

5-2 Basic Principles Of Cost Analysis

1) Introduction

The ultimate objective of this project is to propose practical models of multi-storied forest management that can be applied in the tropic regions. Cost analysis, which demonstrates numerically whether the models proposed are truly practical or not, will form the core of the final report of this project.

At present, however, our proposals are still limited to simple and incipient models of multi-storied forest management due to shortage of available data for cost analysis. Therefore, in this interim report we shall discuss only the general process of the cost analysis to be included in the final report, and present a summary of the fundamental data obtained in the project so far.

First, it must be stated that unlike ordinary demonstration, project, this project includes certain species of technical developments though its objective is to validate multi-storied forest management on a commercial scale.

In Japan, some eager forest owners have been engaged in commercial multi-storied forest management for many years, and the active planting of one million hectares of multi-storied forests (equivalent to one tenth of all of Japan's man-made forest) is now under way as part of the government's long-term plan for forest resource development. On the contrary, other countries in the tropical regions are yet to approach the technical aspects of multi-storied forest management as well as commercial aspects.

In these circumstances, it is felt that the following process will be necessary in order to achieve this project's goal of creating practical models for establishing commercially viable multi-storied forests.

(Technical Developments)

1. Establishment Of Three Types Of Multi-Storied Forests

This is the first step to establish successful multi-storied forests which we are now trying at Chikus and Bukit Kinta sites.

2. Making Manuals Of Multi-Storied Forest Management

After ensuring the work procedures and schedules for establishing three types of multi-storied forests, it is necessary to make manuals of multi-storied forest management which is suitable to other tropical regions.

(Cost Analysis)

3. Cost Analysis Of Establishing Multi-Storied Forests

Here, we will do provisional calculations of the costs of multi-storied forests being established in this project, collect market data, and survey the prices of relevant products (e.g., logs) in order to ascertain what type of commercial problems of commercial problems exist and consider measures for resolving these problems.

4. Propose Practical Models

This is the final goal to propose practical models of multi-storied forest management whereby it involves the determination of necessary work procedures and which type of commercial entity would be appropriate in terms of the technical requirement of plantation and the pre-requisites of forestry management.

The stages of work of the project are as shown in Fig. 29.

Presently, we have proposed three simple models based on the results of experimental plot in Block-B. However, the cost analysis for these models are yet to be done. And also, we have not proposed other models based on the results of Chikus Block-A and Bukit Kinta site.

According to these stages, our project is currently in stage 1 of technical development. Hence, it is necessary to find suitable techniques to establish multi-storied forest, thereafter, we will proceed to the next stages and may sometimes return to stage 1, if necessary. Therefore, in the initial stage, we are unable to ascertain the best method for establishing multi-storied forest. This is also why we did not follow the same method of cost analysis used by JICA project in Nigeria.

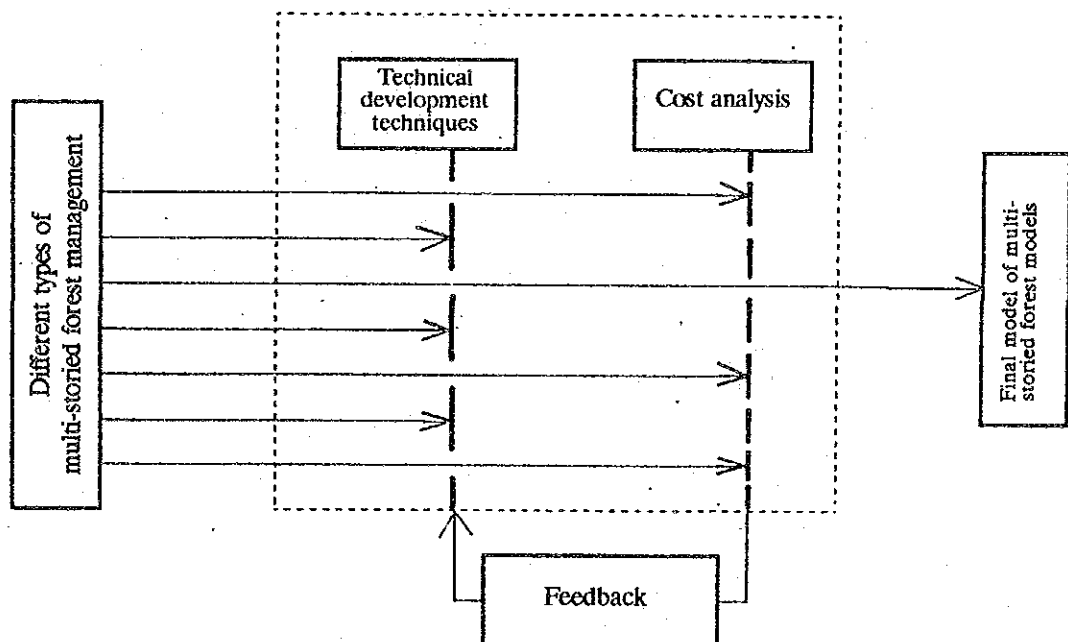


Fig. 29. Flowchart of the project

2) Analysis Of Multi-Storied Forest Management Costs In This Project.

(1) Selection Of Work Procedures

The following general types of work are expected as part of multi-storied forest management.

1. Preparations (building and maintaining forest roads)
2. Nursery work (except commercially purchased seedlings)
3. Site preparation
4. Planting
5. Weeding
6. Cutting of climber
7. Salvage cutting
8. Thinning
9. Pruning
10. Felling

(2) Preparing Procedures Manuals (Including The Duration And Frequency of Work Procedures)

Because the duration and frequency of each work procedure depends on the type of multi-storied forest, a clear procedures manual for each must be prepared.

Incidentally, the surface area (42 ha.) planted in 1992 fiscal year at Chikus Block-B, on which the aforementioned models are based, involved the following work procedures.

Fiscal year	Type of work
1992	Felling of pre-existing trees (felling, pruning, extraction and piling-up) Site preparation Planting Weeding
1993	Weeding Weeding Weeding Weeding

Operations in addition to those listed above included the construction of forest roads and fire break throughout the Chikus site (completed in 1992 fiscal year), nursery work, and seedlings transportation.

As evinced by the model described above, the second clearing of pre-existing trees at Block-B is now necessary, whereby taking into consideration changes in forest illuminance and tree growth, we must establish which types of work are necessary as well as the proper duration of each.

(3) Provisional Calculations Of Costs

Before the provisional calculation of costs, let us examine the list of direct expenses spent on multi-storied forest seedlings planted between pre-existing trees at Chikus Block-B in 1992 fiscal year as calculated from the work breakdown of each contractor (see Reference 1 in Section 5-3, "Plantation Cost Analysis").

Work procedure	Unit cost (RM/tree)	Quantity (trees)	Payment (RM)
Felling and pruning	3.50	17,168	60,088.00
Extraction and piling-up	2.50	17,168	42,920.00
Site preparation	1.00	17,168	17,168.00
Planting	0.85	17,168	14,592.80
Weeding	0.60	17,168	10,300.80
Weeding	0.40	17,000	6,800.00
Weeding	0.40	17,000	6,800.00
Weeding	0.40	17,000	6,800.00
Weeding	0.40	17,000	6,800.00
Total			172,269.60

Now, let us look at nursery work. First, the seedling unit cost is calculated from direct expenses used in seedlings production between September 1992 (the start of seedlings production) and December 1993 (excluding expenses used in nursery preparation); see Tables 83 to 85 in Section 5-4, "Calculating the Costs of Seedlings Production".

Type of seedling	Total Expenses (RM)	Number of surviving seedlings (trees)	Unit cost (RM/tree)
Wildings	65,348.00	59,900	1.09
Cultivated seedling	78,676.00	89,278	0.88

However, these figures show only the total number of seedlings cultivated at nurseries; the unit cost of dipterocarp seedlings for planting between pre-existing trees is not clear.

The unit cost of seedlings purchased commercially was RM 2.2 per seedlings in the case of *Shorea leprosula*, while the cost of transporting seedlings used in multi-storied forest was RM 1.0 per seedling.

Hence, the provisionally calculated plantation costs (i.e., direct expenses) per hectare for the entire ((one-year) process, from seedlings cultivation to weeding, of planting a B-type multi-storied forest at Block-B are RM 4,833 (see Tables 77 and 78 in Section 5-3, "Cost Analysis on Silviculture").

In contrast, the costs of developing a simultaneously planted forest are, according to Tajima Report* and past unit costs in plantation contracts in Perak, roughly RM 2,000 per hectare for *Acacia mangium* and RM 3,000 per hectare for dipterocarps.

***Note:** "Tajima Report" refers to Kenzo Tajima's "Report on the Field Validation of Multi-Storied Forest Management Techniques in Malaysia," a report concerning forest management (December 1992).

Thus, the costs of planting a B-type multi-storied forest are roughly 2.4 times higher than those of a simultaneously planted forest of *Acacia mangium*. Furthermore, multi-storied forest management involves other expenses and costs that ultimately must be incorporated into cost analysis (such as those for preparing seedlings nurseries, purchasing vehicles and equipment, and constructing forest roads, offices, and other facilities).

(4) Precautions Concerning Cost Analysis

Priority in cost analysis for the time being must be given to provisional calculations of the total expense of planting multi-storied forests based on the aforementioned models. To do this, it is first necessary to prepare manuals of rationalized forestry procedure.

Next, estimated revenue from felling must be calculated, for which we need to draft harvest projections more solidly based on current trends, and at the same time estimate the long-terms prices of timber.

Finally, concurrent with this work we also plan to develop better models and determine conditions that will enable us to satisfy such business pre-requisites as 1) reducing the costs of preparations, 2) reducing seedlings costs, 3) increasing the efficiency of mechanized work, and 4) recovering capital invested by a) cost reduction in the felling and transporting pre-existing trees and b) the sale of timber from pre-existing trees.

5-3 Cost Analysis on Silviculture

5.3.1 The Costs of Planting Multi-Storied Forest in Man-Made Forest To The Multi-Storied Forest

The conversion of man-made forest to the multi-storied forest has started in October 1992 at Chikus Block-B. The costs of work is calculated based on the contracts for silvicultural works in 1992 and 1993.

Silvicultural works are done by contractors in Peninsular Malaysia. Although this project should estimate the contract price before agreeing the contract, but since this was the first project for Forestry Department which involved strip-cutting of man-made forest and line planting in it, there was no standard for estimation. Instead, cost estimates were prepared in consultation with Forestry Department officials, based on existing materials and their experiences. The following summary of contracts up to now is intended for use in the cost analysis that will be presented in the final report.

From the felling of upper trees to the planting of seedlings and the final weeding, establishment of multi-storied forest at Chikus Block-B involved the six main work procedures listed in Table 77 below, an overview of work procedures and their costs (direct expenses only). Because there are five patterns of line planting, each involving different quantities of trees felled and seedlings planted per hectare, unit costs were calculated not per hectare but per seedling. Diameters and height of upper trees are critical determinants in the cost of felling and log collection. They were an average diameter of 13 to 18 cm., with an average height of 13 to 18 m., in the case of the three-to-four-year-old *Acacia mangium* man-made forest at Chikus Block-B. See Reference 1 for a list of silvicultural contracts. Outputs per day of silvicultural works were still being surveyed and could not be prepared in time for this interim report.

Table 77. Work procedures and their costs

Work procedure	Cost (RM/tree)
1. Felling of upper tree and disbranching	3.50 - 4.00
2. Skidding and stacking	2.50 - 3.00
3. Site preparation	1.00
4. Seedling loading and transportation	0.20 - 1.00
5. Planting	0.85
6. Weeding	0.40 - 0.60

Note: 1. RM: Malaysian currency.
2. Trees were felled with chainsaws.
3. Farm tractors were used to collect and stack felled trees.
4. Site preparation was performed manually using hatchets.
5. Weeding was performed manually using hatchets.

Table 78, the per-hectare costs (direct expenses only) provisionally calculated under the listed preconditions, shows that the per-hectare cost of two-storied plantation was roughly RM 4,800 for the first year.

Table 78. Cost in two-storied forest planting in 3-year old *Acacia mangium* man-made forest

Precondition	Cost (RM)	Basis of estimate
Species of upper trees: <i>Acacia mangium</i> 3-year old (DBH 14 cm., H 13 m.) Seedlings planted: 900/ha. Remaining trees: 765/ha.		
Upper trees felled: 382/ha (2:2 [2 rows felled/2 rows left] method)	Felling costs: 1,337	(382 trees x RM 3.50)
Tree length skidding distance: 200 m.	Skidding costs: 955	(382 trees x RM 2.50)
Site preparation (spot weeding): 1 m diameter (382/ha.)	Site preparation costs: 382	(382 seedlings x RM 1.00)
Seedling cost: RM 2.20/seedling (Species: <i>Shorea leprosula</i>)	Seedling costs: 841	(382 seedlings x RM 2.20)
Seedling loading and transportation: RM 1.00/seedling (from Chikus nursery to Block-B)	Transportation costs: 382	(382 seedlings x RM 1.00)
Seedlings planted: 382/ha	Planting costs: 325	(382 seedlings x RM 0.85)
Weeding: Line weeding with 1 m. width	Weeding costs: 611	(382 seedlings x RM 0.40)
	Total 4,833	

- Note: 1. The estimated unit cost is based on 1992 plantation contracts.
2. Weeding costs are the total for four times of weedings. Under the 2:2 method, weeding is discontinued after the first year.

5.3.2 The Costs of Planting of Multi-Storied Forest in Open Land

Planting began at Chikus Block-A in April 1993, and a summary of contracts for 1992 and 1993 is presented below for use in cost analysis to be contained in the final report. Multi-storied forest planting work at Chikus Block-A, from the felling of low quality secondary forests (which regenerated following clear-cutting) to the planting and the completion of weeding, consisted primarily of the five work procedures listed below. The felling of secondary forests, not normally needed after clear-cutting, was necessary when this project began as pioneer species (e.g., *Macaranga* spp.) had already thickly covered the planned site, growing to heights of two to three metres. An overview of the principal work procedures and their costs is shown in Table 79 and a list of silvicultural contracts in Reference 1.

Outputs per day of each work were still being surveyed and could not be prepared in time for this interim report.

Table 79. Work procedure and costs

Work procedure	Cost (RM)
1. The felling of secondary forest	230.00 - 814.00/ha.
2. Piling and burning (2 times)	290.00 - 651.00/ha. (each time)
3. Transport of seedlings	0.20/seedling
4. Planting	0.60/seedling
5. Weeding	0.20/seedling

- Note: 1. RM: Malaysian currency
 2. Trees were felled with bulldozers.
 3. Piling was done with bulldozers.
 4. Weeding was performed manually.

Table 80, the provisional costs per hectare as calculated under the pre-conditions listed (direct expenses only), shows that the cost of two-storied forest plantation is roughly RM 3,600 per hectare in the first year. In addition, as reported in detailed in the previous section "Planting Experiments," the extremely poor growth results achieved in 1993 for high-quality timber species (i.e., dipterocarps) simultaneously planted with fast-growing species in open land indicate the unsuitability of these method.

**Table 80. Costs in two-storied forest planting in open land (clear cut site)
 (based on the simultaneous planting of two alternating rows of fast-growing
 and high-quality timber species)**

Precondition	Cost (RM)
Pre-existing species: <i>Macaranga</i> spp. and other species in the secondary forest/2½-year old (DBH 5 cm, H 3 m)	
Felling of secondary forest: Clear-cutting	Felling costs: 230
Piling/burning: Two times	Piling/burning costs: (290 x 2) 580
Seedling cost: Fast-growing speci (<i>Acacia mangium</i>)	Seedling costs: (450 x 0.60) 270
High-quality timber speci (<i>Shorea leprosula</i>)	(450 x 2.20) 990
Seedling loading and transportation: RM 0.20/seedling (from Chikus nursery to Block-A)	Transportation costs: 180 (900 x 0.20)
Seedlings planted: 900/ha. (<i>Acacia mangium</i> 450/ha. <i>Shorea leprosula</i> 450/ha.)	Planting costs: (900 x 0.60) 540
Weeding: Spot weeding with 1 m of diameter	Weeding costs: (900 x 5 x 0.20) 900
	Total 3,690

- Note: 1. The estimated unit cost is based on 1992 plantation subcontracts.
 2. Weeding costs are the total for five times of weedings. Although weeding for *Acacia mangium* is discontinued after the first year, weeding for *Shorea leprosula* will be necessary for several years (if the trees survive).

5.3.3 The Costs of Planting Multi-Storied Forest in Logged-Over Natural Forest

Discussion of this planting, which was only recently started at the end of February 1994 at the Bukit Kinta site, will be included in future reports as sufficient data is currently unavailable.

