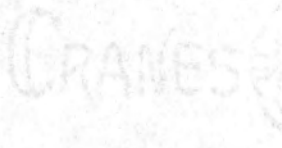


March 18, 1968

To the Graduate Council:

I am submitting herewith a thesis written by Nik Hassani Bin Mohamed entitled "The Structure of the Malayan Smallholder Farms with Emphasis on the Relationships Between Farm Size, Yields, Labor Supply, and Incomes." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

  
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THE STRUCTURE OF THE MALAYAN SMALLHOLDER FARMS WITH EMPHASIS  
ON THE RELATIONSHIPS BETWEEN FARM SIZE, YIELDS,  
LABOR SUPPLY, AND INCOMES

---

A Thesis  
Presented to  
the Graduate Council of  
The University of Tennessee

---

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science

---

by  
Nik Hassani Bin Mohamed

June 1968

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## CHAPTER I

### INTRODUCTION

The striking characteristic of farms in the underdeveloped countries is their variability. Considerable variations exist between farms in Africa, Latin America, and Asia; they even vary between and within regions in the same country. Nevertheless, farm situations in the low-income countries may be generalized to a certain degree. One outstanding feature is that "peasant farms" or "smallholders"<sup>1</sup> dominate. These consist of small farms organized on a family unit basis.<sup>2</sup>

Wickizer<sup>3</sup> defined peasant type farming as:

. . . all farms of small scale agriculture in tropical countries from the primitive type of shifting cultivation to the more intensive culture as exemplified by rice growing in a number of Asiatic regions. The measuring of small holdings is relative. The number of acres held or cultivated by the tropical farmer is not a reliable guide to classification. . . .

In addition, he argued that the apparent lack of efficiency of these type farms was due to the fact that:

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<sup>1</sup>For the purpose of this study, a smallholder is defined as a farm that is in a contiguous or noncontiguous unit and the total acreage owned is less than 100 acres. This is the traditional definition of a smallholder in Malaya. Areas of 100 acres and larger are defined as a plantation.

<sup>2</sup>John W. Mellor, The Economics of Agriculture Development (Ithaca, New York: Cornell University Press, 1966), pp. 133-34.

<sup>3</sup>V. D. Wickizer, "The Smallholder in Tropical Export Crop Production," Food Research Institute Studies, 1:49, February, 1960.

.... his holdings are too small or too scattered, or his right to use the land he farms is poorly defined. Formidable though his handicaps are, the smallholder exists by the millions, and often thrives.

In terms of land area, farm size tends to be small in peasant agriculture. Labor force per farm, however, tends to be as large or larger than in high income countries. Land and capital resources are so scarce that the level of production, and hence, net income tends to be low.<sup>4</sup>

In general then, the small size farms in peasant agriculture can be characterized by a large number of individual units. Farm size has been determined by the institutional organization of agriculture and by the man-land ratio. Over the years, the natural increase in population has led to decreases in the size of the holdings.

Subdivision and fragmentation of lands occur under various tenure systems, but have been more frequent in countries where the inheritance laws demand division of land. Islamic and Buddhist, and to some extent Hindu, laws demand the division of the deceased estates between the surviving heirs.<sup>5</sup>

However, farm size is not a variable that can be easily manipulated. Changes in sizes of farms are associated with political,

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<sup>4</sup>Mellor, op. cit., p. 134.

<sup>5</sup>Changes in Agriculture in 26 Developing Nations, 1948-1963, U.S.D.A. Foreign Agricultural Economic Report No. 27 (Washington: Government Printing Office, November, 1967), p. 40.

social, and economic repercussions.<sup>6</sup> Land reform programs have encountered difficulties wherever undertaken.

Due to economies of size, some argue that concentration of agriculture on relatively large units will make it easier to increase total production. It is also argued that the typical smallholdings of the traditional agriculture need to be replaced by larger units, to take advantage of the possibility of mechanization, to make efficient use of scarce management resources and to overcome inefficiencies in resource use associated with fragmented holdings.<sup>7</sup> Others believe that in most of the underdeveloped nations, surplus labor exists; consequently, their argument is that the problem becomes one of maximizing the value of output from a relatively fixed area of land, by using labor as effectively as possible combined with the other scarce inputs.<sup>8</sup>

The efficiency problem relating to farm size then is one of deciding the right quantities and right proportions to combine scarce resources to achieve low-cost expansion of farm production. Differences in the relative supplies and costs of factors between countries and even

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<sup>6</sup>Kenneth L. Bachman, and Raymond P. Christensen, "The Economics of Farm Size," in Herman Southworth and Bruce F. Johnson, Agricultural Development and Economic Growth (Ithaca, New York: Cornell University Press, 1967), p. 255.

<sup>7</sup>Ibid., pp. 234-35.

<sup>8</sup>S. E. Johnson and R. P. Christensen, "Efficient Use of Labor, Land, Capital for Agricultural Development of Densely Populated Areas," in U. S. Papers Presented for United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, Vol. 3 (Washington: Government Printing Office, February, 1963), p. 39.

within the country affect the factor proportions that are most economic and hence may influence the optimum farm size.<sup>9</sup>

Bachman and Christensen<sup>10</sup> conclude that the appropriate size farms cannot be determined on an a priori basis. Farm sizes have to be evaluated in terms of the agricultural development problems and the economic situation in the country.

In Malaya as well as in the rest of Southeast Asia, an appreciable part of the rural economy is composed of smallholders. The Malayan smallholders may be placed in two broad groups. The first group consists of those farmers who are engaged in export-producing crops, mainly rubber; the second group includes the rice growing farmers, producing rice for home consumption. Coconut smallholders are also included in this second group.

## I. THE PROBLEM

The inherent duality of the Malayan agriculture, viz., the plantations or estates and the smallholder type farms, present a problem. The conflict between the large, efficient plantation units and the small fragmented holdings of the smallholders which are presumably inefficient, give rise to problems in public policy in the process of planning for agricultural development. Consequently, according to Wharton<sup>11</sup> one main

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<sup>9</sup>Bachman and Christensen, op. cit., p. 237.

<sup>10</sup>Ibid., p. 235.

<sup>11</sup>Cliffton R. Wharton, Jr., "Economic and Non-Economic Factors in the Agricultural Development of Southeast Asia" (New York: Agricultural Development Council, June, 1963), p. 4. (Mimeographed.)

problem is defining the desirable economic and social optimum-size of farm firms.

Differences in farm size is reflected in the differences in income levels between farms. The average annual income per household among rubber farmers in Malaya was \$770 in 1961.<sup>12</sup> Rice farmers earned, on the average, between \$521 in Bachang, Malacca and \$1,478 in Tanjong Karang, Selangor in 1966.<sup>13</sup>

On the other hand, coconut smallholders' average annual income per farm was between \$250 to \$300. These income levels are low when compared to the per capita income of \$950 for Malaya in 1965.<sup>14</sup> In terms of per capita income, the level of income of the smallholder is very low considering the fact that an average farm family consists of five members.

Low production per acre and consequently the low returns for the smallholders may be due to the differences in farm size. Thus an understanding of the distributions of farms by size is the basic key to analyzing the variation in incomes between farms.

Achievement of higher farm incomes involves complex considerations of resource allocation and use. The smallholders may be able to raise

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<sup>12</sup>E. K. Fish, "Productivity and Income from Rubber in an Established Malay Reservation," Malayan Economic Review, 6:19, April, 1961.

<sup>13</sup>Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report Nos. 1 and 2 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), pp. 188, 205.

<sup>14</sup>First Malaysia Plan, 1966-70 (Kuala Lumpur: Government Printer, 1965), p. 4.

their income levels by operating on larger farm units. Research in rubber indicates that production on estates averages more than 800 pounds per acre, but smallholders average less than 500 pounds. The average yield per acre of rice on smallholder farms in Selangor was 536 gantangs<sup>15</sup> per acre, whereas in Penang and Province Wellesley the average was 432 gantangs in 1965-66 crop season.<sup>16</sup> Selangor's rice farms average about 3.6 acres and while that of Penang and Province Wellesley was 2.5 acres. The yield was much lower in Pahang which had a much smaller average farm size. Average size rice farms in Pahang was 1.7 acres and the yield was 289 gantangs per acre. Similarly average production of coconut on plantations are higher than on smallholdings.

## II. THE OBJECTIVES OF THE STUDY

The objectives of the study were: (1) to discuss the structure of the Malayan smallholder farms and their role in the agricultural economy of the nation; (2) to examine the relative efficiency of the farms in terms of rubber, rice and coconut smallholder production and income with respect to farm size; (3) to estimate the farm size and labor requirements for rubber, rice, and coconut farms in order to achieve a \$3,000 net income level per farm; and (4) to determine the effects of variation in labor supply on optimum farm size necessary to fully utilize labor force.

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<sup>15</sup> A gantang of padi weighs approximately 5.6 pounds.

<sup>16</sup> Statistical Digest (Kuala Lumpur: Ministry of Agriculture and Cooperatives, Malaysia, February, 1967), p. 9.

### III. DATA USED IN THE STUDY

The basic crop production data used in the study were taken from the Statistical Digest, Ministry of Agriculture and Cooperatives, Malaysia. The distribution of the farms and farm sizes for each crop were taken from the Malayan census of agriculture, 1960. Relationships between production and farm size were computed from the census figures. In order to derive the return associated with each size class the unit price for rubber was set at seventy cents per pound, rice at sixty-four cents a gantang and coconut at \$30 per pikul.<sup>17</sup> These prices were used throughout this study.

The labor requirements and costs of production data were estimated on the basis of studies published by the Department of Agriculture, Malaya.<sup>18</sup> The cost of production and labor needed per acre of mature rubber were obtained from previous studies.<sup>19</sup>

### IV. PROCEDURE

To achieve the study objectives, the following procedures were used:

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<sup>17</sup> A pikul of coconut weighs approximately 133-1/3 pounds.

<sup>18</sup> Narkswaski and Selvadurai, *op. cit.*, Koh Theam Hee, "Farm Recording of Padi in Tanjong Karang" (Kuala Lumpur: Department of Agriculture, 1967). (Mimeographed.)

<sup>19</sup> Robert Ho, "Labor Inputs of Rubber Producing Smallholders in Malaya," Malayan Economic Review, 12:79-89, April, 1967; and A. H. Tan, "The Incidence of Export Taxes on Small Producers," Malayan Economic Review, 12:90-98, April, 1967.

1. Farm size distribution for each of the three crop enterprise, rubber, rice, and coconut and the production levels were drawn from the Malayan Census of Agriculture, 1960.

2. Labor requirements and total cost of production per acre were adapted from information available from related farm studies in Malaya to establish the economic and technical conditions of production. The specified levels of labor supply for each crop type were set at different levels because the production processes and value of the products of the three crop types differ.

3. The two yield levels for each crop were established from analysis of the census data and crop production studies.

4. The income targets established for the study would adequately put the smallholders income at par with those in nonagricultural employment.

#### V. RESEARCH ON FARM SIZE PROBLEMS

Evidence indicates that the small family size farms in many underdeveloped nations have a higher gross output per acre than do larger farms. Mann's<sup>20</sup> study in Punjab, India, found that family size farms have a higher production per acre than on the larger cooperative farms. In instances where yields were higher on cooperative farms, it was due to the capital available from the government to provide superior irrigation facilities for these farms. However, only three of the ten

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<sup>20</sup>Bachman and Christensen, op. cit., p. 245.

cooperative farms continued for more than a few years. Landowners decided that production and income from their land would be greater if they farmed it themselves on small family sized farm units.

Long<sup>21</sup> in analyzing the results of Farm Management Research Centre Studies in India indicated that gross output per acre averaged higher on small farms than larger farms.

Krishna<sup>22</sup> also used the Farm Management Studies data and in analyzing the economies of farm size in India used three criteria:

- (1) output per unit of all input, (2) output per unit of paid input, and
- (3) output per acre. He concluded that:

. . . Under present conditions, the ratio of output to total input shows no consistent relation to the size of farm. In respect to the ratio of output to paid input, the small farms turn out to be more productive than the large farm, and in respect to output per acre, the small farms appear to be more productive.

