Afforestation and Tree Plantation under MGNREGS

A Resource Booklet for MGNREGS Functionaries:

Designed and Developed by WASSAN as part of GIZ Project “Environmental benefits of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA-EB)”
This booklet is a handy reference for use by cutting edge MGNREGA functionaries. It is intended to help and support them to apply the knowledge/ tools/ instruments for the creation of technically sound assets and helps in following all the steps of the process/procedure in their proper sequence, with the recommended precautions.

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Foreword
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Afforestation and vegetation activities are integral to the Natural Resource Management (NRM). These activities have inherent value in terms of providing strength to the natural resource base and also enabling livelihoods, directly and indirectly, to the dependent communities. Afforestation, tree plantation in common lands, private lands such as block plantation, linear plantation are part of vegetation development. Tree plantation could be for different purposes like horticulture, fodder or for soil fertility improvement. Overall it has multi dimensional impacts. Its importance can be seen in following aspects:

i) helps in timely onset of monsoons by attracting clouds
ii) Convert wastelands into productive lands
iii) Restrict soil erosion and water run-off velocity
iv) Recharging ground water
v) Ameliorate NTFPs and leads to alternative livelihoods
vi) Improve bio-diversity
vii) Leads to change in micro and macro climate
viii) Reduce pollution (Air, sound and water)
ix) Helps in carbon sequestration and carbon credits etc.

There are several reasons for imbalance and disturbance in hydrological cycle. Bio diversity is damaged. There is a dire need to stop depletion of natural resources. It is also important to strengthen and regenerate the natural resources. Enhancing green cover with diverse plantation is urgent need in the context of climate change. For this purpose, following types of works are permitted under MGNREGS:
Classification of Works for MGNREGA

Important objective of plantation is to increase the green coverage in environmental angle. Greenery invites rains and water is elixir of life. The plantation can be taken up in many ways and places. This brings the space available into productive use. Therefore, plantation also generates continued income to the households and community / Gram Panchayat. MGNREGA has allowed different types of plantation. People are given the choice to choose the varieties of plants to get optimum benefit besides contributing to environmental protection. The type of plantation permitted are:

- **Block Plantation:** Wherever land is available in blocks, block plantation can be taken up. This could be both private and public lands.
  - Afforestation on hillocks, waste lands, grazing land, village forest, coastal soils.
  - Plantation in public Institutions (such as Education institutions, Health institutions, Government offices, etc)
  - Tank foreshore plantation

- **Linear plantation:** To make avenues greener and bring the empty space available into productive use.
  - Avenue plantation on road side, railway track side.
  - Bund Plantation / Boundary Plantation
  - Canal side Plantation

- **Horticulture Plantation:** Locally relevant varieties

- **Sericulture Plantation:** To cultivate host plants.

- **Farm Forestry:** To maximize the gains from farm land integrating agriculture and forestry

