Malaya (Federation) - Agriculture U.S.

A RECONNAISSANCE STUDY
OF FARMING ORGANIZATION
IN A COASTAL AREA OF WEST JOHORE

(A Preliminary Report)

David W. Brown
Economics Department
University of Malaya in Singapore

August 1960

A RECONNAISSANCE STUDY OF FARMING ORGANIZATION IN A COASTAL AREA OF WEST JOHORE

(A Preliminary Report)

David W. Brown
Economics Department
University of Malaya in Singapore

August 1960

PREFACE

Here at the University of Malaya we have been attempting to acquaint our economics students with principles and techniques for making decisions in agriculture -- ranging from the management of individual farms to the planting of national rural development programs. Effective teaching of these concepts requires, in part, descriptive information of the actual resource situations on farms, as well as estimates of the results of the different farming alternatives that can be considered. The study reported here was prompted by the need for more information of this sort from Malayan farms, as well as a desire to learn more about the difficulties encountered in getting input-output data from farmers themselves. At the same time, it was hoped that the findings of this study would be of direct use to agricultural extension workers and other rural development agencies in Malaya.

The descriptive data in this study were obtained and analyzed with the needs of agricultural economics students in Malaya, as well as in other countries, particularly in mind. People who have been working with farmers in Malaya may find little information in this report that is new to them. The main hope has been to enable students who have not had the opportunity to live and work in Malayan farming areas, such as the Muar area, to understand better what farmers have been doing and what opportunities exist for making changes on these farms. To others, this study may point up the kinds of information that are needed to estimate the income effects of various cropping adjustments on individual farms.

This report concentrates largely on describing the resource situations and production practices now existing on farms in the study area. Plans are in future reports to use the input-output data presented here, along with data from other sources, to develop estimates of the costs and returns that would be involved if these farmers were to make various kinds of adjustments in the kinds of enterprises produced. The present report, being preliminary in nature and rather hastily prepared, no doubt contains errors and omissions. Furthermore, the fact that the writer is a relative new-comer to Malaya may have led to misinterpretation of the survey results. Accordingly, we would be very grateful if persons reading this report would call attention to items which should be corrected or clarified in any future reports which are prepared.

The students who participated in the survey included: Annuar bin Eusoff, Chan Teck Kee, Ronald Chua, Hamidi bin Osman, Lee Kam Cheng, Lian Teck Jin, Lim Ban Choon, Mohamed Nor bin Ismail, Nik Mohamed Amin, K. Sreenivasan, Syed Abdullah Yahya and Zainal Abidin bin Mokhtar. They took an active part in planning survey procedure, preparing the questionnaire forms, and tabulating results, and provided many useful suggestions.

Many other persons were also extremely helpful in laying the groundwork for the study and in interpreting the results. I would particularly like to express appreciation to the following: Ali bin Raya, formerly District Officer at Muar; Hassan bin Abdullah, Syed Sulaiman bin A. Kadir, and Mohd, Amin bin Othman, all of the Agriculture Department in the Johore West circle; Syed Abdul Rahman bin Iros, Assistant Rural Development Officer at Muar; Haji Abdul Rahman bin Mahmood, President of the Johore Smallholders Association; Ahmad bin Haji Salleh, R.R.I. Rubber Instructor at Muar; M. Jebaratnam of the Rubber Industry Replanting Board (Fund B) at Muar; Peter Jones, State Drainage and Irrigation Engineer of Johore; Peter Class, State Agricultural Officer of Johore; and Chew Hong Jung, Ahmad bin Baba, Goh Kim Swee, and Ahmad bin Mohd. Nor of the College of Agriculture at Serdang.

The study was financed under a research grant made to the University of Malaya in Singapore by the Council on Economic and Cultural Affairs.

David W. Brown
Visiting Professor of
Agricultural Economics

August 1960

TABLE OF CONTENTS

I. INTRODUCTION

Public programs aimed at raising levels of living of rural families can consider two general lines of attack: (1) improving the institutional framework within which farm families operate -- land tenure laws, group settlement projects, rural credit facilities, construction of new roads and bridges, replanting schemes, etc. -- and (2) education and research which help guide farm people how to make more effective use of of their resources within the existing institutional setting. In either case, effective planning of rural development programs relies, in part, on estimates of the present position of farm families relative to what they could achieve under alternative production and marketing adjustments. National and regional averages may help, but are not enough. Information is needed for representative individual families in the major resource situations found in rural areas.

Several studies in Malaya have described existing income situations, resource-use patterns, and institutional arrangements associated with farm families.[1/] When published, the results of the National 1960 Census of Agriculture will provide many new insights into the existing characteristics of agricultural producers in the Federation of Malaya. Not so much attention has been given to the extent to which farm families can improve their welfare through individual adjustments. This is the subject-matter focus of the study reported here.

A. Objectives of the Study

This investigation represents an attempt to learn more about existing farming programs in a selected area of southern Malaya as a basis for assessing the possibilities for improving incomes through individual production and marketing adjustments. More specifically, the subject-matter objectives of the study were to:

1/ See, for example:

U. A. Aziz, "Survey of Five Villages in Nyalas," Dept. of Economics, Mimeographed Report, University of Malaya, Feb. 1957.

P. T. Bauer, "Report on a Visit to the Rubber-Growing Small-Holdings of Malaya," Great Britain Colonial Office Research Publication #1, London: H.M. Stationery Office, 1948.

E. H. G. Dobby and others, "Padi Landscapes of Malaya," Malayan Jour. of Tropical Geography, Vol. 6, Oct. 1959.

T. B. Wilson, "The Economics of Padi Production in North Malaya, Part I: Land Tenure, Rents, Land Use and Fragmentation," Federation of Malaya, Department of Agriculture, Bul. 103, 1958.

1. Describe the land, labor, and managerial resources available on farms in the selected locality.

2. Describe existing agricultural production and marketing patterns on these farms.

3. Develop some rough input-output data (yields, labor and equipment requirements, etc.) for specific farming enterprises.

4. Estimate the net returns associated with existing farm programs.

5. Assess the opportunities for improving incomes through adjustments in individual farming programs.

At the same time, this study was intended to explore possible ways for obtaining the above kinds of information, and the difficulties and sources of error which are encountered, in the hope of suggesting improved procedures for future studies of farming adjustments. Accordingly, this report not only presents the factual results of the investigation itself, but pays considerable attention to the methodological implications of each stage.

B. Geographical Setting of the Study

The farming situations to which this study refers are situated near the town of Muar, which is located on the western coast of Johore -- the southernmost State in the Federation of Malaya. Muar is about 120 miles northwest of Singapore, and about 130 miles south of Kuala Lumpur.

The study site itself is located south of Muar. Its boundaries extend about 15 miles along the coast and from 5 to 8 miles inland. (See figure 1.) The southern part of the site corresponds to the boundaries of the Sri Menanti drainage area.[2/] About one-third of the site extends outside the drainage area itself.

Mostly Malaysian smallholdings. The land in the study area is mostly in agricultural smallholdings. Unlike the areas further inland, there are no large estates. As will be seen in the data presented later on, most of the holdings are operated by the owners' families, who usually live right on their own land. There are, however, a few absentee landowners who live in the nearby towns of Muar or Batu Pahat.

2/ This drainage area is one of three or four along the Johore coast in which flood control schemes have been developed before and since World War II by the Federation of Malaya Drainage and Irrigation Department. These schemes are designed to reduce flooding from both water runoff further inland and tidal waters. Flood-control measures in Sri Menanti include stream dredging, construction of new drainage ditches, construction of bunds (dikes) to prevent water inflow, and control gates to regulate stream flow. Land owners in the area usually pay a small "drainage tax" to help cover the maintenance costs of the projects.

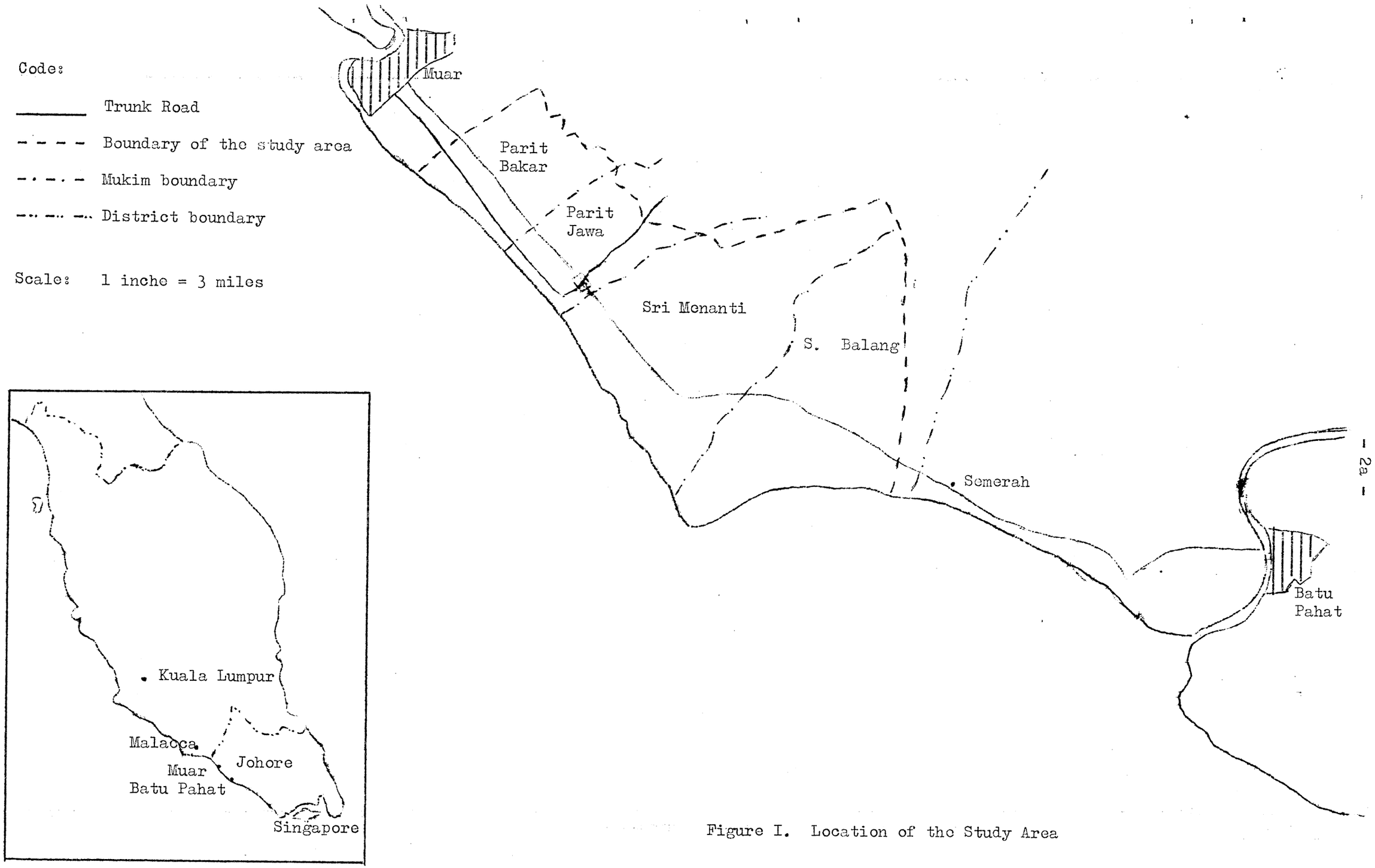

Figure I. Location of the Study Area

The population itself is largely Malay, although families which came from Java a generation or two ago are common in some parts of the study area. Only a few residents are Chinese or Indian.[3/]

Few roads or large villages. A major trunk highway, which connects Muar and Batu Pahat, runs parallel to the coast and splits the study area roughly in half. There are only one or two side roads. Every half mile or so the highway intersects small "laterite" bicycle paths, which are located next to drainage canals ("parits") and which provide access to smallholdings located away from the main road. Most of these bicycle paths run at right angles to the main road, and may extend as far as 6 to 7 miles inland or 2 or 3 miles toward the coast.

There are no large urban communities in the study area. Rather than being clustered together in villages ("kampongs"), as they are in some other parts of Malaya, most of the houses, shops, schools, mosques, and other buildings are strung out along the main roads and parits. However, some of the larger parits have small clusters of shops located where the parits intersect the main highway.

Clay and peat soils predominate. The study area lies on coastal alluvium and is almost flat throughout and only a few feet above sea level at the highest point. Along the coast -- extending from a few hundred yards to three miles inland -- the soils are low-organic clays. Further inland, the clays are overlayed with peat deposits, which vary in depth from a few inches to several feet. The inland edge of the study area borders on the more undulating, upland laterite soils which are characteristic of much of Malaya's interior.

Climate. Temperatures in the study area are rather constant throughout the year, usually ranging about seventy degrees (F) to the high nineties from day to day.

There is no marked dry or monsoon season. The average annual rainfall is between 90 and 100 inches, and fairly evenly distributed throughout the year. No month has more than 10 inches or less than 6 inches.[4/] During certain seasons, however, severe rain and windstorms (called "Sumatras") occur. These are highly localized and last only a few hours. However, in some parts of the study area they occasionally result in flooding which may last for several days.

3/ The 1957 population in the four mukims (administrative blocks which roughly correspond to U.S. townships) included in the study area was distributed as follows:

Malaysians	28,309	(76%)
Chinese	8,390	(23%)
Others	366	(1%)

Based on data from the 1957 Population Census of the Federation of Malaya, Report No. 1, Dept. of Statistics, Kuala Lumpur, p. 4.)

4/ These rainfall figures are based on maps developed by W. L. Dale, "The Rainfall of Malaya, Part I," The Journal of Tropical Geography, Vol. 13, Dec. 1959.

The agricultural land in the study area is largely planted to tree crops -- mostly rubber, coconuts, and fruit. Unlike the characteristic land-use pattern further inland, there is little land in forest or open cultivation. Although there are signs of serious plant malnutrition, the vegetation gives the overall appearance of dense and lush growth.

The typical house is set well back from the road or parit, in the midst of a small, irregularly planted stand of mixed fruits and coconuts. (These small fruit orchards are called "dusuns.") There is likely to be a two- or three-acre tract of mature rubber, or coconuts and bananas. Occasionally one comes across a specialized planting of rambutans or citrus fruit. At the southern extreme of the study area is a large block of land (about 4,000 acres) which is entirely in wet padi production. This block is divided into tracts of about one acre, each of which is operated by a farmer who lives as far as two or three miles away.

The Agriculture Department operates two demonstration units in the area. One of these, at Parit Sudah, is developing demonstrations of improved production practices for coconuts and various fruits -- coffee, bananas, rambutans, and citrus -- which may be used as interplantings. The Department also maintains a few demonstration plots at the edge of the Parit Yusoff padi areas. Variety and fertilization trials have been established and seed is made available to padi farmers who want to introduce improved varieties.

Basis for selecting the area. The area to be studied was chosen on a rather arbitrary basis. However, other areas in southern Malaya were considered beforehand and the choice rested largely on the following considerations:

1. Existence of a fairly wide variety of crops.
2. Abundance of smallholdings, rather than large estates.
3. Interest of local government officials and agricultural workers in the project.
4. Homogeneity of soils and ethnic groups in the area.
5. Nearness to the University.

C. Sources of Information

Most of the data used in this analysis are based on a survey which was made of a sample of farmers in the area described above. Also, personnel in the Agriculture Department and other government agencies were interviewed informally to help in the synthesis and interpretation of data supplied by the farmers.

Kinds of information supplied by the farmers. This survey was conducted in two stages.

In the first stage, a sample of 284 farm operators was interviewed to obtain information about:

1. the background of the operator and his family.
2. the land and labor resources on the farms.
3. the kinds of crops and livestock which were produced and sold on these farms.
4. existing land-use patterns.[5]

In the second stage, 126 of these same farmers were reinterviewed to obtain more specific information about individual crops. This stage was aimed at getting more details about the production and marketing practices carried on in connection with these enterprises, the labor, equipment and materials used for each operation, and the yields which were obtained. This information was secured for the eleven crops which were shown in the first stage to be most commonly produced by the farmers for sale.

How the sample farms were chosen. Individual farm operating units were regarded as the basic unit for study. Since no list of all the farmers in the area was available, an "area sampling" scheme was used to select the farmers to be included in the sample for the first stage of the survey. Basically this involves dividing the entire area into "area segments" which are believed to contain more or less the same number of farms, selecting a desired number of segments at random, and then interviewing all eligible farms which fall within the selected segments.

To do this, "standard sheets" -- with a scale of 8 chains (528 feet) to the inch -- were obtained for the entire study area.[6] These sheets show the individual tracts of land as alienated by the government, along with lot numbers and the acreages. Then -- using a recent revision of a topographical map for the area which showed roads, parits, land use, and the approximate locations of buildings -- area segments were drawn out on the lot sheets so that there would be approximately 10 buildings in each segment. (On the basis of previous reconnaissance, it was guessed that this would result in about 8 eligible farms per segment.) So far as possible, segment boundaries were made to coincide with easily identified national features -- paths, roads, drainage ditches, etc. Each segment was numbered more or less in order of its geographical position. Then starting with a random number, the segments to be sampled were selected in a systematic fashion to make sure that the sample would be distributed throughout

---

5/ The survey schedule used in this first stage is included in Appendix A.

6/ Copies of these sheets were secured from the state office of the Johore Survey Department at Johore Bahru.

the entire area. In all, 38 (9%) of the 424 area segments were included in the sample.[7]

Attempts were made to interview all eligible farms which were located within the segment boundaries. A farm was considered to be located in the segment where the operator resided, even though a portion of the land operated as part of the same unit may have been outside the segment. This insured that each farm would be considered to be in one and only one segment, no matter how many separate tracts of land it contained.[8] These criteria successfully covered most of the situations encountered. However, a number of farmers operated some land of their own as well as some land jointly with relatives, making it hard to ascertain whether a respondent was really a separate operator or a partner. This sometimes resulted in arbitrary decisions made occasionally by the enumerators as to what was to constitute an operating unit and who was to be considered as its operator. Usually the choice largely hinged on who made the major farming decisions relative to a given land tract.

Having met the above requirements, an operating unit was regarded as being on eligible farm if the operator had either sold some crop products during the previous year, or if he had at least 100 chickens or 5 sows on hand at the time of the interview. Farms operated by a hired manager or with more than 100 acres were excluded. (Neither of these latter situations were actually encountered in the segments sampled.)

The above procedures were used to select farmers to be interviewed in the reconnaissance survey of the first stage of the study. Farmers to be reinterviewed in the second stage were selected at random on the basis of the crop products which the reconnaissance survey showed them to have marketed during the previous year. That is, a list was made of all the farmers in the original sample who had marketed rubber, all those who had

---

7/ Actually, a shortcut was used to select the area segments to be included in the sample, since the division of the entire study into 424 segments would have been a very time-consuming job. First the area was divided into "count units," each containing something between 50 and 150 buildings on the map. The total number of area segments which would fall within each count unit was then computed. (For instance, a count unit with 72 buildings would be listed as containing 7 area segments.) Then the area segments were numbered and listed according to count units and the numbers of the segments to be sampled were chosen. It was therefore necessary to sub-divide only those count units which contained segments falling in the sample. After a count unit had been sub-divided, the specific segment to be enumerated was selected at random.