Data from the Iranian 1960 census of agriculture also indicated that crop yields average higher on small farms than on larger ones. However, yield did not decline continuously with increases in farm size. Apparently the proportion of inputs (labor) employed on smaller farms was higher than on larger farms. Factor proportions differ greatly among farms, and it may be that redistribution of labor on farms in order that land of the same quality is used equally intensive, would

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<sup>21</sup>E. J. Long, "The Economic Basis of Land Reform in Underdeveloped Economies," Land Economics, 37:117, May, 1961.

<sup>22</sup>R. Krishna, "Land Reform and Development in South Asia," in W. Froelich, Land Tenure, Industrialization and Social Stability (Milwaukee: Marquette University Press, 1961), p. 224.

increase total farm output. The data do not indicate however what farm size most efficiently uses the scarce capital resource.<sup>23</sup>

Penny and Zulkifli<sup>24</sup> in their study of comparison in relative efficiency between plantations and rubber smallholders in Indonesia concluded that the efficiency differential in favor of estates over smallholdings was probably less than generally believed. The study reports that value of product-added per acre after deducting capital expenditures was slightly larger on smallholdings than on estates. However, value added per man employed was much larger on estates than on smallholdings. Estates depend on hired labor and thus economize on its uses.

Farm size studies in Japan indicate that the distribution of farms by size categories has not changed much since 1910. Farms were relatively small. In 1960, about 2 percent of the farms were larger than 12.5 acres. The Japanese Household Survey in 1960 reported that the individual crop yields average higher on larger farms, but the multiple cropping ratio was larger for small farms, indicating more intensive cultivation on smaller farms. While total output per acre was higher on smaller farms, recent studies indicate that rice yields per acre were higher on larger farms. This reflects the capital intensive

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<sup>23</sup>Bachman and Christensen, op. cit., pp. 246-247.

<sup>24</sup>D. H. Penny and M. Zulkifli, "Estates and Smallholdings: An Economic Comparison," Journal of Farm Economics, 45:1017-21, December, 1963.

operation of the larger farms using more purchased inputs such as fertilizers, pesticides, etc.<sup>25</sup>

In Malaya, a study was made of yields, labor inputs and incomes of different sizes of rubber smallholdings; yields per acre were found to be slightly larger on smaller farms. However, the data also showed much higher income on larger farms due to more efficient use of labor employed.<sup>26</sup>

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<sup>25</sup>Bachman and Christensen, op. cit., p. 247.

<sup>26</sup>Ibid.

## CHAPTER II

### THE STRUCTURE OF THE MALAYAN SMALLHOLDINGS

#### I. THE STUDY AREA

The land area of Malaya is 50,700 square miles,<sup>1</sup> with about six million acres under cultivation in 1965. Two-thirds of the cultivated area is in rubber. Agricultural production in Malaya is dominated by tree crops.<sup>2</sup> Besides rubber there are coconut, oilpalm and fruit trees. Rice is the main grain for the domestic population.

Rubber, coconut, and oilpalm are both plantation and smallholder's crops. Rice is produced by smallholders only. The estimates of acreages under various crops for plantation and smallholders for 1965 are shown in Table I. Of six million acres under cultivation, the smallholders made up 4.1 million acres. In 1965 the total acreage of the smallholders' rubber, rice, and coconut combined was 3,580,040 acres. Rubber was 2,333,100 acres, rice 808,240 acres and coconut 438,700 acres. Between 1960 and 1965, the cultivated area for rubber increased by more than 27 percent.

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<sup>1</sup>Pierre R. Crosson, Economic Growth in Malaysia, National Planning Association (Published for USDA, Economic Research Service, March, 1966), p. 41.

<sup>2</sup>The following are the crop classifications according to economic life span: Perennials - life span greater than 10 years (rubber, oilpalm and coconut); Intermediate = 10 years or less but more than one year (pineapple, sugar cane); Annuals = one year and less (rice and vegetables).

TABLE I  
ESTIMATES OF ACREAGE UNDER VARIOUS CROPS, MALAYA, 1965

|                       | Plantation        | Smallholders | Total     |
|-----------------------|-------------------|--------------|-----------|
|                       | ----- Acres ----- |              |           |
| Rubber                | 1,859,000         | 2,333,100    | 4,192,100 |
| Coconut               | 68,000            | 438,700      | 506,700   |
| Rice                  | --                | 808,240      | 808,240   |
| Other Crops           | --                | 505,200      | 550,200   |
| Total Cultivated Area | 1,927,000         | 4,130,240    | 6,057,240 |

Source: Statistical Digest (Kuala Lumpur: Ministry of Agriculture and Cooperatives, February, 1967), p. 2.

Agricultural land in Malaya is characterized by extreme localization of activity. This is partly due to the nature of the crops. Rubber is found on higher elevations in the interior of the country, coconut are grown mostly along the sandy coastal areas, and rice in the river deltas.

## II. NUMBER AND FARM SIZE DISTRIBUTION

Number of farms. In 1960 there were 449,650<sup>3</sup> smallholder farms. In relative terms, 44 percent of these farms were rubber farms, 31 percent were rice farms, and 9 percent were coconut farms. The average size per farm was 5.3 acres for rubber farms, 2.5 acres for rice farms, and 3.3 acres for coconut farms.<sup>4</sup>

The number of farms and acreage for each crop by states is shown in Table II. Rubber farms are concentrated in the states of Johore (66 percent), Pahang (65 percent), Negri Sembilan (57 percent), Malacca

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<sup>3</sup>The Census of Agriculture, Malaya, 1960 reported the number of farms in two ways, (1) by cropland, and (2) by type of farms. Cropland Groups: The total cultivated land of each farm was divided into seven main cropland groups; rubber, rice, coconut, vegetable garden, other temporary cropland and mixed holding. An individual farm may report one or more of these croplands, for example, rice, rubber, and mixed holdings, so the aggregate of the number of farms reporting each of the seven cropland classes will always exceed the total number of farms. Type of Farms: According to this classification, farms were divided into seven types of farming according to the predominant land use of the farm: a rubber farm for example would be a farm in which 75 percent of the cultivated land operated was under rubber. Hence a farm would be classified into one or another type class. The aggregate number of farms that reported each of the type classes would equal the total number of farms, 449,650.

<sup>4</sup>C. F. Sarle, "Memorandum on Census of Agriculture, Malaya, 1960" (Kuala Lumpur: Ministry of Agriculture and Cooperatives, August, 1962), p. 5. (Mimeographed.)

TABLE II  
NUMBER AND PERCENT OF TOTAL AREA OF SMALLHOLDER FARMS,  
BY TYPES OF FARMS AND BY STATES, MALAYA, 1960

| States                              | No. of<br>Farms | Type of Farm        |      |         |        | Total |
|-------------------------------------|-----------------|---------------------|------|---------|--------|-------|
|                                     |                 | Rubber              | Rice | Coconut | Others |       |
|                                     |                 | ----- Percent ----- |      |         |        |       |
| Johore                              | 56,128          | 66                  | 2    | 21      | 11     | 100   |
| Kedah                               | 83,534          | 31                  | 54   | 1       | 14     | 100   |
| Kelantan                            | 70,424          | 39                  | 37   | 3       | 21     | 100   |
| Malacca                             | 18,556          | 52                  | 24   | 6       | 18     | 100   |
| Negri Sembilan                      | 23,774          | 57                  | 21   | 1       | 21     | 100   |
| Pahang                              | 27,910          | 65                  | 18   | 3       | 14     | 100   |
| Penang and<br>Province<br>Wellesley | 19,686          | 32                  | 43   | 11      | 14     | 100   |
| Perak                               | 72,646          | 46                  | 27   | 10      | 17     | 100   |
| Perlis                              | 12,640          | 9                   | 75   | 0       | 16     | 100   |
| Selangor                            | 34,034          | 34                  | 26   | 27      | 13     | 100   |
| Trengganu                           | 30,318          | 36                  | 29   | 6       | 29     | 100   |
| Malaya                              | 449,650         | 44                  | 31   | 9       | 16     | 100   |

Source: Census of Agriculture, Malaya, 1960, Report No. 8, Table 520 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, February, 1962), p. 11.

(52 percent), and Perak (46 percent). Rice farms are predominant in the north and northeastern states of Kedah (54 percent), Penang and Province Wellesley (43 percent), Perlis (75 percent), Kelantan (37 percent), and Perak and Selangor, each with 27 percent and 26 percent, respectively.

A distinction should be made with respect to the number and average size of farms which are pure or specialized farms and farms which are nonspecialized. A specialized rubber farm means that these farms produced only rubber, as distinct from nonspecialized rubber farms which in addition to rubber also produced other crops. Consequently, income of a specialized rubber farm is strictly from the rubber production. On the nonspecialized rubber farms, income from rubber is not the only source of income from the holding. The same distinction holds for specialized and nonspecialized rice and coconut farms. Of the 175,000 pure rubber smallholders in 1960, 29 percent were less than five acres in size and 57 percent were less than 10 acres. About half of the rice farms were pure rice smallholdings.

Farm size. The average farm size of the specialized and nonspecialized farms is shown in Table III. Specialized farms were larger in size than nonspecialized farms. The average farm size for all farms was 4.7 acres. Rice farms averaged 2.5 acres for nonspecialized farms, 3.1 acres for specialized farms. Rubber specialized farms averaged 7.2 acres while nonspecialized rubber farms averaged 5.3 acres. For coconut, nonspecialized and specialized farms averaged 3.3 and 4.3 acres in size, respectively.

TABLE III  
AVERAGE ACREAGE OF SPECIALIZING AND NONSPECIALIZING FARMS  
FOR RUBBER, RICE AND COCONUT, MALAYA, 1960

| States                        | All<br>Cropland | Rubber          |                 | Rice            |                 | Coconuts        |                 |
|-------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                               |                 | NS <sup>a</sup> | SP <sup>b</sup> | NS <sup>a</sup> | SP <sup>b</sup> | NS <sup>a</sup> | SP <sup>b</sup> |
| ----- Acres per Farm -----    |                 |                 |                 |                 |                 |                 |                 |
| Johore                        | 6.2             | 6.3             | 6.9             | 1.7             | 1.5             | 4.7             | 5.3             |
| Kedah                         | 5.4             | 5.8             | 9.8             | 3.5             | 4.0             | 1.7             | 2.3             |
| Kelantan                      | 3.8             | 3.9             | 6.4             | 2.1             | 2.3             | 1.5             | 2.2             |
| Malacca                       | 3.7             | 4.5             | 7.1             | 1.5             | 2.1             | 1.8             | 2.8             |
| Negri Sembilan                | 4.1             | 4.6             | 7.1             | 1.2             | 1.1             | 2.1             | 2.4             |
| Pahang                        | 5.8             | 6.3             | 8.2             | 1.7             | 1.7             | 2.1             | 3.0             |
| Penang and Province Wellesley | 3.9             | 7.8             | 11.7            | 2.4             | 2.5             | 2.6             | 4.1             |
| Perak                         | 4.2             | 4.8             | 6.1             | 2.2             | 2.6             | 4.1             | 4.7             |
| Perlis                        | 4.5             | 3.4             | 7.5             | 3.7             | 4.1             | 2.7             | 0.0             |
| Selangor                      | 4.2             | 5.0             | 6.0             | 3.3             | 3.6             | 3.4             | 3.9             |
| Trengganu                     | 4.1             | 5.4             | 8.6             | 2.1             | 2.3             | 1.7             | 1.8             |
| Malaya                        | 4.7             | 5.3             | 7.2             | 2.5             | 3.1             | 3.3             | 4.3             |

<sup>a</sup> Nonspecialized farms,

<sup>b</sup> Specialized farms.

Source: Census of Agriculture, 1960, Report No. 8, Table 560  
(Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1962), p. 31.

Data from other studies on Malayan smallholders also gave evidences of farm size for the various crops. Ho<sup>5</sup> reported that in the studies on rubber smallholders in three areas, the average size rubber farms were: Terachi Valley 2.5 acres, West Johore 3.0 acres, and Coastal Selangor 3.9 acres.

