

FARM FORESTRY AND AGRO FORESTRY INITIATIVES OF ITC, BHADRACHALAM - A Case Study

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Abstract

ITC has launched plantation programs to achieve self-sufficiency on raw materials. These programs include the farm forestry, social forestry and research and development for tree improvement. The purpose of Research and Development for tree improvement is to demonstrate farmers on best alternative land use option. It has already developed 'Bhadrachalam' clones which are almost nine times more productive than normal seedlings. ITC has taken up the scheme of farm forestry for commercial and sustainable tree growing with a developed a package of scientific silvicultural practices. These technologies are transferred to the farmers to support them to raise and maintain highly scientific and successful plantations with a buy back arrangement at prevailing market price. Multi species plantations along with inter crops are promoted on private wastelands by providing long-term loans to resourceful households. ITC has envisaged social forestry programme to alleviate poverty in support of National Poverty Alleviation Programme during 2001-02. About 500 poor tribal farmers converted 1730 hectares of private wastelands into productive farmlands and planted 4.5 million saplings of different species. After the adoption of the schemes, the average net gains to farmers is about US\$ 520 per annum under rain fed condition and US\$ 833 per annum with irrigation on a 4 year rotation cycle. This is significantly higher than most other cash crops in our operational area and at much lower risks. Now these rural households having access to their own woody biomass, they can meet most of their fuel wood requirements in-house through lopping, cuttings and pruning.

It is ITC's endeavour to continuously explore opportunities for growth by synergising and blending its multiple core competencies to create new opportunities of growth. The employees of ITC are inspired by the vision of growing ITC into one of India's premier Institutions and are willing to go the extra mile to generate value for the economy, in the process creating growing value for the shareholders.

Paperboards and Specialty Papers Division a core sector environment and ecology conscious enterprise, one of the important divisions of ITC having a turnover of around Rs.600 crores becoming instrumental in the development of a backward scheduled tribal area around Bhadrachalam (temple town), district Khammam in the state of Andhra Pradesh, India.

To achieve self sufficiency in cellulosic raw materials (present need 4.00 lac tonnes per annum and it is likely to grow to 6.00 lac tpa and then 8.00 lac tpa) launched plantation programme (Farm Forestry). In the early stages encouraged 6185 farmers to cover 7441 hectares with Eucalyptus seed route plantations from 1138 villages in the districts of Khammam, West Godavari, Krishna, Guntur, Prakasam, Nalgonda and Warangal of Andhra Pradesh.

To make this programme more attractive by increasing the levels of productivity from 6 - 10 CuM (MAI) to 20 - 58 CuM (MAI) & to show to the conventional agri farmers a best alternative land use option, initiated Research & Development for tree improvement and developed 'Bhadrachalam' clones.

Farm Forestry: For commercial & sustainable tree growing, developed a package of scientific silvicultural practices and transferring to the farmers (details given in Annexure-I) to raise & maintain highly scientific & successful plantations with a buy back arrangement at prevailing market price. So far encouraged 6372 farmers participation in plantation programme and covered an area of around 10,000 hectares.

In addition to achieve self sufficiency to improve the livelihoods of people below poverty line ITC had envisaged social forestry programme to alleviate poverty in support of National Poverty Alleviation Programme during 2001-02. This model simultaneously tackles problems of endemic poverty of tribal and meets part of the needs of woods for our business. Multi species plantations along with inter crops are promoted on private wastelands by providing long term loans to resourceful households.

Outcomes:

Achievements in all three initiatives have been very encouraging.

- a) **Research and Development:** 86 fast growing and high yielding, disease resistant clones are being produced on a commercial scale. The productivity of 'Bhadrachalam' clones ranges between 20-58 m³/hectare/year, which is 3 to 9 times more productive than normal seedlings. 23 site-specific clones (includes 86) adapted to problematic alkaline and saline soils have also been developed so far.
- b) **Farm Forestry:** The commercial viability of these clones & subabul selected varieties is evident from the fact that since 1992, 6,372 farmers have become our partners and planted over 10,000 hectares.
- c) **Social Forestry:** Since its inception in 2001-02 covered 2,500 poor tribal farmers, converted 1730 hectares of private wastelands into productive farmlands and planted 4.5 million saplings of different species.
- d) **Environment:** Apart from other well-known consequences of such a large-scale greening effort, these plantations have the potential to sequester 0.5 million tonnes of carbon, thus mitigating GHGs.
- e) **Farm Incomes:** Average net gains to farmers is about Rs.25,000/hectare/year (US\$ 520) under rainfed condition and Rs.40,000/hectare/year (US\$ 833) with irrigation on a 4 year rotation cycle which is significantly higher than most other cash crops in our operational area, and at much lower risks.

Plantation for pollution prevention:

By promoting the planting of nearly 30.86 million plants, the project has increased the green cover in the country over 10,000 hectares. Apart from the innumerable benefits of such large-scale afforestation, it directly contributes to *in-situ* moisture conservation, groundwater recharge and significant reduction in topsoil losses due to wind and water erosion.