8/ A few farms were operated by partners. In these cases, the farms were considered to be in the segment where the older partner resided. In one or two instances, where the operator lived in a large town outside the study area, the farm was considered to be in the segment where the northernmost point of its westernmost tract was located.

marketed coconuts, etc.[10] If more than 20 farmers sold the crop concerned, the farmers to be reinterviewed were selected at random; otherwise all of the farmers who marketed that crop were reinterviewed. This resulted in some farmers being selected for none of the crops which they had sold, while others happended to be sampled for as many as three crop enterprises.

D. How the Survey Was Conducted

Field enumeration was carried on by 12 third-year students who had studied economics at the University of Malaya.

Prior to the survey itself, a preliminary survey schedule was prepared and tried out on several farmers in the study area. This pretesting suggested several changes to be included in the final schedule used for the reconnaissance survey.

The two stages of the actual survey were conducted during the month of February 1960. The first two weeks were devoted to the reconnaissance survey and the latter two weeks to the detailed enterprise survey. The enumerators lived in either the Government Rest House or a private hotel in Muar, and travelled every day to and from the study area (some 5 to 20 miles away) by car or bus. As some area segments were as far as six or seven miles from the main road, the students frequently borrowed or hired bicycles to get to these segments. Many of the farmers were not at home in the mornings (perhaps tapping rubber or going to town) and most of the interviewing was done in the afternoon and early evening. The enumerator would spend the early part of each morning in Muar to edit the previous day's schedule and go over any problems with the team leader.

An effort was made to let the farmers in any one area segment know about the survey before any actual enumeration was done. The District Officer sent letters to the Penghulus[11] in all of the mukims in the study area to inform them about the survey and asking them to pass the word on to the Ketuas, schoolteachers, and other local leaders. Before starting to enumerate a given mukim, the enumerators met with the Penghulu concerned and arranged to see the Ketuas responsible in the section included in the area segments to be sampled.[12] The Ketuas were almost too helpful. After they had introduced the enumerators to a farmer they sometimes stayed during the interviews and tried to help answer questions. In a few instances the

---

10/ Wet padi was an exception to this. No farmers sold padi, and so all those who had harvested padi were listed.

11/ The Penghulus are appointed on a more or less permanent basis by the government to carry out certain local duties, such as tax collection or information gathering, and are paid a relatively high income. Often they have holdings or private businesses of their own as well.

12/ The Ketuas are elected by the residents of their particular parit on more or less a lifetime basis. In this area, they usually were farmers themselves and seemed to be no better off financially than many of their neighbors. Although the ketuas receive a token annual stipend from the government, they do not have many regulatory duties and seem to be regarded with high esteem by most people in the parts which they serve.

enumerators felt that the presence of the Ketuas may have modified the answers given by the respondents. However, probably less than one-third of the interviews were conducted in the presence of the Ketuas, or other non-family members.

In both stages of the survey, the enumerators operated in teams of two, one of whom was a Malay and the other a non-Malay. Each team was assigned segments located in various parts of the study area, and ordinarily both team members visited every farm in their segments. The use of two-man teams instead of a single enumerator did reduce the total number of farmers covered, but was considered to offer the following advantages:

1. Area segment boundaries and eligible farmers could be identified with greater accuracy, with two enumerators to check on each other.
2. The interviews could be conducted more informally and leisurely, one enumerator asking the questions, and the other recording answers and clarifying questions.
3. Observations made on the farm and interpretation of the answers could be checked by more than one person.
4. Since some segments contained Chinese farmers as well as Malays, the presence of both a Chinese and a Malay enumerator could help to establish rapport and interpret answers.[13]

In both stages of the survey, a special effort was made to conduct the interviews in a relaxed and informal way. Farmers were told that the students were there to learn more about farming in the Muar area as part of their education. (This was one of the real reasons for conducting the study in the first place.) The enumerators were urged to conduct the interviews in a flexible, semi-structured manner, using their own wording and ordering of questions, so as to stimulate a farmer to start talking about various phases of his farm business and to provide an overall picture of his operations and ideas, rather than mechanically answering structured questions. This was done with varying degrees of success. Sometimes the enumerators felt a bit pressed for time and tended to get the bare minimum of data required on the schedule. Looking back on the survey, it would have been better to draw a considerably smaller sample so as to encourage the enumerators to take more time with each farmer. When farmers seemed reluctant to give an answer, or gave rather vague answers, some effort was made to probe more deeply. At the same time, farmers were not pressed so far that they would be encouraged to give wild guesses or misleading answers. In the reconnaissance survey, answers to most questions were given without much hesitation, although the enumerators felt that some farmers had given misleading answers, especially with respect to the amount of land owned or operated and to the sources of off-farm income. In the second stage, which sought detailed information about enterprise production and marketing

---

[13] Five of the six teams contained one Chinese and one Malay student.

practices, not every farmer was able to provide all the details about the crop concerned. The idea was to get the farmer to relate what he could about the inputs and production involved, without necessarily forcing him to give answers which were ill-informed. As a result, the enterprise data presented later on in this report are based only on the information given by farmers who it was felt had given meaningful answers, rather than including all information from all farmers. Usually the information was supplied by the operators themselves, although frequently other family members proved to be very helpful in answering some of the questions.

On the whole, the enumerators received excellent cooperation from the farmers. In the reconnaissance survey, out of the 305 farmers who were found to be eligible, only 4 refused to grant interviews; 17 other operators could not be located despite repeated attempts to reach them.

Tabulation of the results. The data were tabulated at the University of Malaya by hand. The descriptive data from the reconnaissance survey were coded (each answer being given a number or letter designation) and recorded on special tabulation codes. Each card contained 56 numbered cells, and two cards were used for each farm. This made it easier to sort the 284 farms into various subgroups for tabulation purposes. Some of the information from the enterprise survey was also coded on cards.

II. DESCRIPTION OF OVERALL FARMING PROGRAMS

The information assembled in the initial reconnaissance survey of the 284 farms provides a general picture of (1) the land and labor resources available and (2) the way in which these resources are now being utilized. This kind of information can serve as sort of a benchmark to help identify the opportunities which seem relevant for improving incomes on these farms. Specifically, the results presented here focus on the commodities produced and sold, the importance of off-farm income sources, farm size and tenure arrangements, the background of the operators and their families, and hired labor used in farm production.

In all of these tabulations, it should be remembered that the results refer to a sample of the entire universe of farms being studied. While the sample was designed so that there would be no reason to expect a consistent bias one way or another, it may be that the particular group of farms included in this particular sample is not representative of the entire universe in some respects. For the more important figures, 95% confidence limits have been calculated to show the range within which the true value for all the farms in the sample area is likely to be.

A. Farming Enterprises

In what farming enterprises did the farmers engage? What recent changes have been made in these enterprises? The results show that farmers in this area concentrated largely on crop production, with very little attention being given to livestock. A wide variety of tree crops was grown, rubber and coconuts being by far the most predominant.

Crops harvested and marketed. As shown in Table 1, more than 25 different kinds of crops were harvested on farms in the area in the year preceding the survey. More than half of the 284 farms produced rubber or coconuts. Nearly half of the farms harvested some bananas. The other crops were harvested on much fewer farms. As indicated by the second and third columns in Table 1, crops other than rubber, coffee, coconuts, dukus, and durians, were produced by many farmers for home consumption alone.

One farmer harvested as many as 12 crops, while two harvested none. (These latter two specialized in poultry.) The average farmer harvested about three kinds of crops. One farmer marketed 8 crops, while seven farmers marketed no crops. The average farmer sold less than two crops. (See Table 2.) Probably these figures underestimate the number of crops harvested or sold, as informal visits to a few selected farms after the survey revealed that the operators had forgotten to mention one or two crops.

Table 1. Proportions of holdings harvesting and marketing produce from various crops. 284 farms, Muar, 1960.

Crop *	No. of farms		No. of farms marketing as % of those harvesting this crop
	harvesting	marketing	
Fruit			
bananas	141	42	30
dukus	50	28	56
durians	55	30	55
jack fruit (nangka)	25	3	12
mangosteens	26	8	31
pineapples	18	3	17
rambutans	45	10	22
Permanent crops			
arecanuts	45	15	33
bamboo	17	5	29
coconuts	165	133	81
rubber	157	157	100
coffee	18	18	100
Short-term crops			
sweet potatoes (koledek)	14	0	0
tapioca	30	0	0
wet padi	20	6	30
yams (koladi)	31	4	13

* This list includes only those crops harvested on 5 per cent or more of the 284 holdings. Other crops harvested included mangos, langsats, sago (rumbia), nipah palm, limes, sugar cane, maize, pulasan, dry padi, and various vegetables.

Table 2. Total number of crops harvested and marketed per farm. 284 farms, Muar, 1960.

No. of crops	No. of farms	
	Harvesting	Marketing
0 - 2	134	234
3 - 5	108	47
6 - 8	32	3
9 or more	10	0

Table 3. Changes made in crop programs during the previous five years. 54 farms, Muar, 1960.*

Change made	Rubber	Coconuts	Fruit	Another permanent crop	A temporary crop
		-- no. of farms			
First began this crop	10	14	7	0	2
Expanded area in this crop	2	1	2	0	0
Replanted old area to same crop	12	4	3	1	-
Decreased area in this crop	2	2	0	0	0
Went out of production entirely	3	4	1	0	0

* Only 54 of the 284 farms made shifts in crop acreages. In the table, the total numbers of changes made adds up to more than 54 because some made changes in more than one enterprise group.

The farmers were asked whether they had made any changes in the kinds of crops grown during the previous five years. Only 54 of the 284 farmers (19% ± 5%)[1] reported permanent changes. As shown in Table 3, there was some general tendency to shift toward rubber or coconuts. New plantings of rubber or coconuts did not necessarily entail more land or the removal of other crops; sometimes the new stands were estblished in the midst of old rubber, coconut, or fruit stands. Of the seven who established new fruit stands, bananas were the most common additions.

Livestock enterprises. At the time of the survey, 258 of the 284 farms (91% ± 4%) had some livestock on hand. All of these farms had a few chickens which were raised for home consumption and which were free to roam around the farm without much conscious management. In addition, a few farmers had some ducks, goats, or (on Chinese farms) pigs. Sixty-one (21% ± 8%) sold some eggs or livestock during the previous year, but usually these sales were made only occasionally, when some extra cash was needed for a festival or to purchase supplies. However, seven Chinese farmers who lived near the coast and who (in addition to fishing) did specialize in poultry, duck, and/or pig production to a limited extent.[2]

[1] The "± 5%" is the 95% confidence interval. That is, chances are 95% that the true proportion of all farmers in the area from which this sample was taken was between 14 and 24%. Confidence limits shown for other variables in this report can all be interpreted in a similar way. For the approximations used, see W. G. Cochrane, Sampling Techniques, 1953, pp. 124-129. and 204.

[2] Along the main road in the study area, one could observe one or two farmers who had large flocks of egg hens housed in cages — much along the lines now being adopted by poultry producers in Singapore and near Penang. But none of these large egg producers happened to be included in the sample.

Only 12 farmers indicated that they had made conscious changes in the numbers or kinds of livestock produced during the preceding five years. But in no case was the change very great.

Table 4. Livestock inventory and sales. 258 farms, Muar, 1960.

Kind of livestock	No. of farms		No. of head on farms with this kind of livestock		
	With stock	Selling products	Median	Minimum	Maximum
Chickens	258	39	10	2	100
Ducks	32	7	4	1	50
Pigs	20	16	8	1	20
Goats	16	5	4	1	14
Cattle	1	0	1	-	-

B. Major Sources of Family Living

The above data have indicated only the kinds of farm commodities produced and marketed. They give no indication of how important these products were to the farmers as a source of income. While no attempt was made in the reconnaissance study to ask each farmer for the dollar value of everything he sold or earned, questions were asked to provide some idea of the relative importance of various income sources.

Rubber or coconuts often major farm income source. Each farmer was asked which of the crop or livestock products that he produced on his farm had been, in his opinion, the largest source of family living during the previous year. (He was requested to consider not only sales, but also home consumption.) In the majority of cases, the answer was fairly clearcut, since there tended to be one or two enterprises which stood "head and shoulders" above the rest. However, some farmers regarded several crop enterprises as almost equally important and found it difficult or impossible to name a single crop. As shown in Table 5, rubber or coconuts was most frequently regarded as the major source of farm income.

Table 5. Enterprises regarded as being the most important source of farm living. 277 farms, Muar, 1960.*

Enterprise**	No. of farms	% of farms
Rubber	134	48
Coconuts	96	35
Fruits (usually durians or dukus)	17	6
Another permanent crop (coffee, sago, nipah, etc.)	6	2
Chickens	5	2
Wet padi	2	1
Vegetables	2	1
Pigs	1	-
No enterprise especially important	14	5
	277	100

* Seven farmers were unable or unwilling to give answers.

** Although some crops have been lumped together here into groups, the answers were given in terms of a specific crop or livestock enterprise.

Subsequent analyses in this report will refer to the four "type-of-farming" groups shown below:

Type of farming	No. of farms
Rubber	139
Coconuts	98
Other crops	41
Livestock	6
	284

These groupings were based for the most part on the opinions given by the operators as to which farm enterprise had been the most important source of family living, as presented in Table 5 above. The 14 farms whose operators regarded no enterprise as being most important were included with the "other crops" group. The 7 farms for which no answers had been given were classified subjectively on the basis of other acreage and production data given by the operators.[3/]

Many had off-farm income sources. About 60% (± 7%) of the households on the farms interviewed indicated that they had off-farm income during the previous year. Broken down by types-of-farming groups, 65% of the "rubber" farms, 49% of the "coconut" farms, and 68% of the "other crops" farms had off-farm income sources. The sources of such income were widely varied, as shown on the next page:[4/]

3/ At best this type-of-farming classification is very rough and ready. The enterprise mixtures on farms within any one group are by no means highly similar. For example, some farmers in the "rubber" group specialized almost entirely in rubber production, while other farmers earned nearly as much income from coconuts or fruits as from rubber.

It might well be argued that it might be more meaningful to group the farms according to the degree of specialization -- "specialized rubber", "specialized coconuts", "mixed crops", etc. However, if such a grouping were to be made on the basis of income, estimates of prices and total production would have been needed for each enterprise on every farm. Even if this information had been available, the wide variation in number, kinds, and proportions of enterprises would have made such a classification very difficult.

Sometimes the amount of land in various crops is used as a criterion for dividing farms into types-of-farming groups. Such a classification would not be very meaningful in the Muar area, since the total production of a particular crop per acre varies widely from farm to farm.

For example, even though two farms each have three acres in coconuts, it may be that total coconut production on one is twice that of the other because of differences in the age of trees, number of trees, managerial practices, etc.

4/ 9 households had two or more off-farm income sources.

Work on other farms or estates (mostly rubber tapping and grass cutting)	93 farms
Remittances from family members living elsewhere	16
Fishing	11
Shopkeeping	11
Odd jobs nearby	9
Retirement income, land rent, etc.	9
Carpentry	7
Government employment (police, P.W.D., D.I.D., etc.)	6
Teaching school	6
Other (barber, taxi driving, ditch digging, mat weaving, etc.)	14

However, only 22% (± 7%) of the operators regarded off-farm income as contributing more to their income than the production from their own farming operations. According to type-of-farming groups, 21% of the "rubber" farms, 24% of the "coconut" farms, and 75% of the "other crops" farms regarded off-farm income sources as being more important than farm income. Again, these estimates were in nearly all cases based on subjective estimates and may be considerably inaccurate, especially since it was difficult for farmers to assess the value of some kinds of farm produce used for home consumption.

C. Land Resources

We have seen that the farmers in the study area relied largely on farm income for family support and that, collectively, they used their land for a wide variety of crops. This section explores briefly the amount of land operated by the farmers, the tenure arrangements found on these farms, and the land-use patterns found on various fields within the operating units.

Most farmers owned some land. About 90% (± 7%) of the 284 farmers owned some land or all of the land on which they operated. About 26% (± 8%) of the 284 farmers rented part or all of the land operated.

In terms of operating units, about three-fourths of the farmers owned all of the land which they operated. As shown in Table 6, there was a greater tendency for "rubber" farmers to rent some or all of their land than in the other groups. (In many cases these farmers owned tracts of fruit or coconuts and rented in rubber acreages which they tapped. Often these operators did not exercise complete managerial control over the rubber tracts.)

Of the 255 farmers who operated some owned land, 37 indicated that some of this land was jointly owned with other people -- usually brothers, sisters, or parents. Often the jointly owned land had been divided among the owners so that each operated his own separate part of the tract involved.

But sometimes there were no formal subdivisions, and the various owners planted and harvested crops more or less at will throughout the tract. (Usually these were dusuns surrounding two or more houses in which relatives lived.) The average farmer who operated some jointly owned land had about 5 acres of jointly owned land.

Table 6. Land tenure, by types of farming. 284 farms, Muar, 1960

Tenure of land operated	Type-of-farming group				All types of farming
	Rubber	Coconuts	Other crops	Livestock	
Owned:					
no. of farms	89	84	35	4	212
% " "	(64)	(86)	(85)	(67)	(75)
Owned and rented:					
no. of farms	31	10	2	0	43
% " "	(22)	(10)	(5)	(0)	(15)
Rented:					
no. of farms	19	4	4	2	29
% " "	(14)	(4)	(10)	(33)	(10)
Total:					
no. of farms	139	98	41	6	284
% " "	(100)	(100)	(100)	(100)	(100)

Twenty farms (7% ± 4%) rented out some land to other farmers. In all cases, the land rented out was owned by the farmer concerned. The amount of land reported as being rented out ranged between $\frac{1}{2}$ and $52\frac{1}{2}$ acres. These 20 farmers rented out an average $5\frac{3}{4}$ acres. Of all the land operated by the 284 farmers in the survey (roughly 1900 acres) about 76 per cent was owned, 10 per cent was jointly owned, and 14 per cent was rented in.

Few operated more than 10 acres. The total land operated by individual farmers for agricultural purposes ranged between $\frac{1}{4}$ and $65\frac{1}{2}$ acres. The average farmer operated 6.7 acres (± 1.1 acres). The median was considerably lower -- 4 acres. (See Table 7.)

The above size figures include all land operated, whether it be owned, jointly owned, or rented in by the farmer. In the case of jointly owned land, it is possible that the same tract could have been included as part of two farms, although an attempt was made to "pro-rate" such tracts among the various owners in these calculations. Since most of the operators' houses were in the midst of coconut and fruit trees, or other crops, no attempt was made to separate the area occupied by the houses and outbuildings.

Table 7. Total land operated by individual farmers. 284 farms, Muar, 1960.