(Reference-1)

Plantation Contracts: Breakdown According to Work Procedure

1. General plantation work

Contract number	Contract date	Block	Unit cost	Contracted quantity	Unit	Contracted price	Completed quantity	Amount paid	Contractor	Remarks
3/1992	Aug. 1992	A	Felling	230.00	60	ha.	13,800.00	60	ESWAI	
1/1993	Aug. 1992	A	Felling	813.75	65	ha.	52,893.75	0.00	KOPERASI	
2/1992	Jun. 1992	B	Felling and disbranching	3.50	14,028	tree	49,098.00	17,168	ZUMI	
3/1993	Sep. 1993	B	Felling and disbranching	4.00	27,658	tree	110,632.00	0.00	ZUMI	
2/1992	Jun. 1992	B	Skidding and piling	2.50	14,028	tree	35,070.00	17,168	ZUMI	
3/1993	Sep. 1993	B	Skidding and piling	3.00	27,658	tree	82,974.00	0.00	ZUMI	
3/1992	Aug. 1992	A	Burning and piling	290.00	60	ha.	17,400.00	60	ESWAI	Two times of burning
1/1993	Aug. 1993	A	Burning and piling	651.00	65	ha.	42,315.00	0.00	KOPERASI	In progress
2/1992	Jun. 1992	B	Site preparation	1.00	14,028	tree	14,028.00	17,168	ZUMI	
3/1993	Sep. 1993	B	Site preparation	1.00	27,658	tree	27,658.00	0.00	ZUMI	
	Feb. 1994	BK	Site preparation				6,000.00	0.00	ZUMI	In progress at plot D
	Oct. 1993	Arbo- return	Site preparation	630.00	5	ha.	3,150.00	5	MSK	Excluding rental of heavy-duty machinery
3/1992	Aug. 1992	A	Transport of seedlings	0.20	27,540	tree	5,508.00	27,540	ESWAI	
2/1992	Jun. 1992	B	Transport of seedlings	1.00	14,028	tree	14,028.00	17,168	ZUMI	
3/1993	Sep. 1993	B	Transport of seedlings	1.00	32,747	tree	32,747	0.00	ZUMI	
	Feb. 1994	BK	Transport of seedlings	1.00	800	tree	800	0.00	ZUMI	Plot D

Contract number	Contract date	Block	Unit cost	Contracted quantity	Unit	Contracted price	Completed quantity	Amount paid	Contractor	Remarks
3/1992	Aug. 1992	A	0.60	51,240	tree	30,744.00	51,240	30,744.00	ESWAI	
2/1992	Jun. 1992	B	0.85	14,028	tree	11,923.80	17,168	14,592.80	ZUMI	
3/1993	Sep. 1993	B	0.85	32,747	tree	27,834.95		0.00	ZUMI	In progress
	Feb. 1994	BK	0.85	800	tree	680.00		0.00	ZUMI	Plot D
	Oct. 1993	Arbo- return	0.65	2,250	tree	1,462.50	2,250	1,462.50	MSK	

3/1992	Aug. 1992	A	200.00	50	ha.	10,010.00		0.00	ESWAI	Contract adjusted
	May 1993	A	0.20	50,000	tree	10,000.00	29,948	5,989.60	Teong Ah Hing	Contract adjusted
	Aug. 1993	A	0.20	12,371	tree	2,474.20	12,371	2,474.20	Teong Ah Hing	
	Oct. 1993	A	0.20	32,591	tree	6,518.20	32,591	6,518.20	Teong Ah Hing	
	Oct. 1993	A	0.20	32,591	tree	6,518.20	32,591	6,518.20	MSK	
	Dec. 1993	A	0.20	32,591	tree	6,518.20	32,591	6,518.20	KOPERASI	
	Aug. 1993	B	0.40	17,000	tree	6,800.00	17,000	6,800.00	Teong Ah Hing	
	May 1993	B	0.40	17,000	tree	6,800.00	17,000	6,800.00	Teong Ah Hing	
2/1992	Jun. 1992	B	0.60	14,028		8,416.80	17,168	10,300.80	ZUMI	
	Oct. 1993	B	0.40	17,000	tree	6,800.00	17,000	6,800.00	MSK	
	Dec. 1993	B	0.40	17,000	tree	6,800.00	17,000	6,800.00	KOPERASI	
	May 1993	Arbo- return	0.20	1,000	tree	200.00	1,000	200.00	Teong Ah Hing	
	Oct. 1993	Arbo- return	0.20	7,281	tree	1,456.20	7,281	1,456.20	MSK	
	Dec. 1993	Arbo- return	0.20	7,281	tree	1,456.20	7,281	1,456.20	KOPERASI	

1/1992	Jun. 1992	A	0.88	10,000	m.	8,800.00	10,467	9,210.96	DINA JAYA	
3/1992	Aug. 1992	A	0.80	11,319	m.	9,055.20	11,319	9,055.20	ESWAI	
	Aug. 1993	A	0.30	11,208	m.	3,362.40	11,208	3,362.40	Teong Ah Hing	
3/1993	Sep. 1993	B	1.00	17,192	m.	17,192.00		0.00	ZUMI	

2. Inventories and other work

Contract number	Contract date	Block	Unit cost	Contracted quantity	Unit	Contracted price	Completed quantity	Amount paid	Contractor	Remarks
1/1993	Aug. 1993	A	162.75	65	ha.	10,578.75		0.00	KOPERASI	Contract: 10,578.70
	Oct. 1993	Arbo- return	400.00	3	day	1,200.00	3	1,200.00	MSK	D5 (including operator)
5/1992	Feb. 1993	A, B natural forest	1,125.00	73,715	m.	82,929.38	79,256	89,163.00	ANEKA	
	Sep. 1992	B				11,300.00		11,300.00	TASIK	Transport to Block-A
	Oct. 1993	A	0.15	4,822	plate	723.30	4,822	723.30	Teong Ah Hing	High-quality timber species
	Oct. 1993	A	0.20	3,044	plate	608.80	3,044	608.80	Teong Ah Hing	Acacia mangium
	Oct. 1993	A	0.50	4,822	plate	2,411.00	4,822	2,411.00	Teong Ah Hing	Including pole placement for high-quality species
	Feb. 1994	BK	6.50	115	pole	747.50		0.00	ZUMI	Indicators around plot D
1/1992	Jun. 1992	A	5.00	113	pole	565.00	113	565.00	DINA JAYA	
3/1992	Aug. 1992	A	3.00	136	pole	408.00	136	408.00	ESWAI	
3/1993	Sep. 1993	B	2.00	145	pole	290.00		0.00	ZUMI	
	Feb. 1994	BK	0.80	500	pole	400.00		0.00	ZUMI	Plot D
1/1992	Jun. 1992	A	15.00	113	pole	1,695.00	113	1,695.00	DINA JAYA	
3/1992	Aug. 1992	A	15.00	136	pole	2,040.00	136	2,040.00	ESWAI	
3/1993	Sep. 1993	B	15.00	145	pole	2,175.00		0.00	ZUMI	
2/1993	Oct. 1993	BK	10545.6	7.80	ha.	82,256	6,6018	69,620.21	F. Inventory	

Contract number	Contract date	Block		Unit cost	Contracted quantity	Unit	Contracted price	Completed quantity	Amount paid	Contractor	Remarks
3/1992	Aug. 1992	A	Seedling	0.60	23,700	seedlin	14,220.00		0.00	ESWAI	Contract adjusted
	Oct. 1993	A	Seedling marking	0.20	4,822	seedlin	964.40	4,822	964.40	Teong Ah Hing	High-quality timber species
	Oct. 1993	A	Seedling marking	0.20	3,044	seedlin	608.80	3,044	608.80	Teong Ah Hing	Acacia mangium
2/1992	Jun. 1992	B	Forest road constructio	10.00	1,200	m.	12,000.00	1,200	12,000.00	ZUMI	

3. Indirect expenses

Contract number	Contract date	Block		Unit cost	Contracted quantity	Unit	Contracted price	Completed quantity	Amount paid	Contractor	Remarks
1/1993	Aug. 1993	A	General and administrative expenses				11,450.00		0.00	KOPERASI	Work in progress
3/1993	Sep. 1993	B	General and administrative expenses				11,820.00		0.00	ZUMI	
2/1993	Oct. 1993	BK	General and administrative expenses				5,450.00		5,450.00	F. Inventory	
	Feb. 1994	BK	General and administrative expenses				1,730.00		0.00	ZUMI	Plot D

Breakdown of general and administrative expenses: worker's compensation insurance, fire insurance, taxes, travel expenses, and miscellaneous expenses.

5-4 Calculating The Costs Of Seedlings Production

Table 81, the per-month acquisition costs of seedlings for planting and their production costs from September 1992 to December 1993, does not include equipment purchased locally before August 1992, equipment provided by the Japanese side, or equipment depreciation.

a. The Conditions And Basic Principles In Calculating Seedlings Production Costs

1. Seedlings received gratis from the Perak State Forestry Department are included in seedlings production costs at a unit cost of RM 1.00 per seedling. Also included are transport costs and fuel costs for the lorry, etc.
2. All seedlings purchased from other State Forestry Departments (those received gratis and those for which payment was made) are counted at RM 1.00 per seedling. As these seedlings were transported using the project's lorry, the driver's allowance and fuel costs, etc., are also included.
3. The unit cost of seedlings from private nurseries is based on actual payments made, which included the cost of transporting them to the Chikus nursery.
4. Included in the cost of acquiring wildings are worker salaries, JICA staff salaries (nursery), travel allowances, equipment used in seedlings collection, and the cost of fuel for the seedlings collection team's Pajero.
5. Included in the cost of seedlings production in nurseries raised from seed are worker salaries, JICA staff salaries (nursery), travel allowances for the seed collection team, equipment used in seed collection, and the cost of fuel for the seed collection team's Pajero.

As seedlings acquisition involves wildings collection, nursery cultivation, purchases from private nurseries, as well as purchases from or given by State Forestry Departments, seedlings production cost must be made. These account were closed at the end of December 1993 and the total production costs were calculated. In addition, most of the seedlings from State Forestry Department and private nurseries were subsequently cultivated for at least six months at the Chikus nursery.

b. Calculating Seedlings Production Costs

1. Costs are slightly high because of the high percentage of seedlings from private nurseries, which cost between RM 200 and RM 2.95. In contrast, wildings, because of low labour costs and per-worker daily yields of 100 to 200 seedlings, cost only RM1.09 each (Table 82).

2. As a single *Shorea* mother tree yields between 20,000 and 30,000 seeds which, depending on their maturity at collection, have germination rates close to 40%. The unit cost of seedlings cultivated from seed is only 88 cents. assuming planting in the field was carried out after the seedlings were kept and maintained in the nursery for a period of four months (Table 83). This method, though offering the lowest unit cost, does not provide consistent supplies due to the generally short life span of dipterocarp seeds which makes storage and cultivation difficult.

3. State Forestry Departments depend primarily on wildings and thus cannot be relied on to deliver large quantities of seedlings for this project. Instead, we intend to rely on them as of information on seeds and wildings.

From the preceding, it was revealed that the cost of purchasing dipterocarp and other species seedlings from private nursery is excessively high (about RM 3.00 per seedling) especially when considering the low daily salary of workers which is only RM 11.00.

However, because of the difficulty (reflected in this unit cost) of dipterocarp seedlings production and the lack of information on seeds and wildings even among private nurseries - factors that inhibit our growing of seedlings from seed - the collecting and production of wildings inside the forest is the most cost-effective method and results in the highest survival rates. This is because wildings collected have already been growing healthily, even by transporting them to Chikus nursery and later subjected to 2 or 3 months of hardening period before planting, the cost is still lower and the survival rate after planting is high.

Judging from 1993 rainfall patterns in Malaysia's west coast, especially the area around the Chikus nursery where it rained every two days, we feel that there is no danger of seedlings collected in the wild subsequently dying without watering at temporary nurseries prepared inside natural forests. Experiments carried out at our project's temporary nursery in Gerik revealed almost no problems in this area.

The only problem is the lack of information on where to collect seeds and wildings. As there are always trees flowering or fruiting somewhere in Malaysia and wildings are always available, a system for collecting and relaying this information must be established and gradually improved.

c. Seedling Cultivation Log

In 1994 fiscal year, we intend to establish specific parameters for cost analysis and begin keeping a seedlings cultivation log that will facilitate analysis of each process.

See Table 84 (below) for the seedlings cultivation log we are planning.

Table 81. Monthly seedling production costs and cost breakdown

Category	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
1) Wilding	24,806	5,612	4,300	1,871	6,142	13,825	12,113	2,280	0
2) Cultivated seedling	0	0	0	4,840	0	0	0	0	37,094
3) Seedlings from 14 private nurseries	15,000	892	22,500	0	14,152	0	5,000	0	0
4) Seedlings from the Perak State Forestry Department	18,000	0	0	0	1,471	11,150	0	1,316	3,848
5) Seedlings from other State Forestry Departments	14,428	0	1,000	0	0	0	0	12,000	0
Total of seedlings	72,234	6,504	27,800	6,711	21,765	24,975	17,113	15,596	40,942
1) Personnel expenses	9,551	1,565	3,822	3,390	4,683	5,896	6,870	7,193	6,066
2) Seedlings purchasing costs	59,552	2,230	29,000	0	43,220	4,570	11,000	13,316	3,848
3) Fuel costs	1,378	458	174	259	684	609	622	1,008	1,239
4) Equipment costs	4,429	593	1,664	14	2,117	991	2,995	4,584	16,471
5) Miscellaneous expenses	7,135	5,955	2,122	3,373	3,273	6,941	6,013	6,720	5,249
Total expenses	82,045	10,801	36,782	7,036	53,977	19,007	27,500	32,821	32,873
Unit cost per seedling	1.14	1.66	1.32	1.05	2.48	0.76	1.61	2.10	0.80

Category	Oct.	Nov.	Dec.	Total	Dead seedlings	Surviving seedlings	Survival rate
1) Wilding	12,593	4,558	8,741	96,841	36,941	59,900	62%
2) Cultivated seedling	43,170	4,174	0	91,477	2,199	89,278	98%
3) Seedlings from 14 private nurseries	12,600	0	0	70,144	5,929	64,215	92%
4) Seedlings from the Perak State Forestry Department	0	1,000	0	36,785	2,894	33,891	92%
5) Seedlings from other State Forestry Departments	0	0	0	27,428	1,535	25,893	94%
Total of seedlings	68,363	9,732	8,741	322,675	49,498	273,177	85%
1) Personnel expenses	9,015	6,709	8,325	73,085			
2) Seedlings purchasing costs	27,900	1,000	0	195,636			
3) Fuel costs	754	798	729	8,712			
4) Equipment costs	19,281	400	1,258	54,797			
5) Miscellaneous expenses	8,962	5,054	9,405	70,202			
Total expenses	65,912	13,961	19,717	402,432			
Unit cost per seedling	0.96	1.43	2.26	1.25			1.47

Note: 1. Seedling figures indicate numbers of seedlings; expenses are in Malaysian ringgit.

2. Seedling quantities and expenses from September 1992 to January 1993 are included in the figures for January 1993.

Table 82. Monthly wildling costs and cost breakdown

Category	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
1) Wildling									
Total of seedlings	24,806	5,612	4,300	1,871	6,142	13,825	12,113	2,280	0
1) Personnel expenses	9,551	1,565	1,147	662	908	4,593	2,650	161	0
2) Fuel costs	1,378	458	53	67	76	202	310	31	0
3) Equipment costs	4,429	593	1,604	0	525	690	282	825	0
4) Miscellaneous expenses	7,135	5,955	637	884	872	6,425	3,314	271	0
Total expenses	82,045	10,801	3,441	1,613	2,381	11,910	6,556	1,288	0
Unit cost per seedling	0.79	0.69	0.80	0.86	0.39	0.86	0.54	0.56	0.00

Category	Oct.	Nov.	Dec.	Total	Dead seedlings	Surviving seedlings	Survival rate
1) Wildling							
Total of seedlings	12,593	4,558	8,741	96,841	36,941	59,900	62%
1) Personnel expenses	1,376	715	3,749	26,611			
2) Fuel costs	227	172	729	3,704			
3) Equipment costs	1,695	585	17	8,535			
4) Miscellaneous expenses	2,767	375	2,239	26,498			
Total expenses	6,065	1,847	6,734	65,348			
Unit cost per seedling	0.48	0.41	0.77	0.67			

Note: 1. Seedling figures indicate numbers of seedlings; expenses are in Malaysian ringgit.

2. Seedling quantities and expenses from September 1992 to January 1993 are included in the figures for January 1993.

Table 83. Costs of cultivating seedlings from seed

Category	Quantity	Unit cost per seedling
Cultivated seedling	91,477	0.86
Total		
Surviving seedling	89,278	0.88
Survival rate	98%	
Expenses		
Personnel expenses	20,661	
Fuel costs	2,899	
Equipment costs	24,167	
Miscellaneous expenses	30,949	
Total	78,676	

Note: These figures show the expenses of seed collection and numbers of seedlings between March and October 1993.

Note: These figures were determined as of the last day of December 1993.

Note: Seedlings returned to the wild are calculated at a unit cost of 90 cents as more may die in the future.

Note: High equipment expenses reflect the costs of preparing additional temporary nurseries.

Table 84. Seedling cultivation log

Year	Work procedure	Species	Workload	Workers and salary Aggregate	Salary	Worker's allowance	Fuel costs	Equipment costs
Equipment used				Common expenses		Total		Remarks

5-5 Analysis Of Costs for Roads

1) Plans And Results Concerning Roads

It was planned to convert pre-existing roads in the Chikus and Bukit Kinta areas into all-weather roads. Most work roads and fire belts had to be newly constructed. Table 85 shows the plans and results concerning roads. Figs. 30 and 31 show the current state.

Table 85. The plans and results concerning roads

(Unit: m)

Category	Chikus		Bukit Kinta		Total		Remarks
	Plan	Result	Plan	Result	Plan	Result	
Forest road	8,000.0	8,050.0	1,593.0	1,660.0	9,593.0	9,710.0	Forest roads includin
Operation road	11,500.0	1,200.0	2,000.0	-	13,500.0	1,200.0	1,300 meters of fire
Fire break	11,500.0	10,815.5	-	-	11,500.0	10,815.5	break

2) Expenses

Although it was initially planned to directly supervise the construction of roads, partly because of requests from the Malaysian government, however, it was decided to contract out the construction work except for gravelling and simple repairs.

Regardless of the difficulties of detailed cost analysis, roads control the success of planting in tropical regions because of the significance of costs associated with road construction and maintenance.

Tables 86 and 87 show the total expenses of constructing and maintaining roads.