This plant population has the potential to sequester 0.5 million tonnes of carbon thus helping in the reduction of Green House Gas (GHG) and conservation of natural forest resources. This 0.5 million tonnes of carbon is approximately worth US\$ 1.5 million at the rate of US\$ 3 per metric tonne. Year-wise the volume of carbon sequestration is as follows:

Year	No. of farmers	No. of clonal saplings(lakhs)	Area (ha.)	Carbon Sequestration (MT)
1992	5	9613	4	200
1993	6	25857	15	750
1994	47	92817	39	1950
1995	187	299919	183	9150
1996	127	428075	220	11000
1997	181	948426	489	24450
1998	286	1643934	838	41900
1999	376	1825111	980	49000
2000	423	2211354	1178	58900
2001	647	2458681	1110	55500
ITC SF Proj	967	917396	560	28000
2002	800	2936770	1322	66100
ITC SF Proj	1543	1657000	1170	58500
Subabul	777	15406904	1914	95700
Total:	6372	30861857	10022	501100

Over 6,000 rural households having access to their own woody biomass, they can meet most of their fuel wood requirements in-house through lopping, cuttings and pruning. To this extent therefore, existing public forests are protected from wanton destruction by rural households in search of fuel wood.

As a result of the leaf-litter from multi-species plantations and the promotion of leguminous inter-crops between rows, depleted soils are constantly getting enriched, making these farmlands more productive. In the near future, the increase in soil fertility will lead to a decline in fertilizer and pesticide consumption, thus reducing the pollution of groundwater sources through leaching of such chemicals.

The details like year wise spread of plantations, clones suitability to soils, clones performance on different soils, yields and standard performance levels of 'Bhadrachalam' clones are as follows:

➤ Participant farmers and their levels:

Year of Plantation	Size of Plantation					Total No of Farmers
	< 1 ha	1 - 5 ha	5 - 10 ha	10 - 50 ha	> 50 ha	
1992	2	3				5

1993	3	2	1			6
1994	30	16				46
1995	149	37	1			187
1996	61	54	10	1		126
1997	42	73	11	5		131
1998	110	120	15	10	1	256
1999	148	237	22	16		423
2000	156	214	35	15	2	422
2001	224	383	23	10		640

➤ Clones suitability to soils

S No	Type of Soil	Adaptable Clones
1	Alluvial	1,3,6,7,10,27,105,115,122,130,266,274,284,286,288,292,316,
2	Black Alkaline	1,10,27,71,83,99,105,130,271,285,316,405,411,412,413,470,526
3	Black	1,3,7,10,27,71,72,83,99,105,122,266,271,272,285,290,316,405,411,412,413,417,439,526
4	Red	1,3,6,7,10,27,71,72,99,105,122,130,158,159,223,266,272,274,284,285,286,288,290,292,315,316,319,405,411,412,413,417,469,470,499,526
5	Red Sandy	3,6,7,71,105,122,266,288,316
6	Sandy	3,6,7,10,288,

➤ Clonal Performance on Different Soils

S No	Type of Soil	MAI (CuM)	
		Maximum	Minimum
1	Alluvial	35.41	12.08
2	Black Cotton	41.93	15.61
3	Black	47.81	15.04
4	Red	57.37	16.70
5	Red Sandy	40.54	10.23
6	Sandy	50.72	18.64

➤ Performance of Clones as per the soil and management practices followed.

S No	Type of Soil	No of Plantations		
		Poor	Normal	Excellent
1	Alluvial	11%	22%	67%
2	Black Cotton	11%	18%	71%
3	Black	9%	18%	73%
4	Red	10%	15%	75%
5	Red Sandy	11%	23%	67%
6	Sandy	9%	23%	69%

Standard Performance Levels:

Age of the Plantation (Years)	MAI (Cum/ha/yr)		
	Poor	Normal	Excellent
1	< 8	8 to 10	> 10
2	< 10	10 to 12	> 12
3	< 12	12 to 15	> 15
4	< 15	15 to 18	> 18
5	< 18	18 to 20	> 20
6	< 20	20 to 22	> 22
7	< 22	22 to 24	> 24

➤ Yields (MAI) as per holding levels of participant farmers

S.No.	Size of Plantation	MAI (CuM)	
		Minimum	Maximum
1	Less than 1 ha.	16.70	57.37
2	1 ha. to 5 ha.	18.64	49.38
3	5 ha. to 10 ha.	10.23	39.65
4	10 ha. to 50 ha.	12.08	33.71
5	Above 50 ha.	---	---

VILLAGE CASE STUDY

Name of the village: Kavuluru
Mandal: G.Konduru
District: Krishna
State: Andhra Pradesh

Village Kavuluru is located 28 KMs away from Vijayawada city, 10 KMs from Ibrahimpatnam. (3 KMs interior on Vijayawada, Tiruvuru State Highway).

Geographical Location:

Latitude : 17° 15' North
Longitude : 80° 40' East

Total size of the village is around 2000 hectares of cultivable land having 4000 voters (1100 families) and categorized as follows:

Big farmers (above 8 hectares)	:	50
Medium farmers (between 4 - 8 hectares)	:	200
Small farmers (between 2 - 4 hectares)	:	150
Marginal farmers (land holding below 2 hectares)	:	200
Agriculture labourers (land holding below 2 hectares)	:	100
Landless farmers	:	100
Landless agriculture labourers	:	200

Major economic activity of the villagers is agriculture, dairying and getting casual employment through surrounding industries. Land use pattern is dominated by cotton,

chilli & pulses (black gram and green gram) followed by paddy, sugarcane and maize. Around 100 members are working in banks, schools, industries and village administration as permanent employees. Average annual income among big farmers is Rs.80,000/- per family & Rs.40,000/- for small farmers. Women folk from landless families and agri labourer categories are employed in farm activities. The prevailing wage rates for male & female members are Rs.70/- and Rs.30/- respectively. The variation mainly is due to the industries existing around.