Total acres operated	No. of farms	% of all farms
less than 5	154	54.3
(less than 1)	(13)	(4.6)
(1 - 1¾)	(34)	(12.0)
(2 - 2¾)	(35)	(12.3)
(3 - 3¾)	(40)	(14.1)
(4 - 4¾)	(32)	(11.3)
5 - 9¾	80	28.1
10 - 14¾	22	7.7
15 - 19¾	9	3.2
20 - 24¾	7	2.4
25 - 29¾	4	1.4
30 - 34¾	5	1.8
35 or more	3	1.1
	284	100.0

Probably the actual farm sizes were somewhat larger than those reported here. By-and-large, the farmers seemed willing to disclose all the land they had. Some even went to the trouble of showing the enumerators the titles to their various tracts. (The standard sheets used by the enumerators showed the surveyed acreages for each ownership tract, and were very helpful for estimating farm sizes. Most operators could identify their tracts on the maps.) However, the enumerators felt that some operators were reluctant to reveal how much land they owned or operated and, accordingly, may have underestimated their total holdings. (This came to light in one or two instances, when neighboring farmers all mentioned renting land from the same landowner, the sum total of which exceeded the land area reported by the landowner when he was interviewed.) Some farmers, it was felt, may have unintentionally forgotten to mention all of their tracts of land. This was found to be true for a few of the farmers which were interviewed in the second stage of the survey.

There seems to be some difference in the amount of land operated among the various types of farming groups. As shown in Table 8, the average farmer who had rubber or coconuts as a major income source operated more than twice the acreage operated by the average farmer who relied largely on livestock or other crops.

There was considerable difference in average size among the three tenure groups. The average rented farm was much smaller than the average farm which was partly or entirely owned. (See Table 8.) In all type-of-farming groups, the farms with both owned and rented land tended to be larger than either of the other two tenure groups. During interviews with the farmers who operated owned as well as rented land, it became apparent that, in most instances, these farmers initially had owned some land (usually inherited), but later had expanded their operations by renting in additional land nearby.[5/] There was a greater tendency for the renters to have off-farm sources of income.

Table 8. Average acres operated, by type of farming and tenure. 284 farms, Muar, 1960

Tenure of land operated	Type-of-farming group				All types of farming
	Rubber	Coconuts	Other crops	Livestock	
	-- ave. no. of acres operated per farm --				
Owned	7.7	7.3	2.9	2.9*	6.7
Owned and rented	8.1	12.5	5.0*	--	9.0
Rented	3.2	4.6*	3.3*	0.25*	3.2
All tenure groups	7.2	7.7	3.1	2.0*	6.7

* These averages are based on less than 10 farms.

Kinds of tenure arrangements. Among the 72 farmers who rented in land, there was a variety of arrangements, most frequently a fixed cash rent ("pajak") or a fixed proportion of the output ("bagi dua"). (See Table 9.) In all but one or two cases, the tracts of land were rented under an oral agreement on a year to year basis. Sometimes the amount or basis of payment varied from year to year, but in nearly every case the same tenant tended to remain on a particular tract for a number of years. Many tenants seemed to regard the rented land as almost their own, and did not seem to be worried about the possibility of being asked to move off the land at the end of the year. (It came out on some farms that the tenants had formerly owned the tracts now rented but had turned the land title over to a person to whom they had become indebted.)

Fragmentation common. Many farmers operated more than one separate tract. These were sometimes located as far as three or four miles from the house. Sometimes a farmer would inherit a tract located some distance away. Other times a farmer might consciously buy or rent a piece of land (usually already planted to coconuts, fruit, or rubber) even though it was not very near his previous operations.

5/ This is an interesting contrast to the pattern in many agricultural regions of the world (such as the U.S. Cornbelt) where the tendency is for beginning farmers to rent land at first and then, as they acquire capital, to buy land later on.

What is meant by a "tract" was loosely defined in the survey. The main idea was to divide each farm into parts, each of which had a distinct land-use or cropping pattern. Some farms had two or more tracts located next to each other. Other farms had separate tracts which were scattered about among other people's land. If two adjacent lots (as demarked on the standard sheets) had the same land-use pattern, they were considered to be one tract. Using this definition, it turned out that the median farm had 2 tracts of land. Many farms were recorded as having only one tract (one corner of which was usually devoted to a house and a few fruit trees). One farm had 8 tracts. The median tract contained 2 acres, the sizes ranging between $\frac{1}{4}$ and 30 acres.

Table 9. Rental arrangements on operating units which rented in land. 72 farms, Muar, 1960.

	No. of holdings	% of renters
Paid fixed cash rent (pajak)	27	37.5
Paid fixed rent in kind (pajak)	12	16.7
Paid fixed proportion of output to landlord (not necessarily 50%)	23	31.9
Fixed amount of output retained by tenant (timbang kati)	4	5.6
Retained fixed amount or proportion, depending on price	1	1.4
Paid no rent for use of land	5	6.9
	72	100.0

Land-use patterns. A knowledge of the kinds of crops which are predominant on an overall farm does not provide much idea about the crops grown on specific fields within the farm. For example, a farmer who specializes in coconuts and bananas could either have these two crops grown in separate fields or mixed together in the same field.

In the study area, the tendency was to plant rubber in separate stands by itself, but to interplant coconuts, fruit, and other crops together in various ways. (See Table 10.) The composition of these mixed stands varied greatly.

Most farmers had a small tract surrounding or adjacent to the house devoted to dusun -- a hodgepodge of crops mostly used for household consumption. These dusuns usually contained a few coconut trees; a few fruit trees such as rambutans, durians, dukus, or mangosteens; perhaps some tapioca, yams, or sweet potatoes; and, not infrequently, a single row of arecanuts planted along the edge of the dusun.

Some farmers had tracts which were largely in fruit. These usually had a mixture of three or four predominant species -- most often dukus, durians, and rambutans -- set out in irregular fashion. Such fruit stands were more common in the part of the study area situated north of Parit Jawa than in the southern part.

Table 10. Kinds of crops on individual fields. 284 farms, Muar, 1960.

Fields planted to:	No. of farms	Acres [a]		
		Median	Maximum	Minimum
Rubber only	115	3	50	¼
mature	(100)	(3)	(28)	(¼)
young	(6)	(2)	(28)	(¼)
mixed	(9)	(7)	(50)	(1)
Rubber and coconuts	3	2	4½	2
Rubber and other crops [b]	48	2	14	¼
Rubber, coconuts, and other crops	20	2½	10	½
Coconuts only	65	4½	30	½
Coconuts, fruit and/or other crops [c]	126	2½	16	¼
Specialized fruit only [d]	12	1½	8½	½
Mixed fruit only [e]	14	1½	5	½
Fruit and other crops	19	1	11	¼
Wet padi	20	1	3	½
Other crops only	9	1½	5	¼
Waste land only	5	1¼	4	½

[a] These acreage figures refer to the total land area in the particular crop combination concerned on an individual farm. The total may have consisted of more than one separate field.

[b] Mostly bananas, durians, dukus, and rambutans.

[c] Most of these fields contained bananas. Arecanuts, durians, rambutans, and yams were not infrequent.

[d] These included specialized stands in bananas, rambutans, durians, mangosteens, and limes.

[e] Durians, dukus, and rambutans were the most common fruits in these mixed stands.

While there were some stands of pure coconuts, it was particularly common for coconut palms to be interplanted with bananas. Some of these coconut plantings, however, also had coffee or pineapples mixed in. Tracts which were predominantly in coconuts were more common in the area south of Parit Jawa, than on the Muar side of the study area. Most of these commercial coconut tracts had originally been planted in rows, but disease, insect, and weather damage frequently left many gaps. Usually young coconut seedlings were planted to fill in some of these gaps. It was not so common to find an entire field in young coconuts.

Regularly spaced, well maintained specialized fruit stands were very infrequent. Most of these specialized fruit acreages had been apparently established with the assistance of the Agricultural Department in recent years, and contained fairly young trees. The mixed fruit stands by-and-large contained much older trees.

As noted previously, all the wet padi fields enumerated in this survey were located in one large block of land at the southern extreme of the study area. No other crops were interplanted, and no off-season crops were produced.[6/] These farmers lived on other parts of their farms -- sometimes as far as 2 or 3 miles away from the padi sawa.

C. The Operators and Their Families.

So far we have been concerned with physical land resources and farming patterns. What about the human resources on these farms? The following tabulations perhaps will give some insights into the backgrounds, managerial capacities, and family situations of the farm operators who were interviewed. For analytical purposes, the operator was considered to be the person who made the major farming decisions and who bore responsibility for their consequences, even though more than one family member may have worked on the farm. Usually this was fairly clearcut. Most were husbands, but a few operators were widows who retained at least nominal control over the farming operations.

Mostly Malay and Javanese farmers. As would be expected from the census reports mentioned earlier, most of the farmers in the study (88% ± 5%) were Malaysians -- either Malays or families who had come from Java a generation or two ago. The distribution was as follows:

	No. of farmers	% of farmers
Malay	168	59
Javanese	82	29
Chinese	34	12
	284	100

The three ethnic groups could be found throughout the entire study area. There was some tendency for the Javanese families to be located in the more remote parts of the study area. The Chinese farms would frequently be in clusters of four or five in the midst of a predominantly Malay or Javanese area. The Chinese farms tended to be located nearer the main roads.

6/ More details about existing land-use patterns in the Muar area are presented in the Honors degree thesis now being completed by Lian Teck Jin in the Economics Department of the University of Malaya in Singapore.

Many other places. More than three-fourths of the farmers (217 of the 284 interviewed) indicated that they had moved to their present farms from other holdings nearby or from other localities since childhood. The remainder were operating farms (or portions thereof) on which they had been born. Most of those who had come from other places had previously lived within a few miles -- often on an adjacent holding -- of their present location:

Previous location	No. of farmers
Another part of the Muar district	141
Another district in Johore	29
Another state in Malaya	10
Indonesia (mostly Java)	23
China	13
Borneo	1
	217

The average farmer who moved to the present farm after birth had been there 18 years (± 2 years). One farmer had come 60 years ago; at the other extreme, one farmer had come only two months before the interview. It does not necessarily hold that these farmers had been operating the farm all that time. Some had moved to their present location as children with their parents, and had not taken over the farm until several years later. Some operators operated the farm for a while, went away to take other jobs or to serve in the police or army, and then returned to the farm.

The 217 farmers who had moved to their present farms from elsewhere were asked what their previous occupations had been. The majority had either operated another farm or had worked for other farmers or estate operators (often as rubber tappers):

Previous occupation	No. of farmers
Employed by another farmer or estate operator	73
Operated own farm elsewhere	54
Worked in a non-farm occupation (school teaching, government service, police, shopkeeping, etc.)	42
Had no previous occupation or was in school	48
	217

Operators' ages and education. The average operator was about 44 years old (± 2 years). The youngest was 18 years old; one operator (a widow -- still very alert) claimed that she was nearly 100 years old. A more detailed age distribution is shown in Table 11. The enumerators felt that, in most cases, the younger operators reported their ages fairly accurately. However, older operators would sometimes tend to give ages in rounded numbers -- 55, 70, etc. In most cases, ages were geared to the Roman calendar. It may have been that some of the Chinese farmers

were thinking in terms of the Chinese calendar. However, at most, this could cause an error of two or three years.

Table 11. Distribution of operators by age. 283 farmers, Muar, 1960.*

Years of age	No. of farmers	% of farmers
20 or less	6	2
21 - 30	49	17
31 - 40	86	30
41 - 50	55	20
51 - 60	58	21
61 - 70	22	8
71 or more	7	2
	283	100

* An indication of one operator's age was not available.

Nearly half of the operators had not completed any formal schooling. No one had attended school more than 12 years. Of the 151 farmers who had been to school, the average had attended for a little over 4 years. (A more detailed distribution is shown in Table 12.) This is not necessarily indicative of the number of grades completed, however; it may have been that some farmers repeated the same year more than once.

Table 12. Number of years spent in school by operators. 284 farms, Muar, 1960.

No. of years in school	No. of farmers	% of farmers
0	133	47
1-3	60	21
4-6	71	25
7-9	17	6
10-12	3	1
	284	100

Size of farm households. The average farm household consisted of about six persons, four of whom were children. One household had 27 persons; two operators lived by themselves. A more detailed breakdown is as follows:

Total no. of people in household	No. of farms
1-4	85
5-8	146
9-12	42
13-16	10
more than 16	1
	284

For analytical purposes it seemed reasonable to consider each farm as having one household, since it turned out that there were no partnerships for an entire operating unit. That is, although a father and son or two brothers may have operated the same tract of land, each of them also had other tracts which they operated independently.

It was not always easy to determine whether a person was in one household or another. An individual person was considered to be a member of the household where he slept and took most of his meals. In some instances, two or more related families lived right next to one another, the various members using each other's facilities and spending a good deal of time "next door." Some grown-up children held jobs in towns some distance away from the farm, but came home on weekends and holidays. This sometimes made it necessary to decide rather arbitrarily about whom should be included or excluded.

Occupations of family members. How did the members of the farm households spend their time? As shown in Table 13, about one-third of the family members (including the operator) were gainfully employed on the home farm or worked elsewhere at least part-time. Since there was an average of six people in each household (including four children under 16), this meant that the average farm family had two members who were gainfully employed full or part time.

Table 13. Proportions of family members in farm and off-farm employment, by types of farming. 284 farms, Muar, 1960.

Nature of occupation	Type-of-farm group				All types of farming
	Rubber (139 farms)	Coconuts (98 farms)	Other crops (41 farms)	Livestock (6 farms)	(284 farms)
	-- % of all household members --				
Farm work, full-time	12	14	8	5	12
Farm work, part-time	13	8	7	3	10
Farm work, part-time and off-farm work, part-time	7	7	11	11	8
Off-farm work, part-time	1	0	--	0	--
Off-farm work, full-time	4	3	4	5	4
No farm or off-farm work (idle, in school, or household duties)	63	68	70	76	66
	100	100	100	100	100

The figures in Table 13 are not necessarily an indication of the relative amounts of actual work provided by family members in the four type-of-farming groups. In the interviews, the respondents were not asked to estimate the total number of hours or days contributed by each family member who worked on or off the farm. They were asked only to indicate whether each family member spent all of his time working on the farm, part of his time on the farm and part in off-farm work, etc. (See the reconnaissance survey schedule in Appendix A.) This means, for instance, a person who was recorded as working full-time on the farm could well have contributed fewer hours than another person who was recorded as working part time on the farm and part time elsewhere.1/

D. Hired Labor

Most of the farms in the sample relied entirely or largely on family farm labor for carrying out the various tasks. Less than one-fifth (53 of the 284 farmers) indicated that they had hired some labor on either a day-to-day or a contract basis during the previous year. Only 17 farmers employed full-time help regularly. No farm hired more than six full-time workers. The types of jobs for which hired labor was used are as follows:

Kind of work	No. of farms
Tapping rubber	23
Harvesting coconuts	18
Grass cutting and weeding	17
Husking coconuts	7
Carrying produce to market	7
Harvesting fruit	4
Clearing drainage ditches	4
Preparing land for planting	1

In most instances the hired labor was from other farm households nearby. Sometimes farmers hired relatives. Fruit sold on a contract basis was sometimes harvested by buyers who lived in Muar.

The basis for payment varied from job to job. Rubber tappers usually kept a fixed proportion of the rubber sheets produced each month. Coconut pickers and huskers received either a fixed amount of money per 100 nuts or a fixed proportion of the harvest. Workers were paid a fixed amount per day or per acre for grass cutting. Some farmers sold their "dusun" fruit (mostly dukus, durians, mangosteens, and rambutans) for a fixed cash amount while the fruits were still developing. These contract buyers usually did the harvesting. (Further details about the rates of payment for the various kinds of jobs will be presented in the next section, which deals with individual enterprises.)

1/ The actual number of hours was not asked because (1) it would have been difficult for the respondents to give accurate estimates and (2) the amount of work accomplished in one hour varied widely from person to person reflecting differences in age, skill, and total work load.

There was no indication that any formal written contracts were in use. However, a farmer who hired labor would usually have the same person come back each time to do a particular job. This was less true in the case of fruit harvesting, since the farmer would usually sell to the highest bidder who came along each year. If a farmer hired labor for more than one kind of job, he was not unlikely to hire a different person for each job. For example, some laborers specialized in coconut picking and worked for a regular group of farm operators; others seemed to specialize in grass cutting.

Some farmers exchanged labor with other nearby farmers when doing certain operations. This "gotong royong" was mentioned most frequently in connection with grass cutting, parit clearing, padi transplanting, and padi harvesting.

III. PRODUCTION AND MARKETING PRACTICES FOR INDIVIDUAL CROPS

So far we have described farming patterns in the Muar area from the viewpoint of entire operating units. This section develops a more detailed picture of existing production and marketing practices for the individual crops most commonly found on these farms. Particular attention is devoted to problems in getting basic input-output data which might be used along with other sources to estimate the returns from various possible enterprise combinations on these farms.

A. How the Information Was Obtained

It will be recalled that the survey was divided into two stages: The first stage obtained general descriptive data for 284 operating units, while in the second stage 126 of these farms were revisited to obtain more detailed information for eleven individual crops. Most of the information in this section is based on data recorded during this second stage. Only a few farmers were visited in connnection with each crop, ranging from 30 interviews conducted for rubber and coconuts to 6 interviews conducted for arecanuts and mangosteens. Accordingly, the results presented here are only indicative of the general nature and range of various production and marketing practices; no attempt has been made to draw statistical inferences for the entire population of farmers in the study area.

A special effort was made to conduct the interviews as informally as possible, the main idea being to get the farmer to relate as much as he could about the steps and techniques involved; the equipment, labor, and materials used; the yields obtained; and the marketing practices followed for the crops concerned. Usually the information referred to the production and marketing practices followed by the respondent himself at the time of the survey. Some information referred to things which the farmer had done earlier in connection with the enterprise. (For example, some farmers who were currently operating mature fruit stands were able to recall the labor and materials which they had used when planting and maintaining the young trees.) Sometimes farmers gave information about the production and marketing practices commonly followed by farmers in their locality, even though they themselves were not involved. In these instances the information was recorded as an aid for interpreting the data, note being made that this did not refer to the farmer's own situation.

Not all the farmers provided all the details for every step in producing a particular crop. Sometimes they were unable to recall, or had no experience with, the labor or materials involved for a particular operation. Occasionally the enumerators did not probe deeply enough to get a complete picture. So the results reported here are built up from a composite of the various pieces of information given by individual farmers. In the case of long-term tree crops, farmers were seldom able to say much about the establishment practices unless they had recently set out a new stand. On the other hand, some figures for a particular crop are based on the data given

in connection with other crops. For instance, changkols were used for maintaining several crops, so that the assumed price ($4.50) and length of life (4 years) are based on medians for all farmers who mentioned the use of changkols in one way or another. (However, in arriving at these figures any one farmer was counted only once, even though he may have reported using the changkol in two or more operations.)

For many individual items there was a wide variation from farm to farm in the reported values or amounts. These inconsistencies tended to be greater for rates of production, labor "requirements," and amounts of materials; prices seemed to be more consistent from farm to farm. It is very likely that these variations really existed to some extent, reflecting differences in soils, skills, quality of output, and the like. But, although an effort was made to prevent farmers from being forced to make wild guesses, it is apparent that some farmers gave information about things which they were not well informed. Additional errors no doubt were introduced during the tabulations while trying to "standardize" the estimates given for a particular item. For instance, some farmers reported rubber production in terms of katis per acre per day, others in terms of total number of sheets produced. Although an effort was made to get the neccessary "conversion factors" for each farm, rather arbitrary imputations were sometimes necessary.[1/] Before conducting the survey, an effort was made to learn as much as possible about prevailing practices for various crops from local agricultural technicians. However, the fact that the survey participants were not thoroughly familar with local practices very likely resulted in further errors and misinterpretations.

