Sirpur paper mill - an approach to the greening of environment.

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ABSTRACT

The Sirpur Paper Mill Limited is the oldest paper mill in Andhra Pradesh established in 1942 with a licensed and installed capacity of 71,100 M.T. of production of writing, printing and boards per annum, designed to produce paper from bamboo and wood at 60:40 as major raw material in pulp mixture. Annual requirement of raw material is 91,400 MT airdry bamboo and 73,000 MT airdry debarked wood, totalling 1,64,400 MT. Due to various reasons year after year the raw material resources are depleting and to find alternative sources, farm forestry on large scale has been taken up. Studies have been made on the growth and behaviour of various pulpable species, their adaptability to the soil and climate of this region, pulp quality and yield etc. Trials were also conducted on various Eucalyptus species on different spacing, moisture conversion, manurial, coppicing power, growth and yield etc. About 89.5 lakh seedlings mainly of Eucalyptus were supplied during the past 13 years to the farmers in villages of catchment area. Effluent water from the mills is also used by some farmers for raising pulp wood plantation. Encouraged by the results, more and more farmers are coming forward offering their lands for plantations and area of planting is increasing year by year with the technical guidance of the mill. A bankable scheme for raising plantations in 9000 ha in a period of 7 years in farmers land has been submitted to the banks and the same is under scrutiny. Mesta cultivation is taken up and results are encouraging. Vegetatyive propagation of Eucalyptus cuttings has been sucessfully developed on Brazilian pattern at our Forest Researeh Station.

INTRODUCTION

Sirpur Paper Mill is the oldest paper mill in Andhra Pradesh, established in 1942 and located at Sirpur Kaghaznagar on Kazipet-Ballarshah South Central Railway line. The licensed and installed capacity is 71,100 tonnes of production of writing and printing papers & boards per annum. The mill is designed to produce paper from Bamboo and hard wood at 60:40 pulp mixture and recycled fibre. The annual requirement of the raw material is 91,400 tonnes of Airdry Bamboo and 73,000 tonness of Airdry debarked wood totalling to 1,64,400 tonnes. The Government of Andhra Pradesh agreed to supply 70,000 tonnes of Bamboo and45,000tonnes of miscellaneous wood per annum. Due to flowering of bamboo and also due to the reservation of areas under game sanctuaries as well as supply to 'Buroods' (basket weavers), even 30 percent of the allotted quota is not made availabie. Felling and supply of mixed hard woods is completely stopped. The State

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Forest Department has been advocating that in the near future the Government forests in the catchment of the mills will not be able to maintain the supplies even at the present levels, and the supplies are likely to be reduced further due to the depletion of stock of natural forests. They have further advised that the mills should find alternate sources for obtaining the raw material by taking to farm forestry on large scale.

In view of the situation the mills have decided to encourage farm forestry out side the Governmenment lands in the areas of farmers for planting pulpable species by providing incentives like free supply of nursery seedlings and market rate for the pulp wood purchase.

The Sirpur Paper Mill took up forestry research programme from 1975 in an area of 43 ha. of Vempalli forest block situated 10 Km from factory site and in an area adjoining Peddavagu water pump station of the mills. Observations with the trials conducted are given below—

a) SPECIES PERFORMANCE TRIALS

In 1975 the following species were planted to observe the survival and general growth.

Sl. NO.	Name of the Species
1.	Grevillia robusta
2.	Ailanthus excelsa
3.	Melia azadirachta
4.	Eriodendron enfractuasm
5.	Eucalyptus hybrid
6.	Acacia auriculiformis
7.	Casuarina equisetifolia
8.	Erythrina indica

Grevellia robusta failed completely and was replaced with Gmelina arborea in 1978. Alianthus excelsa was planted in the failed plot of Casurina equisetifolia in 1976. Erythrina indica failed completely. The casualities were more in Eucalyptus hybrid during 1976-77.

In an old cultivated patch of land the following species were planted in 1976.

Sl. No.	Name of the species
1.	Sesbania aegyptica
2.	Glyricidia maculata
3.	Dalbergia panniculata
4.	Sesbania grandiflora
5,	Salmalia malabarica
6.	Pinus caribaea

In addition the species planted in the year 1975 were also planted. The growth was found better in the species planted in the abandoned cultivated area.

In subsequent years the casualities were replaced with the promising species. Melia azadirachta was planted in 1977 in the failed patch of Sesbania grandiflora.

In the year 1977, the following species were planted.

