	166.5
Total Return		3004.0
Gross Profit		474.0
% Gross Profit		18.73

Source: E. J. Sholton, "Kenaf in Thailand", 1968.

at the grade C price, breaking even on sales of this grade, and making a profit on sales in better grades.[64] However in 1967 and 1968 purchasing prices were closer to the grade B price.[65] This would seriously reduce the profit level if the proportion of fibre regraded was the same inthese years as indicated in tables VIII.14 and 15. Merchants are likely to be very much more selective in their purchase of fibre in years of low demand and the proportion of higher grade fibre bought would be higher. On the basis of the 1966 figures, the gain on purchasing 1,000 kilograms of mixed fibre and regrading would be 474 baht, or a gross return of 18.73%. (table VIII.16). Interviews with merchants indicated that in years of low demand their profit margin might be reduced, particularly if prices fell rapidly during the year as the harvest came onto the market, and merchants could find they had purchased at too high a price in September, so that after regrading the price fall had reduced the margin, but the making of a loss under these conditions would be extremely unlikely.

The variable price differentials indicated in table VIII.15 are not apparent for the Bangkok wholesale market (figure VIII.8 and table VIII.17). For the period 1959-71 the percentage differentials between A, B and C grades of kenaf fibre are very consistent indeed, only in 1964 and 1971 is there any change in the differentials, and these do not appear to be related to any 'low' or 'high' in the pattern of price movements. Quotations for kenaf on the Bangkok wholesale market tend to be made only for 'high grade fibre';[66] in consequence the graded prices may well have been compiled from a very limited number of quotations.[67]

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64 2.50 to 2.60 baht a kilogram purchasing price of mixed fibre.

65 1.35 to 1.85 a kilogram.

66 See for example Bank of Thailand Monthly Review.

67 These are taken from the Bangkok Bank Monthly Review.

Fig. VIII.8 Bangkok Wholesale Prices of Kenaf, 1959-71 (Grades A, B and C)

Source: Bangkok Bank Monthly Reviews, 1959-71

TABLE VIII.17

% DIFFERENCES BETWEEN BANGKOK WHOLESALE PRICE OF GRADES A, B AND C KENAF FIBRE

	B/C Differential	A/B Differential	A/C Differential
1959	19.41	10.71	32.20
1960	19.40	10.71	32.20
1961	19.41	10.71	32.20
1962	19.40	10.71	32.20
1963	19.40	10.73	32.20
1964	15.36	10.71	27.72
1965	19.41	10.31	32.20
1966	19.41	10.71	32.20
1967	19.41	10.71	32.20
1968	19.41	10.71	32.20
1969	19.41	10.71	32.20
1970	19.40	9.90	31.22
1971	22.78	10.54	35.74
MEAN	19.36	10.61	32.05

Source: Calculated from monthly kenaf fibre prices contained in the Bangkok Bank Review 1970-1972.

Glutinous and Non-glutinous Price Differentials

As may be seen from figure VIII.6, the differential between glutinous and non-glutinous rice in the 1967-9 period was slight, varying between 4.64 and 15.73% (table VIII.18). The general opinion of farmers, merchants, millers and agricultural officers was that the price differential between the two types has not been greater than the 1967-8 amount for the last 10 to 15 years. There had, prior to 1970, been only a relatively slight incentive for farmers to plant their surplus paddy land to non-glutinous, but the very poor market for rice in 1970-1 which was particularly severe for glutinous varieties and resulted in a drying up of the export market, in view of the good harvests in the North and the North East regions, created price differentials of 32.71% (1970) and 31.15% (1971).

During the 1970-1 crop season, many farmers experienced great difficulty in selling at any price, and many others were reluctant to sell unless forced to by pressing cash needs. The ineffective operation of the government guaranteed purchasing price and quota system, together with the very low price offered under the scheme did little to alleviate the situation. It is important to stress that while paddy farmers in general suffered badly in 1970 and 1971, those producing glutinous rice, even if of very high quality, suffered to a greater extent. The farmers that came best out of the year were those disposing of surplus high grade non-glutinous and those producing only rice for their subsistence needs, and obtaining cash income from other crops such as kenaf, or off-farm sources.

The farmers' reaction to these conditions was to transfer land that they considered surplus from glutinous to non-glutinous rice. In the Lam Pao sample surveys for 1970-land 1971-2 this land use change

TABLE VIII.18(a)

GLUTINOUS/NON-GLUTINOUS PADDY FARM GATE PRICE FOR THE NORTH EAST

1967-1972 (Baht per ton)

	Glutinous	Non-Glutinous	Differential	% Differential
1967	1015.32	1062.45	47.13	4.64
1968	1020.29	1119.08	98.79	9.68
1969	826.29	956.42	130.0	15.73
1970	627.27	832.42	205.15	32.71
1971	517.0	680.0	163.0	31.15
1972	708.7	756.4	47.7	6.73

TABLE VIII.18(b)

GLUTINOUS/NON-GLUTINOUS PADDY FARM GATE PRICE FOR KALASIN CHANGWAT

1969-1972 (Baht per ton)

	First Grade Glutinous	First Grade Non-Glutinous	Differential	% Differential
1969	866.14	950.05	83.91	9.68
1970	585.42	822.03	236.61	40.41
1971	485.84	655.66	169.19	34.82
1972	828.18	851.99	23.81	2.87

	Ordinary Glutinous	Ordinary Non-Glutinous	Differential	% Differential
1969	803.73	875.06	71.33	8.87
1970	538.38	776.76	238.38	44.27
1971	483.55	584.12	100.57	20.79
1972	757.55	776.94	19.39	2.55

Source : Ministry of Agriculture, Department of Agricultural Economics, Division of Marketing.

was reflected in an increase from 2.2% of paddy land planted to non-glutinous to 8.26%. These changes were most apparent in the villages of Um Mao and Non Sung with their heavier dependence on rice production as a source of income (table IV.7). One farmer in Non Sung planted his entire paddy holding to non-glutinous rice in the hope of profiting from selling non-glutinous and buying glutinous for household needs; a second farmer in the village planted the majority of his holding to non-glutinous, planting enough glutinous to meet only part of his household requirements, again hoping to profit on the price differentials between the two varieties.

The Lam Pao pattern was typical of the North East region as a whole, with large areas of land passing from glutinous to non-glutinous rice in the 1971-2 season. Within the North East, the overall change resulted in an estimated decline in glutinous rice production of 40% in 1971-2 compared to the previous year, and it was feared that there would be insufficient glutinous rice to meet export demands, which had returned to normal.[68] From February 1972 the price of glutinous rice began to rise on the Bangkok wholesale market at a time when other rice and paddy prices were falling in accordance with the normal seasonal pattern.[69]

As may be seen from figure VIII.6 and table VIII.18, the reduction in glutinous production resulted in a closing of the non-glutinous/glutinous price differential and in some instances a reversal of the position, with farmers obtaining higher prices for the glutinous types. Many farmers who responded to the adverse market conditions of 1970-1 lost by doing so; it will be interesting to see the reactions of

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68 Bank of Thailand Monthly Review, March 1972.

69 Ibid.

TABLE VIII.19

THE RELATIVE PRODUCTIVITY OF CROPS 1970-1

(a) PRODUCTIVITY OF LABOUR (Baht per man-day)

	Glutinous paddy	Non-glutinous paddy	Kenaf
Na Chuak Nua	16.3	14.0	18.0
Ban Tum	11.4	16.0	31.7
Um Mao	14.4	14.9	27.0
Fai Taek	15.5	22.4	20.5
Ban Lek	11.8	18.4	30.9
Non Sung	21.6	21.7	13.6
Lao Yai	19.2	12.2	10.7
Lam Pao Area	15.0	17.0	25.3

(b) PRODUCTIVITY OF LAND (Baht per rai)

	Glutinous paddy	Non-glutinous paddy	Kenaf
Na Chuak Nua	125.4	107.0	204.2
Ban Tum	88.8	240.0	422.2
Um Mao	114.2	167.5	254.9
Fai Taek	156.6	143.6	329.5
Ban Lek	119.1	176.3	306.7
Non Sung	172.0	242.7	156.5
Lao Yai	212.4	109.1	167.2
Lam Pao Area	127.7	167.2	313.1

(c) PRODUCTIVITY OF CASH INPUT (Baht per baht of input)

	Glutinous paddy	Non-glutinous paddy	Kenaf
Na Chuak Nua	26.7	-	6.2
Ban Tum	7.7	-	47.9
Um Mao	6.9	13.9	28.9
Fai Taek	5.2	6.9	-
Ban Lek	8.7	48.5	31.7
Non Sung	10.5	18.5	43.3
Lao Yai	-	-	-
Lam Pao Area	9.1	19.8	26.74

farmers in the 1972-3 crop season given that the differential has now returned to approximately the 1967-8 situation.

The Relative Productivity of Crops

The level of returns on land, labour and cash inputs varies with the level of inputs, the size of the production and the prevailing price. Given that there are no significant differences in the level of inputs from one year to the next, an assertion borne out by the preliminary processing of the 1972 and 1973 Lam Pao data, the variation in level of returns must be seen in terms of yield and price variations.

Table VIII.19 summarises the level of returns to land, labour and cash inputs for the study area in the 1970-1 crop season. For the area as a whole, the order of the three main crops is consistent for all three factors of production. Kenaf is consistently the most productive crop, with non-glutinous and glutinous rice second and third. There is some variation, however, between villages reflecting the differences in average yields, price levels and emphasis on the various crops. The low level of returns on kenaf labour and land in Non Sung may be seen in terms of the very low yields in the village (see chapter VI).

The higher paddy prices of 1971-2, with similar yields, resulted in an increase in glutinous rice profitability. Kenaf prices, although marginally higher (2.05 baht a ton in 1970-1 and 2.14 in 1971-2) were accompanied by markedly lower yields (114.57 kilograms a rai in 1971-2 and 160 in 1970-1). However in terms of profitability kenaf remained slightly ahead of glutinous paddy for labour (19.8 baht per man-day as against 15.3) and cash inputs (20.1 baht per baht of input, compared with 17.5), and markedly so in terms of land (245.2 baht per rai as against 178.5 baht).

TABLE VIII.20

SOURCES OF MARKETING NEWS OF FARMERS DURING 13 SEPTEMBER-1 OCTOBER 1965

Items	Farmers	
	Number	%
Local Merchants	46	71.88
Central Merchants in Amphurs or Provinces	6	9.38
Bangkok Merchants	-	-
Neighbours	9	14.06
Local Broadcasting Stations	2	3.12
Newspaper	1	1.56
Total	64	100.00

Source: "Markets and Market News Systems in N.E. Thailand", Ministry of Agriculture, 1965, p.15.

Farmers' Sources of Market News

Farmers were found to be generally well informed of the prevailing price levels for kenaf and paddy in the study area. Merchants, millers and neighbours are the main source of information. This viewpoint is confirmed by the Ministry of Agriculture's survey of market news, which found that 71.88% of farmers obtained their price information from local merchants.

While farmers in all the selected villages were aware of the daily radio broadcasts giving the prices of agricultural commodities, and of the weekly price bulletins sent to headmen by the Department of Agricultural Extension, they took little notice of them. The prices quoted by these sources were Bangkok wholesale prices in the case of the radio, and Khon Kaen wholesale prices in the case of the bulletins, and farmers realised that such prices gave little guidance to the local prices. As one rice miller replied when asked what he did when farmers quoted the radio price at him, "I tell them to go and sell their rice to the radio station". The majority of farmers are clearly in a weak position for bargaining with millers and merchants.

The radio and local Agricultural Extension service appear only to be of significance as sources of farmers' information on prices for those crops not commonly grown in the area. Of the farmers interviewed in 1971, 50% obtained their knowledge of the price of maize, soyabeans and peanuts from the Agricultural Extension Offices, and 20% from the radio. However it was made clear in a number of interviews that if they were going to grow any of these new crops, they would require information and assurances from local merchants of the prices they would get and of the certainty of the market. The placing of the farmers' faith in information obtained from neighbours, merchants, and farmers already

growing a new crop is well illustrated by the spread of cassava into parts of Kalasin in 1972-3. Farmers obtained information from existing growers as to cultivation techniques and price levels. Such information was found in the Lam Pao resettlement area or other parts of the North East where the crop was already established. Merchants from Khon Kaen visited villages, quoting prices and giving assurances of markets and collection from the field by truck. Root cuttings were supplied by existing growers and merchants. In 1972-3 large areas of cassava developed on the poor upland outside the Lam Pao irrigation area.

Examination of the farm gate, Bangkok wholesale, and export prices indicates that both the expanded traditional and innovatory sectors of the farm economy have shown themselves equally unreliable as sources of cash income. The greater dependence of the innovatory sector on the internal market compared with the traditional sector has not, over the last decade, resulted in a greater degree of instability.[70] The expanded traditional sector has shown itself to be more competitive and offers more incentive for quality of product than does the innovatory sector. Since 1930, the Bangkok-North East farm gate price differential has narrowed, and the amount of competition has increased markedly since the second world war with the development of transport and communications both inter- and intra-regionally.

However, in both sectors the farmers' income has been depressed by the low proportion of the wholesale and export price obtained by the farmer. In the case of kenaf, the lower level of competition present in the market system, coupled with the purchasing of fibre at one grade and subsequent reselling at five, seriously reduces

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70 Kenaf is dependent for 75% to 80% of its market on the export market, while paddy is only dependent for 15 to 17%.

the farmers' share of the Bangkok price; for paddy the more sophisticated and competitive rice market results in farmers obtaining a much higher proportion of the Bangkok price, but a lower proportion of the export price because of the rice premium.

The low and unreliable price levels prevailing for North East farm produce results in a reluctance to increase the level of inputs and thereby intensify production and increase the quality of the crop. Prince Sithiporn sees the rice premium, because of its effect in reducing the level of return on paddy cultivation, as directly responsible for the low level of fertiliser input prevailing in Thai paddy growing as a whole.[71]

North East farmers have shown themselves responsive to price incentives in new crops and quality of product. It is clear that the introduction of new crops, within the limits of the existing emphasis on paddy production for household consumption, can be accomplished provided it can be demonstrated that the crops can be easily grown and will prove profitable. Little extension work is necessary to encourage further innovatory development, provided that the price incentive is both present and made apparent to the farmer. Adequate price incentive will result in kenaf fibre improving in quality along the lines of the rapid change to improved rice varieties with price differential for the new strains.

Farmers' knowledge of price levels is imperfect; the greater competition present in the rice trade results in farmers in general not suffering from middlemen's price cutting, in kenaf however the lower degree of competition suggests that opportunities for exploitation are

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71 Prince Sithiporn, op.cit., p.37.

greater. More significant for the North East farmer is the lack of any long term price projection that could predict the likely demand; this is particularly important for kenaf, where the likely world jute crop could be determined by April-May. If farmers had reliable price information that applied to the price that they would receive, it is likely that they would act upon it and be more responsive to the forces of the market.

CHAPTER IX

THE COMPONENTS OF FARM INCOME

The North East farmer has, since the late 1920's, been making the transition from a situation of highly self-sufficient traditional agriculture to one of expanded traditional and innovatory agriculture, in which cash income has become an increasingly important feature of the farm economy. Stimulation of farmers' expectations via the penetration of mass media, retail outlets, and transportation has provided the driving force for the farmers' increased demand for cash income. An elaborate system of marketing has spread into the North East since the 1920's, tapping and further stimulating surplus production of the traditional crops, and since the late 1950's the market has played an increasingly important part in the spread of an innovatory sector in the North East agricultural economy.

Examination of production and price levels in preceding chapters has emphasised that both sectors of the North East agricultural economy have been equally unreliable in production and generation of cash income. Income from crops has tended to be both low and irregular, while the stimulus of farmers' cash needs has continued. It is apparent that within the North East a situation is developing where the rate of formation of cash needs is exceeding the rate of cash income formation generated by the agricultural sector; frustration with agriculture as a source of cash income is the inevitable result of this situation.[1]

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1 This may be expressed as:

$$\frac{\text{Rate of formation of cash needs}}{\text{rate of cash income formation from crops}} = \text{degree of frustration with agriculture}$$

The heavy investment in infrastructure which has been taking place in the North East over the last decade has not to date resulted in marked changes in the pattern of agricultural production; however, it has generated plentiful supplies of off-farm employment which offer regular cash income from unskilled labour.

This chapter examines the level and composition of farm income, and the direction that farmers are following in attempting to ensure a regular and sufficient level of cash income.

The Level of Income

There is a general lack of information on the level of income in the rural North East; as was noted in chapter I, since 1960 total and per capita G.D.P. figures have been available for the North East, but there has been no attempt at a rural-urban breakdown. Table IX.1 indicates the total family and per capita value of production and cash income for the Lam Pao study area in 1972. The value of production is calculated from total farm production whether sold or not, and the prevailing prices in the area. Such calculations do not produce figures strictly comparable with the N.E.D.B.'s per capita G.D.P., but they do serve to indicate the very marked rural-urban differential which exists in the North East. In 1969, the most recent year for which such figures are available, the per capita G.D.P. for the North East was 1600 baht, and for Kalasin was 1559 baht.[2] Thus while the Kalasin average is only 2.6% below the regional average, the Lam Pao incomes (calculated four years later) were 39.2% lower and 37.6% below the Kalasin figure.

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2 N.E.D.B., "Gross Domestic Product of North East Thailand 1960-69", 1970, pp.168-169.

TABLE IX, 1

AVERAGE FAMILY AND PER CAPITA INCOME 1971-2 (in baht)

	Value of Production	Cash Income	Per Capita Value	Per Capita Cash
NA CHUAK NUA	6690.8	4311.7	893.3	575.7
BAN TUM	6541.0	4716.4	1031.6	740.4
UM MAO	8494.0	6206.4	1128.6	864.1
FAI TAEK	5827.4	3993.2	848.2	581.3
BAN LEK	4648.6	2798.7	717.4	431.9
NON SUNG	5768.8	3047.0	635.1	416.3
LAO YAI	6431.2	4391.6	918.7	627.4
LAM PAO AREA	6586.5	4464.0	950.4	644.2

A survey of the F.A.O. experimental farm area at Huey Sithon in 1969-70 indicated a total family income (in terms of value of production) of 8,767 baht, and a per capita income of 1109.75 baht.[3] The special situation of the Huey Sithon area, with an element of double cropping, vegetable production for the Kalasin market, considerable off-farm earning opportunities, both on the experimental farm plots and in nearby (6 kilometres) Kalasin town, and the overall heavy injection of funds into the area by the F.A.O. may be expected to result in a higher figure than that of the Lam Pao area. However a re-survey of the Huey Sithon area in 1972 along similar lines to the Lam Pao survey indicated the family income was only 7681.98 baht, and per capita income 984.87, only 16.63% and 3.6% above the Lam Pao figures for the same year.[4] The differences between the 1969-70 and the 1972 figures seem to reflect the survey methods, on the grounds that the two years were roughly similar in terms of production and the prevailing prices of agricultural products.[5]

Since the 1972 figures for the two areas were produced by similar survey methods, they may be considered comparable. It is apparent that forces at work in the Lam Pao area have produced a very similar income level to that created in an advantageously located area subjected to intensive developmental policies. However, the average per capita cash income is higher, suggesting that either a larger percentage of the agricultural produce is sold in Huey Sithon, that is, that agriculture is more commercialised, or that a larger proportion of the income is produced

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3 Chamlong Toothong, "Bench Mark Socio-economic Survey of Nong Wai Irrigation Area", 1969, p.20.

4 R. Ng, "The Socio-Economic Conditions in Huey Sithon", 1972, p.40.

5 Given the increase in average price levels and general inflation one would expect the 1972 income level to be above that for 1969-70.

from direct cash earnings, such as off-farm employment in town or on the experimental farm. In Lam Pao, cash income is only 68.5% of the value of production, and in Huey Sithon 73.1%.

A survey conducted in the Nong Wai irrigation area of changwat Khon Kaen in 1969-70 on a similar basis to the Huey Sithon survey in the same year produced income figures of 10,000 baht, and a per capita figure of 1300 baht. Khon Kaen is one of the richer changwats of the North East, with a per capita G.D.P. 2.1% above the regional average and 12.76% above that of Kalasin.[6] The more advanced irrigation area of Nong Wai, the large urban market in Khon Kaen and the opportunities for off-farm work in the town would be expected to produce a much higher income level than that found in Kalasin. It is unfortunate that we have no data to indicate the level of income in less developed areas outside the irrigation and F.A.O. areas.

Table IX.1 indicates the considerable variation that exists between the villages of the study area in terms of income and the relationship between value of production and cash income. It is clear that these figures do not reflect solely the proximity to Kalasin town or to the Lam Pao irrigation works. The two highest average incomes, both in value and cash income, are found in Ban Tum and Um Mao, the former located close to Kalasin and heavily dependent on paddy production, the latter 30 kilometres from the town and heavily dependent on upland crops. Only a little less than these two villages is the income of Fai Taek, which lacks land and shows population pressure; although close to the town the road link is poor and only open from November to May. Ban Lek is by far the poorest village despite its proximity to Kalasin; severe population pressure and poor land seem to outweigh the advantages of

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6 Chamlong, op.cit., p.14; N.E.D.B., op.cit., pp.184-5.

TABLE IX, 2

% CASH INCOME BY SOURCE 1971-2

	CROPS	ANIMALS	FISH	HANDICRAFTS	OFF FARM	REMITTANCES
NA CHUAK NUA	31.6	18.7	4.0	0.3	43.7	1.5
BAN TUM	44.5	25.6	0.8	0.05	28.5	0.3
UM MAO	23.8	21.2	2.3	4.8	47.9	4.2
FAI TAEK	16.9	14.8	0.09	3.3	40.4	27.4
BAN LEK	37.5	22.3	1.3	0.4	23.7	14.8
NON SUNG	36.1	47.7	0.5	0.2	13.5	0.2
LAO YAI	47.2	39.5	1.5	0.09	9.5	2.3
LAM PAO AREA	32.4	23.9	1.5	0.3	38.2	5.4

Note: For mean levels of cash income see Appendix 10, 1.

TABLE IX, 3

% VALUE OF PRODUCTION BY SOURCE 1971-2

	CROPS	ANIMALS	FISH	HANDICRAFTS	OFF FARM	REMITTANCES
NA CHUAK NUA	53.4	12.1	4.9	0.5	28.2	1.0
BAN TUM	57.8	18.5	1.2	1.8	20.6	0.2
UM MAO	42.5	15.5	2.5	1.4	35.1	3.1
FAI TAEK	41.6	10.2	0.9	0.8	27.7	18.8
BAN LEK	47.6	10.7	1.9	1.0	11.4	7.1
NON SUNG	58.6	23.1	2.2	4.2	11.8	0.09
LAO YAI	61.5	27.0	1.9	1.6	6.5	1.6
LAM PAO AREA	51.2	15.9	2.2	1.6	25.5	3.6

Note: For mean levels of production see Appendix 10, 1.

TABLE IX, 4

% OF FARMERS RECEIVING CASH INCOME 1971-2

	Crops	Animals	Fish	Handicrafts	Off-Farm	Remittances
Na Chuak Nua	86.5	56.8	43.2	2.7	56.8	2.7
Ban Tum	93.3	51.7	8.3	1.7	46.7	1.7
Um Mao	84.4	50.0	21.9	9.4	46.9	3.1
Fai Taek	73.9	43.5	4.3	4.3	52.2	13.0
Ban Lek	81.0	42.9	19.0	2.4	52.4	11.9
Non Sung	78.4	70.3	10.8	2.7	37.8	2.7
Lao Yai	90.1	100.0	27.3	9.1	27.3	9.1
Lam Pao Area	84.4	54.8	18.1	6.2	47.3	6.2

TABLE IX, 5

% OF FARMERS PRODUCING 1971-2

	Crops	Animals*[1]	Fish	Handicrafts	Off-Farm	Remittances
Na Chuak Nua	100.0	56.8	78.4	8.1	56.8	2.7
Ban Tum	100.0	51.7	45.9	18.3	46.7	1.7
Um Mao	100.0	50.0	68.8	37.5	46.9	3.1
Fai Taek	100.0	43.5	52.2	26.1	52.2	13.0
Ban Lek	100.0	42.9	66.7	23.8	52.4	11.9
Non Sung	100.0	70.3	67.6	24.3	37.8	2.7
Lao Yai	100.0	100.0	63.7	9.1	27.3	9.1
Lam Pao Area	100.0	54.8	62.1	22.8	47.3	6.2

*[1] 100% of farmers keep some livestock; these are only those deriving money income from them

this location. Na Chuak Nua, the only village in the sample receiving irrigation water, is exceeded in its level of income by three non-irrigated villages, in spite of the extensive employment opportunities with the R.I.D. at Lam Pao.

The Constituent Parts of Farm Income

In terms of the value of production the dominant source of farm income is the production of crops; in the study area as a whole crop production constitutes 51.2% of total value, twice that contributed by off-farm employment, the next most important source (tables IX.2 and 3). However, with respect to cash income, off-farm earnings are the single most important source, contributing 38.2% as against 32.4% from crop sales.

There is some variation between the selected villages in the main sources of cash income. Crop sales are most important in Ban Tum (47.2%), Ban Lek (37.5%) and Lao Yai (47.2%); off-farm earnings in Na Chuak Nua (43.7%), Um Mao (47.9%) and Fai Taek (40.4%); and animal sales in Non Sung (47.7%) (tables IX.2 and 3).[7] In the study area 84.4% of farmers receive cash income from crop sales and in none of the selected villages does the percentage fall below 73.9% (table IX.4). Off-farm income, on the other hand, is received by less than half the farmers (47.3%); the larger percentage contribution of off-farm income to total cash income reflects the greater size of off-farm earnings (table IX.2).

Fishing, handicrafts and remittances make little overall contribution when measured either in terms of value or of cash income

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7 Cash income derived from crop sales is underestimated by the amount of paddy retained in the barn for sale later in the year, as will be explained later.

(tables IX.2 and 3); together they accounted for 7.4% of the total value of production and 7.2% of cash income. However 62.1% of farmers produce fish, 22.8% handicrafts, and 6.2% receive remittances, but only 18.1% receive cash income from fish sales, and 6.2% from handicraft sales (tables IX.4 and 5). Fishing and handicrafts are thus largely subsistence activities which make little contribution to cash income.

The pattern of cash income combinations present in the study area and the individual villages is illustrated in Appendix X.3. 23.45% of farmers obtained all their cash income from one source, and 28.39% had all but insignificant amounts from a single source. 73.43% of these single income source farmers were dependent on crops and only 14.03% on off-farm employment. A third of farmers had two sources of income, one main and one subsidiary, the most common combination being animal and crop income (35.8% of cases). Animal income was the most important of the two sources, then, for a third; crop income for 30.9%, and off-farm employment for 28.4%. To have three sources of income was less common (8.23%) and four sources even less so (2.1%) (Appendix X.4).[8] Overall, therefore, there was a tendency for concentration on one, or at most two, sources of cash income; this emphasis on a single source made farms extremely vulnerable to fluctuations in their income. A year of severe crop loss and/or low prices results in a sharp fall in the level of cash income for those heavily dependent on crops, and similarly for those dependent on off-farm work, a contraction of the job market again results in a major cut in income.

Consideration of the variations in the importance of the individual components of income will be given in the discussion of the separate sources.

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8 4.5% of farmers received no cash income.

TABLE IX.6

THE COMPOSITION OF THE FARM PRODUCTION BY VALUE (%)

	Crops	Animals	Fish	Off-Farm
1969-79 NONG WAI	45.81	11.74	3.28	30.79

	Agriculture	Non-Agriculture
1969-70 HUEY SITHON	60.0	40.0

	Crops	Livestock	Fish	Handicrafts	Off-Farm	Remittances
1972 HUEY SITHON	71.17	7.84	7.42	0.11	28.25	28.25

Sources: Chamlong Tothong, "Report on bench mark socio-economic survey of Nong Wai", E.C.A.F.E., 1969, p.14.

Chamlong Tothong, "Socio-economic survey of Huey Sithon", E.C.A.F.E., 1969, p.20.

R. Ng., "The Socio-economic Conditions in Huey Sithon", Report prepared for the F.A.O., Dec. 1972, p.40.

Income Composition in other North East Sources

As with the level of farm income, there is very little comparative information on the constituent parts of farm income. The Nong Wai (1969-70), Huey Sithon (1969-70) and Huey Sithon (1972) studies only give a breakdown by value of production (table IX.6). Comparison between years is difficult because of the annual fluctuations already noted. However it is apparent that in the Huey Sithon area the dominance of crop production is greater, reflecting the heavy investment in agriculture made there. The Nong Wai figures, if reduced to a dichotomous classification into agricultural and non-agricultural sources, produce a 57.55%/34.07% split, which, despite the more prosperous nature of the area, is similar to that found in Huey Sithon in the same year. More easily compared are the 1972 Huey Sithon and 1972 Lam Pao figures (table IX.2). Off-farm income is at a similar level of importance, but livestock and handicrafts are less important. The markedly greater importance of fishing is a result of the Huey Sithon tank, which allows fishing all the year round and is a particularly rich source of fish.[9]

Chamlong considered that the Nong Wai crop income and off-farm income were both inflated by the proximity of Khon Kaen's urban market, the availability of irrigation water and the high level of demand for labour by the R.I.D. in 1969-70.[10] Crop income was dominated by the proceeds of the sale of vegetables, which made up 32% of total farm income, a much higher figure than for Lam Pao. The contribution of off-farm sources in the light of the Huey Sithon and Lam Pao surveys does not seem unreasonably high in Nong Wai, given the proximity to Khon Kaen and the R.I.D. employment. A survey at Tha Bo in Nongkai changwat produced

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9 Personal communication from the Fisheries Department.

10 Chamlong, op.cit., p.14.

TABLE IX.7

SOURCES OF CASH INCOME IN THE NORTH EAST (1929-30)

	% Crops	% Animals	% Fish	% Other	Total Income in Baht
Ubonratchathani	11.5	11.4	2.1	75.0	63.20
Khukhan*	21.9	19.3	2.3	56.0	71.25
Nakorn Ratchasima	37.9	7.9	2.4	53.8	117.13
Udornthani	15.4	4.5	5.7	74.4	72.41
Khon Kaen	13.6	23.4	7.5	55.6	83.12
Sakon Nakorn	33.7	21.8	19.1	25.4	75.42
Nongkai	9.7	2.7	17.1	70.1	111.74
Nakorn Phanom	17.0	14.2	14.5	54.4	70.54
North East	20.8	12.4	8.7	58.1	83.11

* Now part of Srisaket

Source: C. Zimmerman, 'Siam Rural Economic Survey', 1931, p.59.

TABLE IX.8

SOURCES OF CASH INCOME, THAILAND (1929-30)

	% Crops	% Animals	% Fish	% Other	Total Income in Baht
Central Region	55	3	1	41	279
Northern Region	39	4	1	57	176
Southern Region	31	10	4	56	125
North Eastern Region	21	12	9	58	83

Source: C. Zimmerman, 'Siam Rural Economic Survey', 1931, p.49.

an off-farm figure of 27% in 1970, which is of the same order.[11] All the available evidence supports Chamlong's conclusion that off-farm income is of considerable importance throughout the North East region, although there is variation in the actual opportunities to supplement the agricultural income by other work.[12] Wherever farmers do have these opportunities, they appear to take them.

Changes in the Pattern of Income Components

The discussion of regional G.D.P. in chapter I indicated the long term growth in North East income since 1960; it is clear that as production for the market and the development of non-farm income sources arose in the region, the level of farm income has steadily climbed and changed in composition. The only pre-war data are in Zimmerman's 1929-30 study (table IX.7). The regional variation in the contribution of crops to cash income reflects the degree of commercialisation of the rice economy at that date, rice being the only crop grown for the market. Sakonnakorn and Nakorn Ratchasima stand out as the changwats with the greatest dependence on rice for cash income. Overall, fish and livestock are at similar levels to that found in the Lam Pao study. The dominance of Zimmerman's category "other" in the region as a whole and in all changwats except Sakonnakorn is striking. This category includes handicrafts and the collection of forest products, notably lac.[13] The studies discussed previously in the period 1969-72 demonstrate that the

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11 Ibid.

12 Ibid.

13 C. Zimmerman, "Siam Rural Economic Survey", 1931, pp.50-52. It is unfortunate that Zimmerman's category 'others' is not sub-divided, as it is likely that the constituent elements vary greatly from one region to another.

TABLE IX.9

SOURCES OF OFF-FARM INCOME

Nature of Income Source	% of Families	% of Income
Wage Labouring	60.1	32.8
Trading	9.8	12.6
Renting land	4.9	1.9
Hiring out buffalo etc.	0.8	3.3
Official employment	4.9	6.1
Lending money	3.2	6.7
Other	16.3	36.3

non-agricultural sources dominant in the pre-war period are now almost absent. In this period, there were few opportunities for paid work off the land.

The more subsistent nature of North East agriculture and the general poverty of the region relative to the other major regions of the kingdom is reflected in Zimmerman's regional summaries of income levels and constituent elements (table IX.8).[14] There are unfortunately no comparative figures of regional farm incomes or the importance of the elements that may be used to compare the relative position of the North East with the other regions in the 1969-72 period.

Off-farm Income

Under the general heading of off-farm income there is included a wide range of non-agricultural sources of income of both a regular and an irregular nature; the main groups may be seen from table IX.9, and some selected examples are contained in Appendix X.5.

