

# HAND BOOK ON MANAGEMENT OF ROOT TRAINER NURSERY













WEST BENGAL FOREST & BIODIVERSITY CONSERVATION SOCIETY

**BLOCK-LB-2, SALTLAKE CITY, KOLKATA-700106** 



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# An overview of Central nursery





# INTRODUCTION

Plantation creation programs, now a days, are largely dependent on seedlings raised in Central Nurseries where seedlings are better looked after and healthier than those raised in Filed Nurseries.

Under WBFBC Project great importance has been given to raise hitech central nursery for raising quality planting materials (QPM).

In this "Handbook" efforts have been taken to describe how to raise nursery in easy step by step method by applying modern technology.

It is expected that the field staff will be benefited for raising Quality Planting Materials with the help of this Hand Book and the project objective will be fulfilled.

9<sup>th</sup> October, 2017

Project Management Unit
WBFBC Project

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#### 1. Goal of this handbook

Many centralised root trainer based nurseries have been set up in the state of West Bengal between 2014 and 2016, under the JICA assisted West Bengal Forest and Biodiversity Conservation Project (WBFBCP). This is a paradigm shift from the traditional polypot based field nursery. In the initial phase of the project, the Project Management Unit (PMU) lend support to the field staff for setting up the root trainer based centralized nurseries, which presently have a combined production capacity of about 80 lakhs seedlings.

For orderly management of the central root trainer based nurseries we require to put in place practical and standard operational guidelines, which would be user-friendly, and easily adaptable for the purpose of day to day management.



## 2. Target User of this handbook

The handbook is basically targeted for supporting the field level staff-Nursery workers, Beat Officers, Range Officers-for smooth nursery operations. Central Nurseries have been set up with a view to producing Quality Planting Material (QPM), the backbone of a successful and productive plantation. It is foreseen that the users of this handbook will get a direction for achieving the target of producing QPMs as may be assigned to them. Albeit for field use, the senior supervisory staff/officers are also expected to consult the handbook as and when required.

## 3. Policy and Guidelines of Managing Nursery-Why we require them

Policy is a set of common rules and regulations, which forms a base to take day to day decisions in managing an organisation. In managing nurseries these set of rules and regulations need to be followed strictly by the nursery workers and/or supervisors. For the centralised root trainer based nurseries, the policy could be linked to seed handling and storage, method of raising QPM, management of nursery stock, certification of quality, management of nursery hardwares, etc. Guidelines, on the other hand are a matter of fact guiding principles to maintain the policies set up by the management and are more flexible than policy. For example, the policy for nursery stock management could include inspection of nursery stock. The guideline for stock inspection may include inspection of 50% of stock by nursery staff every day for noting disease occurrence, water stress, germination percentage etc., for which standard method would be defined.



It must be remembered that, when we are handling large number of central nurseries under the Department for raising QPM with a target of afforestation and/or distribution to local communities, we as nursery mangers (at various levels) have a commitment to fulfil. The nursery production is akin to the 'Goods produced in a factory'. Therefore, without defined policy and guidelines we may fail in our commitment.

# **Components of Root Trainer Nursery in West Bengal**

The important components of Root trainer based Central Nurseries in West Bengal are-Plastic Root Trainers-150cc/300cc/500 cc-with iron bench suspension system



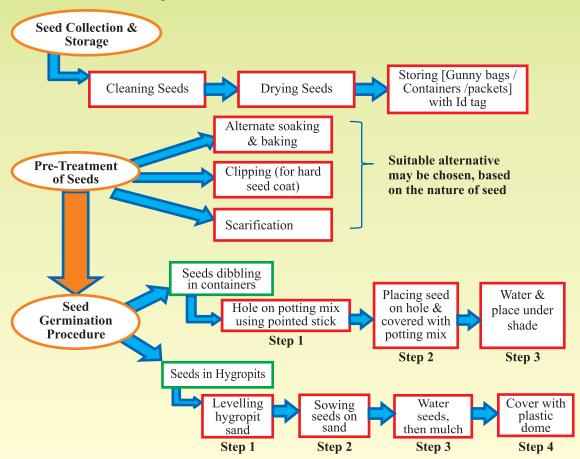




## **Operations Flow Chart of Root Trainer Nursery**

#### 1. Seed Handling Operations

The major operations include **Seed Collection & Storage**, **Pre treatment of Seed**, **Seed Germination Procedure**. The simplified Operation Flow Chart of these processes are shown below.