To eliminate the influence of extremely high or low values, most of the estimates presented on the following pages are based on medians rather than averages. Sometimes even these medians turned out to be obviously non-realistic or irrelevant. (For instance, the recorded amount of time spent needed for making rubber sheets sometimes included the total time span needed for coagulation to take place even though the farmer could be doing other things while waiting.) In these cases, the final estimates were based on the information given by one or more individual farmers who (subjectively) seemed to have given realistic and detailed answers. Once or twice, survey estimates were modified in the light of information supplied informally by local agricultural workers who were familiar with farming practices in the Muar area.

1/ One of the basic purposes of this study was to get a better idea of the kinds of information which could or could not be reliably supplied by farmers and of the terms (units of measure) in which they tended to think as a basis for planning more specialized investigations. Accordingly, the farmers were not forced to answer in terms of any specific unit of measure, or to break down the operations in any pre-determined way. This would have been difficult to do without more adequate prior knowledge about the production and marketing practices likely to be involved. If this could have been done, no doubt the resulting estimates would be more consistent, and more of the farms could have been used for arriving at any one figure.

B. Rubber

Rubber production was studied on 30 farms. Twenty-seven of these were tapping mature rubber trees, while 3 had only young, untapped stands. The sample was purposely stratified so that approximately half were stands on coastal clay and half on peat soils.

Nature of the stands. Most of the mature stands were not very productive or well cared for, compared to modern estate standards. All but three of the 17 mature stands had been planted to clonal seedlings before World War II, the oldest stand being about 45 years old and the median stand being about 30 years old.

All but one of the mature stands were entirely in rubber. Tree densities varied widely because of differences in the initial planting distances and the number of trees which had died after planting. No actual tree counts were made, but farmers' estimates ranged between 50 and 400 tapped trees per acre, the median being about 160 trees.

The rubber area operated by any one farmer ranged between 1½ and 17 acres. The median size was 3 acres. Most of the farms had all of the rubber trees on one tract of land, although a few had as many as three or four separate tracts.

Rubber land on 20 of these farms was owned by the operators. Eight farmers tapped rubber stands rented from someone else, while the remaining two had both owned and rented stands.

Rental arrangements were varied. Five farmers paid a fixed number of katis to the owners each month or year (a median of 105 katis per acre per year) and kept the remainder of the output. Two paid the owners a fixed cash rent (a median of $50 or $60 per acre per year). One farmer split the sheet rubber production 50:50 with the owner. Two farmers received a specified cash payment from the owner (49 cents per kati at the time of the survey) which varied according to the price of rubber.[2/] In all but one or two cases, the renters not only tapped and processed the latex, but also cut weeds around the trees when necessary.

Work operations. Most of the attention given to the mature stands was in connection with the tapping and processing of latex. About the only other attention usually involved was for the farmer, or a hired worker to cut lallang and shrubs from beneath the rubber trees and to clear out the small drainage ditches which cut through most rubber stands. None of the farms studied here applied fertilizer to mature stands.

All of the farmers tapped their rubber trees nearly every day that it didn't rain -- usually 18 to 25 days a month. (This is in contrast to the common estate practice of tapping each tree every two days.) The tapping was usually done by the operator and family members. Some farmers

---

2/ These two farmers were very nearly the same as hired tappers and would have been excluded as operators of rubber stands except that the owners had very little to do with the stands and left most of the operational decisions in the hands of the tappers.

started before sunrise (using lamps to see their way). Usually the latex had been brought to the house, coagulated, and rolled into sheets by noon. On most of the farms one or two persons did the rubber tapping, each tapper handling a median of 320 trees each day.

After the latex was brought (usually in buckets) by foot or bicycle to the house, it usually took an hour or two to coagulate the latex and roll it into sheets. First, the latex was dumped into the split halves of old kerosene tins and coagulant added. Only about half of the farmers used a strainer to remove bark and other impurities. For coagulating, most of the farmers used various local brands of acid (usually formic acid) bought in small bottles at nearby shops. Rather than following the estate practice of adding a rather small amount of acid and allowing the latex to coagulate overnight, the farmers added enough acid to enable the latex to coagulate in one hour or less. A powdered ad itive (tawas) was used by one or two farmers to give the dried sheets a yellow color in the hope of selling at a higher grade. All but one of the farmers had their own rubber mangles -- usually located in a small open-sided shed or underneath the houses. After the rubber had been mangled into sheets weighing about two katis each, they were hung up to dry on bamboo poles in a shady place. None of the farmers smoked his own sheets.

The usual practice was to cut the grass and weed growth among the rubber trees once or twice a year. Weed control seemed to be much more of a problem on clay soils than on peat soils. About half of the farmers cut weeds during spare moments (usually in the afternoon), using a long parang. The others hired neighbors to cut the weed growth on a contract basis, the rate of payment ranging between $4 and $8 per acre each cutting.

A summary of the usual labor, equipment, and materials involved in operating mature rubber stands on the 30 farms studied is shown below:

Labor:

grass cutting	30 hrs. per acre per year.
tapping (320 trees per tapper)	3 " /day + .8 hrs./100 trees/day[3/]
processing: 4 katis sheet per day	1.0 " per day
4-8 " " " "	2.0 " " "
8-12 " " " "	3.0 " " "
12 + " " " "	4.0 " " "

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
long parang	" " "	5.00 "	3 " "
whet stone	" " "	1.00 "	1 " "
mangles (pair)	" " farm	150.00/pair	25 " "
shed for mangle	" " "	10.00 each	2 " "

3/ Based on a simple linear regression which explained 64% of the variation in total tapping time per day:

$$Y = 2.9 + .79X,$$

where Y = hrs. of tapping per day and X = 100's of trees tapped per day.

Materials:

tappping knife (6 mos. life)	1.1 per 100 trees per yr. or 2 per tapper per yr.	$ .60 each
latex cups (3 yrs. life)	33 per 100 trees per yr.	2.50 per 100
spoons (4 mos. life)	300 " " " " "	.20 " "
collecting pails (10 mos. life)	0.5 " " " " " or 1.2 per tapper per yr.	1.20 each
scrap baskets (5 mos. life)	0.75per 100 trees per yr. or 2.4 per tapper per yr.	.30 "
tapping shoes (4 mos. life)	1.1 per 100 trees per yr. or 3 pr. per tapper per yr.	1.30 per pr.
lamp (4 mos. life)	0.5 per 100 trees per yr. or 3 pr. per tapper per yr.	.35 each
oil for lamp	$2.70 per 100 trees per yr.	
coagulating pans ($\frac{1}{2}$ kerosene tin, 6 mos. life)	.25 per 100 katis	.25 each
sieve (6 mos. life)	.15 " " "	1.35 "
acid	60¢ " " "	
lubricant for mangle	.45 bottles per 100 katis	.40 per bottle

Yields. A wide range of yields was reported by the farmers. Part of this may reflect errors in their memory or judgment, but it was apparent that yields did vary from farm to farm as a reflection of differences in soils, drainage conditions, age of stand, tapping skills, moisture content of the sheet, and the like. Most of the farmers thought in terms of "so many katis of unsmoked sheet per day" from their entire operations. Some reported the amount of sheet and scrap sold in a typical month.

For the 26 farms which reported yields the median rate of production was 2.4 katis of unsmoked sheet per tree per year. Assuming 160 trees tapped per acre, this amounts to something less than 400 katis per acre per year. The median yield of the stands on clay soils (2.5 katis per tree per year) was about 15% greater than the median for peat soils (2.2 katis per tree per year). However, this difference may partly reflect the fact that the stands on the peat soil tended to be older than those on clay soil. Yields on some farms were apparently depressed by flooding. (Eleven of 31 farms reported some flooding, ranging between 1 and 45 days in a year.)

Marketing. Most of the farmers let their rubber sheets accumulate for several days -- often 1 or 2 weeks -- before selling, or turning the owner's share of the crop over to him. Nineteen of the 27 farmers who tapped rubber sold their sheets and scrap to local rubber buyers, most of whom had shops along the main road at the same or nearby parits. (There were usually only one or two licensed rubber buyers in each mukim.) The remaining farmers sold their rubber to buyers -- or agents of buyers -- who lived further away in Muar or one of the larger villages. These local buyers, in turn, usually sold their purchases to wholesalers or

smokehouse operators in Muar who sent lorries to pick up the unbaled sheets and scrap. One or two buyers had smoke houses.

In 15 cases, the rubber was picked up and paid for at the farms by buyers' agents or employees who came by on bicycles every few days. The other farmers delivered their sheets to the buyers, one farmer traveling as far as 3 miles.

The price received was usually geared to the current Singapore price. At the time of the survey, the farmers were receiving about $1.03 per kati of sheet and about 34 cents per kati of scrap. Several farmers indicated that they did some bargaining with the buyers. A number of the farmers kept up with daily trends in rubber prices by listening to market reports on the radio, reading newspapers, or talking with neighbors. There seemed to be a tendency to deal with the same buyer every time — perhaps more so than when coconuts or fruit were sold -- although some farmers did indicate that they shifted from buyer to buyer, depending on the price offered and the current need for cash.

Most farmers did not think in terms of grades when they sold rubber. Most of the farmers appeared to be producing Grade 3 or 4 sheets. Informal chats with some of the buyers suggested that they became well acquainted with the individual rubber producers, the care used in tapping and processing, and the resulting grade of sheets offered for sale. The buyers varied the price offered to each producer accordingly.[4/]

Young stands. At least five farmers had planted new rubber stands in recent years. Most of these had been established with the financial assistance of the Rubber Industry Replanting Board, which had an office in nearby Muar.

Replanting procedures varied somewhat from farm to farm. Four of the five farms had killed the old stands by chemical poisoning, and planted the new seedlings in between the dead trees while still standing. One of the farmers had cut down the old stands (instead of poisoning them) and cleared the entire tract before replanting. In every case the newly planted seedlings had been budgrafted. All of the farmers had applied some fertilizer at various intervals, most of the materials being supplied by the Rubber Replanting Board, but some of the farmers bought some additional fertilizer on their own. One of the five farmers reported the use of chemical weed killers in maintaining their young stands. Here again the materials had usually been supplied by the Rubber Replanting Board.

The extent to which the replanting work was carried on by the farm family itself varied. Some farms contracted out certain parts of the job. For example, one farmer paid a neighbor $1 per tree to cut and remove the old stand. One operator had hired help to spread fertilizer. One operator

---

4/ A more detailed description of farmers' marketing practices for rubber and other crops in the Muar area is in an Honors thesis now being completed by Miss Tham Soo Ngoh in the Economics Department of the University of Malaya in Singapore.

had hired a worker to dig holes for the new seedlings at 8¢ per planting point. Three or four operators used hired labor to clear grass and other growth away from the new seedlings. One farmer had contracted out the entire replanting operation -- old tree removal, weed clearing, and planting -- for $200 per acre (excluding materials).

C. Coconuts

Coconut production was studied on 30 farms. As with rubber, the sample was (purposely) equally divided between stands on coastal clay soils and peat soils.

Nature of the stands. The composition of coconut stands in the Muar area varied widely. At one extreme were well-kept "commercial" stands operated by farmers who relied largely on coconuts or copra for income. At the other extreme, a few coconut palms had been planted along with various other crops in dusuns and received little active management or care.[5/]

In most instances the coconut palms in any one tract had been planted in rows, but young seedlings had been planted at various intervals since to fill in gaps left by plants which had been removed as a result of wind, floods[6/], disease, and insect damage. Some farmers had not removed or replaced damaged trees, resulting in battered-looking stands which contained productive palms as well as dead or dying trees. Some stands contained palms which the farmers reported to be up to 60 years old. The median age of the mature palms was about 40 years.

Unlike the rubber stands, a majority of the coconut stands (19 of the 30 stands) was interplanted with one or more other crops. Bananas were scattered among the coconut palms on 10 of the farms. Coffee was interplanted among coconuts on 8 of the 30 farms studied. Other crops included arecanuts (usually planted in single rows at the edge of the coconut stands), pineapples, rambutans, and limes. However, coconuts were dominated by these other crops in only one-fourth of the stands.

5/ A very detailed description of coconut production in the Johore West Coast (including the Muar area) is reported by T. B. Wilson, "The West Johore Coconut Production Survey," Federation of Malaya Agricultural Department, Bul. 104, Nov. 1958.

6/ About half of the farmers reported some flooding on their coconut land. The effects of prolonged flooding were evident in the number of dead or dying palms and in the poor vigor of the remaining palms on several farms -- particularly those next to the sea coast.

The scale of operations also varied widely. On the 30 farms studied, land in coconuts ranged between ½ and 24 acres, the median farmer having 3¾ acres. (These acreage figures don't mean much, since the plant densities varied widely -- ranging from about 10 to 100 plants per acre, with a median of 40 plants per acre.)[7] None of the 30 farms had less than 20, nor more than 1000 palms in all. The median farmer reported having 185 palms. The initial spacing of the palms varied, but was most frequently reported to be 30 feet by 30 feet.

On all but 2 of the 30 farms, the land in coconuts was owned by the operator. One tenant paid a fixed cash rent ($18 per acre annually) to the owner. The other tenant turned over 50% of the coconuts produced to the owner.

Work operations. All but one of the 30 operators harvested nuts. One operator had only a few trees which he tapped for sugar production.

Of the 30 operators, 18 used their own and family labor to harvest the nuts. Ten farmers hired neighbors or full-time coconut harvestors on a contract basis, usually paying $6 to $10 per 1000 nuts. (One farmer gave the workers one nut out of every three harvested.) On the remaining farms, the nuts were harvested by employees of the buyers. The normal practice was to cut down the nuts with a long bamboo pole with a curved sickle-like knife attached to the end. The "commercial" operators usually harvested the nuts at fairly regular intervals -- ranging from 3 to 12 times a year, but mostly every 40 to 60 days.

Of the 29 farmers who harvested nuts, 20 normally processed the nuts into copra. Seventeen built and operated their own kilns. One farmer used a neighbor's kiln. One Chinese farmer used a kiln which had been built cooperatively with several neighbors. One farmer processed his copra in a kiln which was provided by the buyer for use by the farmers who sold copra to him. The kilns cost from $100 to $400 to build, depending on their capacity. The usual procedure was to carry the nuts from beneath the trees to a pile near the kiln. Then the outer husks were removed -- a very time-consuming job involving the use of a "lembing" (a waist-high post stuck into the ground, on top of which is a spear-like knife). The husked nuts were then split into two or three parts (depending on their size) and spread out on top of the kiln for smoking. Old coconut husks were used to fire the kiln. This initial smoking varied in length from about 8 to 24 hours. Then the smoked pieces were removed from the kiln and the inner kernals scraped out (with the help of a small knife) from the shells. The kernals were then either replaced on the kiln for additional smoking or laid out on mats for sun drying, depending partly on weather conditions. The final copra was usually placed in large sacks, each holding about one picul.

7/ Wilson estimated that stands in West Johore average about 35 palms per acre. See T. B. Wilson, Bul. 104, op. cit. p. 16.

The 9 farmers who sold fresh coconuts normally removed the outer husk with the lembing.

Cutting lallang and other undergrowth required a good deal of time and was usually done in the operator's spare time throughout the year. (Several operators hired workers on a contract basis -- $3.50 to $6.00 an acre each time.). The amount of undergrowth -- and accordingly the amount of work involved -- varied considerably from farm to farm, largely reflecting differences in drainage conditions, soils, and the density of tree cover. Usually an effort was made to cut the undergrowth at least two or three times a year. Most coconut tracts contained small drainage ditches which also required clearing once or twice a year. A few operators went to the trouble of collecting old fronds and other debris, burning these materials and spreading the resulting ash as a source of nutrients. Some farmers applied salt around the base of the palms as a means of beetle control.

In many of the "commercial" stands, the operators spent some time each time each year removing dead or damaged palms and replacing them with young seedlings. Nuts from selected palms -- either from the operator's own holding or those purchased from neighbors -- were set aside and allowed to germinate for several months before being set out as seedlings. During the first two or three years the seedlings were given special care in the way of grass and weed clearing, but no farmers mentioned the use of commercial fertilizers or pesticides.

The labor, equipment, and materials likely to be involved in coconut and copra production as now practised in the Muar area can be summarized as below:

Labor:

grass cutting:	coconuts only	38	hrs.	per	acre	per yr.
	coconuts and bananas	13	"	"	"	" "
	coconuts and coffee	22	"	"	"	" "
	coconuts and other crops	54	"	"	"	" "
parit clearing		7	"	"	"	" "
harvesting nuts (6 times a year)		0.9	"	"	tree	per yr.
	or	4.6	"	"	1000	nuts.
husking and tearing		23	"	"	"	"
scraping nuts		27	"	"	"	"
smoking (total lapsed time)		12	hrs.	per	batch	

Equipment:

changkol	1 per man	$4.50	each	4 yrs. life
tajak	" " "	4.50	"	5 " "
long parang	" " "	5.00	"	3 " "
sickle	" " "	3.00	"	2 " "
pole	" " "	1.00	"	1 " "
basket	" " "	3.00	"	2 " "
spike (lembing)	" " "	2.50	"	4 " "
scraping knife	" " "	.50	"	5 " "

Equipment: (cont'd)

sacks	1 per picul	$ .60 each	
kiln: <4000 nuts per year		100.00 "	10 yrs. life
" " " "		200.00 "	10 " "

Yields. The farmers who sold coconuts usually reported their yields in terms of number of nuts per plant or per acre. Those who made copra thought in terms of katis or piculs of copra per harvest. Converting the yields reported as piculs of copra into the equivalent number of nuts, the median annual harvest was reported to be something like 25 nuts per tree.[8] These nuts varied considerably in size and weight, according to the vigor and age of the plants. Those who prepared copra reported a median conversion rate of 250 nuts to each picul of copra. (Other estimated conversion rates ranged between 200 and 350 nuts per picul.)[9]

Annual yields on peat soils (a median of about 35 nuts per plant) tended to be considerably higher than on clay soils (a median of about 20 nuts per plant). This difference is perhaps largely a reflection of the fact that stands on clay soils tended to be older and more subject to severe flooding than those on peat soils.

Information provided by some of the respondents indicated that the coconut plants have their peak yields between 10 and 25 years after planting, with the plants first coming into production about 7 years after planting and the yields stopping when the plants were about 60 years old. Again there was considerable variation from farm to farm in the figures given.

Marketing. The nuts and copra were normally sold within a few days after each harvest. Ten of the 29 farmers sold either copra or nuts to local shopkeepers. Two sold nuts and copra directly to a coconut oil mill which was located along the main road in the study area. About 20 farmers sold copra and nuts to specialized buyers who either lived in villages within the area or came from Muar.[10] Most of these buyers had their own kilns. Some buyers resold the copra they bought to oil mills or other wholesalers. Most farmers usually sold their coconut products to the same person after every harvest.