In value, off-farm income comprised 27.23% of total income in Lam Pao, but in cash terms, 38.73%. Overall 23.86% of farmers derive more than half their cash income from off-farm sources, and 3.7% obtain all their cash from this source (table IX.10). There is considerable inter-village variation (table IX.2). Fai Taek, with its low crop income, proximity to town, and the F.A.O. farm at Huey Sithon has the highest dependence on this source, 57.83%, and 8.69% of farmers had no other type of cash income. Similarly the 48.42% obtained in Um Mao reflects proximity to Kalasin town and employment based in the village, chiefly housebuilding.[15] Na Chuak, Nua, and to a lesser extent Ban Tum,

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14 See chapter I, table I.

15 In Um Mao a group of farmers undertake housebuilding during the dry season over a wide area of Kalasin and adjacent changwats.

TABLE IX, 10

% OF TOTAL CASH INCOME OBTAINED FROM OFF-FARM SOURCES

	NA CHUAK NUA	BAN TUM	UM MAO	FAI TAEK	BAN LEK	NON SUNG	LAO YAI	LAM PAO
100	2.7	5.0	-	-	4.8	2.7	-	3.7
80-99	13.5	6.7	18.8	8.7	2.4	5.4	8.3	9.1
60-79	5.4	5.0	9.4	17.4	7.2	5.4	8.3	7.8
40-59	5.4	1.7	9.4	8.7	2.4	10.8	-	5.3
20-39	21.6	6.7	3.1	4.3	11.9	2.7	16.6	9.1
1-19	8.1	21.7	9.4	8.7	7.2	10.8	-	16.5
0	43.2	53.3	46.9	39.3	47.6	56.8	75.0	50.2
No Cash	-	-	6.3	8.6	-	5.4	-	2.5

although remote from Kalasin town, obtain 43.7% and 28.5% of their cash income respectively from paid work especially, with the R.I.D. as guards or labourers. Non Sung and Lao Yai villagers, remote from Kalasin town or other places of work, derive only 13.5 and 9.5% respectively from such activities.

The most important source of this type of income, both in numbers and income, is labouring (table IX.9). The 27.5% of income derived from 'others' in Na Chuak Nua includes a number of cases of guards at the Lam Pao R.I.D. works. Employment by the Highways Department is only of significance in Non Sung, because of the road improvement scheme under way in amphur Komalasai and the lack of alternative opportunities. Much of the employment is seasonal, mainly in the dry season months when construction work is possible, and falls off once the rains start.

Wage rates for labouring vary greatly, in general from 4 to 10 baht a day for agricultural work in the village, while 12 to 25 baht is paid outside. This discrepancy is reduced by the fact that workers in the village are often repaid by food as well as cash. A full time labourer for the R.I.D. can earn 5,000 to 6,000 baht a year, depending on the number of days worked.[16] Employment during the dry season months, say from January to April, would bring 1200 to 1300 baht from the Highways Department, paying 15 baht a day, and 1700 to 1800 baht from the R.I.D., paying 20 to 22 baht.

The 12.6% of cash income from trading represents in the main the buying and selling of kenaf, paddy and livestock; normally such activities are highly seasonal, limited in scale, and not undertaken by the same individuals every year. Village dealers in agricultural

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16 Payment and employment tend to be on a day to day basis.

TABLE IX.11

LOCATION OF OFF-FARM INCOME

Location	% of Families	% of Income
Home village	31.9	33.0
Kalasin town	38.6	25.9
Yangtalad	5.8	9.1
Komalasai	3.3	1.2
Elsewhere in Changwat Kalasin	5.0	7.8
Elsewhere in the North East	4.2	5.0
Outside of the North East	10.9	19.9

commodities tend to move in and out of the trade, depending on the prevailing prices. More permanent trading takes the form of village shop keeping, which ranges from the keeping of a small shop stocked with a wide range of household and agricultural necessities to farmers who retail small quantities of tobacco, noodles or whisky within the village, often on an irregular basis (see examples in Appendix X.5).

Various forms of official employment are present in the area, including teachers, government employment in the changwat and amphur seats, and payment as a village or tambon head.

Other activities, lending money, renting land, or making clothes in the village, are, overall, of little significance, but earnings can be considerable for the families concerned (Appendix X.2). Despite the generally higher wage rates outside the village, the 31.9% of employment that takes place within the village yields 33% of the cash income, as against the 68.1% of employment outside the village, which results in 67% of the income. Overall 31.9% of employment is within the village and 38.6% in Kalasin town, with relatively small amounts elsewhere (table IX.11).

There is a strong inverse relationship between cash income from crop sales and off-farm income, and a Spearman rank correlation gives a negative correlation significant at the 99.8% level. Farmers with a low or non-existent crop income turn to off-farm sources to supplement or supply their need for cash income. There is a similar negative relationship between per capita holding and off-farm income (significant at the 99.8% level), indicating that farmers with a shortage of land resort to other sources of income; in particular farmers who do not grow kenaf rely more heavily on income from other work, indicating the failure of paddy production to provide sufficient cash income.

The level of income available from off-farm sources, either in

the dry season alone or full time, is clearly very attractive to the farmers in the study area. Examples were encountered in Na Chuak Nua of farmers with large kenaf holdings not fully cultivated because of labour shortage, but with two members of the family working full-time as guards for the R.I.D. Such farmers consider regular off-farm employment, which allows the rest of the family to continue cultivation, a better proposition than full-time cultivation of cash crops. The existence of dry season employment on a day to day basis for all or part of the dry season period is more appealing to many farmers than planting a second crop where irrigation is available. In Na Chuak Nua it is noticeable that the majority of the dry season vegetable cultivation is undertaken by women; similarly in Um Mao the small areas of vegetables produced in the dry season are tended by women with the men giving help in the early morning or on days when they are not labouring.

Opportunities for work off the land vary greatly from one village to another, depending on location in relation to the places of employment. The development of roads and irrigation works in the North East has brought off-farm employment opportunities to many remote villages. In the Lam Pao area, the progress of the R.I.D. canal construction programme is marked by new villages being in a position to supply labour for the construction work; frequently the first real contact farmers have with a road or irrigation development is the opportunity to supplement their income by working on it.

Crop Income

All the households in the sample produced crops (table IX.5), and cash income from their sale was received by 84.4% of them, ranging from 93.3% in Ban Tum to 73.9% in Fai Taek (table IX.4). 18.1% of farmers derived all their cash income from crops, and 43.1% obtained over half

TABLE IX, 12

% OF TOTAL CASH INCOME OBTAINED FROM CROP SALES (1971-2)

	NA CHUAK NUA	BAN TUM	UM MAO	FAI TAEK	BAN LEK	NON SUNG	LAO YAI	LAM PAO
100	16.2	28.3	18.8	17.4	16.7	10.8	-	18.1
80-99	8.1	20.0	3.1	4.3	9.6	13.5	8.3	11.5
60-79	10.4	8.4	3.1	4.3	14.3	2.7	8.3	7.8
40-59	16.2	13.3	9.4	8.6	4.8	10.8	49.8	12.7
20-39	13.5	10.0	18.8	8.6	19.2	24.3	16.6	15.6
1-19	24.3	13.7	41.2	30.3	16.7	16.2	-	18.9
0	10.8	8.3	9.4	17.4	19.4	16.2	16.6	12.3
No Cash	-	-	6.2	8.6	-	5.4	-	2.5

TABLE IX, 13

% CASH INCOME BY SOURCE WITH CROP STORE VALUE INCLUDED AS PART OF CASH INCOME FROM CROPS

	Crops	Animals	Fish	Handicrafts	Off-Farm	Remittances
Na Chuak Nua	40.1	18.8	4.0	0.4	43.7	1.5
Ban Tum	50.2	25.7	0.8	0.05	28.5	0.3
Um Mao	33.1	21.2	2.3	0.5	48.0	4.2
Fai Taek	23.9	14.8	0.09	0.3	40.4	27.4
Ban Lek	46.8	22.3	1.3	0.4	23.7	14.8
Non Sung	57.4	43.8	4.1	0.2	22.3	0.2
Lao Yai	68.7	39.5	1.5	0.09	9.5	2.3
Lam Pao Area	41.6	23.5	1.5	0.2	37.6	5.3

their income in this way (table IX.12). The importance of crop sales in Ban Tum is emphasised by 61.7% of farmers deriving over half their income from crops, and 28.3% all their income. This contrasts strongly with Um Mao and Fai Taek, where only 28.1% and 26% respectively obtain more than half their income from selling crops.

In chapter V it was argued that paddy sales were underestimated by the amount of paddy stored for sale in the September-November period; similarly, crop income will be underestimated by the value of paddy stored and sold during this second sales peak. 42.6% of farmers stored paddy (1971—2), worth 432.6 baht at January-April prices (Appendix X.6). If the value of the paddy stored is added to cash income, an overall increase of 9.69% is produced, and a 30.4% increase in crop income, making it the largest single source of income in the study area and in all the selected villages except Fai Taek and Um Mao (table IX.13). For reasons set out in chapter V, the entire volume of paddy stored is unlikely to be sold. However, since the 1972-3 crop season proved at least as good as the previous one in the area, it is likely that only a small percentage of the paddy stored was not in fact sold, thus the addition of the entire value of the paddy stored may well give a more realistic impression of the importance of paddy production in the crop income of the study area.[17] The difference made by the inclusion of the value of this store is particularly striking in Non Sung, where crop income is increased by 73%, which changes the contribution of crop income to total cash income from 36.1% to 57.4% (table IX.13); elsewhere the position of paddy is not dramatically changed. Exclusion of the

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17 The value of the store has been calculated from the price levels prevailing in January-April and thus makes no allowance for any seasonal price movement or any allowance for storage loss. In the light of the pattern of seasonal price movements examined in chapter VIII, the valuation is likely to be a slight underestimate.

store value indicates that the smallest crop incomes are produced in Fai Taek, Non Sung and Ban Lek; inclusion of the store value leaves Fai Taek and Ban Lek with markedly smaller crop incomes than those of the other villages, reflecting the greater pressure on land and in the case of rice the smaller surplus produced. Including the stored rice's value as part of the cash income is unsatisfactory because of the rather imprecise nature of the information, but in terms of the examination of the overall position of crop income in the farm economy in the year in question (1971-2) the figure is likely to be a truer overall reflection than figures utilising only the January-April cash receipts; in particular, the revised figure gives a truer picture of the position of Non Sung as a producer of surplus paddy for sale.

On the basis of the value ofproduction,paddy is the dominant element of crop income in the study area,but because 60% of the crop is consumed within the villages and is not marketed for cash, the contribution of paddy to cash income is very much lower. Exclusion of the value of paddy stored for future sale results in kenaf being the dominant source of cash income from crop sales, contributing 49.92% as against 40.35% from the sale of glutinous and non-glutinous rice (table IX.14). Kenaf production is of overwhelming importance in Ban Tum, where it comprises 80.68% of cash income; in Na Chuak Nua (46.81%), Fai Taek (58.83%) and Ban Lek (58.33%), kenaf is the single most important source of cash income; in contrast, in Um Mao only 8.54% of cash income stems from this crop, and in Lao Yai only 8.5%; the 34.68% in Non Sung is overshadowed by the 61.09% from paddy.

Inclusion of the value of paddy in store (table IX.15) reduces the overall importance of kenaf in crop income to 38.28% and raises the contribution of paddy sales to 54.26% from 40.35%. Within the selected villages the position of kenaf is also reduced, but remains dominant in

TABLE IX.14

CASH INCOME FROM CROP SALE BY % SOURCE EXCLUDING THE VALUE OF PADDY IN STORE

	Glutinous Paddy	Non-glutinous Paddy	Paddy Sub-Total	Kenaf	Other crops
Na Chuak Nua	29.96	5.86	(35.82)	46.81	17.35
Ban Tum	11.27	4.76	(16.03)	80.68	3.27
Um Mao	45.20	28.22	(73.42)	8.54	18.20
Fai Taek	7.74	2.90	(10.64)	58.83	30.51
Ban Lek	34.10	1.36	(35.46)	58.33	6.19
Non Sung	33.26	27.83	(61.09)	34.68	4.23
Lao Yai	-	80.44	(80.44)	8.50	11.05
Lam Pao Area	23.95	16.40	(40.35)	49.92	9.73

TABLE IX.15

CASH INCOME FROM CROP SALES BY % SOURCE INCLUDING THE VALUE OF PADDY IN STORE

	Glutinous Paddy	Non-glutinous Paddy	Value of Paddy Store	Paddy Sub-Total	Kenaf	Other crops
Na Chuak Nua	23.23	4.54	22.47	(50.24)	36.31	13.45
Ban Tum	10.02	4.23	11.13	(25.38)	71.72	2.90
Um Mao	32.49	20.28	25.38	(78.15)	8.90	12.95
Fai Taek	5.45	2.04	29.55	(37.04)	41.47	21.49
Ban Lek	27.30	1.09	19.93	(48.32)	46.72	4.96
Non Sung	21.14	17.69	36.43	(75.26)	22.05	2.69
Lao Yai	-	55.23	31.40	(86.63)	2.32	11.05
Lam Pao Area	18.37	12.57	23.32	(54.26)	38.28	7.46

TABLE IX.16

CASH INCOME FROM CROP SALES: MEAN SIZE OF INCOME

	Glutinous Paddy	Non-Glutinous Paddy	Paddy Store	Kenaf	Other crops
Na Chuak Nua	756.25	295.80	914.64	1074.00	914.64
Ban Tum	790.28	751.25	878.04	1817.12	295.00
Um Mao	1069.15	1268.38	1234.22	505.00	655.81
Fai Taek	1200.00	450.00	812.17	1301.43	393.75
Ban Lek	715.24	600.00	609.08	951.56	390.00
Non Sung	933.06	1106.04	1301.71	310.88	144.29
Lao Yai	-	3331.67	1625.58	352.33	274.60
Lam Pao Area	853.76	1132.65	1020.66	1181.92	373.74

Ban Tum and the most important single source of crop income in Fai Taek; elsewhere income from actual and potential paddy sales exceeds that of kenaf. The sale of other crops contributes 9.78% of crop income (or 7.46% including paddy stored), that is, not of great importance in the area. In four of the villages, Fai Taek, Um Mao, Na Chuak Nua and to a lesser extent Lao Yai, the sale of non-paddy or kenaf crops makes a significant contribution to crop income. In the case of Na Chuak Nua, the cultivation of some 100 rai of dry season vegetables making use of irrigation water from the Lam Pao scheme is providing an important source of additional income; in 1972 54.05% of farmers were obtaining cash income from crops other than rice and kenaf (table IX.15). Um Mao, with 40.63% of farmers selling other crops produced a wide range of vegetables, including melons, chillies, and peanuts which are sold in Kalasin market, in addition kapok trees are planted on houseplots and suan adjacent to the village for use in handicrafts and sale in Kalasin to merchants. Small areas of hand-watered dry season vegetable crops are raised on the flood prone levée areas of the Lam Phan. In general the small plots of higher land planted to peanuts, chillies or other vegetables were very intensely worked and returns of 2000 to 3000 baht a rai were recorded on individual plots. The 52.17% of farmers in Fai Taek who were selling 'other' crops were mainly producing fruit, especially bananas, on large garden plots either around the house or adjacent to the village. Despite the availability of water from the Lam Pao and the proximity of the village to Kalasin, no dry season vegetable growing has developed. The very bad quality road may be seen as causing problems in transporting vegetables, but the abundant off-farm employment opportunities seem likely to explain the failure of the village to develop labour-intensive market gardening. In Lao Yai, the very large percentage of farmers (83.33%) selling other crops reflects the more subsistent nature of the

village rather than a trend to diversification. Farmers persist in growing a wide variety of crops to meet household needs, many of which are exchanged or today more frequently sold within the village and to neighbouring villages, but only kapok is produced primarily for sale, though even this is extensively used in village handicrafts. The generally smaller size of crop income from the sale of 'other' crops may be seen from the non-zero means (table IX.16).

The pattern of individual crop income combinations is shown in Appendix X.7; 30.1% of farmers derive their total crop income from one crop and a further 20.1% derive 95% of their crop income from one product; 26.33% produce two crops for sale, 5.76% three crops, and 2.1% four crops. Thus half the farmers are dependent on a single crop for virtually all their crop income. Of the single crop incomes, those receiving income from kenaf were the most numerous, 56.55%, as against 30.32% from paddy and 13.11% from 'others'. The most frequent double crop income combination was kenaf and paddy, 51.56% of farmers. With reference to the most important component of these double crop incomes, in 40.62% paddy was dominant, and in 46.87% kenaf, with only 12.5% other crops. The three and four crop incomes show a very wide spread, with most combinations represented by a single case, the only exception being 'kenaf-others-glutinous rice', which is present in 28.57% of cases.

There is a tendency for income from the sale of other crops to be related inversely to the size of the crop income. Farmers with a small crop income are more likely to be selling crops other than kenaf or paddy.[18] A similar inverse relationship between non-glutinous paddy

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18 Spearman rank correlation gives a negative correlation significant at the 99.8% level.

income and kenaf income was established;[19] this may be noted at the village level, with Ban Tum and Um Mao providing extreme examples. To some extent the non-glutinous paddy has developed as a cash crop in villages without extensive kenaf land, as in Um Mao, or where the upland is very poor, as in Non Sung.

The pattern of crop income at the level of the farm, village, or study area as a whole is likely to change from year to year with the relative levels of production and demand for the crops, as well as due to changes in the land use pattern of the area. In 1970-1, the very low paddy prices, and generally poor market for the crop, not only depressed paddy income vis-à-vis kenaf income, but also resulted in an increase in animal income due to farmers finding that the rearing of ducks using paddy was more profitable than selling at the prevailing low prices. Introduction of new cash crops, notably kenaf, brought more farmers into the group earning cash income from crops, but there is no general pattern of diversification and spreading of the economic and environmental risks entailed in the production of cash income from the sale of crops. The well-established pattern of spreading the environmental risks by planting a large area of different types of land to paddy is not echoed in reducing risks by growing two or more cash crops. In part, physical limitations of the land are important in determining the amount of land available for surplus paddy and upland crops and thus the sources of cash income.

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19 Significant at the 99.8% level.

Remittances

About a twentieth (5.14%) of gross production and 3.52% of cash income was produced by remittances. Ban Lek and Fai Taek, with their low per capita land holdings and proximity to Kalasin town are by far the most dependent of the villages on this external source of money. To a high degree, the contribution of remittances will vary from one year to another, depending on the state of the harvest; during years of poor harvest and shortage a large number of villagers leave the area on a temporary basis and send back cash. In 1972, a good crop year for the area in general, only 6.1% of families received income from remittances; of these only one in Fai Taek was dependent on this type of income for almost all (91.34%) his cash income (Appendix X.8).

There is a strong negative correlation between size of holding and cash income from remittances.[20] Farmers who are dependent on remittances are ones with small per capita holdings, and low incomes from other sources, particularly crops.[21] These families making regular use of remittances have family members working away and sending money back to support the rest of the family, reflecting the inability of the holding to provide for the entire household and a lack of suitable off-farm work nearby.

Livestock Income

The sale of livestock and livestock products accounted for 15.9% of total value of production, and 23.9% of total cash income. Overall, 73.12% of farmers received some cash from their livestock (table

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20 Significant at the 99.8% level.

21 Spearman rank correlation indicates negative correlations between remittance income and total cash income and crop income (significant at the 99.8% level).

TABLE IX.17

% OF TOTAL CASH INCOME OBTAINED FROM THE SALE OF LIVESTOCK

	No cash income	0	1-19	20-39	40-59	60-79	80-99	100
Na Chuak Nua	-	40.5	2.6	8.1	18.9	-	2.7	8.1
Ban Tum	-	5.5	20.0	8.3	15.0	5.0	1.7	-
Um Mao	6.3	37.5	12.5	12.5	15.6	-	6.2	3.1
Fai Taek	8.6	47.8	17.4	8.7	13.0	8.7	-	-
Ban Lek	-	54.8	11.9	7.1	14.3	4.8	4.8	2.4
Non Sung	5.4	24.3	13.5	8.1	21.6	18.9	5.4	2.7
Lao Yai	-	25.0	25.0	8.3	25.0	8.3	-	8.3
Lam Pao Area	2.5	43.2	16.9	9.1	17.3	6.2	3.3	2.9

IX.4), for 22.65% of farmers it composed the single largest source of income and for 2.1% the only source (table IX.17 and Appendix X.3). Livestock income ranged from 14.8% of total cash income in Fai Taek to 47.7% in Non Sung, where it was the largest component of cash income (table IX.2).[22]

In the study area as a whole and in all villages except Lao Yai the dominant part is the sale of cattle and buffaloes. In Lao Yai the production of ducks and eggs for the Kalasin market is of particular importance, with three quarters of the sample participating in the process. Much of the surplus paddy, both glutinous and non-glutinous, is fed to ducks instead of being marketed.[23] In 1970-1, the very low paddy prices resulted in a higher incidence of duck rearing, both in the study area and in Huey Sithon, but when the paddy price rose again the practice declined. Lao Yai, with its irregular pattern of surplus paddy production, has a number of farmers who appear to make use of duck rearing to capitalise on the surplus paddy when it is produced. The location of Lao Yai would not appear to offer any advantage for duck rearing, remote as it is from Kalasin. Emphasis on duck rearing must result from the irregular nature of the paddy surplus, and the lack of upland crop income rather than any locational advantage. In general poultry and eggs are exchanged or sold within the village by the smaller producers, only the larger scale producers selling to the Kalasin or Yangtalad markets.

The sale of buffaloes and cattle is part of the traditional North East economy. Since at least as early as 1930, the region has

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22 The Non Sung percentage figure is inflated by the large amount of paddy stored for future sales.

23 Glutinous paddy is fed to ducks but many farmers consider non-glutinous a better fodder. Two farmers in 1972-3 were purchasing non-glutinous specifically for duck rearing in Lao Yai.

TABLE IX, 18

CASH INCOME FROM LIVESTOCK

	Buffalo and Cattle Sale		Buffalo and Cattle Hire		Pig Sale		Poultry and Egg Sales		Total
	Baht	%	Baht	%	Baht	%	Baht	%	
NA CHUAK NUA	685.14	(84.58)	8.65	(1.06)	97.30	(12.01)	18.92	(2.33)	810.00
BAN TUM	935.33	(77.23)	17.83	(1.47)	80.00	(6.60)	177.80	(14.68)	1210.97
UM MAO	1201.56	(91.53)	10.00	(0.83)	90.63	(6.90)	10.47	(0.79)	1312.66
FAI TAEK	334.78	(56.45)	-		128.22	(21.66)	128.70	(21.75)	591.70
BAN LEK	549.05	(87.81)	-		-		76.19	(12.18)	625.24
NON SUNG	1068.11	(80.08)	2.70	(0.20)	170.27	(12.76)	92.65	(6.94)	1333.73
LAO YAI	600.00	(34.60)	-		33.33	(1.92)	1100.63	(63.47)	1733.96
LAM PAO AREA	812.35	(77.51)	7.45	(0.71)	86.21	(8.22)	141.97	(13.54)	1047.97

been one of surplus draught animal production for re-sale in the deficit area of the Central Plain. However, few if any farmers are specialised cattle or buffalo producers. Draught animals are seen as an important form of investment; in years of surplus production of crops, a buffalo is frequently purchased with surplus income. Interviews with groups of farmers indicated that they regarded these animals as investment since they usually increased in value and might well breed, and in years of sudden cash need or poor harvest a beast could always be sold. Farmers pressed for money might sell their draught animals, relying on borrowing animals or money later in the year to make good the loss.

The farmers in the sample who derived the majority of their cash income from selling animals were ones who happened to sell a buffalo in that year, and they might well not do so again for many years. Thus a one year examination of cattle income does not provide a realistic picture for the individual farm economy. A small percentage of cattle and buffaloes are slaughtered in the village for consumption, the meat being disposed of by an elaborate system of sale and exchange; exact figures for this practice are not available. A quarter (23.05%) of farmers in the study area purchased cattle or buffaloes, either as a form of investment or to replace stock (Appendix X.9 and 10). Overall the expenditure on livestock in the area was 67.14% of the income from sales, although a limited number of farmers sold an old beast and bought a young one, in general the expenditure and the income showed the two sides of the livestock economy, with farmers buying to invest and selling to obtain cash income.

Livestock keeping in general remains a very traditional activity; the introduction of improved stock and vaccination scheme have made some progress in the area but there is little sign of any specialisation or commercialisation. The market system is poorly developed with itinerant

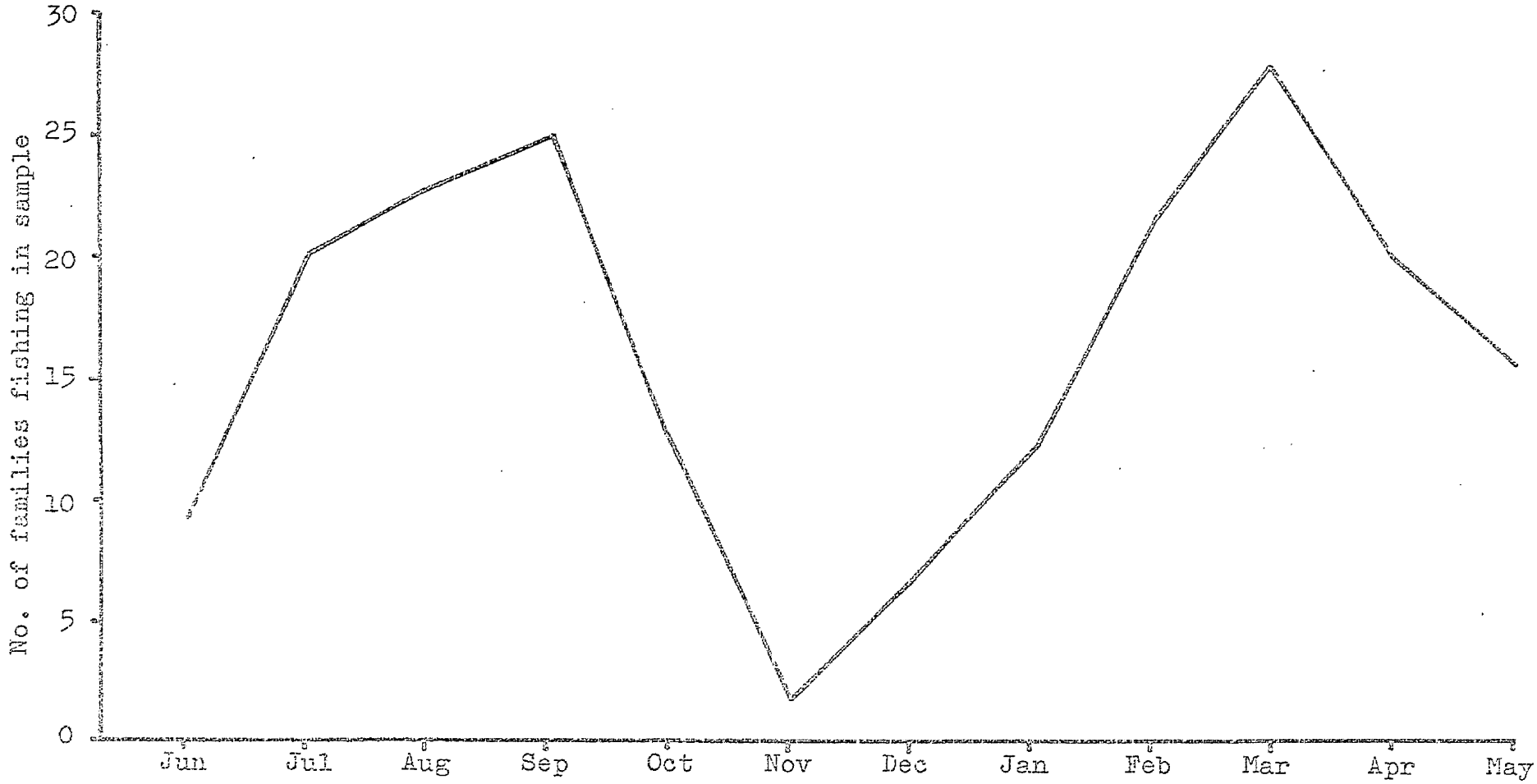

Fig. IX.1 The Seasonal Pattern of Fishing in the Lam Pao Area (1971-2)

cattle traders buying direct from the villagers and re-selling for slaughter in Kalasin or export to another part of the country.

Fishing

In the study area as a whole, 62.1% of households fished at some time during the year (table IX.5), but only 18.1% sold or exchanged fish (table IX.4); fishing is a subsistence activity with the majority of the catch being used for household consumption. Only in one case does fishing constitute more than 40% of the total value of production; in 88.8% of cases fishing contributes less than 10%. In terms of cash income, five households (8.8% of those selling fish) obtained more than 40% of their cash income from fish sales, and one household in Ban Lek 100% (table IX.23). The tabulation of cash income (Appendix X.3) shows that only in one case does fishing occur as the dominant source of cash income and only in eleven cases does it occur at all in the combination analysis.

The inter-village variation in incidence of fishing (table IX.5) reflects the availability of water bodies. Na Chuak Nua, close to the Lam Pao reservoir, has the highest number of people fishing and the largest percentage of cash income derived from it. In contrast Ban Tum, which lacks water close to the village (the large nong to the south is difficult of access) has the lowest incidence and the smallest contribution to cash income.

Fishing takes place all the year round, but in two main peaks, (figure IX.1) August-October and February-April. In effect, the annual pattern of fishing shows an inverse relationship with the rice year. After the rice transplanting has been completed, there is little activity on the farm and consequently fishing in the many streams and ponds which develop during the wet season is important, although frequently with the

TABLE IX.19

% OF TOTAL CASH INCOME OBTAINED FROM THE SALE OF FISH

	No cash income	0	1-19	20-39	40-59	60-79	80-99	100
Na Chuak Nua	-	56.8	43.2	-	-	-	-	-
Ban Tum	-	91.7	8.3	-	-	-	-	-
Um Mao	6.3	28.1	15.6	3.1	3.1	-	-	-
Fai Taek	8.6	87.3	4.3	-	-	-	-	-
Ban Lek	-	80.9	11.9	4.8	-	-	-	2.4
Non Sung	5.4	83.8	10.8	-	-	-	-	-
Lao Yai	-	74.3	8.3	8.3	8.3	-	-	-
Lam Pao Area	2.5	79.5	15.2	1.6	0.8	-	-	0.4

TABLE IX.20

% OF TOTAL CASH INCOME OBTAINED FROM THE SALE OF HANDICRAFTS

	No cash income	0	1-19	20-39	40-59	60-79	80-99	100
Na Chuak Nua	-	94.3	5.7	-	-	-	-	-
Ban Tum	-	96.7	3.3	-	-	-	-	-
Um Mao	6.3	84.4	6.2	3.1	-	-	-	-
Fai Taek	8.6	78.4	13.0	-	-	-	-	-
Ban Lek	-	95.0	2.5	2.5	-	-	-	-
Non Sung	5.4	89.2	5.4	-	-	-	-	-
Lao Yai	-	91.7	8.3	-	-	-	-	-
Lam Pao Area	2.5	91.4	5.3	0.8	-	-	-	-

character of a social event. The incidence of fishing declines with the advent of the kenaf and paddy harvests, and increases again in the dry season. The fishing from February onwards is more serious, including the netting and draining of the rapidly drying nongs and streams. In many villages, communal fishing ('long khaek') is organised to net particularly large nongs. The February-March period sees a peak in the volume of fish caught and in the sales and exchange within the villages.[24]

The Lam Pao reservoir and the development of professional fishermen and a regular network of pickup services in the dry season has played an important part in reducing the importance of subsistence fishing in the area. Fresh, salted and fermented fish is now sold over a wide area from Tha Ruia, the main fishing village of the reservoir, just to the east of the dam site. Zimmerman in 1930 noted that the draining of the nongs in the dry season for fish and fishing rights in general resulted in extensive disputes both within and between villages because of the vital nature of fishing to the farm economy.[25] The cessation of this type of dispute and the decline of the large scale communal fishing reflects the reduction in the importance of fishing to the North East farm economy.

Handicrafts

In the study area, village handicrafts consist in the main of weaving cloth, chiefly cotton, but in Lao Yai some silk is made, and there is also basket making and the manufacture of mats. The materials are all produced in the village, for example cushions are made using cloth woven from home grown cotton and stuffed with kapok grown, hulled and ginned

24 66% of sales and 61% of the volume caught.

25 Zimmerman, op.cit., p.294.

within the village. Some 22.8% of families practise some form of handicrafts, but only 6.2% derive any cash income from their sale. Of these, only one household derived more than 30% of their income (in value) from handicrafts, and 80.4% derived less than 10% of their income from them (table IX.20). Similarly in terms of cash income, only two households obtained more than 30% from the sale of handicrafts, and 80% less than 10%. Hanidcrafts only comprise the dominant source of income in one household in Um Mao, otherwise handicrafts only appear three times in the tabulation of income combinations (Appendix X.5). Um Mao, in spite of its importance as a surplus paddy producing village, and its plentiful off-farm employment opportunities, has by far the highest incidence of handicrafts of the seven villages. The lack of upland results in the labour demand pattern being concentrated in two peaks; without upland crops there is more time to devote to small manufactures in the home. Cotton and kapok are still produced on the small suan plots which are at a slightly higher elevation and some village products are sold in Kalasin town. Elsewhere in the study area handicrafts have been displaced by the incursion of cheap foreign cloth in the market, the spread of upland crops which had displaced cotton, reduced the amount of spare labour, and provided the necessary cash income for the purchase of finished goods from the market.

Both handicrafts and fishing are important to families with a small crop income and land holding, both measured by the value of production and by cash income.[26]

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26 Holding size and cash income are both negatively correlated with the value of fish produced, cash income from fish, the value of handicrafts, and cash from handicrafts sales (Spearman rank correlation significant at the 99.8% level).