Wilson<sup>6</sup> in his coconut study of West Johore in 1958 indicated that specialized coconut farms average size was 3.11 acres.

In the rice production studies by the Department of Agriculture in the 1965-66 season, the average size of farms in Tanjong Karang, Selangor was 4.5<sup>7</sup> acres while in Kedah, the "rice bowl" of Malaya, the average farm size was 4.6 acres per farm.<sup>8</sup>

In 1960, about 45 percent of the total smallholder farms were less than three and three-quarter acres in size, as shown in Table IV. Thirty-three percent of the total rubber farms, 55 percent of the rice farms and 47 percent of the coconut farms were less than three and three-quarter acres in size. Approximately 5 percent of the total smallholder

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<sup>5</sup>Robert Ho, "Labor Inputs of Rubber Producing Smallholders in Malaya," Malayan Economic Review, 12:84, April, 1967.

<sup>6</sup>T. B. Wilson, The West Johore Coconut Production Survey, Department of Agriculture, Bulletin No. 104 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, November, 1958), p. 11.

<sup>7</sup>Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report No. 1 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), p. 7.

<sup>8</sup>Farm Economic Survey of Muda River Project, 1966 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, Malaysia, 1967), p. 9.

TABLE IV  
DISTRIBUTION OF FARMS BY SIZE, RUBBER, RICE, AND  
COCONUT FARMS, MALAYA, 1960

| Size Groups<br>(Acres) | Total<br>Farms      | Rubber<br>Farms | Rice<br>Farms | Coconut<br>Farms | Other<br>Farms |
|------------------------|---------------------|-----------------|---------------|------------------|----------------|
|                        | ----- Percent ----- |                 |               |                  |                |
| Less than 3-3/4        | 45                  | 33              | 55            | 47               | 55             |
| 4 - 7-1/4              | 31                  | 35              | 29            | 27               | 26             |
| 7-1/2 - 14-3/4         | 19                  | 24              | 13            | 18               | 15             |
| 15 and over            | 5                   | 8               | 3             | 8                | 4              |
| Total                  | 100                 | 100             | 100           | 100              | 100            |

Source: Census of Agriculture, Malaya, 1960, Report No. 3,  
Table 106 (Kuala Lumpur: Ministry of Agriculture and Cooperatives,  
1961).

farms were larger than 15 acres. There were 8 percent, 3 percent, and 8 percent of the total rubber, rice and coconut farms, respectively, that were larger than 15 acres in size. Rubber farms were generally larger in size than rice and coconut farms.

Income characteristics. The per capita income for Malaya in 1965 was \$950<sup>9</sup> and \$782<sup>10</sup> for 1964. There is a wide gap between the income earned by urban and rural population. In 1960, Brown<sup>11</sup> made an annual cost calculation, and income for an average six acre smallholding in Batu Pahat, Johore; the estimated per capita income was about \$180 per month per household. The Household Budget Study of 1957-58 estimated a monthly household expenditure of \$160 per rural household. Aziz<sup>12</sup> reported in his study of five villages in Malacca in 1957 that the average household income was \$76 per month or an income of just over \$900 annually.

Smith and Goethals<sup>13</sup> estimated that the gross income of rice farmers in Kedah was \$561 for owner-operated farms and \$441 for tenant

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<sup>9</sup>First Malaysia Plan, 1966-70 (Kuala Lumpur: Government Printer, 1965), p. 4.

<sup>10</sup>Crosson, op. cit., p. 27.

<sup>11</sup>D. W. Brown, "A Reconnaissance Study of Farming Organization in a Coastal Area of West Johore" (Singapore: University of Malaya, 1960), p. 50. (Mimeographed.)

<sup>12</sup>Ungku A. Aziz, "Survey of Five Villages in Nyalas" (Singapore: University of Malaya, 1957), p. 69. (Mimeographed.)

<sup>13</sup>Eldon D. Smith and Peter R. Goethals, "Tenancy Among Padi Cultivators in Malaysia" (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1965), p. 23. (Mimeographed.)

farmers. Narkswasdi and Selvadurai<sup>14</sup> found that the average per farm income of rice smallholders in Tanjong Karang was \$1,478 in 1966.

Hence, there is a great deal of variation in incomes between farms raising different crops and in different parts of the country.

### III. CROP TYPES AND PRODUCTION

Agricultural production in Malaya grew at a rate of 4.8 percent per year between 1960 and 1965. This was 1.8 percent higher than the rate of population increase. The structure of the agricultural industry in Malaya remains heavily oriented toward rubber production. The fall in the unit price of rubber from \$1.07 per pound in 1960 to \$0.69 in 1965 reduced value added in rubber production from \$1,233 million to \$1,015 million.<sup>15</sup>

Rubber production. Malaya's economy is often described as a monocultural with export dominance--the export of rubber. Rubber production is virtually synonymous with rubber exports. The annual growth rate in production of rubber was 3.2 percent between 1960 and 1965 as indicated by Table V. Rubber accounted for a very significant share of the gross national product. However, in the past few years, as shown in Table VI, there has been a marked declining trend in rubber's contribution to gross national product. Exports of rubber accounted for 18 percent of GNP in 1964 while during the "rubber boom" year of the

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<sup>14</sup>Narkswasdi and Selvadurai, op. cit., p. 205.

<sup>15</sup>First Malaysia Plan, pp. 97-98.

TABLE V  
CROP PRODUCTION INDICES, MALAYA, 1960-1965  
1960 = 100

| Commodity | 1961 | 1962 | 1963 | 1964 | 1965 | Annual<br>Growth<br>Rate |
|-----------|------|------|------|------|------|--------------------------|
| Rubber    | 103  | 105  | 110  | 114  | 117  | 3.2%                     |
| Rice      | 108  | 103  | 111  | 99   | 112  | 2.3                      |
| Coconuts  | 94   | 84   | 81   | 76   | 71   | -7.0                     |

Source: First Malaysia Plan, 1966-70 (Kuala Lumpur: Government Printer, 1965), p. 98.

TABLE VI  
VALUE OF RUBBER EXPORTS AS PERCENT OF GROSS NATIONAL  
PRODUCT, MALAYA, 1955-1964

| Year | Value of<br>Exports<br>(Million) | Percent<br>of all<br>Exports | Percent<br>of<br>GNP <sup>a</sup> |
|------|----------------------------------|------------------------------|-----------------------------------|
| 1955 | \$513                            | 63                           | 33                                |
| 1956 | 441                              | 56                           | 28                                |
| 1957 | 420                              | 55                           | 26                                |
| 1958 | 378                              | 57                           | 24                                |
| 1959 | 548                              | 63                           | 32                                |
| 1960 | 570                              | 56                           | 30                                |
| 1961 | 450                              | 49                           | 23                                |
| 1962 | 429                              | 47                           | 21                                |
| 1963 | 438                              | 47                           | 20                                |
| 1964 | 421                              | 44                           | 18                                |

<sup>a</sup>GNP in 1964 was \$2,294 million.

Source: Pierre R. Crosson, Economic Growth in Malaysia  
National Planning Association (Published for USDA Economic Research  
Service, March, 1966), pp. 29-30.

Korean War (1955), it was 33 percent. The relative and absolute decline in the importance of rubber was wholly due to the fall in price per pound of rubber.

Rubber output increased from 706,000 tons in 1960 to 824,000 tons in 1965. The increased production was due to the newly tapped, matured high yielding rubber trees planted in the 1950's under the Rubber Replanting Program. The average yield per acre for both estates and smallholders was 545 pounds in 1960, increasing to 675 pounds in 1965.<sup>16</sup>

During the period 1960-1965, the smallholders new planting and replanting increased from 95,000 acres to 140,000--a substantial increase of about 68 percent.

Plantations accounted for over 50 percent of Malaya's rubber production. Yields per tapped acre averaged 780 pounds on plantations in 1963, considerably higher than the 500 pounds yield achieved by the smallholders. The difference in yield can be attributed to the greater use of high yielding trees and more efficient production practices on plantations.<sup>17</sup>

The importance of the rubber sector is reflected in the total employment in the industry. In 1962 rubber accounted for 60 percent of agricultural employment and 32 percent of total employment in Malaya.<sup>18</sup>

Rice production. Rice forms the staple food of the whole population but Malaya produces only about two-thirds of her rice

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<sup>16</sup>Ibid., p. 99.

<sup>17</sup>Crosson, op. cit., pp. 28-29.

<sup>18</sup>Ibid., p. 30.

requirements. The deficit has been supplemented by imports ranging from 330,000 to 400,000 tons per year. The dangers of depending on other countries for food became very apparent during the Second World War when imports were not possible. Consequently, the national policy since the war has been one of self-sufficiency in rice production if economically possible. In the light of the declining rubber prices, increased rice production could contribute to solving the balance of payment problems.

Two crops of rice are raised annually, the main season crop or the first crop and the off-season or the second crop. The second crop is produced only in areas where irrigation facilities are provided. In 1965 the total area of the second crop was 89,840 acres out of the total rice acreage of 852,940 acres.<sup>19</sup>

Rice production increased from 330,000 gantangs in 1960-61 to 360,000 gantangs in 1965-66, an increase of 9 percent. Increased acreage was responsible for the increased total output rather than the average yield per acre. In the same period the total acreage increased by 11 percent, but the average yield decreased by 4.7 percent, from 427 gantangs to 408 gantangs (Table VII).

In the 1965-66 crop year, there were 763,100 acres planted for the first crop and 89,840 acres for the second crop, as shown in Table VIII. For the first crop, the states of Kedah, Kelantan, and Perak made up 66 percent of the total. While in the second crop, Kedah,

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<sup>19</sup> Narkswasdi and Selvadurai, op. cit., Report No. 1, p. 34.

TABLE VII  
TOTAL AREA, PRODUCTION, AND AVERAGE YIELD PER ACRE  
OF RICE, MALAYA, 1957-1966

| Year    | Area    | Production | Average<br>Yield |
|---------|---------|------------|------------------|
|         | (Acres) | (Gantangs) | (Gantangs)       |
| 1957-58 | 760,130 | 265,776    | 362              |
| 1958-59 | 773,490 | 237,161    | 331              |
| 1959-60 | 788,720 | 303,518    | 399              |
| 1960-61 | 802,640 | 332,177    | 427              |
| 1961-62 | 816,650 | 313,545    | 399              |
| 1962-63 | 838,570 | 340,293    | 420              |
| 1963-64 | 835,620 | 293,567    | 373              |
| 1964-65 | 864,770 | 351,179    | 417              |
| 1965-66 | 898,080 | 359,787    | 408              |

Source: Statistical Digest (Kuala Lumpur: Ministry of Agriculture and Cooperatives, February, 1967), p. 11.

TABLE VIII  
ACREAGE OF RICE (FIRST CROP AND SECOND CROP), MALAYA,  
BY STATES FOR 1965-66 SEASON

| States                              | First<br>Crop<br>Area | Percent<br>of<br>Total | Second<br>Crop<br>Area | Percent<br>of<br>Total |
|-------------------------------------|-----------------------|------------------------|------------------------|------------------------|
|                                     | (Acres)               |                        | (Acres)                |                        |
| Johore                              | 8,500                 | 1.1                    | 1,130                  | 1.3                    |
| Kedah                               | 278,800               | 36.5                   | 8,390                  | 9.3                    |
| Kelantan                            | 116,800               | 15.3                   | 9,460                  | 10.5                   |
| Malacca                             | 20,900                | 2.7                    | 900                    | 1.0                    |
| Negri<br>Sembilan                   | 24,900                | 3.3                    | 1,100                  | 1.2                    |
| Pahang                              | 32,800                | 4.3                    | 80                     | 0.1                    |
| Penang and<br>Province<br>Wellesley | 36,100                | 4.7                    | 30,410                 | 33.9                   |
| Perak                               | 106,000               | 13.9                   | 2,500                  | 2.8                    |
| Perlis                              | 47,100                | 6.2                    | 1,420                  | 1.6                    |
| Selangor                            | 47,300                | 6.2                    | 32,540                 | 36.2                   |
| Trengganu                           | 43,900                | 5.8                    | 1,910                  | 2.1                    |
| Malaya                              | 763,100               | 100                    | 89,840                 | 100                    |

Source: Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report No. 1 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), p. 34.