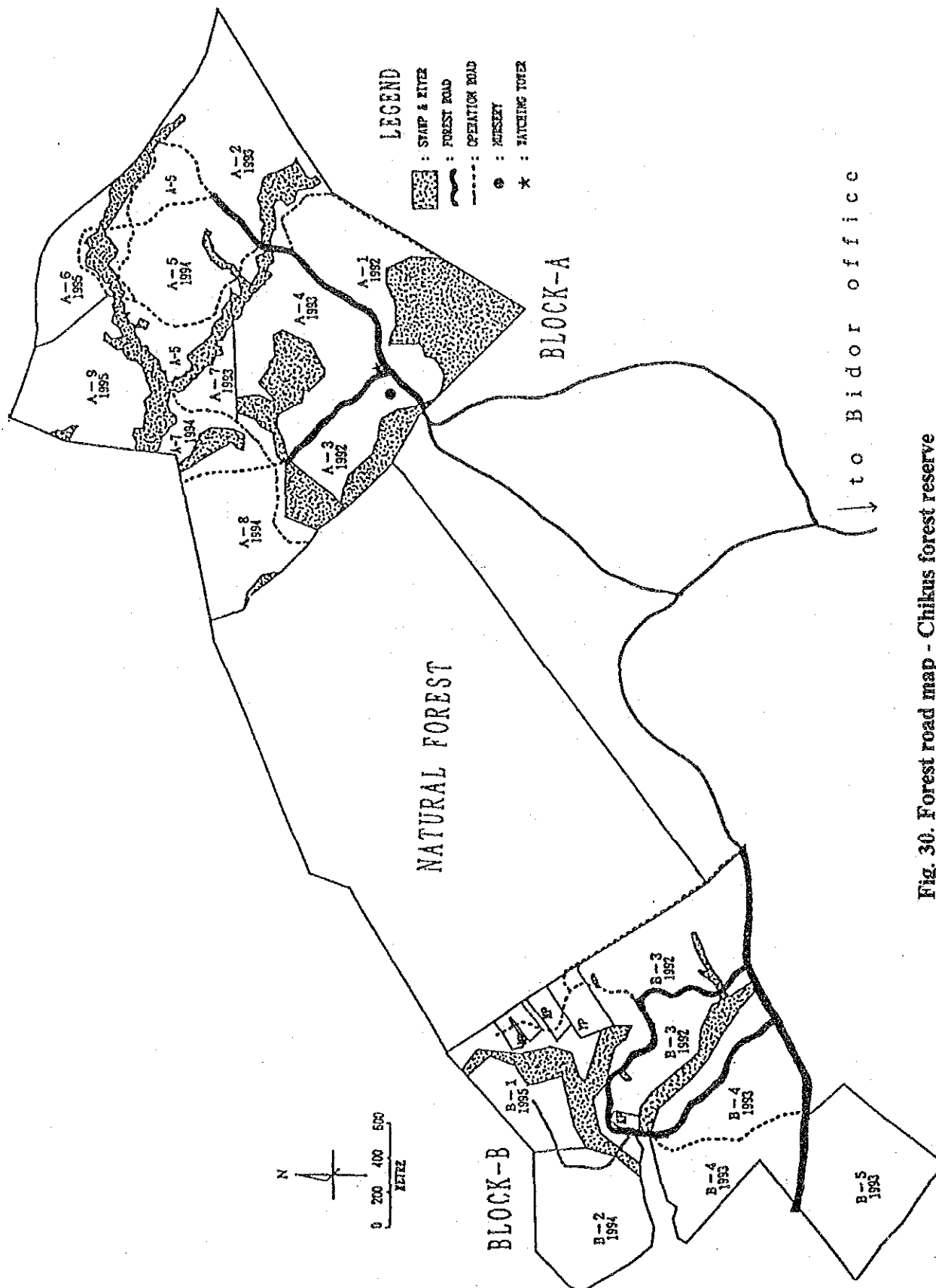


Fig. 30. Forest road map - Chikus forest reserve

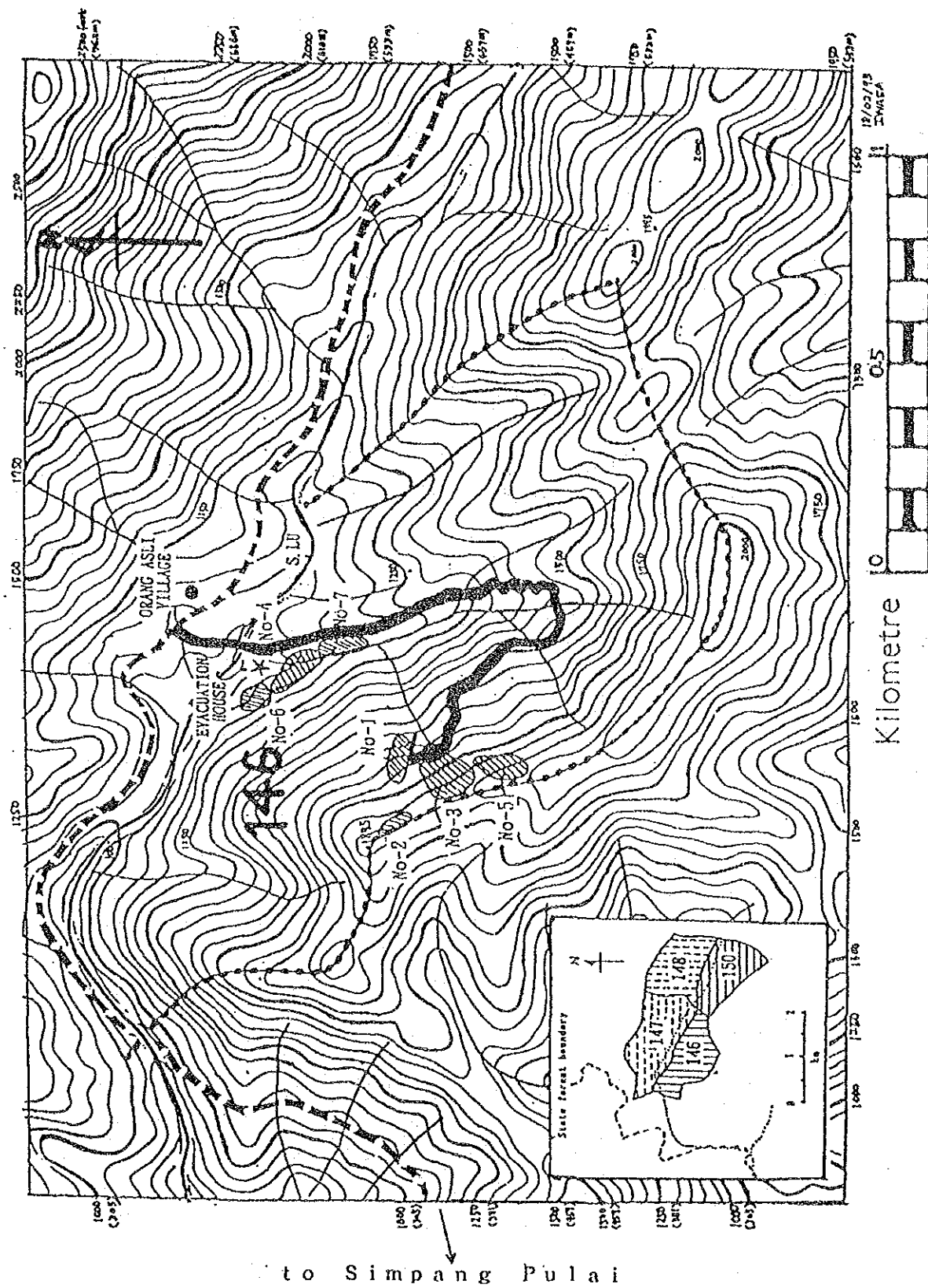


Fig. 31. Forest road map - Bukit Kinta (compartment 146)

Table 86. Road construction and maintenance expenses

(Construction)

Area	Period	Length	Access region	Density	Construction costs (RM)	Unit price of construction
Chikus	Jun. 12, 1992 - Dec. 6, 1992	8,050 m.	500 ha.	16.1 m./ha.	135,305.0	RM 16.80/m.
Bukit Kinta	Same as above	1,660 m.	300 ha.	5.5 m./ha.	135,640.0	RM 81.70/m.

Construction costs in Bukit Kinta included bridge construction costs. If these costs are excluded, the unit price of construction is RM53.1/m. $([135,640 - 47,460] / 1,660 = \text{RM}53.1 / \text{m.})$.

(Maintenance expenses)

The expenses below concerning maintenance during a one-year period between December 1992 (when roads were completed) and December 1993.

Area	Restoration (RM)	Gravelling (RM)	Total (RM)	Construction costs (RM)	Percentage	Remarks
Chikus	45,963	6,545	52,508	135,305	38.8	
Bukit Kinta	20,459	-	20,459	135,640	15.8	Restoration costs are estimated

Table 87. Costs for constructing operation roads and fire break

Category	Area	Year	Length (m.)	Costs (RM)	Unit price	Remarks
Operation road	Chikus	1993	1,200.0	12,000.00	RM 10.00/m.	
Fire break	Chikus	1992	10,851.5	78,130.00	RM 7.20/m.	

3) Maintenance And Repairs of Access Roads

Both the Chikus and Bukit Kinta project sites are some distance (8 and 9 km. respectively) from public roads (which are subject to laws regarding roads), which, combined with the relatively low utilization of roads by local residents, results in infrequent road maintenance by the Malaysian government.

The Bukit Kinta access road, for instance, was originally constructed by a logging company to facilitate logging operations and, since the end of logging, has been used only by the few villagers who live nearby. Roads in the Chikus area are work and transport roads built for the tin mines located around the permanent forest reserve (PFR) in which the project's site is located. Now that the mining operations have ceased, these roads are used only by a small numbers of settlers who raise cattle and water buffaloes or manage orchards. Consequently, since the project implementation, we have been forced to directly supervise the construction (financed by this project) of two bridges along the access road (Chikus and Bukit Kinta respectively), one restoration project (financed by the Forestry Department), and the maintenance of the Chikus site access road (Table 88).

Nevertheless the construction and maintenance of access roads is an extremely important, very basic factor affecting the progress of this project

Table 88. Actual expenses for access roads (up to 1993 fiscal year)

(Unit: RM)

Area	Category	Performed by	Cost	Remarks
Chikus	Bridge construction	JICA	76,570	
	Road construction	JICA	-	JICA's motor grader was use
Bukit Kinta	Bridge construction	JICA	70,867	
	Restoration	Forestry Department	65,000	Includes bridge repairs

5-6 Analysis Of Forest Machinery Costs

The procurement and expenses of forestry equipment have been stated earlier. As mentioned in the section on the principles of cost analysis, a discussion of the costs of mechanized work will be presented in the final report because of the present difficulty of such cost analysis owing to the various uncertainties in current multi-storied forest management.

For your reference, past expenses for equipment used in the overall project are summarized below.

Equipment procurement

(Unit: In thousand of RM)

Category		Mechanical devices	Vehicle transport	Tools	Misc. Implements	Books	Total
Jurisdiction of Bidor	Nursery	168	260	93	1	0	522
	Plantation	0	47	0	0	0	47
	Forest roads	534	272	0	0	0	806
	Operations	80	61	644	49	0	833
	Total	782	639	737	50	0	2,207
Jurisdiction of Ipoh		0	213	154	22	4	392
Total		782	851	890	72	4	2,599

Note: 1. These figures represent the total costs of purchases between December 1991 and December 1993.

2. The cost of equipment brought from Japan was calculated at an exchange rate RM 1.00 = ¥45

5-7 Cost Analysis Of Commercial Operations

A survey is currently underway with regard to this topic, and the results are being gathered for an eventual final announcement,

III. Various Aspects Of Establishment Of Multi-Storied Forest

1 Nursery Practice And Silviculture

1-1 Understanding The Physiological And Ecological Characteristics of High-Quality Timber Species

The selection of species for planting in this project is based on Malaysia's "Pocket Check List of Timber Trees," which lists 43 species of timber trees as the highest timber value (36 dipterocarps and 7 non-dipterocarps). Although an understanding of the physiological and ecological characteristics of the species planted is essential to successful plantation, most species' characteristics that would make them conducive to plantation are not understood very well, and consequently the establishment of arboretum now under way as part of this project must be studied to determine as much as possible about these physiological and ecological characteristics and thus reduce the risk of plantation failure. At the same time, concurrent research of existing documentation is also called for.

1-2 Establishing A System For Seedling Production

For the afore-mentioned reasons and those below, little progress has been made in afforestation in Peninsular Malaysia, and so steps to resolve these problems are necessary.

1) The Difficulty Of Seed Acquisition

Organized seedling production that is coordinated with plantation schedules is hampered by the near impossibility of acquiring a large volume of seeds of a single species at once, which is due to factors such as 1) the fact that many high-quality timber species, particularly dipterocarps, fruits only once every three or four years, and have irregular flowering seasons; 2) the poor accessibility of many seed collection sites; and 3) the fact that many fallen seeds rot or are eaten by insects before collection. It is therefore necessary, first of all, to select and record trees for seed collection that are near logging roads or work roads in selective cut natural forests, etc.; secondly, to enhance the existing network for collecting and relaying information on the flowering and fruiting of the high-quality timber species selected for seedling production (this network, while partially in place within FRIM, is not effectively linked with seedling production operations); and finally, to train climbers and develop other means of collecting seeds prior to falling (to avoid the low germination rates of seeds collected after falling).

2) The Difficulty Of Seed Storage

Another barrier to organized seedling production is the tendency of the seeds of most dipterocarps rot quickly, making them unconducive to prolonged storage. As seedlings can be cultivated in large quantities in bountiful years, we must develop seedling cultivation techniques for preventing excessive growth and epinasty seedlings that are saved for planting in ensuing years. A seed storage is also urgently needed in this project in order to extend the seed planting period as much as possible.

3) The Difficulty Of Asexual Reproduction

At present there are many problems encountered in the asexual reproduction of dipterocarps and other high-quality timber species: As previously stated, problems in seed acquisition and storage make it difficult to acquire seedlings in quantities suitable for the scale of this project. Hence, techniques for the asexual reproduction of seedlings must be developed.

4) The Lack Of Proper Techniques And Manuals For Nursery

Despite the active production and commercial utilization of the many species of high-quality timber species in existence, very few nursing techniques have been developed for specific species, and there are no manuals for the techniques that have been established. Because, consequently, such techniques are unavailable to commercial seedling-production industry, we must begin accumulating knowledge of species-specific nursing techniques and prepare our own manuals on the nursing of high-quality timber species for which proper techniques are developed.

5) Malaysia's Under-Developed Seedling-Production Industry

Large quantities of seedlings of dipterocarps and other indigenous species are needed if they are to be planted on a commercial scale. Because, there are no detailed nation-wide surveys of Malaysia's seedling-production industry, we must, first of all, determine the state of Malaysia's seedling-production industry and their seedling production. Most of the limited number of commercial and Forestry Department-run nurseries that have been surveyed were found to be temporary, unorganized, small-scale operations, which were influenced by the state silvicultural plan which is not so clear in a certain term, and also the small scale of plantation projects. It is therefore of great importance that the Malaysian government endeavour to nurture the seedling-production industry by drafting and announcing specific plans for the planting of indigenous species and the production of seedlings to be used in planting.

1-3 Proper Design And Maintenance Of Forest Roads In Tropical Rainforests

The almost unimaginable destructive capabilities of local downpours in this area (reaching an annual precipitation of three to four thousand millimetres) have frequently resulted in damages such as bridge and slope collapse since the start of this project. Roads used in this project, particularly the forest roads in Bukit Kinta, were constructed to allow access for felling and timber transport. However, these roads, which were modified and maintained for the project were originally designed to minimally facilitate temporary harvesting and timber transport were quite steep, most have not been gravelled, and almost no slope protection work has been performed. Because comprehensive road design and maintenance is needed to ensure the success of establishment of multi-storied forest management, we feel that standards are needed concerning the design, structure, maintenance and administration of logging and other roads in tropical rainforest regions.

1-4 Preparing Models Of Multi-Storied Forest

General models of multi-storied forest management are needed to determine costs and forecast future harvests. The multi-storied forest can be divided into five types (listed below) according to a system of classification based on geometrical structure and the duration of overlapping.

Homogeneity of tree arrangement	Category	Tree configuration
Homogeneous (random)	Short-term two-storied forest	
	Long-term two-storied forest	
	Permanent multi-storied forest	
Concentrated		Clustered multi-storied forest Stripe multi-storied forest

Source: Takao Fujimori "Diverse Forestry," 1991.

Given a project duration of five years, the type of the multi-storied forest will most likely be limited to the following three categories listed above.

1. Stripe multi-storied forest (type I): A two or three storied forest formed by line-clearing a stand of *Acacia mangium* man-made and then line planting high-quality timber species (Chikus Block-B).
2. Stripe multi-storied forest (type II): A two-storied forest formed by taking advantage of the difference in growth rates of fast-growing species and high-quality timber species simultaneously planted in alternating rows. After several years the above-listed type-I stripe multi-storied forest will be formed (Chikus Block-A).
3. Permanent multi-storied forest: A continuous-storied forest formed through the enrichment planting of high-quality timber species in gaps in a selectively felled natural forest (Bukit Kinta area).

Current forestry techniques are believed to be practical for planting continuous-storied forests in selectively felled natural forests in hill areas, as in Bukit Kinta. At the Chikus site, two- or three-storied stripe multi-storied forest will be planted for the time being. Although this site's favourable location is conducive to a wide range of multi-storied forest techniques, because of the immediate need to prepare cost analysis and estimates of future harvest yields before the end of this project, we must promptly select the type of multi-storied forest method (i.e., forestry management model) to be adopted.

1-5 Establishing Silvicultural Techniques For Multi-Storied Forest

In a multi-storied forest, planting methods and ease of planting depend on the type of multi-storied forest to be planted. If commercial operations are a pre-condition for multi-storied forest, a two- or three-storied forest approach (currently used in this project) is believed to be the most practical. Although establishing the silvicultural techniques for multi-storied forest before the end of this project is a formidable task, the results of experimentation can be drawn upon to sketch a model of the type of multi-storied forest envisioned.

Although the results of experimentation performed thus far suggest the feasibility of planting two- or three-storied forest between upper trees in stripe-cut fields, success in forming two-storied forest in large bare fields by simultaneously planting of alternating stripes of fast-growing and high-quality timber species hinges on proper species selection. In other words, the failure of this method of plantation can only be avoided by selecting a species capable of withstanding harsh sunlight, high temperatures, dryness and other adverse conditions.

In terms of concretizing the silvicultural techniques for our multi-storied forest, for two- or three-storied forest formed by line planting in man-made forest, we must first of all (as stated in section 1-4 above) prepare a model of such two- or three-storied forest and use it to accumulate various techniques for plantation. For two-storied forest plantation through the simultaneous planting of alternating rows, it is necessary to determine which combinations of fast-growing species and high-quality timber species would be capable of forming two-storied forests under harsh sunlight conditions.

1-6 Training Technicians For Establishment Of Multi-Storied Forest

The establishment of multi-storied forest management generally involves the planting and maintaining of a forest consisting of multiple species of trees (which combine to form a multi-storied structure) and, unlike single storied forest plantation, requires a broad spectrum of knowledge and sophisticated techniques, concerning, for instance, the physiological and ecological characteristics of the component species, schedules for felling upper trees (which is related to controlling the seedlings' sunlight conditions), felling and collecting upper trees in ways that avoid injuring the seedlings, and the design and maintenance of roads. Hence, technicians must be trained to perform and provide guidance on these and other tasks of multi-storied forest.