The Determinants of Farm Income

Analysis of the determinants of per capita cash income was undertaken using stepwise regression; the following equation explained 94.4% of the variation:

$$Y = 43.8539 + X_5(0.99475) + X_2(1.03807) + X_1(0.9558)$$

where Y = per capita cash income

X_1 = per capita cash income from sale of crops

X_2 = per capita cash income from sale of animals and animal products

X_3 = per capita cash income from sale of fish

X_4 = per capita cash income from sale of handicrafts

X_5 = per capita cash income from off-farm sources

X_6 = per capita cash income from remittances.

The addition of income from remittances, fish and handicrafts (in that order of importance) did not significantly increase the level of explanation.

Income from off-farm sources alone accounted for 61.5% of the variation and off-farm work and animal sales together for 85.9%. The analysis lends weight to the conclusion of the importance of off-farm income sources in the North East farm economy. Since income from animal sales is irregular, the importance of regular cash from working away from the farm is likely to be even greater than indicated by the regression equation.

The procedure was repeated using value of production in place of cash income, for the same list of variables. 94.5% of the variation in total per capita value of production was explained by the equation:

$$Y = 70.54854 + X_5(0.9925) + X_1(0.9671) + X_2(1.06155)$$

where Y is per capita value of production, and the other variables are the same as in the first equation except that value of production is

substituted for cash income.

Even in terms of the value of production, off-farm income gives the highest explanation of the variation of any of the variables, with 55.7%. As in the case of cash income, remittances, handicrafts, and fish only explain a minimal amount of the variation. The inclusion of the value of subsistence production (and paddy stored for future sale), while placing crop production in second place still stresses the importance of off-farm income in explaining the variation between families in terms of income.

The Disposal of Surplus Farm Income

Until comparatively recently the North East farmers' attitudes to production beyond their immediate needs was that it was a fortuitous occurrence and should be saved against future shortages. As its simplest level, farmers stored rice against future harvest failures and did not sell the surplus. A more sophisticated development was the storage for sale at times of cash need. Both these elements of rice storage are still found in the Lam Pao area, but have declined markedly with the penetration of the market economy into the area. Traditionally in the North East, gold jewellery was bought with surplus cash income, and was an important form of saving; in years of poor harvest and severe shortage the jewellery could very easily be liquidated for consumption purposes. A second long established method of saving was the purchase of buffaloes; the North East since at least the 1920's has been seen as a source of draught animals for the Central Plain. The purchase of livestock was clearly a more productive investment than the purchase of gold since the animals accrue in value and may breed, they cost little or nothing to feed and only require the attention of the families' children to prevent them wandering. As in the case of jewellery, in years of shortage

TABLE IX, 21

DISPOSAL OF SURPLUS CASH INCOME 1929-30

	Debt Repayment	Land Purchase	Gold and Jewellery Purchase	Animals Carts and Materials	House Building
UBONRATCHATHANI	-	-	71.71	9.82	18.45
KHUKHAN*'	-	7.46	91.25	0.29	1.00
NAKORN RATCHASIMA	-	5.68	64.06	23.37	6.89
UDORN THANI	0.69	13.70	62.23	5.11	18.27
KHON KAEN	-	43.93	31.07	18.75	6.25
SAKONNAKORN	-	2.53	55.21	38.85	3.41
NONGKAI	4.48	9.67	57.72	18.86	8.91
NAKORN PHANOM	-	3.30	72.43	19.76	4.51
Mean	1.11	13.60	58.03	19.24	8.46

*' Included in Changwat SRISAKET.

Source: C. Zimmerman, 'Siam Rural Economic Survey' 1931, p.93. Table IV.L.

buffaloes are sold for cash.

Thirdly, farmers invest in land, the most recent form of investment in the North East, because the availability of large areas of uncleared land resulted in a very limited land market. However, it is clear in the study area that many farmers now regard land as a good investment, especially in areas where irrigation is likely to be developed and the value to increase.

Table IX.21 indicates the 1929-30 pattern of investment of farm surplus, the dominance of jewellery is evident with the purchase of animals and land very poor second and third.

The traditional pattern of investment was a very safe one for the farmer when seen in terms of the North East environmental conditions. With the penetration of the market economy more fully into the North East villages in the post-war period, the farmers' disposal of surplus income has changed markedly. Farmers have come to have new aspirations and cash needs which have stimulated them to increase and regularise their surplus income. The storage of paddy against future harvest failure or future cash need still occurs but the pressure of cash needs minimises this. More significantly, farmers are coming to spend increasingly large amounts of their surplus income on consumer goods which cannot be easily converted to cash in periods of shortage. Rapid increases have taken place in the ownership of radios, wrist-watches and sewing machines (figure IX.2). In 1971, twelve farmers had bank accounts, indicating that new methods of saving are being used by some at least.

The traditional lines of investment in jewellery, livestock, land and home construction or repairs remain important, but they have been replaced to some degree by the purchase of new consumer goods. Thus to some extent farmers are becoming more vulnerable to the environmental conditions, in that they are disposing of their surplus

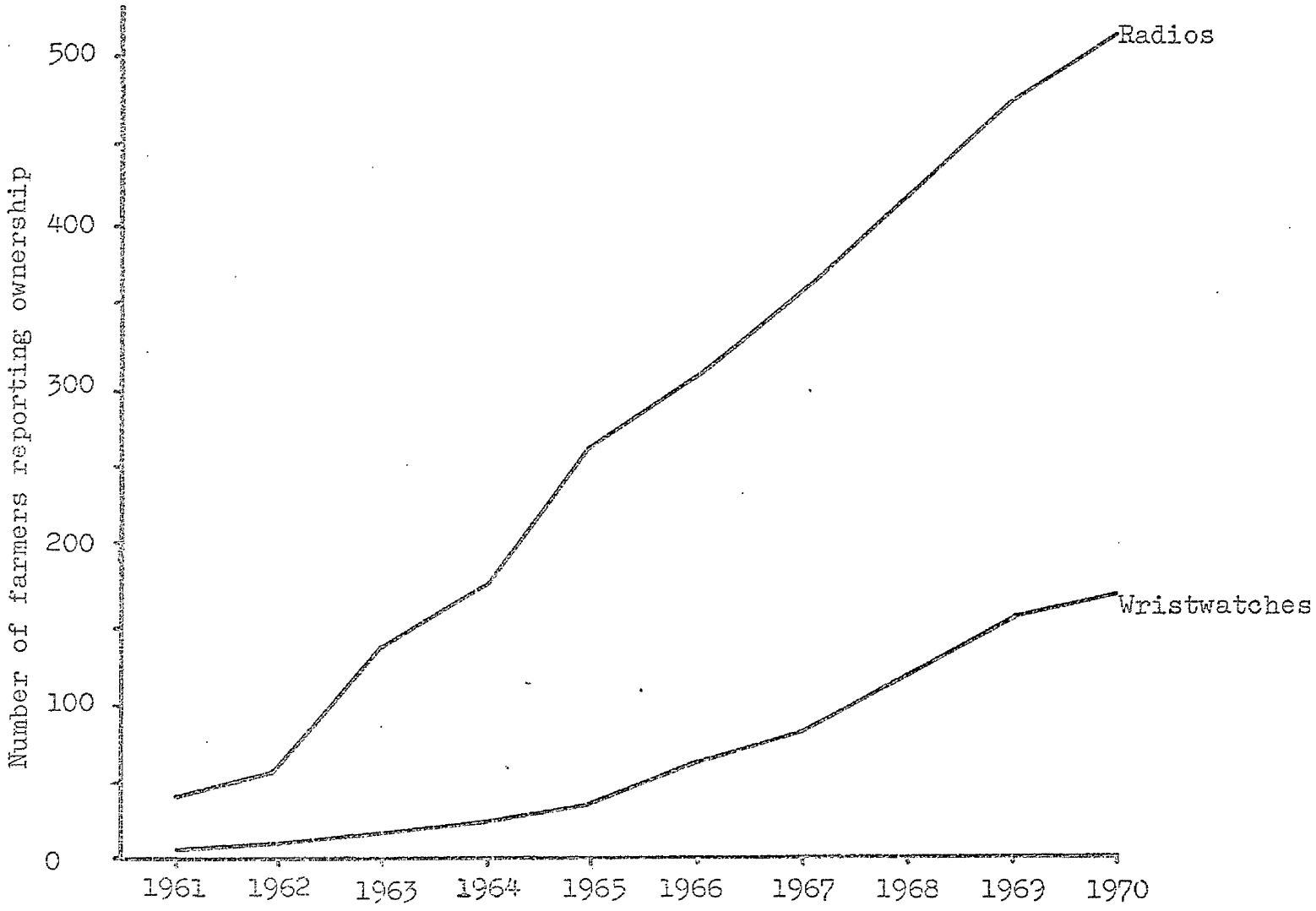

Fig. IX.2 Radio and Wristwatch Ownership in the Lam Pao area, 1961-70

rice in ways that will not easily be liquidated and at the same time are becoming increasingly dependent on a regular cash income.

Cash income from crop sales has been both low and irregular over the last decade, with marked annual variations stemming from both changes in the level of demand and production for both the produce of the expanded traditional and innovatory sectors of North East agriculture. Income from livestock rearing, despite the developments outlined in chapter I, remains traditional in nature, being used to supplement income in years of low crop production. In addition income from agriculture is highly seasonal, the majority being obtained from January to March, with a subsidiary peak in September-October, during which the remaining surplus paddy is disposed of.

The heavy investment in North East infrastructure, by generating off-farm employment, has given a means of obtaining regular cash income over large areas of the region. Thus the farm economy has mirrored the trends in the North East economy as a whole, the G.D.P. produced by the agricultural sector being slow and irregular in its growth rate and the main growth point being the construction industry. Investment in infrastructure has accentuated the North East farmers' cash expectations but has not given him the means of producing a higher or more regular level of income from agriculture. The very slow rate of response to the infrastructure investment exhibited by agriculture has resulted in farmers being increasingly frustrated with agriculture and turning increasingly to off-farm sources of employment which provide a regular cash income without the risk involved in crop production for the market.

The unreliable nature of the cash flow from agriculture results in farmers not channelling surplus cash income back into agriculture. Stimulation of farmers' expectation and the slow or irregular rate of

agricultural growth results in cash needs outrunning cash acquisition, thus income is increasingly used for non-productive consumer goods and small provision is made for saving or investment in agriculture. Farmers are increasingly requiring a rapid return on their investment of labour and capital and more experience of off-farm income sources makes them dissatisfied with the slow rate of return involved in normal wet season cultivation. The success of short growing season vegetable production in many parts of the region in the vicinity of towns reflects the desire for rapid returns.

The concentration of agricultural income in the December-March period results in a tendency towards over-expenditure on newly stimulated needs and a shortage of cash later in the year for agricultural inputs. A twofold damage results; agriculture does not benefit from increased levels of inputs, and farmers are likely to fall into debt because of disposal of the majority of the cash income in the form of consumer goods that cannot be reconverted into cash. The North East farmer has developed a system of insurance against uneven production levels stemming from the unreliable rainfall of the region, in the form of storing paddy, and purchasing buffaloes and convertible items such as jewellery; the development of new expectations on the part of the farmers is now eroding this system of insurance. Farmers are becoming more dependent on cash income, more vulnerable to economic as well as environmental fluctuation, and the traditional insurance against fluctuations is being severely threatened.

The future of agriculture in the North East rests heavily on policies aimed at raising and stabilising the flowcof cash income resulting from crop production. Farmers in the region have shown themselves responsive, through cash incentives, to changes and innovations in agriculture. Stabilisation of price and production levels by irrigation

and marketing schemes could result in development in agriculture at the farm level which would be compounded by farmers ploughing investment back into agriculture. New crops and multiple cropping can be seen as of importance in increasing cash income and evening out the flow of income from agriculture over the year. It is clear that to date the greatest failing of the development policies applied to the North East has been that investment in agriculture has been too slow in promoting change in agriculture.

CHAPTER X

DEVELOPMENT POLICY AND RURAL CHANGE : A CONCLUSION

The unstable nature of the North East farm economy, both in terms of production and cash income, has been examined in the preceding chapters. Agriculture has performed poorly over the last decade at the regional and farm levels, with farmers becoming increasingly dissatisfied with the low and irregular income derived from crop production for the market. The developments which have taken place since the late 1950's have increased the level of farm income by further expansion of the traditional sector and the rapid spread of the innovatory sector.

However, the farmer has become more vulnerable to fluctuations over which he has no control; under conditions of highly self-sufficient traditional agriculture, the environmental instability resulted in farmers developing a system of extensive cultivation, encompassing a variety of land types, and storing or converting surplus rice into gold or jewellery that was readily re-convertible to purchase food in years of disastrous harvests. With the spread of production for the market, and increased dependence on a regular cash income, farmers are increasingly faced by fluctuation in demand levels over which they have no control, thus both the expanded traditional and innovatory sectors, while remaining as vulnerable to rainfall variations as in the past, are now also vulnerable to economic fluctuations. Agricultural change in the North East has resulted in a progression from self-sufficiency to production for the market, but has not given the farmers a greater degree of control over the environment. Development has, to date, brought new

fluctuations without reducing the old ones.

The North East farmers have shown themselves to be adaptable in terms of agricultural technology and new crops, as is well illustrated by the rapid expansion of kenaf cultivation, and the use of new rice varieties. Similarly the North East farmers have responded positively to price movements, and to cash incentives. However it is clear that these responses are all limited by the traditional agricultural system and the unreliable rainfall of the region. Further innovation in crops and techniques will be possible, provided that they fit into the existing agricultural economy and that there is a demonstrable cash advantage to the farmers. Thus radical change in the farm economy of the North East rests on stabilising the production of the traditional sector.

Development policy towards North East agriculture has largely taken the form of infrastructure investment (see chapter I). In essence, heavy investment in irrigation schemes has been envisaged as giving the increased control of the environment necessary for agriculture to develop along the lines of the modified traditional and modified innovatory agriculture which will pave the way for specialised commercial crop production. However, the slow development of irrigation has so far brought little increase in the stability or productivity of North East farming. The small degree of success in increasing the farmers' control of the environment has drawn increasing attention to schemes directed at evening out the economic fluctuations, increasing farmers' returns on crop sales, and giving incentives for farmers to increase the quality of their produce.

Government Involvement in External Marketing of Paddy

From 1946 to 1954, the export of rice was a state monopoly and private trading in rice was restricted to the domestic market. In 1946 the Rice Bureau was created, and rice surplus to domestic requirements was sold to it at a price fixed annually. The stability given to the rice trade by the government monopoly and the fixed price was an important factor in the post-war recovery of the export trade and the rapid expansion of exports which took place.[1] The fixed price scheme gave some degree of confidence to paddy farmers but also kept internal wholesale prices 20% below the export price at a time of buoyant international demand.[2] From 1951, the government loosened its hold on rice exports by allowing restricted private trading under license. It is considered that the low fixed price and government monopoly reduced the regional variation in prices and cut back the middlemen's profit levels, but the data on these points are sparse.[3]

The slackening of the international demand for rice from 1953 onwards resulted in the Thai government experiencing increasing difficulty in selling rice; the solution was found in reversion to a system of private rice trading under general government supervision. Rice traders had to be registered, but were free to trade with no market or price restrictions. The government retained control and derived considerable income from the Rice Premium, which, in the same manner as the 20% mark up between domestic and export prices imposed by the Rice Bureau, kept domestic prices below those on the international market.[4] From 1946 until now, except for a break from April 1971 to June 1973,

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1 J.C. Ingram, "Economic Change in Thailand 1850-1970", 1971, p.88.

2 Ibid., p.89.

3 Ibid., p.89.

4 See chapter VIII for details of the rice premium.

either through the Rice Bureau or the rice premium the Thai government has kept some overall check on rice exports and depressed the internal prices. Government to government contract arrangements have continued, but since 1954 the majority of rice has been exported by the private sector.[5] No other crops have experienced similar controls by the state in their external marketing.

Government Intervention in Internal Marketing of Paddy

Official encouragement for the formation of cooperative marketing organisations in Thailand dates from 1932; in 1938 the government began the organisation of paddy marketing co-operatives.[6] The intervention of World War Two resulted in little progress being made, and by 1948 only some fifty societies had been established, handling relatively small quantities of paddy.[7] The 1948 F.A.O. mission reported strongly in favour of more complete government involvement in the internal marketing of paddy by setting up a very large number of co-operatives and establishing a system whereby the co-operative buying prices for paddy were fixed at the beginning of the season and widely publicised.[8] Little progress has been made towards co-operative marketing in Thailand; by 1966 there were only 119 societies for the marketing of paddy.[9] An insignificant amount of paddy is marketed via co-operatives and despite official statements stressing the importance of co-operative marketing for the development of agriculture, little apparent progress is

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5 Ingram, op.cit.,

6 Thip Thipchaimetta, "Paddy Marketing Co-operatives", Thailand Development Report, October 1969, pp.7-8.

7 F.A.O., "Report of the F.A.O. Mission for Siam", 1948, pp.93-4.

8 Ibid., pp.90-96.

9 Thipchaimetta, op.cit., p.8.

being made.[10]

More active state participation in the internal marketing of paddy stemmed from the very depressed paddy marketing conditions of 1964-5, but neither developed from nor operated through the co-operatives. The very low international rice price in 1965 forced the farm gate price down to 800 baht per khwien in the Central Plain and 600 baht in the North East.[11] The government instigated a support price of 1,000 baht a khwien for rice delivered to Bangkok, for the farmers who belonged to Farmers Groups, some 10% of the paddy growers. These two conditions limited the farmers who could benefit from the scheme effectively to a small number on the Central Plain. There is no information on the quantity of rice purchased by the government under this support scheme, but it is likely to have been small.

The sharp rise in prices from 1966 to 1968 placed any such state buying scheme into abeyance. With the fall in prices from 1969 to 1971, the government was under pressure to revitalise the support system. N.E.D.B. had, in 1968, investigated the costs of rice production, and recommended that the support price sould be at least 1,150 baht a khwien; as a result the Economic Ministry set a price of 1,200, and 1,300 for highest quality paddy.[12] Even allowing for transport costs the farm gate price would have been considerably above the 800 baht a khwien being offered by merchants in 1969-70. However, the government would only purchase rice delivered by rice producers.[13] Despite the setting up of a purchasing centre at Saraburi, the rail junction for the North and

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10 See, for a selection of quotations, Prince Sithiporn Kridakara, "Rice Farming in Siam", 1969, pp.89-160.

11 Ibid., p.18.

12 Ibid., p.19.

13 Ibid., p.30.

North East, where rice was bought at 1,160 and 1,240 baht a khwien, to allow for transport to Bangkok, only limited numbers of farmers in the vicinity of the purchasing centre benefited. The cumbersome procedure, time wasted and cost involved in the delivery of rice under such a scheme discouraged farmers from participating. Farmers in general are selling only 2-3 khwien, and carrying these quantities to Saraburi was clearly impossible from farms located at any distance. Pooling of paddy by a group of farmers for bulk movement and sale was the only practical method of taking advantage of the system. Since the scheme specifically stipulated that rice would only be purchased from its producers, farmers wishing to sell in bulk had to obtain documents from their local amphur office to prove that the rice was their own produce and that they were not rice traders.[15] Every stage of the scheme involved considerable expenditure of time and money by farmers to obtain the necessary documents, arrange sales and transport. As with the 1965 experience with a support price, there is no information as to the quantity of rice purchased by the government, but the amount must have been relatively small.

In 1970-71, the worsening rice market situation caused the government to re-think the entire question of support price schemes, and to attempt to produce a scheme that would at least enable farmers outside the Central Plain to sell their paddy. The particularly good North East glutinous rice harvest and the contraction of the only export markets for the crop in Burma and Laos brought a particularly low price for the glutinous and a great many farmers were unable to sell rice at all. It was considered that the North East in particular should benefit

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15 Ibid., p.31.

from a government guaranteed price purchasing scheme. The solution was the setting up of a quota system linked to a guaranteed price. Organisation was to be in the hands of the Ministry of Economic Affairs. A budget of 250 million baht was allocated, with a guaranteed price of 500 baht a khwien; this allowed for half a million tons of rice to be purchased under the modified support system. By June 1971 the Ministry of Economic Affairs had bought about half this allocated amount.

The Ministry of Economic Affairs allocated quotas to the various changwats, and these in turn gave quotas to amphurs and thereby to tambons and individual villages. The system appears to have operated far from smoothly. Investigation at the village level in Lam Pao revealed great variation in the operation of the system and of knowledge about it. In some villages experiencing difficulty in selling rice there was no knowledge of the existence of Government Purchasing Scheme. The villages that had been allocated a quota split it among families in an arbitrary manner. In many villages the associates of headmen received quotas to sell rice, while many farmers with a great deal of rice on their hands received no quota at all. Where the villages had no quota, they had to apply directly to the amphur office for individual quotas. The farmers and amphur offices seemed confused over the working of the system. The Ministry, however, claimed that "there is no problem in the Government Rice Purchasing".[16] But they admitted that the farmers were dissatisfied on two counts: the guaranteed price was still lower than the previous year's price, and the amount purchased was too small.[17] The government had no really effective system of rice purchase. Officials charged with the job of rice purchase had no expert knowledge of rice, consequently

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16 Bangkok Post, June 12, 1971.

17 Ibid.

the government purchased much very low grade rice and a considerable proportion of it glutinous; thus the government acquired much rice that it could not then dispose of.

Farmers were clearly very poorly informed concerning the quota and many had sold rice at 3-4 baht a tang in February and March and only subsequently discovered that they could have sold to the government at 5 baht a tang. Not only was there a lack of knowledge but there was also much misinformation which discouraged farmers from selling under the government scheme. Stories of difficulty in selling rice to the government magnified.

The farmers applying directly to the amphur office for a quota were faced by a lengthy procedure. Many farmers who were selling needed the money urgently, and could not afford to wait for a quota; they were forced to borrow money or sell to merchants at a lower price. Much time could be wasted at the amphur office arranging the quota and many farmers were daunted by the paper work. Once the arrangements were completed, the farmer also had to wait several weeks before the sale could take place. Farmers were often willing to sell, if they could, at a lower price to the merchants, than to sell to the government, because of the time and effort involved. In addition to the delay, there were practical and financial considerations to the sale. Farmers had to deliver their rice to the government rice store; in the case of Lam Pao this was in Kalasin town. Normally when a farmer sells to a miller or merchant he is supplied with sacks, and the government did not do this. Farmers do not own sacks, nor could they purchase them at the current market price of 15 baht each. Millers and merchants would rent sacks which held approximately 60-70 kilograms each to farmers selling to the government, at 2 baht a sack. The farmers also had to pay the cost of transport from the farm to the store. The cost of transporting each sack to Kalasin was

2-4 baht, depending on the distance, so the total cost of selling 70 kilograms of rice to the government was 4-6 baht. An additional expense would be incurred by three or four visits to the amphur office to arrange the sale, at a return fare of 4 to 5 baht each time. The gross return on one sack was 31.5-35 baht; since merchants were offering 21 -28 baht, in the March-April period of 1971 farmers were still gaining from sale to the government but faced with a great deal of trouble.

The average price level of 5 baht a tang did not appear to be consistent. There was some grading of rice; higher quality non-glutinous rice fetched as much as 6 to 7 baht a tang, while poorer glutinous rice was priced as low as 4.25 by the government buying agencies.

Overall the quota system and guaranteed price did little to alleviate the position of rice growers in the 1970-1 season. There are no figures concerning the final amount of paddy purchased under the 1970-1 arrangements, but if the entire budget was used for purchase, some 125,000 tons might have been bought.[18] With the improvement in the general market conditions for paddy the quota and price support system fell into disuse, although the government has continued to publish guaranteed prices. These have been consistently below the prevailing farm gate price, and no rice has been sold under the scheme.[19]

The two periods of government involvement in the internal paddy market have both resulted from adverse market conditions and appeals by Farmers Groups to help the farmers. No permanent changes in paddy marketing have resulted from either of these periods and no policy aimed at change evolved. Both periods were characterised by short term ad hoc measures to alleviate the suffering of farmers faced by a sudden

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18 Given a total budget of 250 million baht and an average price of 0.50 baht a kilogram.

19 Bank of Thailand Monthly Review, March 1972, pp.7-8.

reduction in the cash returns for their crop.

The free marketing system for kenaf

The discussion of the market conditions for kenaf indicated that while the international market for the crop was likely to remain uncertain as long as the fibre was seen only as a substitute for jute during periods of high jute price, the very poor and highly unreliable quality of much of the Thai kenaf fibre greatly increased this uncertainty. Jute mills adopting Thai fibre have returned to jute more readily because of the unreliable nature of the kenaf, and the international reputation of the crop is low.

Changes in the internal grading system involving more stringent controls will enable the reliability of grading to be introduced, however the problem of low fibre quality has to be dealt with at the farm level. In general farmers are given no incentive to produce higher quality fibre; merchants normally buy 'mixed grade' fibre, which results in little differentiation between good and bad. In years of very high demand, farmers, merchants and graders have all shown themselves to be prone to further lowering standards. They key process at the farm is retting and stripping, since this takes place in the September-November period when the general level of world demand is known. In years of low price, much of the crop is left unharvested, the farmers considering it not worth the labour inputs. Clean and adequate supplies of retting water are fundamental in the production of high grade fibre; without price incentives to take the trouble to obtain suitable retting facilities, kenaf will be retted in whatever water is available. The earliest harvest normally is of generally higher quality because of the better water supply early in the year; later in the season there is a shortage of good

retting water and the fibre may have hardened by being left too long in the field or left out for too long before retting commenced. The advent of price differentials for the various grades of fibre at the farm gate level must be seen as essential if fibre quality and the reputation of Thai kenaf on the world market is to be increased.

The timing of harvesting both for the water supply and the fibre yield and quality is of significance. Also, since the Bengali jute comes on the market in late July, kenaf marketed in late August is likely to fetch a higher price than kenaf marketed later in the year when kenaf and jute both depress the world fibre market. International buyers are more likely to be interested in kenaf as a substitute for jute if it comes on the market near the time of the main jute crop. The early harvest of kenaf is made possible only by early planting. Under the conditions of rainfed agriculture prevailing in North East Thailand, early planting cannot be guaranteed, but the use of tractor ploughing rather than water buffaloes enables several weeks to be gained in most years. Field work in 1972-3 indicated that if the price incentives were present, farmers would make use of tractors in order to gain by early planting and early harvest.

Several lines of approach to the kenaf quality problem may be seen. A number of investigations have suggested that commercial retting and/or the development of cheap but effective retting pits would aid in the improvement of fibre quality.[20] The problem with such retting improvement schemes is that unless there is some financial incentive in the first place, farmers will be extremely reluctant to adopt such technical improvement.

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20 Chechi and Co., "Improved Kenaf Retting Facilities in North East Thailand", U.S.O.M., 1968; E.J. Sholton, "Kenaf in Thailand", 1968, pp.191-212.

The price differentials are the principle source of profit for the middlemen for a very simple process of opening bundles, regrading and rebundling. Because of the small size of production of many individual farmers, kenaf can pass through one or two merchants' hands before reaching the regrading process, and some profit is taken at each of these levels. There appears to be some basis for the development of village level assembly, grading and bulk sale, though the organisational problems would need careful study. Since many kenaf farmers sell small quantities of the fibre as it is ready, rather than waiting for the entire crop to be saleable, one suspects that they sell to meet pressing cash needs. This would present a problem for collection, grading and bulk sale at the village level. It may be possible, however, to organise such schemes on a co-operative basis, involving credit and finance.

Farmers interviewed confirmed that they would become more committed to kenaf cultivation in terms of area planted, hired labour, fertiliser and insecticide if the price level was guaranteed as low as 2 baht. Given the present state of the international kenaf market and the pattern of the last twelve years, it is extremely difficult to envisage how a guaranteed price system could be made in any way economic unless the international market can be stabilised and/or the internal market expanded. It is clear that some guaranteed minimum level of return is needed to increase the level of inputs and thereby the quality of the crop; however, this may be seen as a second requirement after the development of incentives to improve the quality of fibre by changes in retting techniques. The fact that the likely level of Bengal's jute crop will be known in late May means an effective market news system could be of great benefit to farmers.

In 1971-2 a Kenaf Package Project was set up by N.E.D.B. in conjunction with Agri-Business Consultants. The aim was to establish a programme of kenaf improvement operating initially on 60,000 rai in changwat Chaiyaphum which if successful could be elaborated in a kenaf Master Development Programme for the North East region as a whole. A complete range of technical assistance and inputs was planned, including improved seed, fertiliser, pest and disease control, retting tank construction and extension and marketing services. In essence the scheme was to provide a purchasing service which gave an incentive price to farmers to produce grade 'A' fibre and to operate in conjunction with the B.A.A.C. a credit scheme for kenaf farmers to improve their retting facilities and level of inputs in the crop. Investigation of kenaf production and marketing by N.E.D.B. and Agri-Business Consultants suggested that the implications of the retting and input improvements would result in a marked change in the proportion of the three grades produced. At present the proportions are: grade A, 15%, B 50% and C, 35% (see chapter VIII). With the improvement scheme, these would become: grade A, 40%, B, 50% and C, 10%. It is clear that such a change would do much for the international reputation of the fibre provided that uniform grading practices could be implemented.

Fibre was to be purchased by the North East Jute Mill at Nakorn Ratchasima under an agreed price differential scheme. The B.A.A.C. was to supply the necessary credit through kenaf Farmers Groups organised under B.A.A.C. registration. Repayments of the loans were to be made from the proceeds of sales through the purchasing scheme. Many Farmers Groups do not conform to B.A.A.C. regulations and could not receive loans. The successful implementation of this credit scheme would necessitate considerable work on the part of the B.A.A.C. to organise Kenaf Farmers Groups.

The 1972 Pilot Project produced very disappointing results for a variety of reasons. Because of various administrative delays, the credit facilities were not in the event operational. Similarly, lack of inputs and extension staff severely curtailed any changes in the methods of production. Most fundamental, very little kenaf was sold by the farmers to the marketing scheme. The incentive price level for grade A was fixed at 2.50 baht a kilogram, on the assumption that the mixed grade price would be 2 baht. In the event, mixed grade prices reached 3.70 baht in September 1972, and 3 baht in October. No farmers would sell to the incentive scheme. This led to a modification of the policy to offer the following prices:

	A	B	C	Mixed Grade
September 15 :	4.00	3.85	3.35	3.70
October 1 :	3.30	3.00	3.50	3.00

The differential of just 0.15 baht and 0.30 baht hardly appears to give the farmers adequate incentive. Unless an individual has substantially more A grade fibre than C, he will make a loss selling graded rather than mixed. Since farmers are not well informed about grading, they may well be reluctant to sell in this way. In addition, there was only one buying unit at the North East Jute Mill in Nakorn Ratchasima, a distance of 120 kilometres from the main growing area in Chaiyaphum. Farmers were expected to provide transport and visit the mill to arrange sales. Transport rates, about 0.08 baht a kilogram, considerably reduce the 0.15 differential. The additional cost of visiting the mill to arrange the sale, the time spent and the delay in receiving payment until after the fibre was graded were clearly sufficient to cause the majority of farmers to sell to merchants who came to the village, took the kenaf and paid cash, even at a slightly lower rate. In view of the small quantities sold under the scheme, the North East

Jute Mill withdrew its support.

A revised scheme was to be implemented in 1973-4, with the hope of full operation and the establishment of buying centres closer to the growers, making use of small baling plants if they could be persuaded to co-operate in the scheme.

There are many weak points in schemes of this nature. There is no allowance made for the very great fluctuation in kenaf price levels that have occurred since the crop was introduced into the North East. The availability of credit to improve retting facilities and increase the level of cash inputs is likely to create severe problems for both the B.A.A.C. and the farmer if kenaf prices fall sharply as they did in 1963 and 1967. Under government regulations concerning co-operatives, the B.A.A.C. cannot force farmers to repay loans, nor can the farmers be forced to sell to a particular scheme. The investment in retting facilities, provided it is accompanied by a satisfactory incentive scheme, is extremely sound, however the establishment of credit facilities to encourage farmers to use a high level of inputs is of more questionable value. So far the attempts at promoting the use of improved seed under the scheme have foundered because of lack of seeds, credit and personnel. However, attempts to introduce improved seeds under Department of Agricultural Extension schemes have all met with little success. The 'Daisy' variety which was encouraged in 1971-2 was found to be far less tolerant of drought and poor soil than the native varieties. Also it was, like the Cuban varieties introduced by U.S.O.M. in the late 1950's, extremely prone to insect and disease damage. Many farmers who were enthusiastically planting the 'Daisy' seed in 1971-2 reverted to the traditional strains in the following year.

As was noted in chapters VII and IX, the yield increase in response to fertiliser is of the order of 25% with a recommended input

of 50 kilograms a rai. Thus at a minimum fertiliser price of 2 baht a kilogram, a minimum kenaf price of 2 baht a kilogram is needed to break even, and a price of 3 baht only gives 50 baht a rai extra income. Fertiliser use is only justified in years of high price. Damage due to insects is a definite problem, particularly in dry years, but the expenditure on insecticide has to be weighed against the return. The Ministry of Agriculture estimates full protection costs 80 baht a rai, which, as with fertiliser, cannot be justified unless there is a guaranteed high price.

Farmers normally apply cash inputs in kenaf in the form of hired labour, particularly for retting and to a lesser extent for weeding. The expenditure of cash, which may be borrowed, on hired labour for retting takes place at a time of year when farmers are fairly certain of the likely price levels that will prevail. They are taking relatively little risk by using cash inputs in this way. It is noticeable that expectation of price level influences the level of weeding inputs and of tractor hire for planting, and farmers will take the financial risk if they think the added return will justify it.