All but 4 of the 29 operators either delivered or carried these products to the roadside to be picked up by lorries. Some of the farmers transported the nuts or sacks of copra for as far as six miles. One or two farmers hired men with bicycles to haul the nuts and copra for them.

8/ This corresponds very closely to the average nut yields estimated by T. B. Wilson, Bul. 104, op.cit. pp. 27-34.

9/ These probably underestimate the number of nuts needed. Wilson, ibid., reports an average of 365 nuts per picul of copra.

10/ Some of the farmers mentioned more than one kind of buyer.

At the time of the survey, the farmers were receiving between 5 and 12 cents for each nut, depending on the size and quality. The median price was 6 cents per nut. Those who were selling copra reported prices ranging between $24 and $33 per picul, depending on the quality of their copra. The median copra price at the time of the survey was reported to be about $30 a picul. (The corresponding copra price at Singapore was about $41 per picul in January 1960.)[11/]

Usually there appeared to be little active bargaining when determining the sale price. Local copra prices seemed to be rather closely geared to changes in the copra prices at Singapore.

D. Coffee

Coffee production was studied on 15 farms. On all but three of these farms, the coffee trees had been planted on peat soil.

Nature of the stands. On all but two of the farms, the coffee trees were interplanted among mature coconut trees. One farmer had planted a block of coffee by itself, while another had interplanted coffee with bananas.

All of these coffee stands were mature, although some farmers had planted some young trees at various times to fill in the gaps left by older coffee trees or coconut palms which had been removed. The median stand was about 15 years old. A few farmers had coffee trees which were reputed to be as old as 30 years.

The coffee trees had usually been set out in regular rows, but many of the stands had gaps where trees had been removed. Initial planting distances varied, ranging from 12 X 12 feet to 30 X 30 feet. At the time of the survey, plant densities ranged from about 10 to 200 trees per acre. The median density was estimated to be 30 trees per acre. This low density reflects the fact that the coffee trees were sometimes planted in only a portion of a tract that had been originally planted to coconuts.

The median stand covered about 3½ acres. No farmer had more than 8 acres, less than 1 acre, in coffee. The total number of coffee trees on any one farm ranged between 40 and about 275. The median farmer had about 100 trees in all.

All of the coffee stands were on land which was owned by the farmers.

Work operations. The major kinds of jobs which were usually carried on in connection with coffee included: (1) harvesting the berries, (2) drying and removing the husks, (3) pruning the plants, (4) cutting undergrowth, and (5) setting out new plants to fill in the gaps.

11/ Monthly Statistical Bulletin of the Federation of Malaya, Department of Statistics, Kuala Lumpur.

The frequency of harvesting varied and was often irregular. Some farmers picked berries only twice a year, while others harvested some trees as often as every two weeks. The majority harvested berries three or four times a year. There was no marked seasonality in the harvesting period, although some farmers reported that yields tended to be higher in May or June and in November or December. Most farmers used family labor for harvesting. One farmer reported paying hired help 50 cents for each kerosene-tin (4 gallons) of berries picked.

The sequence used for processing the berries seemed to vary somewhat from farm to farm, but seemed most commonly to include the following steps: (1) pounding the berries with a wooden "lesong" to loosen the outer pulp, (2) fermentation under damp sacks to loosen the sticky layer still adhering to the depulped beans, (3) washing to remove this fermented layer and (4) drying to make the remaining parchment around the beans brittle. The total lapsed time for processing each harvest usually took from 4 to 8 days, depending largely on how suitable weather conditions were for fermenting and drying.

In addition to the periodic clearing of lallang and other undergrowth, several farmers pruned the mature trees in spare moments throughout the year. No farmers mentioned the use of fertilizers in connection with their mature coffee stands.

A summary of labor requirements and equipment used for producing coffee as reported by the 16 farmers interviewed is shown below:

Labor:

planting young trees	0.9 hrs. per tree
pruning trees	0.8 hrs. per tree per yr.
grass cutting (twice a year)	22 hrs. per acre per yr.
harvesting beans (4 X per yr.)	1.0 hr. per kati dry beans[12/]
processing (pounding, washing, fermenting, washing, drying, pounding)	1.5 hrs. per kati dry beans[12/]

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
tajak	" " "	4.50 "	5 " "
long parang	" " "	5.00 "	3 " "
kerosene tin	" " "	.50 "	6 mos. life
sacks	1 per picul	.60 "	2 yrs. life
mats	2 per farm	5.00 "	1 " "
pounder (lesong)	1 " "	30.00 "	5 " "

12/ These estimates are based on very scanty evidence and may be very inaccurate.

Yields. Farmers reported a median yield of about 3/5 kati of dried beans from each tree per year. The estimates varied from about 1/5 kati to 1¾ katis per tree.

According to some farmers, the coffee trees first started to bear fruit 5 or 6 years after planting.[13/] The peak yields occurred when the trees were 10 to 20 years old, and some coffee production reportedly continued until the trees were 30 or 40 years old.

In estimating their coffee yields, most farmers thought in terms of either (1) tins of berries per harvest from the entire holding or (2) total katis of dried beans per harvest. A few thought in terms of yields of berries or dried beans per tree. Information from several farmers suggested that one 4-gallon tin of fresh berries would yield about 2½ katis of dried coffee beans.

Because of the variations in frequency of harvesting and seasonal growth conditions, farmers as a whole seemed to be less certain about coffee yields than they were about the yields of some other crops (such as rubber or durians). Inaccurate estimates of the total number of bearing trees may have led to further errors in the yields reported here. Accordingly, the yields recorded here should not be accepted with much confidence.

Marketing. All the farmers sold their dried coffee to local shopkeepers after each harvest. In every case, the beans were delivered (in sacks, baskets, or tins) by the farmers to the buyer and were transported as far as 6 miles. Most operators kept a portion of the coffee beans for home consumption.

At the time of the survey, the farmers were selling beans for $1.40 to $1.50 per kati. There was no formal grading, and usually the farmer seemed to accept the price offered by the buyer without much bargaining.

E. Arecanuts

Arecanut production was studied on only 6 farms, so that the information presented here is not very complete and may not be representative.

Nature of the stands. Although there was some planting of arecanuts in separate blocks or in the midst of other stands, the more usual practice in the Muar area was to plant arecanuts in simple rows at the edge of other stands, such as coconuts or "dusuns." None of the farmers studied seemed to rely on arecanuts as his major income source.

The median farm had about 30 arecanut plants. No farmer had more than 300 plants. The median age of the arecanut stands was about 9 years. One stand was reported to be 20 years old. A few farmers had set out some young plants to replace some of the old arecanuts, but in no case did there appear to be any planned replanting programs.

13/ This seems late. Agricultural Department sources indicate that coffee trees normally come into bearing after three years.

Work operations. Little attention was normally given to the mature arecanuts except to harvest the nuts and prepare them for sale. Undergrowth was cut from beneath the plants once or twice a year -- usually as part of the weeding operations for adjacent stands of coconuts, coffee, or fruit. No mention was made of fertilizer use or pest-control measures for either mature or young arecanut stands.

The nuts were harvested at varying -- not always regular -- intervals ranging from 2 to 12 times a year. The median harvesting frequency on the six farms studied was about once every two months. Normally a long pole and sickle, similar to that used for coconuts, was used to cut down the arecanuts.

After harvesting, the nuts were usually taken to the farmer's house for partial processing. The first step was to split the fruit into halves with a short parang and set them out to dry in the sun for a day or so. Then the thick fleshy outer husks were removed and the nuts set out to dry again for another day or so. The final product was usually placed in large sacks for transport.

Some rough information about the labor and equipment used in arecanut production, as given by the six farms studied, is as follows:

Labor:

grass cutting	.45 hrs. per tree per year.
harvesting (6 times per year)	.60 " " " " "
processing (splitting, drying, fleshing, drying)	.60 hrs. per kati

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
long parang	" " "	5.00 "	3 " "
pole and knife	" " "	3.00 "	2 " "
tins	" " "	.50 "	6 mos. "
short parang	" " "	3.00 "	3 yrs. "
sack	" " picul	.60 "	2 " "

Yields. The median farm had an annual yield of about 2 katis of dried nuts per plant. Other farms reported average yields between 1 and 3 katis per plant. Most farmers apparently did not pay particular attention to arecanut yields and were not able to say much about the relationship of age of stand to rates of production. However, they did indicate that the arecanut plants began yielding 5 to 7 years after planting and ceased to yield much about 15 years after planting.

Marketing. All of the six farmers sold the arecanuts after they had been dried and removed from their outer husks. The normal practice was to sell the nuts after each harvest to local shopkeepers, although one of the respondents sold directly to a buyer who came from Muar. Some of the farmers delivered the nuts to the buyers while in other cases the buyers (or their agents) picked up the nuts at the farm.

There were at least one or two small establishments in the Muar study area which were buying arecanuts from nearby farmers as green fruits fresh from the trees. These establishments employed local women to dry the nuts, split them, and remove the outer husks in much the same manner as done by the individual farmers.

The prices which the farmers had been receiving at the time of the survey ranged between 5 and 8 cents per kati of split dried nuts. As with coffee, there seemed to be little bargaining, the farmers apparently accepting the prices offered by the buyers.

F. Bananas

Banana production was studied on 20 farms. Bananas were grown in most parts of the Muar study area, but tended to be more commonly found in the coastal clay sections than on the peat soils further inland.

Nature of the stands. In most instances bananas tended to be regarded as a supplementary income source. Accordingly, most banana stands were interplanted with other crops -- particularly with coconuts and sometimes as one of many crops in "dusuns." Only one of the 20 banana producers studied had a sizeable tract of land devoted entirely to bananas. Bananas were frequently planted in gaps left by the removal of old trees, as well as in open spaces around the farmers' houses, along the banks of parits, and along roadsides and footpaths.

Very often the bananas had been originally planted in regular rows. But failure to thin out or to replant systematically later on resulted in most banana stands taking on a very helter-skelter appearance after a few years, with clumps of varying numbers of plants scattered at irregular intervals.

A dozen or so varieties of bananas (or banana-like plantains) were grown on the farms studied. Among the most common were "Pisang Buyong", "Pisang Embun", "Pisang Tandok". Other varieties mentioned by the farmers included "Pisang Awak", "Pisang Emas", "Pisang Kapas", "Pisang Manis", and "Pisang Nangka". Most farmers had two or more varieties mixed together. The yields of these different varieties varied widely, reflecting differences in number of fruit in each bunch, size of each fruit, time required for the fruits to form and mature, ease of propagation, and response to soils and cultural practices. Some varieties (such as "Pisang Awak") would survive under a wide range of soil and drainage conditions with very little active attention. Other varieties (such as "Pisang Emas" or "Pisang Tandok") were very sensitive to soil and moisture variations or did not easily self-propagate.

The amount of land with some bananas ranged from $\frac{1}{2}$ to 13 acres on the 20 farms studied. (The median banana acreage was about $4\frac{1}{2}$.) However, the land area covered was not at all indicative of the total banana production;

some tracts consisted of only a few scattered clumps of bananas in the midst of other crops, while the bananas in other tracts were planted very close together and dominated the other crops in the same tracts. About three-fourths of the banana stands were on land which was owned by the farmers. An attempt was made to find out how many banana plants were on each farm at the time of the survey, but few farmers had a very accurate idea of how many plants they had. Some gave estimates in terms of individual plants, while others estimated the number of banana clumps. Some estimates were on a per-acre basis, while others were for the entire farm. Their estimates (sometimes little more than wild guesses) ranged between 30 and about 1400 individual plants per farm.

A majority of the farmers reported extensive flooding on land planted to bananas, some bananas having been flooded for as long as 10 days at a time in recent months.

Work operations. The attention which the farmers gave to the banana stands varied from farm to farm. Some did little more than clear undergrowth once or twice a year, harvest the bunches as they ripened, and occasionally remove the old stalks. At least 13 of the 20 banana producers did more or less regularly set out new shoots (from materials obtained from the old plants) and thinned out the total number of plants in each clump. This replanting was done on a continual basis in the midst of the old plants, rather than cutting down the entire stands and starting all over again. No farmer mentioned the use of fertilizer in connection with banana production.

Three or four of the 20 farmers harvested the bananas at very irregular intervals, but most attempted to go through their stands to cut the ripe bunches either once or twice a month. Some spent a day or so just before each harvest walking through the stand and locating the bunches which were ready for harvesting.

There was considerable variation from farm to farm, but the rates of equipment and labor use seemed to boil down to the following:

Labor:

replanting and maintaining (includes grass cutting, removing old stalk, setting out new sprouts)	0.7 hrs. per clump per yr.
harvesting	0.6 " " " " "

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
tajak	" " "	4.50 "	5 " "
long parang	" " "	5.00 "	3 " "
short parang	" " "	3.00 "	3 " "
whet stone	" " "	1.00 "	1 " "

Yields. An effort was made to obtain estimates of the rates of banana production, but the results did not prove to be very meaningful. Most of the farmers were able to provide a rough indication of the total number of katis or bunches of bananas produced on their farms in a usual month or harvest. (These estimates ranged between 300 and 24,000 katis per farm per year.) But, because these yields represented varying combinations of the different banana varieties, and because of the difficulty in estimating the number of bearing plants in any one month or year, the usual yield per plant or clump of a particular variety was almost impossible to ascertain.

In the absence of other data, a more meaningful approach would be to build up the estimates on the basis of the life cycle of individual plants. Most of the farmers figured that it took a newly planted banana shoot 9 to 12 months to grow and develop into a mature bunch of bananas. (Some varieties take longer than others.) Over the years, a planting point which had originally consisted of one shoot was usually developed additional shoots nearby, resulting in clumps of a few plants each. (The number of plants varied widely from clump to clump and from farm to farm in the Muar area.) Figuring on an average of three developing shoots at any one time, this would mean a yield of three bunches per clump per year.

As noted earlier, the weight of each bunch varies widely, depending largely on the variety, soil nutrient and moisture conditions, and the amount of competition from other crops and weeds. Rough estimates given by a few of the farmers interviewed, as well as by personnel in the Agriculture Department, for some varieties were as follows:

Pisang	Awak	70	katis	per	bunch
"	Buyong	10	"	"	"
"	Emas	10-20	"	"	"
"	Kapas	60-70	"	"	"
"	Medan	30	"	"	"
"	Nangka	40	"	"	"
"	Nipah	10	"	"	"
"	Tandok	50-60	"	"	"

Marketing. The harvested bananas were sold by nearly every farmer to shopkeepers or specialized buyers located nearby. One of the 20 farmers sold directly to a buyer who came from Muar. About half of the farmers delivered the bunches of bananas (usually by bicycle) to the buyers' shops. These shops were usually located along the main road which dissected the study area. On the other half of the farms, specialized buyers or agents for the local shopkeepers picked up the bananas and carried them to the main road or to the shops. Here the bunches of bananas were stacked along the roadside (usually shaded by a roof or leaves) to be picked up within the day by lorries which came from Muar or Batu Pahat. Some of the lorries were operated by the wholesale buyers themselves, while others were hired by the buyers. It was not uncommon for the lorries to deliver other goods to the local shops when coming to

pick up the bananas, or to pick up other produce, such as fruit or copra in addition to bananas.

The bananas were usually sold on a per-kati basis, including both the stems and the fruit itself. The prices received by farmers varied widely according to the variety involved. Farmers most frequently reported the following prices at the time of the survey.

Pisang	Awak	2-3 ¢ per kati
"	Buyong	5 " " "
"	Emas	6 " " "
"	Embun	4-6 " " "
"	Kapas	1 " " "
"	Manis	6 " " "
"	Medan	4-6 " " "
"	Nangka	2-4 " " "
"	Nipah	3 " " "
"	Tandok	11-13 " " "

Usually the price offered by the buyers was accepted by the farmers without much bargaining. However, there seemed to be a number of buyers available in any one parit, and farmers did not always deal with the same buyers each time.

G. Dukus

Duku production was studied on 20 farms. This crop -- one of the most common "dusun fruits" -- was grown largely on the better-drained coastal clays, but not so often on the peat overlays further inland.

Nature of the stands. Only 2 of the 20 farms studied had specialized blocks of dukus planted alone. The normal situation was for dukus to be planted along with one or more other crops, particularly durians, mangosteens, mangos, rambutans, and bananas. Usually the dukus (as well as the other fruits) were scattered throughout the tracts, rather than being planted in regular rows. The density varied widely, ranging from 2 duku trees per acre to 64 trees per acre. At least three of the stands had been originally planted more or less regularly -- either 20 X 20 feet or 30 X 30 feet.

All of the duku stands consisted largely of mature trees, although one or two farmers had some trees which were not yet bearing. By-and-large there was no conscious attempt to replace the old trees. The median age of stand was about 40 years, while two farmers reported that their stands were about 60 years old. Several of the stands were of varying ages. Many farmers found it difficult to estimate the age of the old dukus, since they had been planted by someone else (usually relatives).

All of the duku stands were on land owned by the operators.

Work operations. As with most of the other dusun fruits, not much work was involved with dukus other than cutting undergrowth once or twice a year and harvesting the fruit.

The dukus were normally harvested once a year -- usually a month or so after the durian harvest. The exact harvest time varied from year to year, depending on the climatic conditions during the period of flowering and fruit development. The farmers most frequently mentioned May and June as the usual harvest months, although sometimes the harvest was as early as March or as late as August. Normally the harvest lasted 30 to 40 days.

Sixteen of the farmers harvested their own dukus, while four usually sold the fruits to buyers (for a predetermined cash amount for the entire crop) who picked the dukus. Of the 16 farmers who picked dukus themselves, 7 usually hired some labor to help with the harvesting. (These pickers were paid between $1.00 and $2.50 a picul -- a median of $1.50 per picul.) Each tree was picked as many as four or five times during the harvest season. Most farmers picked the fruit using a pole to knock down the fruit. A few used ladders to help get at the fruit. Usually the picked fruit was carried in small baskets to larger centrally located baskets, which in turn were used to carry the fruit to the buyer.

Duku producers in one or two localities mentioned the use of lamps at night during the harvest season to keep flying foxes and other pests from injuring the unpicked fruit. These lamps were normally made from old condensed-milk cans which a wick and kerosene were placed. These lamps were hung with strings (using sort of a pulley arrangement) from the limbs of various trees (perhaps a dozen or so per acre) throughout the stand. Each evening the farmers would refuel and light the lamps and hoist them up into the trees. In the morning the lamps would be lowered again and extinguished. Very frequently the lamps would go out during the night and would have to be relighted. Some fa mers also used trapping devices or guns to get rid of flying foxes in their dusuns.

No farmer mentioned the use of fertilizers or chemical pest controls in connection with duku production.

The usual labor and equipment used for mature duku stands seemed to include the following:

Labor:

grass cutting	24 hrs. per acre per year
harvesting fruit (30 days duration)	4.4 hrs. per picul
lighting lamps (for flying foxes)	15 hrs. per acre per year.

Equipment

changkol	1 per man	$4.50 each	4 yrs. life
long parang	" " "	5.00 "	3 " "
pole	" " "	.50 "	1 " "
rope	" " "	1.20 "	1 " "
ladder	" " "	2.00 "	5 " "
large basket	" " "	3.00 "	2 " "
small basket	" " "	1.20 "	1 " "

Materials:

oil and wick for lamps	$7.00 per acre per season (30 days)

Yields. Farmers seemed able to make fairly reasonable estimates of the amounts of dukus produced. Usually the farmers thought in terms of katis produced per tree or total katis produced on the entire farm.

