



Guideline on Agroforestry Development



SCATFORM Manual and Guideline Series No.3



2020

Guidelines on Agroforestry Development

1. Introduction:

National Agroforestry Policy was launched in 2014 aiming to expand tree plantation in integrated manner with crops and livestock to improve productivity, employment, income and livelihoods of rural households, especially for small holder farmers. The policy heightens the dissemination of a dynamic, ecologically based natural resource management system that, through integration of woody perennials on farms and in the agricultural landscape, diversifies and sustains production and builds social institutions.

Tripura has a very large land cover with forest approx. 6292 km² accounting for approx. 60 per cent of the total geographical area. Forest area of Tripura contains mid tropical hill and plain type agro-climatic zone. However, forest lands dedicated to livelihood under forest rights are not well managed. The land can be effectively utilized as cultivable land through agroforestry system in order to enhance livelihoods of the marginal farmers.

Agroforestry system produces agriculture, horticulture and forest crops providing 5Fs, Food Fodder, Fuel, Fiber and Fertilizer on the same piece of land by optimum utilization of land, light and time. It improves soil fertility by using trees particularly nitrogen fixing legume trees and is also highly suitable for raising crops on slope in Tripura where livelihoods with limited lands and soil erosion are main issues.

In TFIPAP, agroforestry played a vital role to prevent the conversion of forests to agriculture lands through the expansion of shifting cultivation. Agroforestry helped increase forest cover especially in hilly areas in North Tripura and Unakoti Districts. Agroforestry in TFIPAP was promoted through the delineation of RoFR lands since many RoFR lands registered do not have clear demarcation on the ground.

The objective of SCATFORM is to improve the quality of forest by livelihood development of forest dependent communities. Agroforestry is recognized as the most promising way to reach the goal in SCATFORM. In SCATFORM, agroforestry is introduced for livelihood development, reduction of soil erosion and fertility management.

2. Objective:

The main objective of agroforestry plantation of SCATFORM is to provide sustainable forest cover and income generation from understorey crops in RoFR land. The opportunities of income generation from RoFR land will ensure the sustainability and maintenance of vegetation in RoFR land.

3. SCATFORM Approach on Agroforestry:

3.1 Identification of CS Plots and RoFR landholders for agroforestry development:

Agroforestry in SCATFORM will be implemented in RoFR lands. The RoFR landholders (beneficiaries of agroforestry in SCATFORM) should be clearly identified for implementation of agroforestry.

Agroforestry is planned for CS plot basis with RoFR landholders in the CS plot. Beneficiaries receive full benefit individually; therefore, they need to be recognized/agreed by all the RoFR landholders in the same CS plot.

ROFR certificates are issued but not clearly demarcated in the field (Figure below as an example). SCATFORM will work only with ROFR landholders with the certified ROFR land titles physically with a map and GPS coordinates. The clear ownership to the land is essential to implement agroforestry. The cultivation areas may be spread out and far away each other. Grouping such villagers to form new larger lands together may help monitoring and providing project support.

The participants in agroforestry scheme will form Farmer Interest Groups (FIG) under JFMC/EDC, which is described in the micro plan. A leader of the group is assigned as a contact person of the group. The villagers who participate in the agroforestry development will receive training, materials support in an organized way through the group.

Work step for identification of RoFR landholders for agroforestry development:

1. Identify JFMC/EDC to implement Agroforestry
2. Obtain Mouja map with CS Plots from Revenue dept.
3. Obtain a list of RoFR landholders registered in the CS plot with their sizes from Tribal Welfare Department
4. Organize a meeting for micro planning, identify CS plots for agroforestry
5. Organize PRA exercise with RoFR landholders in the CS plot to identify participants to agroforestry scheme of SCATFORM
6. Identify the RoFR landholders as beneficiaries to work in SCATFORM
7. Demarcate an RoFR lands of identified landholders with GPS coordinates as accurate as possible with villagers and village committee
8. Register the demarcated RoFR lands in the CS plot to TWD with the consensus among all RoFR landholders in the same CS plot

