APPM Efforts in Farm Forestry Programme

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ABSTRACT:-- *Because of non availability of Bamboo which is a major constituent in fibre furnish earlier and to reduce dependence on forests, it is essential to develop farm forestry for pulp and paper industries for their existence. The management of A.P. Paper Mills felt that they should strive on their own to increase the potential of fibrous raw material not only to meet the existing demand but also future requirement for expansion. With this view, fibrous raw material furnish was changed from forest dependent bamboo (80%) and tropical hardwoods (20%) to that of farm forestry based hard woods (85%) and bamboo (15%). This helps in preserving the much needed forest cover besides helping indirectly in reducing soil erosion to maintain the eco-system.*

Under farm forestry, APPM has taken up a massive programme of raising casuarina bag plants and subabul stumps to grow more trees for distribution to farmers in coastal districts of Andhra Pradesh. The targetted programme of raising Ten million casuarina bag seedlings per year and their distribution to farmers free of cost/at nominal rate has been successfully achieved from 1991. This has been achieved by covering about 1,000 to 1,200 hectares every year by incurring an expenditure of nearly Rs 35 lakhs. There are proposals to further increase the target.

The extensive programme of farm forestry apart from ensuring increased raw material supply to the mill, also developed fresh areas under tree growth in fallow and other waste lands in the near by districts; providing better employment opportunity to rural poor and weaker section.

To improve the quality of planting material APPM has established casuarina clonal seed Orchard, and the seeds are being collected from selected mother trees for nursery programme.

A demonstration plot was established in farmers field for the benefit of farmers engaged in subabul cultivation to demonstrate various methods of planting techniques for raising subabul plantations. Stump planting, which is a new technique adopted for the species in the catchment area has shown better results. Plantation studies are under progress in utilisation of mills treated effluent water to irrigate pulp wood species.

INTRODUCTION

Increasing awareness among public towards protecting ecology and environment to the benefit of mankind has put heavy pressure on government to enact laws against exploitation of natural sources like forests, rivers and atmosphere by the industry.

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Indian pulp and paper industry, one of the major consumer of both these resources has responded by utilising fast growing fibrous raw materials cultivated in marginal/ waste lands resulting in minimum deforestation and soil erosion. Realising it's responsibility in protecting the ecology and environment THE ANDHRA PRADESH PAPER MILLS LTD., one of the largest integrated pulp and paper mills in India producing about 85,000 MT of paper and boards requires about 2.1 lakhs MT of fibrous raw material per annum, has gone in for identification of fast growing wood species to reduce dependence on forests, some of the species identified for farm forestry are:

i. Casuarina (CASUARINA EQUISETIFOLIA)

ii. Subabul (LEUCAENA LEUCOCEPHALA)

iii. Eucalyptus (EUCALYPTUS TERETICORNIS)

To meet the requirement of about 1.75 lakh MT of hardwood per annum, APPM is encouraging farm forestry plantations in near by waste/low yielding lands. APPM has also modified the process technology suitably to use short fibered mixed hard woods along with bamboo.

In this article, the methodology and efforts put in by APPM to wards farm forestry are presented.

CASUARINA EQUISETIFOLIA (CASUARINA)

Casuarina Equisetifolia is one of the major plantation species which has wide adaptabilities. It grows well even in poor sandy coastal soils in different Agro climatic conditions. This is also capable of fixing atmospheric nitrogen directly, there by improving the soil condition. It is estimated that total extent of casuarina plantations covered in Vizayanagaram, Vizag, East and West Godavari districts is around 20,000 hectares.

APPM has taken up a massive programme of raising casuarina bag plants under Farm Forestry Scheme to grow more trees for distribution to farmers in the coastal belt of Vizag, East and West Godavari and Krishna Districts. The targetted programme of raising 10 Million casuarina bag seedlings per year and their distribution to farmers

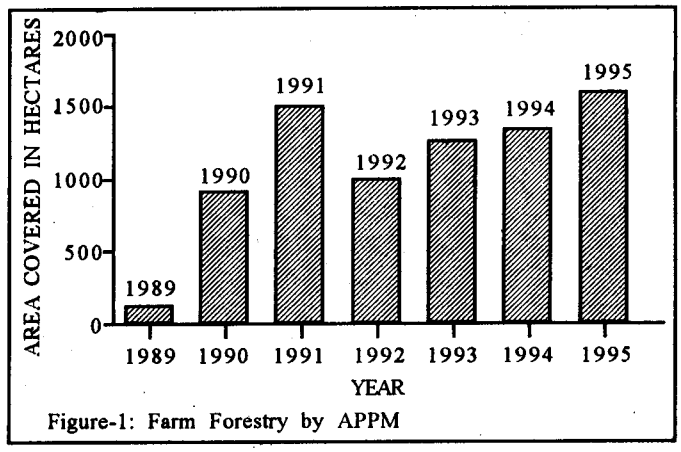

Figure-1: Farm Forestry by APPM

free of cost/ at nominal rate has been successfully achieved from 1991 (fig.-1). The annual expenditure incurred for this programme to cover 1,000-1,200 hectares is nearly Rs. 35 lakhs. During 1989-1995 about 48 million casuarina bag plants were distributed to 3,200 farmers covering 3,500 hectares area in three districts. Apart from distribution of seedlings, technical assistance is also being rendered by APPM by closely monitoring the plantations of farmers.

