Appendix 14

Report on Forest Protection, Nursery and Planting Machinery The Technical Cooperation for the Trial Plantation Project in Benakat, South Sumatra

Writeen by Seishi Miura

Dispatched Period

From 12th March, 1980

To 11th March

Preface

This report includes my opinion based on the experience during two years of the dispatched period. It would be my greatest pleasure if this report can provide a good reference for the progress of the Project.

1. Necessity of the forest protection

Vast Alang-Alang grassland in Sumatra and other islands of Indonesia, where some 15 mil. ha had been burnt down by the prescribed burning for the shifting cultivation, the grazing or the hunting, so far a considerable amount of afforestation has been carried out.

As the demand for timber increases, many ideas or techniques such as man-made forest, the improvement in quality, breeding or the forest fertilization were applied. However, unless the protection against any damage by diseases, insects or animals, or against the forest fire, is secured upto the harvesting time in the planted forest, it is impossible to meet the demand. Therefore, it is indispensable to intensify the forest protection or maintenance.

Further, if this forest is utilized for the natural resort for the nation in the future, the more intensive forest protection will become necessary.

2. Necessity of the fire break tree

On 8th of November 1980, as soon as we received the granted machinery the machinery granted in 1979 fiscal year), we started the planting of the fire break tree after employing the operator and training as well as preparation of the nursery, construction of the forest road and the fire

protection belt. In 2 to 3 months after the planting of the fire break tree Acacia manguim, Swietenia macrophylla, the planting stock are covered by the Alang-Alang. As for the weeding, the regeneration cutting was done at first, (For the protection, the regeneration cutting is suitable as far as there is no land surface barking. At the second or third care, it became the strip weeding. Then it is the same as the normal planting project. I think it may lose the effectiveness of the fire protection belt.)

3. Suitablity of Swietenia macrophylla as the fire break tree

Judging from the S. macrophylla in Palembang or the road side trees at Medan and the interview of the residents, this is considered to reach the full-grown tree in 30 - 50 years. However, in such a period, the planted trees grow bigger, then I am afraid that this fire break tree belt may not work as expected. But, before giving the final judgement. I saw one showing a splendid growth at the Benakat district. Therefore I wish to continue a further observation of this. A. mangium or Anthoceplalus cadamba were also planted as first growing species.

4. Corridor system

According to the corridor system, the fire protection belt was provided 3 years before the actual planting. The fire break trees were planted and became reasonably grown trees. Meantime the growing of the Alang-Alang was suppressed in order to be ready for the fire. If the fire protection belt was hit by the fire in this 3 year period, the actual planting is believed to delay further. However, by this, it may have an advantage to prevent the general public from transgressing the national forest border and reclamating.

5. Expectation for the future fire protection belt

From November, 1980 to now, the fire protection belts attached to the main road and to the working road were provided respectively. In such area, the belts with the fire break tree, the bare land, or the cover crop were compared with each other. The result was shown in the table below.

Cost comparison among the fire break tree, the bare land and the cover crop

Type	Tree breed & seed name	1980									1981							Total	Converted figure Per ha	Remarks
		Stock & seeds		Cultivation (Tractor)				Planting		Sub total	Weeding		Cultivation				Sub total			
		Quantity	Cost	Area	Depreciation	Operator's wage	Fuel costs	Laborer	Cost		Laborer	Cost	Operator	Cost	Depreciation	Fuel cost				
		Stocks	RP	ha	RP	RP	RP	Persons	RP	Persons	Rp	Persons	RP	RP	RP	RP	RP	RP		
Fire break tree	A. mangium	820	8,200	0.55	1,798	750	940	3.28	2,460	14,148	0.9	900	-	-	-	-	900	15,048	27,360	3 times of weeding
	S. macrophyila	6,306	63,060	4.20	-	-	-	25.22	18,915	81,975	7.0	7,000	-	-	-	-	7,000	88,975	21,184	No cultivation due to steep slope. 3 times of weeding
Bare land	-	-	-	0.55	1,798	750	940	-	-	3,488	-	-	3	3,000	2,697	1,056	6,753	10,241	18,620	3 times of cultivation
Cover crop		30	50,000	1.76	5,676	750	3,009	Seeding 1.00	750	60,185	2.9	2,900	-	-	-	-	2,900	63,085	35,843	3 times of weeding

As described in chapter 4, in order not to delay the beginning of the actual planting, the forest road shall be provided at first. Then the road width was enlarged, and maintain the bare land belt by the vehicular traffic. Thus, the repair cost of the forest road can be curtailed, and at the same time the planting was promoted.