- **Nursery Raising:** Raising nursery to support plantation activity by supplying the required plants. This can be established at appropriate location to cater the cluster of villages.
The locally relevant and resistant varieties are very much suitable for any type of plantation. The table below gives options for choosing the plants. The species must be selected based on recommendations by Department of Horticulture or Forest Department. The beneficiaries can pick up the species/plants of their choice from the approved list of plants/species as per local agro-climatic conditions, availability of water, etc.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Category</th>
<th>Name of the Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Timber</td>
<td>Aam, Ailanthus, Akhrot, Angu, Anwala, Bahera, Bamboo, Banj, Chamkharik, Chir, Deodar, Eucalyptus, Fir, Haldu, Harar, Jamun, Kafal, Khair, Maple, Neem, Poplar, Ringal, Sain, Sal, Salix, Semul, Shisham, Siris, Spruce, Surai, Tejpatand Tun</td>
</tr>
<tr>
<td>2</td>
<td>Fuel-wood</td>
<td>Acacia, Banj, Haldu, Eucalyptus, Jamun, Kwiral, Kharsu, Moru, Sain, and Shisham.</td>
</tr>
<tr>
<td>3</td>
<td>Fodder</td>
<td>Babul (Acacia nilotica), Subabul, Bakil, Bans, Bhimal, Banj, Dhauri, Kharsu, Kharik, Kwiral, Maple, Moru, Neem, Phalyat, Robinia, Shahtoot, Siris and Timla</td>
</tr>
<tr>
<td>4</td>
<td>Fruits</td>
<td>Aam, Akhrot, Amrood, Anwla, Bahera, Ber, Harar, Imli, Jamun, Kafal, Malta, Mehal, Nimbu, Shahtoot and Timla</td>
</tr>
<tr>
<td>5</td>
<td>Fiber</td>
<td>Kapok (Cibapentandra), cotton tree (Bombaxceiba),</td>
</tr>
<tr>
<td>6</td>
<td>Oil Yielding</td>
<td>Karanja, Simarouba, Mahua, Cheura, Kokum, Olive, Neem, Jatropha, Jajoba, Tung, Wild Apricot</td>
</tr>
<tr>
<td>7</td>
<td>Rejuvenation of depleting water sources</td>
<td>Akhrot, Banj, Deodar, Maple, Phalyat, Ringal, Siris and Utis.</td>
</tr>
</tbody>
</table>

(Source: Forest Works Manual and Schedule of Rates for Forestry related works in Uttarakhand, under MGNREGA, Ministry of Rural Development, Govt. of India. This table is relevant for Uttarakhand state)

It is advised that each State/UT should list out category wise tree species, as per the agro-climatic condition, availability of irrigation water, soil type. The states can also list of the plants based on the growth type such as plants that grow straighter, smaller canopy, bigger canopy, etc.
General Calendar for Plantation Activities

The following are important steps starting from survey to select the sites to the plantation and maintenance.

- **Site Survey**: Complete by February
- **Cleaning the site**: Complete by February
- **Alignment and staking the pegs**: February
- **Digging Pits**: February to March
- **Fencing the plantation area**: May-June
- **Selection of plants separating from nursery bed**: 10 days before plantation
- **Transportation of plants from nursery to plantation site**: June-July
- **Inter transportation of plants from site to pit**: June-July immediately after transportation to site
- **Application of Plant Protection Chemical and Fertilisers before plantation in the pit**: June – July before plantation
- **Staking**: June – July Immediately after plantation
- **Fencing the plant**: June – July Immediately after plantation
- **Watch and ward**: Immediately after plantation, round the year
- **Weeding and soil work in the basins**: July – August
- **Replacement of causalities**: August-September
- **1st Inter ploughing in the plantation area after plantation**: September-October
- **Circular weeding and soil work in the basins**: Oct-Nov and Jan-Feb
- **2nd Inter ploughing in the plantation area after plantation**: January-February
- **Fire tracing lines**: February-Mar
- **Seed dibbling in the trenches**: July-August

*Note: This table is prepared for the areas where monsoons start in the month of June. The states/UTs are requested to prepare similar calendar according to the local conditions.*
Critical Steps in Planning process

- Identification of appropriate sites (common, individual and forest lands)

- Identification of beneficiaries for providing usufruct rights

- Identification of location specific species. List of approved species is available with Department of Horticulture, Forest Department according to the local agro climatic conditions, irrigation requirements, soil type, survival etc. Beneficiaries can choose the plants/species from the approved list according to their requirements.

