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Selected Characteristics of Smallholder Rubber Producers in Aceh Province, Indonesia

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Selected Characteristics of Smallholder Rubber Producers in Aceh Province, Indonesia[1]

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Abstract

Production, consumption and investment activities of smallholder rubber farmers in government planned resettlement schemes were examined to gain a good understanding of problems and successes in these projects. The study area was located in Aceh province of Sumatra Island, Indonesia. Each farmer was provided 2 hectares for plantation, 0.75 hectare for food crops and 0.25 hectare for household area. Sampling was satisfied based on age of the rubber trees held by smallholders. Eight groups were defined based on planting dates from 1977-78 through 1986-87, excluding 1984-85 and 1985-86, when no clones were planted. Each group was sampled for data on family characteristics, labor allocation, income and expenditures. The complex interactions between farm families and agricultural production environment were highlighted. High income and expenditure variations within groups same planting dates were found due to the number of trees a family received, and the systematic investment and production behavior of family households. The distance to food crop land and presence of wild animals were some of the constraints in optimal use of resources. A more detail and careful examination is suggested to explain the relationships between characteristics of families and production of rubber and food crops.

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OBJECTIVE

Government planned resettlement schemes are an important tool for social and economic development in Indonesia. To understand the problems and successes of such resettlement schemes, we must gain a good understanding of family characteristics and the general circumstances of communities where resettlement schemes are being established. This report provides descriptive information on one such type of resettlement scheme. Data described here were collected as part of a broader research project to examine the feasibility of integrating food crops and livestock production within smallholder rubber producing households.

Understanding the production, consumption and investment activities of smallholder rubber farmers can yield useful information for shaping policies that lead to improved living standards. This research focuses on smallholder rubber producers, particularly their family characteristics, labor utilization, sources of revenue and expenditures. An objective of this research is to identify variations in family characteristics, labor utilization, revenue and expenditure variables associated with different patterns in various stages of latex production.

On a rubber plantation, trees can be tapped five or six years after planting and, depending upon the exploitation system, have an economic life of 16 to 30 years. Even with the same exploitation system and cultivation practices, latex production varies with the age of the tree. Therefore, the production and consumption patterns of farmers could vary in accordance with changes in revenue from the sale of rubber.

ORGANIZATION OF THE PAPER

Background information on representative smallholder rubber producers is introduced in the following section. Then, the data collection process used in the study area is described, and the family characteristics of rubber farmers in different stages of production are presented statistically. A discussion of the pattern of labor utilization in production activities and use of food crop land follows. Current rubber production and estimated income along with household expenditures of farmers is analyzed. Some policy implications from this survey data and analysis are discussed in the last section.

BACKGROUND[5]

The Nucleus Estate Smallholder (NES) Development projects were initiated (1) totransfer technology from estates to smallholders, 2) utilize estate input and processing facilities for smallholders, and 3) allow estates to generate revenue from the sale of planting material and to reduce overhead costs by greater utilization of processing facilities without bearing the cost of planting additional areas of crop themselves[6].

Since PTPs[7] primarily supervises the cultivation practices and exploitation system in each stage of tapping, PTP is recognized as the nucleus of the project and

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[5] The data in this section draws heavily from the publication "Gambaran Umum Proyek NES 1 Alue Ie Merah PT. Perkabunan. 1" (1993).

[6] Small Holder Development Projects, Sumatra, available from the library at the National Rubber Research Institute of Indonesia in North Sumatra. The date of this publication is estimated to be late 1960s.

[7] Perusahaan Terbatas Perkebunan (Translation to English = Government Owned Plantation Co. Ltd.)

farmers are seen as plasma, thus the name "Nucleus Estate Smallholder (NES) Development Project".

Alue Ie Merah in Aceh is one of the earliest NES projects in Indonesia and is located 106 Km from the capital of East Aceh District, Langsa. The project is funded by a loan from the World Bank and was administered by PTP 5 when first established in 1977. In May 1982 management was transferred to PTP 1 in Langsa, East Aceh. Today, there are 2,926 farmers in the project. Each farmer receives 2 hectares of rubber trees, .25 hectare for thehousehold area and .75 hectare for food crops. These farmers live in 14 small villages surrounded by plantation and food crop land. Alue Ie Merah is the largest village with a daily market and is growing rapidly. Each village has a primary school and a Mosque.