## 2. Composting Operations

Preparation of compost is one of the most vital operations in a container based nursery. Each of our nursery unit has a capacity of raising 2,00,000 seedlings or more. Therefore the requirement of compost for potting mix would be quite high.

For example, in a 300cc root trainer based nursery with 2,00,000 capacity the requirement of compost for one bulk of seedling (=2,00,000 seedling) is estimated below-

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Total root trainer volume for the bulk = 300 \text{ cc } x 2,00,000 = 6,00,00,000 \text{ cc}

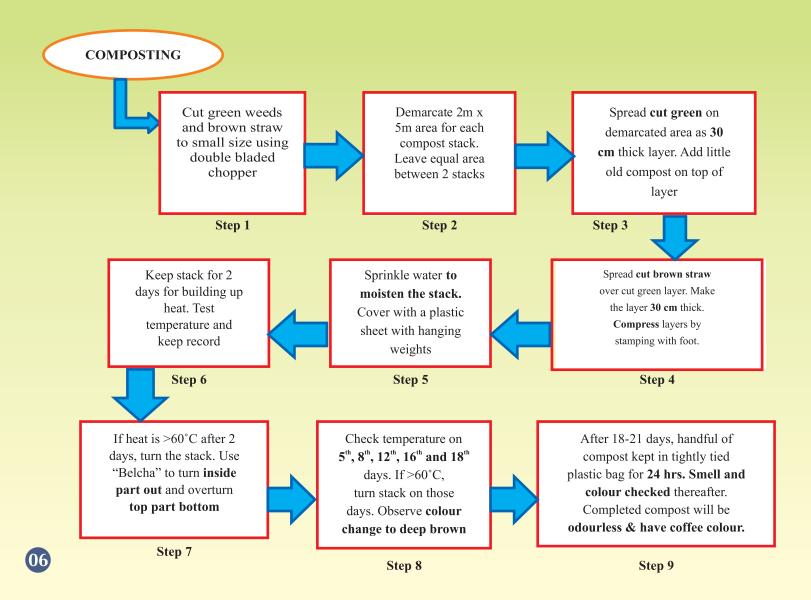
Potting mix considered – Sand 1 part : Compost 1 part

Compost required for 2,00,000 seedlings = 3,00,00,000 \text{ cc } [50\% \text{ potting mix}]