- Estimation/Quantification of number of plants required to raise – specie wise

- Identification of nursery site

- Raising Nursery (different types/species of plants)

- Development of selected/identified Land for plantation: Removal of boulders, contour bunding, terracing, fencing, farm ponds, trenches, etc. (depending upon on the slope %, soil type, terrain, etc)

- Preparation for plantation: Survey and alignment of pits, preparation of NADEP compost/ Vermi compost

- Plantation activities: Digging pits, transportation of plants to pit, Plantation, staking, etc

- Post plantation activities: Maintenance, adding soil fertility such as liquid bio fertilizers, farm yard manure, fertilisers, plant protection chemical etc in recommended doses.
Block Plantation is a method of plantation wherein single/multiple species are planted in a patch of land available. This type of plantation is taken up mostly in common lands, Government lands, Panchayat lands to preserve the bio-diversity and enrich energy plantation, generate livelihoods of dependent people. Diversified plantation with local varieties that give fruits, Non-Timber Forest Produce (NTFP), fodder, bio mass plants, etc can be taken up in common lands. Usufruct rights can be allotted to the beneficiaries as listed out in Paragraph 5 of Schedule-I in Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA).

4.1 Hill Afforestation

Introduction
Hillocks are mostly located in ridge portions of Watershed areas. These uplands are prone to erosion because of slope. These hillocks are best suitable for plantation with local varieties.

Location
Barren Hillocks, in between trenches. Afforestation can be taken up in waste lands and fallow lands belong to Government, private organisations, individuals, Gram Panchayat, Religious Institutions, etc

Possible Outcomes
- Barren hills are regenerated in natural process
- Waste resources are brought into productive use
- Afforestation in uplands prevents soil erosion and prevents rain water flow on to the structures in downstream; otherwise rain water flow damages them.
4.2 Plantation in Public Institutions

Introduction

Non availability of adequate space for plantation in several villages is one of the major constraints. There are many public institutions where space is available for plantation. These plantations are expected to provide shade, fruits, bio mass, etc.

Location

Public Institutions such as schools, colleges, health centres, Veterinary centres Government offices, Lands belong to Religious places, Gram Panchayat land, which have premises with sufficient area for plantation is available.

Suitable varieties

Mix of the plants that grow tall and with bigger canopy for shade are useful.

Possible Outcomes

- Resources are brought into productive use
- The trees provide shelter, shade for people visit offices.
- Generate additional income to the institutions
### 4.3 Tank Foreshore Plantation

**Introduction**
Tank fore shore where water is cleared within 15 days even the tank is full is suitable for plantation. Certain plants such as acacia, babul are suitable to grow even in water logged conditions. Irrigation tanks have adequate space, where plantation can be taken up.

**Location**
In tank foreshore, where inundation is less than 15 days; In the tank bed. Suitable plants need to be selected for submergence area, non-submergence area and periphery.

**Possible Outcomes**
- Available space is converted into productive use
- Babul trees provide fodder to the small ruminants.
- Babul wood is very useful for furniture
- Gram Panchayat gets additional income

*Babool trees provide food to livestock*
Generally adequate space in block is required for taking up plantation. Providing watch and ward is relatively easier to such block plantation. However, land in block is not available in many places. On the other hand space is available alongside rural roads, high ways, canals, railway tracks, etc. This land can be converted into productive use by taking up plantation. But, the plants which do not spread canopy widely and plants which don’t grow their roots horizontally are suitable. The plantation must be taken up on the toe of the road/canal bund. Safe distance must be maintained from the railway track as specified by Railwyas.

- **Road sides**: Generally Government allocates land for roads with adequate space on both sides. The space available all along the rural gravel roads, Bitumen Thar roads, high ways are suitable for plantation.
- **Canal sides**: Plantation can be taken up on the toe of the canal bund
- **Railway Tracks**: Large patch of land is available alongside the railway tracks.
- **Bund/Boundary Plantation**: In farmers’ fields, on north side and south side bunds in east-west direction. If farmers are willing, plantation can be taken up around the field on all sides.
Suitable Plants

Plants that grow straighter, roots grow straighter. If the roots spread horizontally, such plants may damage roads, canals, railway tracks and also become difficult to plough the land.

Suitable plants are: Tamarind, neem, pongamia, piple, Peltolphorum, black berry, Kanchanam/Kanchanar (Bauhinia), Maddi (Arjuna), Mahogany, kadamba, Edakulapala/Saptaparni, Nidra Ganneru, Gangaravi, Akasa Malli, Sisu, Ippa, Banyan, Gulmohar, Sarugudu/ Sarava (Casuarina), teak, avisa, etc. The type of plants may vary from state to state.