ANNEXURE-II (See rule 8(h)) TITLE FOR FOREST LAND UNDER OCCUPATION	
1. Name(s) of holder(s) of forest rights (including spouse)	Sri Chanbadan Tripura Sri Shantikumar Tripura
2. Name of the father/mother	Sri Shantikumar Tripura
3. Nos. of dependents	6
4. Address	Padmaranjali para
5. Village/Gram Sabha	Jagabandhu para
6. Gram Panchayat	Chitajhari
7. Tehasil/Taluka	Gandachara
8. District	Dhalai Gandachara
9. Whether Scheduled Tribe or other Traditional Forest Dweller	: ST
10. Area in acre	: 5.00 acres
11. Description of boundaries by prominent landmarks including Khasra/Compartment No.:	Khatian No : 31 Plot No : 23 part Type of Forest : PF Type of Land : Tita

This title is heritable, but not alienable or transferable under sub section (4) of section 4 of the Act.

We, the undersigned hereby, for and on behalf of the Government of Tripura affix our signatures to confirm the above forest right.

Divisional Forest Officer
Dhalai District: Ambassa

District Tribal Welfare Officer
Dhalai District: Jawharnagar

District Magistrate and Collector
Dhalai District: Jawharnagar

3.2 Elaboration of agroforestry model:

Agroforestry model in SCATFORM will be developed based on existing experiences, consultation with experts and other departments, literature reviews, and preference of villagers. In order to reach the goal, SCATFORM apply four agroforestry models: agroforest (three tier multistrata system with intercropping), live fences, contour hedgerow, and improved fallow. One product form each beat will be

selected (one forest tree, one fruit and one intercrop) based on potential cluster formation and marketability. SCATFORM encourages participants to incorporate at least one selected crop in their model. Agroforestry site survey will be conducted in order to understand the outcome, issues and potential of the models.

Agroforest (Multistrata system with intercropping):

In the multistrata agroforestry system, forest crops, shorter or thinner sized crops and understory short rotation crops are combined as optimum use of sunlight and production. Three tier model (forest tree with long duration (more than 4 years), fruit tree with medium rotation (1 to 4 years) and intercrop with short rotation (2-6 months) are grown at the same time on the same plot. As the forestry crop grows and closes its canopy, other intercrops lose its production and only forestry crop remains. In TFIPAP, nine models are introduced (Table 5) and some showed promising results. Outcome of the TFIPAP needs to be reviewed for developing suitable agroforestry models for each region of the project sites.

Several factors need to be considered for selecting agroforestry crops: agro-ecological conditions, villagers’ preference, market potential, cluster formation, etc. The crops used in agroforestry models in Tripura are presented in Table 1.

Table 1: Potential crops for Agroforestry in Tripura.

Crop type	Plant
Tree species	Bamboo, Gamar, Yongchak (Parkia), Cinnamon, Acacia, Teak, Agar, Subabul Dalbergia, <i>Erythrina indica</i> (Indian coral tree), Grilicidia,
Fruit	Lemon, Litchi Jackfruit, Areca nut, Coconut Mango, Orange, Banana, Scented lemon, Papaya, Moringa, Mosambi, Wood apple
Intercrops	Maize, betel vine, Pineapple, Black Pepper, beans, chilly, ginger, turmeric, Sesame, Pigeon pea (<i>Cajanus cajan</i>), Large Cardamon, soybean, oil seeds, millet, vegetables Ghandaki (after 3 years when the shade developed)

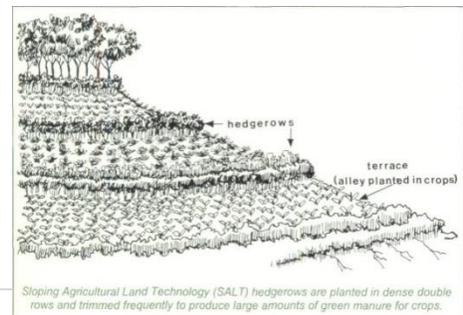
Introduction of live fences:

