Promoting Plantations Under Social Forestry and Genetics-APPM Experience

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The ever increasing demand for wood based raw material along with declining resources has made the pulp and paper industries to search for new avenues in order to bridge the gap. As a part of this scenario, plantations were introduced by means of social farm forestry especially targeting marginal and degraded lands for industrial self sufficiency. In course of time these plantation activities focused much upon genetically improved planting stock by introduction of quality seed material and Clonal planting material. This has created raw material sustainability along with assured economic returns to the agrarian sector. Introduction of genitically superior varieties in farm forestry has also helped in greening of waste lands and as efficient carbon sinks. Introduction of trees along with agricultural crops has also given way for agroforestry models.The farm forestry activities of Andhra Pradesh Paper Mills have created self-sufficiency of resources and sustaining raw material requirement. This has also helped large-scale participation of farmers, being eco friendly and farmer friendly in approach, helping in generating employment to the local communities, ensuring better financial returns to farmers. Under the scheme development and distribution of quality seedlings of Casuarina ,Subabul and Eucalyptus has benefited farmers to achieve maximum productivity per unit area on a continuous basis. Improved planting stock and innovative agro silvicultural techniques and other cultural practices have become a main stay in improving the socio economic condition of the farmer and creating healthier environment. Apart from getting the best realization out of their wasteland, the scheme has helped in meeting their local needs like fuel and fodder requirements to great extent.

INTRODUCTION

Sustainability together with the ability to maintain productivity over time is a common phenomenon. The objective is to optimize production and for better economic returns from unit area. (Sharma,1996).

Nearly 80 per cent of wood in developing countries is consumed for fuel, whereas the developed countries use approximately the same amount for industrial uses (Goodman, 1986). In developing countries, especially tropics enhanced productivity on sustainable basis without disturbing natural resources needs to identify alternative land use (Singh and Upadhyaya, 1999). In arid and semi arid Eco zones agrarian practices have been very selective. There are several push and pull factors beginning with resources to returns. The experience of APPM in this context along the coastal belt of Andhra Pradesh has shown that farmers are very selective.

The Farm Forestry scheme was formulated during 1989 in order to be self-sufficient and sustain the requirement of raw material. Apart from creating raw material resource pool to mills, the scheme envisages to help the farmers of the State, encouraging them to participate in large-scale activities. Therefore, the scheme is largely farmers friendly and eco-friendly in approach. This has ensured better plantation yield and ultimately better financial returns to farmers. Under this scheme, APPM has started developing and distributing quality seedlings to the farmers of Coastal Districts of Andhra Pradesh. It does not have any binding on the farmers to supply the material back to the mills and they can get the ruling market prices at any point of time. By farm forestry activity the mill has produced 341 million quality planting stock distributed to over 25,000 beneficiaries covering an area of 48,000 hactares. (Table- 1)

Most of the areas taken up for plantation by the farmers are rainfed on marginal/wastelands. Introduction of improved cost effective techniques helps in achieving higher productivity per unit area. Superior low cost planting stock by means of treated naked Casuarina seedlings and Subabul stumps have become mainstays among the farmers. Establishment of such low cost and efficient technology in tune with

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Table 1

Total Consolidated Position of Farm Forestry

Year	No. of Nurseries Developed	No. of Seedings Distributed Millions	Seeds Distributed M.T.	Extent of Area HAC SUB+CASU+EUC	No.of Beneficiaries
1989	4	1.3	0	166	82
1990	12	5.0	0	795	558
1991	19	9.8	0	1465	1539
1992	18	8.1	0	1038	997
1993	23	10.3	3.54	3716	1294
1994	17	9.8	0.535	1483	803
1995	15	11.3	0	1409	737
1996	18	12.6	0.57	2091	868
1997	13	11.8	0.17	1542	1106
1998	13	13.4	0.28	1694	781
1999	17	18.7	0.63	2212	1131
2000	17	22.7	0	2558	1471
2001	15	26.1	0	3189	1650
2002	14	32.3	0	3934	2202
2003	16	36.3	0	4782	2330
2004	21	46.43	0	6619	2998
2005	32	65.75	0.5	9663	4924
TOTAL	284	341.68	6.225	48355.58	25471

economic status of the farmers has also helped in improving their socio-economic conditions.

METHODOLOGY

Identification of Alternative Land Use System

Casuarina and Subabul appeared as a convenient option for alternative land use system wherein commercial crops demand labour intensive practice and more resources. Thus wood lots have helped in creating more flexibility to a greater extent. Land allocation for wood lots by farmers in regions close to industries also geared up farm forestry as it provided remunerative prices and ready market for the produce.