Possible Outcomes
- Road side avenues look greener
- The pedestrians and cyclists feel comfortable in their journey
- Prevents soil erosion and control dust and noise pollution, etc.
- Income to the farmers
- Availability of bio mass for enhancing soil fertility
- Shade and shelter to the agriculture workers and farmers
- Protection for the crop
- Prevention of soil erosion due to wind blow.
- The space available is utilized for greenery development and can be brought into productive use.
- Usufruct rights can be provided to the beneficiaries as per the existing guidelines
- Enables livelihood opportunities and generates income to the land owning institutions.
Horticulture plantation provides assured incomes to the farmers every year. It brings uncultivable lands into productive use. This sort of plantation can be taken up in farmers’ fields. Priority can be given to the farmers belong to SC, ST, Small and Marginal categories. Plantation can be extended up to an area of 5 acres but ensuring critical irrigation support. Locally suitable varieties like Guava, Mango, Custard Apple, Cashew, Tamarind, Blackberry, etc can be taken up for plantation.

Possible Outcomes
- Income to the farmers
- Availability of biomass for enhancing soil fertility
- Shade and shelter to the agriculture workers and farmers
- Protection for the crop
- Prevention of soil erosion due to wind blow.
Intercropping with Farmers own funds or covergence
This intercropping can be done upto 5 years from plantation, which gives supplemental benefits.

- **Food crops:** Groundnut, red gram, green gram, horse gram, cow pea, soya, beans
- **Vegetable:** Tomato, cucumber, ladyfinger, onion, ginger,
- **Flower:** Marigold, chrysanthemum,
- **Interplants:** Sandalwood, silver oak, Teak

### 6.1 Mango

**Suitable Soils**
Pervious soils such as red, alluvial, etc are suitable for mango plantation. Salt/saline soils, block soils without drainage facilities are not suitable.

**Varieties**
Benishan, Collector, Suvarna Rekha, Manjeera, Neelam, Neeleshan, Shakargutli, Mallika, Himayath, Jahangeer, Banginapalli, Dashehari, Himasagar, Langda, etc. Depending upon the suitability of the soil and resources, one can choose appropriate variety.

### 6.2 Custard Apple

**Suitable Soils**
Pervious soils where water infiltrates quickly like red soils with high percentage of sand, sandy soils and alluvial soils, etc are more suitable. Soils with more lime content and chloride content are also suitable.

**Varieties**
Balanagar, Washington, collandogem, Atimoya
6.3 Cashew

**Suitable soils**
Moderate to high temperature zones with high percentage of humidity are suitable areas. Red soils, sandy soils, red loamy soils, fallow lands and hill slopes are suitable. Coastal areas are highly suitable for this cultivation.

**Varieties**
Balanagar, Washington, collandogem, Atimoya (7 m spacing)

6.4 Tamarind

**Suitable soils**
Red soils, sandy soils, red loamy soils, fallow lands are suitable. Saline, alkaline, black soils without proper drainage facilities lime soils are not suitable.

**Varieties**
Hybrid (such as PKM) and local

6.5 Black Berry

**Suitable soils**
Pervious soils such as red soils, sandy soils, red loamy soils are suitable. Saline, alkaline, black soils without proper drainage facilities are not suitable.

**Varieties**
Hybrid (such as PKM) and local
Steps in Marking

- Mark the points leaving adequate space (half of the spacing) from the boundary
- Mark the points horizontally with the required space as per the design, by holding ropes
- Once the horizontal marking of points is completed, hold the rope vertically and mark the points.