Live fence can be introduced at farmlands. Live fences of *Gliricidia sepium*, *Erythrina* spp. or other similar species are commonly used for live fences. The trees are trimmed and leave and twigs can be used as nitrogen-rich mulch or fodder. *G. sepium* is easy to introduce and already seedlings are under production by TFD. It also grows from cuttings. Trees can be connected with bamboo rafters for fencing.



Soil erosion control by contour hedgerow:

In order to reduce soil erosion, hedgerows of nitrogen-fixing trees or shrubs can be introduced as contour hedgerow on slope. The trees or shrubs are trimmed to keep them from competing with nearby crops for sunlight, nutrients and water. The trimmed leaves and twigs provide nitrogen-rich mulch or fodder.



Medicinal plants can be grown as shrubs on hedgerow if suitable species are available.

Improved fallow:

When the lands are fallowed to restore soil fertility after a period of cultivation, nitrogen fixing shrubs can be sown to speed up the improvement of fertility. Many individual plants with relatively short life shrubs are required. A simple and cheap propagation like direct sowing is the best option. Denser spacing is more effective to suppress weeds.

3.3 Financial feasibility analysis:

Since agroforestry occupies the land for long period especially after trees grow and intercropping are terminated, financial feasibility needs be carefully assessed.

High cost of external input:

During TFIPAP, some farmer groups stopped intercropping in agroforestry after the termination of the project supports because of the cost of external inputs such as seeds and fertilizer. Crops with less external inputs such as millets and nitrogen-fixing legumes may need to be considered.

Understanding of drop of crop production as tree grows:

As the trees planted in agroforestry sites grow, the production and benefits of intercrops will drop unless there is not enough spacing. The concepts and perspectives of agroforestry should be clearly understood by participants.

Understanding cashflow of farmers:

In maize production, it was found that farmers stopped cultivating maize since they cannot pay for fertilizers. In the business model, not only cost and benefit but also cash flow of farmers will be carefully studied to develop feasible model.

Maintaining constant benefit from the different crops:

The model is developed based on the idea that trees will grow and shade the intercrops but fruit will be produced after a few years to maintain the minimum benefit from the agroforestry model because they are planted in proper distances to receive enough sunlight (Table 2). A common vision of agroforestry to shift the benefit from short term agricultural crop, intermediate fruits then to longer term forest trees should be shared among the stakeholders including villagers and forest officers. In TFIPAP, the

Table 2: Cost and benefit estimate per ha for 5 years (an example for Model 1).

Year	Cost			Benefit					Profit
	Tree crops	Intercrop	Total	Bamboo	Jackfruit	Maize	Pineapple	Total	
1	52,000	0	52,000	0	0	40,000	0	40,000	-12,000
2	2,000	6,200	8,200	0	0	40,000	7,500	47,500	39,300
3	2,000	6,200	8,200	0	0	25,000	10,000	35,000	26,800
4	2,000	6,200	8,200	4,500	0	0	15,000	19,500	11,300
5	2,000	6,200	8,200	10,000	5,000	0	20,000	35,000	26,800
Total	60,000	24,800	84,800	14,500	5,000	105,000	52,500	177,000	92,200

Source: TFIPAP (2012). Agroforestry for Rehabilitation of the Shifting Cultivators, Tripura Forest Environment Improvement and Poverty Alleviation Project, Government of Tripura, Agartala

Work step for development of Agroforestry model and convergence

1. Review agroforestry model implemented by TFIPAP and another project/scheme
2. Conduct field surveys to figure out the actual status of the model (productivity, marketing, etc.)
3. Organize district level workshop to assess the model, organize financial/technical support, and discuss other issues related to agroforestry development with other departments.