Kelantan, Penang, and Province Wellesley and Selangor made up 90 percent of the total.

Coconut production. Statistics on the coconut production in Malaya are at best very rough estimates. The average production between 1957 to 1961 was estimated at 161,000 tons, of which estates produced some 34,000 tons, leaving 127,000 tons produced by smallholders.<sup>20</sup>

Yields have been low due to the major portion of the palms being well past their prime age of production. Consequently, production dropped from 141,000 tons in 1960 to 107,000 tons in 1965--an average decrease of 7 percent annually in the production as shown in Table V, page 22. Smallholders average yield varied between four to four and one-half pikuls per acre. Intercropping with fruit trees is common in coconut. This could provide extra income for the coconut farmers.

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<sup>20</sup> First Malaysia Plan, 1966-1970, p. 107.

### CHAPTER III

#### EFFICIENCY OF DIFFERENT SIZE FARMS IN PRODUCTION AND INCOME PER FARM

##### I. INTRODUCTION

In order to show the efficiency levels between farms of different size classes, a comparison was made of yields per acre and income for each farm size class. The production levels per acre corresponding to each size class of farms was assumed to be one criteria for measuring the efficiency between farms of different size class. The income estimates, which are based on both yield and farm size characteristics, are indicative of the adequacy of income levels to provide acceptable living levels. The relative efficiency between rubber, rice, and coconut farms was compared in terms of income.

Rubber farms were divided into eight size classes ranging from less than one acre to approximately 15 acres. Similarly, rice farms were divided into seven size classes, ranging from below one acre on class I to about 10 acres on class VII. Coconut farms were also divided into eight size classes.

Gross returns per farm for corresponding size groups from rubber, rice, and coconut holdings were estimated at three levels of

returns--low, medium, and high.<sup>1</sup> The same average yield per acre and price was used for computing the various levels of gross returns on each size class. The prices used were 70 cents per pound of rubber, 64 cents per gantang of rice, and \$30 per pikul of coconut.

## II. RELATIONSHIP BETWEEN FARM SIZE AND PRODUCTION

Farm size and production on rubber farms. In Malaya, the average size of farms specializing in rubber was 7.2 acres, and 5.2 acres for nonspecialized farms; thus size class VI may be considered representative of the average rubber farms. Farms in this size group constitute 24 percent of all rubber farms and had an average yield of 421 pounds (Table IX). In Malaya, yields were lowest on class VII farms, with an average yield of 406 pounds per acre. The yield from farms of size class VIII averaged 423 pounds. Yields decreased from 702 pounds on size class 1 to 421 pounds on size class VI.

In Johore, the highest yield for rubber farms was on class I farms (494 pounds). The lowest yield of 348 pounds per acre was on class VIII farms, the largest size class. Hence, yields decreased with increase in farm size except for size class II which had a lower average yield than size class III.

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<sup>1</sup>The census data reported a range of acreage per farm on each size class, for example on size class III (2 - 2-3/4 acres). A low gross return was estimated from the lowest end of the size class interval, a medium return from the midpoint of the interval. The highest return was estimated from the maximum end of the interval.

TABLE IX  
PRODUCTION OF RUBBER PER ACRE BY SIZE OF FARMS,  
MALAYA, 1960

| Class | Size of Farm <sup>a</sup><br>(acres) | Negri  |        |          |          |       |       |
|-------|--------------------------------------|--------|--------|----------|----------|-------|-------|
|       |                                      | Malaya | Johore | Sembilan | Selangor | Kedah | Perak |
|       |                                      | pounds |        |          |          |       |       |
| I     | Below 1                              | 702    | 494    | 744      | 670      | 571   | 754   |
| II    | 1 - 1-3/4                            | 510    | 437    | 512      | 443      | 499   | 491   |
| III   | 2 - 2-3/4                            | 470    | 446    | 459      | 417      | 519   | 447   |
| IV    | 3 - 3-3/4                            | 454    | 421    | 432      | 398      | 516   | 446   |
| V     | 4 - 4-3/4                            | 428    | 388    | 462      | 325      | 455   | 410   |
| VI    | 5 - 7-1/4                            | 421    | 378    | 421      | 398      | 474   | 388   |
| VII   | 7-1/2 - 9-3/4                        | 406    | 359    | 367      | 351      | 521   | 402   |
| VIII  | 10 - 14-3/4                          | 423    | 348    | 378      | 344      | 469   | 463   |

<sup>a</sup>Farm sizes of 15 acres and larger were omitted from the analysis since they are so few in number.

Source: Census of Agriculture, Malaya, 1960, Report No. 6A, Tables 858, 859, 860, 863, 866, and 868 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1962), pp. 83-85, 88, 91, 93.

There is thus a marked tendency for rubber production per acre on smallholder farms to have an inverse relationship with farm size; as farm size becomes larger, yields per acre decreases. A similar pattern of farm size and production per acre exists in the states of Negri Sembilan, Selangor, Kedah, and Perak.

Among the five states, the highest average yield of 754 pounds was on size class I farms in Perak. The yield of 325 pounds per acre on size class V farms in Selangor was the lowest average yield for any size class.

The Malayan Census of Agriculture, 1960, reported that 68 percent of all rubber farms fell within size classes I through VI. One may suspect that the higher yields on smaller farms may be attributed to more intensive use of family labor available; in terms of labor utilization it is likely that these farms are using labor inefficiently. A recent study of rubber smallholders in Malaya, indicated that the smaller farms produce higher yields, but on larger farms tapping rate increased from 56 trees on small farms to 108 trees on the larger farms. Large farms depend on hired labor for tapping and have a tendency to minimize tapping costs.<sup>2</sup> Similarly, Penny and Zulkifli<sup>3</sup> in comparing the efficiency of rubber plantations and smallholders in Indonesia conclude

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<sup>2</sup>Kenneth L. Bachman and Raymond P. Christensen, "The Economics of Farm Size," in Herman Southworth and Bruce F. Johnson, Agricultural Development and Economic Growth (Ithaca, New York: Cornell University Press, 1967), p. 247.

<sup>3</sup>D. H. Penny and M. Zulkifli, "Estates and Smallholdings: An Economic Comparison," Journal of Farm Economics, 45:121, December, 1963.

that plantations tend to minimize tapping costs and consequently the value added per man tends to be higher on estates.

Farm size and production on rice farms. Production per acre on each size class for Malaya and selected rice growing states is shown in Table X. The average farm size for smallholders specializing in rice was 3.5 acres, and 2.5 acres for nonspecialized rice farms. Thus the average size rice farms fell within size groups III and IV which made up 24 percent of all rice farms. In Malaya the average yield was 271 gantangs for size group III and 277 gantangs per acre for size class IV. On size classes I and II yields were 318 and 275 gantangs, respectively. Yield on size class I was the highest, and the lowest yield on size class VII was 292 gantangs per acre.

In Kedah, the highest yield of 372 gantangs was on size class IV, and the lowest yield of 331 gantangs was on size class II farms. However, the yield of 384 gantangs on size class VII farms in Penang was the highest average yield for any size class as compared to the lowest average yield of only 183 gantangs on size class VII farms in Kelantan. In Kelantan, the inverse relationship between farm size and production per acre was evident. Yield was highest on size class I farms, and decreased with increasing farm size to the lowest yield of 183 gantangs on size class VII.

In Malaya, rice farms below one acre in size had the highest average yield per acre. In the states of Perlis, Perak and Kelantan, yields on size class I farms were the highest for all rice farms in the respective states.

TABLE X  
PRODUCTION OF RICE PER ACRE BY SIZE OF FARMS,  
MALAYA, 1960

| Class | Size of Farm <sup>a</sup><br>(acres) | Malaya                        | Kedah | Perlis | Penang &<br>Province<br>Wellesley | Perak | Kelantan |
|-------|--------------------------------------|-------------------------------|-------|--------|-----------------------------------|-------|----------|
|       |                                      | ----- gantangs per acre ----- |       |        |                                   |       |          |
| I     | Below 1                              | 318                           | 346   | 337    | 347                               | 289   | 311      |
| II    | 1 - 1-3/4                            | 275                           | 331   | 309    | 356                               | 252   | 253      |
| III   | 2 - 2-3/4                            | 271                           | 338   | 302    | 357                               | 260   | 222      |
| IV    | 3 - 3-3/4                            | 277                           | 372   | 337    | 301                               | 240   | 224      |
| V     | 4 - 4-3/4                            | 282                           | 369   | 310    | 361                               | 230   | 214      |
| VI    | 5 - 7-1/4                            | 295                           | 346   | 316    | 355                               | 235   | 194      |
| VII   | 7-1/2 - 9-3/4                        | 292                           | 367   | 313    | 384                               | 254   | 183      |

<sup>a</sup>Farm sizes of 10 acres and larger were omitted from the analysis since they are so few in number.

Source: Census of Agriculture, Malaya, 1960, Report No. 9, Tables 596, 598-599, 603-605 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1962), pp. 13, 15-16, 20-22.

Evidence from Narkswasdi and Selvadurais'<sup>4</sup> study on rice farms in Malacca may explain the high yield on farms less than one acre. In order to measure the interfarm efficiency, the concept of output per man-equivalent was used as a measure of labor efficiency. One man-equivalent refers to a man working eight hours a day and 0.5 man-equivalent if one works only four hours per day. The number of gantangs (yields) produced per man-equivalent was used. The total labor hours per farm were converted into man-equivalent. Thus the more output per man-equivalent, the higher would be the efficiency of labor and vice versa. However, this measure of output per man-equivalent reflects not only labor efficiency, but also yields and size of padi acreage.

Narkswasdi and Selvadurai<sup>5</sup> indicated that increases in yields were consistently reflected in higher income from rice (Table XI). This was not true for farms in the last group, 601 and above, although the yield was as high as 653 gantangs, the average labor income was only \$25 per farm. This was due to the small size of the farms (0.8 acres) and the low level of labor efficiency, 2,719 gantangs of rice per man-equivalent. The smaller farms had higher yields per acre than larger farms because family labor was used more intensively. The total man-hours of labor per acre were highest on small farms. Therefore,

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<sup>4</sup>Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report No. 2 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), pp. 207-208.

<sup>5</sup>Ibid., pp. 210-212.

TABLE XI  
AVERAGE FARM SIZE AND LABOR EFFICIENCY FOR DIFFERENT RATE  
OF PRODUCTION LEVELS, RICE FARM IN MALACCA, 1965-66

| Production<br>Level<br>Per Acre | Average<br>Yield<br>Per Acre | Average<br>Labor<br>Income<br>Per Farm | Average<br>Farm<br>Size | Labor<br>Efficiency<br>Per Man-<br>Equivalent |
|---------------------------------|------------------------------|----------------------------------------|-------------------------|-----------------------------------------------|
| (gantangs)                      | (gantangs)                   | (dollars)                              | (acres)                 | (gantangs)                                    |
| 1-100                           | 89                           | \$-274                                 | 3.5                     | 762                                           |
| 101-200                         | 147                          | -235                                   | 4.0                     | 1,511                                         |
| 201-300                         | 260                          | -72                                    | 2.8                     | 2,204                                         |
| 301-400                         | 342                          | 112                                    | 3.8                     | 3,184                                         |
| 401-500                         | 439                          | 207                                    | 3.4                     | 3,269                                         |
| 501-600                         | 541                          | 339                                    | 3.0                     | 4,354                                         |
| 601 and over                    | 653                          | 25                                     | 0.8                     | 2,719                                         |
| AVERAGE                         | 328                          | 53                                     | 3.4                     | 2,776                                         |

Source: Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report No. 2, Table 88 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), p. 211.

production on small farms may be very high but the costs of imputed labor used was also high. Hence labor efficiency would be low.

Labor efficiency increased as yield increased except for the production level of 601 gantangs and above. However, there was little variation in farm size for the different yield groups. Thus it showed that labor efficiency rather than farm size had a greater effect on yields per acre. Again this was not true for the last group of farms.