One of the typical farmers Shri G. Venkata Rao is of the opinion that ITC had taken an excellent initiative for developing high yielding clones for the sake of farmers to increase the productivity per unit area. Many farmers of the village are eagerly waiting to witness the higher yields and actual returns from clonal plantations.

11 farmers of the village have taken-up Eucalyptus 'Bhadrachalam' clonal plantations and the total area is 7.8 ha. These farmers have planted Eucalyptus during the years 2000 and 2001. The farmer wise details, as follows:

- | | |
|-----------------------------------------|------------------------------------------------------------------------------------------------|
| a) Name of the Farmer: | Shri G.Venkata Rao, S/o.Chowdary |
| Father's Name: | Chowdary |
| Age: | 35 years |
| Qualification: | Intermediate (10+2) |
| Family: | Joint Family |
| Total family members: | 7 (wife, son, parents, brother and his wife) |
| Total Land Holding: | 7.2 hectares |
| Status of Land: | 1.2 hectares - ancestral
6.0 hectares - purchased |
| Area of Plantation: | 1.2 hectares |
| Planting Date: | 16.8.2000 |
| Species Planted: | Eucalyptus 'Bhadrachalam' Clones |
| Irrigation Facility: | No assured irrigation, but back waters of Thermal power station is available. |
| Phases of Plantation: | Planted in one phase |
| Other Crops under cultivation: | Chilly - 1.6 ha.
Cotton - 0.8 ha.
Black gram & Green gram - 2.8 ha.
Paddy - 0.8 ha. |
| Labor Employed: | Family members - 35 man days
Hired laborers - 60 man days (male)
80 person days (female) |
| Financial Resource: | Bank loan |
| Intercrops: (1 st year only) | Black gram |
| Yield obtained: | 20 bags/1.2 ha. |
| Income | Gross - Rs.48,000/- (US\$ 1000)
Net - Rs.23,000/- (US\$ 479) |
| Motivation: | Exposure visit to other farmer plantation. |
| % of income thru tree farming: | Crop is growing. It may reach 50%. |
| b) Name of the Farmer: | Shri D.Chandrasekhara Rao |
| Father's Name: | Venkata Subbaiah |
| Age: | 48 years |
| Qualification: | 10 th Class |

Family:	Single Family
Total family members:	4 (wife & two children)
Total Land Holding:	3.6 hectares
Status of Land:	2.5 hectares - ancestral 1.1 hectares - purchased
Area of Plantation:	1 hectares
Planting Date:	20.9.2000
Species Planted:	Eucalyptus 'Bhadrachalam' Clones
Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Chilly - 1 ha. Cotton - 0.8 ha. Paddy - 0.8 ha.
Labor Employed:	Family members - 35 man days Hired labourers - 45 man days (male) 70 persondays (female)
Financial Resource:	Bank loan
Intercrops: (1 st year only)	Blackgram
Yield obtained:	15 bags/1 ha.
Income	Gross - Rs.35,000/- (US\$ 729) Net - Rs.20,000/- (US\$ 416)
Motivation:	Faced labor problem with other crops & fluctuations in market price of agricultural commodities. Also exposure visit to other farmer plantation.
% of income thru tree farming:	Crop is growing. It may reach 25%.
c) Name of the Farmer:	Shri M Venkateswara Rao
Father's Name:	Subbaiah
Age:	55 years
Qualification:	Illiterate
Family:	Joint Family
Total family members:	6 (wife, son, daughter-in-law & two grand children)
Total Land Holding:	4.2 hectares
Status of Land:	0.8 ha. - ancestral 2.8 ha. - purchased 0.6 ha. - leased
Area of Plantation:	0.8 hectares
Planting Date:	20.9.2000
Species Planted:	Eucalyptus 'Bhadrachalam' Clones
Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Sugarcane - 2.4 ha. Paddy - 1 ha.
Labour Employed:	Family members - 25 man days Hired labourers - 50 man days (male) 65 person days (female)

Financial Resource:	Bank loan
Intercrops (1 st year only):	Black gram
Yield obtained:	14 bags/0.8 ha.
Income	Gross - Rs.28,000/- (US\$ 583) Net - Rs.18,000/- (US\$ 375)
Motivation:	Exposure visit to other farmer plantation.
% of income thru tree farming:	Crop is growing. It may reach 20%.
d) Name of the Farmer:	Shri Ch Venkata Rattaiah
Father's Name:	Venkaiah
Age:	49 years
Qualification:	8 th Class
Family:	Single Family
Total family members:	4 (wife & two daughters)
Total Land Holding:	7.2 hectares
Status of Land:	0.8 ha. - ancestral 2.4 ha. - purchased 4.0 ha. - leased
Area of Plantation:	0.8 hectares
Planting Date:	26.10.2000
Species Planted:	Eucalyptus 'Bhadrachalam' Clones
Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Chilli - 3.6 ha. Sugar cane - 0.8 ha. Blackgram - 0.8 ha. Maize - 1.2 ha.
Labour Employed:	Hired labourers - 55 man days (male) 85 person days (female)
Financial Resource:	Bank loan
Intercrops (1 st year only):	Cotton
Yield obtained:	20 quintals/0.8 ha.
Income	Gross - Rs.36,000/- (US\$ 750) Net - Rs.8,000/- (US\$ 166)
Motivation:	By seeing adjacent plantations
% of income thru tree farming:	Crop is growing. It may reach 20%.
e) Name of the Farmer:	Shri D.Nageswara Rao
Father's Name:	Venkateswara Rao
Age:	47 years
Qualification:	Intermediate (10 + 2)
Family:	Single Family
Total family members:	4 (wife & two children)
Total Land Holding:	1.6 hectares
Status of Land:	1.6 ha. - ancestral
Area of Plantation:	0.4 hectares
Planting Date:	20.9.2000
Species Planted:	Eucalyptus 'Bhadrachalam' Clones

Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Gave on Lease - 1.2 ha.
Labour Employed:	Hired labourers - 31 man days (male) 42 person days (female)
Financial Resource:	Savings
Intercrops (1 st year only):	Blackgram
Yield obtained:	5 bags/0.4 ha.
Income	Gross - Rs.10,000/- (US\$ 208) Net - Rs.5,000/- (US\$ 104)
Motivation:	By seeing adjacent plantations
% of income thru tree farming:	Crop is growing. It may reach 15%.
f) Name of the Farmer:	Smt.D.Suseela
Husband's Name:	Ranga Rao
Age:	35 years
Qualification:	5 th Class
Family:	Single Family
Total family members:	4 (wife & two children)
Total Land Holding:	3.2 hectares
Status of Land:	1.6 ha. - ancestral 1.6 ha. - leased
Area of Plantation:	0.4 hectares
Planting Date:	20.9.2000
Species Planted:	Eucalyptus 'Bhadrachalam' Clones
Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Chillis - 0.8 ha. Black gram - 0.8 ha. Green gram - 0.8 ha. Jowar - 0.4 ha.
Labour Employed:	Family Members - 10 man days Hired labourers - 21 man days (male) 42 person days (female)
Financial Resource:	Bank Loan
Intercrops (1 st year only):	Black gram
Yield obtained:	5 bags/0.4 ha.
Income	Gross - Rs.10,000/- (US\$ 208) Net - Rs.5,000/- (US\$ 104)
Motivation:	By adjacent farmers
% of income thru tree farming:	Crop is growing. It may reach 20%.
g) Name of the Farmer:	Shri J Venkateswara Rao (Scheduled Caste farmer)
Father's Name:	Panakalu
Age:	63 years
Qualification:	Illiterage

Family:	Joint Family
Total family members:	13 (wife, three sons, three daughter-in-laws and grand children)
Total Land Holding:	4.4 hectares
Status of Land:	1.2 ha. - Purchased 3.2 ha. - leased
Area of Plantation:	0.4 hectares
Planting Date:	20.9.2000
Species Planted:	Eucalyptus 'Bhadrachalam' Clones
Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Paddy - 0.8 ha. Cotton - 1.2 ha. Blackgram - 0.4 ha. Chilli - 1.6 ha.
Labour Employed:	Family Members - 25 man days Hired labourers - 20 man days (male) 20 person days (female)
Financial Resource:	Bank Loan
Intercrops (1 st year only):	Black gram
Yield obtained:	6 bags/0.4 ha.
Income	Gross - Rs.11,000/- (US\$ 229) Net - Rs.4,000/- (US\$ 83)
Motivation:	By adjacent farmers
% of income thru tree farming:	Crop is growing. It may reach 15%.
h) Name of the Farmer:	Shri G.Pichaiah
Father's Name:	Venkaiah
Age:	55 years
Qualification:	Illiterate
Family:	Joint Family
Total family members:	5 (wife, son, daughter-in-law, & one grand-daughter)
Total Land Holding:	4 hectares
Status of Land:	0.8 ha. - ancestral 1.6 ha. - purchased 1.6 ha. - leased
Area of Plantation:	0.4 hectares
Planting Date:	20.9.2000
Species Planted:	Eucalyptus 'Bhadrachalam' Clones
Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Chilly - 1.2 ha. Paddy - 0.8 ha. Cotton - 1.6 ha.
Labour Employed:	Hired labourers - 25 man days (male) 45 person days (female)
Financial Resource:	Bank Loan