The participant farmers are from Aceh and Java. During the first five or six years after planting, while the rubber trees are immature, PTP recruits farmers to work on the plantation from 7 a.m to 2 p.m. During that time farmers receive housing and food crop land and 2,000 Rp. a day[8] as wages. PTP opens the lottery to assign plots to farmers when at least 60 percent of the trees in each 2 hectare plot have reached approximately 45 cm girth at 150 cm above the union. Although each farmer is assigned two hectares, the number of trees each individual receives varies from 350 to 900 due to topography. In order to calculate costs more efficiently, eleven different farm sizes are categorized as class A through D2, where A represents the highest number of trees and D2 the lowest number of trees. Accordingly, the size of the credit

[8] US 1 dollar is approximately equivalent to 2000 Indonesian Rupiah during 1993.

package assumed by a farmer ranges from three to seven million Rupaid before interest. The loan recovery period is up to 15 years with 10.5 percent interest per year. After one or two years of tapping, 30 percent of the latex from each harvest is collected by PTP as credit repayment.

DATA COLLECTION

Data collected are family characteristics, labor utilization, family and production expenditures, highest and lowest yield per 2 hectare plot during a year, and number of trees tapped in different stages of life of the tree. Alue Ie Merah was chosen for its homogeneous planting of the same GT 1 clone in eight different stages of growth, all in one contiguous area. Planting dates range from 1977-78 to 1986-87, excluding 1984-85 and 1985-86, when no trees were planted. We planned to take a sample of at least ten households from each planting years from eight different years.

The survey was enumerated by three scientists during the last week of October and November, 1993. The majority of the farmers sampled were those suggested by PTP officials, and they are relatively well-off and cooperative. On the first day of data collection, perhaps for security reasons, the site manager accompanied us. Later, at least one extension person from PTP 1 accompanied us during data collection. Each household was interviewed one time only. It is likely that biases were introduced by the presence of the manager and perhaps the extension worker, too.

FAMILY CHARACTERISTICS

In order to be eligible as a plasma farmer, a person must be married, between 20 to 40 years old, have help available from members of the family, and both husband and wife must be in good health. The husband must be able to maintain the rubber trees and the wife should be able to work the food crop land[9].

Table 1. Family Characteristics associated with Different Planting Dates in NES Project, Alue Ie Merah, 1993.

Planting Date	Obs.	Average Age Husband	Average Age Wife	Average No. of Children	Average No. of Ch. w/Parents
1977-78	10	52	39	5	3
1978-79	9	46	35	4	4
1979-80	10	45	36	6	4
1980-81	10	40	33	4	4
1981-82	10	43	33	4	3
1982-83	11	33	26	3	3
1983-84	13	43	34	3	2
1986-87	10	34	28	2	2

Table 1 presents the average age of husband and wife, total number of children, and the number of children staying with parents for each planting date. We found that age within one planting date ranged from 20-60, reflecting replacement of older individuals who abandoned their plantation and home yard, with the replacement person being relatively younger than the rest of the group. The households with a 1986-87 planting date had an average of two children and those with a 1977-78

[9] This information was taken from a sample contract between the bank and an individual farmer.

planting date had average of five children with only three of them staying with their parents at the time of the urvey.

LABOR UTILIZATION

a) Labor Use for Rubber Production

All the farmers that we surveyed work in their plantation early in the morning until 2:00 pm. and perform other production activities later in the afternoon. From the time that rubber trees are brought into production, they can be tapped every day if there is no rain in the morning. PTP recommends tapping four days out of seven. All the plasma farmers in Alue Ie Merah produce coagulated latex (cuplump), and the selling of cuplumps to PTP is done collectively. There are about 20 farmers in a group, each having an appointed leader. Therefore, tapping days and collecting days are mostly uniform among the farmers within a group.

However, the number of trees tapped per time period varies consideribly among the farmers. One reason for this variation is the difference in the initial number of trees received by each farmer. Second, during the first year of tapping, the number of tapped trees is usually less than the total stand. While the number of mature trees increases over time, the tapped trees may be reduced as a result of tapping panel dryness caused by a high intensity tapping system or other factors such as wind damage, white root disease etc. Therefore, hours spend in the plantation vary with the number of trees regardless of planting date.