Steps in Execution

- Dig the pits of specified size with recommended spacing following the contour lines
- Remove top soil upto 9 inch and keep it aside.
- Keep this 9 inch top soil at downstream side to the pit leaving a berm of minimum 0.30 mtr
- Transport the nursery plants safely to the hillock area, upto the road point/plot
- Transport the plants from the road point/plot to the pit
- Add Farm Yard Manure (FYM) and tank silt to the pits alongwith prescribed PPC
- Remove the polybag cover
- Put the plant in the pit
- Put a stake in the pit adjacent to the plant
- Fill the pit with the first 9” layer soil
- Make the basins with earth deposited near the pit. Dig the earth upto 10 cm and make basins with the radius of 0.50 m to 1.00 m.
- Apply PPC to prevent possible damage to the plants by termites
Apply Di Ammonium Phosphate (DAP) and urea in specified quantities to every plant immediately after plantation. Cover the fertilizer with soil and apply water.

Provide boundary fencing to the plantation.

Provide watch and ward to the plantation.

Replace the dead plants, whenever they are found dead.

**Maintenance**

**2nd year**
- Replant the dead/damaged plants up to maximum limit of 20%.
- Re-dig the pits to replace the dead plants.
- Make the basins to every plant.
- Plough the empty space between the plants.
- Watering in regular intervals during non-rainy seasons as per the estimate.
- Remove weed in the basins and mulch with stone or biomass to prevent excess loss of moisture. Soil work in the plant basins must be done twice in a year during January and September months.
- Apply fertilizers to the plants twice a year with urea or DAP in specified quantity. Sprinkle around the plant, cover with soil and apply water immediately.
- Apply plant protection chemicals as per the specifications.

**3rd year**
- Replant the dead/damaged plants up to maximum limit of 20%. Usually this is 10%.

**Possible Outcomes**
- Barren hills are regenerated in natural process.
- Waste resources are brought into productive use.
- Prevention of soil erosion in uplands and reduction of rain water flow on to the structures in downstream; otherwise rain water flow damages them.
Re-dig the pits to replace the dead plants

Watering in regular intervals during non-rainy seasons as per the estimate

Remove weed in the basins and mulch with stone or biomass to prevent excess loss of moisture. Soil work in the plant basins must be done twice in year during January and September months.

Apply fertilizers to the plants twice a year with urea or DAP in specified quantity. Sprinkle around the plant, cover with soil and apply water immediately

Apply plant protection chemicals as per the specifications

Do’s and Don’ts

Do’s

- Get the formal approval from appropriate authority who is the owner/custodian of the land
- Select locally relevant and drought resistant varieties (such as Neem, Pongamia, Cassia, Custard apple, Peeple, Seemaruba, Banyan etc)
- Discuss with community on selection of varieties
- Instead of single type, select different plants for getting multiple benefits like fruits, fodder, timber etc.
- Take up the plantation during rainy season.
- Provide head load conveyance for transporting the plants from plot/road side point to pit.
- Safely unload and keep the plant near to the pit
- Tear the cover using the blade, in L shape in such a manner that the soil should not be detached from the plant roots
Before plantation, add the mixture of manure and tank silt to the pit.

Straight growing species may be planted on the boundaries.

Make basins immediately after plantation.

Provide at least one bucket of water immediately after plantation.

Replace the damaged/dead plants.

Remove first layer up to 9" and keep it aside. Do not mix the earth dug in next layers to this top soil. The soil up to first 9" will be fertile. This can be used to fill the pit after plantation.

**Dont’s**

- Do not plant the trees with wider canopy on the boundaries.
- Do not dig the pits without proper alignment.
- Do not reduce the permitted space.
- Do not plant without removing the cover.
- Do not cut the roots while tearing the cover.
- Do not remove any plant in the hillock.
- Do not allow livestock for open grazing for an initial period of minimum 3 years.
- Do not deposit the earth on the upstream side.
- Do not take up plantation under electric lines, causeways and existing plants.
- Do not select roads where widening possible in near future.
## FAQs