Add 10% handling loss = 3,30,00,000 \text{ cc } = 33 \text{ m}^3 [1 \text{ cc } = 0.000001 \text{ m}^3]
```

It should be remembered, for obtaining a final volume of 33 m<sup>3</sup> of compost, the starting volume should be at least 3 times the final volume. As per the estimation given in the box above, the starting volume of the composting material should be around 100 m<sup>3</sup>.

Because of the huge requirement of compost in the container based nurseries, composting should be a continuous process in a factory scale.

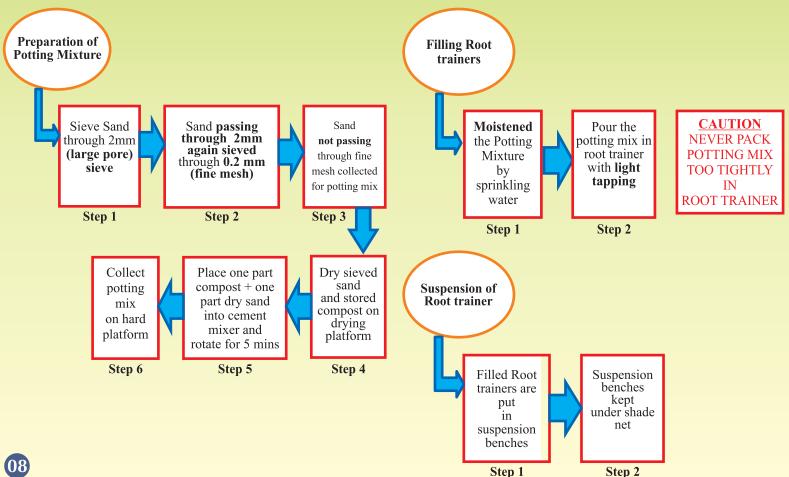


## **Important points to Remember in Composting:**

- 1. Smaller size of green weeds and straw will expedite decomposition.
- 2. Green materials used should be fibrous and not oily when rubbed between fingers.
- 3. The materials should be completely decomposed. Otherwise generation of Ammonia could damage the roots of plant.
- 4. Water content of compost is important. By pressing a handful of compost, if 1-2 drops of water ooze out, the moisture level is correct.
- 5. Checking temperature of stack, keeping record and <u>turning the stack as and when it crosses 60°C is very important</u>. For this purpose long laboratory thermometer may be used. On inserting hand up to elbow if the heat is unbearable, then it is certain that 60°C has been attained.
- 6. Compost should be stored in big plastic bags and the date of bagging should be tagged.

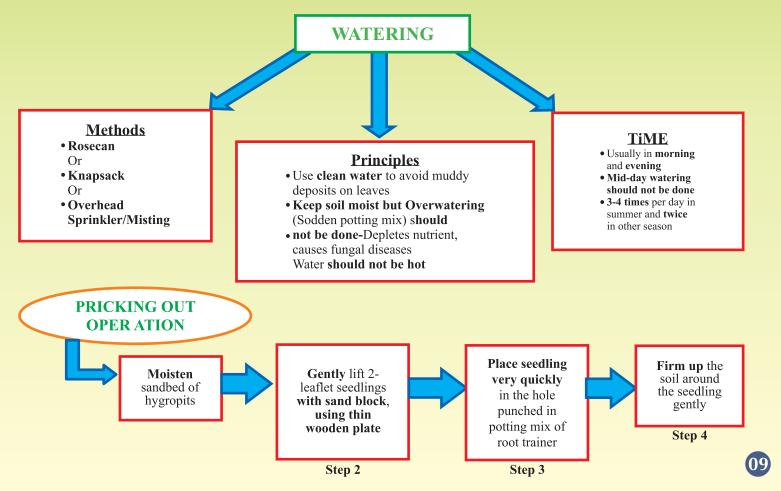
## 3. Container Preparation Operations

Preparation of containers for dibbling of seeds or planting of pricked seedlings involve few small but important operations—**Preparation of potting mixture**, Filling of Containers (Root Trainers) / **Suspension** in stands.



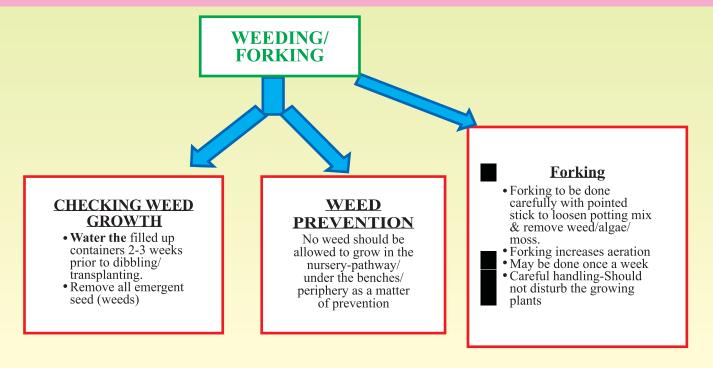
## 4. Tending Operations

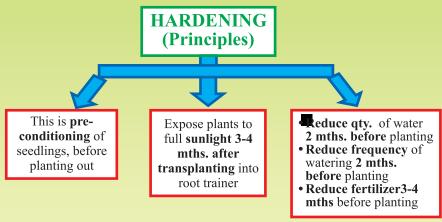
For raising healthy nursery stock the basic operations of tending are Watering, Pricking out, Forking and Weeding, Application of insecticide/Fungicide, Grading and Culling.



## **Important points to Remember for Pricking Out:**

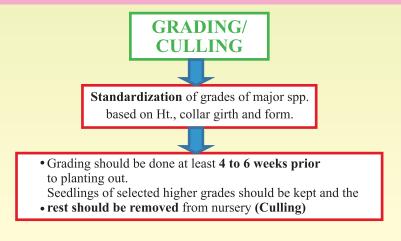
- 1. Hold the sprouted seedlings only by leaflet and not the stem or root. This may causedamage to the tender stem/root and cause infection.
- 2. The roots should not be exposed for long. Seedlings should be planted immediately after lifting. Seedlings should be placed in centre of root trainer.
- 3. Remember to punch a hole in the potting mix of root trainer prior to pricking.
- 4. Roots should not curl or bend while it is inserted in root trainer.





## **Important points to Remember for Hardening:**

- It reduces post planting mortality and helps quick establishment of plants.
- Expose the plants to full sunlight first and continue to apply water and fertilizer in the same qty and frequency.
- Reduce the water and fertilizer qty and frequency prior to planting (see above) to make them field hardy.



## 5. Nursery Maintenance-Job of the Nursery Manager

#### **Daily Checking by Nursery Supervisor**

- (i) cleanliness of nursery
- (ii) stock of seedlings
- (iii) important installations, viz: water supply, pump service, misting and watering system, shade nets composting, etc.

#### (I) Cleanliness of Nursery

- All the paths/inner roads and the space under the iron benches should be devoid of any weed or grass growth.
- Uncleaned root trainers with mud and muck should not be stored in the open in heaps. As soon as the root trainers are retrieved they should be washed in washing tank with hard brush, dried in shade (not in open sun), packed in gunny bags and kept in store. The nursery manager should make entry in stock register as to the number of root trainers of various sizes received back. Working implements viz: spade/fork/water can etc should be kept in store.

