West Coast Paper Mills Nursery Eucalyptus Plantation (Kuluwali)

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At a distance of about half a mile from the West Coast Paper Mills at Dandeli, they have raised a wet Nursery over an area of about 10 acres. The locality enjoys 75" to 80" rainfall and the maximum temperature goes up to about 95°F. This is the Central Nursery that feeds the requirement of the Kuluwali plantation to a great extent. In Kuluwali itself another wet-Nursery has been started for raising of Eucalyptus Hybrides Seedlings. In the Central Nursery at Dundeli they are also raising some exotic bamboos and Wood Species for carrying experiments in the experimental plot, which they have secured from the Mysore Government on lease (68 acres).

The Nursery work commences from the middle of October when the surface is cleared of all weeds and soil dug up. The beds, which are generally $10' \times 4'$ are prepared from the middle of November. The dug out soil is mixed with farm yard manure and sand in required quantities, the proportion being dependent on the texture of the original soil. No chemical fertiliser is mixed in the Nursery bed. The prepared beds are then continuously watered for three weeks with a view to allow the quick germinating type of weeds to germinate and come up, which are taken out before sowing Eucalyptus seeds. Sowing of Eucalyptus seeds is done by the beginning of January and the beds are lightly watered every day. Germination commences within a week, after which the beds are watered twice daily more liberally. Within 40 days of sowing, the seedlings obtain a height of about 4". At this stage they are pricked out from the beds and transplanted in separate beds with a spacing of 3" x 3". They have devised a

frame ($5' \times 3'$) with spikes fixed at $3'' \times 3''$ apart. The spikes are about 3" long and when the frame is pressed against the bed, half of the area of a bed (10' x 3') gets ready holed 3" x 3" for putting in the seedlings forthwith. This devise has been very efficient and has minimised labour. From the root-system they retain about 4" only and cut off the top portions before transplanting. By this system they have got better results with development of more bushy root system. The beds are then regularly watered by hose pipe till June, by the end of which they grow to a height of $l\frac{1}{2}'$ to $2\frac{1}{2}'$. The plants are now ready for planting in the plantation. Transplants were raised in 6" polythene bags. But as direct planting from the beds has been equally successful, the former was discarded.

The plantation site is first cleared of all the forest growth during the month of December and the debris burnt on the spot during the months February and March. The area is then staked out with spacing $6' \times 6'$ (1200 plants per acre). Pits are then dug out 1' x 1' x 1'. These are then sprayed with D. D. T. Powder and after sometime all the pits are refilled with the dug out earth. As soon as the monsoon sets in, the plants are planted in the pits. No manure, cowdung or inorganic chemicals are used in the pits while planting. After planting the plants are never watered.

Eucalyptus plantation was started at Kuluwali in the year 1962 (July). An area of five thousand acres of land with scrab jungle on it, was settled with a private owner (Inamder of Kuluwali) on 30 years lease. Rs. 9. 50 has been fixed up as rent per acre

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per annum, alongwith progress of plantation i. e. rent will be charged when an area has been brought under plantation. The idea is to have atleast three rotations of crop within the lease period for each year's plantation.

In 1962 they planted 500 acres with Eucalyptus Hybrides in Kuluwali area. During the two subsequent years another 2000 acres have been planted up. So upto date they have raised plantation of 2500 acres and there is programme to add 1000 acres every year. The original forests of Kuluwali contained teak, sandal and other miscellaneous species. The owner had removed all the valuable trees and only scrab jungle is now standing over the area. This place is about 55 miles away from Dundeli and falls within Dharwar District.

All the Delegates, were shown this area on the 26th November forenoon, Dr. J. Singh, Ph. D. is incharge of this plantation and he lives within the plantation. There are permanent residences for the staff for about 200 labourers who work all through the year. At the time of planting operation more than 500 labourers work over the area.

The operations carried out during the first year of the plantations and for a few months in the second year are enumerated as below with their cost, as supplied by the Officer Incharge of the Plantation :

EXPENDITURE IS PER ACRE (1200 plants)

- 1. Felling the forest growth 18.00
- Collection of the debris and burning 10.00
- Staking the area i. e. putting marks 6' x 6'
 6.00
- 4. Pitting (1200 pits per acre) 55.00
- 5. Dusting the pits with D. D. T. powder 10.00
- 6. Refilling the pits with earth 15.00