The growth during the 3 years of waiting is considered to be tremendous. By the way, as far as I saw in the North Sumatra, West, Middle, and East Java. I could not find the real fire protection belt.

Note) Depreciation of the tractor

Kubota tractor body only. Depreciation period - 5 years.

Cost of the tractor	4,779,000
Annual depreciation	4,779,000 ÷ 5 = 955,800
Daily depreciation	955,800 ÷ 365 = 2,618
Hourly depreciation	2,618 ÷ 8 = 327

Attachments used - Kubota 14 in. bottom plough.

First time (Rough plough) 0.08 - 0.11 ha/hour. Average 0.1 ha.
Second time (Plough). 0.18 - 0.21 ha/hour. Average 0.2 ha.
Fuel consumption 20ℓ per day ÷ 7 x RP 60 = RP 171 ... Rough plough; one hour
Fuel consumption 15ℓ per day ÷ 7 x RP 60 = PR 128 ... Plough; one hour
Planting efficiency 250 stocks per day per one laborer.
Weeding by hand 0.9 ha per day per one laborer.
Weeding by machine 1.8 ha per day per one laborer.
Wages for labor. RP 750 in 1980 : RP 1,000 in 1981
The cost price for a stock was assumed to be RP 10.

Based on the above calculation, we found the costs for the cover crop and the fire break tree were high because in either case, the cost for stocks and seeds were included.

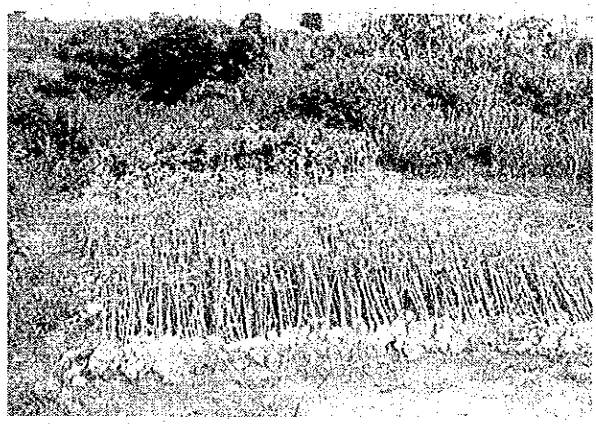
In case of the cover crop, if the direct seed production becomes possible in the future, it will be a considerable saving because seed croping, cultivation, seeding and weeding are the only expenses.

As for the bare land, if the number of ploughing becomes half of the current level, one third of the cost/ha, can be curtailed.

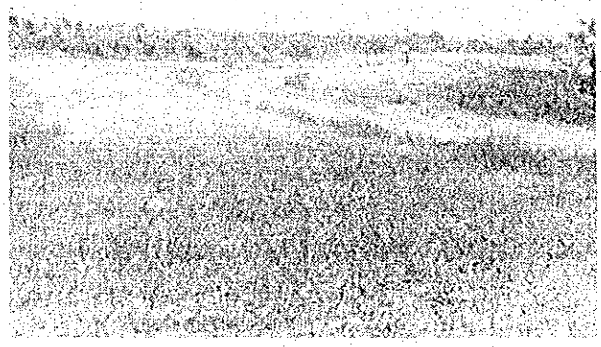
6. Testing and observation

(1) Introduction of the tractor or the motor cultivator for the plough of weeds after planting of fire break trees

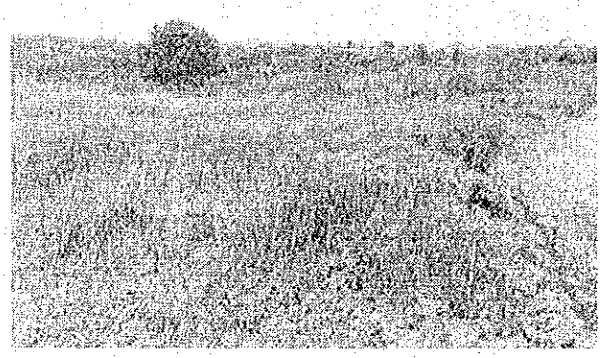
In the cultivation by the bottom plough attached to the Kubota tractor, it is possible to plough the weed. In the future, it is possible to use that if the planting interval was carefully selected. However, this is based on the use of Yammer motor cultivator with a rotary harrow. This is because it becomes impossible to plough into the ground due to the weed height, as well as the ups and downs of the land. In addition, on the down slope the steering wheel is lifted, and it gives the operator unstableness and fatigue. Since the attachment is for ploughing, it is difficult to plough as described above, and it tends to result in the early bud of weeds.