Farm size and production on coconut farms. Coconut production per acre on size classes I through VIII are shown in Table XII. Yields were highest on the average, on the smallest farms but did not vary in any consistent manner among the size groups. The average yield was 3.8 pikuls on size class I, and 3.4 pikuls on size class VIII.

### III. RELATIONSHIP BETWEEN FARM SIZE AND GROSS INCOME PER FARM

The relationship between farm size and gross income would be indicative of the adequacy of incomes earned per farm. The variations in incomes within and between crop enterprises, as a result of differences in farm sizes would indicate the relative efficiency levels between farms. The estimated gross returns on each size class and for each crop enterprise are shown in Table XIII.

Rubber farms. On the average size smallholder rubber farms (represented by size class VI farms) which made up 24 percent of the

TABLE XII  
 PRODUCTION OF COCONUT PER ACRE BY SIZE OF FARM,  
 MALAYA, 1960

| Class | Size of Farms <sup>a</sup> | Production<br>Per Acre |
|-------|----------------------------|------------------------|
|       | (acres)                    | (pikuls)               |
| I     | Below 1                    | 3.8                    |
| II    | 1 - 1-3/4                  | 2.7                    |
| III   | 2 - 2-3/4                  | 2.7                    |
| IV    | 3 - 3-3/4                  | 2.9                    |
| V     | 4 - 4-3/4                  | 2.7                    |
| VI    | 5 - 7-1/4                  | 2.7                    |
| VII   | 7-1/2 - 9-3/4              | 3.1                    |
| VIII  | 10 - 14-3/4                | 3.4                    |

<sup>a</sup>Farm sizes 15 acres and larger were omitted since they are so few in number.

Source: Census of Agriculture, Malaya, 1960, Report No. 7, Tables 464, 494 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1962), pp. 9, 30.

TABLE XIII

GROSS RETURNS FROM RUBBER, RICE, AND COCONUT PER FARM FOR EACH SIZE CLASS,  
MALAYA, 1960

| Class <sup>a</sup> | Rubber <sup>b</sup> |        |       | Rice <sup>c</sup> |        |       | Coconut <sup>d</sup> |        |       |
|--------------------|---------------------|--------|-------|-------------------|--------|-------|----------------------|--------|-------|
|                    | Low                 | Medium | High  | Low               | Medium | High  | Low                  | Medium | High  |
| I                  | --                  | 491    | --    | --                | 203    | --    | --                   | 114    | --    |
| II                 | 357                 | 489    | 625   | 176               | 241    | 308   | 81                   | 111    | 142   |
| III                | 658                 | 780    | 905   | 347               | 411    | 477   | 162                  | 192    | 223   |
| IV                 | 953                 | 1,071  | 1,190 | 532               | 597    | 665   | 261                  | 293    | 326   |
| V                  | 1,198               | 1,309  | 1,423 | 722               | 789    | 857   | 324                  | 354    | 385   |
| VI                 | 1,473               | 1,803  | 2,136 | 944               | 1,155  | 1,369 | 405                  | 496    | 587   |
| VII                | 2,131               | 2,455  | 2,771 | 1,402             | 1,611  | 1,822 | 697                  | 802    | 907   |
| VIII               | 2,961               | 3,663  | 4,367 | --                | --     | --    | 1,020                | 1,262  | 1,504 |

<sup>a</sup>From Tables IX, X, and XII, pages 31, 34, and 38.

<sup>b</sup>Production for Malaya in Table IX above. Price of 70 cents per pound.

<sup>c</sup>Production for Malaya in Table X above. Price of 64 cents per pound.

<sup>d</sup>Production for Malaya in Table XII above. Price of \$30 per pikul.

total rubber farms, gross returns ranged from a low of \$1,473 to a high gross return of \$2,136. The return from the smallest farms, size class I, was less than \$500. However, size class I farms accounted for only 1 percent of the total rubber farms. Approximately 52 percent of the rubber farms (size classes VI to VIII) had an estimated gross return of about \$1,500 and above per farm. Gross returns were between \$3,000 to \$4,000 per farm on size class VIII.

Rice farms. Fifty-five percent of the rice farms were less than 3.75 acres in size (size classes I to IV). On the average, gross incomes from these farms were less than \$700. Size classes V, VI, and VII which together accounted for 45 percent of the total rice farms, had an estimated gross income that ranged from \$722 to \$1,822 per farm.

Gross returns on the largest rice farms, size class VII, were less than \$2,000. Class VII farms made up 7 percent of the total rice farms. The gross return on the smallest rice farms, size class I, which made up 6 percent of the total rice farms, averaged \$203 per farm.

Coconut farms. Coconut gave the lowest gross return per farm. The smallest coconut farms, size class I, which had the highest yield per acre, had the lowest gross return per farm. In fact, the gross return of \$114 on coconut farms of less than one acre was approximately one-half, and one-fifth that of rice and rubber farms of less than one acre. Size class I farms accounted for 7 percent of the total coconut farms in Malaya. Fifty-seven percent of all coconut farms were in size classes I through V, and had an estimated gross incomes of less than

\$385 per farm. Gross incomes on size classes VI, VII, VIII, which together made up 33 percent of the total coconut farms, ranged from \$405 to \$1,500 per farm.



## CHAPTER IV

### OPTIMUM FARM SIZE FOR SPECIFIED LABOR SUPPLY AND INCOME LEVELS

#### I. INTRODUCTION

Much of the literature on agricultural development assumes an abundance of labor in agriculture, the marginal product of which is zero or close to zero. This labor can be withdrawn from agriculture without any significant decline in agricultural production.<sup>1</sup> Crosson<sup>2</sup> reported that in 1962 Malaya had an overall unemployment rate of 6 percent. In 1962, 54.7 percent of the employed labor force was in agriculture. In fact in its broader sense, agriculture is the source of income for the majority of the rural population. With the expected rate of population growth in excess of 3 percent per year during the next decade, the economy will have a rapidly increasing labor force.<sup>3</sup> Population growth rate in

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<sup>1</sup>W. A. Lewis, "Economic Development with Unlimited Supplies of Labor," in A. N. Agarwala and S. P. Singh, The Economics of Underdevelopment (New York: Oxford University Press, 1963), pp. 402-03.

<sup>2</sup>Pierre R. Crosson, Economic Growth in Malaysia, National Planning Association (Published for USDA, Economic Research Service, March, 1966), pp. 39-41.

<sup>3</sup>Don Paarlberg, Policies and Measures Leading Toward Greater Diversification of the Agricultural Economy of the Federation of Malaya (Kuala Lumpur: Government Printer, February, 1963), p. 5.

1965 was 3 percent and at this rate population is expected to double in 25 years.<sup>4</sup>

In view of the anticipated population increase, an adequate farm size should be provided to the smallholders to enhance increased output in order to support the rapid population growth. Mellor<sup>5</sup> recognized this fact:

It is important to know the extent to which agricultural production could be increased within a static technological framework through the greater use of labor. Contrary to the assumptions of much development theory, there is considerable evidence that increased labor input within the traditional framework of production can increase output significantly in most low-income countries. If this is the case, economists need to turn increasing attention to the factors which influence the availability of labor in agriculture and the means by which existing labor may be mobilized.

The data presented below were used to derive the farm size for rubber, rice, and coconut farms to give a specified income level for varying family labor supplies.

## II. DATA AND PROCEDURE

The solutions sought were farm sizes and labor supply per farm for rubber, rice, and coconut at specified yield levels to achieve a target net income of \$3,000. The labor requirements and costs of production for specified yield levels per acre for each crop enterprise were estimated. These assumptions are presented below. Another solution

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<sup>4</sup>First Malaysia Plan, 1966-70 (Kuala Lumpur: Government Printer, 1965), p. 5.

<sup>5</sup>John W. Mellor, The Economics of Agriculture Development (Ithaca, New York: Cornell University Press, 1966), p. 157.

in the study was to estimate the farm sizes and incomes that would fully utilize the family labor assumed available per farm. The family labor supplies were varied at two levels for each crop enterprise. The effect of yield on farm size necessary to reach specified income goals or to fully utilize a fixed labor supply were estimated by using two yield levels for each of the three crops.

Labor assumptions. In Malayan agriculture, labor is the most important item of cost in the production of rubber, rice, and coconut. In this study, it was assumed that an annual labor supply of 303 days per man was available. This would exclude one day of rest every week (Sunday or Friday, whichever the case may be), plus ten days for national and religious holidays. Each farm worker was assumed to be available eight hours per working day. This norm, widely accepted in Malaya for computational purposes, comprised five to six hours input before noon, and the remainder in the evening before dusk. Each man would be available for 2,424 hours per year for farm work.

Annual labor requirements per acre of rubber. The labor requirements for an acre of rubber were estimated to be approximately 514 man-hours per year<sup>6</sup> (Table XIV). About 2.38 man-hours were required to operate an acre of rubber per day. This would include tapping approximately 180 trees, collecting the latex and processing the latex into

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<sup>6</sup>Robert Ho, "Labor Inputs of Rubber Producing Smallholders in Malaya," Malayan Economic Review, 12:80, April, 1967.

TABLE XIV  
ESTIMATED LABOR REQUIREMENTS FOR AN ACRE OF RUBBER  
PER DAY AND PER YEAR IN MAN-HOURS,  
MALAYA, 1968

| Item       | Man-Hours |                                 |
|------------|-----------|---------------------------------|
|            | Per Day   | Per Year of 216<br>Tapping Days |
| Tapping    | 1.48      | 319.68                          |
| Collecting | .42       | 90.72                           |
| Transport  | .03       | 6.48                            |
| Processing | .45       | 97.20                           |
| Total      | 2.38      | 514.08                          |

Source: Robert Ho, "Labor Inputs of Rubber Producing Small-holders in Malaya," Malayan Economic Review, 12:83, April, 1967.

rubber sheets. It was assumed that the trees could be tapped 216 days in a year.<sup>7</sup>

Labor requirements per acre of rice. About 400 man-hours would be required to produce an acre of rice.<sup>8</sup> Of this total, 92 man-hours would be required for ploughing the field, 72 man-hours for transplanting and 104 man-hours for harvesting as shown in Table XV. The repairs of bunds and irrigation ditches, preparation of the nursery beds, weeding, application of fertilizer and pest control made up the remaining 132 man-hours required to produce an acre of rice.

Labor requirements for an acre of coconut. On the average, 157.5 man-hours would be required to operate an acre of coconut.<sup>9</sup> The first part of the production process would involve the harvesting of ripe bunches from the coconut palms and husking and splitting the fruits. These two operations required 49.5 man-hours (Table XVI). The process of curing, packing and shipping made up the balance of 108 man-hours.

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<sup>7</sup>The system of tapping assumed here is the alternate daily tapping. Normally a rubber smallholder divides his holding into blocks. For example, a two acre farm would be divided into two blocks of one acre per block. The farmer would tap the trees in the first block on the first day and the second block on the following day. He would return to the first block again on the third day of tapping.

<sup>8</sup>Udhis Narkswasdi and S. Selvadurai, Economic Survey of Pudi Production in West Malaysia, Report No. 1 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), pp. 150-151.

<sup>9</sup>Personal communication with farm management officer, Malaysia.

TABLE XV  
ESTIMATED LABOR REQUIREMENTS FOR AN ACRE OF RICE,  
MALAYA, 1968

| Item                              | Man-Hours          |
|-----------------------------------|--------------------|
| Repairs of bunds and drains       | 20.0               |
| Preparation of nursery and sowing | 52.0               |
| Ploughing the field               | 92.0               |
| Transplanting                     | 72.0               |
| Weeding                           | 44.0               |
| Fertilizer application            | 8.0                |
| Pest control                      | 8.0                |
| Harvesting, cleaning and storing  | 104.0              |
| Total                             | 400.0 <sup>a</sup> |

<sup>a</sup>For the purpose of this study the total man-hours differed from that reported by Narkswasdi and Selvadurai. The reason for this is that in this study it was assumed that land cultivation would be done by bullock labor. In the Narkswasdi and Selvadurai study part of the land was cultivated by machine.