Among the 83 households surveyed, 9% hire someone for tapping, 45% use

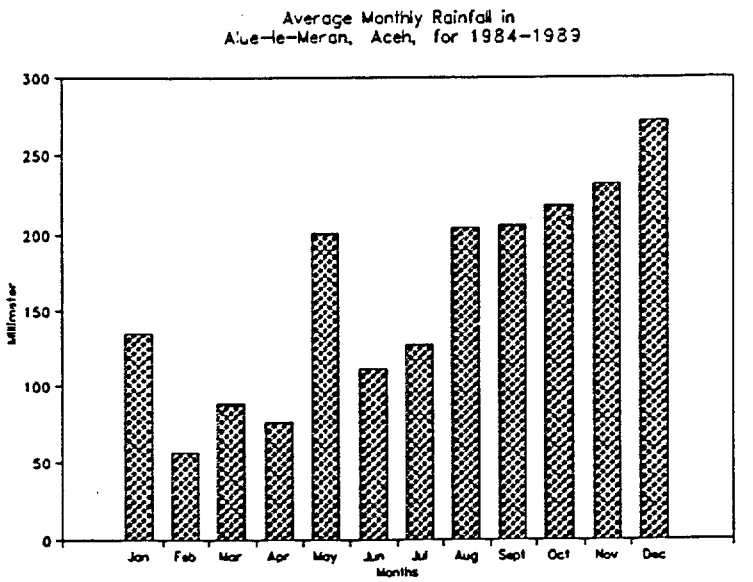
occasional help from housewives and children, and 35% of the men tap alone. For collection of cuplumps, 8% of the farmers hire helpers, 51% use help from wives or children, and 40% collect alone. The amount of time spent in the plantation between the groups utilizing the labor of two members of the family is not significantly different from the groups using only one member of the family. The reason may be that while some farmers go to the their plantation just for tapping and collection, while some regularly perform weeding regularly. The average amount of time spend for each tree either for tapping or for collection is about 30 seconds.

b) Labor Use for Other Production Activities

Besides land for rubber production, a plasma farmer has .8 hectare of land outside the village and approximately .1 hectare for household area. The seasonal precipitation in Alue Ie Merah is favorable for crop production year round. The area has heavy precipitation from August to January and medium precipitation from February to July (see rainfall distribution in Figure 1).

Mostly soybean and rice are grown on the food crop land. Generally, farmers who are growing seasonal crops spend the rest of the afternoon, usually after 2 p.m.working on food crops. Forty three percent of the farmers we surveyed were growing at least one crop in 1993, 41% of them grow rice, 57% grow soybean, and the rest of them have either chilies, corn, cocoa, rubber, or coffee.

Figure 1



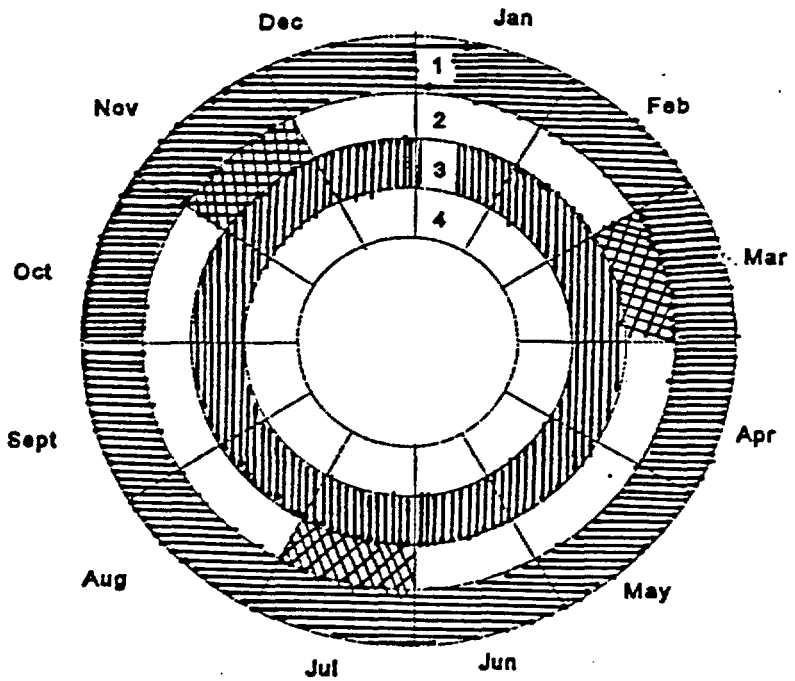
Source: Data provided by NES project site office, Alue-Ie-Merah, Aceh.