Motivation to Farmers

The motivation work undertaken by the company has won the trust from farmers and public administration units. Audio visual aids have become handy for effective publicity. Farmers meet every year has helped in exchange of ideas and motivating the farmers, forest staff, public and NGOs' to take up community development schemes through extension service, training, publicity and field trips.

Since 1989, large number of training programmes were conducted and it has proved, that involvement of farmers in farm forestry is an important tool in establishing and maintaining the wood lots in the degraded wastelands and marginal lands.

The green cover in these coastal districts has increased the value of the land, which in turn increase the demand for seedling production in the net work of nurseries.

Cost Effective Technologies

The introduction of the concept of treated bare rooted Casuarina seedlings and Subabul stumps has attracted tremendous response from the farmers as the technique has proved cost effective with higher survival percent. They are instrumental in promoting the concept, philosophy and mechanism of joint forest management in the 8 Coastal Districts of Andhra Pradesh. Reduction in the use of poly bags has not only been saving but also Eco-friendly.

The constant innovative techniques in tree improvement have started yielding results by improving the per unit volume production of pulpwood in the catchment area. Today, the word "wastelands" has been replaced as gold mines in many of the localities as they were once abandoned sites. It has proved that the land is never a waste. It is wasted because of unsustainable land use practices. Today they are highly productive because of usage of improved planting stock and innovative agro silvicultural

techniques and other cultural practices. This has not only brought down the felling cycle between 3 and 4 years and also early returns with increased fund regeneration capacity.

Programmes with District Administration

The gesture of the District Administrative Authorities awarding the seedling production responsibility to APPM for their farm forestry development in rural areas itself shows the efforts of the Company in mustering the labour force and also the social acceptance of the Company. Mill activities have also extended in utilization of wasteland and poverty alleviation schemes by means of creating employment mainly in tribal areas. The activities have been recognized by I.T.D.A. and C.L.D.P. under Indira Kranthi Patham and District Water Management Agency, respectively. These schemes actively involve the local communities, Village organizations and self help groups.

Genetics and Tree Imporvement Programme

Macro Propagation

The genetic variability available in tree population can be utilized for improvement programme of the species by selection of superior varieties basing on certain characteristics. Such superior varieties can be further macro propagated in order to establish clone banks. Early attempts on genetic improvement of Casuarina equisetifolia concentrated on identifying superior trees from plantations ,their vegetative propagation and establishment of Clonal seed orchards (Rao,1989). Research on these lines with Casuarina equisetifolia have helped in identifying superior performers and further developed into Clonal seed orchard. Macro propagation trials with new species Casuarina junghuhniana have shown significant results (Table-2). Trials are under progress for testing the pulping characteristics of Casuarina junghuhniana, in order to compare with the conventional Casuarina equisetifolia. Multi locational clonal trials with selected genotypes can also fix optimal rotation period of Casuarina. This would largely benefit marginal farmers for plantations in degraded lands under rainfed conditions. Studies need to be further extended for other tree species improvement on these lines, for improved pulp quality and short rotation cycle.

Clonal Seed Orchard/ Demonstration plot

The seed material needed for developing nurseries of Casuarina are obtained from Clonal Seed Orchard. Establishment of elite trees through election criteria and quality seed material from CSO has ensured in better nursery stock. Plantations from such qualitative seedlings have ensured higher survival percentage and enhanced productivity on a sustainable basis per unit area.

APPM also interacts with farmers by organizing farmers meet to explain the best management practices which helps the farmers to have maximum yield and realization out of plantations on marginal and fallow land available with them.

Environment Friendly

The Company has established a symbiotic relationship between the farmers and themselves by producing environment friendly pulpwood species in their less productive lands. The Company has introduced various improvised site-specific nursery stock productions to ensure sustainability of the programmes. The Company has been able to develop quality seedlings from seed material developed CSO of Casuarina, which are highly acceptable in the rural mass.

Today the efforts in Coastal Districts of Andhra Pradesh can sustain the pressure of fodder and fuel by their assistance through farm forestry project. The plantations have also helped in the sequestration of Carbon (Table –3)

The plantations established all along the coastline and also on shifting sand dunes have not only stabilized the sand dunes but also conserved the soil and moisture in the region. The plantations are also serving as shelterbelts and wind breaks thus, mitigating the harsh effects of perennial cyclones in the region.