<table>
<thead>
<tr>
<th>Q:</th>
<th>How to identify the local and appropriate varieties?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>Discuss with the community. Community especially elder people will share the knowledge on locally relevant varieties.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q:</th>
<th>What happens if adequate spacing between the plants is not there?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>Adequate spacing between plants reduces competition for soil nutrients, root growth, canopy growth and moisture.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q:</th>
<th>What happens if the trees with wider canopy are planted on the boundaries?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>If the trees of wider canopy are grown on boundaries, they may branch out to the others land. The others may put objection to this as the trees spread the shade and cause reduction in production.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q:</th>
<th>Why proper alignment is needed for digging the pits?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>For allowing the trees to have adequate space to spread their canopy and also reduce competition.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q:</th>
<th>Why does somebody safely unload the plants from headload?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>To prevent damage to the stem and roots.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q:</th>
<th>Why should not one hold the branches of nursery plant while moving / shifting/ transporting them?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>To prevent damage to the plant. Best method is to hold the cover.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q:</th>
<th>Why should not we cut the roots? Can’t they regrow?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>They regrow. But takes time for roots to entrench into soil.</td>
</tr>
</tbody>
</table>
Nursery is a support system for plantation activities. If nursery is available and accessible nearby, plantation becomes very easy. Farmers and functionaries can choose the required, quality plants. Nursery raising is one of potential activities that can provide higher number of wage days. The ideal location for taking up nursery is the place where there is an open/bore well nearby, other perennial water source of water such as river side, pond side and canal side with 75% of the space under shade. The nursery should be well accessed by proper Road.

**Tech Design and key tasks**
- Till and clean the identified place.
- Level the place for safe drainage of water.
- Preparation of beds
- Preparation of soil to fill the covers
- Seed dibbling in the covers
- Preparation of bed
- Arranging poly bags on the bed
- Watering
- Soil work/Weeding
- Watch and ward

**Indicators for good Nursery Site**
- Proximity to the residential area with good access
- Availability of labour to work
- Water facility
- Electricity connection to the water source
- Pervious soil
- Accessibility for transportation to carry/bring material/plants
### Timeline of Activities for growing a Nursery

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identification of site and ploughing to clean the area</td>
<td>August</td>
</tr>
<tr>
<td>2</td>
<td>Leveling the land to allow safe disposal of water</td>
<td>October</td>
</tr>
<tr>
<td>3</td>
<td>Collecting red/alluvial soil, tank silt, sand, FYM, vermin compost</td>
<td>October</td>
</tr>
<tr>
<td>4</td>
<td>Procurement of polythene bags</td>
<td>October</td>
</tr>
<tr>
<td>5</td>
<td>Fencing around the nursery site to protect from browsing animals</td>
<td>November</td>
</tr>
<tr>
<td>6</td>
<td>Arranging watch and ward</td>
<td>From November</td>
</tr>
<tr>
<td>7</td>
<td>Preparation of beds and application of pest control mechanism, if required</td>
<td>November</td>
</tr>
<tr>
<td>8</td>
<td>Seed Procurement from Forest Department/Others</td>
<td>November</td>
</tr>
<tr>
<td>9</td>
<td>Seed treatment</td>
<td>November</td>
</tr>
<tr>
<td>10</td>
<td>Breaking the soil clausds into fine dust, mix it well and filter to keep ready to fill the Polythene bags</td>
<td>November</td>
</tr>
<tr>
<td>11</td>
<td>Filling the bags</td>
<td>November</td>
</tr>
<tr>
<td>12</td>
<td>Arranging bags in beds before inserting seed/stumps into the bags</td>
<td>November/December</td>
</tr>
<tr>
<td>13</td>
<td>Watering the bags upto one week (before putting seed/stumps into bags)</td>
<td>November/December</td>
</tr>
<tr>
<td>14</td>
<td>Putting treated seed or stumps or nursery plants brought from primary nursery in the bags</td>
<td>November/December</td>
</tr>
<tr>
<td>15</td>
<td>Watering the beds with water gun to maintain the required level of moisture</td>
<td>Daily from November/December</td>
</tr>
<tr>
<td>16</td>
<td>Application of Farm yard/organic manure</td>
<td>Every 2months once from /organic</td>
</tr>
<tr>
<td>17</td>
<td>Rearrangement of beds, grading according to the height of the plant, pruning the roots that trenched out from the covers</td>
<td>December-January</td>
</tr>
<tr>
<td>18</td>
<td>Replacement of the causalities (plants/stumps) in the covers with new seed/stump/plant</td>
<td>December-January</td>
</tr>
<tr>
<td>19</td>
<td>Weeding</td>
<td>November, January, March</td>
</tr>
<tr>
<td>20</td>
<td>Maintaining the nursery Journal and information board</td>
<td>As soon as nursery is started</td>
</tr>
</tbody>
</table>