Technical Assistance to farmers:

Traditionally farmers adopt bare rooted seedlings for raising their plantations, with this method the survival percentage is found to be low resulting in low yield per unit area. To further increase the yield per unit area to improve the percentage of survival, poly pot seedlings were introduced. This has helped in almost uniform growth

Table-1

Efforts in Farm Forestry By A.P.P.M.

Year	Species	No. of Seedlings Distributed (Millions)	Area Covered (Hectares)
1989	CASUARINA	1.0	134.4
1990	,,	5.0	937.2
1991	,,	10.0	1523.6
1992	,,	7.8	1001.6
1993	,,	10.0	1205.6
1994	,,	7.5	982.0
1995	,,	7.0	960.0
1993	SUBABUL	0.5	68.4
1994	,,	2.5	339.6
1995	,,	4.0	528.0
1995	EUCALYPTUS	0.5	66.0

and improved the yield per unit area. APPM has established **Casuarina clonal seed orchard** over an extent of 6.4 hectares (using Green House) for production superior quality seeds. Seeds from selected mother trees are being used for nursery programme. The mills has just launched a programme for clonal propagation of superior elite mother trees as a part of TREE IMPROVEMENT PROGRAMME. It is expected an increase in per unit yield with clonal seedlings and making Casuarina more profitable to the farmers.

Pulping characteristics of clonal growth Casuarina

To asses the pulping characteristics of the clonal grown casuarina, laboratory experiments were conducted with experimental plantation trees of about $3^1/_2$ years age. The proximate analysis and morphological characteristics vide table 2A indicate no perceptible difference between clonal and normal wood. Similarly no much difference was observed in pulping and bleaching characteristics and resultant pulp strength properties (vide table 2B & 2C). However, these results are to be established with commercially grown farm forestry trees. Though there is no improvement in pulping characteristics in view of higher yield per unit area, it will be advantageous to make use of clonal propagation for raising farm forestry.

Table-2A

Proximate Analysis and Morphalogical Characteristics of Clonal and Normal Casuarina

S.No.	Particulars		Clonal	Normal
1.	Ash,	%	1.2	1.0
2.	1% NaOH solubility,	%	20.7	20.4
3.	A-B extractives, (Ash corrected)	%	3.3	3.1
4.	Lignin,	%	21.0	20.4
5.	Holo cellulose,	%	74.8	75.5
6.	Pentosans,	%	15.6	15.3
7.	MORPHALOGICAL CHARACTERISTICS			
	Avg. Fibre length	mm	0.93	0.91
	Avg. Fibre dia	microns	14.3	11.5

LEUCAENA LECOCEPHALA (SUBABUL)

Leucaena lecocephala (subabul) is known as a wonder tree. The plant attains a height of 10 to 15 meters in 4 to 5 years. It is a fast growing good

Table-2B

Pulping Characteristics of Clonal Vs Normal Casuarina

S.No.	Particulars		Clonal	Normal
1.	Active Alkali,	%	15.0	15.0
2.	Sulphidity,,	%	20.2	20.2
3.	Bath Ratio		1 : 2.8	1 : 2.8
4.	Total Yield,	%	48.6	49.3
5.	Total Rejects,	%	1.2	1.0
6.	Screen Yield,	%	47.6	48.3
7.	Kappa No.		22.1	22.6
8.	Calculated K. No.		15.7	16.0
9.	RAA at 18 TW		9.3	8.9
10.	Unbleached Viscosity,	Cps	21.6	23.4
11.	**Unbleached Strength at 40 SR**			
	Burst Factor		40.6	41.5
	Breaking Length,	mtrs	6410	6650
	Tear Factor		67	67
	Double Folds,	Nos	99	98
	Stretch,	%	3.0	2.7

Cooking Conditions:		
	1.25	Hr to 135 C
	0.5	Hr at 135 C
	1.0	Hr to 165 C
	1.25	Hr at 165 C

Table-2C

Bleaching Characteristics of Clonal Vs Normal Casuarina

S.No.	Particulars		Clonal	Normal
1.	Chlorine,	%	4.64	4.75
2.	Alkali,	%	2.0	2.0
3.	Peroxide, (50% Basis)	%	0.8	0.8
4.	Hypo,	%	1.2	1.25
5.	Buffer,	%	0.47	0.47
6.	Brightness,	%	82.0	81.6
7.	Viscosity,	Cps	10.2	10.6
8.	**Bleached Strength at 40 SR**			
	Burst Factor		38.9	39.2
	Breaking Length,	mtrs	6390	6420
	Tear Factor		50	47
	Double Folds,	Nos	18	23
	Stretch,	%	2.9	2.9

	Temp	Cy%	Time (Min)
Chlorination	Ambient	3.0	45
Ep stage	60-65 C	10.0	90
Hypo stage	40-45 C	10.0	150

coppicer and also fix nitrogen; can withstand high temperature upto 45°C. As the tree grows well in black cotton soils, Prakasam, Guntur and parts of Krishna districts in Andhra Pradesh are well suited. In these three districts, about 10,000 hectares subabul is grown in place of conventional commercial crops like tobacco, cotton and chillies, as the farmers are getting more profit.