3.4 Value chain and cluster formation for marketing support:

Marketing of intercrop produce from agroforestry has not experienced problems so far. However, by introducing same model with same crops by many farmers may drop the price in the market. Marketing measures such as establishing cooperatives to handle marketing, branding, direct delivery through e-commerce, cultivation of high value medicinal plants and spices, and value-addition through organic certification and or processing may be pursued.

SCATFORM will take three tier approach for value chain development (Table 3). Collection and primary processing can be done in JFMC/EDC level.

Table 3: Three levels of value addition and processing in SCATFORM.

Level	Type of Processing	Organized unit	Typical Location/market
Tier 3 (T3)	Collection and Primary Processing	SHG at JFM/EDC level	Local Market/ Easy access to collectors/
Tier 2 (T2)	Simple Processing with Management	Collection/Primary Processing Centre (CC)	Regional centre/ close to product market
Tier 1 (T1)	Advanced Processing for Value Addition	Advanced Value Addition Unit (AVAU)	Decided by Feasibility /Centrally located possible/ Niche market

3.5 Capacity development for agroforestry development:

Orchard development and long term vision of crop production:

The review of TFIPAP revealed that the survival rate of agroforestry was about 62.7% on average due to insufficient orchard management. Necessary orchard management such as manuring, pruning, and training for FIG should be undertaken in the second year onwards in many places. Without proper orchard management, fruit trees will not be able to produce an expected output and provide canopy cover in the future. More attention on raising awareness on the orchard management and providing technical and financial supports is required.

Organic fertilizer for maintaining soil fertility:

In order to maintain soil fertility, compost made with local materials including cow dung and manure produced from increased pig farming will be promoted. Convergence with DOA including training and material supply can be organized.

3.6 Convergence with other line departments:

Agroforestry in SCATFORM will be planned and implemented with other line departments particularly Department of Agriculture (DOA), and Rural development (DRD). District level consultation workshop will be held with other line department.

MGNREGA is expected to provide financial convergence on labour cost of agroforestry development through DRD. MGNREGA guarantees rural employment for 100 days per person of unskilled wage in a year, and up to 50 % can be non-wage component.

DOA is expected to provide technical and financial assistance such as the provision of high-quality fruit tree seedlings/saplings, intercropping seeds and day-to-day technical guidance. To ensure this work during and after the project period, the linkage with the responsible Village Level Workers (VLWs) in the project target areas of DOA should be established. The VLWs should be frequently invited to village level activities such as agroforestry plantation, gap filing, manuring, pruning, etc. MoU will be made between PMU and DOA for the convergence.

4. Project activities

Agroforestry plantation will be conducted in 3 phases (1st year preparation, 2nd year plantation, 3rd to 5th year follow-up) (Table 4). Field level technical supports need to be provided by LC/COs for the process of plantation and follow-up of fruit trees and intercropping for 3 years. Beat level TFD officers and FFs in JFMCs help them to carry out these activities.

4.1 Preparation phase

The preparation starts with motivating JFMC/EDC members and getting them interested in agroforestry by inviting them to awareness workshops. Its selection is a first come first served basis. Then, the RoFR lands of interested JFMC members get physical demarcation, and forming Farmer Interest Group follows. After this comes the selection of a suitable agroforestry model and land preparation such as layouting and manuring.

4.2 Plantation phase

Plantation of forest trees and fruit trees need to be conducted just before rainy season (around April). Intercropping can also start in this season (around April) or in the end of rainy season (around September). Then, the first orchard management such as gap filling, plant protection, manuring, pruning and training will be conducted in the immediate winter period when the growths of trees are slow.

4.3 Follow up

The follow up activity shall be conducted for 3 years until the first harvest of fruit trees begins or villagers learn the activity by doing.

4.4 Scale

In SCATFORM, Agroforestry development is planned for approximately 20ha for each JFMC/EDC (8,800 ha in total). Standard size per landholder is 0.5 ha per household and 40 households per JFMC/EDC.