There is little doubt that farmers would respond to price incentives to produce better kenaf fibre, but interviews with them confirm that their greatest concern is with the very great fluctuations in price that have affected kenaf in the past. A 0.50 baht a kilogram incentive to produce better kenaf is of little use if the overall price can still fall as low as 0.50 baht. It seems possible to apply the grading and price incentive scheme, but in the absence of any guaranteed price system it is unreasonable to expect the farmers to borrow money to increase inputs other than to improve retting facilities. Group or communal retting and collection of the fibre may well be a policy worth considering in this context.

A guaranteed price scheme would be extremely difficult to operate under the present kenaf marketing arrangements. Farmers would be willing to sell to a support scheme in years of low price, but unless it could offer the same level of prices as the commercial merchants in good years, there would be great reluctance to sell to these agencies. If the kenaf market could be concentrated in government hands, a smoothing out of the price fluctuations by the setting of a price level and bulk storage would be economically viable but would have little chance of inception in the Thai context. Since the mid-fifties Thailand has not been in favour of state control of aspects of the economy in this way, and vested interests among merchants and exporters would make such a system difficult to implement.

At the village or co-operative level, collection and bulk sale to merchants could be an important step forward, but one cannot envisage farmers selling at a lower price to the co-operative in good years to compensate for co-operative purchases in years of low price. Farmers would tend to sell outside the co-operative in years of high price. From the farmers' viewpoint the guaranteed minimum price level is of great importance, but this would be most difficult to implement in practice unless the government was prepared to lose money, particularly in the initial stages. It may be that several years of guaranteed price might result in important stabilisation of kenaf production and improvement in quality, which in turn might help in stabilising the level of international demand for the fibre. The adoption of a price incentive scheme by N.E.D.B. is working towards such stabilisation; it was hoped that the North East Jute Mill in Nakorn Ratchasima withdrawing from the project would not prevent baling plants and other mills from co-operating, and that the 1973-4 project would be better organised, but as yet the results are not known.

The Government Role in Marketing

The Thai government to date has severely limited its involvement with the internal marketing of crops. Its participation in the internal rice market in the period since 1965 has had little real impact, but particularly under the quota system operating in 1971 the difficulty of any state action in such a highly developed and complex system as the international rice market was well illustrated. There is clearly more opportunity for involvement in the less developed markets which are present for the new crops. However the 1971-2 experience with the kenaf project reveals that there are considerable organisational problems and that the government marketing will face difficulties competing with the private sector. N.E.D.B., in setting up the kenaf project in 1971, discovered that they could not set up an independent marketing system by obtaining the co-operation of baling plants or mills. There was a belief implicit in this that the existing private sector would combine to put the new government marketing system out of business. The whole question of lack of facilities and experience to purchase, grade and sell the fibre amongst government personnel comes to the fore in any discussion of such schemes. Effective government marketing would either have to work through, or draw its staffing from, the private sector.

Despite the failure of any government marketing at both the national and local level, in the form of co-operatives, to produce any significant results, it remains implicit in Thai agricultural policy. The Minister of Agriculture has said: "The Agricultural Ministry will try its best to reach farmers directly. Official marketing organisations will be set up to fulfill farmers' demands for easy sale terms".[21]

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21 Quoted in the Bangkok Post, April 26 1969.

Government policy appears to centre on the ill effects of the middlemen, and sees their elimination or reduction in their numbers as fundamental in improving the level of return received by the farmers. An example is the Minister's statement:

> "Middlemen must be eliminated to improve the living conditions of the farmers.... Middlemen have caused economic instability among farmers which is a reason why our farmers have been in difficult circumstances".[22]

The government concern over the exploitation of the farmers by the private marketing chains runs contrary to the findings of most economists, who have stressed the essential competitiveness of the markets for the various commodities and the small size of the marketing margins. To date co-operative marketing has resulted in little success in the kingdom as a whole. This failure emphasises the essential difficulty of any overall or local involvement in the paddy market. Some limited success has been experienced with maize in the north of the Central Plain, exporting to co-operative organisations in Japan. New crops, such as maize, because they have no well organised and competitive marketing system, do provide an opportunity for state involvement provided it is brought into operation quickly and efficiently. The involvement with kenaf suggests that efficiency is severely lacking even in the case of this relatively new crop, which, because of the grading necessary, does offer an opportunity for the involvement of the government, either in an overall scheme or through local co-operatives. The discussion in chapter VIII emphasised that the margins are large and an organisation should be able to be set up that would benefit farmers in the short term by increasing the percentage of the Bangkok wholesale price that they obtain and in the long run by stimulating higher quality

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22 Ibid.

production with an effective grading system, which would give Thai kenaf a reputation for quality to make it more competitive with jute and help to even out the fluctuations in international demand that have been present during the last decade.

The high degree of indebtedness to middlemen has been seen by many as an important factor in the exploitation of the farmers.[23] Farmers have to sell directly after the harvest to pay debts; in the case of rice, this can mean a lower price is obtained. If the farmers owe money to the middlemen, they may be forced to sell to their creditors at particularly low prices. This was found to be particularly the case in the Central Plain.[24] However, in the Lam Pao study area the problem did not appear to be a common one. The provision of loans via the various credit co-operatives, while reducing the farmers' dependence on the middlemen, still encourages sale early for repayment. For example, the Farmers Groups organised by the B.A.A.C. expect the local group leader to inform them when farmers have sold, and encourage them to sell and repay their debts after the harvest. Thus the replacement of middlemen credit by co-operatives, while not obliging the farmers to sell to the credit source at what may be a deflated price, still put a premium on sale immediately after the harvest and give no incentive to store against the later higher rice price.

Problems and Prospects of Agricultural Transformation: a concluding view

It has been shown that fundamental changes in the land use pattern have been induced by the rapid expansion of the cash cropping sector, where almost the entire crop, along with surplus rice, must go

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23 Thipchaimetta, op.cit., p.8.

24 Ibid.

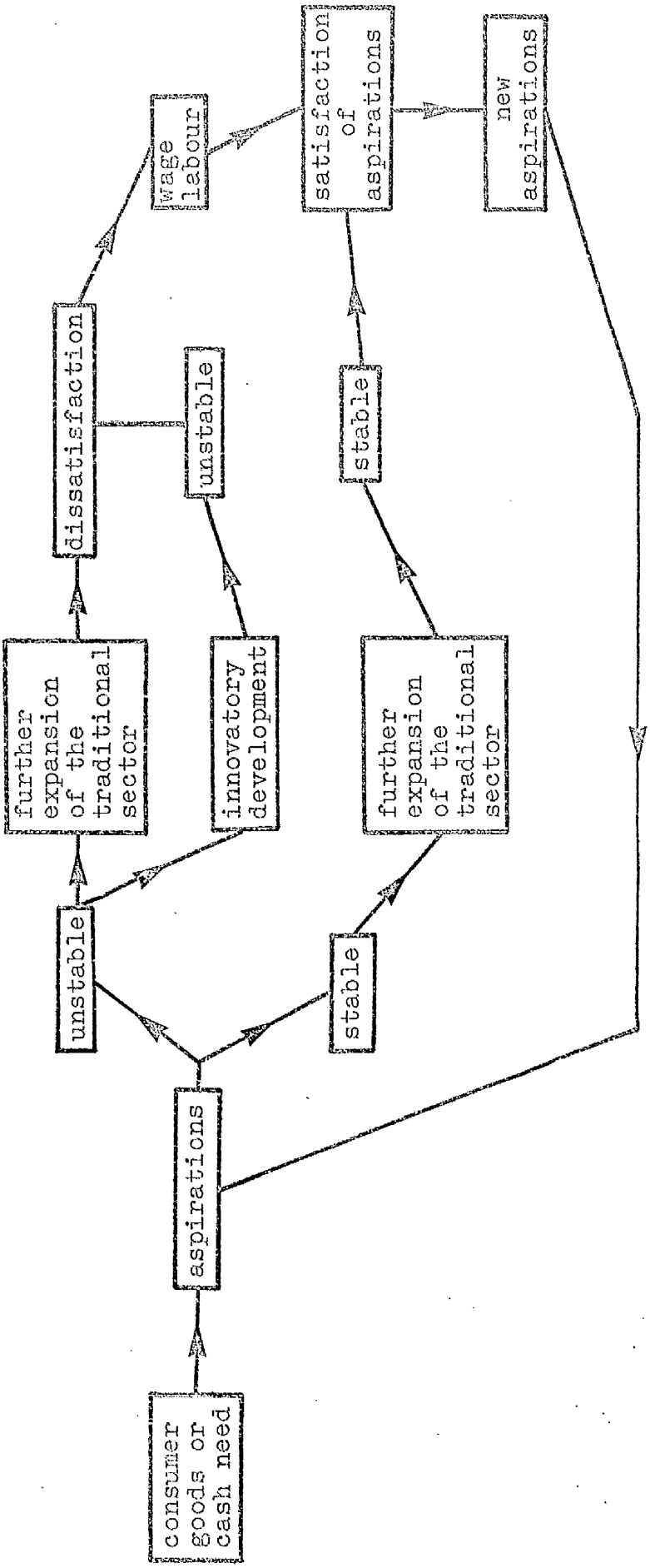

Fig. X.1 The Agricultural Response to New Aspirations

through the market mechanism to yield the necessary monetary returns to satisfy the increased expectations. The process is complicated, but is clearly related to the problem of state intervention and the efficiency of the marketing system, which is left largely to the private sector.

Price levels have not been stabilised, incentives for improved quality produce have not been developed, nor the farmers' share of the export price increased. Both the expanded traditional and innovatory sectors of the North East farm economy have been equally unstable in production and level of returns. To date the agricultural policy directed at the North East has failed to stabilise the production of either the traditional or the new crops. The transformation of the rural economy into one of modified traditional or modified expanded, where the farmer has a degree of environmental control and specialisation can take place has not been made.

Development of expanded traditional and innovatory agriculture from the traditional sector has been seen in terms of farmers' response to new aspirations engendered by the development of transport, mass media, new consumer goods, and a retail outlet network. The generation of new cash aspirations has been taking place faster than the agricultural production has been able to create cash income to satisfy the new wants. Elaboration of the farmers' response to increased aspirations is shown in figure X.1. The line of development at each stage in the model is in response to increasing levels of aspiration, and the ability of the traditional or innovatory sectors of the agricultural economy to generate a steady flow of cash income of the level required to satisfy the wants.[25]

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25 The formulation in footnote 1, chapter IX, may be elaborated:

$$\frac{G_i}{G_a} = D$$

G_i = rate of generation of cash income

G_a = rate of generation of aspiration

D = degree of dissatisfaction with the agricultural sector or sectors, and the level of incentive to seek 'stable' sources of income.

The ability of the agricultural economy to produce the required level of cash income is measured in terms of 'stability', that is, the regularity of the income flow, a function of reliability of production, stability of markets, and the nature of the market system.

The expansion of the traditional sector can successfully satisfy the wants if it is stable in production and level of return, and there is no defect in the market mechanism or government policy that results in a deflated return. Instability can come from the market, the production conditions, or both, and results in either low or extremely uneven levels of cash return. If the traditional sector is unstable, innovatory development, provided a suitable crop is available, may result.

Similar lines of argument apply with respect to the innovatory sector, stable conditions enabling aspirations to be satisfied and unstable resulting in dissatisfaction with the return from the sector. Where both sectors are unstable, a situation of dual development may ensue with perhaps the instabilities cancelling each other out to some degree, or combining to compound dissatisfaction with crop production as a source of income. Unstable conditions either stemming from the production or the market are likely to result in a low level of participation by farmers, rendering specialisation less likely, and encouraging a tendency towards risk spreading and low levels of input. A low degree of commitment, as in the case of kenaf in the North East, can result in low quality production and a compounding of the instability of the economic element. The solution to dissatisfaction shown in the model is wage labour off the farm, either local or temporary or permanent migration, depending on the availability of work. This solution to the increased 'aspiration gap' between cash income generative capacity of agriculture and farmers' aspirations may occur at an early stage, with

little or no development of agriculture along traditional or innovatory lines (figure II.2).

The model is circular, in that aspiration is likely to rise continually and feed back change into the farm economy. It is possible that a situation of stability, based either on traditional expansion or innovation may become unstable and unable to generate the necessary cash income and so produce dissatisfaction and a search for either new crops or non-agricultural sources of want satisfaction.

It is clear that with rising aspiration in the North East, farmers have become increasingly dissatisfied with the cash income flow from expanded traditional, innovatory and dual situations of production. This dissatisfaction with agricultural income is reflected in the tendency for the North East to be a region of net migration loss and of marked temporary seasonal migration to other parts of the country and to urban areas within the region. The increasingly available off-farm employment within the rural North East results in many farmers undertaking full or part-time employment in their own area. Seasonal migration and local employment in non-agricultural activities is likely not only to supply the extra income that cannot be obtained from agriculture but also to increase the expectation of the farmers for a regular flow of cash income and thereby increase dissatisfaction with agriculture as a source of cash. Transport and communications developments have increased seasonal and permanent migration opportunities and consequently the flow of migrants as is the pattern when a less privileged region is linked to one apparently more prosperous.[26]

Heavy investment in infrastructure, by increasing farmers'

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26 E.G. Ravenstein, "The Laws of Migration", Journal of the Royal Statistical Society, 48, 1889.

awareness of the outside world, has stimulated aspirations, and the generation of large amounts of off-farm work has provided a means of satisfying these new aspirations. The investment in agricultural infrastructure, particularly irrigation, has been too slow in generating change in the agricultural sector; agriculture has not become a source of higher levels or more stable cash income, despite the investment. Cessation of the flow of investment capital in construction, either regionally or locally, and the reduction in off-farm employment is not likely to result in farmers turning to expanding agriculture for money income; rather, migration will result, either to urban areas of the North East or to other parts of Thailand, notably Bangkok. Even if the irrigation schemes become fully operational, many farmers are likely to prefer non-agricultural sources of income, given the generally seasonal and irregular income that is likely to result from crops, even under irrigated conditions.

Agriculture still has a role to play in the North East, but returns to the investment and development schemes must be accelerated. Multiple cropping will even out the cash flow, but either new crops with stable demand conditions must be introduced, or effective ways found to stabilise and increase the price levels obtained by the farmers for the existing crops. The success of intensive vegetable production in the areas adjacent to the main North East urban centres illustrates the farmers' continued willingness to participate in agriculture if it yields rapid and regular income flows. The use of irrigation water to produce short season vegetables in one of the villages of the Lam Pao area indicates farmers' desire for quick returns; these could not come from the existing cropping pattern even if the yields could be stabilised by irrigation. However only the expanded traditional sector is likely to be stabilised by irrigation, and the upland innovatory development will

remain as unstable as previously. Since paddy has been unreliable in demand level, even if production conditions are stabilised, without market development schemes the cash flow from the crop is likely to remain irregular. Under present South East Asian and world trends in paddy production, great expansion in production under North East conditions is not going to be possible. The 1971-2 glut will probably be repeated, and paddy cannot expand the income of the region's farmers. Clearly a new line of innovatory development is needed, producing a pattern of modified traditional and modified innovatory on the irrigated land. Much could be done for the present innovatory sector by stabilising and increasing the level of production and returns, but it will remain unreliable because of the rainfed conditions and kenaf is likely to experience continued demand fluctuations no matter what policy is followed.

Serious rethinking of the role of irrigation in North East Thailand is necessary; development must be speeded up, and methods of crop diversification must be considered. The region's irrigation schemes were planned in the 1950's and early 1960's on the basis of a rice market which was continuing buoyant, and envisaged large areas of double-cropped, high yielding rice.[27] It is improbable that the development of high yield double cropped rice will be possible over a large area; specialised rice growing on a small area and specialised cultivation of new crops, particularly cash crops, would seem at present a more suitable solution. A large area of non-paddy crops could be grown with the same volume of irrigation water, because of the very high water demands of

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27 Examples of this view are contained in the Feasibility Studies for North East projects conducted for the R.I.D. by consultant firms, for example: R.I.D., Lam Pao Feasibility Study, 1962.

paddy compared with, for example, peanuts or soyabeans.[28]

Even allowing for population growth, the North East will not be able to support the production of rice resulting from stabilised yields and double cropping. The region is not likely to be able to compete with the more fertile, developed commercial rice growing area of the Central Plain; in the event of reduced demand the North East is first to suffer because of the greater advantage of the rival region.[29]

The heavy investment in North East agricultural infrastructure appears to be working against the progress of agriculture in the region by aiding in the stimulation of farmers' levels of aspiration without developing the capacity of agriculture to satisfy those aspirations. The attendant generation of off-farm employment has enabled the 'aspiration gap' left by agriculture to be partially filled. Removal of off-farm labouring opportunities may well result in increased rates of migration and discontent in the region. As Feierabend has noted, where aspirations are rising and the mechanisms for satisfying these are deficient, social and economic unrest is likely to be engendered.[30] The slow and uneven growth rates in the North East agricultural G.D.P. are reflected at the farm level, similarly the growth sector of construction in the regional economy is reflected in the off-farm income component of the farm economy.

Thus, not only has the investment in North East agriculture failed to achieve the declared objectives of accelerating rural development, it has also produced some elements which could be considered detrimental.

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28 R.I.D., Lam Pra Plerng Feasibility Study, 1964.

29 R. Ng., "Some Land Use Problems of North East Thailand", Modern Asian Studies, 4, 1, 1970, pp.23-42, reference p.40.

30 I.K. Feierabend and R.L. Feierabend, "Systematic Conditions of Political Aggression: an application of frustration aggression theory", in I.K. and R.L. Feierabend and T.R. Gurr, "Anger, Violence and Politics", 1972, pp.136-183, reference p.137.

BIBLIOGRAPHY

ABBOTT, J.C. "Marketing Problems and Improvement Schemes". F.A.O. Marketing Guide No.1, 1966.

ABBOTT, J.C. "Agricultural Marketing Boards: Their Establishment and Operation". F.A.O., 1966.

AGARWAL, M.C. "Marketing Margins for Malayan Cabbages". Journal of Agricultural Economics, 17 (1), 1966, pp.91-98.

ALLEN, J.L. "The Market for Kenaf in the United Kingdom". Tropical Products Institute, 1969.

ANDERSON, D.A. "Marketing and Development: The Thailand Experience". 1970.

ANDERSON, M.M. "Summary Classification of Food Consumed by 10 Villages in Ubon Province". Unpublished Field Progress Report, 1962.

ANDREW, J.M. "Siam: Second Rural Economic Survey 1934-35". Harvard, N.D.

ASIAN DEVELOPMENT BANK. "Asian Agricultural Survey". 1969.

ASIAN DEVELOPMENT BANK. "Nong Wai Pioneer Project for Irrigated Agriculture". 2 volumes. 1971.

ASSEN, J. "Field Observations on Agriculture in North East Thailand and Laos". 1968.

A.S.R.C.T. "Seasonality and Intensity of Rainfall in N.E. Thailand". Bangkok, 1967.

BAILEY, F.G. "Caste and the Economic Frontier". 1957.

BANGKOK BANK "Monthly Reviews", 1959-72.

BANGKOK BANK "Annual Report", 1966-1972.

BANK OF THAILAND "Monthly Review", 1966-72.

BANK OF THAILAND "Annual Report", 1966-1972.

BAU, D.H. "Agricultural Economic Survey of Saraphee District". 1951.

BEHRMAN, J.R. "Supply Response in Underdeveloped Agriculture". 1968.

BELL, P.F. and TAI, J. "Markets, middlemen and technology: Agricultural supply response in the dualistic economies of South East Asia". Malayan Economic Journal, Vol.14 No.1, 1969, pp.29-46.

BELLMAN, R.G. and ZADEH, L.A. "Decision making in a fuzzy environment". Management Science, 17, 1970, pp.3141-3164.

BEN-NUN, R. "The Lam Dom Noi, Lam Nam Pao and Ubolrat Self Help Resettlement Projects". 1971.

BERGER, L., Inc. "North East Economic Development Plan". 1971.

BERGER, L., Inc. "North East Thailand Recommended Development Budget and Foreign Assistance Project 1972-76". 1971.

BERTHOLET, C.J.L. and DISWAT, Bencha "Housing and Food Patterns in Eleven N.E. Villages". 1963.

BLANCHARD, W., ed. "Thailand, Human Relations Area File, 1958.

BOEKE, J.H. "Economics and Economic Policies of Dual Societies as exemplified by Indonesia". New York Institute of Pac. Rels. 1963.

BOHANNON, P. and DALTON, G. "Markets in Africa". 1962.

BOONLINKAJORN, Prapandh and KRITTAYANAWACH, Prawit "Effect of Planting and Harvesting Times on Yield of Kenaf". A.S.R.C.T., 1970.

BOONKLINKAJORN, P., KRITTAYANAWACH, P., CHOMCHALOW, N. and KASIPAR, A. "Effect of planting date on the yield of kenaf". Thai Journal of Agricultural Science, 3, 1970, pp.43-54.

BRANNON, R. "End of Tour Report". U.S.O.M., 1963.

BROMLEY, R., HODDER, W.B. and SMITH, R.H.T. "Market Place Studies: A World Bibliography". Forthcoming.

BROWN, L.R. "Agricultural Diversification and Economic Development" in "Thailand: A Case Study", Foreign Agricultural Economics Report No.8, Regional Analysis Division, Economic Research Service, U.S. Department of Agriculture, 1963.

BRUMBY, P.J. and BAKER, J. "Thailand: Livestock Reconnaissance Mission". F.A.O./I.B.R.D., 1973.

BUCK, T.W. "Shift and share analysis - a guide to regional policy?" Regional Studies, 4, 4, 1970, pp.445-50.

CADY, J.H. "Thailand, Burma, Laos and Cambodia". 1966.

CHATURVEDI, J.N. "Theory of Marketing in Underdeveloped Countries". 1959.

CHECCHI AND CO. "Potential for Private Agri-Business Investment in N.E. Thailand". 1965.

CHECCHI AND CO. "Improved Kenaf Retting Facilities in the North East". U.S.O.M. 1968.

CHU, Chien et al. "A Brief Review of the Thai Kenaf Mill Industry". A.S.R.C.T., 1968.

CHUCHART, Chaiyong et al. "Economic Survey of Land Cooperatives in the North East of Thailand". Kasetsart University Economic Report No.4, Bangkok, 1959.

CHUCHART, Chaiyong "Production and Marketing Problems affecting the Expansion of Corn Growing in Thailand". Kasetsart University Economics Papers, No.8, 1962.

CHUCHART, C. "The Relation between Land Tenure and Rice Production in Five Central Provinces of Thailand". Ministry of National Development, Bangkok, 1965.

CHUCHART, Chaiyong, "An Economic Study of the Production and Marketing of Thai Kenaf". A.S.R.C.T., 1967.

CHUCHART, Chaiyong et al. "Production and Marketing Problems affecting the Expansion of Kenaf and Jute in Thailand". Kasetsart University Economics Papers No.7 (in Thai), 1962.

CHUCHART, Chaiyong et al. "An Economic Study of the Production and Marketing of Thai Kenaf". A.S.R.C.T., 1967.

CHUCHART, Chaiyong and TOSOONTHORN, Suphan, "Costs and Returns on Korat Farm Enterprises". Kasetsart University, 1957.

CHUCHART, C. and TONGPAN, S. "The Determination and Analysis of Policies to Support and Stabilise Agricultural Prices and Income of Thai Farmers". 1965.

CLARK, C. and HASWELL, M. "The Economics of Subsistence Agriculture". 1964.

CLARK, D.K. "The Inland Waterway Transport System of Thailand". 1964.

CLARK, D.K. and GIARATANA, A.C. "The Railway System of Thailand". R.A.C.F.O. Field Paper No.3, 1964.

COADES, G. "The Making of South East Asia". 1962.

COWAN, J.A. and CHALMERS, R.S. "Economic Growth and Structural Change in North East Thailand" (mimeograph), N.D.

CRIPPS, F. "The Far Province". 1965.

DAMMANN, N. "Evolution of Community Development in 4 N.E. Villages". U.S.O.M. 1964.

DARLING, F.C. "Thailand and the United States". 1965.

DAVID, P.A. "Kenaf Culture". N.D.

DEMAINE, H. and DIXON, C. "Land tenure patterns and agricultural development in North East Thailand: a case study of the Lam Pao Irrigation Scheme in Changwat Kalasin". Journal of the Royal Siam Society, Vol.60, part 2, 1972, pp.45-60.

DEMPSEY, J.M. "Long Vegetable Fibre Development in Southern Vietnam and other Asian Countries". 1962.

DEPARTMENT OF LAND DEVELOPMENT. "Agricultural Development in Thailand with special reference to rural institutions". 1969.

DEWEY, A.G. "Peasant Marketing in Java". New York, Free Press, 1962.

DEWEY, A. "Capital, Credit and Saving in Javanese Marketing" in R. Firth and B.S. Yamey (eds.), "Capital, Saving and Credit in Peasant Societies". 1964.

DE YOUNG, J.E. "Village Life in Modern Thailand". 1963.

DOBBY, E. "South East Asia". 1958.

EMBREE, J.F. "Thailand: A loosely structured social system". American Anthropologist, 52, 1950, pp.181-193.

ENGLE, E.B. "Terminal Report to Development Program in North East Thailand, 1956-8". 1958.

EVERS, Hans-Dieter, ed. "Loosely Structured Social Systems: Thailand in comparative perspective". 1969.

EXECUTIVE COMMITTEE OF THE EIGHTH CONGRESS. "Siam General and Medical Features". 1930.

F.A.O. "Report of the F.A.O. Mission for Siam". 1948.

F.A.O. "Trade in Agricultural Commodities". 2 vols. 1964.

F.A.O. "Rice milling in developing countries: case studies and some aspects of economic policies". No.45, Commodity Bulletin Series, 1969.

F.A.O. "National Rice Policies". F.A.O. Commodity Policy Studies, Annually 1966-1971.

F.A.O. Year Book. 1966-1972.

FEI, J.C.H. and RANIS, G. "Agrarianism, dualism and economic development", in Adelman and Thomas (eds.), "The Theory and Design of Economic Development". 1966.

FEIERABEND, I.K. and FEIERABEND, R.L. "Systematic Conditions of Political Aggression: An Application of Frustration Aggression Theory", in Feierabend, Feierabend and T.R. Gurr, "Anger, Violence and Politics", 1972, pp.136-183.

FIRTH, R. and YAMEY, B.S. "Capital, Saving and Credit in Peasant Societies". 1964.

FISHER, C.A. "South East Asia". 1964.

FRONDA, F.M. "Thailand Farming". Philippine Journal of Agricultural Economics, 36, 4, 1952.

GIARATANA, A.C. "The Highway System of Thailand". R.A.C.F.O. Field Paper No.2, 1964.

GIARRATANA, A.G. "Provincial Road and Trail Reconnaissance in N.E. Thailand". 1964.

GINSBERG, N. "From Colony to Nation: Geographical perspectives on patterns and policies", Annals of the Association of American Geographers, 63, 1, 1973, pp.1-21.

GOULD, P.R. "Man against his environment: a game theoretic framework", Annals of the Association of American Geographers, 53, 1963, pp.290-297.

GRAHAME, W.A. "Siam, a Handbook of Practical, Commercial and Political Information". First edition, 2 volumes, 1912.

GRIST, D.H. "Rice". 1968.

HAMADA, H. "Rice in the Mekong Valley". Tokyo, 1965.

HARRIS, G.L. et al. "Area Handbook for Thailand". 1966.

HILL, G.W. "Field Trip Report". N.E.D.B./U.S.O.M. 1969.

HODDER, W.B. "Economic Development in the Tropics". 1970.

HUGHES, R.B. "Thailand: Agricultural Cooperatives: An evaluation with recommendations for improvement". 1968.

HUNTER, G. "Modernising Peasant Society". 1969.

INDIAN CENTRAL JUTE COMMITTEE. "Report on the Market and Transport of Jute in India". 1952.

INGERSOLL, J. "Human Dimension of Mekong River Basin Development: A case study of the Nam Pong Project, North East Thailand". 1968.

INGERSOLL, J. "The Social Feasibility of the Pa Mong Project". 1970.

INGERSOLL, J. "Notes on North Eastern Rice Stations and Cultivation". 1972.

INGRAM, J.C. "Economic Change in Thailand 1850-1970". 1971.

INTERDEPARTMENTAL COMMITTEE ON NUTRITION FOR NATIONAL DEFENCE. "Nutrition Survey". 1960.

ISRANKURA, Vanrob "A Study on Rice Production and Consumption in Thailand". Ministry of Agriculture, 1966.

JANLEKHA, K. "A survey of socio-economic conditions in a rural community in North East Thailand". The World Land Use Survey Occasional Papers, No.8, 1968.

JITTRASATRA, Nit "Economic Effects of Khon-Kaen-Yangtalat Feeder Road". Unpublished M.Sc. Dissertation, 1967.

KASIPAR, A. "Jute and Kenaf". Research and Experiment Division, Department of Agriculture, Technical Bulletin, 1967.

KEYES, C.F. "Isan: Regionalism in North East Thailand". 1965.

KIRBY, R.H. "Kenaf (Hibiscus cannabinus L.)", Fibres, 1949, pp.336-8.

KLAUSENER, W.J. "Report on the Village of Nong Khon". U.S.O.M., 1956.

KRIDAKARA, Prince Sithiporn, "Rice Farming in Siam". 1969.

KRISANAMIS, P. "Paddy price movements and their effects on the economic situation of farmers in the Central Plain of Thailand". 1967.

KRISHNA, R. "Farm supply response in India - Pakistan; a case study of the Punjab region". The Economic Journal, 73, 1963.

KRISHNA, R. "Agricultural price policy and economic development" in H.M. Southworth and B.F. Johnston, "Agricultural Development and Economic Growth, 1968, pp.497-540.

KUWINPANT, Preecha, "Rice Market in Ayutthaya". The Journal of Social Science (Special Issue) July 1971, pp.171-213. (In Thai).

LANE, M. "Development of peanut growing and processing in North East Thailand". U.S.O.M., N.D.

LONG, J.F. et al. "Economic and Social Conditions among Farmers in Changwat Khon Kaen". Kasetsart University Economic Reports, No.22, 1963.

MADAN, B.K. "Economic Problems of Under-Development in Asia". 1953.

MADDOCK, J.W. "Agricultural Credit in Thailand". (A study of Nakorn Ratchasima). 1960.

MADGE, C. "Village Communities in N.E. Thailand". TUFEC, 1955.

MAHAMAKET UNIVERSITY STUDENTS "Report on Socio-Economic Conditions of People in N.E. Thailand". N.D.

MATHER, J.N. "Siam Jute". Bulletin of the British Jute Trade Association, Volume 9, 1963.

McFARLAND, G.B. "Thai-English Dictionary". 1954.

MEHREN, G.L. "Market organisation and economic development". Journal of Farm Economics, Vol.41, No.5, 1959.

MEKONG COMMITTEE "Tributary Projects in Thailand". 1970.

MILFORD, R. "Thailand: Livestock Reconnaissance Mission", I.B.R.D., 1973.

MINISTRY OF AGRICULTURE "Annual Report to the F.A.O." 1948.

MINISTRY OF AGRICULTURE "Agriculture in Thailand". 1957.

MINISTRY OF AGRICULTURE. "Agriculture in Thailand". 1961.

MINISTRY OF AGRICULTURE. "A Study of Agricultural Conditions of the Farmers in Roiet, Mahasarakarm and Kalasin 1962-3". 1963.

MINISTRY OF AGRICULTURE. "Study of Agricultural Economic Conditions of the Farmers in Roiet, Mahasarakarm and Kalasin 1962-3". 1963.

MINISTRY OF AGRICULTURE. "Marketing of Agricultural Commodities in the North East". 1964.

MINISTRY OF AGRICULTURE. "Marketing Margins and Marketing Channels of Major Agricultural Commodities in the North East Region of Thailand, 1963-4". 1964.

MINISTRY OF AGRICULTURE. "Annual Report, Research and Experiment Station Division", 1965, pp.47—53.

MINISTRY OF AGRICULTURE. "Report of the Study of Market News Systems in the North East". 1965.

MINISTRY OF AGRICULTURE. "Silk Production and Marketing in N.E. Thailand". 1965.

MINISTRY OF AGRICULTURE. "Thailand: Agricultural Statistics". 1966.

MINISTRY OF AGRICULTURE. "Report of the Study on Market News Systems in the N.E." 1967.

MINISTRY OF AGRICULTURE. "Upland Crop Report". 1968.

MINISTRY OF AGRICULTURE. "Commodity Prices" (in Thai). 1972.

MINISTRY OF AGRICULTURE. "Agricultural Statistics of Thailand". 1972.

MINISTRY OF AGRICULTURE. "Agricultural Statistics". 1972.

MINISTRY OF AGRICULTURE. "Annual Report on Rice Production in Thailand". 1947-1972.

MINISTRY OF COMMERCE AND COMMUNICATIONS. "Siam Nature and Industry". 1930.

MINISTRY OF NATIONAL DEVELOPMENT. "Thailand Facts and Figures". 1966.

MIRACLE, M.H. "Subsistence agriculture: analytical problems and alternative concepts". American Journal of Agricultural Economics, Vol.50, No.2, May 1968, pp.292-310.

MONTRAKUN, Sarot, "Agriculture and Soils of Thailand". 1964.

MONTRAKUN, Sarot and SUWANAWONG, Sombhot, "Integrated Techniques for Rice Cultivation in Thailand", 1969.