Hillside temporary planting of sitenia macroferra



Cultivation by the bottom plough photographed on 15th July, 1981



Cultivation by the disk harrow on 15th July, 1981
On 22nd September, cultivated again, and ploughing of the Alang-Alang

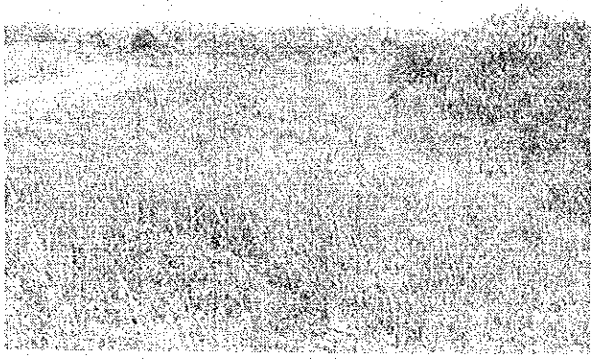
Name of medicine	Spray date	Climatic condition	Sprayed amount (g) per m^2 Form	Granular or liquidal	Object		Remarks
					Species	Name of weed	
DPA	1981 11.20	Sunny	4.5	Granular	S. maro-phyila	Alang-Alang	Up to 24th December, there was no sign of dying of the alan alan. Again observed on 27th January, there was one weeding in the meantime. The unsprayed area can be identified by the slightly more grown Alang Alang This is considered to be the effect of the medicine. No damage on trees are identified.
"	"	"	(standard) 9.0	"	"	"	
"	"	"	18.0	"	"	"	The same as above.
"	1981 10.24	"	300.0	"	" A. mang-ium	"	On 24th November, the Alng-Alang died, and the change in the vegetation was noted. The A. mangium leaf edge became black, and the damage showed up. There was a small damage on the S. macrophylla. There was a separation at the tree top.
ROUND UP	"	"	Solution of 1:100 concentration 2ℓ	Liquidar		"	Leaves of the alan alan has changed into yellow in a week and died.

(2) Spraying test of the weed killer

The spraying of the weed killer depends on how we can facilitate rapid growth of the increasing area of forest with minimum labor and costs. I think for the species not affected by the medical damage, the spraying should be applied actively.

Further tests with 50 g and 100 g for each species will be conducted.

- The ROUND-UP is difficult to apply because of the transportation of water and influence of wind, but it may be useful to spray in the year before the planting.



Cultivation by the rotary harrow on 15th July, 1981
On 22nd September, cultivated again, and ploughing of the Alang-Alang

Spraying of the DPA granular medicine of 300 f/m^2 after clearing. The change in vegetation was noted.

(3) Survival and growth test for the planting in the plastic pot and that without pot

After observing the dead standing tree in the planted area in 1980, the rough handling of the stock, imperfect compaction of the soil or delay in weeding was noted. We conducted tests based on the assumption that the exposition of roots against the sun should be avoided as much as possible.

Observed date	Specias	Stock age	Planted date	Climatic condi-tions	With pot				Without pot				Remarks
					Number of stocks planted	Average stock height	Dead stocks	Survi-val rate	Number of stocks planted	Average stock height	Dead stocks	Survi-val rate	
		day				cm	Stocks	%		cm	Stocks	%	
1981 11.20	A. mang-ium	28	1981 11.20	Sunny	50	17.8			50	13.3			
12.3				"			2	96			10	80	Investigation of the dead stock
12.18				"		19.0	0	96		15.7	3	74	Death and growth
1982 1.20				"		28.9	0	96		29.1	1	72	"
						Average height							
Total					50	11.1	2	96	50	15.8	14	72	