Land preparation for seasonal crops such as rice, soybean or chili takes a month. The soybean variety used by farmers in Alue Ie Merah takes 3 months from planting to harvest. Although the precipitation is favorable for growing crops year round, our survey found that there are typical times for growing soybeans, with multiple crops grown a maximum of three times over the year. July, November and March are most frequently the planting times. Rice is grown all through the year. In the home yard, 39% of the respondents have mostly cocoa and/or coffee, and a few have chili plants.

Livestock production is also very common in the study area. Among 83 r espondents, 58% of them raise livestock, the majority have poultry, and a few have cattle or small ruminants. Illustrations of seasonal production activities for soybean, rice and livestock production are in Figure 2.

Figure 2*

Crop and Livestock Production Activities of Smallholder Rubber Farmers in Aceh



1. Rubber
2. Soybean
3. Rice
4. Livestock

Tapping/Collecting (Mornings, From 7 am to 12 pm)

Planting Soybean

Planting Rice

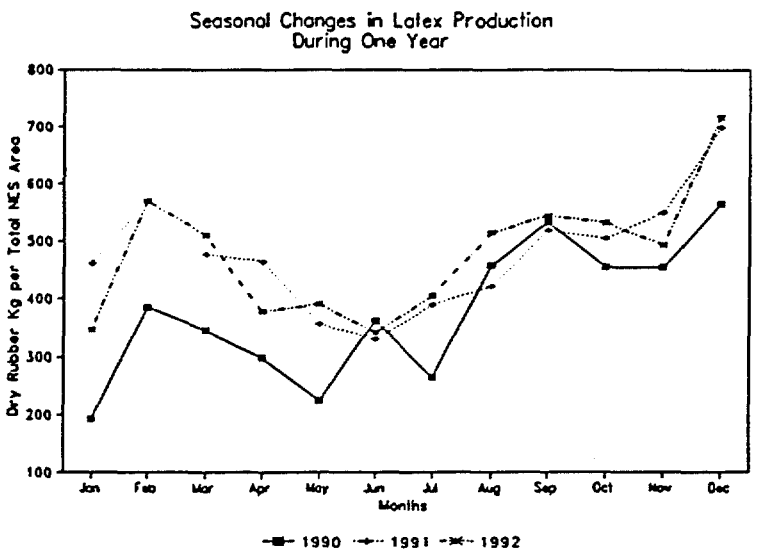
* This figure is adapted from Bezuneh (1985).

HOUSEHOLD INCOME AND EXPENDITURE

a) Income

For participant farmers in the NES projects, the primary crop is supposed to be rubber trees. Other income generated from the food crop land or home yard is meant to stabilize income variation during the year and throughout one rubber production cycle of approximately 25 years. The distinct seasonal yield change due to rainfall and the physiology of rubber trees is crucial in estimation of income variation. January, April, May and June are the lowest yielding months in a year, December and February yield the highest, and the rest of the months fall in the middle. Figure 3 shows three-year monthly yield variations recorded by the project site office in Alue Ie Merah.

Figure 3



Source: Site manager 's record, NES project , Alue-Ie-Merah, Aceh.

From the survey we identified the highest and lowest yield per week for individual farmers. The approximations for high, low and medium yields within one year are obtained from figure 3, where extrapolation is made as 8 weeks for high yield, 21 weeks for low yield and 22 weeks for medium yield. Then, yearly income is estimated with a constant price of Rp. 1100 per kg[10], 44% dry rubber content[11] and 30% credit repayment schedule. Yield per hectare varies during one production cycle. Table 2 reports the gross incomless loan repayment estimated from the average rubber yield of individual farmers from eight planting years.

Table 2. Number of Trees in Production and Yearly Income Range for Different Planting Dates in NES Projects, Alue Ie Merah, 1993.

Planting Date	Max. and Min. No. of Trees in a group (Total trees per 2ha)		Average Yield Kg/tree/Week	Max. and Min. Gross Income per Year in the group (Rp.000)[12]	
1977-78	702	300	.34	3898	981
1978-79	759	400	.27	2614	1555
1979-80	740	250	.28	3120	788
1980-81	614	200	.33	3202	754
1981-82	585	300	.31	3602	1346
1982-83	700	220	.23	2277	744
1983-84	576	200	.29	2819	811
1986-87	500	300	.20	1828	620

[10] A prevailing farm gate price in Alue-Ie-Merah, during November, 1993.

[11] These data were constructed from the site manager's record where both price and dry rubber content is the monthly average of 1990, 1991 and 1992.

[12] US 1 dollar is approximately equivalent to 2000 Indonesian Rupiah during 1993.