Source: Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report No. 1 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), pp. 150-151.

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TABLE XVI  
ESTIMATED LABOR REQUIREMENTS FOR AN ACRE OF COCONUT,  
MALAYA, 1968

| Item                 | Man-Hours Per Acre |
|----------------------|--------------------|
| Harvesting           |                    |
| Husking              | 49.5               |
| Splitting the fruits |                    |
| Curing               |                    |
| Packing              | 108.0              |
| Shipping             |                    |
| Total                | 157.5              |

Source: Personal communication with farm management officer,  
Malaysia.

Cost of production per acre of rubber. The cost of production data as shown in Table XVII were adapted from previous studies.<sup>10</sup> Acids and depreciation on equipments accounted for \$31.00. Land taxes and establishment costs amounted to \$32.66. Hence, the total costs of production per acre of rubber would be \$63.66.

Cost of production per acre of rice. The data on production cost per acre of rice were taken from the rice production study in Malaya.<sup>11</sup> The total costs of production was estimated at \$48.20 as shown in Table XVIII. Fertilizers, seeds, and land taxes accounted for \$35.50 per acre. Depreciation on buildings and tools, and cost of pesticides were estimated at \$12.70.

Cost of production per acre of coconut. The cost was estimated to be \$25.30 per acre of coconut (Table XIX). Land taxes, and depreciation on farm buildings and tools amounted to \$13.30. The establishment cost was estimated at \$12.00 per acre.

Yields, target incomes, and labor supply. Two yield levels for each crop were used. They were established from analysis of Census data and previous studies. In rubber, the yields of 420 pounds and 500 pounds were used. The yield levels were 420 gantangs and 500

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<sup>10</sup>A. H. Tan, "The Incidence of Export Taxes on Small Producers," Malayan Economic Review, 12:95, April, 1967.

<sup>11</sup>Narkswasdi and Selvadurai, op. cit., Report No. 1, pp. 150-151, 200-201.

TABLE XVII  
ESTIMATED COSTS OF PRODUCTION PER ACRE OF RUBBER,  
MALAYA, 1968

| Item                                                      | Cost Per Acre |
|-----------------------------------------------------------|---------------|
|                                                           | (dollars)     |
| Costs of acids, and depreciation on equipment             | 31.00         |
| Land taxes                                                | 6.00          |
| Establishment cost depreciated over 30 years <sup>a</sup> | 26.66         |
| Total                                                     | 63.66         |

<sup>a</sup>The cost to establish an acre of rubber farm is about \$800.00. The economic life of a rubber plant is 30 years. Normally the holding would be replanted after every 30 years.

Source: A. H. Tan, "Incidence of Export Taxes on Small Producers," Malayan Economic Review, 12:95, April, 1967.

TABLE XVIII  
ESTIMATED COSTS OF PRODUCTION PER ACRE OF RICE,  
MALAYA, 1968

| Item                                | Cost Per Acre |
|-------------------------------------|---------------|
|                                     | (dollars)     |
| Fertilizer--300 pounds              | 30.00         |
| Seeds                               | 2.20          |
| Land taxes                          | 3.30          |
| Depreciation on buildings and tools | 10.20         |
| Pesticides                          | 2.50          |
| Total                               | 48.20         |

Source: Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report No. 1 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), pp. 150-151, 200-201.

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TABLE XIX  
ESTIMATED COSTS OF PRODUCTION PER ACRE OF COCONUT,  
MALAYA, 1968

| Item                                                      | Cost Per Acre |
|-----------------------------------------------------------|---------------|
|                                                           | (dollars)     |
| Land taxes                                                | 3.30          |
| Depreciation on farm buildings and tools                  | 10.00         |
| Establishment cost depreciated over 50 years <sup>a</sup> | 12.00         |
| Total                                                     | 25.30         |

<sup>a</sup> Establishment cost was assumed to be \$600 per acre.

Source: Personal communication with farm management officer, Malaysia.

gantangs for rice. The yield level of 5 pikuls and 8 pikuls selected for coconut were somewhat higher than reported by the Malayan Census of Agriculture, 1960. Coconut yields ranged from 2.7 pikuls to 3.8 pikuls per acre per year.<sup>12</sup> Wilson<sup>13</sup> in his coconut production study of the West Johore smallholders reported that the average yield was 4 pikuls per acre. On about a third of the area surveyed, production was less than 2 pikuls. Low yields were the result of very low palm densities per acre. Palm density was 35 palms per acre and out of these 20 percent were badly diseased. One-third of the surveyed area contained either less than ten healthy palms per acre or none at all. This area accounted for about 4 percent of the total population of healthy palms. Wilson estimated the loss of income for the total area to be \$13 million annually. The West Johore coconut area is one of the major coconut growing areas in the country.

The coconut situations in the other states are very similar. The existing coconut holdings are already well past their prime age of production. Most of the holdings were planted in the first two decades of the Twentieth Century. The yield levels of coconut assumed here, though considerably higher than average yields reported by the census, were considered to be attainable using good management practices.

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<sup>12</sup>Census of Agriculture, Malaya, 1960, Report No. 7, Tables 464, 494.

<sup>13</sup>T. B. Wilson, The West Johore Coconut Production Survey, Bulletin No. 104 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, November, 1958), pp. 40-41.

The target income goal for this study was net income of \$3,000. The net income concept used here would include the returns to family labor. The unit prices used were 70 cents per pound for rubber, 64 cents per gantang of rice and \$30 per pikul of copra (coconut).

Resident labor supply per farm were specified at two levels for each crop enterprise. The labor supply for rubber farms was assumed to be 1.5 men and 3.5 men per farm. On rice farms, the labor supply was assumed to be 1.5 men and 3.0 men. The available labor supply on coconut farms was assumed at 1.5 men and 2.5 men per farm.

### III. EFFECTS OF VARIATIONS IN YIELDS, LABOR SUPPLY AND INCOMES ON FARM SIZE

#### Rubber Farms

\$3,000 net income level. To provide a net return of \$3,000 per farm, 13 acres of land would be required. The labor supply required to attain this income goal when production was fixed at 420 pounds of rubber per acre was 2.8 men. To achieve the same net income level when production was fixed at 500 pounds per acre, a farm size of 10.5 acres and a labor supply of 2.2 men would be required (Table XX). Net income per man equivalent of labor would be \$1,071 at 420 pounds yield level, and \$1,363 at the 500 pounds yield level.

Labor supply of 1.5 men. The assumed family labor supplies of 1.5 men and 3.5 men per farm was adapted from current studies on smallholder farms in Malaya. The Malayan Census of Agriculture, 1960,

TABLE XX  
RELATIONSHIP BETWEEN LABOR SUPPLY, FARM SIZE, YIELD  
AND RETURNS, RUBBER FARMS

| Number<br>of<br>Men                               | Yield<br>Per<br>Acre | Farm<br>Size | Gross<br>Return<br>Per Acre | Gross<br>Return<br>Per Farm | Net<br>Return<br>Per Acre | Net<br>Return<br>Per Farm |
|---------------------------------------------------|----------------------|--------------|-----------------------------|-----------------------------|---------------------------|---------------------------|
| <u>Assumed<br/>labor<br/>supply</u> <sup>a</sup>  | (pounds)             | (acres)      | ----- dollars -----         |                             |                           |                           |
| 1.5                                               | 420                  | 7.1          | 294 <sup>c</sup>            | 2,087                       | 230.34 <sup>a</sup>       | 1,635.41                  |
| 3.5                                               | 420                  | 16.5         | 294                         | 4,851                       | 230.34 <sup>f</sup>       | 3,800.61                  |
| 1.5                                               | 500                  | 7.1          | 350 <sup>d</sup>            | 2,485                       | 286.34 <sup>f</sup>       | 2,033.01                  |
| 3.5                                               | 500                  | 16.5         | 350                         | 5,775                       | 286.34                    | 4,724.61                  |
| <u>Computed<br/>labor<br/>supply</u> <sup>b</sup> |                      |              |                             |                             |                           |                           |
| 2.8                                               | 420                  | 13.0         |                             |                             | 230.34                    | 3,000.00                  |
| 2.2                                               | 500                  | 10.5         |                             |                             | 286.34                    | 3,000.00                  |

<sup>a</sup> Assumed labor supply of 1.5 and 3.5 men per farm.

<sup>b</sup> Computed labor supply to give specified net income of \$3,000.

<sup>c</sup> Production assumed at 420 pounds per acre and price of 70 cents per pound.

<sup>d</sup> Production assumed at 500 pounds per acre and price of 70 cents per pound.

<sup>e</sup> Returns to land, family labor, and management; production level assumed at 420 pounds per acre and price of 70 cents per pound.

<sup>f</sup> Returns to land, family labor, and management; production level assumed at 500 pounds per acre and price of 70 cents per pound.

reported that on the average, 1.5 men labor supply was actually available per farm. In this study, a 1.5 men labor supply situation was chosen for rubber, rice, and coconut. However, other recent studies in Malaya also reported other levels of labor supply per farm. Consequently, 3.5 men labor supply on rubber farms was also assumed.

The objective of the analysis presented below would be to estimate the farm size that would fully utilize the assumed levels of labor supplies. It was assumed that the farms sizes derived would differ with varying labor supplies.

Since, it was assumed an individual would be working eight hours per day and that 303 working days would be available per man, per year, a 1.5 men labor supply would mean a total 3,636 man-hours per year. On rubber farms, it was estimated that the labor required was 514 man-hours per acre, per year. Labor requirements on rubber farms were assumed to be distributed evenly throughout the year. Therefore, approximately seven acres of rubber land would be the maximum farm size required to fully utilize the assumed annual labor supply of 1.5 men per farm (Table XX).

From this seven acre farm, gross return of \$2,087 and net return of \$1,635 would be realized when production was assumed to be 420 pounds per acre. However, at the production level of 500 pounds per acre, a seven acre farm would provide \$2,485 and \$2,033 gross and net incomes, respectively.

Labor supply of 3.5 men. Approximately 8,484 man-hours would be possible from a resident labor supply of 3.5 men per farm. Sixteen and one-half acres of rubber land would be required to fully utilize the assumed labor supply available per farm. Gross return of \$4,851 and net return of \$3,800 would be realized from this size farm when rubber production was assumed to be 420 pounds per acre. The same size farm would provide \$5,775 gross return and \$4,724 net return when rubber production per acre was assumed to be 500 pounds.

Percentage of rubber farms larger than 10 acres. In Malaya, in 1960, the average size of farms specializing in rubber were 11.7 acres in Penang and Province Wellesley, 9.8 in Kedah, 8.2 in Pahang, and 6.9 acres in Johore. The analysis above showed that 13 acres and 10.5 acres would be required for a smallholder to achieve the income target of \$3,000. Thus, only in the state of Penang and Province Wellesley does the average size come close to the acreage determined in this study. In 1960, there were only 21 percent of all the rubber farms in Malaya 10 acres or larger.<sup>14</sup> In the states of Johore, Kedah, Kelantan, and Perak where the total number of rubber farms were substantial, the percentage of farms of size 10 acres and above were 24 percent, 32 percent, 14 percent, and 17 percent, respectively (Table XXI).

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<sup>14</sup>Census of Agriculture, Malaya, 1960, Report No. 3, Table 106.