#### (ii) Stock of Seedlings

- Check the seedlings in growing area-specially fungus or insect or pest attack should be checked and any such attack detected should be noted and action taken.
- Any growth of moss in the root trainer medium should be forked out carefully.
- Stock register of seedlings should be maintained properly. This should show species wise stock in, stock out, stock culled and balance on any given day. [See Form 1 in Annexure].
- Stock display board should be revised every day based on stock position.

#### (iii) Checking of installations

- Water level in tank should be checked.
- Pump working –drawl and output-should be checked.
- The sprinkler/misting nozzles should be checked.
- Composting heaps should be checked and if the heap needs to be turned due to heat generated, it has to be done by engaging labourer.
- Shade nets should be checked and if it is torn or sagged should be repaired.

#### **Periodical Checking by Nursery Supervisor**

- (I) Once every month the growth in diameter and height should be recorded species wise. For this purpose random sampling from the stock may be done. [See Form 2 in Annexure].
- (ii) At least once a year the iron benches should be checked. As a matter of routine overhauling they may be painted with rust proof paint once a year and if needed welded/repaired.
- (iii) Root Trainer stock checking should be done at least twice a year-post plantation retrieval and prior to seedling raising.

## **ANNEXURE**

#### **FORM 1: Daily Stock Register of Nursery**

<u>Species</u>	
Month & Voor	

Date	Opening Balance	Stock Received	Stock Out	Stock culled	Balance stock (2)+(3)- (4)-(5	Initial of Nursery supervisor	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Note: (i) The register should be in a ledger format. Few pages should be earmarked for each species. All species should be accounted for.

(ii) The record should be updated daily and displayed in the Nursery Stock Display board.

## **FORM 2**: Record of Nursery Growth

Species		
Seed Source	Germination (in %)	
Date of direct sowing in root	t trainers (if applicable)	
Date of pricking out and fix	ing in root trainers (if applicable)	

Date	Bay no.	Seedling no.	Ht. in cm	Collar girth in cm	Avg. ht. in cm	Avg. collar girth in cm	Avg. ht gain since last reading	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						

Date	Bay no.	Seedling no.	Ht. in cm	Collar girth in cm	Avg. ht. in cm	Avg. collar girth in cm	Avg. ht gain since last reading	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		1						
		2						
		3						
		4						
		5						
		6						
		7						
		8						
		9						
		10						

Note: (i) Measurement should be done once a month, preferably on a fixed date.

(ii) The seedlings to be measured should be selected randomly, 10 nos. from each bay (of root trainers) and at least 3 bays, i.e; at least 30 seedlings.	
Average of height and collar girth should be calculated on the seedlings measured (at least 30 seedlings)	

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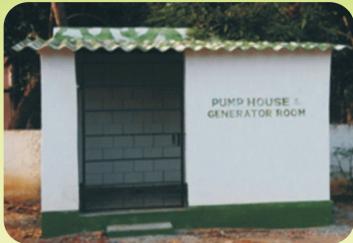
# Open Growing area





# Water source, storage and distribution system









# Storage system





**5** Shade house



# Germination Bed and Hygropit



# RAMP & Stacking of Root Trainer







# Seed Storage



# Two way-Sieving of sand









## Display Board of Differnt Central Nursery under WBFBC Project









### Display Board of Differnt Central Nursery under WBFBC Project









### Step by step method of composing