The potential revenue from .8 hectare of land in soybean production can generate an average net revenue of 400,000 Rp. (equivalent to US $ 200) for one growing season and 692,000 Rp.(equivalent to US $ 336) for one growing season for rice production. The production costs include seed, fertilizer, chemicals and some hired labor for land preparation and/or harvesting. The majority of the rice growers we surveyed grow rice for their own consumption.

b) Expenditures

Figure 4 illustrates the average expenditure of plasma farmers for each planting date by eight different stages. Expenditures recorded are for food purchased, education, costs of food crops planted, social and religious expenses, clothing and miscellaneous. Expenses for household maintenance, health, travelling and cigarettes are included in the miscellaneous category. The earliest planting date of 1977-78 represents 10 years of production and the latest planting date of 1986-87 is 2 years in production during the sample period.

In general, family characteristics of farmers who began operations in the earlier planting periods date reflect middle age parents. Some of the children are in high schools, and some have already married and moved out of their parents' household. Families from later planting periods tend to be starting their families. The average expenses per year for 1977-78 and 1986-87 planting dates are Rp. 3,045,000 and 1,615,000 respectively. Table 3 presents yearly expenditures for families in eight age classes of trees for smallholder rubber producers in Aceh.

Figure 4

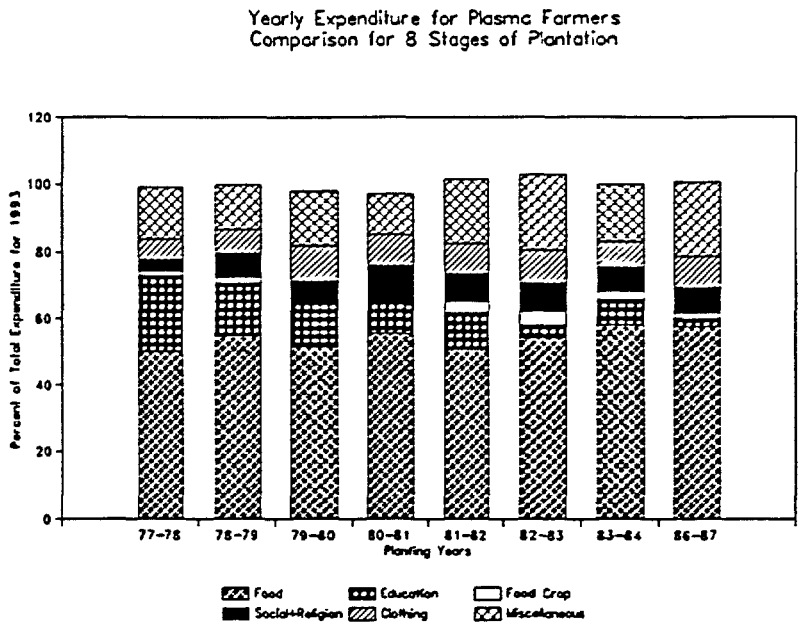


Table 3. Yearly Expenditures for Plasma Farmers in Aceh, Comparison of Eight stages of Rubber Production.

Planting Date	No. of Obs.	Maximum Expenditure		Minimum Expenditure		Average Expenditure	
		Rp.(000)	US$	Rp.(000)	US$	Rp.(000)	US$
1977-78	10	3802	1901	1775	888	3045	1522
1978-79	9	4521	2260	1407	704	3380	1690
1979-80	10	8729	4364	1483	742	3695	1848
1980-81	10	4572	1672	2286	836	2674	1337
1981-82	10	8026	4013	827	414	3316	1658
1982-83	11	3062	1531	1161	581	1856	928
1983-84	13	3708	1853	1408	581	2365	1182
1986-87	10	2216	974	1108	487	1615	808

DISCUSSION

Different stages of latex production are associated to some extent with changes in the life-cycle of farm families who are engaged in the rubber production. As table 1 clearly reveals, the average age of both husbands and wives varies directly with the age of the established rubber plantation. For example, the average number of children is only two for the period 1986-87 planting date. However, it isn't clear whether this variation represents a structural change in the number of children in farm families or whether the more recent planting dates reflect characteristics of a younger family that has simply not had time for more children. The availability of family labor would affect the extent of family labor utilization on the rubber plantation and the mix of crops. The use of other family members varies significantly.