2 Forest Management

1) Introduction

A common objective of the various fields of forest management is to develop forest management guidelines that are based on technical results such as seedling cultivation, plantation and logging, that ensure high profitability and investment efficiency.

To this end it is necessary to determine the pre-requisites of multi-storied forest management in tropical regions from the global standpoint that takes into account the promotion of environmental conservation and sustainable development throughout the tropics

2) Separate Business Perspectives

As stated earlier, multi-storied forest management of this project in Chikus Block-B is beginning to bear fruit in the form of new techniques.

However, various technical problems concerning the initial growth stages of dipterocarps are now being faced at Chikus Block-A, while even at Bukit Kinta area, record-breaking downpours throughout Peninsular Malaysia between May and December 1993 repeatedly washed out access roads leading to project sites, significantly delaying operations as a result.

Consequently, as already stated, for the interim report it was decided to create several models using the multi-storied forest being grown at Chikus Block-B. These models are extremely simplified due to the unavailability of sufficient data and consequently one of the most important matters in the entire project is the developing of more realistic models that take into account a broad range of factors, such as growth forecasts of the dipterocarps planted, estimates of future revenue from felled trees, and the provisional calculation of the costs of plantation and felling.

For Block-A, technical matters, such as planting more species in addition to the 30 already being planted, will be examined, and so we will have to incorporate subsequent results and conclusions into our multi-storied forest management models.

For the Bukit Kinta area, we have to prepare appropriate management models which are based on inventories of sites planted in late 1993 (i.e., illuminance, seedling growth, the growth of other vegetation [e.g., climber], and other factors).

3) Governmental Policy

In Malaysia, forestry competes for land with oil palm and rubber plantation and a wide range of other agricultural development.

Therefore, to encourage private investment in forestry, it is necessary to point out the superior profitability of forestry over agricultural development, while the Japanese companies considering investing in forestry projects in Peninsular Malaysia should be reminded of the fact that forestry in Malaysia represents a better investment opportunity than other nations or other fields.

Also, with Malaysia's forestry industry facing with such severe problems as rising costs (including personnel expenses) and shortage of forestry workers it is very risky for Japanese companies to undertake long-term forestry investment. Therefore, the pre-requisites for long-term stability in investments in Malaysia must be determined.

Hence, from now, in the field of forest management, in addition to properly understanding the Malaysian government's present forestry-promoting measures, we must propose some measures for promoting private investment (foreign and domestic) in forestry.

4) Collecting Documentation And Information

A Japanese company seeking to invest in Malaysian forestry projects first needs a variety of information about the investment environment. While considerable progress is being made in this area thanks to the cooperation of Malaysian officials, however, the procuring of detailed documentation is expected to take a long time. We must therefore continue to request the Malaysian officials for as much detailed documentation as possible.

We have also been unsuccessful in attempts to acquire yield prediction table concerning dipterocarps and other tropical species which is due to the lack of survey data.

(One of the reason for the lack of data is that trees do not form annual rings in a wet tropical climate that varies only slightly throughout the year). Thus, yield prediction table must be formulated through systematic field surveys.

Nevertheless, we cannot expect to get large amounts of data in view of Malaysia's short history of large-scale afforestation and the infrequency with which pre-felling and post-felling inventories are performed in natural forests.

Because of these circumstances, in this project, we must prepare forest compartment records, regularly perform field surveys of stands, and use these results in the preparation of yield prediction table and procedures for post-planting nursing.

3 Forestry Machinery

One of the most important issues concerning forestry machinery is as stated in the section "The Allocation and Maintenance of Equipment", the effective use of equipment allocated to each location.

To ensure effective equipment use, we must consider means of promoting the active use of allocated equipment by contractors in order to reduce work costs, instead of restricting equipment use to operators employed by this operation.

Next, we must perform surveys on the process of equipment use in each type of work whenever possible in order to select the appropriate type of equipment.

In other words, as stated in the section on cost analysis, because work expenses must be reduced considerably in order to successfully commercialize multi-storied forest management, the proactive use of equipment to achieve this end ranks with the maintenance of roads in terms of importance.

It is necessary that operators be trained to be capable in using the allocated equipment efficiently and effectively.

Reference-1 Seedlings purchased and unit cost of each species

Category	1992 August		1992. September		1993 January	
Species	No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount
1. Shorea leprosula (Meranti tembaga)	11000 (MANONG)	\$1.00= 11000	748 (MANTIN)	\$1.00= 748		
2. Shorea parvifolia (Meranti sarang punai)	7000 (MANONG)	\$1.00= 7000	2000 (MANTIN)	\$1.00= 2000		
3. Neobalanocapus heinimi (Chengal)	4000 (TERENGGANU)	\$2.20= 8800	7000 (TERENGGANU)	\$2.30= 16100		
4. Intsia palembanica (Merbau)						
5. Tectona grandis (Teak)						
6. Shorea acuminata (Meranti rambai daun)						
7. Hopea odorata (Merawan siput jautau)	4000 (TERENGGANU)	\$2.00= 8000				
8. Palaquium spp. (Nyatoh)						
9. Shorea laevis (Balau kumus)					500 (MANTIN)	\$1.50= 750
10. Parashorea densiflora (Gerutu pasir)						
11. Dryobalanops aromatica (Kapur)						
12. Alstonia spp. (Pulai)						
13. Endospermum malaccense (Sesendok)						
14. Cinnamomum spp. (Medang teja)						
15. Heritiera spp. (Mengkulang)						
16. Dipterocarpus cornutus (Keruing gombang)						
17. Shorea bracteolata (Meranti pa'ang)						
18. Shorea hopeifolia (Damar siput jantan)						
19. Shorea singkawang (Meranti sengkawang merah)						
20. Acacia mangium (Akasia)					9680 (MANTIN)	\$0.30= 2904
21. Agathis borneensis (Damar minyak)						
22. Scaphium spp. (Kembang semangkok)					500 (MANTIN)	\$1.50= 750
23. Shorea hyprochra (Meranti temak)						
24. Calamus manan (Rotan manau)						
25. Hevea brasiliensis (Rubber tree)					500 (MANTIN)	\$1.00= 500
26. Parkia spp. (Petai)						
27. Durio spp. (Durian)						
28. Toona spp. (Surian)						
29. Swietenia macrophylla (Mahogany)					500 (MANTIN)	\$2.00= 1000
30. Shorea ovalis (Meranti kepong)						
31. Shorea dolichocarpa (Damar hitam katup)						
Total	26000	348000	9748	18848	11680	5904

February		March		May		June	
No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount
				520 (GERIK)	\$1.00= 520		
				500 (GERIK)	\$1.00= 500		
				451 (MANONG)	\$1.00= 451	1750 (MANONG)	\$1.00= 1750
				2889 (KEDAH)	\$2.95= 8523		
				4446 (KEDAH)	\$2.95= 13116		
				4119 (KEDAH)	\$2.95= 12151		
892 (RAMADAN)	\$2.50= 2230	4000 (RIM)	\$2.50= 10000	2698 (KEDAH)	\$2.95= 7959		
		1000 (RIM)	\$1.00= 1000				
		500 (KEDAH)	\$2.95= 1475				
		15000 (Ah Hing)	\$0.60= 9000			9400 (PAPANG)	\$0.30= 2820
		500 (KEDAH)	\$2.95= 1475				
		1000 (KEDAH)	\$2.30= 2300				
		500 (KEDAH)	\$2.50= 1250				
		500 (RAUB)	\$2.50= 1250				
		500 (RAUB)	\$2.50= 1250				
892	2230	23500	29000	15623	43220	11150	4570

July		August		September		October	
No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount	No. of seedlings	Unit price Amount
1000 (RIM)	\$2.20= 2200						
		8000 (MANTIN)	\$1.00= 8000				
4000 (RIM)	\$2.20= 8800						
		3000 (MANTIN)	\$1.00= 3000				
		1000 (MANTIN)	\$1.00= 1000				
		426 (GERIK)	\$1.00= 426				
						5000 (KEDAH)	\$2.50= 12500
		890 (MANONG)	\$1.00= 890				
				3413 (PAPANG)	\$1.00= 3413		
				435 (PAPANG)	\$1.00= 435		
						4000 (KEDAH)	\$2.50= 10000
						3600 (KEDAH)	\$1.50= 5400
5000	11000	13316	13316	3848	3848	12600	27900

November		Total from August 1992 to December 1993		Unit price per seedling	Remarks
No. of seedlings	Unit price Amount	No. of seedlings	Amount	Unit price	
		12748	13948	\$ 1.10	<p>1. The table covers the period from August 1992 to December 1993. No seedling purchases were made in October through December 1992 or in April or December 1993. Also, no seedling purchases were made prior to August 1992 as the nurseries were still being prepared.</p> <p>2. Breakdown of nurseries from which seedlings were purchased</p> <p>(1) Commercial nurseries</p> <p>a. Terengganu Nursery (Terengganu state)</p> <p>b. RIM Nursery (Selangor state)</p> <p>c. Ramadan Nursery (Negri-Sembilan state)</p> <p>d. Ah Hing Nursery (Perak state)</p> <p>e. Kedah Nursery (Kedah state)</p> <p>(2) Negri Sembilan State Forestry Bureau</p> <p>a. Mantin Nursery (Negri-Sembilan state)</p> <p>b. Raub Nursery (Pahang state)</p> <p>(3) Perak State Forestry Bureau</p> <p>a. Papang Nursery</p> <p>b. Manong Nursery</p> <p>c. Gerik Nursery</p> <p>Also, seedlings from nurseries under jurisdiction of the Perak State Forestry Bureau were free of charge and therefore have been calculated on a trial basis at a cost of \$1.00 a piece in view of the purchase price of seedlings from other state forestry bureaus.</p>
		9000	9000	\$ 1.00	
		11000	24900	\$ 2.26	
		520	520	\$ 1.00	
		500	500	\$ 1.00	
		10201	10201	\$ 1.00	
		4000	8000	\$ 2.00	
		2889	8523	\$ 2.95	
		4946	13866	\$ 2.80	
		4119	12151	\$ 2.95	
		11590	28989	\$ 2.50	
		1000	1000	\$ 1.00	
		3000	3000	\$ 1.00	
		500	1475	\$ 2.95	
		1000	1000	\$ 1.00	
		426	426	\$ 1.00	
		5000	12500	\$ 2.50	
		890	890	\$ 1.00	
		3413	3413	\$ 1.00	
		34080	14724	\$ 0.43	
		435	435	\$ 1.00	
		4500	10750	\$ 2.40	
1000 (PAPANG)	\$1.00= 1000	1000	1000	\$ 1.00	
		3600	5400	\$ 1.50	
		500	500	\$ 1.00	
		500	1475	\$ 2.95	
		1000	2300	\$ 2.30	
		500	1250	\$ 2.50	
		500	1000	\$ 2.00	
		500	1250	\$ 2.50	
		500	1250	\$ 2.50	
1000	1000	134357	195636	\$ 1.47	

Reference 2 : Results of surveys of remaining trees, etc., in selectively-cleared natural forests

- Table-1 Results of survey of section 146 in Bukit-Kinta (breakdown of surveyed trees in each survey plot)
Table-2 Breakdown of harvest survey trees in sections 146 and 147 in Bukit-Kinta

Table-1 Diameter distribution of remaining trees in plot 146 (number in plot) (1)

BUKIT KINTA 146 COMPARTMENT STANDING TREE (INSIDE PLOT ONLY)

SPECIES	DIAMETER CLASS (cm)						TOTAL NO. TREES	TOTAL VOLUME	TOTAL BASAL AREA (cm ²)	Tree Group		
	15-29	30-44	45-59	60-74	75-90	90-				LHW	N	NO-RS
ARA	2	2	1				5	3.64	5,839.01	LHW	N	NO-RS
BALAU		1		1		1	3	16.79	13,549.16	HHW	D	RS
BAYUR		2					2	1.34	2,058.70	LHW	N	NO-RS
BEKAK	4	5	2				11	10.55	13,971.64	MHW	N	NO-RS
BENGANG	1	1					2	0.62	1,096.94	LHW	N	NO-RS
BINTANGOR		1	1				2	2.23	3,424.82	LHW	N	RS
BITIS							0			HHW	N	NO-RS
DAMAR HITAM							0			LHW	D	RS
DEDALI	3	4					7	3.37	5,893.17	LHW	N	RS
DURIAN	1						1	0.14	422.79	LHW	N	RS
GERONGGANG		1	2				3	3.06	4,708.77	LHW	N	NO-RS
GERUTU PASIR	1						1	0.21	638.02	LHW	N	RS
JELAWAI JAHA				1	1		2	10.25	8,832.29	MHW	N	RS
JELUTONG		2		1		1	4	14.22	12,773.00	LHW	N	RS
KANDIS	2	1	1				4	2.35	4,068.83	MHW	N	NO-RS
KARAS	1	1					2	0.90	1,711.65	LHW	N	NO-RS
KASAH	3	4		2	1		10	17.38	18,786.31	LHW	N	NO-RS
KASAI	7	6	2				15	10.25	15,704.83	MHW	N	RS
KAYU ARANG	7						7	0.98	3,017.08	LHW	N	NO-RS
KEDONDONG	17	11	6	5	2	1	42	59.17	67,105.32	LHW	N	RS
KEKABU							0			LHW	N	RS
KEKATONG							0			HHW	N	NO-RS
KELAMPAYAN		2					2	1.08	1,659.37	LHW	N	NO-RS
KELAT	98	43	13	6	6	2	168	146.42	182,238.76	MHW	N	RS
KELEDANG	18	19	8	4	1		50	48.39	64,281.27	MHW	N	RS
KELUMPANG	1						1	0.08	260.19	LHW	N	NO-RS
KEMBANG SEMANGK	12	9	7	5			33	34.71	45,982.19	LHW	N	RS
KEMPAS			2	1			3	5.69	7,075.36	MHW	N	RS
KERANJI		2	1				3	3.17	4,873.47	HHW	N	RS
KEREDAS	1						1	0.12	380.18	LHW	N	NO-RS
KERUING	1	2	1				4	3.57	5,593.19	MHW	D	RS
KUNGKUR							0			LHW	N	NO-RS
OTHERS	49	22	4				75	24.92	47,040.24			
LEBAN	5	1	2				8	3.72	6,609.84	HHW	N	NO-RS
LUDAI	1	2	1				4	3.27	5,161.55	LHW	N	NO-RS
MACHANG		1					1	0.70	1,081.17	LHW	N	NO-RS

Table-1 Diameter distribution of remaining trees in plot 146 (number in plot) (2)

MAHANG	2	7	2				11	7.43	11,657.61	LHW	N	NO-RS	NO-FELLED
MEDANG	62	58	33	8	7	1	169	174.46	222,980.23	LHW	N	NO-RS	FELLED
MELEMBU	1	4	4			1	10	21.42	23,062.51	LHW	N	NO-RS	NO-FELLED
MEMBATU							0			HHW	D	NO-RS	FELLED
MEMPENING	1	8	2				11	9.02	13,986.17	MHW	N	RS	FELLED
MEMPIANG	11	2	1	2			16	10.51	14,359.70	LHW	N	NO-RS	FELLED
MENGKULANG	2	1	2				5	3.56	5,805.68	MHW	N	RS	NO-FELLED
MERANSI			1				1	1.33	2,043.09	MHW	N	NO-RS	NO-FELLED
MERBAU	1		3	1			5	11.90	12,790.63	HHW	N	RS	FELLED
MERPAUH							0			LHW	N	NO-RS	FELLED
MERSAWA							0			LHW	D	RS	FELLED
MERTAS							0			LHW	N	NO-RS	FELLED
MINYAK BEROK	8	3	4				15	6.98	11,727.80	LHW	N	NO-RS	FELLED
MT.BUKIT							0			LHW	D	RS	FELLED
MT.MELANTAI	2	4	1				7	5.18	8,374.86	LHW	D	RS	FELLED
MT.NEMUS			1				1	1.31	2,019.12	LHW	D	RS	FELLED
MT.PA'ANG		3					3	2.21	3,397.77	LHW	D	RS	FELLED
MT.SARANG PUNAI							0			LHW	D	RS	FELLED
MT.SERAYA	1	4	2	2		3	12	54.28	48,302.68	LHW	D	RS	FELLED
MT.TEMBAGA	1	1	1				3	2.00	3,265.99	LHW	D	RS	FELLED
NYATOH	11	8	3		2	1	25	32.84	35,512.90	LHW	N	RS	FELLED
PELONG	1	1					2	0.59	1,021.72	LHW	N	RS	FELLED
PENAGA	3						3	0.51	1,576.83	HHW	N	NO-RS	NO-FELLED
PENARAHAN	12	17	1	2	2		34	39.07	46,442.35	LHW	N	NO-RS	FELLED
PERAH	14	27	10	1			52	38.38	59,012.41	HHW	N	NO-RS	NO-FELLED
PETAI	1	5	2	1			9	12.29	14,620.83	LHW	N	RS	NO-FELLED
PETALING	10	2	1	1			14	6.28	9,851.42	MHW	N	RS	FELLED
PULAI	1		1	1			3	8.62	7,569.94	LHW	N	RS	FELLED
PUTAT	2						2	0.33	1,023.23	LHW	N	NO-RS	NO-FELLED
RAMBUTAN	3	4	3				10	6.37	10,339.42	MHW	N	NO-RS	NO-FELLED
RAMIN	4						4	0.45	1,372.90	LHW	N	RS	NO-FELLED
RENGAS	2	6	6	2			16	20.89	27,393.60	MHW	N	RS	FELLED
RESAK	3	2					5	1.62	3,221.16	HHW	D	RS	FELLED
SENTUL	1						1	0.18	568.40	LHW	N	NO-RS	NO-FELLED
SEPETIR							0			LHW	N	RS	FELLED
SESENDOK	2	3	1	1			7	6.76	9,346.09	LHW	N	RS	FELLED

Table-1 Diameter distribution of remaining trees in plot 146 (number in plot) (3)