Several farmers observed that good and bad yields seemed to come in cycles, the yields being particularly high every two or three years. In some years yields were so poor that the farmers didn't even bother to harvest the fruit. The median yield reported (reflecting "good" and "bad" years and varying ages of trees) was about 70 katis per tree per year. Some farmers reported average yields as high as 300 or as low as 20 katis per tree.

The yield data given by these farmers showed no close relationship to the age of the trees. However, information given by a few farmers indicated that dukus normally did not produce until 12 years after planting, but that yields continued to increase until the trees were 30 to 40 years old, and that some fruit had been produced on trees that were 70 or 80 years old.

Marketing. Normally the harvested dukus were sold a day or so after being picked. Of the 20 farmers studied, 5 normally delivered the dukus to local shopkeepers, while the remainder sold the harvest to specialized fruit dealers (or their agents) who came from Muar or other places further away. When selling to these "outside" buyers, the farmers (except those who sold fruit on the tree) normally transported the harvested dukus to the main road, where they werepicked up by lorries. Farmers did not always deal with the same buyers from year to year, or even from picking to picking within a harvest season.

Farmers reported prices in recent years ranging between 6 and 20 cents per kati of dukus sold. (The median price was 10 cents.) There was considerable price variation from year to year, largely reflecting the amount of fruit harvested locally in each season. Usually the farmers accepted the price offered by the buyer without much active bargaining.

The farmers who sold the dukus on a contract basis received a specified amount per tree or for the entire crop. The contract price varied from year to year, depending on how productive the season appeared to be. Usually the farmer would negotiate with one or more potential buyers a month or more before the harvest.

H. Durians

Durian production was studied on 20 farms. All of the stands were located on coastal clay soils, mostly in the extensive dusun areas that were particularly common at the Muar side of the study area.

Nature of the stands. Only one of the 20 farms had a stand of durians that was not mixed in with other crops. About three-fourths of the farms had durians and dukus mixed together. Other crops most frequently mixed in included mangosteens, bananas, rambutans, and coconuts. Only 4 of the 20 durian stands had been planted in any sort of regular pattern (the spacing being either 20 X 20 feet or 30 X 30 feet). The average densities of the durian stands ranged from 6 to 65 trees per acre.

As with dukus, the farmers seemed to know rather definitely how many durians they had. The total number of durian trees on any one farm ranged between 3 and 70, with a median of about 30 trees per farm. No farm had durian stands which covered an area of more than 3 acres.

The median age of the durian stands was 45 years. Some stands were estimated to be as old as 70 years of age. The durians had often been planted by the operators' fathers or grandfathers and the respondents sometimes found it difficult to estimate the exact age of their trees. Several of the farmers had durians of varying ages, the usual practice in past years having been to plant the durians (as well as other dusun fruit) in gaps left by the removal of old trees from time to time. Three or four farmers had young non-bearing durians (one of these was a specialized stand), but for the most part there seemed to be no active effort to replace the old durians with young ones. It came out in several interviews that the farmers were assuming that their durian trees would go on bearing fruit more or less indefinitely (at least to the end of the farmers' lifetimes) and hadn't given much thought to the planting of replacements.

All but 2 of the 20 durian stands were on land owned by the operators. The other two farmers rented in durian stands and paid the owners 50% of the production.

Work operations. As with dukus and the other dusun fruits, undergrowth clearing and fruit harvesting were about the only work operations involved.

The ripe fruit were usually picked up from the ground every day during the harvest season. Some farmers carried the fruit to small temporary open sheds to shade the fruit until they were sold (usually a day or two later). Farmers reported that each harvest season usually lasted from 25 to 45 days (a reported median of about 40 days). The harvesting took place, normally something between April and July -- most frequently in May or June, before the duku harvest.

The one farmer who had recently planted a specialized stand of young durians did not plough up the entire piece, but changkoled small areas at each planting point. He used clonal seedlings instead of budgrafting, and applied some commercial fertilizer.

A summary of labor and equipment typically involved in durian production on the 20 farms would be as follows:

Labor:

grass cutting	24 hrs. per acre per yr.
harvesting fruit (40 days duration)	2 hrs. per picul

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
long parang	" " "	5.00 "	3 " "
large basket	2 " "	3.00 "	2 " "
storage shed	1 per farm	6.00 "	1 " "

Yields. Most farmers seemed able to recall the average production of durians which they had harvested in recent years. Usually they thought in terms of total katis of durians for the entire holding. A wide range of yields was reported from farm to farm and season to season. The median "usual" yield for all of the farms turned out to be about 50 katis per tree per year. The yields given by the farmers showed no close relationship to the age of trees, but information given by some farmers indicated that the durians normally started to bear fruit about 10 years after planting and that the peak yields occurred when the trees were 15 to 40 years old.

Marketing. Most farmers sold their durians nearly every day during the harvest season. The durians were usually either taken by the farmer to a local shopkeeper or taken to the roadside to be picked up by buyers who came along in lorries (mostly from Muar). Some of these buyers had employees or agents who would come on bicycles to the farms and pick up the fruit. Two of the 20 durian producers normally contracted the entire harvest in advance to a buyer who could come and pick the fruit. (One of these farmers was paid an agreed amount for the entire crop, regardless of what the yield turned out to be; the other agreed on a certain amount per kati.) A majority of the farmers normally dealt with the same dealer or shopkeeper each year.

The price received varied widely, reflecting largely differences in the quality and size of individual fruit, as well as local yield conditions in each particular year. Farmers reported receiving between 6 and 28 cents per kati in the year preceding the survey. The median price was reported to be about 18 cents per kati. Some of the farmers agreed in advance to sell the fruit to a certain shopkeeper or buyer, but the price would not be established until the buyer had collected the fruit and had resold it.

I. Rambutans

Rambutan production was studied on 8 farms. All but one of the rambutan stands were on clay soils, but none was on land which had prolonged flooding.

Nature of the stands. Rambutans were one of the fruits most commonly grown in dusuns and other mixed stands. In the area as a whole there seemed to be some tendency to replace the other dusun fruits with rambutans and to treat the new rambutans as more of a commercial enterprise. However, most of the 8 farms studied here had older stands of rambutans which were interplanted with other dusun fruits and cared for in much the traditional manner.

Only 2 of the 8 farms had specialized rambutan stands. The remaining stands were mixed in with other crops -- most frequently dukus and durians. The density of the rambutan trees ranged between 3 and 50 trees per acre. The median density was about 20 trees per acre. Three farms had spaced the trees fairly regularly -- one at a planting distance of 10 X 20 feet, while two others were spaced 30 X 30 feet.

The total number of rambutans on any one farm ran between 5 and 90 trees. The median number of trees was 45. These stands covered an area ranging from 1 to 8 acres per farm.

All of the rambutan stands were on land owned by the farmers.

At least 4 of the 8 farmers had some young, non-bearing trees in addition to older mature trees. Several of the older stands contained trees of varying ages. The trees ranged in age from 1 year to (reportedly) about 40 years. The median age stand was about 9 years old. At least 5 of the farmers had either mature or young trees.

Work operations. As with the other dusun fruits, weed clearing and fruit harvesting comprised the major part of the time devoted to mature rambutan stands.

The rambutans were reported to bear fruit normally once a year -- usually in April or May. According to most farmers, the harvest season lasted about 30 days. All of the farmers interviewed picked the fruit themselves (sometimes with the help of family or hired labor) instead of contracting the harvest to buyers. The usual practice was to cut the bunches of fruit with special scissors. Sometimes a pole was used to help reach the fruit. Some farmers used lamps during the harvest season to prevent "flying foxes" and other pests from damaging the fruit at night (in much the same manner as with dukus).

The farmers who had sent out young trees in recent years had applied fertilizer once or twice a year during the first few years. (Some of this fertilizer was apparently supplied at reduced rates by the Agriculture Department.) One or two of the eight farmers mentioned the occasional application of fertilizer to their mature stands.

A summary of the labor materials and equipment normally used operating mature rambutan stands might be as follows:

Labor:

manuring young trees (once a year)	.15	hrs. per	tree per year.
maintaining mature trees (grass cutting)	24	" "	acre " "
harvesting (30 days duration)	2.4	" "	picul
lighting lamps (for flying foxes)	30	" "	acre " "

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
long parang	" " "	5.00 "	3 " "
scissors	" " "	2.00 "	7 " "
rope	" " "	1.20 "	1 " "
pole	" " "	.50 "	1 " "
large basket	2 " "	3.00 "	2 " "

Materials:

seedlings	$1.50 each
fertilizer (for seedlings) ½ kati per tree	.12 per kati
fertilizer (for mature trees) 5 katis per tree	.12 " "
oil and wicks for lamps	7.00 per acre (30 days)

Yields. As with most other fruits, the annual yields varied widely. Higher yields on some farms reflected the fact that trees from improved stock had been planted. The median farmer reported a "usual" yield of about 50 katis per tree. Other farmers reported yields ranging from 20 to 100 katis per tree per year.

Information supplied by a few farmers indicated that their rambutan trees normally started bearing fruit from 3 to 5 years after planting. Peak yields were believed to occur when the trees were 10 to 15 years old. One farmer estimated that the rambutans would bear fruit until about 40 years.

Marketing. Most farmers either sold their rambutans to local shopkeepers or directly to specialized fruit dealers from Muar and other places. About half of the farmers normally delivered their fruit to the buyers. Otherwise, the rambutans were picked up at the farm or nearby roadside by the buyers or their agents. Usually the rambutans were sold a day or two after being picked.

Farmers reported recent prices ranging between 12 and 30 cents per kati. In the previous season, they received a median price of about 20 cents per kati. There appeared to be some bargaining between farmers and buyers in several instances. No farmer reported selling the crop on a contract basis in advance.

J. Mangosteens

Mangosteen production was studied on only 6 farms — all those who had reported sales of this fruit in the initial reconnaissance survey. All of the mangosteen stands were on coastal clay soils. Three of the stands were on land that was occasionally flooded.

Nature of the stands. On all of the farms the mangosteen trees were scattered among various other crops -- most frequently dukus and durians (among others). Usually the mangosteens in any one tract were dominated by these other crops. Plant density ranged from 4 to 80 trees per acre.

The six farms had a total of between 8 and 70 trees each. (The median was about 30 trees.) These trees covered land areas ranging from ½ to 2½ acres.

Most of the mangosteen stands were of bearing age -- ranging between 8 and 55 years old. The median age stand was about 30 years old. The trees on any one farm sometimes were of varying ages. At least 3 farmers had, in addition to the mature trees, planted young trees which had not yet come into bearing.

Work operations. The farmers seemed to give their mangosteen trees very little attention -- perhaps less than some of the other dusun fruits such as dukus or rambutans.

Once or twice a year the weed growth was cut as part of the usual maintenance operations for the entire tracts on which the mangosteens were growing. As with dukus, at least one of the mangosteen producers used lamps during the harvest season to prevent damage by pests.

The mangosteens usually bore fruit once a year, just after the durian season (about the same time as dukus) -- most frequently in May. Normally the harvest season lasted about 30 days. Most farmers used poles to knock down the fruit that was out of easy reach.

Estimates of equipment and labor typically involved on these stands are as follows:

Labor:

grass cutting	24 hrs. per acre
harvesting fruit (30 days duration)	8 hrs. per 1000 fruits

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
long parang	" " "	5.00 "	3 " "
poles	" " "	.50 "	1 " "
large basket	" " "	3.00 "	2 " "

Yields. In the case of mangosteens, farmers thought in terms of number of fruit instead of katis or piculs. The median stand was reported to produce 550 fruits per tree. The first harvest usually occurred 5 to 7 years after planting. Peak yields were reported to occur when the trees were about 20 to 50 years old, and some trees had yielded until 60 years of age or more.

Marketing. As with the other dusun fruits, mangosteens were mostly sold to local shopkeepers or to specialized buyers from other places. Those who sold to local shopkeepers usually delivered the fruit while the specialized buyers usually picked up the fruit at the farm or nearby roadside. Usually the farmers sold their fruit in several batches throughout each harvest season.

"Usual" prices were reported to range between $ .65 to $1.50 per 100 fruits. The median reported price in the previous year was reported to be about $ .95 per 100. There appeared to be relatively little price bargaining.

K. Pineapples

The 6 farms which were recorded as selling some pineapples for sale (in the reconnaissance survey) were studied. None of these farms produced pineapples on the commercial scale found on some smallholdings in other parts of Johore (such as Pekan Nanas). All of these pineapple stands were located on peat soils.

Nature of the stands. The majority of the 6 farmers gave this crop relatively little attention, the pineapples usually being planted in gaps between other crops or along parit borders, and being regarded as a supplementary source of income. On 5 farms the pineapples were grown in the midst of mature coconuts, while the remaining farms had two acres of pineapples alone. The reported density of pineapple plants was very low by commercial standards, ranging from about 30 to 100 plants per acre. (Very likely this underestimates the actual plant density, since some of the farmers apparently considered "one plant" to be all the plants which had since developed or were developing from an original planting point. In most cases, the farmer had little actual idea of the actual count and gave what sometimes seemed to be wild guesses.)

The total number of mature pineapple plants (or groups of plants) on each farm was reported to range from 50 to about 200. One farmer had recently set out about 700 plants which had not yet come into bearing. (This was the farmer with a specialized block of pineapples.) These stands covered areas ranging between 1½ and 8½ acres.

Two of the farmers -- one with 4 acres and the other with 8½ acres -- had planted most of their pineapples a few months before the survey and were not yet producing much fruit.

Work operations. Normally little care was given to the pineapples other than harvesting the fruit at (usually) irregular intervals and perhaps occasionally removing the old plants which had already borne fruit. Most farmers took care of the pineapples at odd moments in between other jobs, and were not able to give a very meaningful indication of the actual time involved.

Yields. The farmers seemed to have little idea about the number of fruit which they usually harvested over a given period of time. For what it's worth, farmers reported a median of yield of about 90 fruits per 100 mature plants each year on stands which had been planted for several years. Some farmers mentioned that yields normally were higher in the period between March and May.

Marketing. The pineapple producers in this area seemed to have no regular buyers or marketing practices, but sold the fruits in various ways. Sometimes they would take a few pineapples to the roadside or a nearby village and try to sell them to shopkeepers and local residents. Sometimes neighbors would come to the farm and ask the farmer to pick and sell them a few fruits. Apparently not many of the pineapples produced in this area were being shipped to larger towns elsewhere.

Reported prices received at the time of the survey varied, ranging between a mean of 10 to 30 cents per fruit. These differences largely reflected differences in the size and quality of the fruit.

L. Wet Padi

Wet padi production was studied on 8 farms. All of these padi fields were located in the larger padi area which had been developed near Parit Yusoff at the southern end of the study area.

Nature of the operations. In all cases the padi was grown mainly for consumption in the farm households. These farmers all relied on other crops in tracts nearby as income sources.

The amount of padi land which any one holder could have was restricted by Government -- ordinarily one acre each. In terms of operating units, these allotments had been sometimes combined or split up within individual family groups. The farmers studied here each operated between ½ and 2 acres. The median padi acreage per farm was 1 acre.

The work sequence for producing the padi was very nearly the same for all the farms studied, and ran along the following lines:

Starting in June or July, the land, which had been in fallow since the previous harvest, was flooded and prepared for planting by changkoling. (Family labor was used for this, as well as for all the other work operations. Few, if any, of the farmers connected with padi in this padi area used draft animals.) About the same time the padi seed was germinated in small nursery plots. Usually the seed had been set aside from the previous year's harvest.

(As noted earlier, there is an agricultural demonstration station in one corner of this padi area which, among other services, gives farmers improved strains of padi seed in exchange for an equivalent amount of the farmer's own padi.)

About 30 to 60 days after the seeds were germinated, the padi seedlings were transplanted. Usually t is transplanting was done by women. Two of the eight farmers mentioned that they would work jointly with the people on several neighboring padi fields, all of the workers planting one tract, then going on to the next, etc. ("gotong royong").

During the 4 or 5 months between transplanting and harvesting, the farmers usually weeded the young padi stands at least once or twice. A tajak (a hoe-like implement) was often used. During the first part of this period the fields were flooded, depending on how much water was available. (The water came from water run-off further inland through a special canal and control gate which had been constructed by the Drainage and Irrigation Department. Another canal served as an outlet for the excess water to be drained from the padi area to the nearby sea.)

Ordinarily the padi was harvested sometimes between December and February -- usually January. Rather than harvesting an entire field with a sicle at one time (the more usual practice in the larger padi areas of Northern Malaya), individual plants were harvested as they ripened, using a small knife called the "tuai." Most of the farmers studied had constructed a small raised lean-to right next to their individual sawa. Every day during the harvest season the wife and children (as well as the man of the family sometimes) would go to the sawa for the entire day, resting and taking their meals in the little lean-to. Each day or two the family members would go through the padi field and harvest the mature plants. Then the padi would be threshed, winnowed, and partially dried (using mats and small flat baskets), before being placed in sacks for transport. The harvest season itself would last from about 1 to 4 weeks.

Birds did some damage to the ripening grain, but this was not regarded as serious by at least two or three of the farmers interviewed. Some farmers devised mechanical devices of various kinds to scare the birds away -- ranging from "scare-crows" to small metal reflectors on the top poles to wind-activated noise makers. In addition, one or more family members would spent the entire day at the padi field to shoo away birds during the last several days before the harvest.

The harvested padi was taken from the padi fields to the farmers' houses -- sometimes as far as 2 or 3 miles away. Bicycles were used to transport the padi. At the house sites the padi would be spread out on mats for further drying in the sun, and stored until needed by the family. In the village of Parit Yusoff -- located right next to the padi area, there was a small cooperative rice mill. At various times during the year, the farmers would bring their harvest to the mill for processing. The mill

charged $1.00 per picul of padi milled, and in addition kept the bran which had been removed. None of the 8 farmers interviewed reported selling any of his padi. After harvesting, the padi fields were left fallow with the straw still standing. One or two of the farmers planted occasional crops, such as maize, but for the most part no off-season crop was produced.

Rough estimates of the labor, equipment, and materials normally used in padi production on these farms are as follows:

Labor:

land preparation, planting and transplanting	140 hrs. per acre per yr.
weeding	40 " " " " "
harvesting	65 " " " " "
threshing and drying	23 " " " " "
milling (cooperative)	$1 per picul

Equipment:

changkol	1 per man	$4.50 each	4 yrs. life
tajak	" " "	4.50 "	5 " "
long parang	" " "	5.00 "	3 " "
tuai	" " "	.50 "	5 " "
niru (for winnowing)	" " "	1.00 "	2 " "
basket	" " "	3.00 "	2 " "
sacks	1 per picul	.60 "	2 " "
mats	2 per acre	5.00 "	2 " "
hut	1 per farm	150.00 "	3 " "

Supplies:

seed	4 gantangs per acre	(from old harvest)

Yields. The reported yields on the 8 farms ranged between 50 and 500 gantangs per acre, with a median of about 120 gantangs. It appears likely that some farmers were reporting extreme highs or lows in yields rather than their usual harvests in recent years. Further errors may have arisen from wrong estimates of the actual acreage planted to padi. However, there did seem to be some variation in the care given to padi from farm to farm and, accordingly, the "normal" yields may have in fact varied almost as much as these figures would indicate.