MORGAN, W.B. and MUNTON, R.J.C. "Agricultural Geography". 1971.

MOSHER, A.T. "Getting Agriculture Moving". 1966.

MOSHER, A.T. "To create a Modern Agriculture". 1971.

MUELLER, W.F. "Some market structure considerations in economic development". Journal of Farm Economics, Vol.41, No.2, 1959, pp.414-25.

MYINT, H. "The Economics of Developing Countries". 1964.

MYINT, H. "The Economics of Developing Countries". 1967.

MYINT, H. "The S.E. Asian Economy in the 1970's". 1971.

NAKAJUB, Arb "Agricultural Productivity in Thailand". 1967.

NAKASIMA, C. "The Economic Behaviour of Subsistence Farmers" in C.R. Wharton, "Subsistence Agriculture and Economic Development", 1968, pp.165-185.

NARKSWASDI, Udhis, "Agricultural Credit Systems in Certain Countries". 1963.

NARKSWASDI, Udhis "Farmers' Indebtedness and Rice Marketing in Central Thailand" (in Thai). 1964.

N.E.D.B. "The Thai Agricultural Plan 1961-66". 1961.

N.E.D.B. "Fact Book on Man Power in Thailand". 1967.

N.E.D.B. "Agricultural Development Strategy for Thailand", A Report by the Agricultural Development Strategy Sub-Committee. 1969.

N.E.D.B. "G.D.P. of North East Thailand 1960-1969". 1970.

N.E.D.B. "Changwat Development Planning in the North East". N.D.

N.S.O. "Agricultural Census". 1963.

N.S.O. "Special Family Expenditure Survey Report: Food Consumption in Thailand". 1964.

N.S.O. "Statistics Handbook of Thailand". 1965.

N.S.O. "Annual Crop Cutting Survey". 1968-1972.

NG, R. "Rice cultivation and rural settlement density in North East Thailand". Tijdschrift voor Econ. en Soc. Geografie, Vol.19, 1968, pp.200-210.

NG, R. "A study of recent migration in Thailand". Journal of Tropical Geography, 31, 1970, pp.65-78.

NG, R. "Some Land Use Problems of North East Thailand". Modern Asian Studies, No.4, Part 1, 1970, pp.23-42.

NG, R. "The Socio-Economic Conditions in Huey Sithon", Report prepared for the F.A.O., unpublished, 1972.

NUECHTERLEIN, D.E. "Thailand and the Struggle for Southe East Asia". 1965.

ONSLOW, C. "Asian Economic Development". 1965.

OWEN, W. "Distance and Development". 1968.

PAKKASEM, Phisit, "Thailand's North East Economic Development Planning: A Case Study in Planning". N.E.S.D.B./D.E.D. No.1, 1973.

PARIS, J.D. "Comments". Regional Studies, 4, 4, 1970, p.491.

PENDLETON, R.L. "The importance of termite mounds in modifying certain Thai soils". Journal of American Agronomy, 34, 1942, pp.340-4.

PENDLETON, R.L. "Land use in North East Thailand". Geographical Review, Vol.33, 1943, pp.15-41.

PENDLETON, R. "Thailand". 1962.

PENDLETON, R.L. and MONTRAKUN, Sarot. "Soils of Thailand". N.D.

PENNY, D.H. "Growth of "economic-mindedness" among small farmers in North Sumatra, Indonesia" in C.R. Wharton, Jr. (ed.), "Subsistence Agriculture and Economic Development", pp.152-161.

PILGRIM, J. "Report on a Study of the Lam Pao Irrigation and Self Help Resettlement Project Areas". 1971.

PLATENIUS, H. "The North East of Thailand: its Problems and Potential". 1963.

POOMVISES, Vira et al. "Detailed Reconnaissance Soil Survey of the Lam Pao Irrigation Project". 1963.

RAVENSTEIN, E.G. "The laws of migration". Journal of the Royal Statistical Society, 48, 1889.

RESOURCES FOR THE FUTURE. "Agricultural Development in the Mekong Basin". 1971.

RIMMER, P.J. "Freight Transport in Thailand". Paper read at the Seminar on "Contemporary Thailand" at A.N.U., 6-9 September, 1971.

R.I.D. "Lam Pao Feasibility Study". 1962.

R.I.D. "Lam Pra Plerng Feasibility Study". 1964.

R.I.D. "Tables showing Water Resources in Thailand". Bangkok, 1970.

ROYAL STATE RAILWAYS. "Annual Report on the Administration of the Royal State Railways, 1936-7", 1937.

ROBOCK, L.I. "Radio Perception and Listening in the N.E.". U.S.I.S., 1964.

ROY, E. van, "The Malthusian Squeeze". Bangkok Bank Monthly Review, Aug. 1967.

SATO, Takashi. "Field Crops of Thailand". 1966.

SCHULTZ, T.W. "Production Opportunities in Asian Agriculture". Paper presented to the Symposium on "Development and Change in Traditional Agriculture: Focus on South East Asia", Michigan State University, 1968.

SCHULTZ, T. "Transforming Traditional Agriculture". 1964.

SEALE, C.C., PATE, J.B. and GANGSTED, E.O. "The effect of date of planting and age at harvest on the yield and quality of kenaf in South Florida". Turrialba, 4, pp.125-130.

SELDON, T.H. and WALKER, L.D. "Economic Evaluation and Selection of Lands for Irrigation". 1968.

SEOVILLE, O.J. "Agricultural Development in Thailand". U.S.O.M. 1964.

SHOLTON, E.J. "Kenaf in Thailand". 1968.

SHOLTON, E.J. "The Kenaf Package Project 1972/1973 and 1973/1974". Agri-Business Consultants, 1973.

SIGAFUS, R.E. "Notes on Crop Production Statistics for Thailand by Province". 1968.

SILCOCK, T. "Thailand:Social and Economic Studies in Development." 1967.

SILCOCK, T.H. "Economic development of Thailand" in T.H. Silcock (ed.), "Thailand: Social and Economic Studies in Development". 1967.

SILCOCK, T.H. "The rice premium and agricultural diversification", in idem., ed., "Thailand: Social and Economic Studies in Development", 1967.

SILCOCK, T.H. "Thailand" in R.T. Shand, ed., Agricultural Development in Asia", Ch.IV, pp.103-119, 1969.

SILCOCK, T.H. "The Economic Development of Thai Agriculture". 1970.

SKINNER, G.K. "Chinese Society in Thailand". 1957.

SKINNER, G.W. "Leadership and Power in the Chinese Community of Thailand". 1958.

SKINNER, G.W. "Marketing and Social Structure in Rural China", Part 1, Modern Asian Studies, 1964, pp.3-43.

SLAYTER, R.O. "Agricultural Climatology of the Katherine Area". 1960.

SMITH, H.D. "Agricultural Production and Consumption Patterns in Thailand". N.D.

SMITH, R.H.T. and HAY, A.M. "A theory of spatial structure of internal trade in underdeveloped countries". Geographical Analysis Vol.1, 1969, pp.121-136.

SMITH, W. "Thailand: Transport Co-ordination Study Final Report (Draft)", Volume II. (4 volumes). 1970.

SOCIAL AND ECONOMIC STUDIES DIVISION, MEKONG COMMITTEE. "Brief Description of the Lam Pao Project". E.C.A.F.E., June 1970.

SOLOMAN, M.R. "The market in underdeveloped countries". Journal of Marketing, 1948, Vol.13, pp.519-541.

S.E.A.D.A.G. "Agricultural Revolution in South East Asia". 1970.

SOUTHWORTH, H.M. and JOHNSTON, B.F. "Agricultural Development and Economic Growth". 1968.

SPEERS, W.H. "Assisting Agricultural Extension in N.E. Thailand". 1957.

SPENCER, J.E. and STEWART, N.R. "The nature of agricultural systems". Annals of the Association of American Geographers, 63, 4, 1973, pp.529-544.

SRIPLUNG, S. "Potentials in the Economic Development of Thailand's Agriculture". Division of Agricultural Economics, 1967.

STAMP, L.D. "Siam before the War". Geographical Review, Vol.108, 1942, pp.209-224.

STAMP, D.L. "Asia". 1962.

STEPHEN, S.R. "Alternative Jute Fibres". Bulletin of the British Trade Research Association, Vol.7, 1959.

STERNSTEIN, L. "Settlement patterns in Thailand". Journal of Tropical Geography, Vol.22, 1965.

STERNSTEIN, L. "Aspects of agricultural land tenure in Thailand". Journal of Tropical Geography, Vol.24 (1), 1967, pp.22-9.

STILWELL, F. "Further thoughts on the shift and share approach". Regional Studies, 4, 4, 1970, pp.451-8.

SYMONS, L. "Agricultural Geography". 1968.

TANTAYANUBUTS, Boonchuan. "Changes in Land Use along the Friendship Highway". 1968.

THAI-UNITED STATES RESEARCH AND DEVELOPMENT CENTRE. "Annotated Bibliography of Writings on North East Thailand". 1965.

THIEME, J.G. "Prospects for Development of Vegetable Oil Industry in North East Thailand". 1960.

THIPCHAIMETTA, Thip. "Paddy Marketing Cooperatives". Thailand Development Report, October 1969.

THOMPSON, V. "Thailand and the New Siam". 1967.

TOTHONG, Chamlong. "Bench Mark Socio-Economic Survey of Nong Wai Irrigation Area". 1969.

UNITED NATIONS. "Atlas of Physical, Economic and Soil Resources of the Lower Mekong Basin". 1968.

UNITED NATIONS. "Annual Statistical Bulletin", Mekong Committee, 1966-1972.

U.S.B.R. "Pa Mong Stage One Feasibility Study Appendix VI". 1968.

UNITED STATES DEPARTMENT OF AGRICULTURE. ECONOMICS RESEARCH SERVICE "Kenaf: A Bibliography 1950-62". 1962.

U.S.I.S. "A Pilot Village Study in North East Thailand". 1960.

U.S.I.S. "Current Attitudes in North East Thailand". 1961.

U.S.I.S. "Radio Listening Habits in the N.E. of Thailand". 1962.

U.S.I.S. "Radio ownership in the N.E. of Thailand". 1963.

U.S.O.M. "Kenaf in Thailand". 1956.

U.S.O.M. "Economic Survey of the Korat-Nongkai Highway". 1960.

U.S.O.M. "Extension Projects help to raise Farm Income in Thailand". 1964.

U.S.O.M. "Report on the Feasibility of Production, Processing and Distribution of Kenaf in North East Thailand". 1966.

U.S.O.M. "Drought in the North East and the Rain-Making Ceremony". 1966.

U.S.O.M. "Private Enterprise Investment in the North East". N.D.

U.S.O.M. "Comprehension in the Rural N.E.". Coordination Centre for S.E. Asian Studies, N.D.

USHER, D. "Income as a measure of productivity: alternative comparison of agricultural and non-agricultural productivity in Thailand". Economica, Vol.33, 1966, pp.430-441.

USHER, D. "The Thai Rice Trade" in T.H. Silcock, ed., "Thailand: Social and Economic Studies in Development". 1968.

VAN DER HEIDE, J.H. "The economical development of Siam during the last half century". Journal of the Royal Siam Society, 3, 1906, pp.74-101.

WAGNER, W. "Research for Planning Thai Agricultural Development". 1968.

WAGNER, W. and TONGPAN, S. "Structure of Thai Rice Prices". 1965.

WALLACE, W. "An Analysis of North East Thailand's Transport Network as a Constraint to Economic Development". 1970.

WANN, J.L. "Agricultural Credit and Marketing in Thailand". 1961.

WATABE, T. "Glutinous Rice in Northern Thailand". 1967.

WHARTON, C.R., Jr. "Marketing, merchandising and money-lending: a note on middlemen monopsony in Malaya". Malayan Economic Review, Vol.7, 1962, pp.24-44.

WHARTON, C.R., Jr. "The inelasticity of South East Asian agriculture: Problems of monoculture export dominance". Thai Agricultural Economics Society, Bangkok, 1962.

WHARTON, C.R., Jr. "The economic meaning of subsistence". Malayan Economic Review, 8, 2, 1963, pp.46-53.

WHARTON, C.R., Jr. "Risk uncertainty and the subsistence farmer". Paper presented to the Symposium on "Development and Change in Traditional Agriculture: Focus on South East Asia", Michigann State University, 1968.

WHARTON, C.R., Jr., ed. "Subsistence Agriculture and Economic Development". 1968.

WHARTON, C.R., Jr. "Subsistence agriculture, concepts and scope", in idem., ed., "Subsistence Agriculture and Economic Development," pp.12-20.

WEBBERT, M.V. "Basic Data on the Economy of Thailand". Overseas Business Reports, Washington, 1966.

WHITTLESEY, D. "Major agricultural regions of the Earth". Annals of the Association of American Geographers, 26, 1936, pp.199-240.

WILKEY, J.J. "Report on Agricultural Credit, Agricultural Marketing and Cooperative Organisations". U.S.O.M., 1959.

YOUNG, G. "Communist rebels terrorise villages in Thais Siberia". Sunday Observer Nov. 20th, 1966, p.4.

ZADEH, L.A. "Towards a Theory of Fuzzy Systems", Report No.692, Berkeley Electronic Research Lab., 1969, pp.469-70.

ZIMMERMAN, C. "Siam: First Rural Survey". 1931.

ZIMMERMAN, C.C. "Some phases of land utilization in Siam". Geographical Review, Vol.27, 1937, pp.378-393.

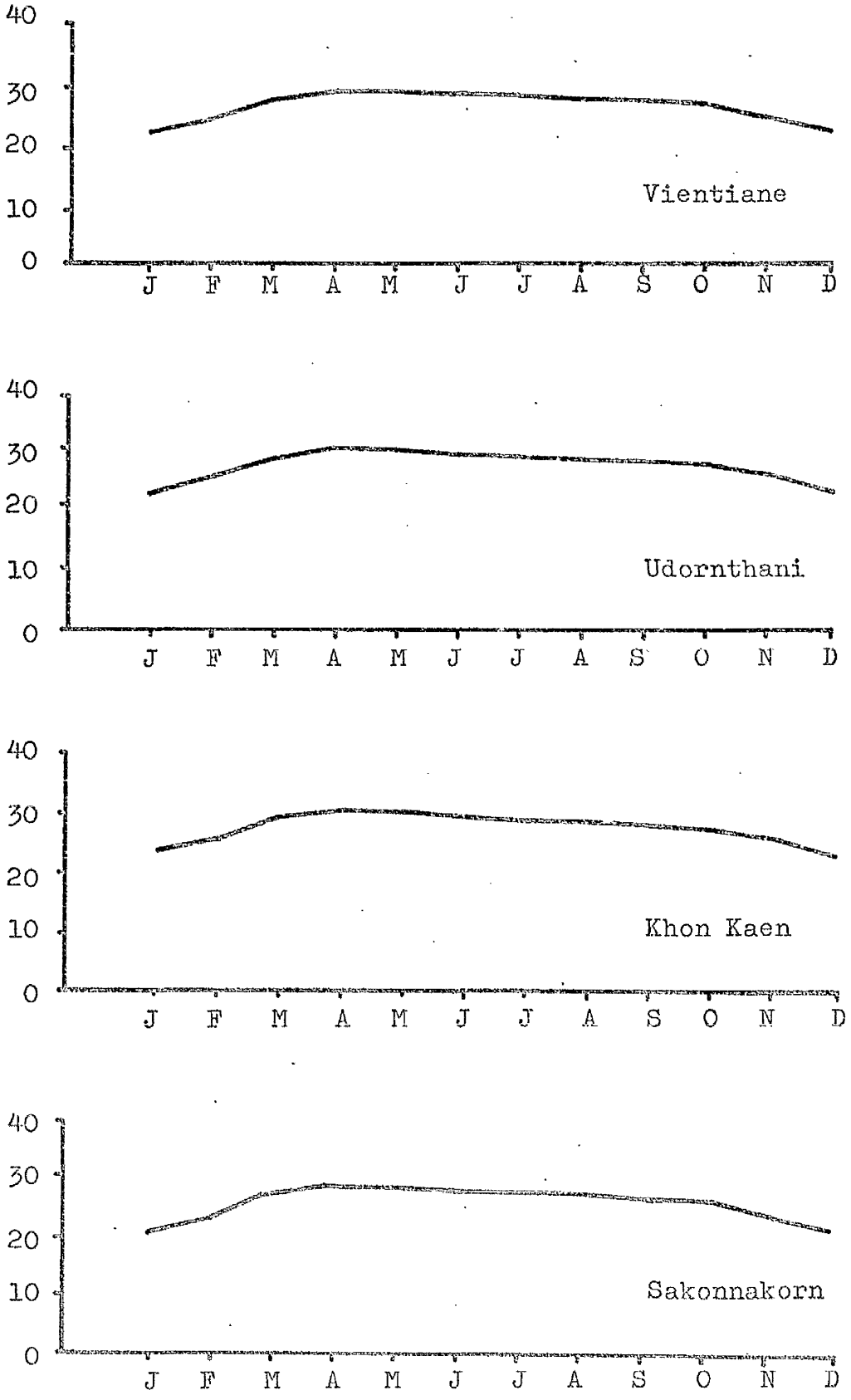
APPENDIX I

ABBREVIATIONS USED IN THE TEXT

A.D.B.	Asian Development Bank
A.R.D.	Accelerated Rural Development Programme
A.S.C.R.T.	Associated Scientific Research Corporation of Thailand
B.A.A.C.	Bank for Agriculture and Agricultural Cooperatives
D.E.D.	Department of Economic Development
E.C.A.F.E.	Economic Commission for Asia and the Far East, United Nations
E.T.O.	Express Transport Organisation
F.A.O.	Food and Agricultural Organisation of the United Nations
F.O.B.	Free on Board
G.D.P.	Gross Domestic Product
G.R.P.	Gross Regional Product
I.B.R.D.	International Bank for Reconstruction and Development (World Bank)
N.E.E.D.	North East Economic Development Sub-Committee
N.E.D.B.	National Economic Development Board
N.S.O.	National Statistical Office
O.D.A.	Overseas Development Administration of the British Government
R.D.	Rice Department, Ministry of Agriculture (as in R.D.1, an improved rice variety)
R.I.D.	Royal Irrigation Department
S.O.A.S.	School of Oriental and African Studies, University of London
U.S.B.R.	United States Bureau for Reclamation
U.S.I.S.	United States Information Service
U.S.O.M.	United States Overseas Mission

APPENDIX II

CLIMATE



Appendix II.1 Average Monthly Temperatures (in degrees centigrade)

Source: U.S.B.R., 'Pa Mong Stage One Feasibility Study,' 1968

APPENDIX II, TABLE 2

MEAN MONTHLY RAINFALL AND VARIABILITY, CHANGWAT KALASIN 1957-1967

	mm Mean	Coefficient of Variability (σ/x)		mm Mean	V (σ/x)
January	0.8	2.87	July	199.9	0.44
February	8.0	1.55	August	250.4	0.76
March	32.6	1.03	September	333.9	0.51
April	56.3	0.61	October	63.1	0.57
May	231.4	0.54	November	9.5	1.74
June	171.6	0.44	December	0.1	3.70

Mean Annual Rainfall 1357.6 mm.

Source:- Calculated from Changwat Data Book Kalasin, N.S.O. 1971

APPENDIX III

REGIONAL PADDY PRODUCTION

APPENDIX III, TABLE 1

THE NORTH EAST CONTRIBUTION TO OVERALL THAILAND PADDY PRODUCTION

	% Holding Area	% Cultivated Area	% Harvested Area	% Production
1947	35.99	36.61	37.05	26.84
1948	38.19	36.76	37.44	27.39
1949	39.41	35.42	33.95	24.83
1950	40.02	36.66	35.27	27.27
1951	40.40	39.66	40.18	31.87
1952	40.90	35.05	36.65	27.25
1953	41.75	41.12	42.24	32.82
1954	41.93	35.10	34.70	25.74
1955	43.26	40.26	39.55	29.31
1956	43.55	41.21	40.35	31.49
1957	43.01	32.68	35.31	28.27
1958	42.95	37.49	38.02	28.04
1959	43.74	40.68	41.28	29.83
1960	43.37	39.33	39.32	29.28
1961	43.78	39.89	40.08	28.40
1962	44.00	42.8L	42.45	33.21
1963	43.82	41.13	40.51	30.34
1964	43.00	37.85	38.05	29.06
1965	42.80	37.42	35.16	24.90
MEAN	39.67	36.28	38.26	28.78

Source:- Annual Report On Rice Production In Thailand, 1947-1965, Ministry of Agriculture

APPENDIX III.2

% OF GLUTINOUS RICE CULTIVATED BY REGION 1955-1965

	North	North East	Central Plain	South
1955	16.3	78.3	4.3	1.1
1956	14.9	79.5	4.3	1.3
1957	19.4	74.2	5.4	1.0
1958	17.3	76.7	4.8	1.2
1959	16.6	78.5	4.0	0.9
1960	17.8	77.0	4.1	1.1
1961	17.6	77.0	4.4	1.0
1962	15.4	79.7	4.0	0.9
1963	16.4	78.4	3.2	1.0
1964	18.5	75.5	5.1	0.9
1965	17.8	76.1	5.1	1.0

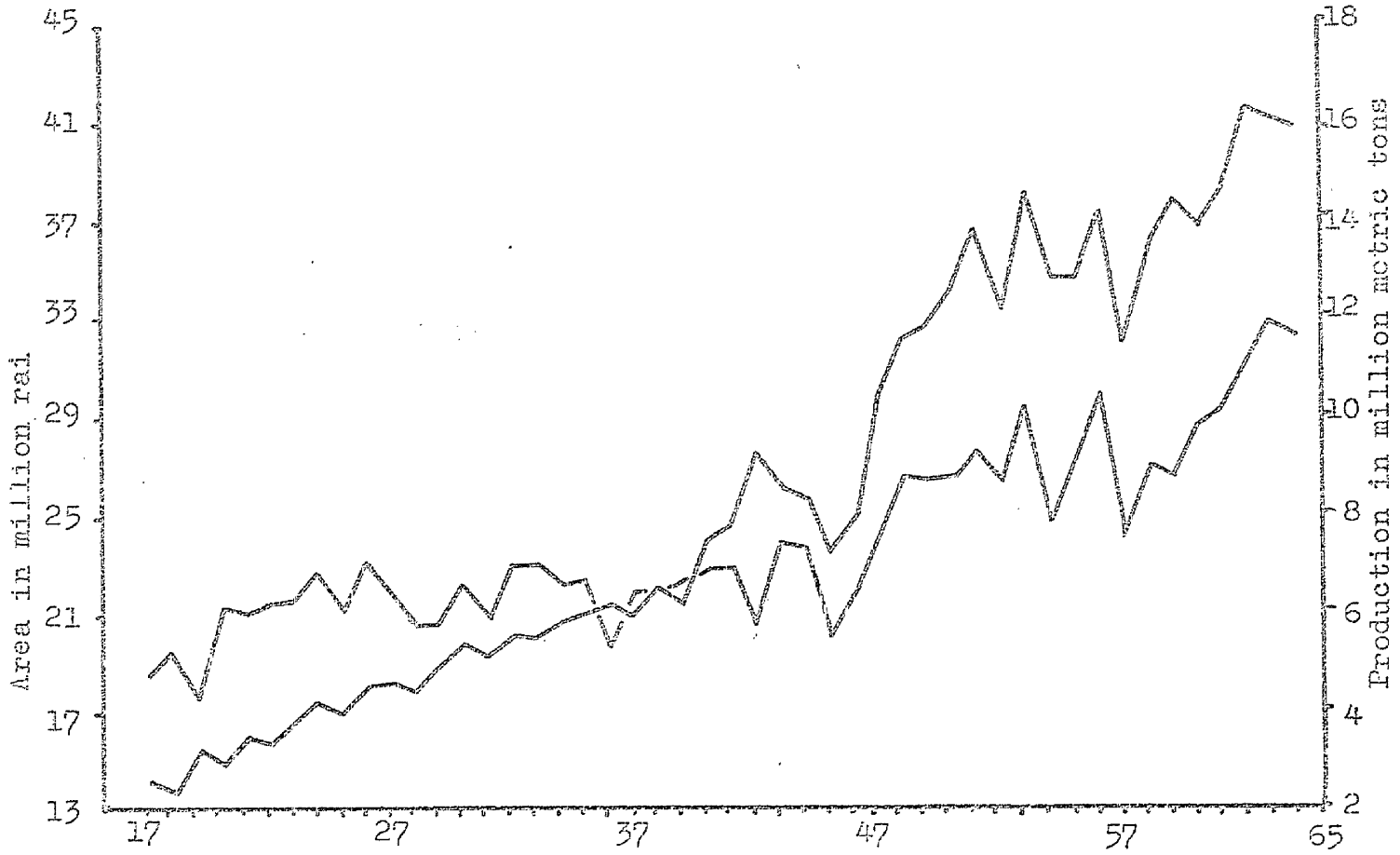
Source: "Annual Report on Rice Production in Thailand", Ministry of Agriculture, 1955-1965.

APPENDIX III, TABLE 3

GROWTH OF PADDY AREA AND PRODUCTION 1948-1970

	Thailand		NORTH EAST	
	Production	Area	Production	Area
1948	4.4	24.1	23.4	8.5
1949	3.6	2.3	-11.4	-2.6
1950	3.6	1.5	11.2	8.8
1951	1.9	8.0	26.5	16.4
1952	1.7	10.1	-23.0	-20.4
1953	2.4	24.7	33.5	+34.9
1954	0.6	-30.7	-45.7	-23.1
1955	0.5	28.5	46.3	19.1
1956	1.9	13.3	21.6	6.9
1957	1.3	-32.9	-39.8	-33.2
1958	0.6	26.6	25.8	30.2
1959	1.9	-4.7	2.1	14.3
1960	1.6	15.7	13.6	-7.6
1961	0.9	4.4	1.2	5.8
1962	2.2	13.5	32.7	15.7
1963	2.2	8.1	-1.3	4.8
1964	2.3	-4.7	8.7	8.9
1965	1.2	-3.7	-17.5	-0.9
1966	2.45	30.2	25.9	36.6
1967	1.34	-19.9	-24.7	7.6
1968	3.2	12.3	47.2	-21.0
1969	6.1	24.5	53.1	17.0
1970	2.7	-1.0	1.9	-3.6
Mean% Growth Rate Per Annum	2.19	6.56	9.2	4.4

Source:- Produced from Annual Reports on Rice Production in Thailand, Ministry of Agriculture, 1947-65.



Appendix III.4 Total Cultivated Area and Paddy Production, 1917-1965

Source: Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1965

Appendix III.5 Paddy Yield per Rai - Five Year Moving Averages, 1917-65

Source: Annual Report on Rice Production in Thailand, Ministry of Agriculture, 1965

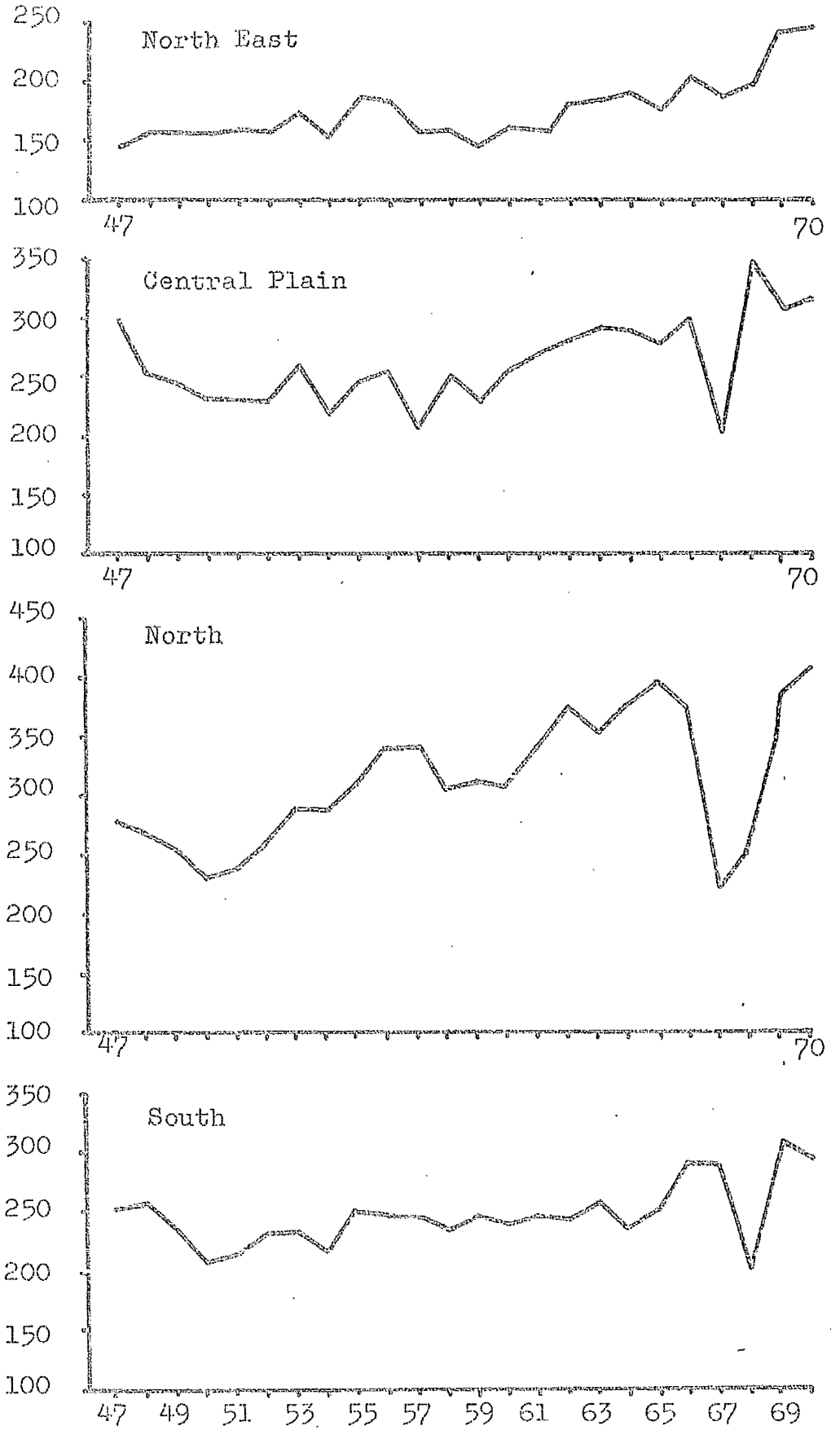
APPENDIX III.6

REGIONAL DIFFERENCES IN PADDY YIELDS, 1906-1950

(In kilograms per rai)

	Central Plain	All other	Kingdom
1906-9			292.8
1914-18			244.2
1921-24	254.4	294.0	270.0
1930-34	234.0	234.0	234.6
1940-44	202.2	177.0	187.8
1948-50	234.0	172.8	202.2

Source: J.C. Ingram, "Economic Change in Thailand", 1971, pp.48-50.