SIMPOH	3	2	2	1		8	8.46	11,684.84	MHW	N	RS	FELLED
SURIAN	9	1	1			11	3.24	7,066.16	LHW	N	NO-RS	FELLED
TEMPINIS	4	3	1			8	4.11	6,929.61	HHW	N	NO-RS	NO-FELLED
TERAP	6	13	9	2	1	31	37.91	49,045.46	LHW	N	RS	FELLED
TERENTANG						0			LHW	N	RS	FELLED
TUALANG	3		1			4	2.34	4,421.57	MHW	N	RS	FELLED
TULANG DAING	11	8	6			25	19.25	27,740.02	MHW	N	NO-RS	NO-FELLED
PLOT TOTAL	433	342	159	51	23	1,019	995.37	1,275,373.81				
						433	56.00	168,022.65				
TOTAL	9,214	3,639	1,692	543	245	117	11,414.97	14,058,077.31				
PER HA	73	29	13	4	2	1	89.10	122,321.74				

Table-2 Breakdown of harvest survey trees in sections 146 and 147 (1)

SPECIES	DIAMETER CLASS cm												TOTAL NO.TREES	TOTAL VOLUME m ³	SPECIES GROUP
	50	60	70	80	90	100	110	120	130	140	150				
BINTANGOR	2	4	9	3	0	0	0	0	0	0	0	18	80.34	RS	
GERONGGANG	0	1	0	0	1	0	0	0	0	0	0	2	11.69	NON-RS	
JELUTONG	0	1	1	6	3	1	2	2	0	1	0	17	167.22	RS	
KARAS	1	0	0	0	0	0	0	0	0	0	0	1	1.78	NON-RS	
KEDONDONG	2	10	10	5	1	0	0	0	0	0	0	28	127.50	RS	
KEKABU	0	1	0	1	0	0	0	0	0	0	0	2	10.82	RS	
KEMBANG SEMANGKOK	1	17	15	5	1	0	1	0	0	0	0	40	183.23	RS	
KUNGKUR	0	0	1	0	0	0	0	0	0	0	0	1	5.75	NON-RS	
LUDAI	0	2	1	2	0	0	0	0	0	0	0	5	23.12	NON-RS	
MACHANG	0	1	1	0	1	0	0	0	0	0	0	3	18.08	NON-RS	
MEDANG	7	31	21	3	2	1	0	0	0	0	0	65	259.19	NON-RS	
MEMPISANG	1	1	0	0	0	0	0	0	0	0	0	2	5.25	NON-RS	
MERPAUH	0	3	5	2	1	0	1	0	0	0	0	12	70.86	NON-RS	
MERTAS	0	2	2	3	0	0	0	0	0	0	0	7	39.06	NON-RS	
MINYAK BEROK	0	1	0	0	0	0	0	0	0	0	0	1	3.24	NON-RS	
NYATOH	3	11	2	2	2	0	0	0	0	0	0	20	81.47	RS	
PELONG	0	0	0	0	1	0	0	0	0	0	0	1	9.41	RS	
PENARAHAN	1	7	2	0	0	0	0	0	0	0	0	10	30.36	NON-RS	
PULAI	0	2	2	0	1	0	0	1	0	0	0	6	37.81	RS	
SEPETIR	0	0	2	0	0	0	0	0	0	0	0	2	11.65	RS	
SESENDOK	1	8	5	1	0	0	0	0	0	0	0	15	54.16	RS	
SURIAN	0	0	2	1	0	0	0	0	0	0	1	4	40.13	NON-RS	
TERAP	0	6	7	2	0	0	0	0	0	0	0	15	68.53	RS	
TERENTANG	0	5	9	1	0	0	0	0	0	0	0	15	61.56	RS	
TOTAL LHW-NON DIP.	19	114	97	37	14	2	4	3	0	1	1	292	1,402.21		
TOTAL LHW	19	175	222	104	84	18	52	22	4	10	7	717	4,826.71		
GRAND TOTAL	40	263	323	138	123	20	70	25	5	10	9	1026	6,601.83		

note

HHW; Heavy Hardwood
 MHW; Midium Hardwood
 LHW; Light Hardwood
 DIP; DIPTEROCAPR species

Table-2 Breakdown of harvest survey trees in sections 146 and 147 (1)

SPECIES	DIAMETER CLASS cm												TOTAL NO.TREES	TOTAL VOLUME m ³	SPECIES GROUP
	50	60	70	80	90	100	110	120	130	140	150				
BALAU	0	2	6	2	2	1	2	2	1	0	0	18	155.72	RS	
MEMBATU	0	0	4	3	2	0	2	1	0	0	0	12	102.20	NON-RS	
RESAK	0	2	3	0	1	0	0	0	0	0	0	6	27.98	RS	
TOTAL HHW-DIP.	0	4	13	5	5	1	4	3	1	0	0	36	285.90		
BITIS	2	1	0	0	0	0	0	0	0	0	0	3	7.10	NON-RS	
KEKATONG	0	2	0	2	1	0	1	0	0	0	0	6	41.81	NON-RS	
KERANJI	0	0	2	0	1	1	0	0	0	0	0	4	31.67	RS	
MERBAU	0	0	4	5	4	0	1	0	0	0	1	15	130.34	RS	
TOTAL HHW-NON DIP.	2	3	6	7	6	1	2	0	0	0	1	28	210.92		
TOTAL HHW	2	7	19	12	11	2	6	3	1	0	1	64	496.82		
KERUING	0	8	13	3	9	0	5	0	0	0	0	38	263.21	RS	
TOTAL MHW-DIP.	0	8	13	3	9	0	5	0	0	0	0	38	263.21		
KASAI	0	3	2	0	0	0	0	0	0	0	0	5	18.08	RS	
KELAT	8	34	23	2	4	0	0	0	0	0	0	71	286.28	NON-RS	
KELEDANG	2	9	12	1	2	0	0	0	0	0	0	26	119.53	RS	
KEMPAS	2	8	8	8	5	0	4	0	0	0	1	36	239.21	RS	
MEMPENING	2	5	4	0	0	0	0	0	0	0	0	11	37.03	NON-RS	
PETALING	1	0	5	0	0	0	0	0	0	0	0	6	21.56	NON-RS	
RENGAS	2	12	10	6	6	0	3	0	0	0	0	39	227.09	NON-RS	
SIMPOH	2	2	4	2	0	0	0	0	0	0	0	10	43.53	RS	
TUALANG	0	0	1	0	2	0	0	0	0	0	0	3	22.78	RS	
TOTAL MHW-NON DIP.	19	73	69	19	19	0	7	0	0	0	1	207	1,015.09		
TOTAL MHW	19	81	82	22	28	0	12	0	0	0	1	245	1,278.30		
DAMAR HITAM	0	1	2	0	1	0	0	0	2	0	0	6	56.49	RS	
MERSAWA	0	6	5	5	5	0	3	2	0	2	0	28	237.80	RS	
MT.BUKIT	0	1	1	2	3	0	0	0	0	0	0	7	48.78	RS	
MT.MELANTAI	0	5	9	1	2	0	0	0	0	0	0	17	78.88	RS	
MT.NEMUS	0	0	3	0	1	0	1	0	0	0	0	5	34.58	RS	
MT.PA'ANG	0	1	10	4	5	0	0	0	0	0	0	20	126.18	RS	
MT.SARANG PUNAI	0	14	18	9	9	3	4	1	0	2	1	61	447.75	RS	
MT.SERAYA	0	21	52	34	27	9	29	14	1	2	4	193	1,657.82	RS	
MT.TEMBAGA	0	12	25	12	17	4	11	2	1	3	1	88	736.22	RS	
TOTAL LHW-DIP.	0	61	125	67	70	16	48	19	4	9	6	425	3,424.50		

Reference-3 Weather Observation Data

METEOROLOGICAL DATA

STATION: TAPAH(LAT.4° 12'N ; LONG.101° 16'E ; HT.35.1 m)

YEAR	A.R.F.A.	N.R.	M.MAX.T.	M.MIN.T.	M.T.	M.T.(8)	M.T.(14)	M.R.H.(8)	M.R.H.(14)
1963	3042.4	141							
1964	3718.2	148							
1965	3578.0	149							
1966	4317.4	188							
1967	4322.4	221							
1968	3815.0	186	33.4	N.A.	N.A.	24.0	32.1		N.A.
1969	4582.1	211	33.4	N.A.	N.A.	24.2	32.3		60
1970	3589.0	167	33.1	21.5	27.3	23.9	32.1		61
1971	2836.3	161	32.7	21.4	27.1	23.7	31.4		61
1972	3153.9	152	33.0	N.A.	N.A.	23.5	N.A.		N.A.
1973	3748.6	206	N.A.	N.A.	N.A.	23.4	31.5		61
1974	3102.0	171	32.6	21.2	26.9	22.8	31.5		59
1975	2783.1	166	N.A.	21.4	N.A.	23.1	31.6		61
1976	3160.8	167	N.A.	21.1	N.A.	22.7	31.5		60
1977	3008.3	157	33.0	21.6	27.3	23.0	32.1		59
1978	2612.9	144	N.A.	21.7	N.A.	23.3	32.2		60
1979	3343.0	161	33.5	21.6	27.6	23.3	32.3		61
1980	2889.6	160	N.A.	21.7	N.A.	23.3	32.1		63
1981	N.A.	N.A.	33.6	N.A.	N.A.	23.3	32.4		59
1982	3540.9	190	N.A.	21.6	N.A.	23.1	32.2		61
1983	2738.8	161	34.0	22.1	28.1	23.4	32.6	94	61
1984	3680.4	175	33.3	21.7	27.5	23.1	31.9	94	62
1985	3309.9	156	33.7	21.6	27.4	22.9	32.4	94	62
1986	2948.1	145	33.4	21.7	27.6	23.1	32.1	94	60
1987	3816.2	169	33.7	22.1	27.9	23.4	32.5	94	61
1988	3157.6	158	33.4	22.1	27.8	23.5	32.1	N.A.	N.A.
1989	2704.2	N.A.	33.3	21.9	27.6	23.1	32.2	94	59
1990	2474.1	154	33.7	22.0	27.9	23.1	32.4	94	58
1991	3216.7	161	33.2	22.1	27.8	23.1	31.8	94	61
1992	2876.0	N.A.	33.4	21.9	27.8	23.0	31.9	94	59
AVE.	3312.6	168	33.3	21.7	27.6	23.3	32.0	94	60

REMARKS

A.R.F.A.: ANNUAL RAINFALL AMOUNT
N.R.: NUMBER OF RAIN DAYS
M.MAX.T.: MEAN MAXIMUM TEMPERATURE
M.MIN.T.: MEAN MINIMUM TEMPERATURE
M.T.: MEAN TEMPERATURE
M.T.(8): MEAN TEMPERATURE AT 8:00 a.m.
M.T.(14): MEAN TEMPERATURE AT 2:00 p.m.
M.R.H.(8): MEAN RELATIVE HUMIDITY AT 8:00 a.m.
M.R.H.(14): MEAN RELATIVE HUMIDITY AT 2:00 p.m.

MEAN MAXIMUM TEMPERATURE ANDS MEAN MINIMUM TEMPERATURE

STATION: TAPAH

LAT.: 4° 12' N

LONG.: 101° 16' E

HT. above M.S.L.: 35.1 m

YEAR/ MONTH	JAN			FEB			MAR			APR			MAY			JUN		
	MAX/T	MIN/T	MEAT	MAX/T	MIN/T	MEAT	MAX/T	MIN/T	MEAT	MAX/T	MIN/T	MEAT	MAX/T	MIN/T	MEAT	MAX/T	MIN/T	MEAT
1963																		
1964																		
1965																		
1966																		
1967																		
1968	32.9	21.7	27.3	33.6	20.7	27.2	34.4	N.A.	N.A.	33.6	N.A.	N.A.	33.6	N.A.	N.A.	33.7	22.4	28.1
1969	33.6	19.9	26.8	34.1	19.7	26.9	34.6	19.8	27.2	34.5	19.6	27.1	33.9	19.8	26.9	34.1	19.8	27.0
1970	32.8	20.9	26.9	34.2	20.7	27.5	33.9	21.3	27.6	33.9	22.0	28.0	33.5	22.5	28.0	34.1	22.2	28.2
1971	31.3	20.9	26.1	32.6	20.7	26.7	33.3	21.0	27.2	33.5	21.5	27.5	33.9	22.2	28.1	33.9	22.0	28.0
1972	32.9	20.4	26.7	33.2	22.2	27.7	33.9	N.A.	N.A.	33.4	N.A.	N.A.	33.9	N.A.	N.A.	33.7	N.A.	N.A.
1973	32.9	20.7	26.8	34.3	21.6	28.0	33.5	21.7	27.6	33.8	22.6	28.2	32.9	22.2	27.6	33.2	22.4	27.8
1974	31.7	20.2	26.0	32.3	20.9	26.6	33.6	20.5	27.1	33.0	21.7	27.4	32.9	21.4	27.2	32.8	21.5	27.2
1975	32.8	20.8	26.8	32.4	20.7	26.6	33.0	21.2	27.1	33.3	22.2	27.8	33.1	21.8	27.5	32.9	21.9	27.4
1976	32.2	20.1	26.2	33.1	20.7	26.9	32.8	21.1	27.0	32.8	21.7	27.3	33.3	21.5	27.4	32.8	21.1	27.0
1977	32.8	20.9	26.9	32.3	20.5	26.4	33.4	21.1	27.3	33.6	21.9	27.8	33.4	22.3	27.9	33.0	21.8	27.4
1978	32.7	20.9	26.8	33.5	21.1	27.3	33.7	22.1	27.9	33.5	22.2	27.9	N.A.	23.0	N.A.	33.9	21.9	27.9
1979	33.5	20.2	26.9	34.0	21.3	27.7	34.3	21.6	28.0	33.8	22.3	28.1	34.4	21.8	28.1	33.7	22.2	28.0
1980	N.A.	20.8	N.A.	33.3	21.1	27.2	33.4	21.6	27.5	33.7	22.7	28.2	33.7	22.6	28.2	33.3	22.4	27.9
1981	32.4	20.8	26.6	33.5	21.1	27.3	34.2	21.1	27.7	33.7	22.3	28.0	33.5	22.5	28.0	34.4	21.5	28.0
1982	33.2	19.6	26.4	33.6	21.1	27.4	33.8	21.9	27.9	33.6	22.2	27.9	33.6	22.4	28.0	34.0	21.9	28.0
1983	33.2	20.9	27.1	34.7	21.6	28.2	35.2	22.3	28.3	34.9	22.9	28.9	34.3	23.1	28.7	34.7	22.5	28.6
1984	32.2	21.2	26.7	32.0	21.4	26.7	33.4	21.9	27.7	34.0	22.0	28.0	33.9	22.3	28.1	33.5	21.8	27.7
1985	33.6	20.4	27.0	34.2	21.7	28.0	33.8	21.8	27.8	34.4	22.3	28.4	34.0	22.4	28.2	34.9	20.9	27.9
1986	31.8	21.8	26.8	33.8	21.2	27.5	33.0	21.6	27.3	33.5	22.3	27.9	34.0	22.4	28.2	33.6	21.8	27.7
1987	32.7	21.1	26.9	34.4	20.8	27.6	34.6	22.2	28.4	34.1	22.7	28.4	33.7	22.4	28.1	34.5	22.5	28.5
1988	33.2	22.0	27.6	33.5	22.1	27.8	34.0	22.5	28.3	34.1	22.8	28.5	34.4	22.9	28.7	34.1	22.3	28.2
1989	33.0	21.7	27.4	33.6	21.0	27.3	33.1	21.7	27.4	33.7	22.3	28.0	34.0	22.5	28.3	33.8	22.0	27.9
1990	32.8	20.9	26.9	34.5	21.8	28.2	34.5	21.8	28.2	34.4	23.0	28.7	34.2	22.7	28.5	34.4	22.1	28.3
1991	32.8	21.5	27.2	34.0	21.2	27.6	34.3	22.5	28.4	33.7	22.4	28.1	33.4	22.6	28.0	34.5	22.8	28.7
1992	33.2	20.8	27.0	33.7	21.8	27.8	34.4	21.9	28.2	34.3	22.7	28.5	34.1	22.8	28.5	33.9	22.7	28.3
AVE.	32.8	20.8	26.8	33.5	21.1	27.3	33.8	21.6	27.7	33.8	22.2	28.0	33.7	22.3	28.0	33.8	21.9	27.9

NOTE:

MAX/T : MEAN MAXIMUM TEMPERATURE

MIN/T : MEAN MINIMUM TEMPERATURE

MEAT : MEAN TEMPERATURE

JUL	AUG			SEP			OCT			NOV			DEC			ANNUAL			YEAR/ MONTH
	MAXT	MINT	MEAT	MAXT	MINT	MEAT	MAXT	MINT	MEAT	MAXT	MINT	MEAT	MAXT	MINT	MEAT	MAXT	MINT	MEAT	
																			1963
																			1964
																			1965
																			1966
																			1967
																			1968
32.8	21.7	27.3	33.5	21.8	27.7	33.1	21.3	27.2	32.8	20.1	26.5	33.5	20.1	26.8	33.2	19.9	26.6	33.4	N.A.
33.4	19.7	26.6	32.7	19.6	26.2	33.5	N.A.	N.A.	32.6	N.A.	N.A.	31.6	21.4	26.5	32.2	20.9	26.6	33.4	N.A.
33.1	21.7	27.4	33.2	21.2	27.2	32.4	21.2	26.8	32.4	21.8	27.1	32.3	21.6	27.0	32.0	21.6	26.8	33.1	21.5
33.2	21.0	27.1	32.4	21.3	26.9	32.9	21.8	27.4	32.9	21.6	27.3	31.9	21.1	26.5	30.7	21.8	26.3	32.7	21.4
32.7	N.A.	N.A.	33.2	N.A.	N.A.	32.8	22.0	27.4	32.4	21.9	27.2	32.4	22.1	27.3	31.8	21.8	26.8	33.0	N.A.
32.9	21.6	27.3	31.2	21.9	26.6	32.4	21.5	27.0	32.2	21.6	26.9	31.8	21.6	26.7	N.A.	N.A.	N.A.	N.A.	N.A.
32.2	21.0	26.6	33.1	21.7	27.4	31.9	21.3	26.6	32.4	21.7	27.1	32.1	21.5	26.8	32.8	20.8	26.8	32.6	21.2
N.A.	21.0	N.A.	32.9	21.4	27.2	32.4	21.4	26.9	33.2	21.6	27.4	31.1	21.4	26.3	31.5	21.1	26.3	N.A.	21.4
32.6	20.9	26.8	32.9	20.9	26.9	32.6	21.4	27.0	N.A.	21.9	N.A.	31.6	21.5	26.6	32.0	21.1	26.6	N.A.	21.1
33.3	21.8	27.6	33.2	21.7	27.5	32.8	21.7	27.3	32.7	22.3	27.5	32.4	22.0	27.2	32.8	21.2	27.0	33.0	21.6
33.1	21.5	27.3	N.A.	21.5	N.A.	33.2	21.5	27.4	33.2	21.6	27.4	32.8	21.4	27.1	32.8	21.2	27.0	N.A.	21.7
33.2	21.7	27.5	33.8	21.7	27.8	32.7	21.6	27.2	33.5	21.8	27.7	32.0	22.1	27.1	33.4	20.9	27.2	33.5	21.6
33.8	22.0	27.9	32.7	21.5	27.1	33.6	21.5	27.6	32.9	21.6	27.3	32.4	21.9	27.2	32.4	21.4	26.9	N.A.	21.7
33.9	21.4	27.7	34.5	21.1	27.8	33.1	21.7	27.4	33.4	22.2	27.8	33.1	22.1	27.6	33.1	N.A.	N.A.	33.6	N.A.
33.5	21.4	27.5	33.3	21.7	27.5	33.3	21.9	27.6	N.A.	21.5	N.A.	33.2	21.9	27.6	32.6	21.7	27.2	N.A.	21.6
34.2	22.1	28.2	33.7	22.2	28.0	33.3	21.9	27.6	33.8	22.1	28.0	33.8	21.9	27.9	32.2	21.7	27.0	34.0	22.1
33.7	21.7	27.7	33.9	21.7	27.8	33.5	21.6	27.6	33.7	21.7	27.7	32.8	21.9	27.4	32.9	21.5	27.2	33.3	21.7
33.9	20.8	27.4	33.6	21.5	27.6	32.9	21.9	27.4	33.2	22.0	27.6	32.6	22.1	27.4	32.7	21.7	27.2	33.7	21.6
34.1	21.3	27.7	34.6	21.5	28.1	33.5	21.7	27.6	33.1	21.9	27.5	32.4	21.6	27.0	33.2	21.5	27.4	33.4	21.7
34.4	22.0	28.2	33.6	22.2	27.9	34.1	22.0	28.1	33.6	22.6	28.1	33.2	22.5	27.9	32.2	22.1	27.2	33.7	22.1
33.5	21.8	27.7	33.3	21.9	27.6	32.8	22.0	27.4	33.8	21.8	27.8	32.3	22.3	27.3	32.3	21.2	26.8	33.4	22.1
33.4	22.0	27.7	33.6	21.9	27.8	32.9	22.0	27.5	32.7	22.1	27.4	33.0	21.9	27.5	33.2	21.1	27.2	33.3	21.9
33.5	21.8	27.7	34.3	21.8	28.1	33.8	22.2	28.0	33.2	22.2	27.7	32.5	21.8	27.2	32.6	21.5	27.1	33.7	22.0
33.4	22.0	27.7	33.4	22.2	27.8	33.1	22.3	27.7	32.6	21.9	27.3	32.1	21.6	26.9	31.4	21.8	26.6	33.2	22.1
33.2	21.9	27.6	33.3	21.9	27.6	33.6	21.9	27.8	33.0	21.9	27.5	31.8	21.5	26.7	31.9	21.3	26.6	33.4	21.9
33.4	21.5	27.5	33.3	21.6	27.5	33.0	21.7	27.4	33.0	21.8	27.4	32.4	21.7	27.1	32.4	21.3	26.9	33.3	21.7
																			AVE.

MEAN MONTHLY RAINFALL AMOUNT ANDS MEAN NUMBER OF RAINDAYS

STATION: TAPAH

LAT.: 4° 12'N

LONG.: 101° 16'E

HT. above M.S.L.: 351 m

YEAR/ MONTH	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL	
	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR	RFA	NR
1963	316.5	14	114.8	6	213.6	15	188.0	14	256.8	14	102.9	7	141.0	7	238.5	11	217.4	13	405.6	13	592.0	15	255.3	12	3042.4	141
1964	449.3	10	290.8	12	388.4	11	283.7	19	244.3	11	449.3	10	402.1	17	197.9	5	163.8	12	228.3	14	255.8	14	364.5	13	3718.2	148
1965	142.7	8	117.9	6	239.5	15	485.6	18	381.3	11	133.6	6	116.8	8	200.7	13	354.3	11	591.3	18	307.3	17	507.0	18	3578.0	149
1966	175.5	11	340.9	12	481.6	16	413.0	15	89.4	4	293.1	13	224.3	14	592.6	21	325.6	20	377.9	24	643.6	24	359.9	14	4317.4	188
1967	337.8	24	351.5	14	399.2	19	619.3	25	508.8	21	1290	13	1079	8	152.9	16	421.9	21	611.1	24	580.6	26	102.4	10	4322.4	221
1968	273.8	14	230.9	11	163.6	14	476.3	19	375.4	21	459.7	18	334.8	13	91.2	11	248.1	15	366.5	18	189.7	12	605.0	20	3815.0	186
1969	202.2	21	268.2	14	478.0	23	458.0	25	712.7	22	270.8	12	89.4	9	485.1	17	108.2	10	564.4	24	503.9	19	441.2	15	4582.1	211
1970	595.9	18	118.6	11	366.8	15	201.9	16	404.4	20	74.4	7	170.2	7	227.6	14	261.1	12	409.9	14	561.3	21	196.9	12	3589.0	167
1971	157.5	11	333.5	13	410.7	15	168.7	14	130.8	11	159.8	10	103.9	13	152.7	10	333.0	13	140.5	11	351.5	19	393.9	21	2836.3	161
1972	134.6	10	245.1	10	211.3	13	354.6	17	378.7	10	254.8	11	51.1	5	106.4	11	301.5	14	468.9	16	445.0	21	201.9	14	3153.9	152
1973	182.9	14	183.6	11	190.0	20	443.2	27	488.4	11	367.3	16	150.4	9	202.9	18	278.9	13	460.7	25	438.1	22	362.2	20	3748.6	206
1974	193.5	11	140.7	13	365.8	17	516.1	19	343.1	18	186.2	10	180.8	12	144.0	8	306.8	22	101.9	8	288.8	15	334.3	18	3102.0	171
1975	253.3	14	244.8	13	263.2	16	298.2	17	351.7	14	198.8	7	195.7	14	66.5	8	248.2	17	85.3	12	309.2	16	268.2	18	2783.1	166
1976	191.1	18	275.2	12	298.9	19	202.7	16	97.6	9	254.1	13	256.2	13	154.8	9	155.9	12	499.4	20	513.3	15	261.6	11	3160.8	167
1977	309.7	12	328.8	14	331.2	15	219.2	11	208.4	14	94.5	6	60.7	6	116.9	10	111.7	11	504.2	21	421.2	19	301.8	18	3008.3	157
1978	190.5	12	202.2	13	423.6	18	284.8	13	209.4	11	211.7	9	71.4	6	126.9	6	171.3	8	240.5	17	361.4	18	119.2	13	2612.9	144
1979	68.0	9	339.2	11	149.6	10	360.3	21	466.3	13	193.5	12	362.4	14	157.9	8	386.4	19	307.2	12	328.8	20	223.4	12	3343.0	161
1980	11.9	7	177.5	10	252.6	17	339.2	15	413.6	19	185.3	7	136.4	10	276.0	15	364.7	14	272.9	15	316.0	17	143.5	14	2889.6	160
1981	272.7	9	349.9	16	192.1	15	451.5	14	489.9	17	112.0	6	97.4	6	72.0	3	290.6	13	347.0	16	N.A.	N.A.	167.8	9	N.A.	N.A.
1982	188.1	7	308.2	11	364.8	18	491.1	22	256.7	21	285.4	7	350.0	12	135.5	20	222.4	12	302.1	19	425.8	22	210.8	19	3540.9	190
1983	127.4	10	424.6	18	175.5	14	85.3	12	191.6	15	94.4	8	327.4	14	319.7	13	353.7	17	235.7	16	255.4	12	148.1	12	2738.8	161
1984	218.7	18	502.7	18	400.4	20	375.4	19	266.6	13	250.8	11	222.7	13	51.0	6	179.3	7	196.5	13	598.4	21	417.9	16	3680.4	175
1985	230.6	9	438.3	16	169.4	19	104.8	11	356.6	14	20.3	3	202.7	11	215.4	11	306.2	13	593.4	19	482.2	20	190.0	10	3309.9	156
1986	195.2	12	350.4	12	378.1	19	314.4	18	251.9	8	209.1	11	225.3	11	20.4	2	300.2	14	335.9	20	201.0	9	166.2	9	2948.1	145
1987	100.9	7	362.2	11	389.6	17	379.0	15	296.8	14	90.5	7	261.5	11	285.4	13	294.9	16	577.0	24	90.3	9	690.1	25	3816.2	169
1988	334.2	12	290.2	15	287.0	15	304.1	16	186.0	9	232.9	8	196.2	10	326.6	18	342.5	21	34.4	4	351.9	17	271.6	13	3157.6	158
1989	234.3	12	192.0	7	244.2	15	355.7	14	214.8	13	89.2	10	163.2	10	28.3	4	322.7	13	423.1	N.A.	386.7	18	50.0	6	2704.2	N.A.
1990	274.8	14	172.1	10	213.3	14	184.3	12	300.3	11	130.5	7	175.0	10	59.9	6	259.7	19	336.1	21	205.9	18	162.2	12	2474.1	154
1991	199.5	11	416.1	11	277.9	18	394.6	16	539.7	24	120.9	8	241.4	8	211.2	9	126.5	8	281.2	17	156.9	14	250.8	17	3216.7	161
1992	358.6	N.A.	202.9	10	237.2	12	221.0	11	350.5	15	52.8	4	229.3	12	143.1	12	271.5	11	81.9	11	412.9	18	314.3	15	2876.0	N.A.
AVE.	1230.7	12	277.1	12	298.6	16	332.5	17	325.4	14	190.3	9	194.9	10	185.3	11	267.6	14	346.0	17	378.4	18	282.7	15	3312.6	168

NOTE:

RFA: RAINFALL AMOUNT(mm)

NR: NUMBER OF RAINFALL(day)

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92. 10.17	Fixed assets	Mechanical devices	Construction equipment	FCE - 001	Backhoe loader	John Deere Backhoe loader 310 D	1	RM 108,000	RM 108,000	Oriental-Hitachi Construction Machinery SDN BHD		Chikus nursery Register No. ACE 2055
92. 11.18	"	"	"	002	Multi-purpose Loader	Bobcat Loader Model 853	1	RM 155,790	RM 155,790	POSIM Industrial Equipment SDN.BHD.		Chikus nursery accessories:Bucket, grader, Fork Register No. ACE 1418
93. 10.22	"	"	"	003	Motor grader	Mitsubishi Motor Grader MG.330	1	RM 270,000	RM 270,000	ALQUIP SDN.BHD.		Chikus nursery Register No. ACF 5134

Equipment Register

[illegible]

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92. 3.30	Fixed assets	Mechanical devices	Power equipment	FMP 001	Concrete mixer	Kubota Engine AC-60/6hp Produced locally	2	RM 4,900	RM 9,800	Sharikat Ipoh Hardware SDN.BHD.		Chikus nursery for soil mixing
92. 3.30	"	"	"	002	Air compressor	Kubota AC-60/6hp	1	RM 4,200	RM 4,200	"		Chikus nursery
93. 3.30	"	"	"	003	Roller conveyer	Aluminium roller Produced locally	1	RM 4,500	RM 4,500	"		Chikus nursery
93. 3.30	"	"	"	004	Generator	Kubota Diesel CV1160-16KVA Single phase	1	RM 16,000	RM 16,000	"		Installed in Chikus nursery for power supply to facilities
93. 1.20	"	"	"	005	Generator	Kubota Diesel CV1160-16KVA Single phase	1	RM 18,000	RM 18,000	"		Installed in Chikus nursery for power supply to facilities
93. 12.16	"	"	"	006	Generator	Denyo BLG-10FSS Triple phase	1	RM 24,000	RM 24,000	Dynasearch (M) SDN.BHD		Chikus nursery for incinerator

Equipment Register

[illegible]

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.31	Fixed assets	Vehicles	Automobiles	FAU 001-003	Mitsubishi Pajero	LO 49 GVMNSR DG Diesel	3	RM 46,791.23	RM 140,373.69	United Straits Fuso SDN.BHD.		Register no. ACC 4156-001 Forestry Department ACC 4157-002 Bidor ACC 4158-003 Bidor
"	"	"	"	" 004	Toyota Landcruiser	RJ77RV-MN	1	RM 63,096.62	RM 63,096.62	U.M.W.Toyota Motor SDN.BHD.		Register No. ACC 9608 Assigned to Ipoh office
"	"	"	"	" 005	Toyota Hilux 4WD	LN 106R TRMRS Diesel	1	RM 44,566.29	RM 44,566.29	"		Register No. ACC6677 Assigned to Bidor office
"	"	"	"	" 006	Toyota Lite Ace Van	YM35RV-MRS	1	RM 27,669.41	RM 27,669.41	"		Register No. ACC 9607 Assigned to Ipoh office
92.12.23	"	"	"	" 007	Toyota Landcruiser Station Wagon	HZ180R-GCMRS	1	RM 75,043.22	RM 75,043.22	"		Register No. ACF 1771 Assigned to Ipoh office
93.3.1	"	"	"	" 008 009	Mitsubishi Pajero	LO 49 GT	2	RM 48,733.23	RM 97,466.46	United Straits Fuso SDN.BHD		Register No. ACG 696 -008 ACG 670 -009 Assigned to Bidor office
93.3.31	"	"	"	" 010	Micro bus	Mitsubishi Canter FE444EZDGI	1	RM 63,805.75	RM 63,805.75	Saripati (M) SDN.BHD.		Register No. ACH 2756 Assigned to Bidor office
93.6.28	"	"	"	" 011 012	Motor bike	YAMAHA DT-125	2	RM 11,917.92	RM 23,835.84	Fortune Motors Industries		Register No. ACH 9871-011 ACH 9913-012 Assigned to Bidor office
92.9.21	"	"	"	" 013 014	Dump Truck	Mitsubishi 4t Dumptruck FL415EDRB	2	¥ 4,750,000	¥ 9,500,000	Japan		Register No. ACK 7348 -013 ACK 120 -014

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Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92 3.11.	Fixed assets	Tools, etc.	Office equipment	FOE 001	Copier	Toshiba Copier ED-2510	1	RM 20,000	RM 20,000	Tele Dynamics Metro		Assigned to Bidor office
91 1.14.	"	"	"	002	Word processor	Toshiba RUPO JW-95KP	1	¥ 248,000	¥ 248,000	Japan		Carried by Abe Used by Iwasawa (Bidor)
92 2.17.	"	"	"	003	"	"	1	¥ 248,000	¥ 248,000	"		Purchased and sent from Japan Used by Abe (Ipoh)
92 2.17.	"	"	"	004	"	Toshiba RUPO JW-98UP	1	¥ 298,000	¥ 298,000	"		Used by Hirasawa (Bidor)
92 2.17.	"	"	"	005	"	Canon α-370	1	¥ 211,500	¥ 211,500	"		Used by Sakamoto (Ipoh)
93 3.30.	"	"	"	006 007 008	Laptop computer	Toshiba T1800/60	3	RM 4,200	RM 12,600	Tele Dynamics Metro		006 Used by Kim 007 Used by Mangsor 008 Used by Samudin
93 3.2.	"	"	"	009	Word processor	Toshiba RUPOJW-05 With transformer	1	¥ 232,100	¥ 232,100	Japan		Used by Sakoda (Bidor)
93 3.2.	"	"	"	010 011 012	Computer	NEC PC-9801FA2	3	¥ 439,000	¥ 1,317,000	"		010 Used by Takai 011 Used by Iwasa 012 Used by Hirasawa
93 12.1.	"	"	"	016	Computer	IBM PS/w 2405 NVC	1	¥ 363,000	¥ 363,000	"		Used by Sakoda (Bidor)

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Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.5.23.	Non-fixed assets	Tools, etc.	Office equipment	OE 001	Type writer	Olivetti ET 2400/17	1	RM 1,980	RM 1,980	Towa Business Machine		Assigned to Ipoh office Used by secretaries, clerical staff at Ipoh office
93.2.20.	"	"	"	OE 002	Laptop computer	Toshiba T 1800/40	1	RM 3,990	RM 3,990	Tele Dynamics Metro		Assigned to Ipoh office Used by secretary
"	"	"	"	OE 003	Printer for above	Toshiba EW201	1	RM 1,100	RM 1,100	"		"
93.3.2.	"	"	"	FOE 013-015	Printer for NEC computer	EPSON VP-1700 ESC/P 24-J84	3	¥ 161,700	¥ 485,100	Japan		FOE-006 Ipoh office FOE-007 Used by Iwasa FOE-008 Used by Hirasawa
93.3.30.	"	"	"	OE 004-006	Printer for laptop computer	Toshiba EW201 Canon BJ20 T1800/60	3	RM 1,100	RM 3,300	Tele Dynamics Metro		EW201-004 Used by Kim EW-201-005 Used by Mangsor CANON-006 Used by Sue
93.4.22.	"	"	"	OE 007	Type writer	Olivetti ET 2450/21	1	RM 2,450	RM 2,450	Towa Business Machine		Bidor office
93.3.2.	"	"	"	OE 008-010	NEC computer display	NEC PC-KD1521 for PC-9801FA	3	¥ 85,900	¥ 257,700	Japan		-008 Ipoh office -0090 Used by Iwasa -010 Used by Hirasawa
93.12.21.	"	"	"	OE 011	IBM computer display	IBM 2414 A04 for IBM PSN2405	1	¥ 95,200	¥ 95,200	"		Bidor office Used by Sakoda
94.2.16.	"	"	"	OE 012	Word processor	Toshiba RUPO JW 05P	1	¥ 159,000	¥ 159,000	"		Carried by Hayashi Ipoh office Used by Takai