Table 4: Activities in Agroforestry Plantation.

Phase	Items
Preparation (1 st year)	<ol style="list-style-type: none"> 1. Awareness raising among JFMC members 2. Demarcation of RoFR land 3. Forming a group of RoFR landowners to participate in agroforestry development

	4. Model selection and land preparation
Plantation (2 nd year)	1. Plantation of forest trees and fruit trees 2. Intercropping of understorey crops
Follow up (3 rd to 5 th year)	7. Intercropping of understorey crops (continuing for 3 to 5 years) 8. Orchard management such as gap filling, plant protection, manuring, pruning, training and thinning of canopy and middle tier fruit trees (continuing for 3 years)

5. Training and workshop:

Two trainings for project staff (LC/CO/BO) and one awareness workshop for villagers are planned for agroforestry development (Table 5). After trees and crops are planted, series of trainings can be carried out with convergence of Agriculture Department.

Table 5: Training and Workshop on Agroforestry Development.

SN	Topic	Content	Duration	Place	Participant	Trainer / organiser	Responsibility	Timing
1	ToT in agroforestry	Tree plantation, soil and plant nutrient, plant protection, intercropping	3 days	ICAR / Agriculture College	LC/CO/BO	ICAR / Agriculture College / DOA	Additional Director (M & E)	Preparatory Phase
2	ToT in orchard management	Plant protection, manuring, pruning, training, intercropping	3 days	ICAR / Agriculture College	LC/CO/BO	ICAR / Agriculture College / DOA	Additional Director (M & E)	Preparatory Phase
3	Awareness workshop	Basic agroforestry and IGAs (livestock, fisheries)	1 day	RMU level	JFMC/EDC members FFs/SHGs	DMU / SDMU / RMU	LC/CO	Implementation Phase

Source: MoD (2018)

6. Lessons learnt from Agroforestry in TFIPAP

In TFIPAP nine agroforestry models were implemented in a total of 1,414 FIGs with 10,002 beneficiaries, covering 8,459 hectares, which accounted for 5% of entire RoFR lands in the state (Table 6). The average size of agroforestry plantation per farmer group was 5.55 hectares, the maximum size was 53.3 hectares, and the minimum size was 0.3 hectares.

Table 6: Cost, Profitability, and Planted Area of Agroforestry Models in TFIPAP (as of 2015-16).

Model	Forest tree (quantity)	Fruit tree (quantity)	Inter crop (quantity)	Initial cost (INR/hectares)	Expected profit (INR/hectares) for 5 years	JLG number	Area (hectares)	Area (%)
1	Bamboo (200)	Jackfruit (80)	Maize (8 kg), Pineapple (8,000)	52,000	177,000	46	192	2.3
2	Gamar (150)	Lemon (200)	Pigeon pea (10 kg), Ginger (400 kg)	56,000	255,000	86	545	6.4
3	Bamboo (150)	Areca nut (1,000)	Sesame (5 kg), Maize (8 kg), Black pepper (1,000)	53,000	284,500	231	1,385	16.4

4	Acacia (150)	Litchi (100), Lemon (100)	Maize (8 kg), Turmeric (400 kg)	51,000	391,000	111	761	9.0
5	Teak (100)	Jackfruit (80)	Maize (8 kg), Ginger (400 kg)	52,000	380,000	80	420	5.0
6	Bamboo (150)	Mango (100)	Maize (8 kg), Pineapple (8,000)	55,000	242,500	631	3,658	43.2
7	Agar (640)	Areca nut (640)	Turmeric (400 kg), Black pepper (640)	52,000	84,000	34	226	2.7
8	Acacia (312)	Banana (416)	Turmeric (400 kg)	52,000	207,000	186	1,205	14.2
9	Acacia (100)	Orange (125), Papaya (650)	Turmeric (300 kg)	52,000	252,500	9	67	0.8
Total / Average				52,778	252,611	1,414	8,459	100