IV. SOME ESTIMATES OF FARM INCOME

Given the data for the various enterprises described in the previous section, it is possible to construct some estimates of the net income which farmers in the Muar area were earning from agricultural production at the time of the survey. This section compares income for a composite farm in three assumed "type-of-farming" situations. As indicated earlier, the survey on which the input-output data are based was exploratory in nature. Accordingly the income estimates are very rough and may be considerably in error.

A. How the Income Estimates were Made

The first step in developing these income estimates was to select a resource situation representative of the land and labor typically available on farms in the Muar area. Then costs and returns for each assumed enterprise combination was calculated on the basis of the "usual" yields, labor and equipment requirements, and prices described in the previous section. The result was a composite estimate, presumably representative of what the typical rubber producer (for example) with the assumed amount of land and labor would be earning. The estimates do not describe the returns from any actual farmer in the survey.

Some studies have obtained costs and returns estimates from each individual farm in a survey. Then the farmers are grouped according to general "types of farming" and comparisons made of the average net income in each type-of-farming group. This procedure was not used here to estimate incomes for two reasons: (1) it was expected to be difficult for every farmer to remember the costs and returns for all of his farming operations and enterprises, and (2) differences in average income between type-of-farming groups would be likely to reflect wide variations from farm to farm in acreage, family labor supply, production methods, and kinds and proportions of crops produced.

B. Resource Assumptions

In the income estimates which follow, the amounts of land and family labor which are assumed to be available on Incho Average's farm (as this composite farm will be called) have been geared to the results of the Muar study.

The farmers in the survey operated an average of $6\frac{3}{4}$ acres each. Showing some waste land for paths, the house, and yard space, it will be assumed that Incho Average has 6 acres available for crop production of one kind or another. It will be further assumed that Incho Average owns his own farm and is located in the Sri Menanti drainage area; accordingly each year he will pay $6.00 per acre for land tax, plus a $4.00 drainage fee.

Inche Average will be assumed to be available for farm work full time -- as much as 8 hours a day, 25 days a month. In addition, he will be assumed to have (1) a wife who can do certain lighter kinds of farm jobs part time (up to 4 hours a day, 25 days a month) and (2) a teen-aged son who is available part time (also up to 4 hours a day, 25 days a month) and who can do most kinds of farm work. In all, this available family labor will amount to about 400 man-hours per month or 4800 man-hours per year. It will be further assumed that Inche Average can hire labor to do certain jobs if needed.

C. Incomes from Four Variations

Let's estimate what Inche Average's net annual income would be if he were operating, in turn, each of three (of many) enterprise "mixes" and using the production techniques that the Muar survey showed to be common in the area: (1) rubber, (2) coconuts and bananas, and (3) dusun fruits.

These estimates are geared to the yields and inputs associated with mature stands commonly found in the area. They do not include initial establishment costs or reflect the yields found on very young or old stands. The income figures include the total value of crop production, whether consumed in the home or sold to someone else. The values of minor commodities produced on most of the farms for home consumption -- poultry, goats, vegetables, etc. -- are not included.

Rubber. If Inche Average were to produce rubber on his six acres in the "typical" manner, he would have a stand about 30 years old with about 160 trees to the acre. He would be tapping the trees about 240 days a year and would be producing 9.6 katis of sheet per day from the six acres.

Annual returns from the six acres would be as follows:

2304 katis sheet (2.4 katis/tree X 960 trees) @ $1.00	$2304
760 " scrap (0.8 " " " " ") @ $0.35	266
	$2570

Labor required for the entire year would include:

tapping (10.7 hrs./day X 240 days)	2568 hrs.
processing (3 hrs./day X 240 days)	720
maintaining stand (30 hrs./A. X 6 A.)	180
	3468 hrs.

Since Inche Average and his family have a total of 4800 hours available, there would be more than enough family labor to cover the overall requirement. But it might still be necessary to hire some outside workers to help with the daily tapping since all of the tapping would normally be done during the morning hours. If one tapper could handle 320 trees each tapping day, the 960 trees on the six acres could just be covered by Inche Average and his family. It would mean however that all the time available from the wife and son would be used for tapping, and that grass cutting and parit clearing would be done by Inche Average -- not an uncommon situation in

actual practice.

Annual equipment cost[1] would include:

1 changkol	($4.50 ÷ 4 yrs. life)	$1.12
1 long parang	($5.00 ÷ 3 " ")	1.67
1 whetstone	($1.00 ÷ 1 " ")	1.00
1 pair mangles	($150 ÷ 25 " ")	6.00
1 shed	($10 ÷ 2 " ")	5.00
		$14.79

Annual costs of materials and supplies would include:

6 tapping knives (2/tapper/yr.) @ 60¢	$3.60
317 latex cups (33/100 trees/yr.) @ $2.50/100	7.92
2880 spoons (300/100 trees/yr.) @ 20¢/100	5.76
3.6 pails (1.2/tapper/yr.) @ $1.20	4.32
7.2 scrap baskets (2.4/tapper/yr.) @ 30¢	2.16
9 pr. tapping shoes (3 pr./tapper/yr.) @ $1.30/pr.	11.70
9 lamps (3/tapper/yr.) @ 35¢	3.15
oil for lamps ($2.70/100 trees/yr.)	25.92
6 coagulating pans (¼/100 katis) @ 25¢	1.50
2 sieves (6 mos. life each) @ $1.35	2.70
23 bottles acid (1 bottle/100 katis) @ 60¢	13.80
10 bottles lubricant (.45 bottle/100 katis) @ 40¢	4.00
	$86.53

Other costs would include:

land tax @ $6/acre	$36.00
drainage fee @ $4/acre	24.00
tapping licenses @ $1/tapper	3.00
bicycle depreciation and maintenance	25.00
	$88.00

Net annual cash income from the six acres in rubber would be:

total cash returns	$2570
total cash expenses	189
	$2381

Copra and bananas. Suppose Inche Average had the six acres in a mixture of coconuts and bananas.

If he were like many of his neighbors he would have 40 coconut palms per acre which were an average of 40 years old and which produced about 25 nuts per palm per year. (This would be equivalent to about 1/10 kati of copra per palm p r year.) The nuts would be harv sted 6 times a year. In addition, he would fill in the gaps left by dead coconut palms at a rate of about two seedlings per acre each year. He sells the coconuts as copra.

[1] Only items which can be expected to last one year or more are included as equipment.

Here it is assumed that he has interplanted the coconuts with two varieties of bananas: 100 plants of Pisang Medan per acre, which yield about 30 katis per bunch, and 100 plants of Pisang Nangka per acre, which yield about 40 katis per bunch.

Annual returns from the six acres of coconuts and bananas would be:

24 piculs copra (240 palms X 0.1 picul/palm) @ $30	$720
180 piculs Pisang Medan (600 plants X 0.3 picul/plant) @ $5.00	900
240 piculs Pisang Nangka (600 plants X 0.4 picul/plant) @ $3.00	720
	$2340

Labor would be required as follows:

harvesting coconuts (0.9 hrs./palm X 240 palms)	216 hrs.
making copra (50 hrs./1000 nuts X 6000 nuts)	300
planting coconuts seedlings (0.5 hr./plant X 12 plants)	6
harvesting bananas (0.4 hrs./plant X 1200 plants)	480
maintaining bananas (0.2 hr./plant X 1200 plants)	240
grass cutting and parit clearing (20 hrs./A. X 6 A.)	120
	1362

This would leave about 3400 hours of available family labor unused. Since both coconuts and bananas are harvested at fairly regular intervals, there would be no need in this case to hire seasonal labor during peak harvesting periods.

Annual equipment costs would include:

2 changkols ($4.50 each ÷ 4 yrs. life)	$2.25 2/
2 tajaks ($4.50 each ÷ 5 yrs. life)	1.80
2 long parangs ($5.00 each ÷ 3 yrs. life)	3.33
2 short parangs ($3.00 each ÷ 3 yrs. life)	2.00
1 whetstone ($1.00 ÷ 1 yrs life)	1.00
1 sickle ($3.00 ÷ 2 yrs. life)	1.50
1 pole ($1.00 ÷ 1 yr. life)	1.00
2 baskets ($3.00 each ÷ 2 yrs. life)	3.00
1 lembing ($2.50 ÷ 4 yrs. life)	.62
2 scraping knives (50¢ each - 5 yrs. life)	.20
1 kiln ($100 ÷ 10 yrs. life)	10.00
	$26.70

Materials would include only 24 sacks for copra, assuming one sack for each picul sold. At 60 cents per sack, this would amount to $14.40 per year.

2/ Here it is assumed that only the farmer and his son will do weeding and maintenance work.

Other costs would include:

land tax @ 6/acre	$36.00
drainage fee @ 4/acre	24.00
bicycle maintenance and depreciation	25.00
	$85.00

Net annual cash income from the six acres in coconuts and bananas would be:

total cash returns	$2340
total cash expenses	126
	$2214

Dusun fruits. Finally, suppose Inche Average had the entire six acres in several dusun fruits interplanted together -- mainly dukus (40 yrs. old), durians (50 yrs. old), mangosteens (30 yrs. old), and rambutans (10 yrs. old), along with a few bananas (Pisang Medan). It is assumed that all of the fruit trees are mature and that no young, non-bearing trees are coming along.

Annual returns would be something like:

5040 katis dukus (72 trees X 70 katis/tree) @ 10¢	$504
3600 katis durians (72 trees X 50 katis/tree) @ 18¢	648
39,600 mangosteens (72 trees X 550 fruit/tree) @ 95¢/100	376
3600 katis rambutans (72 trees X 50 katis/tree) @ 20¢	720
3600 katis bananas (120 plants X 30 katis/plant) @ 5¢	180
	$2428

Labor needs for the year as a whole would include:

harvesting dukus (4.4 hrs./picul X 50 piculs)	220 hrs.
harvesting durians (2.0 hrs./picul X 36 piculs)	72
harvesting mangosteens (8 hrs./1000 fruit X 40 thousand)	320
harvesting rambutans (2.4 hrs./picul X 36 piculs)	86
harvesting bananas (0.4 hr./ plant X 120 plants)	48
lamp lighting during harvest (15 hrs./A. X 6 A.)	90
maintaining bananas (0.2 hr./plant X 120 plants)	24
grass cutting and parit clearing (24 hrs./A. X 6 A.)	144
	1004

Even though there is plenty of family labor from the viewpoint of the year as a whole, it may be that the harvest seasons, bunching up in the months of May and June as they do, are more than the family can cope with. Assuming that durians and rambutans are harvested in May, the labor requirements for that month would be as follows:

harvesting durians	72 hrs.
harvesting rambutans	86
harvesting bananas	4
lamp lighting	45
maintaining bananas	2
grass cutting	12
	221

Similarly, labor requirements for June, when dukus and mangosteens are harvested, would be:

harvesting dukus	220 hrs.
harvesting mangosteens	320
harvesting bananas	4
lamp lighting	45
maintaining bananas	2
grass cutting	12
	603

Inche Average and his family could handle the May harvest, but would need to hire some labor in June, since collectively they can work only about 400 hours in one month. If he hires a neighbor to pick most of the dukus (46 piculs) at $1.50 per picul, his total labor bill will amount to $69.

Annual equipment costs will include the following:

2 changkols ($4.50 each ÷ 4 yrs. life)	$2.25
2 tajaks ($4.50 each ÷ 5 yrs. life)	1.80
2 long parangs ($4.50 each ÷ 3 yrs. life)	3.33
1 whetstone ($1.00 ÷ 1 yr. life)	1.00
2 poles (50¢ each ÷ 1 yr. life)	1.00
2 ropes ($1.20 each ÷ 1 yr. life)	2.40
2 ladders ($2.00 each ÷ 5 yrs. life)	.80
3 large baskets ($3.00 ÷ 2.yrs. life)	4.50
3 small baskets ($1.20 ÷ 1 yr. life)	3.60
1 storage shed ($6.00 ÷ 1 yr. life)	6.00
2 pr. scissors ($2.00 ÷ 7 yrs. life)	.57
	$27.25

Materials would include only the oil and wicks used in the lamps for controlling night pests. At $7 per acre, this would amount to a total of $42 per year.

Other costs would include:

land tax @ $6/acre	$36.00
drainage fee @ $4/acre	24.00
bicycle depreciation and maintenance	25.00
	$85.00

Net annual cash income from the six acres in dusun fruits would be:

total cash returns	$2428
total cash expenses	223
	$2195

D. What These Estimates Mean

These budgeted estimates have attempted to give some idea of what general levels of income were being received under selected circumstances. Similar estimates could be constructed for many other enterprise combinations or land and labor resource situations commonly found in the area. In this connection, it is not correct to assume that returns for any one enterprise combination would be proportional to the size of farm -- hence, the reason for not putting these estimates on a "per-acre" basis. For example, a rubber producer would ordinarily use only one set of mangles, whether he had 2 acres, 6 acres, or 15 acres. No matter how small the farm is, chances are the farmer will still need to have at least one changkol and one parang. If Inche Average were to have only 3 acres, but still had the same amount of family labor, he would not have to hire any labor at all in connection with the harvesting of dusun crops, whereas labor was the largest single item of expense in the 6-acre situation.

These estimates reflect income received from the farm itself only, and do not reflect the relative possibilities for off-farm employment. Different enterprise combinations would use varying amounts of family labor. For instance, the rubber stand used more total family labor than either of the other two enterprise combinations budgeted alone, leaving less excess family labor for work in other jobs off the farm. (Incidentally the estimated labor requirements in the budget estimates shown here seem to reflect the pattern on actual farms in the survey, in that there was a greater tendency among coconut and fruit producers to have off-farm employment than there was among rubber producers.)

The income estimates described here have been intended to describe returns which farmers in the Muar area have been receiving and reflect existing prices, enterprise combinations, and production techniques. Similar estimates could be budgeted to predict what future returns would be if these farmers were to shift to other enterprise combinations or production methods. In making such predictions, the data obtained in the Muar survey would be helpful, but would need to be supplemented with information from other sources. For example, the yield averages found by surveying the farmers reflect the old unimproved stands which now prevail in the area; farmers who are considering planting new rubber stands in the future would be likely to use higher-yielding budgrafted planting materials. Also, crops other than those now prevalent in the

study area could be considered as possible enterprise choices. Equally important, the figures reported in this study reflect prices paid and received by farmers at the time of the survey; prediction of future income would entail estimates of what future prices are likely to be.[3/]

3/ Four honors thesis, now being completed by students in the Economics Department at the University of Malaya in Singapore, are using data based on the Muar study to estimate returns from various enterprise combinations under various assumptions:

Miss Leong Siew Mun has developed compounded estimates of net returns over the entire lifetime of the two major crops in the area -- rubber and coconuts.

Idris b. Rahman has estimated the sizes of holdings that would be needed to produce a specified income level.

K. Sreenivasan has used linear programming (a mathematical budgeting technique) to estimate the combination of crops that would be most profitable on a "typical" farm in the Muar area.

Lim Ban Choon has also used linear programming to estimate the combination of fruits that would be most profitable on a farm that was to specialize in fruit production.

V. IMPLICATIONS OF THE STUDY

This report has presented the results of a pilot study of farms near Muar. The study was aimed at generally describing existing land-use patterns, resource situations, and farming practices on individual farms in the area. At the same time it explored the possibilities of using survey methods to obtain input-output data for use in estimating returns from alternative crop enterprise possibilities. The data gathered, along with informal observations which may be worth considering when planning future research work, as well as farm advisory, land alienation, and rural development policy.

A. Varied Farming Situations and Their Implications

The farms in the study area varied widely with respect to the kinds and combinations of crops produced, the amounts of land and family labor available, and sources of off-farm earnings. This made it hard to describe a "typical" (modal) farm for the entire area. Even when the farms were classified into several type-of-farming or size groups, there was still a great deal of variation within any one group.

This suggests that the enterprise combination or farming practice that pays best for one farmer in a heterogeneous area such as this may not be the most profitable one for other farmers. The enterprise pattern that may pay for a farmer who has, say, only 3 acres or one man available may be quite different from the crop and livestock combination which pays best for the farmer with 10 acres or three family members available for work. One farm family may rationally take the extra time to process its coconuts into copra, whereas another family may more productively sell the nuts directly and use the extra work time in another farming enterprise or in off-farm employment. The size of farm needed to give a certain level of income in the Muar area, in turn, may reflect the kinds of enterprises and production techniques found on each particular farm.

Not all the farming programs in the Muar area had the same degree of flexibility. Some operators rented in most of their land from someone else and did not have much to say about the kinds of crops grown or the methods of production used on these tracts. Some owner-operators were restricted in enterprise choice by provisions in their land titles. Most of the farms in long-term tree crops and, accordingly, could not rationally consider changes in enterprises or techniques as often as farmers with annual crops, such as padi or vegetables. Even so, some enterprise situations were more flexible than others. For example, farmers who had old rubber or fruit stands could rationally consider shifting to other crops in the near future, while those with young rubber or fruit had "committed" their land use for some time into the future.

B. Getting Data for Farm Planning

This study has attempted to develop some input-output data for several crop enterprises as a basis for estimating the incomes that have been, or would be, received by individual farmers in various resource situations. These input-output data were based on one or two interviews with farmers rather than on actual measurement of yields, labor requirements, tree densities and the like.

The accuracy of the figures given seemed to vary widely from farm to farm. Some farmers (not necessarily those with larger holdings) had a pretty good memory of what was involved in producing a particular crop and were able to supply what seemed to be accurate and complete information. Other farmers were not able to say very much about the yield, labor, and materials associated with a particular crop. This partly reflected the fact that some farmers regarded the enterprises about which questions were being asked as existing largely for home consumption and accordingly hadn't given these crops much attention. The survey team participants, not being well acquainted with local farming practices, were not always able to know in what direction to probe further or how to interpret the answers given in the light of previous experience. This perhaps resulted in not getting all of the information that could have been given by the farmers if questions had been phrased more meaningfully. On the other hand, it could be argued that enumerators with little rural experience, such as those who took part in this survey, would be less inclined to "color" the answers given by any preconceptions about local farming practices.

Looking back on the survey, some changes in procedure might have resulted in more accurate and complete input-output information. For one thing, the enumerators felt a bit under pressure to complete the farms assigned in the allotted time; the added information from allowing more time to be spent on any one farm would probably have more than offset any loss of information by interviewing fewer farmers. The farmers interviewed were selected at random. Some of these could provide a wealth of information; others could provide very little. Since the existing production practices for any one enterprise in the area were rather similar from farm to farm, it might have been better to concentrate on getting cost and returns data from those farmers who were better informed and most willing to supply information. One could not draw any statistical inferences from such a purposively selected sample, but the resulting input-output data would very likely be more reliable and meaningful for farm planning purposes.