- | | |
|-----------------------------------------|---------------------------------------------------------------|
| Intercrops (1 st year only): | Blackgram |
| Yield obtained: | 6 bags/0.4 ha. |
| Income | Gross - Rs.12,000/- (US\$ 250)
Net - Rs.6,000/- (US\$ 125) |
| Motivation: | Exposure visit to other farmer plantation |
| % of income thru tree farming: | Crop is growing. It may reach 15%. |
- i) Name of the Farmer: Shri P Satyanarayana
- Father's Name: Sivudu
- Age: 45 years
- Qualification: I.T.I.
- Family: Joint Family
- Total family members: 4 (wife & parents)
- Total Land Holding: 9.2 hectares
- Status of Land: 9.2 ha. - ancestral
- Area of Plantation: 1.6 hectares
- Planting Date: 19.7.2001
- Species Planted: Eucalyptus 'Bhadrachalam' Clones
- Irrigation Facility: No assured irrigation, but back waters of Thermal power station is available.
- Phases of Plantation: Planted in one phase.
- Other Crops under cultivation: Cotton - 3.2 ha.
Black gram - 1.2 ha.
Paddy - 0.8 ha.
Chilly - 2.4 ha.
- Labour Employed: Hired labourers - 45 man days (male)
90 person days (female)
- Financial Resource: Savings
- Intercrops (1st year only): Blackgram
- Yield obtained: 15 bags/1.6 ha.
- Income: Gross - Rs.37,500/- (US\$ 781)
Net - Rs.22,500/- (US\$ 469)
- Motivation: Exposure visit to other farmer plantation
- % of income thru tree farming: Crop is growing. It may reach 15%.
- j) Name of the Farmer: Shri A Venkateswara Rao
- Father's Name: Tirupataiah
- Age: 45 years
- Qualification: 7th Class
- Family: Single Family
- Total family members: 4 (wife & two children)
- Total Land Holding: 4 hectares
- Status of Land: 1.6 ha. - ancestral
2.4 ha. - leased
- Area of Plantation: 0.4 hectares
- Planting Date: 19.7.2001
- Species Planted: Eucalyptus 'Bhadrachalam' Clones
- Irrigation Facility: No assured irrigation, but back waters of Thermal power station is available.
- Phases of Plantation: Planted in one phase.

Other Crops under cultivation:	Cotton - 1.2 ha. Chilli - 1.2 ha. Paddy - 1.2 ha.
Labour Employed:	Family members - 7 mandays Hired labourers - 13 mandays (male) 25 persondays (female)
Financial Resource:	Bank Loan
Intercrops (1 st year only):	Blackgram
Yield obtained:	3.5 bags/0.4 ha.
Income	Gross - Rs.6,300/- (US\$ 131) Net - Rs.2,500/- (US\$ 52)
Motivation:	Exposure visit to other farmer plantation
% of income thru tree farming:	Crop is growing. It may reach 20%.
k)	
Name of the Farmer:	Shri D Subba Rao
Father's Name:	Chandraiah
Age:	50 years
Qualification:	Illiterate
Family:	Single Family
Total family members:	3 (wife & daughter)
Total Land Holding:	4 hectares
Status of Land:	2.0 ha. - ancestral 2.0 ha. - purchased
Area of Plantation:	0.4 hectares
Planting Date:	19.7.2001
Species Planted:	Eucalyptus 'Bhadrachalam' Clones
Irrigation Facility:	No assured irrigation, but back waters of Thermal power station is available.
Phases of Plantation:	Planted in one phase.
Other Crops under cultivation:	Blackgram - 0.4 ha. Gave on lease - 3.2 ha.
Labour Employed:	Hired labourers - 20 mandays (male) 35 persondays (female)
Financial Resource:	Savings
Intercrops (1 st year only):	Blackgram
Yield obtained:	3.5 bags/0.4 ha.
Income	Gross - Rs.6,300/- (US\$ 131) Net - Rs.2,500/- (US\$ 52)
Motivation:	Exposure visit to other farmer plantation
% of income thru tree farming:	Crop is growing. It may reach 20%.

CASE STUDIES AS PER THE EXTENT OF PLANTATION AREA

Less than 1 ha.

1) Name of the farmer:	Shri MNV Prasad
Father's Name:	Chalapathi
Age:	46 years
Village:	Nimmalagudem
Mandal:	Buttaigudem
District:	West Godavari

With agriculture family background, Mr.MNV Prasad has a small family and has three daughters. First daughter, B.Com, second daughter B.Sc. and third daughter post graduate in Chemistry. He had planted Bhadrachalam clonal saplings in the following manner.

1995	2 acres
1996	2 acres
1997	2 acres
1998	3 acres
2001	7 acres.

Seen cousin's plantation and motivated by ITC managers, for the following reasons:

Less labour intensive, no pest problems, doesn't need intensive management & regular irrigation, less problems from biotic interference and natural calamities like floods & drought. Above all, there is an assured market from ITC Limited Paperboards & Specialty Papers Division.

Economics:

Clones Planted:	3 & 7
Month of Planting:	August, 1996
Area:	0.85 ha.
No.of saplings Planted	2000
No.of saplings Survived	1870

	<u>Nature of Activity</u>	<u>Amount Rs.</u>
1 st Year	Ploughing	800.00
	Planting stock @ Rs.8.50 including transportation	15895.00
	Pitting & Planting	1800.00
	Neem Powder	200.00
	BHC - 50 Kgs	900.00
	FYM 8 tractor loads	2000.00
	Weed Management (application of Glycil 4 ltrs)	1600.00
	Irrigation twice	800.00
	Total:	23995.00
2 nd Year	Ploughing (4 times)	1600.00

	Fertilizer	2120.00
	Irrigation	<u>400.00</u>
	Total:	<u>4120.00</u>
3 rd Year	Ploughing (4 times)	1600.00
	Fertilizer	<u>2120.00</u>
	Total:	<u>3720.00</u>
4 th Year	Ploughing (4 times)	1600.00
	Fertilizer	<u>2120.00</u>
	Total:	<u>3720.00</u>
<u>Cutting & Transportation expenses:</u>		
	Cutting, debarking, loading & transportation @ Rs.380/- per MT	49400.00
	Expenses - Grand Total:	84955.00
	Expenses per hectare	99947.00
<u>Income:</u>		
	Yield - 130 MT @ Rs.1450/- per MT	188500.00
	Net Returns	103545.00
	Net Returns per hectare	121817.65