Appendix III.7 Regional Paddy Yields, 1947-70, (in kilograms per rai)

Source: Annual Reports on Rice Production in Thailand, Ministry of Agriculture, 1947-71

APPENDIX IV

REGIONAL PADDY DAMAGE AND AREA PLANTED

APPENDIX IV, TABLE 1

% DAMAGED AREA BY REGION

	North East	North	Central Plain	South
1947	9.8	2.9	11.1	20.1
	3.7	3.2	5.8	12.3
	9.7	0.3	4.1	3.6
	8.0	0.7	2.1	5.0
	2.5	1.2	4.7	6.7
	1.7	5.7	6.1	5.0
	1.3	0.4	6.9	3.4
	19.5	3.1	22.8	3.2
	8.4	2.5	6.6	3.1
	6.3	1.8	2.6	6.0
	8.7	1.6	21.5	18.1
	9.0	3.3	12.6	7.9
	11.9	2.4	17.2	6.0
	4.7	3.7	4.9	4.0
	8.3	1.0	10.7	2.4
	7.8	0.5	7.8	3.5
	5.2	1.8	3.0	2.2
	8.2	0.4	8.9	17.1
1965	14.6	1.1	6.0	8.3
MEAN	7.86%	1.93%	8.71	7.1

Source: Annual Report on Rice Production in Thailand, 1965-1972, Ministry of Agriculture

APPENDIX IV, TABLE 2

a) RANK OF % PLANTED AREA DAMAGED

RANK	1	2	3	4
1951	S	C	NE	N
1952	C	S	NE	N
1953	C	S	NE	N
1954	C	NE	S	N
1955	NE	C	S	N
1956	NE	S	C	N
1957	C	S	NE	N
1958	C	NE	S	N
1959	C	NE	S	N
1960	C	NE	S	N
1961	C	NE	S	N
1962	C/NE		S	N
1963	C	NE	S	N
1964	S	C	NE	N
1965	NE	S	C	N

b) TOTAL NUMBER OF YEARS IN EACH RANK

	RANK			
	1	2	3	4
Central Plain	$9\frac{1}{2}$	$3\frac{1}{2}$	2	-
North East	$3\frac{1}{2}$	$6\frac{1}{2}$	5	-
South	2	5	8	-
North	-	-	-	15
	15	15	15	15

Source: Calculated from Annual Report on Rice Production in Thailand, 1947-1965, Ministry of Agriculture

APPENDIX IV, TABLE 3

% CAUSE OF DAMAGE:- THAILAND

	% Damaged	% Flood	% Drought	% Insect/Disease	% Other
1951	3.7	75.8	17.0	0.2	7.0
1952	4.4	81.0	13.3	1.1	4.6
1953	3.9	76.2	7.3	11.1	5.4
1954	18.6	13.7	85.0	0.8	0.5
1955	6.8	17.3	61.9	11.2	9.6
1956	4.3	34.1	46.6	9.8	9.5
1957	15.5	52.1	43.8	2.1	2.0
1958	10.2	13.2	72.9	9.1	4.8
1959	13.2	67.5	28.2	3.0	1.3
1960	4.7	53.0	30.8	12.2	4.0
1961	8.5	65.5	22.4	8.4	3.7
1962	7.0	70.4	20.7	4.2	4.5
1963	3.7	60.4	18.1	16.0	5.5
1964	8.7	60.8	28.9	7.4	2.9
1965	9.1	10.5	75.5	7.8	6.2

Source: Annual Report on Rice Production in Thailand, 1951-1965, Ministry of Agriculture

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APPENDIX IV, TABLE 4

% CAUSE OF DAMAGE:- CENTRAL PLAIN

	% Damaged	% Flood	% Drought	% Insect/Disease	% Other
1951	4.7	86.3	6.8	0.1	6.8
1952	6.1	85.5	10.3	0.2	4.0
1953	6.9	85.8	2.2	10.9	1.1
1954	22.8	10.8	88.1	0.9	0.2
1955	6.6	24.8	51.3	9.8	14.1
1956	2.6	51.7	24.3	10.1	13.9
1957	21.5	66.4	30.2	1.7	1.7
1958	12.6	3.9	78.5	10.4	7.2
1959	17.2	81.7	16.3	1.2	0.8
1960	4.9	43.5	39.9	13.1	3.5
1961	10.7	82.3	10.8	4.1	8.2
1962	7.8	70.3	21.7	5.3	2.7
1963	8.0	62.4	13.5	18.5	5.6
1964	8.9	81.9	7.8	7.8	2.5
1965	6.0	7.7	70.8	13.2	8.3

Source: Annual Report on Rice Production in Thailand, 1951-1965, Ministry of Agriculture

APPENDIX IV, TABLE 5

% CAUSE OF DAMAGE:- NORTH EAST REGION

	% Damaged	% Flood	% Drought	% Insect/Disease	% Other
1947	9.8	32.8	58.5	6.5	2.2
1948	3.7	58.9	32.7	6.3	2.1
1949	9.7	65.3	30.3	1.9	2.5
1950	8.0	88.5	3.7	0.4	7.4
1951	2.5	73.5	15.4	0.5	10.6
1952	1.7	63.0	18.7	5.9	12.4
1953	1.3	41.6	33.2	12.9	12.3
1954	19.5	18.5	80.9	0.5	0.1
1955	8.4	8.7	73.9	12.8	4.6
1956	6.3	26.2	55.1	10.8	7.9
1957	8.7	22.4	71.3	4.0	2.3
1958	9.0	28.4	62.7	7.6	1.3
1959	11.9	48.1	45.8	4.8	1.3
1960	4.7	64.4	24.3	9.2	2.1
1961	8.3	42.4	40.4	13.8	3.4
1962	7.8	73.1	19.9	2.7	4.3
1963	5.2	61.5	20.3	13.8	4.4
1964	8.2	57.5	30.4	9.4	2.7
1965	14.6	4.8	86.0	5.2	4.0
1966	6.9	71.7	10.3	13.5	4.5
1967	14.16	2.46	89.31	*	8.22
1968	9.55	6.12	80.28	*	13.58

* Included with "Others"

Source: Annual Report on Rice Production in Thailand, 1947-1968, Ministry of Agriculture

APPENDIX IV, TABLE 6

% CAUSE OF DAMAGE:- SOUTH

	% Damaged	% Flood	% Drought	% Insect/Disease	% Other
1951	6.7	34.0	64.5	-	1.5
1952	5.0	61.2	37.1	-	1.7
1953	3.4	40.7	15.7	-	43.6
1954	3.2	21.4	51.4	3.6	23.6
1955	3.1	12.4	54.5	4.8	28.3
1956	6.0	28.3	61.2	1.6	8.9
1957	18.1	2.6	92.2	1.9	3.3
1958	7.9	24.8	67.5	6.1	1.6
1959	6.0	54.0	39.0	4.3	2.7
1960	4.0	31.1	23.9	25.5	15.5
1961	2.4	37.4	14.2	26.3	22.1
1962	3.5	43.0	15.1	8.5	33.4
1963	2.2	42.6	30.2	10.5	16.7
1964	17.1	0.7	94.5	1.4	3.4
1965	8.3	62.5	14.9	7.0	15.6

Source: Annual Report on Rice Production in Thailand, 1951-1965, Ministry of Agriculture

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APPENDIX IV, TABLE 7

% CAUSE OF DAMAGE:- NORTH

	% Damaged	% Flood	% Drought	% Insect/Disease	% Other
1951	1.2	94.9	0.9	-	4.7
1952	5.7	95.6	2.9	1.5	-
1953	0.4	-	3.4	95.1	1.5
1954	3.1	1.3	96.5	2.0	0.2
1955	2.5	66.5	19.2	11.8	2.5
1956	1.8	62.0	16.5	18.6	2.9
1957	1.6	78.6	18.7	2.2	0.5
1958	3.4	0.1	94.7	4.9	0.3
1959	3.4	6.7	43.2	27.5	22.6
1960	3.7	77.9	6.2	11.0	2.9
1961	1.0	59.6	6.0	10.3	23.1
1962	0.5	7.2	57.7	24.6	10.5
1963	1.8	45.7	12.6	32.5	9.2
1964	0.4	27.7	3.0	8.4	60.9
1965	1.1	60.9	32.2	2.0	4.9

Source: Annual Report on Rice Production in Thailand, 1951-1965, Ministry of Agriculture

APPENDIX IV, TABLE 8

% OF PADDY AREA CULTIVATED (BY REGION 1947-1965)

	North East	North	Central Plain	South	Thailand
1947	87.9	95.3	85.0	81.9	86.4
1948	86.0	96.8	91.0	89.3	89.3
1949	78.3	96.5	93.4	87.6	87.1
1950	82.4	100.5	95.1	90.3	89.9
1951	93.3	100.2	96.7	89.9	95.0
1952	72.5	98.8	93.7	85.1	84.6
1953	93.6	102.9	96.2	90.1	95.0
1954	72.6	100.4	95.5	92.7	83.9
1955	83.4	110.0	94.2	90.4	89.7
1956	87.0	99.7	96.0	90.5	91.9
1957	58.0	100.2	89.7	85.8	76.4
1958	75.2	100.0	94.2	91.2	86.1
1959	82.8	101.8	93.5	89.3	89.0
1960	77.6	101.2	90.9	88.6	85.6
1961	80.6	101.2	94.2	91.9	88.5
1962	90.8	99.0	94.8	95.3	93.3
1963	84.3	99.1	95.5	91.8	90.5
1964	77.2	99.2	95.7	91.7	87.6
1965	75.9	96.7	94.2	93.7	86.8

Source: Annual Report on Rice Production in Thailand, 1947-1965, Ministry of Agriculture

APPENDIX V

THE NORTH EAST IN THE THAI ECONOMY

APPENDIX V, 1

REGIONAL PER CAPITA GROSS DOMESTIC PRODUCT AS PERCENTAGE OF THE NATIONAL PER CAPITA GDP 1960-1969

Year	North East	North	Central Plain	South	Thailand
1960	53.80	71.00	161.25	125.75	100.00
1961	53.42	70.75	165.53	119.18	100.00
1962	52.88	72.27	165.61	112.37	100.00
1963	53.14	71.15	167.76	110.54	100.00
1964	48.05	69.95	175.33	108.44	100.00
1965	50.02	69.26	175.33	108.35	100.00
1966	52.73	72.69	171.78	96.19	100.00
1967	46.95	71.03	181.04	97.06	100.00
1968	50.05	68.85	178.11	96.96	100.00
1969	48.49	68.87	179.01	98.16	100.00

Source:- Regional Accounts Unit, National Accounts Division, NEDB. quoted by Phisit Pakkasem, 'Thailand's North East Economic Development Planning: a case study in regional planning'.
N.E.D.B./D.E.D., 1973, p.42.

APPENDIX V, 2

GROWTH RATES OF GROSS DOMESTIC PRODUCT BY REGION

(At Constant Prices)

Year	North East	North	Central Plain	South	Thailand
1960	-	-	-	-	-
1961	512	312	5.9	5.2	5.3
1962	8.8	9.6	7.6	7.3	8.1
1963	11.4	6.7	8.8	4.7	8.4
1964	0.8	7.2	8.8	5.4	6.6
1965	6.5	4.5	9.9	5.3	7.9
1966	19.2	15.1	10.4	7.2	12.2
1967	-4.7	2.5	9.9	5.5	5.5
1968	7.9	10.7	8.6	10.3	9.0
1969	11.5	8.5	9.4	9.1	9.6
Average Growth Rate	7.4	7.6	8.8	6.7	8.1

Source:- Regional Accounts Unit, National Accounts Division, N.E.D.B. quoted by Phisit Pakkasem, op.cit., p.37.

APPENDIX V.3

COMPARATIVE GROWTH RATES BY SECTOR

Thailand and the North East 1960-1969

	Thailand	North East
Agriculture	5.9	4.5
Crops	5.0	4.3
Livestock	3.0	3.7
Fisheries	39.0	10.4
Forestry	5.6	6.3
Mining and Quarrying	21.3	117.5
Manufacturing	15.2	6.5
Construction	17.8	29.3
Electricity and Water	49.1	148.9
Transport and Communications	8.0	16.4
Wholesale and Retail	11.2	12.3
Banking and Insurance	27.2	35.5
Ownership and Dwellings	3.8	2.5
Public Administration and Defence	8.4	8.2
Services	10.7	13.3

Source: G.D.P. of North East Thailand 1960—1969, N.E.D.B., 1970.

APPENDIX V, 4

FIRST, SECOND, AND THIRD PLAN DEVELOPMENT BUDGETS

North East Thailand

(Million Bahts)

Sector	First Plan		Second Plan		Third Plan	
	฿ Million	%	฿ Million	%	฿ Million	%
AGRICULTURE						
Irrigation	590	9.1	1,102	8.5	914	4.9
Crop Research and Extension	137	2.1	250	1.9	496	2.7
Forestry, Livestock and Fishing	253	3.9	332	2.6	579	3.2
Others a/	107	1.6	187	1.4	198	1.1
TOTAL	1,087	16.7	1,871	14.4	2,187	11.9
INDUSTRY, MINING AND COMMERCE b/						
TOTAL	2	0.0	10	0.1	138	0.7
TRANSPORT AND COMMUNICATION c/						
Highways			3,100	23.9	3,270	17.8
Highway Maintenance			311	2.4	765	4.2
Others			1,026	7.9	193	1.1
TOTAL	2,125 d/	32.6	4,437	34.2	4,227	23.0
POWER						
TOTAL	150	2.3	375	2.9	374	2.0
COMMUNITY FACILITIES AND PUBLIC WELFARE e/						
TOTAL	535	8.2	1,558	12.0	2,204	12.0

APPENDIX V, 4

Sector	First Plan		Second Plan		Third Plan	
	฿ Million	%	฿ Million	%	฿ Million	%
PUBLIC HEALTH						
TOTAL	486	7.5	815	6.3	2,012	10.9
EDUCATION						
TOTAL	2,131	32.7	3,892	30.0	7,243	39.5
DEVELOPMENT BUDGET	6,516	100.0%	12,958	100.0%	18,385	100.0%
NATIONAL DEVELOPMENT BUDGET	23,404		46,448		100,275	
NORTH EAST/ NATIONAL	27.8%		27.9%		18.0%	

Source:- National Economic Development Board. quoted by

Phisit Pakkasem, op. cit., p.50.

a/ Includes Land Development Department, Land Co-operatives, Department of Credit State Enterprises Budget Items.

b/ Artesian wells previously included have been moved to community facilities.

c/ Includes ARD roads.

d/ Breakdown of total not available.

e/ Includes all water programs, community development, public and urban programs.

APPENDIX V, TABLE 5

PERCENTAGE SHARE OF AGRICULTURE IN GDP BY CHANGWAT

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	Change 1970-69
Loei	66.7	63.3	61.4	62.4	58.2	60.0	64.2	57.6	60.3	59.1	-7.6
Udornthani	55.4	48.0	49.4	47.6	42.6	48.0	43.6	30.9	41.5	39.3	-16.1
Nongkai	41.1	42.8	48.4	47.4	47.2	46.4	36.5	47.0	49.1	45.1	+4.0
Sakonnakorn	63.0	61.7	62.5	60.2	58.4	58.6	62.5	65.6	63.4	61.0	-2.0
Nakorn Phanom	60.7	57.7	55.4	57.3	51.9	52.9	49.4	50.4	49.8	47.4	-13.3
Ubonratchathani	54.8	58.3	51.3	50.6	45.2	52.3	48.6	46.8	42.6	40.4	-14.4
Srisaket	54.5	62.2	56.8	56.1	56.2	54.9	65.5	53.9	59.3	57.1	+2.6
Surin	51.0	52.6	58.5	53.5	53.8	46.3	63.0	42.4	58.5	57.3	+6.3
Roiet	70.4	63.4	64.4	62.4	60.9	65.3	66.7	59.7	62.3	60.8	-9.6
Kalasin	64.6	64.9	65.6	-	49.1	59.6	63.2	55.4	60.4	58.2	-6.4
Mahasarakarm	71.6	80.7	69.0	68.3	62.1	63.0	69.3	55.0	64.0	62.0	-9.6
Kohn Kaen	56.4	53.7	55.3	55.2	46.4	45.4	56.2	38.7	43.2	42.1	-14.3
Chaiyaphun	64.9	68.3	64.8	65.1	58.8	62.8	67.2	59.8	59.4	57.4	-7.5
Nakorn Ratchasima	45.9	42.4	43.5	43.0	43.4	41.5	46.1	33.7	33.8	31.3	-14.6
Buriram	65.3	63.2	63.7	67.7	64.1	57.8	63.8	53.7	50.1	48.4	-16.9
North East	57.6	56.5	56.1	55.4	51.3	52.4	56.1	47.0	50.0	48.0	-9.6

Source: 'Gross Domestic Product of North East Thailand 1960-69,' Preliminary Report, N.E.D.B., 1970

APPENDIX V, 6

GROSS DOMESTIC PRODUCT OF N.E. THAILAND FROM CROPS, 1960-69,

at Current Market Prices, in Million Baht

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Paddy	2,091.9	2,551.3	3,230.8	2,955.6	2,422.9	3,006.4	5,201.1	3,280.8	4,792.3	4,537.2
Coconut	33.6	39.3	44.3	57.6	78.1	64.0	48.6	69.4	50.8	54.5
Sugarcane	75.3	73.2	56.4	108.7	90.9	54.2	58.9	68.2	82.6	93.2
Maize	117.1	59.9	48.3	50.8	53.2	66.2	112.4	110.9	117.0	216.4
Groundnut	128.2	76.5	56.8	83.9	75.5	90.1	73.3	69.3	68.6	75.0
Mung bean	13.9	13.6	11.1	7.3	6.7	7.7	6.8	11.9	9.3	9.7
Castor bean	28.4	21.1	21.3	26.4	27.3	16.3	19.5	14.8	16.4	15.8
Soy bean	1.8	1.3	1.1	1.1	0.7	1.7	1.9	1.0	0.8	0.9
Cassava	10.9	17.9	13.8	13.7	26.6	43.2	27.6	28.3	35.2	35.4
Tobacco	163.5	152.5	72.5	115.4	90.1	88.8	121.3	117.8	118.9	137.6
Cotton	91.6	48.7	42.0	36.2	55.1	46.8	52.6	79.5	96.5	124.8
Kenaf	460.2	384.9	266.3	309.4	563.8	984.2	1,073.1	486.4	436.9	588.5
Kapok	67.0	58.5	52.0	90.4	95.3	86.1	61.9	46.7	52.1	56.0
Sesame	29.1	16.9	8.9	10.7	10.8	15.9	14.2	8.9	7.6	7.7
Vegetables	217.2	246.4	245.3	386.3	277.8	314.9	403.73	408.1	436.5	546.9
Fruits & others	681.4	732.8	599.4	684.0	544.3	608.9	663.5	722.7	793.7	841.7
TOTAL	4,211.1	4,494.7	4,770.3	4,937.6	4,419.0	5,495.4	7,940.9	5,526.7	7,118.0	7,341.3

Source:- Gross Domestic Product, North East Thailand 1960-1969, N.E.D.B., 1970

Appendix V.7 Percentage Rate of Growth of the GDP of the Agricultural Sector of Thailand and the North East, 1961-69

Source: 'GDP of North East Thailand, 1960-1969,' N.E.D.B., 1970

APPENDIX V, TABLE 8

IRRIGATION PROJECTS.

No.	Projects	Changwats	Irrigable area	Started	Completed	Scheduled Completion	Irrigated area in 1970
			1,000 rai				1,000 rai
	Mekong River Basin						
1	Hung River	Loei	2	1951	1951	-	2
2	Loei River	Loei	9	1939	1968	-	8
3	Huey Luang	Udornthani	92	1939		1975	52
4	Mekong River	Nongkai, Nakorn Phanom	126	1939		1973	111
5	Song Khram River	Sakonnakorn	276	1950		1972	69
6	Nam Kam	Nakorn Phanom	20	1956	1969	-	20
	Total for Mekong River Basin		525				262
	Chi River Basin						
1	Chi River		327	1939		1974	283
2	Nam Phong	Khon Kaen	320	1951		1973	87
3	Lam Pao	Kalasin	361	1949		1974	82
4	Nam Yung	Kalasin	41	1965		1972	30
	Total for Chi River		1,049				482

APPENDIX V, TABLE 8 (cont.)

No.	Projects	Changwats	Irrigable area 1,000 rai	Started	Completed	Scheduled Completion	Irrigated area in 1970 1,000 rai
	Pasak River Basin	Nakorn Ratchasima	3.0	1960	1960	-	3.0
	Mun River Basin						
1	Lam Pra Plerng	Nakorn Ratchasima	74	1949		1972	62
2	Lam Takhong	Nakorn Ratchasima	123	1939	1971	-	111
3	Lam Chiang Krai	Nakorn Ratchasima	26	1951		1974	1
4	Lam Plaimat	Buriram	4	1951	1960	-	3
5	Lam Chi	Surin	76	1939		1974	66
6	Lam Sieo	Mahasarakarm	59	1951		1972	36
7	Huey Thap Than	Surin	10	1953	1961	-	10
8	Huey Samran	Srisaket	8	1951	1958	-	8
9	Huey Khayung	Srisaket	27	1969		1973	-
10	Se Bai	Ubonratchathani	21	1952	1963	-	21
11	Se Bok	Ubonratchathani	8	1953	1954	-	8
12	Dom-Yai	Ubonratchathani	1	1951	1952	-	1
13	Dom-Noi	Ubonratchathani	150	1969		1975	-

APPENDIX V, TABLE 8 (cont.)

No.	Projects	Changwats	Irrigable area	Started	Completed	Scheduled Completion	Irrigated area in 1970
			1,000 rai				1,000 rai
14	Mun River	Ubonratchathani	218	1939	1965	-	216
	Total for Mun River		805				543
	Total for North-Eastern		2,382				1,290

Source: Agricultural Statistics of Thailand, Ministry of Agriculture, 1972.

APPENDIX VI

LAM PAO PADDY PRODUCTION

APPENDIX VI, 1

GLUTINOUS RICE : % PLANTED AREA AFFECTED BY DAMAGE (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	10.0	20.0	30.0	40.0	50.0	75.0	100.0
Na Chuak Nua	51.4	2.9	11.4	17.1	11.4	5.7	0.0	0.0
Ban Tum	47.4	12.3	12.3	17.5	8.8	0.0	1.8	0.0
Um Mao	40.0	8.6	17.1	17.1	5.7	8.6	2.9	0.0
Fai Taek	40.0	0.0	28.0	12.0	12.0	8.0	0.0	0.0
Ban Lek	28.6	11.9	11.9	14.3	11.9	14.3	4.8	2.4
Non Sung	66.7	6.1	15.2	3.0	6.1	3.0	0.0	0.0
Lao Yai	54.5	0.0	9.1	9.1	0.0	0.0	0.0	27.3
Lam Pao Area	45.8	7.6	14.7	13.9	8.8	5.9	1.7	1.7

APPENDIX VI, 2

GLUTINOUS RICE : CASH INPUT AS % OF TOTAL CASH INPUTS (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	50.0	75.0	80.0	90.0	100.0
Na Cuak Nua	62.9	2.9	0.0	0.0	0.0	0.0
Ban Tum	29.8	3.5	8.8	1.8	1.8	1.8
Um Mao	17.1	0.0	2.9	5.7	0.0	2.9
Fai Taek	32.0	4.0	4.0	0.0	0.0	0.0
Ban Lek	28.6	2.4	2.4	2.4	0.0	2.4
Non Sung	15.2	6.1	0.0	0.0	0.0	0.0
Lao Yai	100.0	0.0	0.0	0.0	0.0	0.0
Lam Pao Area	34.0	2.9	3.4	1.7	0.4	1.3

APPENDIX VI, 3

GLUTINOUS RICE : LABOUR USE AS % OF TOTAL LABOUR USE (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0
Na Cuak Nua	2.9	5.7	2.9	2.9	17.1	17.1	8.6	42.9
Ban Tum	0.0	12.3	29.8	19.3	7.0	19.3	1.8	10.5
Um Mao	0.0	2.9	5.7	0.0	0.0	17.1	17.1	57.1
Fai Taek	0.0	4.0	16.0	4.0	4.0	12.0	8.0	52.0
Ban Lek	0.0	0.0	0.0	7.1	2.4	19.0	11.9	59.5
Non Sung	0.0	3.0	0.0	9.1	18.2	21.2	24.2	24.2
Lao Yai	0.0	9.1	18.2	18.2	18.2	0.0	27.3	9.1
Lam Pao Area	0.4	5.5	10.9	8.8	8.4	17.2	11.8	37.0

APPENDIX VI, 4

GLUTINOUS RICE : CASH INPUT PER RAI (BAHT) (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	10.0	20.0	30.0	40.0	50.0	100.0	400.0
Na Chuak Nua	62.9	20.0	14.3	0.0	2.9	0.0	0.0	0.0
Ban Tum	29.8	14.0	29.8	7.0	5.3	5.3	5.3	3.5
Um Mao	17.1	14.3	22.9	20.0	8.6	5.7	5.7	5.7
Fai Taek	32.0	20.0	16.0	4.0	4.0	0.0	16.0	8.0
Ban Lek	28.6	9.5	26.2	19.0	4.8	2.4	9.5	0.0
Non Sung	15.2	24.2	27.3	12.1	18.2	0.0	3.0	0.0
Lao Yai	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lam Pao Area	34.0	15.5	22.7	10.1	6.7	2.5	5.9	2.5

APPENDIX VI, 5

GLUTINOUS RICE : LABOUR USE PER RAI (MANDAYS) (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	5.0	10.0	15.0	20.0	25.0	40.0
Na Chuak Nua	2.9	31.4	34.3	20.0	8.6	0.0	2.9
Ban Tum	0.0	26.3	38.6	22.8	10.5	1.8	0.0
Um Mao	0.0	22.9	42.9	22.9	11.4	0.0	0.0
Fai Taek	0.0	8.0	36.0	28.0	16.0	4.0	8.0
Ban Lek	0.0	2.4	52.4	35.7	4.8	2.4	2.4
Non Sung	0.0	18.2	36.4	42.4	0.0	3.0	0.0
Lao Yai	0.0	36.4	0.0	18.2	27.3	18.2	0.0
Lam Pao Area	0.4	19.7	38.7	27.7	9.2	2.5	1.7

APPENDIX VI, 6

GLUTINOUS RICE : LABOUR USE IN LAND PREPARATION (MANDAYS/RAI) (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	25.0
Na Chuak Nua	2.9	20.0	37.1	28.6	5.7	2.9	0.0	2.9	0.0
Ban Tum	0.0	7.0	45.6	38.6	7.0	0.0	0.0	0.0	1.8
Um Mao	0.0	14.3	42.9	25.7	8.6	0.0	5.7	2.9	0.0
Fai Taek	4.0	12.0	24.0	24.0	8.0	16.0	0.0	4.0	8.0
Ban Lek	0.0	0.0	38.1	33.3	21.4	0.0	2.4	2.4	2.4
Non Sung	3.0	12.1	48.5	30.3	6.1	0.0	0.0	0.0	0.0
Lao Yai	0.0	0.0	27.3	27.3	27.3	18.2	0.0	0.0	0.0
Lam Pao Area	1.3	9.7	39.9	31.1	10.5	2.9	1.3	1.7	1.7

APPENDIX VI, 7

GLUTINOUS RICE : LABOUR USE IN TRANSPLANTING (MANDAYS/RAI) (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	25.0
Na Chuak Nua	2.9	14.3	25.7	17.1	17.1	8.6	2.9	5.7	5.7
Ban Tum	0.0	10.5	28.1	24.6	8.8	10.5	10.5	1.8	5.3
Um Mao	2.9	5.7	20.0	14.3	25.7	11.4	14.3	0.0	5.7
Fai Taek	0.0	4.0	12.0	16.0	20.0	28.0	4.0	8.0	8.0
Ban Lek	2.4	2.4	23.8	19.0	16.7	11.9	14.3	4.8	4.8
Non Sung	0.0	6.1	27.3	15.2	12.1	24.2	12.1	0.0	3.0
Lao Yai	0.0	9.1	9.1	18.2	0.0	9.1	9.1	36.4	9.1
Lam Pao Area	1.3	7.6	23.1	18.5	15.1	14.3	10.1	4.6	5.5

APPENDIX VI, 8

GLUTINOUS RICE : LABOUR USE IN WEEDING (MANDAYS/RAI) (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	0.5	1.0	1.5	2.0	2.5	4.0
Na Chuak Nua	80.0	2.9	5.7	2.9	5.7	0.0	2.9
Ban Tum	80.7	7.0	1.8	8.8	0.0	1.8	0.0
Um Mao	85.7	5.7	2.9	0.0	2.9	2.9	0.0
Fai Taek	72.0	0.0	12.0	4.0	4.0	4.0	4.0
Ban Lek	71.4	14.3	7.1	4.8	2.4	0.0	0.0
Non Sung	87.9	6.1	6.1	0.0	0.0	0.0	0.0
Lao Yai	81.8	0.0	9.1	9.1	0.0	0.0	0.0
Lam Pao Area	79.8	6.3	5.5	4.2	2.1	1.3	0.8

APPENDIX VI, 9

GLUTINOUS RICE : LABOUR USE IN HARVESTING (MANDAYS/RAI) (PERCENTAGE DISTRIBUTION)

Upper Class Limit	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	20.0
Na Chuak Nua	2.9	20.0	25.7	11.4	8.6	14.3	8.6	5.7	0.0	2.9
Ban Tum	0.0	19.3	26.3	19.3	10.5	5.3	5.3	5.3	7.0	1.8
Um Mao	2.9	8.6	22.9	17.1	25.7	5.7	2.9	8.6	2.9	2.9
Fai Taek	0.0	4.0	12.0	16.0	24.0	16.0	4.0	8.0	4.0	12.0
Ban Lek	2.4	4.8	23.8	19.0	14.3	9.5	11.9	2.4	2.4	9.5
Non Sung	0.0	3.0	21.2	27.3	21.2	9.1	12.1	3.0	0.0	3.0
Lao Yai	27.3	9.1	0.0	18.2	0.0	0.0	9.1	9.1	0.0	27.3
Lam Pao Area	2.5	10.9	21.8	18.5	15.5	8.8	7.6	5.5	2.9	5.9

APPENDIX VI, 10

% DAMAGED BY DROUGHT 1970-1

	0-0	0-10	10-20	20-30	30-40	40-50	50-100
NA CHUAK NUA	78.0	2.4	4.9	7.3	4.9	2.4	0.0
BAN TUM	64.9	6.8	12.2	8.1	4.1	1.4	2.7
UM MAO	91.8	6.1	0.0	2.0	0.0	0.0	0.0
FAI TAEK	44.4	7.4	29.6	11.1	3.7	3.7	0.0
BAN LEK	68.5	6.8	8.2	4.1	4.1	5.5	2.7
NON SUNG	85.7	2.4	4.8	0.0	2.4	2.4	2.4
LAO YAI	91.7	0.0	8.3	0.0	0.0	0.0	0.0
LAM PAO							

APPENDIX VI, 11

% DAMAGED BY FLOOD 1970-1

	0-0	0-10	10-20	20-30	30-40	40-50	50-100
NA CHUAK NUA	80.5	2.4	2.4	4.9	0.0	9.8	0.0
BAN TUM	93.2	2.7	2.7	0.0	0.0	0.0	0.0
UM MAO	67.3	2.0	2.0	6.1	4.1	6.1	12.2
FAI TAEK	85.2	3.7	0.0	3.7	3.7	0.0	3.7
BAN LEK	79.5	2.7	2.7	1.4	6.8	2.7	4.1
NON SUNG	83.3	4.8	7.1	0.0	0.0	0.0	4.8
LAO YAI	50.0	8.3	0.0	8.3	0.0	0.0	33.3
LAM PAO							

APPENDIX VI, 12

% DAMAGED BY INSECTS 1970-1

Upper Class Limits	0	10	20	30	40	50	100
NA CHUAK NUA	90.2	7.3	0.0	2.4	0.0	0.0	0.0
BAN TUM	94.6	2.7	1.4	1.4	0.0	0.0	0.0
UM MAO	87.8	6.1	4.1	0.0	2.0	0.0	0.0
FAI TAEK	96.3	0.0	3.7	0.0	0.0	0.0	0.0
BAN LEK	82.2	9.6	6.8	0.0	1.4	0.0	0.0
NON SUNG	97.6	0.0	2.4	0.0	0.0	0.0	0.0
LAO YAI	100.0	0.0	0.0	0.0	0.0	0.0	0.0
LAM PAO							

APPENDIX VI, 13

% DAMAGED BY OTHER AGENTS 1970-1

Upper Class Limits	0	10	20	30	100
NA CHUAK NUA	100.0	0.0	0.0	0.0	0.0
BAN TUM	91.9	2.7	2.7	2.7	0.0
UM MAO	93.9	6.1	0.0	0.0	0.0
FAI TAEK	96.3	0.0	3.7	0.0	0.0
BAN LEK	93.2	2.7	0.0	0.0	4.1
NON SUNG	100.0	0.0	0.0	0.0	0.0
LAO YAI	100.0	0.0	0.0	0.0	0.0
LAM PAO					

APPENDIX VI, 14

% OF PADDY FARMERS HIRING LABOUR

	FIRST PLOUGHING	SECOND PLOUGHING	TRANSPLANTING	WEEDING	HARVESTING
NA CHUAK NUA	3.2	7.5	5.1	-	20.8
BAN TUM	1.2	1.2	8.3	1.2	5.9
UM MAO	5.3	7.9	18.4	-	10.5
FAI TAEK	9.5	9.5	38.1	-	14.3
BAN LEK	-	-	10.0	-	3.3
NON SUNG	-	-	8.3	-	14.6
LAO YAI	-	7.7	15.4	-	7.7
LAM PAO	3.8	3.5	13.2	0.3	10.4

APPENDIX VI, 15

% OF PADDY FARMERS RECEIVING LABOUR FROM NEIGHBOURS

	FIRST PLOUGHING	SECOND PLOUGHING	TRANSPLANTING	WEEDING	HARVESTING
NA CHUAK NUA	-	-	15.1	-	18.9
BAN TUM	-	-	8.3	-	16.5
UM MAO	-	-	18.4	-	15.8
FAI TAEK	-	-	38.1	-	28.6
BAN LEK	-	-	10.0	-	10.0
NON SUNG	-	-	8.3	-	14.6
LAO YAI	-	-	15.4	-	7.7
LAM PAO	-	-	13.2	-	15.7

APPENDIX VI, 16

% OF PADDY FARMERS RECEIVING LABOUR FROM RELATIVES

	FIRST PLOUGHING	SECOND PLOUGHING	TRANSPLANTING	WEEDING	HARVESTING
NA CHUAK NUA	-	-	9.4	-	3.8
BAN TUM	-	-	10.6	-	4.7
UM MAO	-	-	15.8	-	18.4
FAI TAEK	-	-	28.6	-	9.6
BAN LEK	-	-	13.3	-	8.3
NON SUNG	-	-	8.3	-	18.7
LAO YAI	-	-	7.7	-	30.8
LAM PAO	-	-	12.3	-	10.4

APPENDIX VII

RICE EXPORTS

APPENDIX VII, 1

THAI RICE EXPORTS, 1953-1970

	Total Rice Exports	Paddy Equivalent*1	Glutinous Rice Exports	Paddy Equivalent*1	Glutinous as a % of Total Exports
1953	1,359,110	2,065,847	170,263	258,800	12.52
1954	1,001,486	1,522,259	83,596	127,065	8.34
1955	1,236,539	1,879,539	84,367	128,237	6.82
1956	1,264,986	1,922,779	88,384	134,344	6.98
1957	1,570,237	2,386,760	142,647	216,823	9.08
1958	1,132,930	1,722,054	83,926	127,568	7.40
1959	1,091,671	1,659,340	68,172	103,621	6.24
1960	1,202,772	1,828,213	65,764	99,961	5.46
1961	1,575,998	2,395,517	82,604	125,558	5.24
1962	1,271,023	1,931,954	94,871	144,204	7.46
1963	1,417,673	2,154,863	141,299	214,774	9.96
1964	1,896,258	2,882,312	122,461	186,141	6.45
1965	1,895,223	2,880,739	85,269	129,609	4.49
1966	1,507,550	2,291,476	84,540	128,501	5.60
1967	1,482,272	2,253,053	125,932	191,417	8.49
1968	1,068,185	1,623,641	98,737	150,080	9.24
1969	1,023,064	1,555,057	133,400	202,768	13.03
1970	1,063,616	1,616,696	92,388	140,430	8.68

*1 Converted by a ratio of 1.52, i.e. a 65.78% milling ratio

Source: Agricultural Statistics of Thailand, Ministry of Agriculture, 1972.