Observation date	Observation time		Time required	Planted holes	Size of holes	Fuel consum	Condi-tions	Remarks
	From	To						
1981			Minutes	Holes	Diameter x depth	ℓ	Surface plough	
8.27	14:27	14:43	16	19	15 cm x 40 cm	0.6	"	
	14:55	15:15	20	12	"			
Sub total			36	31		0.6		
9.24	8:20	8:45	25	31	"	0.9	"	
	8:49	9:13	24	30	"		"	
	9:14	9:45	31	30	"	0.8	"	
	9:47	10:25	38	30	"		"	
Sub total			118	121		1.7		
Total			154	152		2.3		Fuel consumption 0.89 ℓ/hour.

The diameter growth test shall be necessary in the future.

(4) Hillside temporary planting

2nd May 1981, Climate; Sunny The unpacked stock from the nursery was temporarily planted in the hillside.

Species; S. macrophylla

Conventionally, since this species was possible to plant as the stump stock. 4,000 roots were planted out without consideration of the effect of the sun on the root. Out of 4,000 only 150 were temporarily planted without taking leaves and branches, and the rest were plnated without leaves and points.

After the observation on 28th May the result of no dead stock was obtained. As the planting area increase, the number of stocks required will get larger. However, in order to achieve high turn-over usage of the nursery in a limited area, and a high survival rate in the remote planting area, it is desirable to plant temporarily out on the site near the planting area during the preparation period.

(5) Improved and attached plant hole digger as the attachment to the 4-wheel tractor

The plnat hole digger was granted in the machanical planting project, but the horse power of the machine, the hardness of the soil, the physical strength of the labor, and inexperience make the use of the machine very difficult.
After the grant of Johndeer tractor, the frequency of the use of the Kubota tractor which has a smaller horse power. Then we conducted testing using this three point link. The result was shown below.

We would like to conduct further testing in strip preparation area after improvement in the future.

Time required for one hole	154 ÷ 152 x 60 = 60.7 seconds
Planted holes per hour	3,600 ÷ 60.7 = 59.3 59 holes
Planted holes per day	59 x 7 = 413 holes (with 7 working hours)

Kubota tractor was used
Please refer to Chap. 5 concerning depreciation cost.

(Comparison of costs)

Labor wage (Daily) RP 1,000 + Depreciation (RP 109 x 7) + Fuel costs

(Mixing fuel)(6.3 ℓ x RP 200)

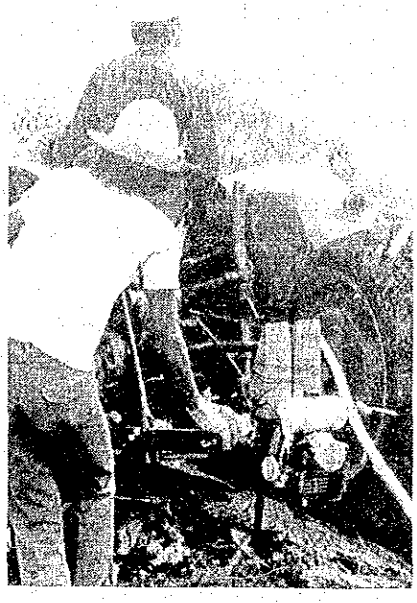
In case of machine use = (1,000 + 763 + 1,260) ÷ 413

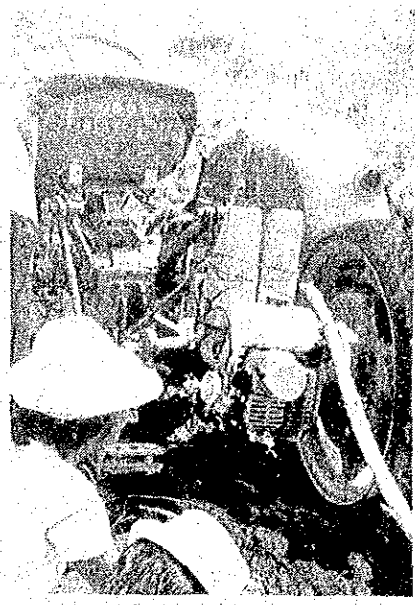
Cost per hole = RP 7.31

Costs per hole for contractor RP 10.00

Costs per hole for employed laborer on daily basis 1,000 ÷ 125 =
RP 8.00

Spraying of the DPA granular medicine of 300 f/m^2 after cleaning. The change in vegetation was noted.
The leaf edge changed to black, and showed the medical damage.