2) Name of the farmer: Shri K Janakiramaiah
Age: 42 years
Qualification: Intermediate (10+2)
Village: Dippakayalapadu
Mandal: Koyyalagudem
District: West Godavari

With agriculture background, Mr.K.Janakiramaiah has a small family with wife Smt.Achyutavalli, one son Ysasvi studying 9th class and one daughter Sudhishna studying 7th class, four members in total. Planted 'Bhadrachalam' clonal saplings in the following manner:

1994	5 acres
1995	5 acres
1996	4 acres
1999	5 acres
2000	36 acres
2001	3 acres.

Motivated by ITC managers for the following reasons:

- ◆ Less labour intensive,
- ◆ Minor fluctuations in market.

- ◆ Can cut & sell the plantation produce on need basis.
- ◆ Number of irrigations are less.
- ◆ Doesn't need intensive management unlike tobacco and sugarcane.

Economics:

Clones Planted: 3 & 7
 Month of Planting: January, 1995
 Area: 0.64 ha.
 No.of saplings Planted 1348
 No.of saplings Survived 1266

	<u>Nature of Activity</u>	<u>Amount Rs.</u>
1 st Year	Ploughing	700.00
	Planting stock @ Rs.6.50 including transportation	8230.00
	Pitting & Planting	1500.00
	Ploughing	1500.00
	Irrigation	<u>2500.00</u>
	Total:	<u>14430.00</u>
2 nd Year	Ploughing (5 times)	1500.00
	Fertilizer	900.00
	Irrigation	<u>2500.00</u>
	Total:	<u>4900.00</u>
3 rd Year	Inter-crop - Sunnhemp	200.00
	Ploughing (5 times)	1500.00
	Irrigation	<u>2500.00</u>
	Total:	<u>4200.00</u>
4 th Year	Fertilizer	700.00
	Ploughing	1500.00
	Irrigation	<u>2500.00</u>
	Total:	<u>4700.00</u>
	<u>Cutting & Transportation expenses:</u>	
	Cutting, loading @ Rs.110/- per MT	13090.00
	Transportation charges	23800.00
	Miscellaneous expenses	<u>5950.00</u>
	Total:	<u>42840.00</u>
	Expenditure - Grand Total:	71070.00
	Expenditure per hectare	111046.00

Income:

Yield - 119 MT @ Rs.1450/- per MT 172550.00

Net Income 101480.00

Net Income per hectare 158562.00

1 to 5 hectares

Name of the farmer: Shri Guglothu Eerya Naik
Father's Name: Parthya
Age: 35 years
Village: Tekulabanzar
Mandal: Chandrugonda
District: Khammam

With agriculture background, Mr.Guglothu Eerya Naik has a joint family with wife Lakshmi, one daughter studying 9th class, two sons studying 7th class and 5th class, brohter, brother's wife and brother's children.

Motivated by ITC managers to take-up Bhadrachalam Eucalyptus clonal plantation because of the following reasons:

- ◆ Less expenditure compared to commercial crops
- ◆ Less involvement, enabling him to concentrate on other activities.
- ◆ Less problems from biotic interference and natural calamities like floods & drought.
- ◆ Assured market.

He had planted 'Bhadrachalam' clonal saplings in the following manner:

Clones Planted: 3, 7 & 27
Month of Planting: August, 2001
Area: 2.40 ha.
No.of saplings Planted: 6000
No.of saplings Survived: 5400

Economics:

	<u>Nature of Activity</u>	<u>Amount Rs.</u>
1 st Year	Ploughing	1800.00
	Planting stock @ Rs.4/-	24000.00
	Saplings transportation to field	1500.00
	Pitting & Planting	6000.00
	Anti termite (Chloropyriphos)	1800.00
	Fertilizer	1260.00
	Ploughing (2 times)	<u>3000.00</u>
	Total:	<u>39360.00</u>
2 nd Year	Ploughing (3 times)	4800.00
	Fertilizer	2200.00
	Total:	<u>7000.00</u>

3 rd Year	Ploughing (3 times)	4800.00
	Fertilizer	2200.00
	Total:	<u>7000.00</u>
4 th Year	Ploughing (3 times)	5000.00
	Fertilizer	2500.00
	Total:	<u>7500.00</u>
5 th Year	Ploughing (3 times)	5000.00
	Fertilizer	3000.00
	Total:	<u>8000.00</u>

Cutting & Transportation expenses:

Cutting, loading & transportation @ Rs.370/- per MT	111000.00
Expenditure - Grand Total:	179860.00
Expenditure per hectare	74942.00

Income:

Yield - 300 MT @ Rs.1400/- per MT (@ 125 tonnes per hectare)	420000.00
Net Income	240140.00
Net Income per hectare	100058.00

5 to 10 hectares

Name of the farmer:	Shri G Veerabhadra Rao
Father's Name:	Satyanandam
Age:	33 years
Village:	Kapavaram
District:	Khammam

With agriculture background, Mr.G.Veerabhadra Rao has a small family with wife Smt.Vijayabharathi and son Abhiram. He had planted Bhadrachalam clonal saplings in the following manner:

2001	5 acres
2002	10 acres

Mr.Veerabhadra Rao is an employee of ITC Limited, Paperboards & Specialty Papers Division and was motivated by plantation managers to take-up clonal plantation after showing him the farmers' plantations in the nearby village.