APPENDIX VII, 2

EXPORT OF GLUTINOUS MILLED RICE IN TONS, 1960-1964

Country	1960	1961	1962	1963	1964
Laos	7,154	13,751	28,395	45,809	46,928
Japan	13,295	7,901	7,666	33,002	16,537
Malaya	10,311	13,790	12,075	18,383	16,050
Hongkong	12,562	16,186	11,858	12,577	12,124
Singapore	12,595	9,872	11,173	9,303	8,129
Others	9,342	18,538	19,952	20,115	20,689
TOTAL	65,263	80,038	91,119	139,189	120,457

Source: Data of Overseas Merchandise Inspection Co., Bangkok, (Mimeograph), and quoted by T. Watabe 'Glutinous rice in northern Thailand,' 1967, p.12.

APPENDIX VIII

LAM PAO KENAF PRODUCTION

APPENDIX VIII, 1

RANK OF KENAF PRODUCTION OF CHANGWATS PLANTING OVER 20,000 RAI, 1958-68

	58	59	60	61	62	63	64	65	66	67	68
Buriram				6	5	7	6		9	N/a	11
Chaiyaphum	1	2	4	2	2	2	3	3	4		4
Kalasin			7	5	3	6	7	7	6		9
Khon Kaen		4	6	7	4	3	1	1	1		2
Loei									13		
Mahasarakarm	3	1	2	1	1	1	2	2	2		5
Nakorn Phanom				11					12		10
Korat	2	3	3	3	6	4	4	4	3		7
Nongkai				12							
Roiet			8	9		9	9	5	8		6
Sakon Nakorn											
Srisaket			5	8	7	8	8	6	11		3
Surin							11	9	7		
Ubon			1	4		5	5	10			1
Udorn				10	8	10	10	8	10		8

Source:- Calculated from data given in E.J. Sholton, 'Kenaf in Thailand'. p.38 and p.43, 1968

APPENDIX VIII, 2

AREA PLANTED TO KENAF (THOUSANDS OF RAI)

CHANGWAT	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Buriram	1.76	1.610	12.640	146.294	94.026	48.000	63.466	8.900	164.103		29.600
Chaiyaphum	49.6	58.800	92.149	218.260	110.039	158.622	178.348	313.693	396.859		211.105
Kalasin	2.377	1.7	71.134	166.142	106.200	71.490	63.430	86.000	196.671	140.00	40.754
Khon Kaen	9.127	31.728	73.134	105.512	96.769	126.192	299.398	450.235	666.941		216.062
Loei	0.055	0.068	0.510	0.950	0.774	0.700	6.392	5.000	29.655		14.321
Mahasarakarm	23.771	136.896	152.608	353.043	121.859	211.733	266.359	398.754	467.682	N/a	196.848
Nakorn Phanom	2.544	0.562	0.760	32.434	12.032	11.298	10.107	16.576	33.144		35.140
Nakorn Ratchasima	27.114	34.354	94.215	200.206	58.160	120.375	169.551	183.780	398.985		58.676
Nongkai	o.209	0.208	0.220	25.000	2.300	5.000	2.500	4.000	2.000		2.802
Roiet	1.992	2.107	39.883	46.325	12.053	27.384	38.602	92.576	180.157		78.562
Sakkonakorn	0.260	0.212	8.422	8.910	3.283	1.342	1.066	4.861	9.722		0.331
Srisaket	2.327	2.367	82.103	99.879	31.233	58.184	89.754	134.631			211.280
Surin	0.442	0.217	0.318	1.951	11.919	1.679	26.384	65.807	191.370		17.273
Ubonratchasima	2.910	2.513	217.958	193.146	6.525	81.492	165.406	248.068	299.141		261.229
Udonthani	1.380	1.374	2.543	33.478	21.269	23.259	38.154	79.646	147.620		55.073
Total	125.868	272.708	849.282	1631.830	691.712	924.804	1,387.245	2,127.744	3,336.631		1,529.056

Source:- (1958-1962) E.J. Sholton, 'Kenaf in Thailand', pp.38 and 43. 1968.

(1963-1968) Statistics of Upland Crop Production, Ministry of Agriculture, 1968.

APPENDIX VIII, 3

KENAF AREA AS % OF TOTAL HOLDING
(Percentage Distribution)

Upper Class Limit	0.0	10.0	20.0	30.0	40.0	50.0	100.0
NA CHUAK NUA	48.6	5.7	14.3	5.7	20.0	0.0	5.7
BAN TUM	10.5	0.0	15.8	17.5	29.8	22.8	3.5
UM MAO	71.4	8.6	11.4	8.6	0.0	0.0	0.0
FAI TAEK	60.0	4.0	8.0	12.0	4.0	12.0	0.0
BAN LEK	57.1	7.1	9.5	16.7	7.1	2.4	0.0
NON SUNG	24.2	9.1	39.4	15.2	9.1	3.0	0.0
LAO YAI	18.2	0.0	45.5	27.3	9.1	0.0	0.0
LAM PAO AREA	40.8	5.0	17.6	13.9	13.4	7.6	1.7

APPENDIX VIII, 4

KENAF PLOT SIZE (RAI)
(Percentage Distribution)

Upper Class Limit	0.0	2.0	4.0	6.0	8.0	10.0	12.0	40.0
NA CHUAK NUA	48.6	5.7	17.1	11.4	5.7	5.7	2.9	0.0
BAN TUM	10.5	8.8	26.3	26.3	10.5	12.3	1.8	0.0
UM MAO	71.4	11.4	11.4	2.9	0.0	0.0	2.9	0.0
FAI TAEK	60.0	4.0	28.0	4.0	0.0	4.0	0.0	0.0
BAN LEK	57.1	19.0	9.5	2.4	0.0	11.9	0.0	0.0
NON SUNG	24.2	21.2	30.3	18.2	3.0	0.0	3.0	0.0
LAO YAI	18.2	36.4	36.4	9.1	0.0	0.0	0.0	0.0
LAM PAO AREA	40.8	13.0	21.0	12.2	3.8	6.3	1.7	0.0

APPENDIX VIII, 5

KENAF % PLANTED AREA AFFECTED BY DAMAGE
(Percentage Distribution)

Upper Class Limit	0.0	20.0	30.0	40.0	50.0	75.0	100.0
NA CHUAK NUA	82.9	2.9	2.9	2.9	5.7	2.9	0.0
BAN TUM	77.2	12.3	3.5	1.8	3.5	1.8	0.0
UM MAO	91.4	0.0	0.0	2.9	0.0	0.0	5.7
FAI TAEK	84.0	0.0	8.0	8.0	0.0	0.0	0.0
BAN LEK	90.5	0.0	2.4	0.0	4.8	2.4	0.0
NON SUNG	45.5	6.1	9.1	6.1	15.2	12.1	6.1
LAO YAI	54.5	0.0	0.0	27.3	18.2	0.0	0.0
LAM PAO AREA	77.7	4.2	3.8	4.2	5.5	2.9	1.7

APPENDIX VIII, 6

KENAF LABOUR USE PER RAI (MANDAYS)
(Percentage Distribution)

Upper Class Limit	0.0	5.0	10.0	15.0	20.0	30.0	40.0	160.0
NA CHUAK NUA	48.6	5.7	17.1	20.0	5.7	0.0	0.0	2.9
BAN TUM	10.5	8.8	29.8	26.3	8.8	10.5	3.5	1.8
UM MAO	71.4	2.9	11.4	5.7	2.9	5.7	0.0	0.0
FAI TAEK	60.0	0.0	8.0	8.0	16.0	8.0	0.0	0.0
BAN LEK	57.1	2.4	16.7	14.3	0.0	7.1	0.0	2.4
NON SUNG	24.2	9.1	18.2	24.2	15.2	9.1	0.0	0.0
LAO YAI	18.2	0.0	18.2	18.2	9.1	36.4	0.0	0.0
LAM PAO AREA	40.8	5.0	18.5	17.6	7.6	8.4	0.8	1.3

APPENDIX VIII, 7

KENAF LABOUR USE IN LAND PREPARATION (MANDAYS/RAI)
(Percentage Distribution)

Upper Class Limit	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	20.0
NA CHUAK NUA	48.6	2.9	25.7	2.9	8.6	5.7	0.0	2.9	2.9
BAN TUM	10.5	12.3	35.1	17.5	12.3	8.8	0.0	1.8	1.8
UM MAO	71.4	11.4	11.4	5.7	0.0	0.0	0.0	0.0	0.0
FAI TAEK	60.0	0.0	8.0	20.0	0.0	4.0	4.0	4.0	0.0
BAN LEK	64.3	2.4	11.9	14.3	2.4	0.0	2.4	2.4	0.0
NON SUNG	24.2	6.1	42.4	12.1	9.1	6.1	0.0	0.0	0.0
LAO YAI	18.2	0.0	9.1	18.2	36.4	9.1	9.1	0.0	0.0
LAM PAO AREA	42.0	6.3	23.1	12.6	7.6	4.6	1.3	1.7	0.8

APPENDIX VIII, 8

KENAF LABOUR USE IN PLANTING (MANDAYS/RAI)
(Percentage Distribution)

Upper Class Limit	0.0	1.0	2.0	3.0	4.0	5.0	6.0	8.0	100.0
NA CHUAK NUA	48.6	5.7	20.0	11.4	8.6	2.9	0.0	0.0	2.9
BAN TUM	10.5	12.3	28.1	21.1	7.0	10.5	5.3	0.0	5.3
UM MAO	71.4	5.7	8.6	5.7	0.0	0.0	0.0	5.7	2.9
FAI TAEK	60.0	0.0	4.0	4.0	16.0	4.0	0.0	8.0	4.0
BAN LEK	57.1	2.4	19.0	11.9	2.4	2.4	0.0	2.4	2.4
NON SUNG	24.2	12.1	27.3	9.1	9.1	6.1	6.1	3.0	3.0
LAO YAI	18.2	9.1	9.1	9.1	9.1	18.2	18.2	0.0	9.1
LAM PAO AREA	40.8	7.1	18.9	11.8	6.7	5.5	2.9	2.5	3.8

APPENDIX VIII, 9

KENAF LABOUR USE IN WEEDING (MANDAYS/RAI)
(Percentage Distribution)

Upper Class Limit	0.0	1.0	2.0	3.0	4.0	5.0	6.0	8.0	30.0
NA CHUAK NUA	57.1	0.0	14.3	8.6	2.9	11.4	0.0	2.9	2.9
BAN TUM	29.8	5.3	14.0	17.5	5.3	10.5	3.5	5.3	8.8
UM MAO	80.0	0.0	2.9	8.6	0.0	2.9	0.0	2.9	2.9
FAI TAEK	76.0	0.0	0.0	8.0	4.0	4.0	4.0	0.0	4.0
BAN LEK	66.7	4.8	7.1	4.8	2.4	4.8	4.8	2.4	2.4
NON SUNG	60.6	6.1	3.0	6.1	6.1	3.0	6.1	6.1	3.0
LAO YAI	54.5	0.0	0.0	0.0	18.2	9.1	9.1	9.1	0.0
LAM PAO AREA	58.0	2.9	7.6	9.2	4.2	6.7	3.4	3.8	4.2

APPENDIX VIII, 10 KENAF LABOUR USE IN HARVESTING (MANDAYS/RAI)
(Percentage Distribution)

Upper Class Limit	0.0	1.0	2.0	3.0	4.0	5.0	6.0	8.0	30.0
NA CHUAK NUA	51.4	5.7	22.9	2.9	8.6	2.9	2.9	0.0	2.9
BAN TUM	12.3	1.8	26.3	14.0	10.5	8.8	5.3	5.3	15.8
UM MAO	71.4	2.9	5.7	2.9	0.0	5.7	2.9	2.9	5.7
FAI TAEK	60.0	0.0	8.0	4.0	4.0	12.0	8.0	0.0	4.0
BAN LEK	57.1	2.4	7.1	11.9	4.8	7.1	0.0	4.8	4.8
NON SUNG	27.3	0.0	6.1	24.2	9.1	6.1	3.0	15.2	9.1
LAO YAI	18.2	0.0	0.0	0.0	27.3	27.3	0.0	18.2	9.1
LAM PAO AREA	42.0	2.1	13.4	10.1	7.6	8.0	3.4	5.5	8.0

APPENDIX VIII, 11

% OF KENAF FARMERS USING HIRED LABOUR

	Ploughing	Planting	Weeding	Harvesting
Na Chuak Nua	8.0	8.0	8.0	20.0
Ban Tum	2.8	-	2.5	12.5
Um Mao	-	-	-	12.5
Fai Taek	-	-	2.5	12.5
Ban Lek	-	-	-	-
Non Sung	-	-	-	-
Lao Yai	-	-	-	14.3
Lam Pao Area	2.4	1.2	7.1	10.1

APPENDIX VIII, 12

% OF KENAF FARMERS RECEIVING LABOUR FROM NEIGHBOURS

	Ploughing	Planting	Weeding	Harvesting
Na Chuak Nua	-	-	-	-
Ban Tum	-	-	-	-
Um Mao	-	-	-	-
Fai Taek	-	-	-	-
Ban Lek	-	3.6	-	7.2
Non Sung	-	-	-	-
Lao Yai	-	-	-	-
Lam Pao Area	-	0.8	-	1.2

APPENDIX VIII, 13

% OF KENAF FARMERS RECEIVING LABOUR FROM RELATIVES

	Ploughing	Planting	Weeding	Harvesting
Na Chuak Nua	-	-	-	4.0
Ban Tum	-	1.4	-	-
Um Mao	-	-	-	2.5
Fai Taek	-	-	-	-
Ban Lek	-	-	-	-
Non Sung	-	4.8	-	9.5
Lao Yai	-	-	-	-
Lam Pao Area	-	1.2	-	2.4

APPENDIX VIII, 14

KENAF CASH INPUT PER RAI (BAHT)
(Percentage Distribution)

Upper Class Limit	0.0	25.0	50.0	75.0	125.0
NA CHUAK NUA	88.6	5.7	0.0	0.0	2.9
BAN TUM	77.2	10.5	5.3	5.3	0.0
UM MAO	91.4	2.9	2.9	2.9	0.0
FAI TAEK	100.0	0.0	0.0	0.0	0.0
BAN LEK	100.0	0.0	0.0	0.0	0.0
NON SUNG	100.0	0.0	0.0	0.0	0.0
LAO YAI	100.0	0.0	0.0	0.0	0.0
LAM PAO AREA	89.1	4.6	3.4	1.7	0.4

APPENDIX VIII, 15

KENAF YIELD (KILOGRAMS/RAI)
(Percentage Distribution)

Upper Class Limit	0.0	50.0	100.0	150.0	200.0	250.0	500.0	1000.0
NA CHUAK NUA	48.6	8.6	14.3	11.4	8.6	5.7	2.9	0.0
BAN TUM	10.5	5.3	5.3	12.3	28.1	14.0	19.3	5.3
UM MAO	71.4	5.7	2.9	5.7	2.9	11.4	0.0	0.0
FAI TAEK	60.0	0.0	8.0	8.0	20.0	0.0	4.0	0.0
BAN LEK	57.1	2.4	14.3	4.8	14.3	4.8	2.4	0.0
NON SUNG	24.2	24.2	33.3	12.1	6.1	0.0	0.0	0.0
LAO YAI	18.2	18.2	54.5	9.1	0.0	0.0	0.0	0.0
LAM PAO AREA	40.8	8.0	14.3	9.2	13.9	6.7	5.9	1.3

APPENDIX VIII.16

DIFFERENCES BETWEEN RICE CULTIVATION OF KENAF AND NON-KENAF GROWERS ('T' TEST)

Variable	Kenaf	Non-Kenaf	'T'
Plot size	14.1	13.1	0.83
Area planted	14.0	12.0	1.81
% damaged	15.0	15.4	-0.14
Yield	296.9	314.0	-0.89
Value	1943.3	1800.7	0.97
Total Inputs	167.2	248.1	-1.79
Total Input/Rai	13.6	26.5	-2.34 +1
Total Labour Input	115.4	107.3	0.8
Total Labour/Rai	9.5	10.2	-1.01
Ploughing Labour	2.3	2.8	-1.94 +2
Planting Labour	3.6	3.7	-0.21
Weeding Labour	0.2	0.3	-1.46
% Sold	6.9	6.9	0.03
Total Income	178.5	201.1	-0.37
Return/Man-day	19.6	16.9	1.55
Return/Rai	154.6	147.5	0.52
Per capita paddy land (rai)	1.97	2.00	0.35

+1 Significant at 98% level.

+2 Significant at 90% level.

APPENDIX VIII.17

SOCIO-ECONOMIC DIFFERENCES BETWEEN KENAF AND NON-KENAF GROWERS

Variable	Kenaf	Non-Kenaf	'T'
Family size	7.3	6.5	2.52^{+1}
Adult male	2.0	1.8	1.39
Adult female	2.0	1.8	1.45
Dependants	3.3	2.8	1.90
Absentee	0.2	0.3	-1.65
Age	44.8	44.8	-0.02
Sex	0.1	0.1	0.27
Education	3.8	3.8	-0.40
Holding	19.5	12.8	5.49^{+1}
Crop Y	3318.3	1716.6	7.60^{+1}
Animal Y	746.2	966.6	-1.09
Fish Y	100.1	69.2	1.57
Handicrafts Y	13.1	9.2	0.94
Other Y	1422.6	2233.8	-1.64^{+2}
Remit. Y	323.0	884.5	-1.13
% Crop Y	69.3	47.4	5.50^{+1}
% Animal Y	11.0	16.6	-2.00
% Fish Y	2.3	3.3	-1.21
% Handicrafts Y	0.3	0.3	-0.41
% Other Y	13.5	27.3	-3.59^{+1}
% Remit. Y	3.7	5.2	-0.74
Total Cash Y	5923.2	5879.9	0.05

+1 Significant at 99% level.

+2 Significant at 90% level.

APPENDIX VIII.18

DIFFERENCES IN LAND HOLDINGS OF KENAF AND NON-KENAF GROWERS

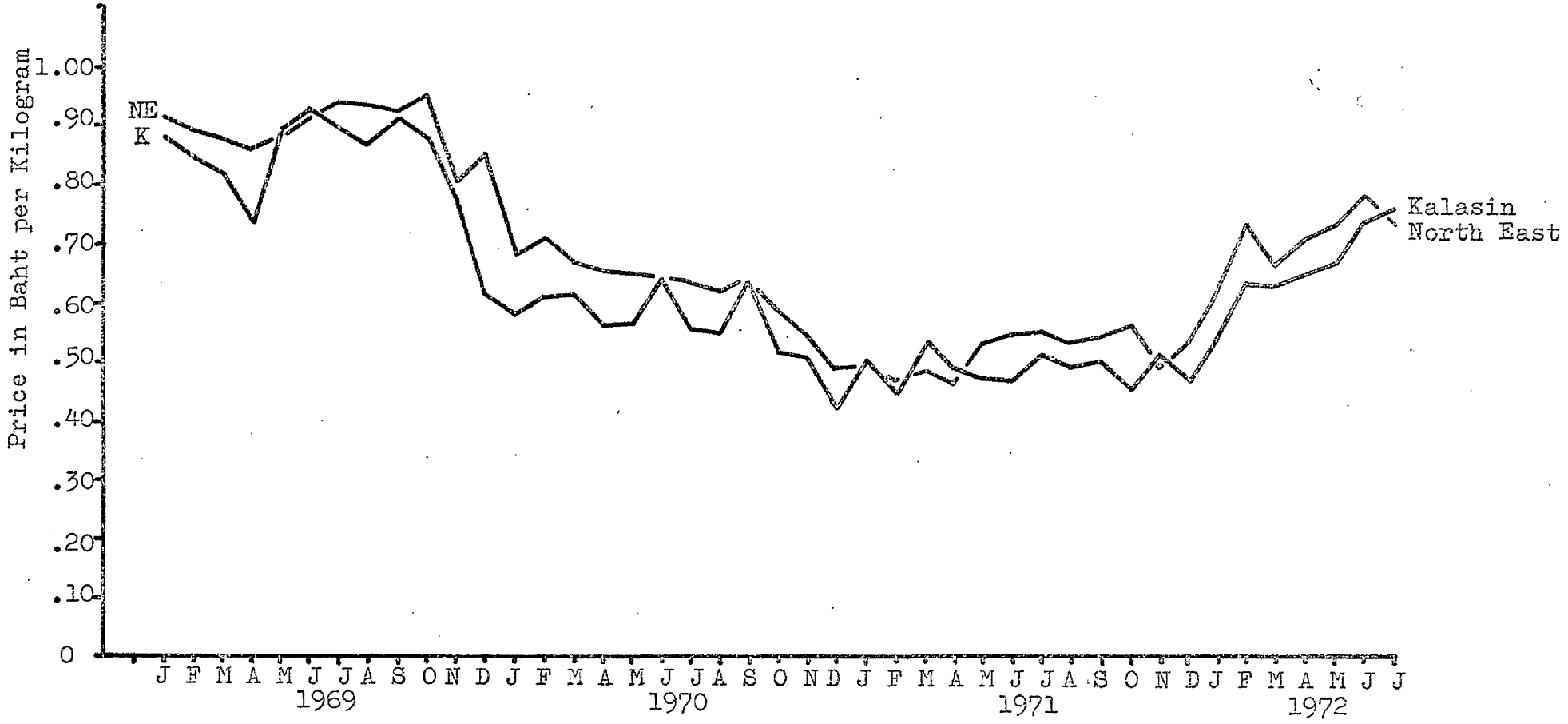
% Crop	Kenaf	Non-Kenaf
Glut.	69.9	91.7
Kenaf	26.4	0.0
Other	3.7	8.3

Mean Plot Size (rai.)	Kenaf	Non-Kenaf
Glut	14.1	13.1
Kenaf	5.0	0.0
Other	1.1	1.2
Total	20.2	14.3

Note: In both cases the 'others' represents, in the main, small subsistent plots of vegetables, fruit, etc.

APPENDIX IX

CROP PRICES



Appendix IX.1 Average Price of Glutinous Paddy by Month for changwat Kalasin and the North East

Source: Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture

Appendix IX.2 Average Price of Non-Glutinous Paddy by Month for changwat Kalasin and the North East

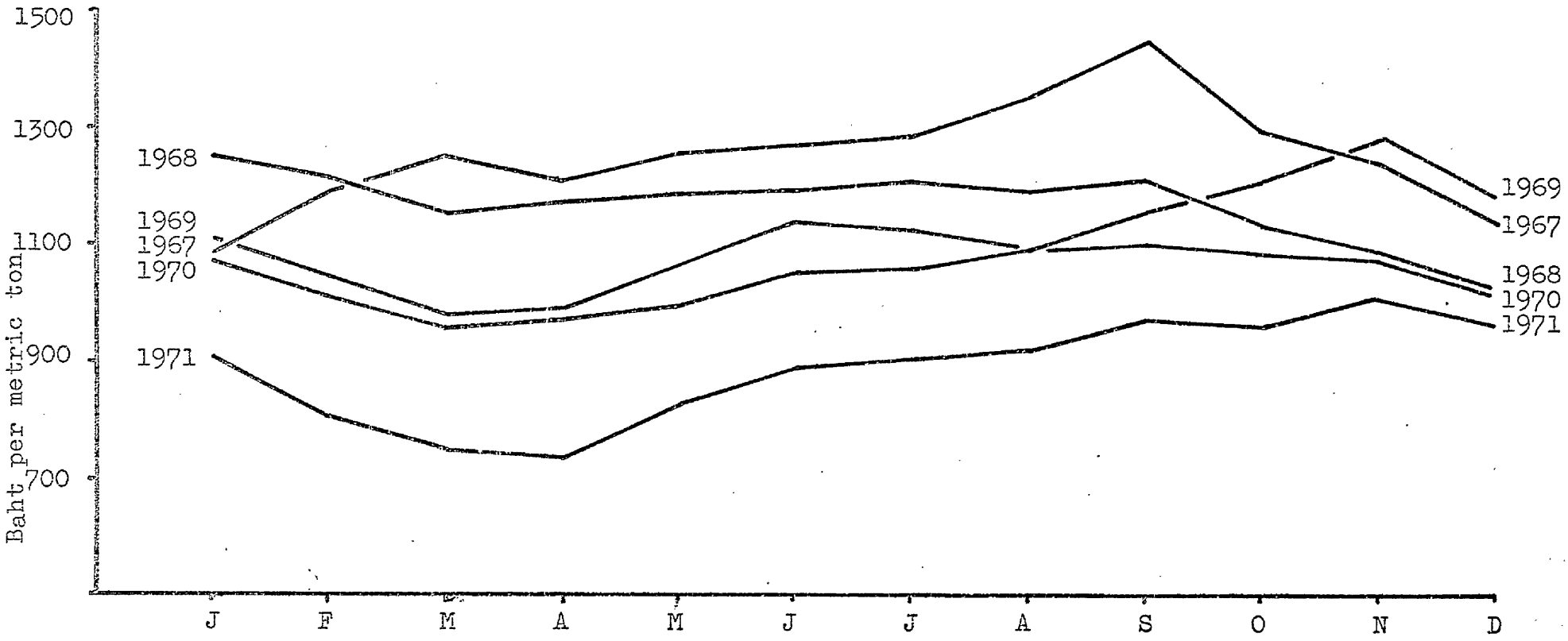
Source: Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture

APPENDIX IX.3

RICE PREMIUM RATES, SELECTED GRADES (Baht per Metric Ton)

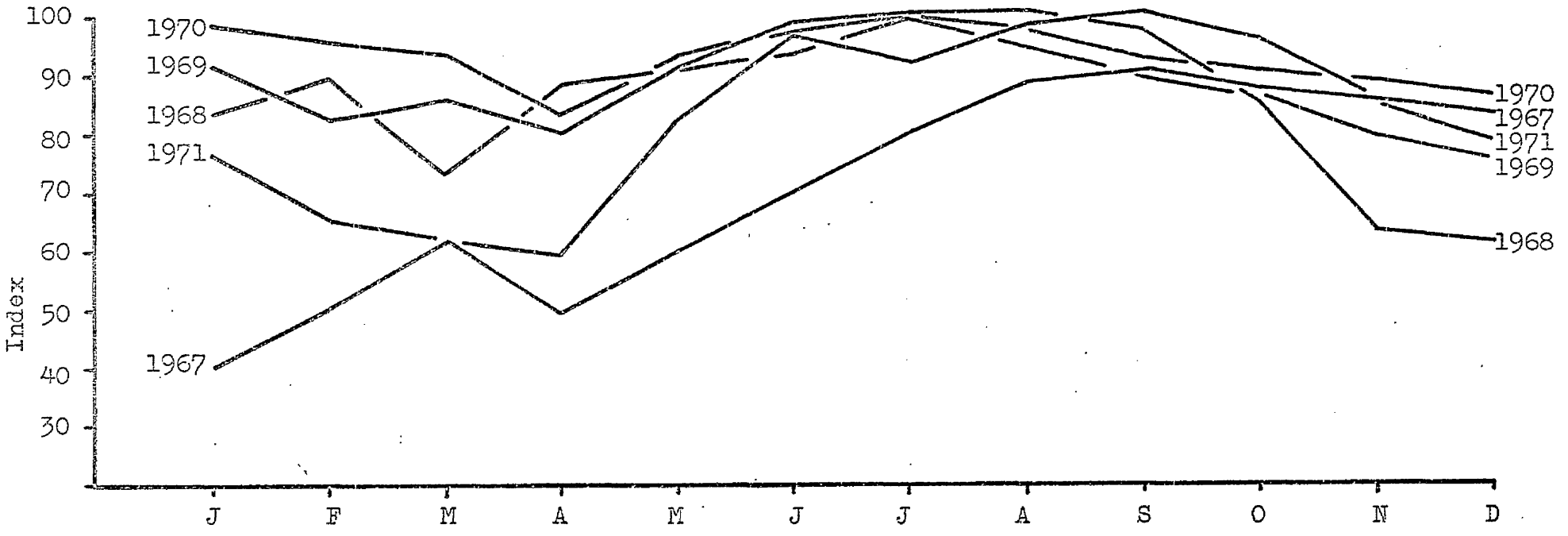
Date of Change	White Rice			Broken Rice	Glutinous Rice
	100%	5%	15%	A1 Super	(Whole)
Jan. 1, 1956	935	935	935	470	600
April 23, 1958				590	
June 18, 1959				470	
Nov. 4, 1959					840
Dec. 30, 1959	890	890	840	450	800
Aug. 2, 1960				540	
Dec. 30, 1960				500	600
April 17, 1961				540	
June 6, 1961			890		
April 3, 1962	950	950	950	600	
May 15, 1962					800
Oct. 3, 1962					700
July 16, 1963					800
Jan. 16, 1967	1,010	980	940	680	
March 1967	1,090	1,050	1,000	700	840
April 1967	1,240	1,190	1,080	790	
May 1967	1,300	1,230	1,130	810	
June 1967	1,320	1,260	1,150		850
July 1967	1,470	1,400	1,290	840	
Aug. 1967	1,640	1,570	1,460	930	860
Sept. 1967	1,520	1,450	1,350	890	850
Oct.-Nov. 1967	1,640	1,570	1,460	930	980
Dec. 1967					850
Jan. 1968					840
Feb. 1968					900
March 1968	2,070	1,970	1,890	1,270	1,470
April-May 1968	1,960	1,810	1,670	1,090	1,420
June-Oct. 1968	1,830	1,680	1,540	960	1,530
Nov. 1, 1968	1,450	1,450	1,300	800	1,250
Sept. 15, 1969	1,100	1,100	1,100	500	
Dec. 3, 1969	1,000	1,000	900		800

Source: J.C. Ingram, "Economic Change in Thailand 1850-1970", 1971, p.245.