Attachment of the plant hole digger to the tractor

7. Other points (In relation to the nursery)

I had been in charge of the nursery since my arrival on 12th March 1980 till the nursery specialist came.

After the completion of the model infrastructure, the preparation of the planting project promotion started from 2nd June 1980. Seeding of Pinus merkusii was done from 14th to 20th June. They started shooting between 23rd to 28th June. The germination rate was very high and it attracted visitors from other nurseries. However, we had an incident.

Right before the transplanting, the 50 germination boxes each containment approx. 2,000 stocks in 50 by 50 cm, were damaged by same cause, and became impossible to transplant.

After this incident, the germination rate was close to zero inspite of our many seedling trials. This affected our cultivation scheme, and caused great inconvenience in the planting.

Fortunately, the result of Albizzia falcataria and S. macrophylla were satsifactory. However, the germination of Encalyptus deglupta was close to zero.

The following was noticed generally. When purchasing the seed, the expert's opinion in writing was enclosed. We conducted one more germination check on site, and confirmed a certain germination rate. However, there was a long time period till seeding. We found the rate went down to the half of the original level at the check just before seeding. This was mainly caused by the soring condition of the seed.

In the future, taking consideration of the plnating timing, and making the storing period from the seed purchasing to actual seeding shorter, will bring a better result.

(In relation to the nursery and the planting machine)

I was engaged in maintaining and operational training of the nursery and planting machinery. When drawing up the operational standards, I had a difficulty in handling of the cost of workmen's clothes because usually they are barefoot or wearing a pair of sandals, and the cost was to be borne by the Indonesian side.

At the beginning, in order to teach the techniques I talked to the foreman or workers directly, but this was discussed in the joint meeting.

They asked to instruct through the counterpart. Then I did training of the operation of the chain-saw or clearing machine for the counterpart, and they teach the operation to the workers or the foreman. However, the result was not satisfactory. I think the experts should teach directly to the foreman or workers. For example, the chain-saw or clearing machine is a very dangerous tool.

I wish the counterpart give a generous understanding for the situation of the project, and master the machinery as soon as possible. Further, I would like to ask the counterpart to work among the workers sometimes to understand the work procedure.

Keeping one's face is not the same as staying away from the actual work site. Even working one hour or 30 minutes will help early understanding of the procedure, and in the future work advantageously in the wage talk or training of the young.

(In relation to the maintenance of the machinery)

There are some points common for large and small machines. One is that the vehicles without an attached driver especially for trucks are rarely washed. The drivers were reluctant to do that and the same is true in the change of the motor oil. They tend to leave every thing for the mechanic. It may be because of the division of labor.

Perhaps only one or two drivers could fix the vehicles at the breakdown on the mountain climbing road.

Since all the counterpart hold the driver's license, they should be more decisive to overcome the driver's reasoning.

I believe it is important to give a kind advice to the people in the different section when they are wrong. I believe the bud for the big trouble should be picked at the early stage.

Appendix 15

List of reports concerning the project activities

1. Report of Pre-Feasibility Survey on Silviculture Project in Indonesia (November, 1975)

2. Report of Feasibility Survey (second survey) on Silviculture Project in Indonesia (South Sumatra) (December, 1976)

3. Report of Development Planning Survey for Afforestation Project in Benakat District, South Sumatra, The Republic of Indonesia (June, 1979)

4. Report of Preliminary Survey on The Technical Cooperation for the Trial Plantation Project in Benakat, South Sumatra (December, 1979)

5. Report of Implementation Design Survey Team on The Technical Cooperation for The Trial Plantation Project in Benakat, South Sumatra (February, 1980)

6. Report of Cooperation Planning Survey Team on The Technical Cooperation for The Trial Plantation Project in Benakat, South Sumatra (June, 1980)

7. Report of Advice Team for Forestry Technical Cooperation Project in Burma and Indonesia (February, 1981)

8. Reports of JICA Consultation Mission, JICA Guidance Team and Short Term Experts for Pilot Infrastructure Scheme on The Technical Cooperation for The Trial Plantation Project in Benakat, South Sumatra (March, 1982)