Month of Planting:	Dec. 2001 & July 2002
Area:	5.80 ha.
No.of saplings Planted	13050

Espacement: 3 x 1.5 M.

Economics:

	<u>Nature of Activity</u>	<u>Amount Rs.</u>
1 st Year	Mechanical Uprootal (proclainer) including loading into lorry & transportation charges	48000.00
	Site preparation i.e. balance uprootal, filling of gaps etc.	22000.00
	Fencing charges (with iron barbed wire)	38000.00
	Ploughing	13000.00
	Alignment charges	500.00
	Pitting & Planting	20000.00
	Anti-termite treatment	3200.00
	Fertilizer	5820.00
	Planting Stock cost including transport	58725.00
	Irrigation	3500.00
	Water pipes, electricity charges	10000.00
	Ploughing (3 times)	21000.00
	Soil Working	2000.00
	Watch & Ward Rs.1200/- p.m.	14400.00
	Total:	<u>260145.00</u>
2 nd Year	Ploughing (3 times)	21000.00
	Fertilizer	27300.00
	Irrigation	6000.00
	Watch & Ward	14400.00
	Total:	<u>68700.00</u>
3 rd Year	Ploughing (3 times)	21000.00
	Fertilizer	27300.00
	Irrigation	6000.00
	Watch & Ward	14400.00
	Total:	<u>68700.00</u>
4 th Year	Ploughing (3 times)	21000.00
	Fertilizer	27300.00
	Irrigation	6000.00
	Watch & Ward	14400.00
	Total:	<u>68700.00</u>
5 nd Year	Ploughing (3 times)	21000.00
	Fertilizer	27300.00
	Irrigation	6000.00
	Watch & Ward	14400.00
	Total:	<u>68700.00</u>
6 th Year	<u>Cutting & Transportation expenses:</u>	
	Cutting, loading & transportation	

@ Rs.250/- per MT	362500.00
Expenses - Grand Total:	897445.00
Expenses per hectare	154732.00
<u>Income:</u>	
Yield - 1450 MT @ Rs.1400/- per MT	2030000.00
Net Income	1132555.00
Net Income per hectare	195268.00

10 to 50 hectares:

Name of the farmer: Dr.P.V.Ramana
 Father's Name: P.Sundara Rao
 Age: 45 years
 Qualification: M.B.B.S.
 Village: Sundernagar
 District: Khammam

Dr.P.V.Ramana, MBBS from a well educated family, worked as Medical Officer in M/s.Singareni Collieries. Since 1983, he is occupied with development of his 40 hectares of land. He has taken-up the clonal plantation in his land in the following manner:

1999	28 hectares
2000	12 hectares

Motivated to take-up the clonal plantations because of the following reasons:

- ◆ Convinced with the productivity of clonal plantations.
- ◆ Fluctuations in market price of cashew, at the same time assured market with buy back guarantee for clonal plantation produce.
- ◆ Pest menace in cashew brought down yields.

Economics:

Month of Planting: July 1999 & July 2000
 Area: 40 ha.
 No.of saplings Planted 64000

Expenditure:

	<u>Nature of Activity</u>	<u>Amount Rs.</u>
1 st Year	<u>Mechanical:</u>	
	Mechanical Uprootal of cashew stumps (100/ha.) including loading into lorry & transport	120000.00
	Site preparation i.e. uprooting balance root	

	System, picking of of bark etc., stacking & burning	28000.00
	Filling of excavated soil	<u>16000.00</u>
		<u>164000.00</u>
	<u>Manual:</u>	
	Manual uprootal of cashew stumps (100/ha)	
	Including filling of excavated soil	140000.00
	Loading & transport	<u>28000.00</u>
	Total:	<u>168000.00</u>
	Ploughing	40000.00
	Staking - 2.5 x 2.5 M.	6400.00
	Cost of stakes	
16000.00		
	Mechanical Pitting	102400.00
	Planting	22400.00
	Internal transport & basal dressing	18000.00
	Cost of anti-termite treatment (aldrin & thimmet)	20000.00
	Fertilizer	16000.00
	Planting stock @ Rs.4.50 including transport	288000.00
	Anti termite treatment 6 times (with application)	80000.00
	17:17:17 NPK fertilizer @ 50 gm with appln.	28800.00
	Harrowing in first year - 3 times	80000.00
	Weeding - twice	32000.00
	Soil working	32000.00
	Shoot cutting - 3 times	6000.00
	Watch & Ward	<u>18000.00</u>
	Total:	<u>970000.00</u>
2 nd Year	Harrowing criss cross - 3 times	80000.00
	Fertilizer	66000.00
	Shoot cutting	6000.00
	Watch & Ward	18000.00
	Total:	<u>170000.00</u>
3 rd Year	Harrowing criss cross - 3 times	80000.00
	Fertilizer	100000.00
	Shoot cutting	6000.00
	Watch & Ward	18000.00
	Total:	<u>204000.00</u>

Yield for 40 ha. @ 75 MT/ha. = 3000 MT.