Natural precipitation and the selection of soybean and rubber varieties are critical determinants of relative labor and land productivity. Additional information will be needed to determine variations in farm investment and their association with the family life-cycle. Livestock very likely play an important role as a source of investment. As we noted, 58% of the farm families raise livestock, and most of them have poultry with a few having cattle and other small ruminants. More systematic analysis of the interrelationships of these production activities with family characteristics will provide important insight into the production system.

The expenditure data of plasma farmers in Aceh reflects significant variation among families in the same planting date category. The average variation within planting date categories is in the range of 3 million Rupiahs per year. However, the

variations are very large for some years. For example, in 1981-82 the maximum expenditure is 8,026,000 whereas the minimum was only 827,000. 1979-80 also represented a period of great variations among the ten families with the maximum expenditure being 8,729,000 and the minimum 1,483,000 Rupiahs per year.

These variations are due to the systematic investment and production behavior of the family household, and partly due to the number of trees a family receives. Official documents from the NES project in Aceh stated that the number of trees a family receives varies from 360 to over 708. The reported reason for the variation in the number of trees each family receives from two hectares is the topography.

The survey in the area discovered that there are some farmers who have only some 200 trees per family. These farmers may earn a total of approximately 380,000 Rp. per year from rubber plantation. Further, the seasonality of latex production contributes to instability in income during the dry season. Even though these farmers are provided crop lands to generate an income supplement, there are many other reasons that some households are not growing crops. Common reasons are that the location provided is too far from the homeyard, or wild animals destroy their crops frequently so the farmers are discouraged from growing again. This lack of investment opportunities in groups of farmer could likely contribute the harvesting pattern of latex. Therefore, government strategies should emphasize on the alleviation in high income variations among the families, and revenue fluctuations during a year among the smallhodler rubber producers to preserve the quality of life in smallholder rubber farmers in Aceh.

The evidence presented in this report reveals the complex interactions between farm families and the agricultural production environment. Government resettlement schemes will be successful to the extent that the incentive patterns created in such resettlement schemes are clearly understood and used to shape supportive infrastructure and broader social and economic policies. In this report we have suggested a few relationships that need to be examined further to gain a better understanding of the feasibility of these problems and to work with various levels of government and the private sector to ensure that national and community goals are achieved. A more careful examination is needed of the association between characteristics of the families and production of rubber and food crops. Further reports on this research will provide more in-depth analyses of these variables.

ACKNOWLEDGMENTS

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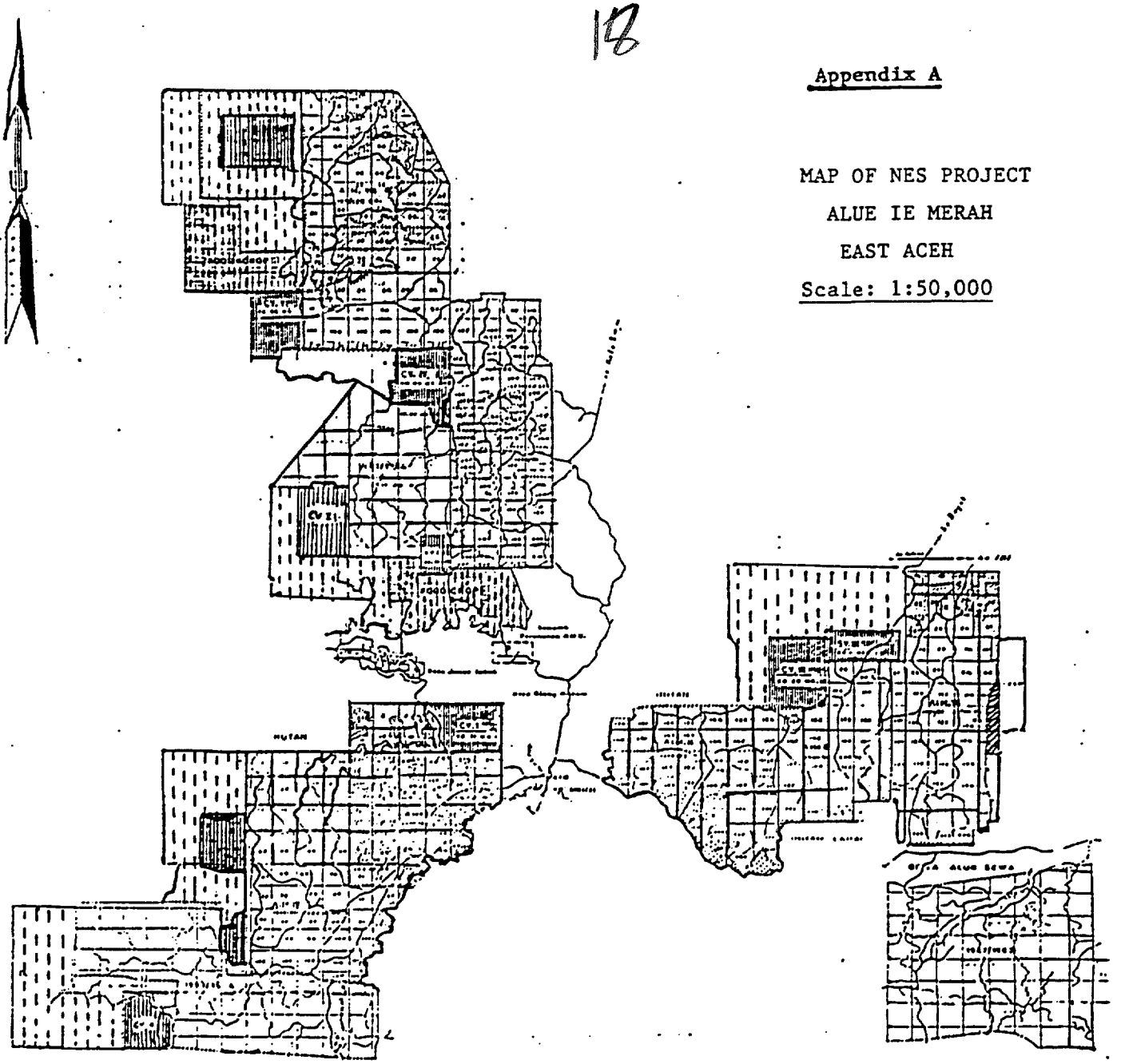
Small Holder Development Projects, Sumatra.