1. Dendrocalamus strictus
2. Eucalyptus hybrid
3. Acacia auriculiformis
4. Albezzia lebbeck
5. Tectona grandia
6. Delbergia paniculata
7. Melia azadirachta
8. Pongamia pinnata
9. Casurina equisetifolia
10. Gmelina arborea.

Except item 9 and 10, the rest of the species have estabilished well and the growth rate is being recorded periodically.

Dalbergia Sissoo and Broussonetia papyrifera have been tried in 1978. The performance was satisfaceory.

The Forest Research Institute, Dehradun have supplied the seed of the following species and were planted in 1979.

1. Laucaena leucocephala (subabul or ipil – Ipil)
2. Eucalyptus camaldulensis — strains
3. Eucalyptus Citriodara — 4 strains
4. Eucalyptus Cloeziana — 1 strain
5. Eucalyptus tereticornis — 5 strains

Subabul and E. Camaldulensis have established well.

Agave sisalana suckers procured from Anantapur district was planted along the road margins in the research plot. They have establilshed very well.

The following species of pines were planted to find out suitability to the localilty.

1. Pinus oocarpa (Zambia)
2. Pinus cubensis (Cuba)
3. Pinus roxburghi (Ranikhet)
4 Pinus caribaea
5. Pinus patula
6. Pinus kesiya (Assam)
7. Pinus caribaea (Honduransis)

The soil was inoculated with mycorrhiza brought from the pine plantations at Araku. Though survived in the first year they died in the subsequent year.

b 1 Provenance trials

b. 1. With the seed supplied from F.R.I. Dehradun, the following provenance of Eucalyptus was tried.

1. Eucalyptus Camadulensis No. 5 (Jodhpur)
2. ,, ,, No 10913 (Australia)
3. ,, Grandis No 4 Kerala)
4. ,. Camaldulensis No. 10929
5. ,, terticornis No. 10904
6. ,, ,, No. 11955
7. ,, ,, No. 10975

Of all the above provenances E. Camaldulensis (Jodhpur) was found to be best suited to the area.

b 2 Eucalyptus Camaldulensis and E. tereticornis.

The Conservator of Forests, Eucalyptus Research Centre, Hyderabad supplied the following provenances of E. Camalduensis and E. tereticornis for conducting experiment to find out the suitability of the species and provenance in Kaghaznagar catchment. Planting was done at 2M × 2M espacement in lines at random in 0.3m cube pits as per the design communicated. The growth was recorded.

b. 3 Sl. No. Seed Lot No.

Eucalyptus tereticornis

1. 10975 plus 11953 (Laura area)
2. 10951 to 54 (cook town area)
3. 12377 (N.W. of Mareeba)
4. 12189 (S.W. of Wt. Garnet)
5. 11034 (West of Mackay)
6. 10775 plus 10816 (Scacdt's creek)
7. 10817 (Barakula)
8. 11239 (South of casino)
9. 10837 plus 10851 (North of Wool Goolga)
10. 11583 (North of raymond terrace)
11. 13014 (5 kms from Mt. Mooloy)
12. 13013 (3.3kms from Mt. Carbine)
13. 12947 (Kennedy river-34 kms. from North Laura)
14. 12946 (19-27 kms. from N. Lake Land Downs)
15. Local Hybrid.

EUCALYPTUS CAMALDULENSIS

1. 3655 (FRI No. 713)
2. 4859 (FRI No. 721)
3. F R.I. No. 710
4. 8073 (FRI No. 716)
5. 12346
6. 12962 (Petford)
7. 12181 (katherine)
8. 12305 (Irivine bank)
9. 12963 (Gilbert river George Town)
10. 12964 (Emu creek petford)
11. 12968 (Burdle keen river goonvile)
12. Local Hybrid.

There were many casualities due to drought and subsequently the experiment was abandoned.

b.4. E. Camaldulensis :

The trials were conducted at Korsini in 1982-83 in collaboration with research range of forest Department. The seed of the following provenances was supplied from F.R.I. Research Centre, Hyderabad. The object of the experiment was to study the comparative growth of the various provenances of Australian origin in black loamy soils of Kaghaznagar catchment.