Cutting & Transportation expenses:

Cutting, loading, transportation and misc. expenses @ Rs.400/- per MT	1200000.00
Expenditure - Grand Total:	2544000.00

	Expenditure per hectare	63600.00
<u>Income:</u>		
	3000 MT @ Rs.1400/- per MT	4200000.00
	Net Income	1656000.00
	Net Income per hectare	41400.00

Annexure I

SILVICULTURAL PACKAGES FOR BETTER MANAGEMENT OF PLANTATIONS

A number of criteria need to be made exigent for better management practice, which are mentioned below.

Selection of Entrepreneur: Farmers, absentee landlords, businessmen. The participant should look at diversification to achieve sustainability through agriculture activity. He should be resourceful, economically sound, to cope up with the high expenses and long gestation of the crop. Estimated cost benefits are mentioned in Table 1.

Site: It is mandatory to study Soil Profile. pH should be less than 8.5, and Electrical conductivity should be less than 2 milli mhos/cm. Water logging and highly eroded sites are to be avoided. 6 ft. deep neutral soils are preferred.

Site preparation: Very good site preparation by mechanical means is required to facilitate good aeration in the soil, which allows maximum percolation of rain-water.

Planting stock: Genetically superior, fairly disease resistant and well hardened quality clonal planting stock ensures optimum survival and growth rate which results in better productivity. Minimum age of the planting stock should be 6 months from the date of setting.

Planting: Spacing should be 3 x 2 meters and pit size - 30 x 30 x 30 cm. The appropriate planting time is the beginning of the monsoon season. Pit should be filled with soil, leaving a space of 7.5 cm in red soils and 5 cm in black soils. Pot watering should be continued for 7 to 10 days. Phorate @ 2 gm per pit should be applied at the time of planting to protect the sapling from root grub. 15 days after planting the saplings should be treated with anti termite chemical (Chloropyriphos) @ 2 to 3 ml per liter water.

Timely Operations:

Weed management - Timely and proper weed management avoids competition from weeds and allow the saplings to pickup fast growth. Timely weeding operations would improve soil aeration.

Water conservation measures enhance the growth almost two times. Such measures, taken up in APFDC plantations boosted up the yields to almost double. It is an actual example happening around Hyderabad.

Fertilizer Application - Timely application of fertilizer has been helping the plants to put on more growth. Application of fertilizer during first year for the Eucalyptus 'Bhadrachalam' clonal plantation is as follows:

Well decomposed FYM (Farm Yard Manure) should be applied as basal dose. FYM should be spread properly throughout the field and incorporated thoroughly in the soil well before planting. One month after planting NPK in the form of complex @ 20 - 25 gm per plant should be applied by pocketing method (minimum 6" away from the plant and at 4" depth). Proper moisture should be ensured whenever fertilizer is applied. Subsequently every year NPK should be applied in two split doses during the rainy season with a gap of 1 to 1 1/2 months.

Irrigation - Timely and on need basis provision of irrigation to the growing plants will enhance the growth by two times to normal growth.

Ploughing - Soil working by means of ploughing in between the rows of technology based plantations is very essential which facilitates proper aeration and conservation of moisture. These conditions are essential for the luxuriant growth of the saplings. Deep ploughing is to be done in either direction followed by harrowing. Ploughing twice a year is beneficial.

Protection of Plantations - Protection is the foremost thing. Protection from mechanical damages - wrong ploughing practices, biotic interference - cattle, white ants, fire & human beings and chemicals - improper application of phyto-toxic chemicals.

Monitoring of Plantations - Samples of 25 trees are measured in the standing population to assess the survival and growth rates. This practice ensures proper accountability of the participating individual or agency.

TABLE 1

COST BENEFITS PER HECTARE OF BHADRACHALAM CLONAL PLANTATION
Spacing - 3 x 2 M

S No	OPERATION	UNIT	RATE	QTY	YEARS							TOTAL Rs.
					1	2	3	4	5	6	7	
1	Ploughing	HA	2400	1	2400	2520	2646	2778	2917	3063	3216	19541
2	Alignment / Staking	LS	150		150							150
3	Digging of Pits & Planting	PLANT	1.5	1666	2499							2499
4	Weeding / Cleaning / Soil Working	HA	833	2	1666	1749						3415
5	Cost of Fertilizers / Green Manure	HA	2250	1	2250	2363	2481	2605	2735	2872	3015	18320
6	Cost of Antitermite Treatment	HA	800	2	1600							1600
7	Provision for Fencing/Maintenance	LS	2000		2000	200	200	200	200	200	200	3200
	SUB TOTAL				12565	6832	5327	5583	5852	6135	6431	48725
8	Contingencies			5%	628	342	266	279	293	307	322	2436
	Sub-Total				13193	7173	5593	5862	6145	6441	6753	51161
9	Cost of Plants		8	1750	14000							14000
	Sub-Total				27193	7173	5593	5862	6145	6441	6753	65161
10	Insurance premium			1.25%	340	430	499	573	650	730	815	4036
	Total Cost (per Ha)				27533	7603	6092	6435	6794	7172	7568	69197
11	Gross Returns	Tons	1400	175	(average yield)							
	Net Returns											175803

Note: Land lease amount, interest on investment not taken into consideration.