If time had been available, it probably would have been more effective to select a smaller sample and make repeated visits to the same farms over an extended period of time -- preferably an entire year or more. This would have allowed cross-checks to be made on the data given, both by additional questions and by giving the enumerators a greater opportunity to see the farmers doing the various work operations. A refinement of this might have

been to ask a selected group of farmers to keep simple records ofthe labor, materials, and yields involved. However, it might be that the farmers who would be willing, or able, to do this would not be very representative of all the farmers in the area.[1/]

Even if the information developed in the Muar study had been entirely accurate, it would not have supplied all of the information needed for guiding future farm enterprise choices. Cost and returns data were obtained only for the crops produced and the methods used in the Muar area at the time of the survey. Farmers could consider crops and livestock other than those now in the area. Similarly, they might consider other varieties or production practices. (For example, most farmers who are now planting rubber or rambutans in the Muar area are using higher-yielding, budgrafted stock; the yields reported im this study reflect older, low-yielding planting materials.) Accordingly, supplementary information from other sources would be needed for guiding farmers in the Muar area about the kinds of future enterprise adjustments that it would them to make. Survey data from other areas in Malaya which have similar soils and climate might be helpful. Estimates based on demonstration trials or experimental results could be another source of input-output data for farming planning.

The writer's impression is that a considerable amount of cost and returns data has been assembled by individual agricultural workers in various parts of Malaya. Some of this has been published through such media as the Malayan Agricultural Journal. Perhaps much more of the existing observations and data could be brought together and made available to other workers and program planners for use in farm advisory and rural development work.

Finally, in pointing up the shortcomings of this pilot study and suggesting the need for more farm-planning data, it should not be implied that we need to wait until comprehensive surveys or experiments have been completed before doing any farm planning work. A lot can be learned from just a few hours with an experienced farmer --- or a person who has worked closely with farmers.

1/ The idea of asking some cooperating farmers in Malaya to keep simple records would not seem to be out of the realm of reason. One farmer who was interviewed in the Muar area showed the enumerators a very complete record of his farming expenses and receipts which he had kept for several years. Many demonstration farmers cooperating with the Agriculture Department have kept simple records.

APPENDIX A

FORMS USED IN THE SURVEY

On the following pages are three of the forms used in the surveys reported here: (1) an area segment account sheet, (2) a survey schedule for the reconnaissance survey (Stage I), and a survey schedule for the more detailed enterprise study (Stage II).

One area segment account sheet was used for each segment. Its main purposes were (1) to help identify which farmers in a segment were eligible to be included in the sample and (2) to provide a record of the visits made to each farm.

Questions in the reconnaissance survey schedule were not necessarily asked in the same order as given in the form.

The enterprise study survey schedule was used more as a check list and a convenient form for recording information given by farmers, rather than suggesting any exact wording and ordering of questions. A separate copy of this schedule was used for each enterprise studied on every farm in the sample. The schedule was used in the field in loose-leaf form to allow additional sheets of page 4 to be added. One sheet was normally added for each major work operation in a particular enterprise (planting, maintenance, harvesting, processing, etc.).

DB-58
Muar Farm Management Study
February 1960

Segment no. _____
Enumerator(s) _____
Date started _____
Date completed _____

AREA SEGMENT ACCOUNT SHEET

	Tract no.											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Is this tract part of a smallholding which sold some farm produce last year? IF NO, SPECIFY USE AND TERMINATE INTERVIEW [a]												
2. Does the operator live on the holding? IF NO, SKIP TO #4												
3. Is the operator's house located in the segment? (If there is more than one operator, consider the house of the oldest partner.) IF YES, BEGIN QUESTIONNAIRE IF NO, TERMINATE INTERVIEW												
4. Is the northernmost point of the westernmost plot of the holding located in the segment? IF YES, BEGIN QUESTIONNAIPE IF NO, TERMINATE INTERVIEW												
5. Status of eligible holdings: [b]												
1st call												
2nd call												
3rd call				1								

a. If not a holding, indicate as follows:
S = shop P = public building or land
H = residence O = other

b. For each call, indicate as follows:
NA = operator not available
R = operator refused to grant interview
PC = interview partially completed
C = interview completed

DB-57

Farm no. _____

February 1960

University of Malaya
Singapore 10

RECONNAISSANCE STUDY OF MUAR SMALLHOLDINGS

Editing

Item	Comment	O K

A. General

1. Farmer's name (IF WILLING) _____

2. Location of holding (parit, kampong, etc.) _____

3. Person interviewed: a. farmer c. son or daughter
b. wife d. _____

4. Language(s) spoken by the farmer:
a. Malay c. Cantonese e. Khek g. English
b. Javanese d. Hokkien f. Teochew h. _____

B. Farmer's Background

1. No. of years the farmer lived on this holding: _____

2. The farmer's occupation before living on this holding:
a. operated another holding for _____ years.
b. worked on another farm or estate.
c. worked in a non-farming occupation (SPECIFY) _____
d. worked in government or teaching.
e. was in school.
f. no previous occupation specified.

3. Place where the farmer lived before coming to this holding:
CIRCLE ONE
a. another part of the Muar district.
b. another part of Malaya (State _____)
c. another country (_____)
d. always lived on the same holding.

4. Formal education completed by the farmer: _____ years.

5. Technical training or assistance in agriculture received by the farmer, if any: _____

Farm no. _____

C. Farm Household

Members living in the household	Sex (M/F)	Age (yrs.)	Occupation(s)*				
			Work on the farm	Work on other farms or estates	Other non-farm jobs	In school	Idle
farmer himself							
farmer's wife							

* Put XX under the occupation where most of the time is spent and X for supplementary occupations, if any.

D. Land Holdings and Tenure

Means of control	Acres operated by:			Rented or tax paid. by farmer **
	this farmer all year	this farmer part of year	others all year	
Owned: permanent title (EMR)*				$____/A./yr
temporary title (AO)*				$____/A./yr
Rented in: for cash				
for kind				
Total acres				xxx

* Including _____ acres sold within the past 6 mos.
Excluding _____ acres bought within the past 6 mos.
If any land is owned jointly with others, give details _____

_____

_____

_____

_____

** Ask only if the farmer appears willing.

Farm no. _____

E. Land Use and Crops

1. General land use and crop production on plots operated by this farmer part or all of last year.

	Plot						Check if any products:	
	A	B	C	D	E	F	Harvested	Sold
a. Acres in the plot							xxx	xxx
b. Soil type							xxx	xxx
c. Days flooded last year							xxx	xxx
d. Compact (C) or scattered (S)							xxx	xxx
e. Located in lot no.							xxx	xxx
f. Land title restriction							xxx	xxx
g. Fruit								
bananas								
duku								
durian								
langsat								
mangosteen								
nangka (jack fruit)								
pineapples								
rambutans								
h. Other permanent								
arecanut								
bamboo								
coconuts								
nipah								
rubber								
rumbia (sago)								
i. Temporary								
keladi (yams)								
keledek								
padi: wet								
dry								
sweet potatoes								
tapioca								
j. Other								
jungle and/or belukar								
lalang								
roads, buildings, etc.								

Farm no. _____

2. Changes made in the crop program during the past five years.

Change made (CHECK)	Kind of crop			
a. New area planted to this crop				
b. Old area replanted to same crop				
c. Area expanded				
d. Area contracted				
e. Old area of this crop removed or taken out of production				

F. Livestock Program 1. Livestock inventory and marketing.

Kind of livestock or product	No. on hand now	Check if any sold last yr.	Kind of livestock or product	No. on hand now	Check if any sold last year
Cattle			Poultry		
milk cows or buffalo			chickens		
bullocks			ducks		
			eggs	xxx	
milk	xxx				
Goats			Fish		
			reared from fry	xxx	
Pigs			from ponds or sawah	xxx	
breeding stock					
others					

2. Changes made in the livestock program during the past five years.

Change made (CHECK)	Kind of livestock			
a. First began this enterprise				
b. Expanded this enterprise				
c. Contracted this enterprise				
d. Eliminated this enterprise				

Farm no. _____

G. Overall Program

1. Agricultural enterprises regarded by the farmer as being his most important source of family living (in terms of value of production) last year:

   a. Most important enterprise _____

      Next most important enterprise _____

   b. No enterprise especially important.

   c. Farmer does not know.

   d. Farmer not willing to tell.

2. Off-farm sources of family living last year:

   a. work on other farms or estates.

   b. fishing

   c. shop-keeping

   d. income from retirement, investments, etc.

   e. family remittances

   f. _____

   g. farmer not willing to tell

3. Major source of family living last year: CIRCLE ONE

   a. farm produce and income.

   b. non-farm income (from G-2) _____

   c. farmer does not know.

   d. farmer not willing to tell.

H. Non-Family Labor

1. Labor hired by the farmer last year

	Kind of laborers		
	Permanent (10-12 mos.)	Temporary (4-9 mos.)	Occasional (1-3 mos.)
a. No. of workers hired	.....	.....	.....
b. Ave. no. of days each worked	.....	.....	.....
c. Ave. hrs. worked per day	.....	.....	.....
d. Total man-hrs. (axbxc)	.....	.....	.....
e. Kinds of tasks performed			
f. Wage rates paid:			
cash	.....	.....	.....
kind	.....	.....	.....

Farm no. _____

2. If any farming operations were done by someone else under contract (usually for a set rate per acre or tree) last year, give details:

Enterprise	Kind of task	Frequency last year	Rate of payment

3. If any labor was exchanged with others last year, explain:

_____

_____

_____

_____

I. Enumerator's Comments

(TO BE COMPLETED AFTER THE INTERVIEW

1. Length of time spent on the holding _____ hrs. _____ min.

2. Enumerator's impression of farmer's cooperativeness:

a. very helpful
b. moderately cooperative
c. somewhat reluctant
d. antagonistic

3. Times when the farmer is most likely to be available for interviewing _____

_____

4. Enumerator's impression about this farm family's level of living:

a. better off than most smallholders in the area.
b. average.
c. worse off than most smallholders in the area.

5. Enumerator's impression about the operator's aptitude:

a. very alert b. average c. not very alert

J. Other Notes

_____

_____

_____

_____

_____

DB-60

Farm no. _____

Muar Crop Enterprise Study
February 1960

Date: 1st visit _____
2nd visit _____
3rd visit _____

Farmer's name _____ Enumerators _____

Location _____ In sample? yes no

A. General 1. Crop _____ 2. (If rubber): a. clonal b. budded

3. Other crops mixed in _____

4. (If other crops): approx. % of plants/area in crop studied _____

5. Total acres/no. plants included in this study _____

6. Plant density: _____ plants per ____ acres or spacing _____ x _____

7. Planted: a. in rows b. irregularly

8. Soil type: a. coastal clay b. peat c. upland laterite

9. Flooded ____ days per year.

10. Tenure: a. owned b. partly owned c. rented in

11. (If owned): land tax per year $____ ; drainage rate per year $_____.

12. (If rented in) rental arrangements _____

_____

_____

13. Information applies mostly to:

a. respondent's own situation
b. situation on another holding known by the respondent
c. general situation of smallholdings in the area

B. Cropping Cycle

Months	0-12 years	0-120 years
Jan.	0	0
Feb.	1	10
Mar.	2	20
Apr.	3	30
May	4	40
June	5	50
July	6	60
Aug.	7	70
Sep.	8	80
Oct.	9	90
Nov.	10	100
Dec.	11	110
Jan.	12	120

Crop _____ Farm no. _____

Output

	Product, size, or grade harvested		
1. These estimates are for: a. measure (per fruit, kati, or what?)	.....	.....	.....
b. space	..... acres	..... acres	.....acres
or	.....plants	.....plants	.....plants
c. time (per harvest, yr., or day?)			
2. Frequency of harvests			
3. Rates of production (for various age of stands given:) a. most recent period(specify)	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
b. usual or average harvest	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
c. 5-yr. high and low	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
4. Product sold in the form of (smoked sheet, coconuts, copra, etc.)			
5. Conversion rate (latex to sheet, coconuts to copra, etc.)			
6. Where processing done (on farm, hired facilities, or what?)			
7.			
8.			

Crop _____ Farm no. _____

D. Marketing

	Product, size, or grade marketed		
1. Nature of buyer:			
a. name			
b. location			
c. other details			
2. Transport:			
a. picked up at farm (F) or delivered by producer (D)			
b. means of transport from farm			
c. distance hauled by farmer	mi.	mi.	mi.
3. Frequency of sales			
4. Other buyers available?			
5. Prices received:			
a. unit of measure (fruit, katis, or what?)			
b. price last received:			
1) date			
2) price			
c. 5-yr. high and low			
6. Person making the sale (farmer, other family members, landlord, or whom?)			
7. Method of determining prices (bargaining, based on S'pore price, or what?)			
8. Sharing arrangements with landlord or family (if any)			
9.			
10.			

Crop _____ Farm no. _____

E. Inputs 1. Covers input items for: (circle)

a. old stand removal
b. land preparation
c. planting
d. maintaining young stand _____ after planting
e. operating mature stand _____ after planting
f. processing _____

2. Labor (for _____ acres/plants per _____ days/mo./yr./operation).

	Nature of job		
a. No. of workers	.....	.....	.....
b. No. of days each time	.....	.....	.....
c. No. of times	.....	.....	.....
d. No. of hrs. per day	.....	.....	.....
e. Total man-hrs.			
f. Rate of pay (if any)			
g. Tools or equipment used			

3. Equipment (for _____ acres/plants per _____ days/mo./yr./operation).

Item	No. used	Yrs. of useful life	Purchase price	Cost of upkeep	Where obtained	Provided by:
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

4. Animal power: kind _____ use _____
no. _____ annual upkeep $ _____

5. Materials (for _____ acres/plants per _____ days/mo./yr./operation).

Item	No.	Units	Price	Rate of use or application	Where obtained	Provided by:
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

6. Hired services (for _____ acres/plants per _____ days/mo./yr./operation).

Kind of task	Frequency of use	Rate of payment	Total cost	Provided by:
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

APPENDIX B
GLOSSARY OF TERMS

Some of the terms used in this report may be new to persons who are not well acquainted with Malaya or who are not familiar with research terms. Below are brief explanations of terms which may be especially confusing.

Area segment. The basic sampling unit in the survey reported here. Each area segment was an area of land believed to contain about 8 farms eligible for study. The entire study area was divided into 424 area segments and 38 of these selected to be included in the sample.

Bagi dua. Term used to describe a crop-sharing rental arrangement under which the tenant pays the land owner a fixed percentage of the crop produced. Strictly speaking, it refers to a 50:50 arrangement, but is used by local farmers to describe other percentage divisions as well.

Changkol. A heavy hoe-like hand implement used to turn over the soil in planting and cultivation operations in place of a plow.

District. A major government administrative area into which each state is divided. The Muar District is one of 8 in the State of Johore. These districts correspond roughly to American counties.

Dollar. Used in this report to refer to Straits dollar, which is roughly equal to 33 cents U.S. or 2s. 4d. Sterling.

Duku. A common dusun fruit which is yellow-brown in color and about the size of a ping-pong ball. The thin outer rind is removed and the soft flesh which surrounds the seeds (similar to the mangosteen) is eaten. This fruit is grown on a small conical-shaped tree.

Durians. A common dusun fruit. It is about the size of a small watermelon, is green in color, has a thick spiney skin, and has a strong odor. The soft pulp around the seeds inside the fruit are regarded as a delicacy by many Malayans. Durians grow on a very tall tree and are allowed to fall to the ground before harvesting.

Dusun. A mixed planting of various crops (mostly fruit trees) often planted about Malay smallholders' houses to supply produce for household consumption.

Enumerators. The 12 students who interviewed the farmers in the survey.

Gantang. A unit of volume equal to about 1 Imperial gallon (about 4.5 liters). 1 gantang of padi weighs about 5.6 pounds. 1 gantang of rice weighs about 8 pounds.

Kati. A unit of weight equal to about 1 1/3 pounds (0.61 kilograms).

Ketua. Local headman who is selected by rural residents on more or less a permanent basis. In the Muar area, each Ketua is usually responsible for the households along part of one parit. The Ketua receives only token payment and usually is occupied in farming or other employment, much as any other rural resident.

Lallang. A tall, unpalatable grass which grows extensively in unshaded, untilled areas in Malaya. This grass grows rapidly and is often difficult to keep under control.

Lesong. A wooden pounding device consisting of a bowl-like base and a short post held in the hand. Used in the Muar area to pound padi into coarse flour and to loosen the outer husks from green coffee beans.

Mangle. A pair of hand-cranked rollers (resembling a washing machine wringer) used in rubber production to remove excess water from coagulated latex and to form the latex into sheets. Most smallholders have two sets -- one with smooth rolls, and a second set with ribbed rolls (used to prevent the final sheets from sticking together).

Mangosteen. A common dusun fruit which is reddish-purple in color and about the size of a small apple. The outer rind is divided into several easily separated segments. The tree grows to about 30 feet high and is characterized by shining, dark green leaves.

Median. The value associated with the middle (person) in a group. For example, suppose five farmers operate respectively 2, 3, 6, 7, and 10 acres. The median acreage per farm would be 6 acres.

Mukim. One of the major government administrative areas into which each district is divided. Corresponds roughly to American townships. There are 18 mukims in the Muar District.

Nipah. A low, multi-stemmed palm which commonly grows in swampy, saline areas. The leaves are commonly used in Malaya to make thatched roofing.

Padi. Equivalent to the term "paddy" in other Southeast Asian countries. Commonly used in Malaya to refer to the harvested rice grains before milling.

Pajak. A farm lease (usually verbal). Used by farmers in the Muar area to describe a variety of rental arrangements, but most frequently referring to an arrangement where the tenant pays a fixed cash payment, or rent in kind, per acre to the land owner.

Parang. A locally made knife used for a variety of jobs on farms in the Muar area. Parangs range in size from those about a foot long (used for such things as cutting branches or splitting coconuts) to three feet long (used to cut shrubs and tall lallang growth).

Parit. Name given to the drainage canals which lead to the sea along the West Johore Coast. Most farmers in the Muar area give their locations according to the names of the major parits near which their homes are located. This is in contrast to the practice in many other parts of Malaya, where farmers' locations are designated by the kampongs (villages) in which they are living.

Penghulu. Headman in charge of a mukim. He is appointed by the government to serve as its local representative and receives a regular salary.

Picul (pikul). A unit of weight equal to 100 katis or 133 pounds (61 kilograms).

Pisang. Malay word used to refer to bananas or the fruit of banana-like plantains in general.

Rambutans. A popular fruit which is about the same size as a hen's egg. The outer rind is red or yellow in color and is covered with coarse, soft hair-like spines. The inner white flesh which surrounds anut-like seed, is sweet and fairly juicy. The tree grows to about 40 or 50 feet in height and takes on a very spread-out, densely branched growth habit. The fruit usually grows in loose clusters, and in harvesting an entire cluster is cut at once.

Respondents. Used here to denote farmers who were interviewed in the survey.

Sago (Rumbia). A fairly short palm usually grown on a non-commercial scale in Malaya. Its thick stem is processed into a tapioca-like starch food. Its leaves are often used for thatched roofing.

Tajak. A heavy-bladed scythe-like implement used in the Muar area to clear weed growth from flooded padi fields and drainage ditches.

Tuai. Small knife with a wooden backing held in the palms of the hand and often used in the Muar area to harvest individual padi plants.