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Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.2.25	Non-fixed assets	Tools, etc.	Various devices	GM - 001	Safe	ALCO 700 Lock & Keylock	1	RM 1,500	RM 1,550	Kuan & Ho SDN.BHD.		Ipoh office
"	"	"	"	GM - 002	Refrigerator	Samsung SR 351	1	RM 1,800	RM 1,800	Syarikat Jackson Refrigeration & Television Service		"
92.9.19.	"	"	"	GM - 003	Telephone	Toshiba Key Telephone Strata	3	RM 1,748	RM 5,244	Tele Dynamics Metro		Ipoh office 3 LINES 8 EXTNS
92.3.19.	"	"	"	GM - 004	FAX	Toshiba FAX TF-131	1	RM 2,200	RM 2,200	"		Ipoh office
92.3.24.	"	"	"	GM - 005	Water filter	Aqua Safe Water Filter CT-11	1	RM 900	RM 900	Flexway Trading		"
92.3.27.	"	"	"	GM - 006	Refrigerator	Samsung SR 461	2	RM 2,300	RM 4,600	Syarikat Jackson Refrigeration & Television Service		Chikus nursery, for seed storage 006-1 006-2
"	"	"	"	GE - 007	Washing machine	Toshiba AW 40SIE	1	RM 980	RM 980	"		Ipoh office
"	"	"	"	GE - 008	Refrigerator	Toshiba GR 161 S	1	RM 660	RM 660	"		"
"	"	"	"	GE - 009	Vacuum cleaner	Hitachi CV-2500	1	RM 270	RM 270	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.31.	Non-fixed assets	Tools, etc.	Various devices	GM - 010	Wireless	Fontek FM-4502	2	RM 2,500	RM 5,000	Pagecom Management SDN.BHD.		010-1 Bidor office 010-2 Chikus nursery
92.3.31.	"	"	"	GM - 011	Portable wireless receiver for above	Fontek SRU-1100 Walkie-Talkie	5	RM 2,250	RM 11,250	"		Chikus nursery
92.3.31.	"	"	"	GM - 012	Recharger for wireless equipment	SR6R	2	RM 250	RM 500	"		012-1 Bidor office 012-2 Chikus nursery
92.3.31.	"	"	"	GM - 013	Antenna for wireless equipment	UHF	2	RM 380	RM 760	"		Bidor office Chikus nursery
92.3.31.	"	"	"	GM - 014	Regulator	Automatic Voltage Regulator AR600SX	2	RM 450	RM 900	"		Bidor office Chikus nursery
92.3.31.	"	"	"	GM - 015	Wireless telephone	NEC Primero SX TR5E-1320-22G	2	RM 3,700	RM 7,400	Saidara Sendirian Berhad		015-1 Assigned to Ipoh office 015-2 Chikus nursery Vehicle-mounted
92.3.31.	"	"	"	GM - 016	FAX	Toshiba TF-131	1	RM 2,000	RM 2,000	Tele Ddynamics Metro		Bidor office
92.3.30.	"	"	"	GM - 017	Car-washing implement	Interdumpp 3HP M12-100	2	RM 2,450	RM 4,900	Shrikat Ipoh Hardware SDN.BHD.		017-1 Ipoh office 017-2 Chikus office
92.3.30.	"	"	"	GM - 018	Water pump	Tokai 2'x2' Kubota AC 60QP 6HP	3	RM 2,850	RM 8,550	"		018-1 Chikus nursery 018-2 (Pump Mausaka Engineering Co.) 018-3

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.30.	Non-fixed assets	Tools, etc.	Various devices	GM - 019	Soil sifter	JY-24.4 with motor	2	RM 3,500	RM 7,000	Syarikat Ipoh Hardware SDN.BHD.		019-1 Chikus nursery 019-2 "
92.3.30.	"	"	"	GM - 020	Sprayer		10	RM 280	RM 2,800	"		Assigned to Chikus nursery One device disposed of
92.3.30.	"	"	"	GM - 021	Power sprayer	ECHO SHR-300	2	RM 1,050	RM 2,100	"		Chikus nursery
92.3.30.	"	"	"	GM - 022	Platform scale	Salter-250 50 kg	1	RM 880	RM 880	"		Assigned to Chikus nursery
92.3.30.	"	"	"	GM - 023	Fire extinguisher	Eversafe 9 kg	4	RM 120	RM 480	Pan Continental		Ipoh office
92.11.25.	"	"	"	GM - 024	Vehicle towing hook	Hook Assy for four wheel drive truck Pajero	3	RM 801.03	RM 2,403.09	Saripati(M) SDN.BHD.		ACC 4156 Vehicle mounted ACC 4157 " ACC 4158 "
93.3.31.	"	"	"	GM - 025	Water pump.	Tokai 2'x2' Kubota AC 60 6 HP	3	RM 2,850	RM 8,550	Syarikat Ipoh Hardware SDN.BHD.		025-1 Chikus nursery 025-2 " 025-3 "
93.3.16.	"	"	"	GM - 026	Portable telephone	NEC Primero Sx1	5	RM 2,947	RM 14,735	Sridata Sendirian Berhad		Specialists and CPs
93.2.10.	"	"	"	GM - 027	Guntacker	MAX-TG-A Guntacker T3-10M	2	¥ 36,900	¥ 73,800	Japan		Used by Aizawa and Ochiai Assigned to Chikus, Bidor

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93.4.27.	Non-fixed assets	Tools, etc.	Various devices	GM - 028	Transformer	200V-240V 100V-200AE	1	¥ 15,000	¥ 15,000	Japan		Bidor office For drafting table
93.4.27.	"	"	"	GM - 029	Extension memory	6MB EPA 6000S Installed in computer	3	¥ 39,200	¥ 117,600	"		Bidor 2 Ipoh 1
93.11.12.	"	"	"	GM - 032	Pressure cooker	6L	1	¥ 25,200	¥ 25,200	"		Carried by Yamaguchi Assigned to Bidor office Used in pathological testing
93.12.21.	"	"	"	GM - 033	Voltmeter	Matsunaga SVC-10000 ND of computer	1	¥ 35,000	¥ 35,000	"		Carried by Takai, Sakoda Assigned to Bidor office For IBM computer
93.3.16.	"	"	"	FGM - 005	Telephone	Toshiba Key Telephone Strata	1	RM 5,043.75	RM 5,043.75	Tele Dynamics Metro		Seven-receiver set Bidor office
93.4.7.	"	"	"	FGM - 006	Ttormer	Matsunaga SVC-1010A for computer	3	¥ 178,000	¥ 534,000	Japan		Bidor 2, Ipoh 1 Voltage electric outlet unit for computer
93.4.7.	"	"	"	FGM - 007	Stabilizer	Takamisawa TUPS-500H 500VA	3	¥ 124,500	¥ 373,500	"		"
93.11.12.	"	"	"	FOP - 002	Sterilizer	PS-100	1	¥ 130,000	¥ 130,000	"		Carried by Yamaguchi Bidor office

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.9.20	Non-fixed assets	Tools, etc.	Surveying equipment	SE - 001	Automatic leveler	Topcon AT-M3 with tripod	1	¥ 164,000	¥ 164,000	Japan		Bidor office Assigned to Sakoda
"	"	"	"	SE - 002	Clinometer	Clinometer (SUNTO) PM-5	5	¥ 32,000	¥ 160,000	"		002-1 Sakoda 002-4 Hirasawa 002-2 Iwasa 002-5 Takai 002-3 Iwasa
"	"	"	"	SE - 004	compass	No. 102531	1	¥ 21,500	¥ 21,500	"		Bidor office
"	"	"	"	SE - 005	Planimeter	Tanaya Planix 5000	1	¥ 137,000	¥ 137,000	"		"
"	"	"	"	SE - 006	Staff	Sanarugo MYZOX ALG-55 Aluminium Staff	1	¥ 10,500	¥ 10,500	"		Assigned Ipoh office
"	"	"	"	SE - 007	Pentograph reducer	S.M.Z. Tokyo 80cm	1	¥ 70,000	¥ 70,000	"		Bidor office
"	"	"	"	SE - 008	Drafting table	SC-AON	1	¥ 163,000	¥ 163,000	"		"
"	"	"	"	SE - 009	Measuring pole	Seishin K.K. SK	5	¥ 39,700	¥ 198,000	"		"
"	"	"	"	SE - 010	Tendrometer tree-height measurer	Topcon TYPE-II	3	¥ 93,500	¥ 280,500	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93.1.8	Non-fixed assets	Tools, etc.	Surveying equipment	SE - 011	Prism compass	MK III	2	RM 650	RM 1,300	EI. Motoiwa LLA		Lost in the field
93.2.10	"	"	"	SE - 012	leveling pole	Takeya Co. 6m	1	¥ 24,500	¥ 24,500	Japan		Carried by Aizawa, Ochiai Bidor office
"	"	"	"	SE - 013	leveling pole	Takeya Co. 10m	1	¥ 30,250	¥ 30,250	"		"
"	"	"	"	SE - 014	leveling pole	Takeya Co. 15m	1	¥ 79,600	¥ 79,600	"		"
"	"	"	"	SE - 015	Walking measurer	Topcon Surveying range finder	1	¥ 53,300	¥ 53,300	"		Bidor office
"	"	"	"	SE - 016	Altimeter	Altimeter TX-22	1	¥ 45,500	¥ 45,500	"		Chikus nursery
93.12.15	"	"	"	SE - 017	Tree height measuring pole	FT-8 8m	4	¥ 21,500	¥ 86,000	"		Carried by Sakoda, Takai Bidor office
93.10.5	"	"	"	SE - 018	Surveying range finder	Topcon	1	¥ 46,800	¥ 46,800	"		Carried by Aizawa Bidor office

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.217.	Non-fixed assets	Tools, etc.	Optical and measuring equipment	OP - 001	Tripod (for camera)	King Attack 750 B	1	¥ 17,800	¥ 17,800	Japan		Portable device Ipoh office
"	"	"	"	OP - 002	Camera	Canon F1	1	¥ 180,900	¥ 180,900	"		Bidor office Assigned to Sakoda
"	"	"	"	OP - 003	Camera lens	Fisheye lens for Canon F1 75/5.6	1	¥ 108,000	¥ 108,000	"		Bidor office
"	"	"	"	OP - 004	Camera	Fuji KARUDIA Travel Mini Dual-P	1	¥ 36,800	¥ 36,800	"		Assigned to Ipoh office
92.330.	"	"	"	OP - 005	Camera	Panasonic Auto Focus CD-2000ZM	2	RM 650	RM 1,300	Tomorrow Educational Suppliers		005-1 Assigned to Takai 005-2 Assigned Hirasawa
92.330.	"	"	"	OP - 006	Scale	Electronic scale	1	RM 480	RM 480	Syarikat Ipoh Hardware SDN. BHD.		Bidor office
92.416.	"	"	"	OP - 007	Binoculars	Starline 8 x 20 x 50ZCF	1	RM 94.50	RM 94.50	Tomorrow Educational Suppliers		Ipoh office
92.74.	"	"	"	OP - 008	Camera lens	Sigma for Canon F-1 70-210mm	1	RM 305	RM 305	Bee Loh Photo		Mounted to Canon F1 Assigned to Sakoda
"	"	"	"	OP - 009	Strobo for camera	118A for Canon F-1	1	RM 245	RM 245	Bee Loh Photo		Bidor office

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93. 3.27.	Non-fixed assets	Tools, etc.	Optical and measuring equipment	OP - 010	Soil dryer	Memet UIM 400	1	RM 2,855	RM 2,855	Practical Enterprise		Bidor office
93. 2.10.	"	"	"	OP - 011	Electronic scale	Shimadzu EL 600-11 AC 100V	1	¥ 56,100	¥ 56,100	Japan		Carried by Aizawa Assigned to Hirasawa
"	"	"	"	OP - 012	Soil hardness meter	Daiki A-0737 DIK-5551 Push-Cone	1	¥ 56,200	¥ 56,200	"		Carried by Aizawa Bidor office
"	"	"	"	OP - 013	PH meter	Horiba D-12 No. S8718	1	¥ 80,800	¥ 80,800	"		Carried by Aizawa Bidor office
92. 2.12.	"	"	"	OP - 014	Binoculars	1603	1	¥ 22,700	¥ 22,700	"		Carried by Yamate Assigned to Bidor office
93. 12.12.	"	"	"	OP - 015	Base for biological microscope DSM-1-104	Daiko Science Field Micro-Scope	1	¥ 22,000	¥ 22,000	"		Carried by Yamaguchi Bidor office
"	"	"	"	OP - 016	Object lens	"	1	¥ 44,000	¥ 44,000	"		" "
"	"	"	"	OP - 017	Biological microscope Lighting equipment	" HG	1	¥ 39,600	¥ 39,600	"		" "
"	"	"	"	OP - 018	Adapter for biological microscope photography	For Nikon Camera	1	¥ 13,200	¥ 13,200	"		" "

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Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.30.	Non-fixed assets	Tools, etc.	Tools	TO - 001	Arc welder	Diamond AC200 Arc Welder Single Phase	1	RM 1,250	RM 1,250	Sharikat Ipoh Hardware SDN. BHD.		Chikus nursery, machine warehouse
"	"	"	"	TO - 002	Drilling machine	Lunan Machine Tool Works 25mm LT-25GF	1	RM 1,250	RM 1,250	"		"
"	"	"	"	TO - 003	Vice	Bench type 125mm Vench Vice 8"	1	RM 280	RM 280	"		"
"	"	"	"	TO - 004	Two-ton Jack	Garage Jack Masada Sei-sakusho SJ-20S	1	RM 480	RM 480	"		"
"	"	"	"	TO - 005	Battery charger	Battery Booster Charger Deca Cclass450	1	RM 2,650	RM 2,650	"		"
"	"	"	"	TO - 006	Grease bucket pump	Grease Bucket Pump Toyosaki T-303A	2	RM 850	RM 1,700	"		"
"	"	"	"	TO - 007	Oil bucket pump	Oil Bucket Pump Toyosaki T-202A	3	RM 800	RM 2,400	"		"
"	"	"	"	TO - 008	Mechanic set	Stanley CU-60	2	RM 3,500	RM 7,000	"		TO-008-1 Blue TO-008-2 Red
"	"	"	"	TO - 009	Welder	Diamond AC Arc Welder AC-300 300AMP	1	RM 2,600	RM 2,600	"		"

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Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93. 2.11.	Non-fixed assets	Tools, etc.	Audio equipment and clocks etc.	SO - 001	Clock	Clock	2	RM 39	RM 78	Batang Padang Supermarket SDN.BHD.		For Bidor office 001-1 office 001-2 C/P room
"	"	"	"	SO - 002	Clock	Clock	1	RM 35	RM 35	"		Bidor office For 2nd floor dining room
93. 2.26.	"	"	"	SO - 003	Clock	Clock	1	RM 39	RM 39	"		Chikus nursery

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Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.27.	Non-fixed assets	Tools, etc.	Audiovisual equipment	AV - 01	TV monitor	Hitachi 21 Colour TV CPT-2192 NR	2	RM 1,360	RM 2,720	Syarikat Jackson Refrigeration & Television Service		01-1 Ipoh office 01-2 Bidor office
"	"	"	"	AV - 02	Video camera	Hitachi VME8E	2	RM 2,450	RM 4,900	"		02-1 Ipoh office 02-2 Bidor office
92.3.30.	"	"	"	AV - 03	Slide projector	Siro	1	RM 1,050	RM 1,050	Tomorrow Educational Suppliers		Ipoh office
"	"	"	"	AV - 04	OHP Screen	153 x 153cm	2	RM 280	RM 560	"		"
92.8.28.	"	"	"	AV - 05	VCR	Toshiba V800SE S/N O 99381085	1	RM 1,250	RM 1,250	Syarikat Jackson Refrigeration & Television Service		"
93.1.16.	"	"	"	AV - 06	Cassette tape recorder	Sony CFS-7105	1	RM 280	RM 280	Kuang Huat Gas & Electrical Trading		Bidor office
93.1.17.	"	"	"	AV - 07	Mini cassette tape recorder	AIWA HSI70 MK III Super Bass	1	RM 335	RM 335	Parksonnia		Ipoh office
93.5.12.	"	"	"	AV - 08	VCR	Toshiba V800ME	1	RM 1,600	RM 1,600	Syarikat Jackson Refrigeration & Television Service		Bidor office
93.11.19.	"	"	"	AV - 09	Conference audio set	Sharp HKW8 model	1	RM 990	RM 990	"		"

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Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.9.20.	Non-fixed assets	Tools, etc	Instruments	OM - 002	Weather observation equipment Thermometer	Ohta Keiki DS-801	2	¥ 265,000	¥ 530,000	Japan		Bukit-Kinta Chikus nursery Weather observation equipment set
"	"	"	"	OM - 003	Weather observation equipment Sunlight sensor	Ohta Keiki DS-801	2	¥ 283,000	¥ 566,000	"		"
93.10.5.	"	"	"	OM - 004	Soil inspection rod	Digital Thermometer Yokogawa DIK-1640 (1m)	1	¥ 54,000	¥ 54,000	"		Portable equipment used by Aizawa Bidor office
"	"	"	"	OM - 005	Soil sampling device	Yokogawa DIK-1600	1	¥ 54,000	¥ 54,000	"		"
"	"	"	"	OM - 007	Thermometer/hygrometer	Chino HN-K	1	¥ 43,000	¥ 43,000	"		"
"	"	"	"	OM - 008	Analyzer for thermometer / hygrometer	Chino HN-L18 Sensor	1	¥ 34,000	¥ 34,000	"		"
"	"	"	"	OM - 009	Thermometer	Yokogawa Thermometer 2455-02	1	¥ 22,500	¥ 22,500	"		"
"	"	"	"	OM - 010	Analyzer	Yokogawa Censor 2459-04	1	¥ 11,700	¥ 11,700	"		"
93.12.15.	"	"	"	OM - 012	Illuminator	Minolta T-IH	3	¥ 106,000	¥ 318,000	"		012-1 Takai Takai, Sakoda 012-2 Takai Portable equipment 012-3 Iwasa