PROVENANCES

T1—Petford (12964)
T2—Petford (13159)
T3—Katherine (12181)
T4—Bullock creeck (13123)
T5—Barwan River (10785)
T6—Agnew (9856)
T7—Murchison River (10182)
T8—Lake albakutya (10666)
T9—Isdell River (12348)
T10--Irvene Bank (12348)
T11--Flinder's R.M. Richmond (13008)

T12-Old river (12352)
T13--Lennard river (12349)
T14--Eucalyptus hybrid (control)

The seedlings were planted in 1982 and periodical measurement are recorded by the Research Ranger (R.R.), Kaghaznagar. The following is the growth put up by each provenance basing on observations made on 5.1.1987 by R.R.

Name of the provenance	Av. height (Mtrs.)	Av. Girth in Cms.	Volume in Cum.
T1—Petford	8.975	25.46	0.03636
T2—Petford	8.397	24.96	0.0327
T3—Katherine	8.729	26.78	0.03913
T4—Bullock creek	6.661	22.40	0·0209
T5—Barwan river	7.902	23.22	0.0266
T6—Agnea	7.667	27.92	0.03735
T7—Murchison river	8.724	28.00	0.04274
T8—Lake albakutya	4.167	12.44	0.00403
T9—Isdell river	10.468	32.06	00.2860
T10 Irvene bank	8.148	23.70	0 02860
T11 Flinder' s R.N.Richmond	9.464	29.18	0.05036
T12 Old River	8.844	26.28	0.03817
T13 Lennard River	9.344	26.81	0.04196
T14 Eucalyptus hybrid	6.326	22.86	0.0209

C. Moisture conservation trials

Experiments were conducted to observe the effect of moisture conservation in survival and general growth of plants in comparison with the plants raised in control plots under normal technique of pit planting. Trenches of 1m × 0.3m size were dug for moisture conservation. The Central trench Portion was filled back for planting, leaving side of the trench to trap and conserve moisture.

The experiments were laid for the following spices.

1. Dendrocalamus strictus.
2. Eucalyptus hybrid
3. Albizzia lebbeck
4. Acacia auriculiformis
5. Dalbergia Paniculata
6. Boswellia serrata

It was observed that the growth was better where moisture conservation measures adopted. One of the main factors for establishment and survival is receiving rainfall immediately after planting.

D) Spacing trials

Spacing trials of bamboo, Eucalyptus and teak were laid to study the optimum espacement to be adopted for the species which can give maximum yield. 5m × 5m for bamboo and 2m × 2m for other species was found good.

E) Manurial trials

Bamboo, Eucalyptus and teak planted in 1977 was taken up for fertilizer treatment. In 50% of the area, urea was applied at 25 grams per plant. It was found that there was marginal difference of growth in comparison to plants, where no manure was applied. In the case of bamboo, saucers were formed around the clumps and the earth so obtained was put as mound at the base. 100 grams of Urea was applied in two doses. The production of culms has increased.

F) Coppicing power trials.

1976 plantation on melia azadirachta was felled in 1980 and 8 coppice shoots on an average per stump were found after 45 days.

1976 plantation of Albezzia labbeck was felled in 1980 and 4 coppice shoots on an average per stump were found.

G) Growth and yield trials.

The following are the average height and girths recorded in 1985 for the species planted in at Vempalli in 1976.

S. No.	Name of the Species	Av. height in m	Av. Girth in cm
1.	Ailanthus	16.20	97.50
2.	Melia azadirachta	14	48
3.	Bamboo Culm	7	15
4.	Eucalyptus camaldulensis	17	17

In the blank area in between Bachelor Hostel and Bungalow No. 4 in the residential complex of the Company, Eucalyptus hybrid was planted in 1976 and Subabul in 1981. Subabul was planted at an spacing of 1m × 1m and felled In 1985. The yield of pulpwood was 135 tonnes per ha. (airdry with bark). Eucalyptus hybrid was felled in 1986. Average girth at breast height was 75 cms. and the yield per tree was 100 kgs. of pulpwood (debarked airdry).

On the experience gained for raising nurseries in their research plot at Vempalli, the Mill has organised a separate wing for farm forestry. The staff of the Mill are well acquainted with the technique of raising nurseries and planting in the field sucessfully.

To begin with, polypot seedlings, mainly of Eucalyptus, were supplied to the farmers free of cost, to enable them to plant in the fields and bunds as well as backyard of their houses. About 89.50 lakhs of seedlings have been thus supplied during the past thirteen years.

Under Rural Development Programme of the Mill every villager who planted atleast 100 bamboo seedlings was given 25 kg. of fertilizer free of cost for their paddy fields.