**Note:** This table is prepared for the areas where monsoons start in the month of June such as Andhra Pradesh, Telangana, Karnataka, etc. The states/UTs are requested to prepare similar calendar according to the local conditions.
Steps in Land preparation
- Clear unwanted bushes
- Level the area
- Fence the area

Steps in Nursery bed preparation (Before transplanting to Polythene covers)
- Prepare a Bed with a size of 10 m x 1 m
- 2000 sqm of area is sufficient to prepare 90-100 beds
- Give marking to nursery bed and fix pegs
- Dig the area for about 0.30 mr where nursery bed is to be arranged
- Put dry grass and burn the area to kill any insects
- Dry the removed earth/soil from the nursery beds under the sun light (Weathering)
- Bring tank silt, break the clods pulverize and add farm yard manure
- Put the mixed and filtered soil to the trench dug
- Draw grid lines on the soil, in the trench
- Dibble treated seed at the grid points
- Mulch with the dry grass/bio mass and apply water with water sprinler, as it helps in retaining the moisture. But do not water directly with the pipe
- Let the seed germinate up to 2-3 leaves

Preparation of Fertile Soil for Poly bags
Nursery rising requires fertile soil. Mixture of farm yard manure, tank silt, red/alluvial soil help in preparation of fertile soil. This neutralises the pH factor in the soil.
- Transport the tank silt, red/alluvial soil, farm yard manure and sand
- Break the mud clods, make the soil material into dust
- Filter to get the fine soil
Mix the biopesticides or chemical to prevent termites to this filtered soil before putting into the covers.

Put this into Polythene bags

Keep the dry grass on the beds and apply water. It functions as mulching and helps in moisture retention

Keep the grass covered till the seeds are germinated

Transplantation of nursery plants (7-10 days grown) in Polythene covers

Fill the Polythene bags with the filtered soil mixture

Water the bags till entire soil in it gets moisture / wetted

Transplant the nursery plants or treated seed into the Polythene bags

Arranging beds

Bed size should be 10 m x 1 m

Fix pegs in the corners and tie rope/twine thread

Arrange the polythene bags in rows, adjacent to each other in such a manner that they stand together with mutual support

Watering the plants

Water the beds upto one week, without removing the covered grass

Give the water daily twice, morning and evening or as per the need

Use water sprinkler, do not give water directly with the pipes

Weeding

Remove the weeds with hands frequently

Pest control

Use plant protection chemical in recommended dose to control the pest

Pruning the leaves

Pruning the leaves allow the plant to grow quickly

Help the plant to access the sun light easily

Do not cut the tender leaves
Do not cut the leaves from the tender/green part of the plant

**Shifting beds**

- Shift the nursery plants from one place to another place, within the nursery site
- Prune/cut the out trenched roots from the polythene bags, as this will help the root to grow stronger
- Shift the beds at least once in a month regularly
  - While shifting, arrange the polythene bags according to height and type of the plant

**Hardening**

Hardening - Gradually reducing the quantity of water makes the plant stronger to absorb the shocks

- Before transporting the plants from nursery to the plantation site, hardening is to be done
- Shift the nursery plants from the beds and keep at a different place
- Stake the entire plants in such a way that they don’t collude. Stake with the ropes and sticks
- Do not give water till the plants get new leaves