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Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.1.21.	Non-fixed assets	Various appliances	Office furniture	OF - 001	Chair	High-backed chair 44-A	6	RM 316	RM 1,896	Rinaat Dagang SDN.BHD.		Ipoh office
92.2.25.	"	"	"	OF - 002	Desk	LION Metal 60 x 30	2	RM 405	RM 810	Kuan & Ho SDN.BHD.		"
"	"	"	"	OF - 003	Book Shelf	LION 5-level	5	RM 253	RM 1,265	"		"
"	"	"	"	OF - 004	Cabinet	LION for files L-44	3	RM 240	RM 720	"		"
"	"	"	"	OF - 005	Cabinet	LION for files L-43	1	RM 215	RM 215	"		"
"	"	"	"	OF - 006	Pigeon hole	3x3-level	2	RM 135	RM 270	"		"
"	"	"	"	OF - 007	Desk	ALCO 48 x 30	3	RM 230	RM 690	"		"
"	"	"	"	OF - 008	Chair	5,000 for typist	3	RM 78	RM 234	"		"
"	"	"	"	OF - 009	Chair	5,000 A for secretary	1	RM 135	RM 135	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92 3.7.	Non-fixed assets	Various appliances	Office furniture	OF - 010	Chair	Steel Model 300	2	RM 98	RM 196	Kuan & Ho SDN.BHD.		Ipoh office
92 3.7.	"	"	"	OF - 011	Chair	Steel Model 300	4	RM 98	RM 392	"		"
-	"	"	"	OF - 012	Book shelf	LION L-31	4	RM 200	RM 800	"		"
"	"	"	"	OF - 013	Book shelf	LION L-33 L-44	1	RM 253	RM 253	"		"
92 3.15.	"	"	"	OF - 014	Desk	LION 60 x 30	1	RM 405	RM 405	"		"
-	"	"	"	OF - 015	Desk	ALCO 48 x 30	3	RM 230	RM 690	"		"
"	"	"	"	OF - 016	Desk	1067 x 1980	2	RM 1,675	RM 3,350	"		"
92 3.31.	"	"	"	OF - 017	Locker	L 551	6	RM 150	RM 900	"		"
-	"	"	"	OF - 018	Locker	L 554	1	RM 170	RM 170	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.31.	Non-fixed assets	Various appliances	Office furniture	OF - 019	Chair		1	RM 480	RM 480	Kuan & Ho SDN.BHD.		Bidor office
"	"	"	"	OF - 020	Cupboard	Glass Cupboard L-35	1	RM 370	RM 370	"		Ipot office
"	"	"	"	OF - 021	Cupboard	HK-5B 555	1	RM 1,250	RM 1,250	Svarikat Xintex		"
92.9.26.	"	"	"	OF - 022	Side table		4	RM 145	RM 580	Kuan & Ho SDN.BHD.		"
92.7.27.	"	"	"	OF - 023	Typewriter desk		1	RM 80	RM 80	"		"
93.1.11.	"	"	"	OF - 024	Desk	Wooden Desk (with chair)	2	RM 130	RM 260	Perabat Kota Raya		Bidor office
93.1.20.	"	"	"	OF - 025	Side table		2	RM 145	RM 290	Kuan & Ho SDN.BHD.		"
"	"	"	"	OF - 026	Typewriter chair		9	RM 78	RM 702	"		"
"	"	"	"	OF - 027	Chair	Executive model 1311	1	RM 179	RM 179	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93.1.20.	Non-fixed assets	Various appliances	Office furniture	OF - 028	Chair	High-backed Model 1313	30	RM 235	RM 7,050	Kuan & Ho SDN.BHD.		Bidor office
"	"	"	"	OF - 029	Chair	High-backed Model 3003	1	RM 420	RM 420	"		"
"	"	"	"	OF - 030	Desk	Wood	2	RM 1,675	RM 3,350	"		"
"	"	"	"	OF - 031	Desk	Metal LION L103 (60 x 30)	14	RM 405	RM 5,670	"		"
"	"	"	"	OF - 032	Desk	Metal LION L121 (48 x 30)	8	RM 280	RM 2,240	"		"
"	"	"	"	OF - 033	Locker	LION L-551	10	RM 150	RM 1,500	"		"
"	"	"	"	OF - 034	Cabinet	LION 4-level L-44	10	RM 240	RM 2,400	"		"
"	"	"	"	OF - 035	Cupboard	LION 3-level L-33	10	RM 253	RM 2,530	"		"
"	"	"	"	OF - 036	Cupboard	LION 3-level with glass doors L-55A	5	RM 370	RM 1,850	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93.120.	Non-fixed assets	Various appliances	Office furniture	OF - 037	Cabinet	LION 2-level L-42	5	RM 195	RM 975	Kuan & Ho SDN.BHD.		Bidor office
"	"	"	"	OF - 038	Long desk		4	RM 210	RM 840.	"		"
"	"	"	"	OF - 039	Chair	Model 5000 for typist	6	RM 78	RM 468	"		"
93.226.	"	"	"	OF - 040	Desk		1	RM 60	RM 60	"		Chikus nursery
93.316.	"	"	"	OF - 041	Desk	Conference desk 1 set	1	RM 1,753	RM 1,753	"		Chikus nursery Ipoh office
93.812.	"	"	"	OF - 042	Computer desk	Artwright TX22B	1	RM 390	RM 390	Tomorrow Educational Suppliers		Ipoh office
94.15.	"	"	"	OF 043 044	Cupboard	LION 3-level glass L-35	2	RM 370	RM 740	Kuan & Ho SDN.BHD.		"
"	"	"	"	OF - 045	Cupboard	LION 3-level L-33	1	RM 253	RM 253	"		"
"	"	"	"	OF - 046	Cupboard	LION Half glass L-30	1	RM 250	RM 250	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92. 2.17.	Non-fixed assets	Various appliances	Stationary	ST - 001	Stapler	MAX HD-INA	1	¥ 17,460	¥ 17,460	Japan		Portable equipment Ipoh office
"	"	"	"	ST - 002	Hole-puncher	LION No.190	1	¥ 10,500	¥ 10,500	"		"
92. 3.31.	"	"	"	ST - 003	White board	4 x 6 Ft	1	RM 250	RM 250	Ginnacom Office Automation		Bidor office
92. 5.21.	"	"	"	ST - 004	Calculator	Citizen Solar CT-600	1	RM 32	RM 32	Gans Trading		"
93. 9.9.	"	"	"	ST - 005	White board	with roller	1	RM 360	RM 360	EEWA Trading		"
93. 10.29.	"	"	"	ST - 006	White board	4 x 6 Ft	1	RM 250	RM 250	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92. 11.5.	Non-fixed assets	Various appliances	Furniture	F - 001	Reception area set	Wood 1 set	1	RM 1,750	RM 1,750	Syarikat Xintex		Ipoh office
"	"	"	"	F - 002	Bed	Wood with mattress	2	RM 373	RM 746	Kar Furnishing		"
93. 1.11.	"	"	"	F - 003	Reception area set	Rattan 1 set	1	RM 850	RM 850	Perabut Kota Raya		Chikus nursery
"	"	"	"	F - 004	Reception area set	Red wood	1	RM 900	RM 900	"		Bidor office
"	"	"	"	F - 005	Reception area set	Wood	1	RM 750	RM 750	"		"
"	"	"	"	F - 006	Dining table set	Black 6 chairs	1	RM 780	RM 780	"		(Second floor)
"	"	"	"	F - 007	Dining table set	White 6 chairs	1	RM 550	RM 550	"		(Second floor)
"	"	"	"	F - 008	Bed	Wood Double	3	RM 200	RM 600	"		"
"	"	"	"	F - 009	Bed	Wood Single	2	RM 200	RM 400	"		"

Equipment Register

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Equipment Register

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Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.217.	Non-fixed assets	Various appliances	Miscellaneous	MM - 001	Aluminium trunk	65 x 23 x 43m	1	¥ 40,000	¥ 40,000	Japan		Assigned to Hirasawa
92.12.1.	"	"	"	MM - 002	Coffee maker	National NC-641E	1	RM 189	RM 189	Super Kinta		Ipoh office
93.211.	"	"	"	MM - 003	Gas cooker	Fujita GC-818/G Cooker, gas cylinder	1	RM 204	RM 204	Lai Ming Colour TV Co.		Bidor office
"	"	"	"	MM - 004	Refrigerator	National NR-B23BFM	1	RM 1,650	RM 1,650	"		"
"	"	"	"	MM - 005	Washing machine	National NA-773	1	RM 880	RM 880	"		"
"	"	"	"	MM - 006	Refrigerator	Sanyo SR-26 DA	1	RM 680	RM 680	"		"
"	"	"	"	MM - 007	Rice cooker	National SRM22U	1	RM 239	RM 239	"		"
"	"	"	"	MM - 008	Iron	National NI-21A	1	RM 47	RM 47	"		"
"	"	"	"	MM - 009	Electric thermos	Panasonic PAP-35	1	RM 190	RM 190	"		"

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93.2.11.	Non-fixed assets	Various appliances	Miscellaneous	MM - 010	Vacuum cleaner	National 4700	1	RM 390	RM 390	Lai Ming Colour TV Co.		Bidor office
"	"	"	"	MM - 011	Kitchen cabinet		1	RM 170	RM 170	Perabut Kin Heng		"
"	"	"	"	MM - 012	Kitchen cabinet		1	RM 320	RM 320	"		"
"	"	"	"	MM - 013	Cupboard		1	RM 239	RM 160	"		"
93.2.26.	"	"	"	MM - 014	Cupboard		1	RM 310	RM 310	"		Chikus nursery
"	"	"	"	MM - 015	Electric thermos	Singer EA-035	1	RM 275	RM 275	Singer (Malaysia) SDN. BHD.		"
93.5.10.	"	"	"	MM - 016	Electric thermos	Panasonic	1	RM 185	RM 185	Lai Ming Colour TV Co.		Bidor office

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.27.	Non-fixed assets	Documents	Documents	-	Tropical Forest		1	RM 33	RM 33	S.S. Mubarak & Brothers (M) SDN. BHD.		
"	"	"	"	TIFS - 16	Tropical Rain Forest		1	RM 44	RM 44	"		
"	"	"	"	GEN - 17	Atlas of the World		1	RM 185.90	RM 185.90	"		
"	"	"	"	TIFS - 15	The Rainforests		1	RM 49.95	RM 49.95	"		
"	"	"	"	-	The Last Rain Forests		1	RM 69.50	RM 69.50	"		
"	"	"	"	-	Tropical Rainforests		1	RM 76	RM 76	"		
"	"	"	"	TIFS - 13	Wild Flowers in Colour		1	RM 32.50	RM 32.50	"		
"	"	"	"	TIFS - 12	Hamlyn Trees Hamlyn Colour Guide		1	RM 26	RM 26	"		
"	"	"	"	GEN - 14	Fascinating Snakes of South-east Asia		1	RM 59	RM 59	"		

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.27.	Non-fixed assets	Documents	Documents	MFRP - 8	Research Pamphlet	Volume 82	2	RM 3	RM 6	FRIM		Research Programmes
"	"	"	"	MFRP - 4	Research Pamphlet	Volume 101	2	RM 10	RM 20	"		Manual of Malayan Silviculture for Inland Forest III
"	"	"	"	MFRP - 6	Research Pamphlet	Volume 106	2	RM 10	RM 20	"		Endemic Trees of the Malay Peninsula
"	"	"	"	MFRP - 7	Research Pamphlet	Volume 108	2	RM 15	RM 30	"		Germination and seedling records
"	"	"	"	MFRP - 1	Research Pamphlet	Volume 53	2	RM 2	RM 4	"		Some Indications of the Total Volume of Wood in Lowland Dipterocarp Forest.
"	"	"	"	MFRP - 12	Research Pamphlet		2	RM 10	RM 20	"		Rubberwood Processing and Utilization
"	"	"	"	GEN - 1	Proceedings in International Rubberwood Seminar	Seminar	2	RM 15	RM 30	"		
"	"	"	"	GEN - 2	Trees and Mycorrhiza	Proceedings of the Asian Seminar	2	RM 30	RM 60	"		
"	"	"	"	GEN - 10	Tissue Culture of Forest Species		2	RM 10	RM 20	"		

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.27.	Non-fixed assets	Documents	Documents	TTFS 8-11	Tree Flora of Malaysia	Volume 1 ~ 4	4	RM 25	RM 100	FRIM		
"	"	"	"	-	Malayan Forest Records	No. 17	2	RM 20	RM 40	"		
"	"	"	"	-	Malayan Forest Records	No. 29	2	RM 25	RM 50	"		
"	"	"	"	-	Malayan Forest Records	No. 30	2	RM 9	RM 18	"		
"	"	"	"	-	Malayan Forest Records	No. 31	2	RM 12	RM 24	"		
"	"	"	"	-	Malayan Forest Records	No. 34	2	RM 100	RM 200	"		
"	"	"	"	MFRP 13-15	FRIM Technical Information	Volume 5.6.7.	6	RM 3	RM 18	"		
"	"	"	"	MFRP 16	FRIM Technical Information	Volume 28	2	RM 2	RM 4	"		
"	"	"	"	MFRP 2	Research Pamphlet	Volume 57	1	RM 2	RM 2	"		

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
92.3.27.	Non-fixed assets	Documents	Documents	GEN 5	Malaysian Forestry and Forest Products Research		2	RM 15	RM 30	FRIM		
92.6.25.	"	"	"	-	Journal of Tropical Forest Science	Volume 4	1	RM 30	RM 30	"		
92.12.2.	"	"	"	-	Birds		1	RM 52.50	RM 52.50	Koperasi Kedaibuku Universiti Malaysia BHD		
"	"	"	"	-	Malaysia		1	RM 203	RM 203	"		
"	"	"	"	TTF 6	Tropical Rainforest of the Far East		1	RM 39.60	RM 39.60	"		
"	"	"	"	TTF 8	Tree Flora of Malaysia	Volume 1	1	RM 120	RM 120	Longman Malaysia Sendirian Berhad		
"	"	"	"	TTF 9	Tree Flora of Malaysia	Volume 2	1	RM 120	RM 120	"		
"	"	"	"	TTF 10	Tree Flora of Malaysia	Volume 3	1	RM 120	RM 120	"		
93.2.9.	"	"	"	-	Malaysian Forest recorded		1	RM 100	RM 100	FRIM		

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93.12.15.	Non-fixed assets	Documents	Documents	-	Hutan Hutan Tropica		1	RM 25	RM 25	FRIM		
93.2.28.	"	"	"	-	Ferns of Malaysia in Colour	L.J. Pigcott	1	RM 150	RM 150	Kinokuniya Book Stores (M) SDN.BHD.		
93.9.3.	"	"	"	-	Planting Quality Timber Trees in Peninsular Malaysia		5	RM 25	RM 125	FRIM		
92.3.27.	"	"	"	MFRP - 3	Research Pamphlet	Volume	2	RM 3	RM 6	"		

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93. 7.13.	Non-fixed assets	Documents	Documents	-	Tree Flora of Malaysia	Volume 2	1	RM 130	RM 130	Longman Malaysia SDN.BHD.		
"	"	"	"	-	Tree Flora of Malaysia	Volume 3	1	RM 130	RM 130	"		
93. 10.3.	"	"	"	-	Japanese- English Dictionary		1	RM 204.60	RM 204.60	Kinokuniya Book Stores (M) SDN.BHD.		
93. 10.17.	"	"	"	-	Lotus 1-2-3 Text Book (English)		2	RM 14.95	RM 29.90	"		
93. 10.18.	"	"	"	-	Research Pamphlet	Volume 102 1989	1	RM 15	RM 15	FRIM		
	"	"	"	-	Research Pamphlet	Volume 109	2	RM 15	RM 15			
"	"	"	"	-	Malaysia Forest Research	Volume 38	1	RM 40	RM 40	"		
93. 11.16.	"	"	"	-	Trees and Mycorrhiza		1	RM 30	RM 30	"		
93. 12.15.	"	"	"	-	Trees and Mycorrhiza	MFR 38	1	RM 40	RM 40	"		

Equipment Register

Date of Acquisition	Classification			Control No.	Item	Standard	Quantity	Unit price	Amount	Supplier	Disbursement	Notes
	Large	Medium	Small									
93. 5.23.	Non-fixed assets	Documents	Documents	-	Malaysian Trees in Colour		1	RM 69	RM 69	Kinokuniya Book Stores (M) SDN. BHD.		
"	"	"	"	-	Recalcitrant Crop Seeds		1	RM 58	RM 58	"		
"	"	"	"	-	The Rainforest		1	RM 39.90	RM 39.90	"		
93. 6.6.	"	"	"	-	Asia No Tooshi Kankyo	アジアの投資環境	1	RM 252.25	RM 252.25	"		
"	"	"	"	-	Kaigai Bizunesu Jijo (Malaysia)	海外ビジネス事情 (マレーシア)	1	RM 66	RM 66	"		
93. 6.22.	"	"	"	-	Planting Quality Timber Tree in Peninsular Malaysia		2	RM 25	RM 50	FRIM		
93. 7.8.	"	"	"	-	Research Date		1	RM 40	RM 40	"		
93. 7.13.	"	"	"	-	100 Malaysian Timbers		1	RM 80	RM 80	Lembaga Perindustrian Kayu Malaysia		
"	"	"	"	-	Tree Flora of Malaysia	Volume 1	1	RM 130	RM 130	Longman Malaysia SDN. BHD.		

Reference 5

Costs of fuel, oil and related materials (as of March 1994)

Item/Standard	Cost (MR)
Fuel	
- Gas (leaded/per liter)	1.13
- Gas (unleaded/per liter)	1.10
- Fuel oil (per liter)	0.658
- Lampoil (per liter)	0.672
Oil	
- Engine oil (5 l)	23.00
- Gear oil (4 l)	22.00
- Motorcycle oil (2-stroke/per liter)	4.80
- Motorcycle oil (4-stroke/per liter)	5.20
- Distilled water for batteries (per liter)	1.60
Materials	
- Cement (50 kg)	8.80
- Gravel (1 ton)	8.00
- Concrete gutters (1.2 x 1.2 m)	500.00
- Corrugated steel pipe (60 cm diameter)	1,300.00
- Reinforcing steel (type 43, 12 m one rod 356 x 127 mm x 38 kg/m)	1,500.00