Source: TFIPAP (2012) Agroforestry for Rehabilitation of the Shifting Cultivators, Tripura Forest Environment Improvement and Poverty Alleviation Project, Government of Tripura

In TFIPAP, the following three models are most preferred by villagers (Table 7). Bamboo is the most popular forest tree which provides benefit at shortest term (4 years). Tree species gamar, acacia, teak and agar will shade the others; therefore, sufficient spacing is needed. Areca nuts are second promising species due to high value of fruit. Some villagers added crops and fruit trees such as jackfruit and turmeric to their agroforestry on their own. Farm forestry was planned but removed due to the lack of interests by villagers. The crops were added and removed due to several reasons during the project (Table 8).

Other suggested species include: 1) forest tree: Yongchak (*Parkia biglandulosa*), Tejpatta/Dalchini (*Cinnamom zeylanicum*), *Litsea glutinosa*, 2) Tree crop/fruit: Sajna (*Moringa oleifera*), Papaya, Mosambi, and, 3) inter crop: Cowpea, Sesame and Black gram.

Table 7: The most preferred model of agroforestry in TFIPAP.

Preference	Model	Crop combinations	Area (ha)	%	Reason for preference
1st	Model 6	bamboo, mango, maize and pineapple	3,658	43.2	quick and good financial return of pineapple and bamboo
2nd	Model 3	bamboo, areca nut, and sesame, maize, and black pepper	1,385	16.4	bamboo, sesame, and maize for their quick return and areca nut for its slow but high return
3rd	Model 8	acacia, banana, and turmeric	1,205	14.2	banana and turmeric for their quick and high return
Total			6,248	73.8	

Table 8: Addition and removal of crops from model in TFIPAP.

Crop	Reason for addition and removal
Rubber	Originally incorporated but removed due to monoculture cultivation.
Farm forestry	Lack of interest in farmer.
Areca nut and pineapple	Realistic cost, minimum maintenance needed. Market demand and having processing potentiality.

Gamar and Acacia	Added for Timber production. Fast-growing, harvested in 12 to 15 years.
Sesame and maize	Good knowledge of farmers.
Sesame, Black gram, Cowpea	Added because of frequent harvest (two to three times a year) for a long period (4 to 5 years). Legume crops will help maintaining soil fertility.
Scented lemon (Elaichi lebu)	High demand in the market. INR 10 per piece in Agartala.
Large cardamom	Potential crop but not added. highly marketable but easily found in forest.
Black pepper	Removed due to requirement of climbing support.
Turmeric and papaya	Short-term annual production
<i>Litsea glutinosa</i>	Added for high market demand as binding material.
<i>Cinnamon</i>	Added for market demand as spice.
Moringa, Youngchak	Added for market demand as vegetable.
Mango (Arunika variety)	Added for maximum shelf life and true dwarf nature of the plant.
Gandhaki	Added for high market demand and need less maintenance.
Mosambi	Added for suitability of growing in any soil type. Mosambi have high market demand and processing potentiality.
Orange	Removed for poor production and higher mortality.
Agar, Teak	Removed for post harvesting problem from RoFR land.

7. Agroforestry models under SCATFORM Project with spacing and timing of planting.

Model No.1

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Bamboo (Mritinga/Bom)	200	May to July	4	10	45x45x45
Jackfruit (Singapur Jack/Local)	80	May to July	10	10	50x50x50
Maize (Local)	8 kg	Sept. to Nov.	0.30	0.60	3 to 4
Cowpea (Kasikanchan)/ Black gram	10 kg	June to July	0.3	0.45	5 to 7
Pineapple (Queen)	8000	Sept. to Oct.	0.30	0.60	45x45x45