**Transporting the plants to plantation site**

- After hardening the plants, keep them ready for transportation
- Select healthy plants
- Do not over load. Load the plants into the vehicle according to its capacity and space
Do’s and Don’ts

/non-bold/Do’s

- Load and unload the plants properly in such a way that they are not damaged
- Do not hold the plant (with cover) at the edge
- Do not disturb the soil and roots
- Maintain adequate percentage of shade for the plants
- Fill the bags with fertile and good quality soil
- Water the plants properly and regularly
- Apply/spray the pesticides as per the recommended dose
- Shift the beds
- Remove weed
- Arrange fencing

/non-bold/Don’ts

- Do not water the plants directly with the pipe

FAQs

Q: How to do seed treatment?
A: There are many ways of seed treatment. But, seed can also be treated with local methods such as using cow urine mixed with ash, etc. But, the most common problem is termites in case there is deficit watering. Proper watering will prevent this situation.

Q: What is the ratio of mixing soils and manure to fill the polythene bags?
A: Generally the mixture of red alluvial soil, tank silt (black soil) and FYM in 4:2:1 (cart loads) ratio with 2-3 kg of foliol dust mixed with this.

Q: What is the size of the cover/bag for each type of plant?
A: 5” x 9” size: If the age of the plant in nursery is less than 6 months or height is less than a meter 6” x 12” or 6” x 18” size: If the age of the plant in nursery upto 1 year or more or the height of the plant is more than 1 mtr.

(Further Learning: Refer Samarthya Technical Training Manual page No: 119 to 140)
Q: What are the major pests/diseases?? What is the frequency? How it can be addressed?
A: There are many types of pests and diseases that may occur. For more information and technical guidance contact local horticulture / forest officer.

Q: What are the indicators for selecting good quality plants?
A: Atleast two branches and looks healthier. Check whether the growth of the plant is due to entrenching of roots into earth, if poly bags are not properly and regularly shifted as per the specifications. Such growth is not good. Before plantation.

Q: Why the fencing is necessary?
A: Fencing prevents predators in initial stages and browsing animals at later stages.

Q: Why the poly bags be shifted frequently?
A: Shifting poly bags prevents entrenching of roots into the ground. It enables only the vegetative growth rather than strengthening the plant and root system. Therefore shift the beds frequently. Select species which have less foliage and grow straight. Such species will not give shade to crops.

Q: What are the apprehensions of farmers regarding bund plantation and how they can be addressed?
A: Formers donot want plants on the bunds as they feel of reduction in production from the particular portion of the crop due to shade. But plantation done on the bunds directing East to West don’t have shade into the field, but on the next tree.

Q: How many days before the plants must be hardened?
A: Atleast 30 days before lifting from nursery

Q: What is the % of shade required
A: Atleast 70% of shade for the initial 2 weeks, later on protect the plants from hot sun light.
Environmental Benefits of Plantation Activities

- Protect watershed areas by arresting water flow, preventing erosion of soils and strengthening sides/flanks of gullies
- Provide home for wild life, especially to squirrels, hares, birds and also for some wild animals.
- Helps in generating humus factor in soils and improve soil fertility
- Regenerate native flora and fauna and also plants which have medicinal value that are useful for treatment of livestock and humans
- Provide fruits, timber, fodder, shade, for both humans and livestock
- Helps in regenerate and strengthening livelihoods for the dependents
- Provide shelter to farmer friendly insects
- Help as live fencing and If fodder is available, farmers can proactively control and regulate open grazing
- Avoid deforestation as people get sufficient fuel wood
- Regenerated hillocks can increase livestock population as fodder availability is increased, which in turn increases availability of Farm Yard Manure and ease bullock constraints etc
- Reduces requirement of manures and fertilizers to the soil and crops
- Strengthens resilience of eco system in the context of climate change
- Gives environmental security besides food security, fodder security, water security and income security
- Enhances functional diversity and responsive diversity of species in the eco system
- Help in getting rains and act as wind breaks