7.	Planting up the Seedlings	10.00	
8.	Cost of plants (Nursery work) @ 2 pice per Seedling	24.00	
9.	Casualty replacement after $1\frac{1}{2}$ months i. e. casualty is about 10%	5.00	
10.	Scraping of weeds $1\frac{1}{2}$ ft.on either side of the rows and dumping in the middle & hoeing 1' x 6" round the plants for airation (done in October)	52.00	
11.	Cutting back the coppice shoots in October and November	12.00	
12.	Fire Protection measures taken in January-February. Clearing the external and internal bound- ary, division into blocks of 100 acres with 50' wide lines. Provi- sion of inspection path and fire guide lines 25'. All weeds scra- ped and burnt on the lines	15.00	232.00
13.	Cutting of the Coppice shoots in the second year (October, November)	6.00	
14.	Scrapping round the plant 1'-6"	10.00	
15.	Application of chemical Fer- tilisers, Ammonium Sulphate, Super-Phosphate and Potash in the preparation and Potash in the proportion of 3:2:1. 4 oz. per plant in a ring $1'-6''$ away and 3'' deep (applied from the end of July to the end of August)	45.00	
16	Drunning the plants for develo-	45.00	
10.	ping clear bales.	6.00	67.00
			299.00 or
			300.00

The operations enumerated above have been arranged in sequence of the actions to be taken in establishing a Eucaltyptus plantation.

Shri P. M. Taggerse in his article on "Role of Forestry in Wood-based Industry" has also said that the average expenditure for raising and maintenance of Eucalyptus is about Rs. 300/- per acre (Rs, 750/- per Hectare) and for bamboo plantation is Rs. 150/- per acre (Rs. 375/- per Hectare).

Scraping of the grass and fire protection measures will continue from year to year till the crop is exploited, as required. It is expected to apply a rotation of about 8 to 10 years to these plantations. They have estimated about 36 tons of air-dry pulp wood in each rotation of 8-10 years. For the subsequent rotations, the plantation will be managed on simple coppice system i. e. the plantation will be formed by the coppice shoots only and all protective measures would be extended to the plantations from year to year.

We have been shown round the Eucalyptus plantations by Dr. Singh, which have been started from 1962. So, we saw three years' plantation in succession. The five hundred acres which had been planted in 1962, have come up quite satisfactorily and other two years crops are also coming up as usual. The area is quite hilly and undulating but there is good soil laver. The soil is hot lateritic origin with mixture of sand. On the top of the hills the soil is comparatively shallower and as such the growth and development of the Eucalyptus plants were found to be poorer as one goes up the hills. Most marked development was noticed in the valley portions. The maximum height growth for the 1962 plantations was found to be about 30' with diameter about 5 inches. But height growth of 8' to 10' with two to three inches diameter class plants were also found to be of common occurrance along the upper slopes and on the top of hills. So, for calculation of the yield at the end of the rotation, lot of considerations have to be taken into account.

One most distinguishing feature of those Eucalyptus plantation in Kuluwali is this that since planting out, they have never been watered, whereas in Orissa, the Forest Department report says that it is essentially necessary to water the Eucalyptus plants during the first summer following planting to avoid heavy casualty and some watering is beneficial in the second summer too. It is considered that two factors are mainly responsible for it. Firstly, the rainfall in Orissa (Sambalpur District) is 56 to 60", against 75" to 80" of the West Coast areas. Secondly, the maximum temperature in Sambalpur area goes upto 115°F or sometimes more, as against about 95°F of the West Coast areas. It is possibly this low temperature coupled with good rainfall are the main ingredients for the success of Eucalyptus plantations over West Coast areas. It is reported that better results have been obtainedin the areas near about Bangalore with Eucalyptus. It is an established fact that Eucalyptus have been fully established in the Ootakamand Valley and over many localities of Mysore State. The three years plantation in Kuluwali, indicate every success of the scheme. But to introduce this species in other States, like Orissa, Bihar and Madhya Pradesh where rainfall is rather low and the temperature is much higher the results of the experiments of the Forest Department have to be watched. All the State Governments have now started Eucalyptus plantations on extensive scale over the waste and fallow lands available in the village skirts for the last three years. But the results are much poorer than those which have been found in Mysore State in Kuluwali and in other places. Availability of extensive areas for Eucalyptus plantations by private industries has also been a very great problem over this part, where due to abolition of the Zamindaries, big and suitable compact

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areas are not available for taking up plantation Scheme on large scale, as has been done by the West Coast Paper Mills.