Model No. 2

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Gamhar	100	May to July	6.5	8	35x35x35
Youngchak (<i>Parkia biglandulosa</i>)	100	May to July	6.5	8	35x35x35
Lemon (Elachi/Assam)	200	May to July	5	8	50x50x50
Arhar (Upas-120, T-21)	10 kg	April to July	0.30	0.70	5
Ginger (Suprabha, Nadia)	400	March-April	0.25	0.30	4 to 5

Model No.3

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Areca nut (Srimangala, Andaman)	250 (only on periphery)	May to June	3	3	50x50x50
Bamboo (Mritinga/Bom)	150	May to July	6	9	45x45x45
Sesame (Krishna Black, Punjab Til)/ Cowpea (Kasikanchan)	5 kg	July to August	0.15	1	2 to 2.5
	10 kg	July –August	0.3	0.45	5 to 7
Maize (Local)	8 kg	Sept. to Nov.	0.30	0.60	3 to 4

Model No.4

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Akashmoni (<i>Acacia mangium</i>)	150	May to July	6	9	35x35x35
Sajna (<i>Moringa oleifera</i>)	100	May to July	9	9	35x35x35
Lemon (Assam/Elaichi)	100	April to July	9	9	50x50x50
Maize (Local)	8 kg	Sept. to Nov.	0.30	0.60	3 to 4
Turmeric	1000	April to May	0.30	0.45	5

Model No.5

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Dalchini (<i>Cinnamomum zeylanicum</i>)	100	May to July	8	10	35x35x35
Jackfruit (Singapur jack/Local)	80	May to July	10	10	50x50x50
<i>Litsea glutinosa</i>	100	May to July	10	10	35x35x35
Maize (Local)	8 kg	Sept. to Nov.	0.30	0.60	3 to 4
Cowpea (Kasikanchan)	20 kg	July –August	0.30	0.45	5 to 7
Turmeric (IISR-Prava, Krishna)	400	February to March	0.30	0.45	5

Model No. 6

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Mango (Arunika)	100	May to July	8	8	50x50x50
Bamboo (Mritinga/Bom)	150	May to July	4	10	45x45x45
Maize (Local)	8 kg	Sept. to Nov.	0.30	0.60	3 to 4
Pineapple (Queen)	8000	Sept. to Oct.	0.30	4	8x8x8

Model No. 7

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Youngchak (<i>Parkia biglandulosa</i>)	400	May to Sept.	3	5	30x30x30
Areca nut (Srimangala, Andaman)	250 (on periphery)	May to June	2.5	3	40x40x40
Maize (Local)	8 kg	August to Sept.	0.30	0.60	3 to 4
Turmeric (IISR-Prava, Krishna)	400 kg	April to May	0.30	0.45	5
Gandhaki	2500	May to June	0.50	0.60	15x15x15

Model No. 8

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Bamboo (Mritinga/Bom)	150	May to July	4	10	45x45x45
Akashmoni (<i>Acacia mangium</i>)	300	May to July	4	8	35x35x30
Maize (Local)	8 kg	Sept. to Nov.	0.30	0.60	3 to 4
Cowpea (Kasikanchan)	20 kg	July –August	0.30	0.45	5 to 7
Turmeric (Krishna)	300 kg	April to May	0.30	0.45	5

Model no. 9

Name of the crop	No. of seedlings/ha	Time of planting	Spacing (in m)		Pit size (in cm)
			Plant to plant	Row to row	
Mosambi	125	May to July	8	10	45x45x45
Akashamoni (<i>Acacia mangium</i>)	100	May to July	10	10	35x35x35
Papaya (Pusananha, Pusa delicious)	650	May to July	3	5	45x45x45
Turmeric (Krishna)	300 kg	April to May	0.30	0.45	5

8. Technical estimates of Agroforestry models (per hectare) under SCATFORM.**Model No.-1**

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Bamboo (Mritinga/Bom)	200 nos.	15	3000
Jackfruit (singapur/Local)	80 nos.	15	1200
Pineapple (Queen)	8000 nos.	3	24000
Maize (Local)	8 kg	60	480
Cowpea (Kasikanchan)/ Black gram	10 kg	100	1000
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	37,980
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	76,380