Appendix A

MAP OF NES PROJECT
ALUE IE MERAH
EAST ACEH
Scale: 1:50,000



Rubber Plantation

Village

Food Crop Land

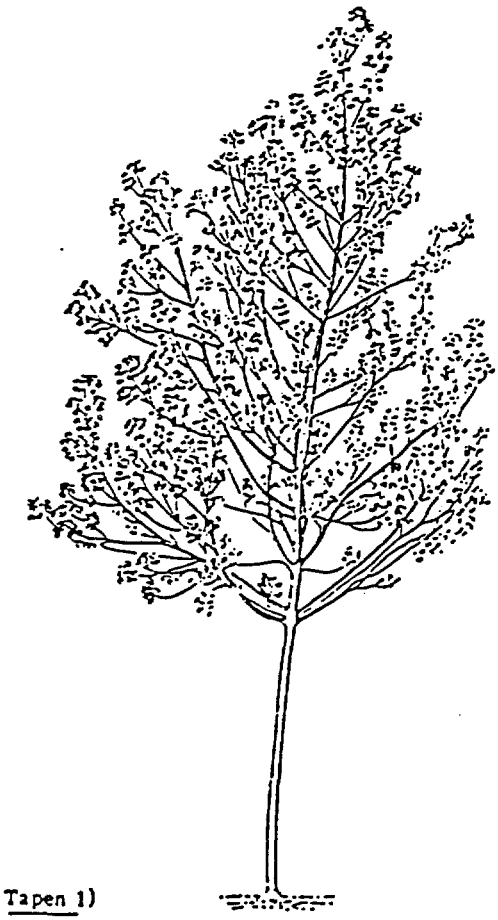
Source: Site Manager's Office, Alue Ie Merah, Aceh, Sumatra.

HEVEA

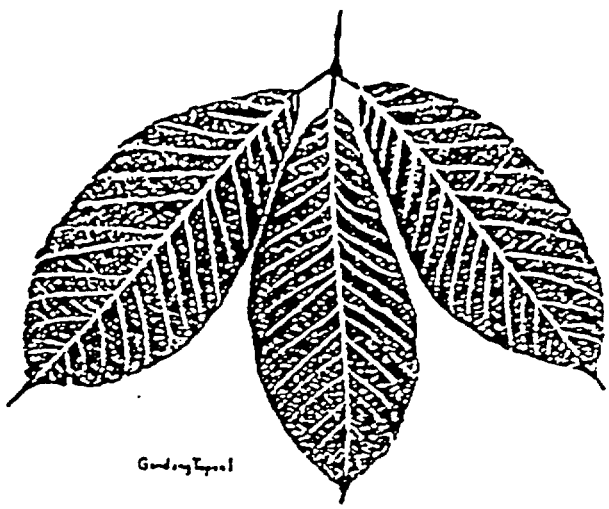
Appendix B

Young Budding
Museum Garden
Scale: 1/36

GT 1 (Condang Tapen 1)