Bamboo Plantation:

Bamboo plantation scheme of the West Coast Paper Mills is simple. They are utilising the gaps in the reserved forests under their lease for planting up with the Seedlings that have come up after the flowering of bamboos over the area. They have got 241 square miles of Reserved Forest under four Forest Ranges under North Canara Forest Division, all of which flowered in course of the last few years. The bamboo consisted of both Daba and Salia, in the proportion of 3:1. As Daba (Bambusa Arandinacea) gives much more yield than Salia (Dendrocalamus Strictus), the West Coast Paper Mills are planting up both Daba and Salia areas with Daba Seedlings only. They are using 3-4 years old Seedlings for this purpose. The rhizomes are taken out with 3'-4' long stem and planted out in pits $1' \times 1' \times 1'$ with spacing varying from $15' \times 15'$ to $25' \times 25'$ according to the nature of the area. The planting is carried out as soon as the monsoon breaks out and continues till it lasts. After about a month of planting, chemical fertilisers, Ammonium Sulphate, Super Phosphate and Potash, in the proportion of 3:2:1, is applied to the plants. 8 ozs. of the mixture is given per plant in ring 1' - 6'' round the plants with 3'' depth. The visitors were taken in the Block no. 7, Compt. no. 4 of Dundeli Range, where they carried out plantation of bamboos during the current year. So far we found the plants are in excellent condition and no casualty came to our notice. They have completely fenced this compartment of 7000 acres with 4- Stand barbed wire at an expenditure of about Rs. 1,00,000/- (one lakh rupees). This they have done to protect against grazing, trampling by cattle and fire hazard that always threaten the new regenerations.

Actually, no better protective measures could be thought of for protection and unfettered deve-

lopment of a regenerated bamboo area. It seems that the West Coast Paper Mills have got programme to fence up many such areas, where the regeneration of bamboos is likely to be endangered by grazing and fire havoc. In addition to fencing, lot of precautionary measures are taken by the West Coast Paper Mills against forest fires. That fire is extremely detrimental, has been fully realised by the West Coast Paper Mills and they have drawn up a regular fire-protection Scheme for the entire leased out areas of 241 square miles and it is being carried out annually with the collaboration of the Forest Department. The Forest Department spends about Rs. 30,000/and the Company contribute an equal amount for the purpose. i. e. they spend about Rs. 60,000/for fire protection for 241 square Miles or 154240 acres, which means that they spend about 40 paisa per acre under this head. The comparative benefit derived from it is of course incalculable.

It has been stated by the West Coast Paper Mills that they were getting about 80,000 tons of bamboos (both Daba and Salia) per year from their 241 square miles of 154240 acres of reserved forests, working on a felling cycle of three years as against the working plan Estimate of 89,000 tons. This means that they got an yield of about 1.6 tons of bamboos per acre per annum. Apparently this figure stands for the average annual increment for Daba and Salia bamboos, which is considered to be excellent. The local Statistics show that the annual increment for Salia is .37 ton per acre i. e. about one ton per cycle and for Daba the annual increment is .85 tons per acre i. e. about 2.6 tons per cycle. For this reason only the West Coast Paper Mills are planting up the Salia areas also with Daba bamboos. The felling cycle applied here is 3 years.

There is one interesting point about the method of working of the Daba Clumps by the West Coast Paper Mills which needs special mention. In Orissa and in the neighbouring States, the Daba Clumps are clear-felled while exploiting, but in the West Coast Paper Mills forests, they work out the clumps in the similar manner as salia bamboos by taking out the specified and selected culms, with the help of special implements. So, the annual shoots come up in the similar way as in Salia clumps. Calculation of the annual increments in Daba clumps has been only possible by working the clumps in the above manner.

A brief review of the Forest Section Staff of the West Coast Paper Mills will be of interest to know as it has been responsible for very efficient working of the forests and raising of successful plantations :-

1.	Incharge, Forest Section	One Officer (Untrained)	
2.	Technical Officers	Four Officers (Trained Forest Officers)	

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 Circle Officers
Eight (Trained Forest Officers)
Deputy Circle Officers
Five (Untrained)
Inspectors
Fourteen (Untrained)
Supervisors
Eighty-three

Out of this staff the Incharge, Forest Section and the Four Technical Officers draw monthly emoluments of more than Rs. 1000/- and the Plantation Superintendent gets a salary of Rs. 1600/per month. The eight Circle Officers get about Rs. 500/- each, the Inspectors get Rs. 150/- and the Supervisors get Rs. 90/- per month. It will be found from this statement that the staff is highly technical and very well paid. The West Coast Paper Mills are spending about rupees ten lakhs per year for plantation and Forest Department work.