The soil erosion has been brought down and there is improvement in

Table 2

Species	2 Year		3 Year		4 Year	
Casuarina equisetifolia	Height* Mtrs.	G.B.H* Cms.	Height* Mtrs.	G.B.H* Cms.	Height* Mtrs.	G.B.H* Cms.
(Bare rooted)	5.50	10.41	7.20	15.28	11.00	33.00
Casuarina junghuhniana (Macro propagated)	7.26	18.03	9.60	26.10	14.50	38.00

* Average Values

Table 3 Asset Creation Out of APPM Farm Forestry Plantations 1989-2005

Particulars	Quantum
No. of seedlings to be developed & distributed (Lakh)	3416
Extent of Area covered under plantation (Hac.)	48356
Approximate No.of beneficiaries in the project	25471
Total estimated wood yield out of the above plantations (Lakh MT)	43

Adhoc Estimates of Tangible and Intangible Benefits

Particulars	Quantum	
	(Lakhs)	Value Rs. Lakhs
Fuel wood available to beneficiaries (MT)	5.66	2264
Fodder available to the beneficiaries (MT)	2.77	1108
Employment generation – man days	241	12050
Asset creation out of yield MT	43 •	43000
Carbon sequestration (MT) on yield Carbon		
Credit value Rs.	21.5	3032
Soil Nitrogen Fixation (MT)	0.145	1595
Addition of Organic manure (MT)	4.04	404
Rain water fixation in Soil M^3	5319	*
TOTAL VALUE (Lakhs Rs.)		63453

* Value could not be assessed

moisture conservation. As seen in around the plantation site, the dried wells are recharged which indicates the improvement in the water table levels.

Socio Economic Considerations

The agrarian sector has benefited to a larger extent with the introduction of Casuarina and Subabul not only by having more fuel and fodder for their needs, and also income regeneration through selling of pulpwood to the various companies. Even the leftovers like stumps which are being uprooted and sold as firewood to the big kilns, thus a separate industry is being getting organized for the production of bricks in the region. The Casuarina poles did serve as scaffolding and for other construction purposes, thus ensuring more supply to the construction industry.

The introduction of Subabul has made a revolution in dairy development and today one of the districts is major producers of milk as Subabul is substituting the fodder for most of the cattle breeders. Thus, the project has promoted "Operation Flood" in the area.

Apart from the above during planting and harvesting seasons, the employment generation is enormous. Thus, the company is serving the society in the upliftment of socio economic condition of the poor.

Economic productivity of the land has improved. The degraded natural forests are showing better regeneration because of relief from the biotic pressures.

Farm Forestry in Promoting Conservation Measures

Andhra Pradesh Paper Mills has established its raw material base in marginal and degraded farmlands of Coastal Districts of Andhra Pradesh. These lands were traditionally poor in fertility and fallow over a long period of time.

- Bringing these areas under farm forestry, has helped in clothing the areas with green cover. This has resulted in prevention of soil erosion and in conservation of water.
- Creation of plantation cover in the marginal lands has increased interception, stem flow and infiltration, hence reducing the run off of rainwater.
- The soil floor in the plantation is rugged with leaf litter that has helped in soil and moisture retention. This was well demonstrated in improvement in the water table wherein the dried up

water holes are being recharged.

- Establishment of Casuarina plantations in the Coastal belt has resulted in sandy dune stabilization and in turn protected the neighboring fertile lands from desertification.

- These plantations have also helped in minimizing the devastation of cyclones as they act as shelterbelts and windbreaks.

- As Casuarina and Subabul are the predominant species planted all over the project area, they have helped in improvement in the soil fertility by way of nitrogen fixation.

CONCLUSION

The Andhra Pradesh Paper Mills Limited has envisaged integrated pulpwood based farm forestry project in cyclone and drought prone coastal districts of Andhra Pradesh viz. Srikakulam, Visakhapatnam, East Godavari, West Godavari, Krishna, and Prakasam Districts. With its humble, aggressive and dynamic approach large tracts of marginal and saline soils which were either to unproductive are brought under tree cover. Even the denuded community lands that were highly exploited for fodder and fuel needs are brought under tree cover thus, the village communities have also benefited to a greater extent.

This has generated huge employment potential in the coastal districts of Andhra Pradesh. Establishment of 48,000 Ha. of plantations and production of over 341 Millions seedlings till date. Since the raw material source is from farmers' marginal lands, farmers are benefited by getting employed in their own lands for the development of pulpwood plantations during the lean period. The total number of beneficiaries till date is around 25,000 which alone speaks volumes about the employment potential and benefits generated in the Coastal Districts of Andhra Pradesh. These plantations also produced leaf litter, fodder and firewood which in turn served the needs of domestic demands and thus relieving the pressure from whatever forests left in these places. There are about 284 nurseries distributed in the above area, which serves as employment insurance sites for the villagers.

Clonal planting stock has enabled to establish genetically superior varieties, with high yield and short rotation cycle

Introduction of Casuarina and Subabul has optimized the sustainable utilisation of natural resources. The unique capabilities of these two species are their capability of restoring soil fertility and improving its productivity through nitrogen fixation.

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