In the year 1981 the Bengali refugees of Easgaon village were encouraged to take Farm forestry in their patta lands which were lying waste. Energy demonstration plot of 0.8 hectares was raised with pulpwood species like Eucaluyptus, Subabul and Casuarina in the farm of Sri Nitya. The plantation was irrigated regularly at the cost of the Mill. Further the mill appointed the owner of land as Watchman by paying Rs 150/- per month. He was encouraged to take up inftercropping with ground nut, green and red gram. The farmer harvested the crop worth of Rs. 500/- This has become a demonstration plot, which has attracted other farmers. In the subsequent year, 9 hectares of farmer's land of Easgaon village was planted with Eucalyptus, Subabul, and bamboo. The vacant land belonging to the Mill. In Chintaguda, Korsini village limits, bachelors' quarters area in the Mill premises and the water pump area Peddavagu was planted with different pulpwood species like Eucalyptus, subabul, Acacia Auriculiformis, Babul etc. They are being used to demonstrate the farmers as model plantations regarding the growth and technique.

The farmers are encouraged to utilise the clarified effluent water from the Mill for raising pulpwood plantation. The Mill arrange free supply of water to the fields Two progressive farmers Sri Satyanarayana Soni and Sri Gajapathi have utilised the facility given by the Mill and raised Eucalyptus in their lands. The height growth of Eucalyptus crop is comparatively better than other plantations of the similar age. The water is being used successfully for raising paddy crop and the farmers were encouraged to raise pulp wood species on the field bunds.

The Mill has submitted a scheme for institutional Financing for Farm Forestry in private lands to the NABARD in the year 1983. As the lead bank viz. Central Bank of India has not shown interest in taking up the scheme, there was no progress.

In the year 1984 an area 107 hectares of land belonging to 18 farmers in ten villages was planted with Eucalyptus. In the year 1985 an area of 74 Ha. of private lands of 14 farmers at Areguda, Mosam and Boregaon villages were planted with Eucalyptus. The survival percentage is 85. In the year 1986 an area of 150 hectares of waste land belonging to 28 farmers located in villages was planted with Eucalpytus. Realising the fact that ploughing of the area before and after planting will give better results in the survival percentage and growth rate, the areas were ploughed before planting at the cost of the Mills.

In the year 1986, NABARD sanctioned Rs. 15 lakhs through Andhra Bank towards Farm Forestry Scheme, where the Mill has agreed to purchase the pulp wood at the market rate.

Applications are received from 50 farmers for the supply of bag plants of pulp wood species to be planted in 1987 over an area of 300 hectares in their waste lands. They require Bank loan. Nurseries are raised to meet the demand and proposals were also submitted to the Banks for financial assistance.

In January, 1987 the District administration of Adilabad organised seminar-cum-workshop at Kaghaznagar. 'The Adilabad weaker Section Farm Forestry Co-operative Society Ltd.'. The Senior officials of the A. P. Forest Department also participated in the seminar, which is mainly concerned with raising, pulpable species in the waste lands belonging to weaker sections, marginal and small farmers. There is a very good response from the farmers. The Mill agreed to purchase the pulp wood from the farmers at the market rate.

As most of the area in Sirpur Paper Mill catchment drought prone, waste lands are available for taking up farm forestry scheme in large scale. The farmers are also enthusiastic. The Mill is supplying seed material and is offering the technical guidance for raising and rearing the pulpwood plantations. What is lacking is the availability of loans from banks and tractors for ploughing the areas. Regarding the choice of species, farmers are preferring Eucalyptus, since it is free from cattle grazing.

A bankable scheme for raising 9000 ha. in a period of 7 years on farmers land was submitted to the banks and the same is under scrutiny.

The area of 2432 ha. belonging to farmers as well as the company, has been planted upto the year 1991.

It is proposed to plant 800 ha. of area in the year 1992, for which 20.14 lakh plants have been raised for the purpose.

Mesta cultivation

An area of 120 ha. of farmer's land and company's land was planted with Mesta by supplying seed free of cost as well as fertilisers on subsidy in 1990. Similarly an area of 120 ha was planted in 1991 covering 16 villages. As the results are encouraging, it is proposed to take up larger area in future.

Make India Green Programme

Under this programme 5 ha. blocks were planted duriug last years in the reserves of different forest divisions by involving school children and Mahila Mandali.

Vegetative Propagation of Eucalyptus cuttings.

This programme has been successfully developed on Brazilian partern at our Forest Research Station.

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