Plantation demonstration plot:

APPM established a demonstration plot in 1993 for subabul species (K-8 variety) at Ongole in Prakasam district of Andhra Pradesh to demonstrate various methods and techniques for raising subabul plantations for the benefit of farmers engaged in subabul cultivation. Ten experimental plots were laid as given here under:

1. Bag plants with irrigation
2. Bag plants without irrigation
3. Stump (root and shoot cuttings) planting with irrigation)
4. Stump planting without irrigation
5. Bare rooted seedlings without irrigation
6. Espacement trial with bag plants (1m x 1m; 2m x 2m; 3m x 1.5m)
7. Bag plants with fertiliser application and irrigation
8. Bag plants with fertiliser application and without irrigation.
9. Direct dibbling of seeds with fertiliser application.
10. Direct dibbling of seeds without fertiliser application.

Periodical growth observations were made once in a month for a period of $2^1/_2$ years. The survival rate and growth parameters (height and girth) with different cultural methods after $2^1/_2$ years is given in Table-3. The data indicates that better growth could be achieved in bag plants with fertiliser and irrigation.

In case of Bag plant and stump technique with and without irrigation also shown good growth

Table-3

Different Cultural Methods of Subabul Vis-A-Vis Growth

S.No.	Cultural Method	No. of Plants in Each Plot	No. of Survival	Survival %	AVG Girth (Cms)	AVG Height (Mtrs)
1.	**Bag Plants with fertilisers**					
	With irrigation	512	512	100	28.0	12.0
	With out irrigation	368	365	99.2	24.0	10.0
2.	**Bag plants**					
	With irrigation	512	509	99.4	28.0	11.0
	Without irrigation	512	501	97.9	24.0	10.0
3.	**Stump plants**					
	With irrigation	24	24	100	26.0	11.0
	Without irrigation	24	24	100	23.0	10.0
4.	**Bare rooted seedlings**	208	188	90.4	23.0	9.0
5.	**Seed dibbling trials**					
	With fertiliser	512	512	100	25.0	9.0
	Without fertiliser	240	225	93.8	21.0	8.0
6.	**Espacement trials with bag plants**					
	1 x 1 Mtr	1152	978	84.9	16.0	8.0
	2 x 2 Mtr	297	282	94.9	23.0	10.0
	3 x 1.5 Mtr	256	248	96.9	26.0	11.0

compared to other techniques. In dry technique (without irrigation) it is also noticed that stump planting shows similar results comparable to that of bag plants. Hence, it is preferable to adopt stump planting technique in view of easy operational methods and lesser cost of raising and planting. However, the yield per unit area for each method is to be ascertained after felling in October 1996.

Effect of espacement in bag planting:

Field trials are under progress to assess the effect of espacement on survival rate. growth. The observations made so far vide given in Table-3, indicates that 3 x 1.5 mtrs spacing gives better growth.

With the encouraging experimental plot results, it is proposed to raise and distribute 5 million subabul stumps to farmers during the current year. This helps to cover an additional 2,000 hectares of catchment area.

Literature support to the farmers:

APPM published MONOGRAPHS on casuarina and subabul cultivation in Telugu (local language) and English covering cultivation practices, management, utility and several relevant parameters for the benefit of farmers engaged in cultivation of these crops (woods).

Raising of pulp wood species with treated effluent water:

As a part of waste utilisation and reducing pollution load, APPM has initiated experimental studies on utilisation of effluent and greening waste sand dunes. Casuarina, subabul and eucalyptus plantations are being raised with treated effluent and the results are encouraged. Efforts are under way to explore the possibility of supplying effluent water to farmers in nearby villagers to grow pulp wood trees.

CONCLUSION

To reduce dependence on forests APPM continues its efforts for identification of fast growing wood species and encouraging the plantations in near by waste/ low yielding lands and to increase the per unit yield by adopting better cultural methods and silvicultural practices. The ultimate objective of APPM is to strive on their own to increase the availability of fibrous raw material not only to meet the existing demand but also future demand for expansion by way of raising large scale casuarina, subabul nurseries and effective implementation of farm forestry programme. The farm forestry programme of APPM is also giving a helping hand to the local farmers to improve their economic condition and providing much needed employment for rural people. Efforts are also being made to utilise the effluent water for farm forestry to reduce pollution load.

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