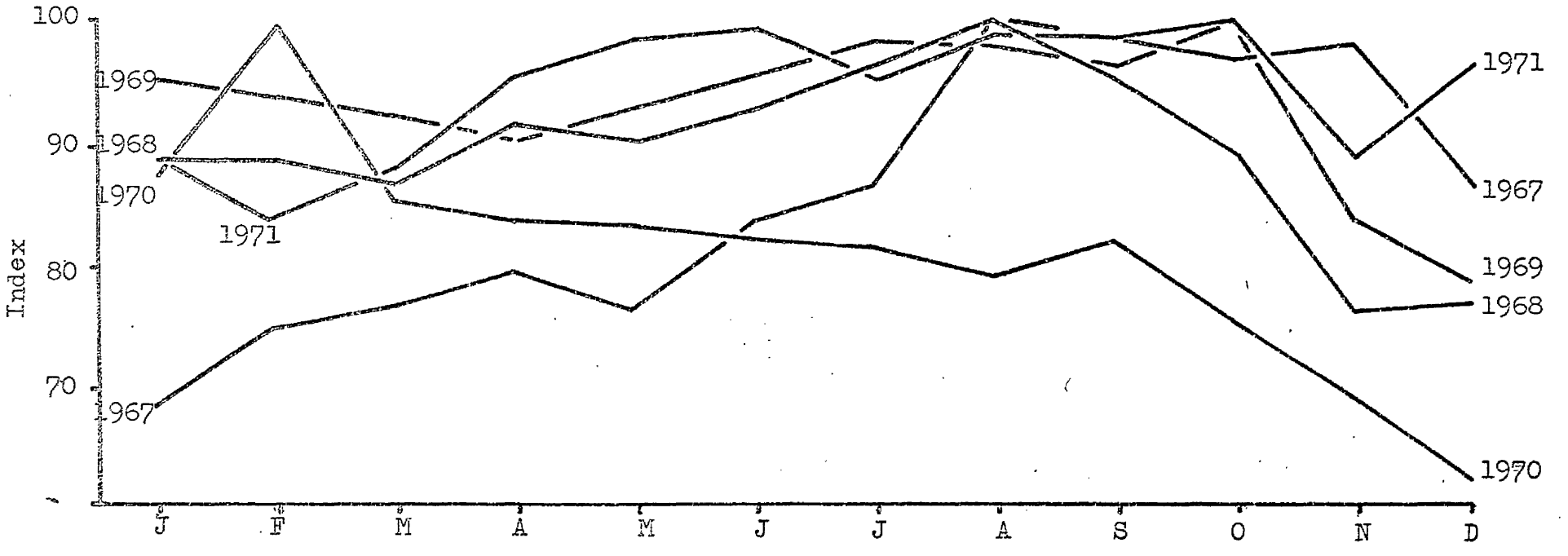
Appendix IX.4 Average Monthly Bangkok Wholesale Prices of Non-Glutinous Paddy, 1967-71

Source: Bank of Thailand Monthly Reviews, 1967-71



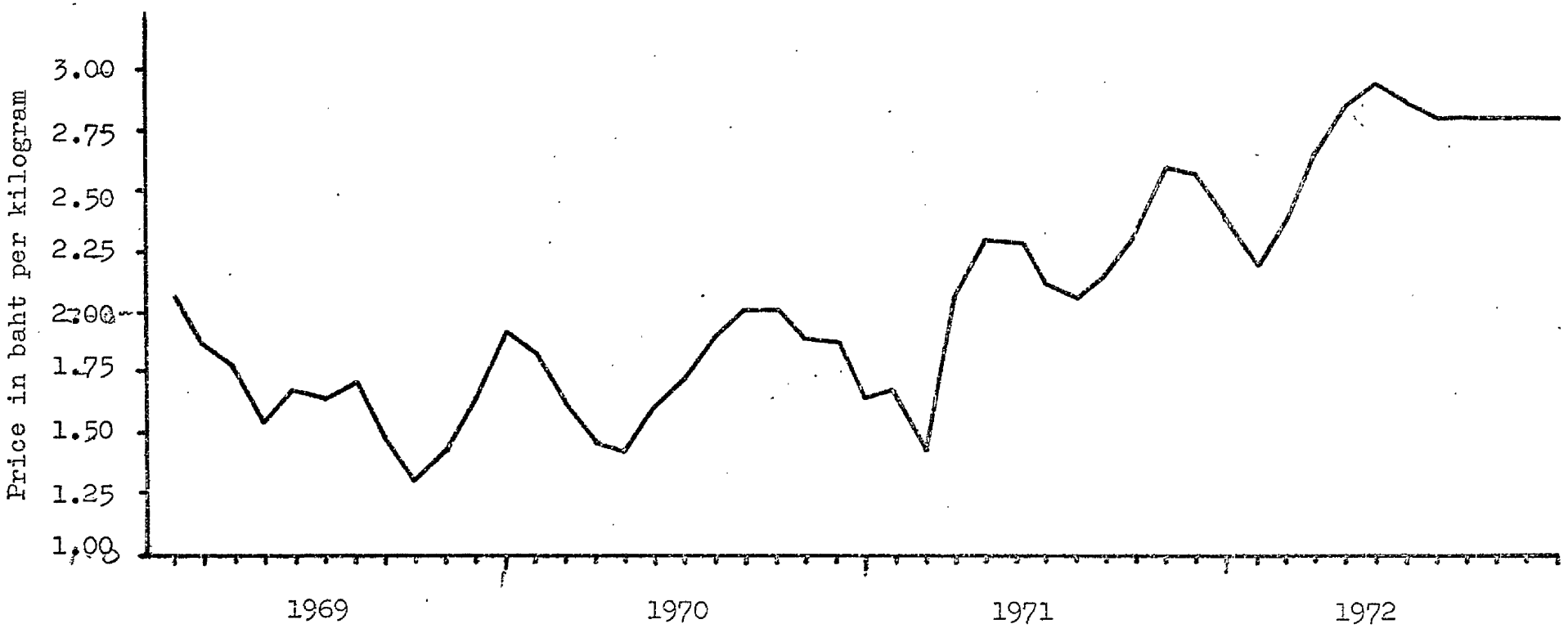
Appendix IX.5 Index of Average Monthly Farm Gate Prices in the North East for Non-Glutinous Paddy, 1967-71 (100 is the price in the month with the highest average)

Source: Calculated from data obtained from the Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture



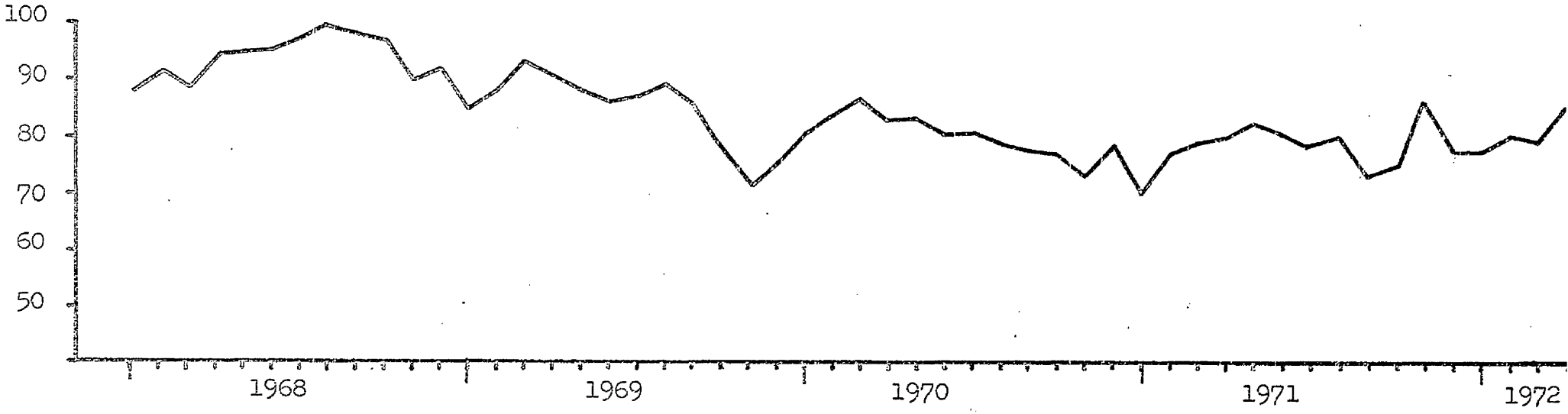
Appendix IX.6 Index of Average Monthly Farm Gate Prices in the North East for Glutinous Paddy, 1967-71 (100 is the price in the month with the highest average)

Source: Calculated from data obtained from the Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture



Appendix IX.7 Bangkok Average Kenaf Prices, three month moving average, 1969-72

Source: Calculated from data contained in the Bank of Thailand Monthly Reviews, 1969-72



Appendix IX.8 Average North East Farm Gate Price of Non-Glutinous Paddy as a Percentage of the Bangkok Wholesale Price

Source: Calculated from data obtained from the Division of Marketing, Department of Agricultural Economics, Ministry of Agriculture and the Bank of Thailand Monthly Reviews, 1969-72

APPENDIX IX.9

GLUTINOUS RICE PRICE INDEX (100 = AVERAGE PRICE)

Upper Class Limit	0.0	60.0	80.0	100.0	120.0	140.0	160.0	200.0
NA CHUAK NUA	74.3	2.9	0.0	17.1	2.9	0.0	0.0	2.9
BAN TUM	87.7	0.0	1.8	8.8	0.0	1.8	0.0	0.0
UM MAO	45.7	2.9	2.9	31.4	2.9	8.6	2.9	2.9
FAI TAEK	80.0	4.0	0.0	8.0	4.0	0.0	0.0	4.0
BAN LEK	76.2	0.0	0.0	23.8	0.0	0.0	0.0	0.0
NON SUNG	75.8	3.0	6.1	3.0	0.0	0.0	9.1	3.0
LAO YAI	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAM PAO AREA	75.6	1.7	1.7	14.7	1.3	1.7	1.7	1.7

APPENDIX IX.10

KENAF PRICE INDEX (100 = AVERAGE PRICE)
(Percentage Distribution)

Upper Class Limit	0.0	80.0	100.0	120.0	140.0	200.0
NA CHUAK NUA	48.6	8.6	22.9	17.1	2.9	0.0
BAN TUM	10.5	15.8	54.4	5.3	12.3	1.8
UM MAO	71.4	11.4	5.7	0.0	8.6	2.9
FAI TAEK	60.0	8.0	12.0	12.0	4.0	4.0
BAN LEK	57.1	7.1	23.8	7.1	2.4	2.4
NON SUNG	24.2	9.1	42.4	15.2	6.1	3.0
LAO YAI	18.2	0.0	63.6	18.2	0.0	0.0
LAM PAO AREA	40.8	10.1	31.5	9.2	6.3	2.1

APPENDIX IX.11

GLUTINOUS PADDY PRICES BY LOCATION OF SALES

	Village	Kalasin	Yangtalad	Elsewhere in changwat Kalasin
Na Chuak Nua	54	71		
Ban Tum	64			
Um Mao	63	61		50
Fai Taek	60			
Ban Lek	60	68		
Non Sung	62		75	
Lao Yai				
Lam Pao Area	60.32	65.55	75	62.5

Glutinous paddy sales outside the village result in a higher level of price, significant at the 98% level (Chi square).

APPENDIX IX.12

NON-GLUTINOUS PADDY PRICES BY LOCATION OF SALES

	Village	Kalasin	Yangtalad	Elsewhere in changwat Kalasin
Na Chuak Nua	60	70		
Ban Tum	58			
Um Mao	60	70		65
Fai Taek		45		
Ban Lek		60		
Non Sung	61		68	71
Lao Yai	70			
Lam Pao Area	61.77	62.56	78.0	68.0

Non-glutinous paddy sales outside the village result in a higher level of price, significant at the 98% level (Chi square).

APPENDIX IX.13

KENAF PRICES BY LOCATION OF SALES

	Village	Kalasin	Yangtalad	Elsewhere in changwat Kalasin	Elsewhere in the North East
Na Chuak Nua	2.21				2.19
Ban Tum	2.20		2.00		
Um Mao	1.84	1.85			
Fai Taek	2.44	3.00			
Ban Lek	2.18	2.22			2.27
Non Sung	1.92		1.30	2.00	
Lao Yai	2.00		2.20		
Lam Pao Area	2.09	2.20	1.83	2.00	2.22

There is no significant difference in the price obtained from the sale of kenaf at different locations.

APPENDIX IX.14

GLUTINOUS PADDY PRICE BY CHANNEL OF SALE (Baht per kilogram)

	Neighbour	Village Merchant	Outside Merchant	Village Rice Mill	Kalasin Rice Mill	Other
Na Chuak Nua	0.53	0.55	0.54	-	0.71	-
Ban Tum	0.66	0.64	-	-	-	-
Um Mao	0.70	0.50	0.66	0.63	0.60	-
Fai Taek	0.60	-	-	-	-	-
Ban Lek	-	0.60	0.69	-	0.66	-
Non Sung	0.48	0.66	0.74	-	-	-
Lao Yai	-	-	-	-	-	-
Lam Pao Area	0.59	0.62	0.66	0.63	0.64	-

APPENDIX IX.15

NON-GLUTINOUS PADDY PRICES BY CHANNEL OF SALE (Baht per kilogram)

	Neighbour	Village Merchant	Outside Merchant	Village Rice Mill	Kalasin Rice Mill	Other
Na Chuak Nua	0.57	0.65	0.60	-	0.70	0.60
Ban Tum	-	0.67	0.60	-	-	-
Um Mao	0.60	-	0.73	0.60	0.68	-
Fai Taek	-	-	0.45	-	-	-
Ban Lek	--	-	0.60	-	-	-
Non Sung	0.60	0.63	0.66	-	0.70	0.60
Lao Yai	-	0.60	0.60	-	0.70	-
Lam Pao Area	0.58	0.63	0.68	0.60	0.68	0.6

APPENDIX IX.16

KENAF PRICES BY CHANNEL OF SALE (Baht per kilogram)

	Neighbour	Village Rice Mill	Outside Merchant	Other
Na Chuak Nua	2.18	2.19	2.20	
Ban Tum	2.13	2.21	2.09	
Um Mao	1.00	--	1.96	
Fai Taek	2.44	3.00	-	
Ban Lek	2.18	2.22	-	
Non Sung	1.86	1.93	1.86	2.00
Lao Yai	-	2.10	2.02	
Lam Pao Area	2.12	2.10	2.06	2.00

APPENDIX X

FARM INCOME

APPENDIX X, 1

CASH INCOME 1971-2

CROPS	ANIMALS	FISH	HANDICRAFTS	OFF FARM	REMITTANCES	TOTAL
1364.1	810.0	172.6	15.8	1884.3	64.9	4311.7
2102.1	1210.9	41.8	2.6	1345.0	14.0	4716.4
1478.1	1312.7	144.5	30.2	2978.4	262.5	6206.4
673.3	591.7	3.9	13.5	1615.1	1095.7	3993.2
1048.6	625.2	37.4	10.2	663.0	414.3	2798.7
1010.1	1333.7	12.7	5.7	679.1	5.7	3047.0
2070.8	1733.9	67.5	4.2	415.2	100.0	4391.6
1422.4	1048.0	67.8	11.1	1676.7	238.0	4464.0

APPENDIX X, 2

VALUE OF PRODUCTION 1971-2

CROPS	ANIMALS	FISH	HANDICRAFTS	OFF FARM	REMITTANCES	TOTAL
3575.2	810.0	324.7	31.7	1884.3	64.9	6690.8
3779.1	1210.9	75.9	116.1	1345.0	14.0	6541.0
3608.8	1312.7	215.8	115.8	2978.4	262.5	8494.0
2426.2	591.7	52.0	46.7	1615.1	1095.7	5827.4
2773.9	625.2	111.8	60.4	663.0	414.3	4648.6
3382.2	1333.7	128.5	239.5	679.1	5.7	5768.8
3954.7	1733.9	124.9	102.5	415.2	100.0	6431.2
3372.1	1048.0	146.6	105.1	1676.7	238.0	6586.5

APPENDIX X.3

COMBINATIONS OF CASH INCOME SOURCES, 1972, (% Distribution)

These combinations were produced by a computer program which made use of the crop combination method developed by Weaver in 1936.[1]

Combinations with largest source crop sales

18.1	crop (100%)
11.1	crop
5.8	crop/anim.
0.8	crop/fish
5.8	crop/o-fm.
1.2	crop/anim./o-fm.
0.8	crop/o-fm./anim.
0.4	crop/o-fm./fish
0.4	crop/rem./o-fm.
44.4	% FARMERS WITH MAIN SOURCE CROP INCOME

Combinations with largest source remittances

0.8	rem.
0.8	rem./crop
0.8	rem./anim.
0.4	rem./hand.
0.4	rem./anim./crop
3.3	% FARMERS WITH MAIN SOURCE REMITTANCES

Combinations with another largest source (sales of fish or handicrafts)

0.4	fish (100%)
0.4	hand./crop/fish
0.8	% FARMERS WITH OTHER MAIN SOURCES

Combinations with largest source sales of animals or animal products

2.1	anim. (100%)
3.3	anim.
10.7	anim./crop
0.8	anim./fish
2.1	anim./o-fm.
0.4	anim./rem.
1.2	anim./crop/o-fm.
0.8	anim./o-fm./crop
0.4	anim./rem./crop
0.4	anim./crop/o-fm./fish
0.4	anim./crop/o-fm./hand.
22.6	% FARMERS WITH MAIN SOURCE ANIMAL INCOME

Combinations with largest source off-farm employment

3.7	o-fm. (100%)
10.7	o-fm./
4.9	o-fm./crop
4.1	o-fm./anim.
0.8	o-fm./rem.
0.4	o-fm./crop/anim.
0.8	o-fm./anim./crop
0.4	o-fm./anim./rem.
0.4	o-fm./crop/anim./fish/rem.
26.3	% FARMERS WITH MAIN SOURCE OFF-FARM EMPLOYMENT

2.5 % WITH NO CASH INCOME

[1] J.C. Weaver, "Crop Combination Regions in the Middle West", Geographical Review, 44, 1936, pp.175-200.

APPENDIX X.4

SUMMARY OF CASH INCOME COMBINATIONS, 1972

% WITH ONE SOURCE

Source	100%	95%	Total
crop	43	34	77
anim.	5	9	14
fish	1	0	1
hand.	0	0	0
o-fm.	8	24	32
rem.	0	2	2
TOTAL	57	69	125

% WITH TWO SOURCES

crop/anim.	11	
crop/fish	2	
crop/o-fm.	12	25
anim./crop	25	
anim./fish	2	
anim./o-fm.	3	30
o-fm./crop	14	
o-fm./anim	7	
o-fm./rem.	2	23
rem./crop	2	
rem./anim.	1	
rem./hand.	1	4
TOTAL	82	

% WITH THREE SOURCES

crop/anim./o-fm.	3	
crop/fish/o-fm.	1	
crop/o-fm./anim.	1	
crop/o-fm./fish	1	6
anim./crop/fish	1	
anim./crop/o-fm.	3	
anim./o-fm./crop	1	
anim./rem./crop	5	10
o-fm./anim./crop	2	
o-fm./anim./rem.	1	3
TOTAL	20	

% WITH FOUR SOURCES

crop/hand./fish/anim.	1	
crop/rem./o-fm./anim.	1	2
anim./crop/hand./o-fm.	1	
anim./crop/o-fm./fish	1	2
o-fm./anim./rem./crop	1	1
TOTAL	5	

% WITH FIVE SOURCES

o-fm./crop/anim./rem.	1

For an explanation of the combinations, see Appendix X.3.

APPENDIX X, 5

SOME EXAMPLES OF OFF FARM INCOME, 1972

Occupation	Days Worked	Income in Baht	Other Features
Guard at Lam Pao, R.I.D.	300	6,780	
Labouring for R.I.D., making canals	300	5,400	
Cutting house poles	7	700	Cuts two poles a day, and sells them for 50 baht each
Village tailoring	part-time all year	6,000	Owns a sewing machine
Village kenaf trading	15	600	Buys 1535 kg. kenaf, at 3400 baht, and sells to a merchant in Khon Kaen for 4000
Village noodle selling	120	2,400	
Village cattle trading	60	2,400	Buys 10 beasts for 14300 baht, and sells for 16740 baht
Village money lender			Charges 5% per month
Village headman	all year	2,880	
Village school teacher	all year	10,144	

APPENDIX X, 6

VALUE OF CROP STORE 1971-2

	MEAN	NUMBER OF FARMERS	% OF FARMERS	STORE + CROP INCOME	% INCOME
Na Chuak Nua	395.5	16	43.2	1759.6	29.0
Ban Tum	263.4	18	29.5	2365.5	12.5
Um Mao	578.5	15	46.9	2056.6	39.1
Fai Taek	282.5	8	34.8	955.8	42.0
Ban Lek	261.0	18	42.9	1309.6	24.9
Non Sung	738.8	21	56.8	1748.9	73.0
Lao Yai	948.3	7	63.6	3019.1	45.8
	432.6	103	42.4	1855.0	30.4

APPENDIX X.7

COMBINATIONS OF CASH INCOME FROM CROPS, 1972 (% Distribution)

Combinations with largest source glutinous rice sales	
7	glut. (100%)
2.5	glut.
2.1	glut./n-glut.
4.5	glut./kenaf
1.6	glut./other
0.4	glut./n-glut./kenaf
0.4	glut./n-glut./other
0.4	glut./other/n-glut.
0.4	glut./n-glut./kenaf/other
19.3	TOTAL WITH MAIN SOURCE GLUTINOUS RICE

Combinations with largest source non-glutinous rice	
4.1	n-glut. (100%)
1.6	n-glut.
1.6	n-glut./glut.
0.4	n-glut./kenaf
0.4	n-glut./other
0.4	n-glut./glut./kenaf
0.4	n-glut./kenaf/other
0.4	n-glut./other/kenaf
0.4	n-glut./glut./other/kenaf
0.4	n-glut./kenaf/glut./other
10.3	TOTAL WITH MAIN SOURCE SALES OF NON-GLUTINOUS RICE

29.6	TOTAL WITH MAIN SOURCE RICE SALES

Combinations with largest source sales of kenaf	
18.5	kenaf (100%)
9.9	kenaf
9.1	kenaf/glut.
0.8	kenaf/n-glut.
2.5	kenaf/other
0.4	kenaf/glut./other
0.4	kenaf/n-glut./glut.
0.8	kenaf/n-glut./other
1.6	kenaf/other/glut.
0.8	kenaf/glut./n-glut./other
44.8	TOTAL WITH MAIN SOURCE SALES OF KENAF

Combinations with largest source other crop sales	
5.8	other (100%)
0.8	other
1.6	other/glut.
0.4	other/n-glut.
1.2	other/kenaf
9.9	TOTAL WITH MAIN SOURCE SALES OF OTHER CROPS

15.6	TOTAL WITH NO CROP INCOME

For an explanation of the combinations, see Appendix X.3.

APPENDIX X.8

% OF CASH INCOME OBTAINED FROM REMITTANCES

	No cash income	0	1-19	20-39	40-59	60-79	80-99	100
Na Chuak Nua	-	97.3	2.7	-	-	-	-	-
Ban Tum	-	96.7	3.3	-	-	-	-	-
Um Mao	6.3	89.4	4.3	-	-	-	-	-
Fai Taek	8.6	78.2	4.4	-	4.4	-	4.4	-
Ban Lek	-	87.5	2.7	-	-	5.4	5.4	-
Non Sung	5.4	91.9	-	-	2.7	-	-	-
Lao Yai	-	92.7	8.3	-	-	-	-	-
Lam Pao Area	2.5	91.5	1.6	1.6	0.8	0.8	1.2	-

APPENDIX X.9

EXPENDITURE ON LIVESTOCK (% OF FARMERS)

	Buffalo/Cattle Purchase	Buffalo/Cattle Hire	Pig Purchase	Poultry Purchase
Na Chuak Nua	37.8	2.7	8.1	29.7
Ban Tum	28.3	1.7	5.0	28.3
Um Mao	43.8	3.1	3.1	12.5
Fai Taek	26.1		13.0	21.7
Ban Lek	26.2		2.4	26.2
Non Sung	42.2	2.7	16.2	45.9
Lao Yai	25.0		8.3	75.0
Lam Pao Area	33.3	1.6	7.4	30.5

APPENDIX X.10

EXPENDITURE ON BUFFALOES AND CATTLE (In baht)

	Buffalo/Cattle Purchase		Buffalo/Cattle Hire		Total (Baht)
	Baht	%	Baht	%	
Na Chuak Nua	240.5	94.0	15.4	6.0	255.9
Ban Tum	560.8	96.2	22.7	3.8	583.0
Um Mao	571.9	90.7	58.8	9.3	630.6
Fai Taek	688.3	98.1	13.0	1.9	701.3
Ban Lek	430.9	94.2	26.4	5.8	457.3
Non Sung	857.3	98.6	12.2	1.4	869.5
Lao Yai	504.2	100.0			504.2
Lam Pao Area	545.5	95.9	7.5	8.23	568.7

APPENDIX XI - THE MARKET FOR THAI KENAF

Since 1964, Thailand has ranked as the world's leading producer of kenaf (Appendix XI.1), similarly the kingdom has been consistently the seventh or eighth world producer of all hard fibres, including jute. Bangla Desh (formerly East Pakistan) dominates the world market in normal years (Appendix XI.2); Bangla Desh jute is favoured for its high quality and consistent grading practices.[1] The high cost of jute and the disruption of Bangla Desh's production by flood and political upheavals have caused manufacturers to turn to kenaf either as a substitute or to use as mixed jute/kenaf fibre.[2] The inferior nature of kenaf has meant that the demand for the crop varies with the prevailing price of jute, which in practice depends on the size of the harvest in Bangla Desh,[3] with which the demand for Thai kenaf thus shows an inverse relationship.

In 1965 and 1966, the very poor Bengali crop resulted in a high level of demand, especially for the Indian gunny bag mills; in these two years half Thailand's exports of kenaf went to India.[4] The 1968 crop in Pakistan was, in contrast, extremely good, and in consequence the demand for Thai kenaf fell drastically.

Thai kenaf has earned a poor reputation for quality, which has encouraged the swing away from it in years ofplentiful jute supply.[5] In years of high demand, the quality of Thai kenaf on the market has

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1 E.J. Sholton, "Kenaf in Thailand", 1968, p.382.

2 J.F. Allen, "The Market for kenaf in the United Kingdom", Tropical Products Institute, 1969, p.4.

3 Sholton, op.cit., p.31.

4 Chaiyong Chuchart et al., "An economic study of the production and marketing of Thai kenaf", A.S.R.C.T., 1967, p.7.

5 Sholton, op.cit., p.401.

fallen.[6] However, in all years the grading practices have proved extremely inconsistent, which has again prejudiced manufacturers against the product.[7]

Unlike the other world kenaf producers, Thailand does not consume the majority of its production internally,[8] consequently the Thai producers are more vulnerable to fluctuations in the international fibre market (Appendix XI.3); in no year has domestic consumption exceeded 25% of the total production. There are now ten gunny sack mills in Thailand, five of them government owned, and five private. The original three mills were established by the government as part of their policy of the development of a public industrial sector in the 1950's.[9] The capacity of these three mills was in total 20 million gunny sacks a year (Appendix XI.4) though they never operated at full capacity. In part the operation of the original factories below capacity stemmed from a lack of fibre. With the rapid expansion of fibre growing from the late 1950's, gunny sack production also began to increase, and by 1962 the mills were operating at 50% capacity. Between 1963 and 1968, the industry's output increased from 20 million to 75 million sacks a year with the establishment of seven more mills (Appendix XI.5). Since 1966, Thailand has been fully self-sufficient in gunny sacks. In 1962, 30.83 million sacks were imported, and by 1967 the figure had fallen to 1.3 million, and 6.45 million were exported.[10] However, even at full capacity the industry could only absorb 115,000 tons of fibre annually.[11]

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6 Ibid., p.339.

7 Ibid., p.341.

8 Ibid., p.23.

9 This period of government control of industry from 1951-56 was largely unsuccessful and came to an end with the death of Marshal Surit in 1956. Details of the policy are discussed in J.C. Ingram, "Economic Change in Thailand, 1850-1970", 1971, pp.287-8.

10 A.S.R.C.T., "A Brief Review of the Thai Kenaf Mill Industry", 1968, p.9.

11 Ibid.

Mills have run at 80% capacity, using 92,000 tons.[12] Since 1968, there has been no appreciable expansion in the consumption of fibre by the gunny sack mills, and the government has forbidden the creation of new mills on the grounds that the present capacity is ample for present needs.[13]

The Thai kenaf processing industry has met with the same problems of low quality as the overseas buyers. Exporters have creamed off the best grade fibre for the export market so that except in years of low international demand the domestic industry has had only inferior fibre.[14] Aside from the possible long term competition from man-made fibres and the contraction of world gunny sack demand due to increasing use of bulk transportation techniques, the low quality of the Thai crop is likely to limit the opportunities for the development of an extensive export market.[15]

In 1967-8, the Thai gunny mills took 25% of the crop; the high percentage reflected the growth of the industry, but also the fact that the severe drought of that year had seriously limited production. It is clear that kenaf production cannot rely on a firm basis of domestic demand, as do the other world producers, and consequently the North East farmers have no cushion from the fluctuations in international demand. The implications of this for farm income are discussed in c hapter IX. This uncertainty which is present in kenaf demand is of importance in explaining the attitude of farmers to the crop and the nature of the marketing system associated with it.

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12 Ibid.

13 Ibid., p.2.

14 The Khon Kaen Mill has been importing jute to mix with its kenaf fibre for this reason.

15 A.S.R.C.T., op.cit., p.5. Thailand is at a cost disadvantage vis-à-vis India and Bangla Desh gunny sack production, of 33%, and the relative merit of Thai sacks is a matter of some dispute.

APPENDIX XI, 1

THAILAND'S POSITION IN THE WORLD PRODUCTION OF JUTE, KENAF AND SIMILAR FIBRES, 1946-1967

Jute, production in 1000 metric tons

	1946/1951	1951/1956	1956/1960	1960/1961	1961/1962	1962/1963	1963/1964	1964/1965	1965/1966	1966/1967
Pakistan	1,327	1,034	1,049	821	1,232	1,125	1,054	973	1,170	1,085
Thailand	3	2	3	6	11	7	12	12	13	14
World	1,489	1,892	2,059	1,763	2,573	2,458	2,346	2,174	2,280	2,454
Thai Position	7th	7th	7th	7th	8th	8th	8th	8th	8th	8th

Source:- F.A.O. Commodity Reports, 1946-67, and quoted by E.J. Sholton, 'Kenaf in Thailand', p.21, 1968.

APPENDIX XI, 2

THAILAND'S POSITION IN THE WORLD PRODUCTION OF JUTE, KENAF AND SIMILAR FIBRES, 1946-1967

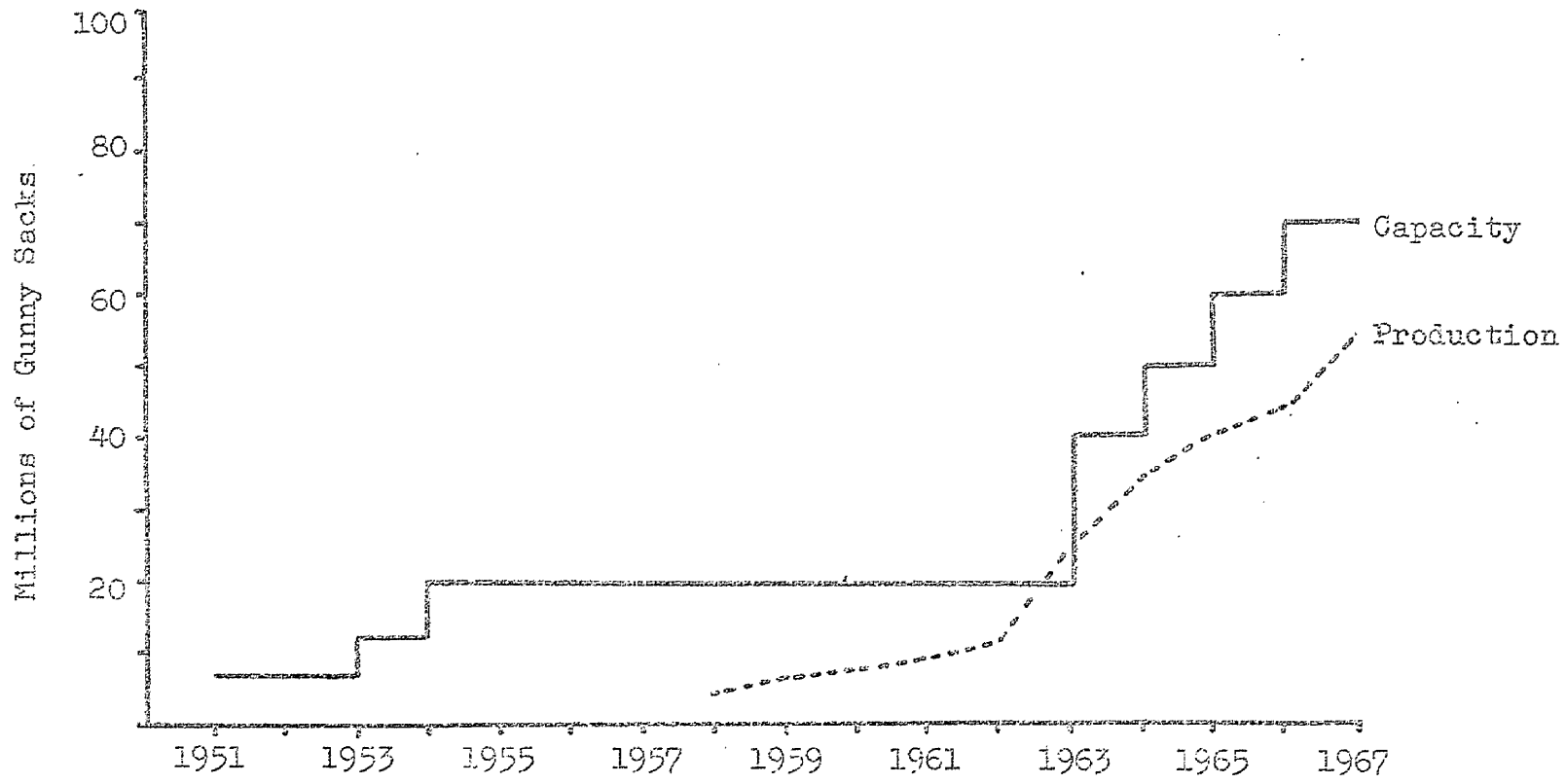
Kenaf and similar fibres, production in 1000 metric tons

	1946/1951	1951/1956	1956/1960	1960/1961	1961/1962	1962/1963	1963/1964	1964/1965	1965/1966	1966/1967
Thailand	12	13	29	178	332	132	208	298	396	530
World	233	367	578	721	1,017	790	924	1,010	1,143	1,319
Thai Position	6th	5th	5th	3rd	2nd	3rd	3rd	1st	1st	1st
Thai percentage	5.2	3.5	5.0	24.7	32.6	16.7	22.5	29.5	34.6	40.2
Kenaf etc. % of fibre	13	16	21	29	28	24	28	31	33	34
Thai % of world fibre production	0.7	0.6	1.1	7.2	8.4	4.0	6.3	9.2	11.4	13.7

Source:- F.A.O. Commodity Reports, 1946-67, and quoted by E.J. Sholton, 'Kenaf in Thailand',. p.21, 1968.

Appendix XI.3 Production and Export of Kenaf, 1953-70

Source: C. Chuchart et al., 'An Economic Study of the Production and Marketing of Thai kenaf,' A.S.R.C.T. 1967



Appendix XI.4 Growth in the Capacity of the Thai Kenaf Mills, 1951-67

Source: Chien Chu et al., 'A Brief Review of the Thai Kenaf Industry,' A.S.R.C.T., 1968

ADDENDUM

1. Page 74 Third paragraph

After 'died out after about 200 mm' insert (ref 36)

2 Page 84 Bottom of page

Add 'All errors quoted in the Thesis are standard deviations, with the exception of that for the bowing of fuel pins which is a maximum possible error.

3. Page 86 Insert at end of third paragraph.

"No allowance has been made for the possible error introduced by the fact that the plan of the cores are not strictly circular. Hines et al ref 104, have given the solution of the diffusion equation for a hexagonal cross-section core and it is a trivial matter to extend this to the octagonal cross-section. Using this solution for the core with the most pronounced 'flats', Core F, it can be shown that the deviation between the flux calculated for the octagonal core is less than 0.13% from that of the circular core everywhere within the core. It is thought therefore that the error introduced by such a neglect is considerably less than the experimental error.

4. Page 134 Insert

104 Hines, K.C., Holbrough D.W. Solution of the pile equation for a bare cylindrical system of hexagonal cross-section AERE R/R2248, 1957