Model No.-2

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Gamhar	100 nos.	10	1000
Youngchak (<i>Parkia biglandulosa</i>)	100 nos.	20	2000
Lemon (Elachi/Assam)	200 nos.	10	2000
Arhar (Upas-120, T-21)	10 kg	80	800
Ginger (Suprabha, Nadia)	400 kg	60	24000
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	38,100
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680

Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	76,500

Model No.-3

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Areca nut (Srimangala, Andaman)	250 nos.	10	2500
Bamboo (Mritinga/Bom)	150 nos.	15	13000
Sesame (Krishna Black, Punjab Til)/ Cowpea (Kasikanchan)	5 kg	80	400
	10 kg	100	1000
Maize (Local)	8 kg	60	480
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	2 L	500	1000
Sub-Total	--	--	25,180
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	63,580

Model No.-4

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Akashmoni (<i>Acacia mangium</i>)	150 nos.	10	1500
Sajna (<i>Moringa oleifera</i>)	100 nos.	10	1000
Lemon (Assam/Elaichi)	100 nos.	10	1000
Maize (Local)	8 kg	60	480
Turmeric (IISR-Prava, Krishna)	1000 kg	20	20000
Fencing material (Nylon net)	400 m	15	6000

Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	32,280
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	70,680

Model No.-5

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Dalchini (<i>Cinnamomum zeylanicum</i>)	100 nos.	20	2000
Jackfruit (Singapur jack/Local)	80 nos.	20	1600
<i>Litsea glutinosa</i>	100 nos.	20	2000
Maize (Local)	8 kg	60	480
Cowpea (Kasikanchan)	20 kg	100	2000
Turmeric (IISR-Prava, Krishna)	400 kg	20	8000
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	24,380
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	62,780

Model No.-6

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Mango (Arunika)	100 nos.	40	4000
Bamboo (Mritinga/Bom)	150 nos.	15	2250
Maize (Local)	8 kg	60	480
Pineapple (Queen)	8000 nos.	3	24000
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	39,030
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	77,430

Model No.-7

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Youngchak (<i>Parkia biglandulosa</i>)	400 nos.	20	8000
Areca nut (Srimangala, Andaman)	250 nos.	10	2500
Maize (Local)	8 kg	60	480
Turmeric (IISR-Prava, Krishna)	400 kg	20	8000
Gandhaki	2500 nos.	5	12500
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	39,780
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680

Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	78,180

Model No.-8

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Bamboo (Mritinga/Bom)	150 nos.	15	2250
Akashmoni (<i>Acacia mangium</i>)	300 nos.	10	3000
Maize (Local)	8 kg	60	480
Cowpea (Kasikanchan)	20 kg	100	2000
Turmeric (Krishna)	300 kg	20	6000
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	22,030
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304
Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	60,430

Model No.-9

Particulars	Quantity	Rate (in Rs.)	Amount (in Rs.)
Mosambi	125 nos.	40	5000
Akashmoni (<i>Acacia mangium</i>)	100 nos.	10	1000
Papaya (Pusananha, Pusa delicious)	650 nos.	25	16250
Turmeric (Krishna)	300 kg	20	6000
Fencing material (Nylon net)	400 m	15	6000
Subabul pole for fencing	400 nos.	2	800
Compost fertilizer	--	--	--
Pesticides	3 L	500	1500
Sub-Total	--	--	36,550
Jungle clearing and land preparation	40 Man days	192	7680
Layout preparation	12 Man days	192	2304

Land development	22 Man days	192	4224
Pit excavation	40 Man days	192	7680
Sawing of saplings or seeds	20 Man days	192	3840
Follow up maintenance (2 yrs.)	40 Man days	192	7680
Fencing making	26 Man days	192	4992
Sub-Total	--	--	38,400
Total	--	--	74,950

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