TABLE XXI  
PERCENT OF RUBBER FARMS 10 ACRES AND ABOVE BY STATES,  
MALAYA, 1960

| States                              | Total Number<br>of<br>Rubber Farms <sup>a</sup> | Percent Farms<br>10 Acres<br>and Above <sup>b</sup> | Total<br>Rubber<br>Acreage <sup>c</sup> |
|-------------------------------------|-------------------------------------------------|-----------------------------------------------------|-----------------------------------------|
| Johore                              | 36,484                                          | 24                                                  | 728,800                                 |
| Kedah                               | 24,256                                          | 32                                                  | 196,600                                 |
| Kelantan                            | 26,116                                          | 14                                                  | 109,700                                 |
| Malacca                             | 7,924                                           | 7                                                   | 119,600                                 |
| Negri<br>Sembilan                   | 11,968                                          | 14                                                  | 214,500                                 |
| Pahang                              | 16,420                                          | 28                                                  | 230,200                                 |
| Penang and<br>Province<br>Wellesley | 3,154                                           | 35                                                  | 32,400                                  |
| Perak                               | 29,360                                          | 17                                                  | 398,700                                 |
| Perlis                              | 1,540                                           | 19                                                  | 6,900                                   |
| Selangor                            | 9,840                                           | 17                                                  | 212,700                                 |
| Trengganu                           | 8,328                                           | 29                                                  | 83,000                                  |
| Malaya                              | 175,392                                         | 21                                                  | 2,333,100                               |

<sup>a</sup>Source: Census of Agriculture, Malaya, 1960, Report No. 3  
(Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1961), Tables  
106-117.

<sup>b</sup>Ibid.

<sup>c</sup>Statistical Digest (Kuala Lumpur: Ministry of Agriculture and  
Cooperatives, 1967), p. 2.

### Rice Farms

\$3,000 net income level. At 420 gantangs and 500 gantangs of production levels, a farm size of 13.6 acres and 11 acres, respectively, were required to provide a net return of \$3,000, as shown in Table XXII. The labor supply needed was 2.2 men and 1.8 men, respectively, per farm. Net income per man equivalent would be \$1,363 at the 420 gantangs yield level, and \$1,666 at the 500 pounds yield level.

Labor supply of 1.5 men. For rice farms, the family labor supply of 1.5 men and 3.0 men was assumed. The solution sought was to estimate the acreage required per farm to fully employ the assumed levels of labor force.

The labor requirement to produce an acre of rice was estimated to be 400 man-hours per year. A 1.5 men labor situation would mean a total of 3,636 man-hours per year. Hence, nine acres of rice land would be required to utilize the assumed labor force of 1.5 men (Table XXII). This size farm would realize a net income of \$2,007 when yield per acre of rice was assumed to be 420 gantangs. However, the same size farm would provide \$2,912 gross return and \$2,473 net return per farm when yield was assumed to be 500 gantangs per acre.

Labor supply of 3.0 men. A total of 7,272 man-hours per year would be available from 3.0 men labor force. Approximately eighteen acres of rice land would be required per farm to fully utilize the assumed labor supply. Gross return of \$4,892 and net return of \$4,014

TABLE XXII  
RELATIONSHIP BETWEEN LABOR SUPPLY, FARM SIZE, YIELD  
AND RETURNS, RICE FARMS

| Number<br>of<br>Men                               | Yield<br>Per<br>Acre | Farm<br>Size | Gross<br>Return<br>Per Acre | Gross<br>Return<br>Per Farm | Net<br>Return<br>Per Acre | Net<br>Return<br>Per Farm |
|---------------------------------------------------|----------------------|--------------|-----------------------------|-----------------------------|---------------------------|---------------------------|
| <u>Assumed<br/>labor<br/>supply</u> <sup>a</sup>  | (pounds)             | (acres)      | ----- dollars -----         |                             |                           |                           |
| 1.5                                               | 420                  | 9.1          | 268.80 <sup>c</sup>         | 2,446.08                    | 220.60 <sup>e</sup>       | 2,007.46                  |
| 3.0                                               | 420                  | 18.2         | 268.80                      | 4,892.16                    | 220.60                    | 4,014.92                  |
| 1.5                                               | 500                  | 9.1          | 320.00 <sup>d</sup>         | 2,912.00                    | 271.80 <sup>f</sup>       | 2,473.38                  |
| 3.0                                               | 500                  | 18.2         | 320.00                      | 5,824.00                    | 271.80                    | 4,946.76                  |
| <u>Computed<br/>labor<br/>supply</u> <sup>b</sup> |                      |              |                             |                             |                           |                           |
| 2.2                                               | 420                  | 13.6         |                             |                             | 220.60                    | 3,000.00                  |
| 1.8                                               | 500                  | 11.0         |                             |                             | 271.80                    | 3,000.00                  |

<sup>a</sup> Assumed labor supply of 1.5 and 3.0 men per farm.

<sup>b</sup> Computed labor supply to give specified net income of \$3,000.

<sup>c</sup> Production assumed at 420 gantangs per acre, and a price of 64 cents per acre.

<sup>d</sup> Production assumed at 500 gantangs per acre, and a price of 64 cents per acre.

<sup>e</sup> Returns to land, family labor, and management; production level assumed at 420 gantangs per acre, and price of 64 cents per gantang.

<sup>f</sup> Returns to land, family labor, and management; production level assumed at 500 gantangs per acre, and a price of 64 cents per gantang.

would be realized when the yield of rice was assumed to be 420 gantangs per acre. The same size farm would provide \$5,824 and \$4,946 gross and net incomes, respectively, when yield of rice per acre was assumed to be 500 gantangs.

Double cropping of rice. The farm size determined in the analysis above showed that approximately 13.5 acres and 11 acres of rice land would be required to achieve a net income of \$3,000 per farm when one crop of rice was grown per year. Since double cropping is practiced in Malaya, it is necessary to analyze the farm size, with respect to rice, in terms of both a single crop and a double crop of rice per year.<sup>15</sup>

Using double cropping areas a farm size of 6.8 acres or 5.5 acres (planted acreage of 13.5 acres and 11 acres, respectively) would be required to provide the net income target of \$3,000 at the two yield levels assumed. Hence, the labor supply required to provide \$3,000 net income for smallholders practicing double cropping of rice would be 1.1 men and 0.9 man, respectively. Net return per man-equivalent would be very significant for these smallholders as compared to smallholders who raise only one crop of rice per year.

In Malaya, during 1965-66 crop season the total planted acreage

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<sup>15</sup> Double cropping of rice involves the planting of a short term variety (maturation period ranging from 120-140 days) for both the first crop and second crop as opposed to the long term variety (maturation period ranging from 180-200 days) normally used in single crop rice growing areas. The costs and returns per acre for the first and second crop are the same. In fact, the short term variety used in double cropped areas tends to give a slightly higher yield per acre.

of rice for both first and second crop combined was 852,940 acres. An estimated acreage of 89,840 acres were double cropped. With the completion of two large irrigation projects, the Muda River Project in Kedah and the Kemubu Project in Kelantan an additional 315,000 acres of land would be available for double cropping of rice.<sup>16</sup> The major double cropping areas are in the states of Kedah, Penang and Province Wellesley, Kelantan, Perak, and Selangor. In 1966, almost all the rice lands in Penang and Province Wellesley and about 90 percent of the total rice lands in Selangor were double cropped.<sup>17</sup> In these states, little adjustment in farm size would be required to provide a rice smallholder with a farm of 6.7 acres. In Kedah, rice farms averaged 4.0 acres in size in 1960. A recent study indicated that within the Muda River Project the average farm size on rice farms was 4.6 acres.<sup>18</sup> The same survey also covered the state of Perlis where the rice farms average size was found to be 4.4 acres. In 1960, the corresponding figure was 4.1 acres. Hence, in these two states where double cropping would be possible, the existing rice farms lacked about two acres as compared to the farm size determined in this study necessary to return \$3,000 net income. Selangor and Province Wellesley's farm sizes were 3.6 acres and 2.5 acres, respectively, in 1960. Kelantan's rice farms average size was only 2.5

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<sup>16</sup>First Malaysia Plan, 1966-70, p. 116.

<sup>17</sup>Narkswadi and Selvadurai, Report No. 1, op. cit., p. 34.

<sup>18</sup>Farm Economic Survey of the Muda River Project, 1966 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), p. 9.

acres. Hence, in these states an additional acreage would be required on most of the farms to provide a rice smallholder with a net income of \$3,000.

Percentage of rice farms 10 acres and larger. In terms of a single crop of rice, the farm size determined in this analysis to achieve a \$3,000 net return were 13.6 acres and 11 acres for the assumed yields of 420 and 500 gantangs per acre. In 1960, the rice farms in Malaya averaged only 3.1 acres per farm, for farms specializing in rice. Thus, a large proportion of the rice farms would be considerably smaller than minimum size to achieve the income target used in this study.

In Malaya, there were only 10 percent of the total rice farms that were ten acres or larger in size (Table XXIII). The percentage of farms that were ten acres or larger was 13 percent in Kedah, 1 percent in Penang and Province Wellesley, 7 percent in Perak, and 6 and 5 percent in Selangor and Kelantan.

#### Coconut Farms

\$3,000 net income level. Using the input-output data shown in Table XIX, page 52, it was estimated that 24 acres of land were required to provide a net return of \$3,000 per farm. A labor supply of 1.6 men was needed to attain the above income goal when production was fixed at 5 pikuls per acre. To achieve the same net income target, a labor supply of 0.9 man was required when production was fixed at 8 pikuls per acre. However, the corresponding farm size was only 13.9 acres (Table XXIV).

TABLE XXIII

RICE FARMS 10 ACRES AND ABOVE IN THE STATES OF KEDAH, PERLIS,  
PENANG AND PROVINCE WELLESLEY, PERAK, SELANGOR,  
KELANTAN, AND MALAYA, 1960

| States                           | Total<br>Number<br>of Farms <sup>a</sup> | Percent Farms<br>10 Acres<br>and Above <sup>b</sup> | Percent of<br>Total Rice<br>Acreage<br>in Malaya <sup>c</sup> |
|----------------------------------|------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------|
| Kedah                            | 70,344                                   | 13                                                  | 33.7                                                          |
| Perlis                           | 11,712                                   | 6                                                   | 5.7                                                           |
| Penang and<br>Province Wellesley | 13,558                                   | 1                                                   | 7.8                                                           |
| Perak                            | 37,348                                   | 7                                                   | 12.7                                                          |
| Selangor                         | 11,166                                   | 6                                                   | 9.4                                                           |
| Kelantan                         | 47,740                                   | 5                                                   | 14.8                                                          |
| Malaya                           | 257,446 <sup>d</sup>                     | 10                                                  | 100.0 <sup>e</sup>                                            |

<sup>a</sup>Source: Census of Agriculture, Malaya, 1960, Report No. 3, Tables 108, 109, 113, 114, 115, and 116 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1961).

<sup>b</sup>Ibid.

<sup>c</sup>Udhis Narkswasdi and S. Selvadurai, Economic Survey of Padi Production in West Malaysia, Report No. 1 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), p. 34.

<sup>d</sup>The figures in the column do not add up to the total for Malaya since all the states are not included.

<sup>e</sup>Percentages in the column do not add up to 100 percent since all the states are not included.

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TABLE XXIV

RELATIONSHIP BETWEEN LABOR SUPPLY, FARM SIZE, YIELD  
AND RETURNS, COCONUT FARMS

| Number<br>of<br>Men                                           | Yield<br>Per<br>Acre | Farm<br>Size | Gross<br>Return<br>Per Acre | Gross<br>Return<br>Per Farm | Net<br>Return<br>Per Acre | Net<br>Return<br>Per Farm |
|---------------------------------------------------------------|----------------------|--------------|-----------------------------|-----------------------------|---------------------------|---------------------------|
| <u>Assumed</u><br><u>labor</u><br><u>supply</u> <sup>a</sup>  | (pikuls)             | (acres)      | ----- dollars -----         |                             |                           |                           |
| 1.5                                                           | 5                    | 23.1         | 150 <sup>c</sup>            | 3,465                       | 124.70 <sup>e</sup>       | 2,880                     |
| 2.5                                                           | 5                    | 38.5         | 150                         | 5,715                       | 124.70                    | 4,801                     |
| 1.5                                                           | 8                    | 23.1         | 240 <sup>d</sup>            | 5,544                       | 214.70                    | 4,959                     |
| 2.5                                                           | 8                    | 38.5         | 240                         | 9,144                       | 214.70                    | 8,266                     |
| <u>Computed</u><br><u>labor</u><br><u>supply</u> <sup>b</sup> |                      |              |                             |                             |                           |                           |
| 1.6                                                           | 5                    | 24.1         |                             |                             | 124.70                    | 3,000                     |
| 0.9                                                           | 8                    | 13.9         |                             |                             | 214.70                    | 3,000                     |

<sup>a</sup> Assumed labor supply of 1.5 and 2.5 men per farm.