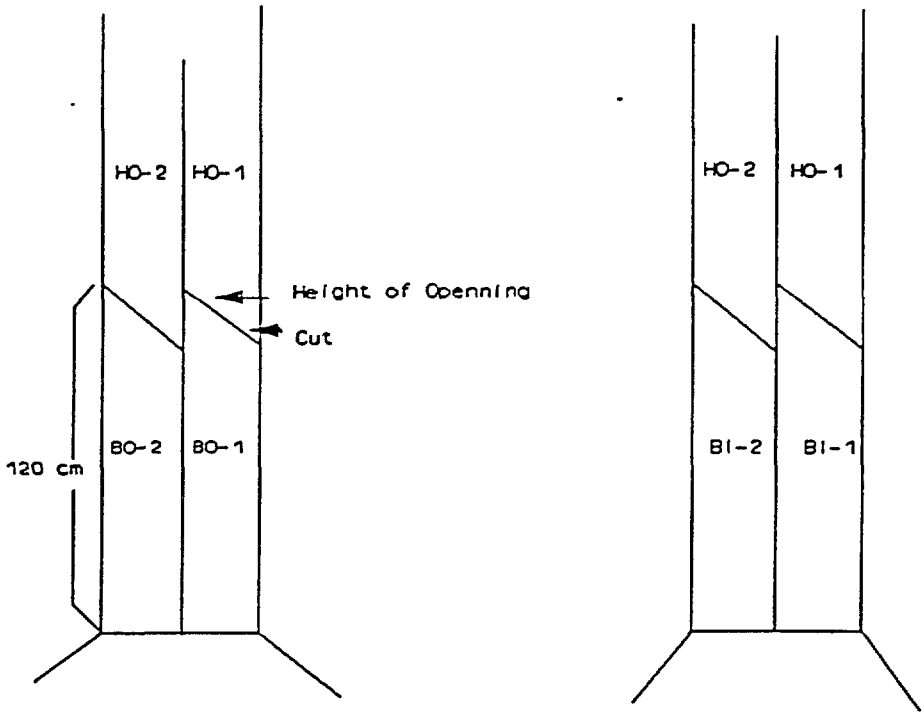
MT Budding of Tappable Age
Test 1934
Scale: 1/106



Source: Dijkman (1951), Hevea, Thirty Years of Research in the Far East

Appendix C

The Front Sectional View of the Tree Trunk
Illustration for Panels and Cuts



1. BO-1 = The first base panel (Virgin Bark)
2. BO-2 = The Second Base Panel (Virgin Bark)
3. BI-1 = The First Base Panel on the First Renewed Bark
4. BI-2 = The Second Base Panel on the First Renewed Bark
5. HO-1 = High Panel - 1
6. HO-2 = High Panel - 2

Source: Lukman. "International Notation for Exploitation System". In Natural Rubber: Biology, Cultivation and Technology Sethuraj, M. R. & Mathew, N. M. (Editors), 1992.

Appendix D

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Table 4. Itemized Expenses as a Percent of Total Expenditure, Comparison for Eight Stages of Plantation for 1993.

Items	Planting Years							
	77-78	79-79	79-80	80-81	81-82	82-83	83-84	86-87
Food	49.35	53.95	51.68	55.61	49.28	52.08	56.95	56.81
Education	22.76	16.01	13.98	9.79	10.69	3.70	7.61	2.50
Food Crop	1.21	1.44	0.00	0.32	3.43	4.26	2.30	1.49
Social+Religious	3.90	7.46	6.24	10.43	8.15	8.44	7.50	7.90
Clothing	6.11	6.74	10.69	9.32	8.70	9.38	6.89	9.05
Maintenance	1.70	1.39	1.22	2.52	1.33	1.21	2.18	0.49
Health	4.20	8.92	1.74	2.05	3.64	4.49	2.43	4.81
Travelling	5.54	0.60	3.13	5.19	3.82	8.56	1.81	6.47
Cigars	5.23	3.49	11.33	4.77	10.95	7.88	12.32	10.49
Miscellaneous*	16.67	14.40	17.41	14.53	19.74	22.14	18.74	22.26

* Maintenance +Health+ Travelling+Cigars