<sup>b</sup> Computed labor supply with specified net income of \$3,000.

<sup>c</sup> Production level of 5 pikuls per acre and price of \$30 per pikul.

<sup>d</sup> Production level of 8 pikuls per acre and price of \$30 per pikul.

<sup>e</sup> Returns to land, family labor, and management; production level assumed at 5 pikuls per acre.

<sup>f</sup> Returns to land, family labor, and management; production level assumed at 8 pikuls per acre.

Net return per man equivalent would be \$1,875 at the 5 pikuls yield level, and \$3,333 at the 8 pikuls yield level.

Labor supply of 1.5 men. On coconut farms, the family labor supplies were assumed at the levels of 1.5 men and 2.5 men per farm. The annual labor requirements per acre of coconut was estimated to be 157.5 man-hours. The labor requirements for coconut farms seemed to be relatively low when compared to labor requirements on rubber farms. The low labor requirements for coconut would be due to the fact that there would only be about 60 trees per acre of coconut as against 180 to 200 rubber trees per acre of rubber. The distribution of labor on coconut farms was assumed to be evenly distributed throughout the year. The solution sought was to estimate the farm size that would fully utilize the two assumed labor supplies.

A labor force of 1.5 men would give a total of 3,636 man-hours of labor available for work on the farm. Twenty-three acres of land would be required in order to fully utilize the assumed labor supply of 1.5 men (Table XXIV). Gross returns of \$3,465 and \$5,544 would be realized from a 23-acre farm when coconut yield was assumed to be five pikuls and eight pikuls, respectively. In terms of net returns, this size farm would provide \$2,880 and \$4,959 at the production levels of five and eight pikuls, respectively.

Labor supply of 2.5 men. A resident labor supply of 2.5 men per farm would give a total annual labor supply of 6,060 man-hours

available for farm work. Thirty-eight and one-half acres of land would be required to fully utilize the labor available in this situation. From this size farm, gross return of \$5,715 and net return of \$4,801 would be realized when yields per acre was assumed to be at five pikuls. At the production level of eight pikuls per acre, gross and net returns of \$9,144 and \$8,266, respectively, would be possible from this size farm.

Percentage of coconut farms 10 acres and larger. The farm size for a coconut smallholder to achieve the specified net income goal differed considerably from the existing average size of coconut farms. In 1960, the average size of farms specializing in coconut were 5.3 acres in Johore, 2.2 acres in Kelantan, 4.7 in Perak and 3.9 acres in Selangor. The farm size for a coconut smallholder determined in this study was approximately 24 acres and 14 acres. Therefore, coconut farms in Johore and Perak were very small when compared to the farm size required to provide the target income goal specified for this study.

In 1960, about 18 percent of the total 54,422 coconut farms in Malaya were ten acres and larger in size (Table XXV). In Johore and Selangor which had substantial coconut areas, the percentage of farms that were ten acres and larger were 22 percent and 12 percent, respectively.

TABLE XXV  
PERCENT OF COCONUT FARMS 10 ACRES AND ABOVE IN FOUR STATES,  
AND MALAYA, 1960

| States   | Total Number<br>of Farms<br>in 1960 <sup>a</sup> | Percent<br>10 Acres,<br>and Above <sup>b</sup> | Total<br>Coconut <sup>c</sup><br>Acreage |
|----------|--------------------------------------------------|------------------------------------------------|------------------------------------------|
| Johore   | 15,940                                           | 22                                             | 133,800                                  |
| Kelantan | 5,654                                            | 13                                             | 41,500                                   |
| Perak    | 7,252                                            | 18                                             | 56,800                                   |
| Selangor | 11,454                                           | 12                                             | 90,300                                   |
| Malaya   | 54,422 <sup>d</sup>                              | 18                                             | 438,700 <sup>e</sup>                     |

<sup>a</sup>Source: Census of Agriculture, Malaya, 1960, Report No. 3, Tables 106-117 (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1961).

<sup>b</sup>Ibid.

<sup>c</sup>Statistical Digest (Kuala Lumpur: Ministry of Agriculture and Cooperatives, 1967), p. 2.

<sup>d</sup>The figures in the column do not add up to the total for Malaya since all the states are not included.

<sup>e</sup>The figures in the column do not add up to the total for Malaya since all the states are not included.

## CHAPTER V

### SUMMARY AND CONCLUSION

The objectives of this study were: (1) to discuss the structure of the Malayan smallholders and their role in the agricultural economy of the nation; (2) to examine the relative efficiency of the farms in terms of rubber, rice and coconut smallholder production and income with respect to farm size; (3) to estimate the farm size and labor requirements for rubber, rice, and coconut farms in order to achieve a \$3,000 net income level per farm; and (4) to determine the effects of variation in labor supply on farm size necessary to fully utilize labor force.

Basic data on crop types, area, and production were obtained from the statistical Digest, Ministry of Agriculture and Cooperatives, Malaysia and the Malayan Census of Agriculture, 1960.

In Malaya, the smallholders made up 4.1 million acres of the total of six million acres under cultivation in 1965. The agricultural economy of Malaya is dominated by tree crops; rubber, coconut, oil palm, and fruit trees. Rubber is by far the most important crop. Rice is the main grain for the domestic population.

In 1960, the rubber smallholders made up 44 percent of the total cultivated acreage of all smallholder farms while rice, and coconut accounted for 31 percent and 9 percent of the acreage, respectively. The smallholder farms were classified as specialized and nonspecialized

farms. Specialized farms were larger than nonspecialized farms. The average size for all smallholder farms was 4.7 acres. The average farm size for smallholders specializing in rubber, rice, and coconut were 7.2 acres, 3.1 acres, and 4.3 acres, respectively. The average farm size for nonspecialized rubber farm was 5.3 acres, 2.5 acres for rice, and 3.3 acres for coconut farms.

About 45 percent of all smallholder farms were less than three and three-quarter acres in size. Five percent of all farms were larger than 15 acres.

The per capita income for Malaya was estimated at \$950 in 1965. However, there is a wide gap between the income earned by urban and rural population. On the average, a farm household of five members earned an income of approximately \$900 annually. In terms of per capita income, it would be relatively low.

Between 1960 and 1965, agricultural production in Malaya grew at an annual rate of 4.8 percent. Over the same period, the annual growth rate for rubber production was 3.2 percent. The structure of the agricultural economy of Malaya remains heavily oriented towards rubber production.

Rubber is the main export crop and accounted for 18 percent of the gross national product in 1964 as compared to 33 percent in 1955. There has been a marked declining trend in rubber's contribution to the gross national product on account of the fall in the price of rubber.

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Rice production grew at an annual rate of 2.3 percent between 1960 to 1965. In some areas two crops of rice are raised annually, the first crop and the second crop or sometime known as the off-season crop. Increases in acreage planted was responsible for the 2.3 percent growth rate, rather than increased in yield per acre.

Coconut production declined at an annual rate of 7 percent between 1960 and 1965. Coconut yields have been low since the major portion of the coconut palms are well past their prime age of production.

Two criteria were used to determine the efficiency levels between farms of different sizes and crop enterprises; yield per acre and gross income per farm. Farms were divided into eight size groups for rubber and coconut farms, ranging from less than an acre for size class I to 10 acres and over for size class VIII, the largest size group farms. Rice farms were divided into seven size classes: farms of less than an acre were designated size class I and farms of 7.5 acres and over as size class VII,

For all rubber farms in Malaya, yields decreased from 702 pounds on size class I to 421 pounds on size class VI. In the State of Johore, the yield was 494 pounds on size class I, the highest average for all rubber farms in the state. The lowest average yield of 348 pounds was on class VIII farms, the largest size class farms.

A similar pattern of inverse relationship between rubber production and farm size were evident in the other states too. The average yield of 754 pounds on size class I in Perak was the highest

average yield for any size class. Among the largest size class farms, size class VIII, Kedah had the highest yield of 469 pounds per acre.

In Malaya, the rice yield of 318 gantangs per acre on size class I was the highest yield for any size class. Yield increased from 271 gantangs on size class III to 292 gantangs on size class VII.

However, in the State of Kedah, the highest yield of 372 gantangs was on size class IV, and the lowest yield of 331 gantangs was on size class II farms.

Hence, the rice production data for Malaya, and for the States of Kedah, Perlis, Penang and Province Wellesley, and Perak did not indicate any clear relationship between farm size and yield per acre.

However, in the State of Kelantan, the inverse relationship between farm size and yield per acre was evident. Yield was highest on size class I farms, and decreased with increased in farm size to the lowest yield of 183 gantangs on size class VII.

In Malaya, rice farms of less than an acre had the highest yield. In the States of Perlis, Perak, and Kelantan, yields on size class I farms were the highest for all rice farms in the respective states.

On coconut farms, yields were highest on the smallest farms, size class I, but did not vary in any consistent manner among the size groups.

The income per farm from rubber, rice, and coconut on each size class were estimated. Approximately 52 percent of all the rubber farms in Malaya had an estimated gross returns of \$1,500 and above per farm.

Gross returns on the largest rubber farms were between \$3,000 to \$4,000.

Fifty-five percent of the rice farms, size class I to IV, were estimated to gross less than \$700 per farm. Gross income for the remaining rice farms ranged from \$722 to \$1,822. On the largest rice farms, gross return was less than \$2,000.

Fifty-seven percent of all coconut farms, size class I to V, earned less than \$385 per farm. Average gross income for farms in size class VIII was estimated at \$1,500.

Among the rubber, rice, and coconut enterprises, returns from coconut was the lowest. The highest return of \$1,504 from coconut was relatively low compared to the highest returns of \$1,822 on rice farms, and \$4,367 on rubber farms.

One of the purposes of this study was to estimate the farm size and labor requirements for rubber, rice, and coconut to achieve a target net income of \$3,000; budgets were developed specifying the resource requirements, costs, yields, and returns for each crop enterprise.

The study showed that about 13 acres of rubber land would be required to provide a net return of \$3,000. The labor supply required to attain this income goal was 2.8 men.

For rice, 13.6 acres of land would be required to provide a net return of \$3,000. The labor supply required on this size farm was 2.2 men.

Twenty-four acres of coconut would be required to provide a smallholder with \$3,000 net income. A labor supply of 1.6 men would be required to achieve the above income goal.

Income per man equivalent of labor averaged \$1,071 for rubber, \$1,363 for rice farms, and \$1,875 for coconut farms. This would indicate that coconut production is a relatively more profitable use of labor, given the assumption used in this study. On a per acre basis budget analysis indicated net returns per acre for rubber of \$230, for rice \$221 per acre, and for coconut \$125. Thus the relative profitability of the three crops would depend on whether labor or land was the restricting resource.

Variations in labor supply resulted in changes in optimum farm sizes for each crop enterprise. A labor supply of 1.5 men per farm was assumed for rubber, rice, and coconut farms. Another level of labor supply for each enterprise was also assumed; 3.5 men labor supply for rubber, 3 men, and 2.5 men for rice and coconut, respectively.

For rubber, a seven acre farm would be required to fully utilize the assumed labor supply of 1.5 men per farm. Nine acres of rice or twenty-three acres of coconut would be required to fully utilize a labor force of 1.5 men.

The results of the study clearly indicate the need for adjustments in farm size to achieve adequate levels of farm incomes for the Malayan smallholders. At present, the average farm size for rubber, rice, and coconut farms is 7.2 acres, 3.1 acres, and 4.3 acres, respectively; while the estimated farm size to attain \$3,000 net income was 13 acres for rubber, 13.6 acres for rice, and 24 acres for coconut.

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In addition, about 52 percent of the existing rubber farms had an estimated gross income less than \$1,500, 55 percent of the rice farms earned less than \$700, and 57 percent of all coconut farms earned less than \$385 per farm.

Evidence indicates that at present there is considerable under-employment of labor on the farms. Increased farm size is a necessity for more efficient use of labor available on the farms.



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