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NURSERY TECHNIQUES  
IN SOCIAL FORESTRY

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## VITAL POINTS IN NURSERY TECHNIQUES

### Introduction

The success of any afforestation scheme depends largely on the quality of seeds, nursery techniques and the planting stock itself. Although direct seeding has given good results with some species in particular areas e.g. Acacia nilotica and Acacia senegal in the Sudan, Eucalyptus camaldulensis and Eucalyptus tereticornis in Katanga and Zambia and Azadirachta indica (neem) in Nigeria, afforestation by this method is extremely limited: The general practice is to plant stock raised in nurseries. All nursery operations are directed towards the production of healthy, vigorous plants. The paper reviews the existing nursery techniques and operations and highlights those relevant to social forestry practices.

### Choice of Nursery Site

Under the normal forest conditions, a nursery site should be located as near the planting site as is possible. There should be reliable supply of good quality water and the site should be well drained. A site with gentle slope may be preferred but not necessary when using polythene tube containers and once site has been selected, shelter (live fence) should be planted to protect the seedlings against wind. In social forestry, the emphasis is on the farm and consequently most of these requirements are limiting. Among the important factors that require consideration are good drainage and this can be achieved

through raised soil platform or intermixing the local soil with crushed murrum. The farm nursery should approximate those used in raising agricultural crop seedlings.

#### Preparation of Seedbeds

Seed germination beds may be constructed using timber planks, or bricks or concrete blocks. Unfortunately, all these have some expenses attached to them. While the important factor is sufficient drainage, this should be achieved in the cheapest way possible. Proposals have been made from experience that raised soil platforms can be guarded on the sides with rocks collected on the farm, at very little expense. To improve on the drainage, the raised soil should be overlaid on rough material such as broken stones. The top of the bed should however be firm and level as practicable.

#### Soil Mixture

The forest department in the past has developed a guide to the possible soil ingredients and amounts to use. For example in Muguga the following mixture, which is referred to as Muguga Standard Mixture has been adopted.

5 parts forest soil (top soil from local indigenous forest)

2 parts local peat (chopped into 0.5 cm to 1 cm chunks)

1 part clay (crushed to 0.5 cm crumbs)

- 1 part rotted compost manure
- 1 part crushed stones (0.5 cm).

To every cubic metre of the mixture 2 kg of NPK were added. Later the peat part was avoided and its place taken by compost manure. This indicates that depending on unavailability of one component changes are feasible. In social forestry these changes are inevitable and therefore the locally available ingredients including the cow dung manure and compost manure should be emphasised.

#### Nursery Containers

The nursery containers in use today varies from those holding 0.5 litres of soil to those of more than 20 litres. However the choice of the size of a container should basically be governed by the purpose for which the seedling is being raised. If the purpose is general planting at 20.30 cm of height the 0.5 litre container may suffice. On the other hand, the ceremonial trees which require to be of a big size thus taking upto 2 years in the nursery, a larger container is essential. The important fact to remember is that the large the size, the more expensive and justification of this cost is vital.

#### Sowing of Seeds and Pricking Out

Seeds should never be sown densely. Smaller sized seeds may be mixed with sand or partially crushed soil before broadcasting. A thin layer of soil may be spread

after broadcasting the seeds. The beds should be watered at least once a day and preferably in the evenings. Two to three weeks after germinating, the seedlings are pricked out into containers. This technique is time consuming and results in losses of seedlings through physical damage and fungal attack.

In social forestry, direct sowing into containers or open beds is recommended. This method unlike use of seedbed, requires a lot of seeds but is simpler and overall cheaper. For the small sized seeds, the use of a seedbed cannot be ruled out completely, whereas as in most of our indigenous species with large seeds, the direct sowing method is very applicable.

### Protection

Protection actually refers to elimination of animal interference on the seedling. In the normal forest station, this is quite easily achieved through fence and establishment of a live fence around the nursery. In the high potential areas, the nurseries are established on the cultivated part of the farm and thus well protected from animals.

The tricky part is in the arid and semi-arid areas where the main activity is pastoralism. However innovative ideas have cropped which are very effective in terms of

protection. The technique involves putting soil in a broken 'sufuria' or 'karai' and sowing the seeds. The container is hung up a tree where seedlings cannot be disturbed. Further the seedlings by virtual of hanging up a tree are shaded and at the time of planting out, can easily be transported upto the planting site. This reduces the time of exposure of the roots and therefore improves on the survival.

#### Shading

In the arid areas, seedbeds require full shade on top and sides to protect the bed from direct sun. After pricking out, the seedlings should be in full shade for 2-3 weeks, and half shade for a further week, after which no shade should be necessary. With some species, on certain sites, very light shade may be an advantage to plant growth, but it is felt that these rather special conditions are rarely met with. The practice of affording shade to growing plants in the nursery to reduce the necessity for watering in very dry weather is quite wrong as will be shown below.

#### Mulching on Seedling beds and Containers

Heavy mulch is more efficient and beneficial than shade in soil moisture conservation. During the dry periods of the year it is almost essential in many areas to add some

mulch to your beds and containers. This is more so where the seedling canopy is not closed and thus evaporation can take place directly from the soil surface. Many local products can be tried for this purpose - wood shavings, chopped leaves, chopped succulent grass etc. The best method is to cultivate your beds and containers first, and then literally spread the mulch between the rows of seedlings. With containers, small stones can be effectively used.

It will be observed even after 2-3 months, that the top layer of soil having been protected from the direct effect of watering, still remains loose. The layer of mulch can overflow the plant tray, as water will pass through the mulch quite easily. Experience has shown that this mulch greatly reduced the drying out of seedling beds and containers.

#### Watering

Seedlings must be watered twice a day, in the mornings and evenings. In some areas where evapo-transpiration is not too high like in the high altitude areas, watering once in the evenings may be adequate. Seedlings should not be watered during the hottest part of the day as this raises the mortality rate through induced evapo-transpiration. However an exception to this is during pricking out operation.



### Weeding

The top soil collected for use in the nursery contains huge quantities of weed seeds. Weeding in all nurseries in the country is manually done and can be labour intensive. As such weed seeds should be reduced before filling the soil into containers. One most effective way of doing this is to induce weed seed germination through watering to stimulate weed growth and then remixing the soil thus killing germinated weeds. This technique can be undertaken on the nursery site or on the collection site where soil is still being collected.

### Root Pruning

This is very essential for plants raised in boxes, Swaziland beds and polythene containers.

The main purpose of root pruning in container raised seedlings is to restrict the growth of tap roots. This encourages development of fibrous lateral roots as well as preventing the tap root from going deep into the soil. Root pruning may be done by cutting the roots with either a strong wire, sharp knife or by constantly moving or lifting the polythene tubes. Root pruning should be done once a month and should start one to one and half months after pricking out.

### Hardening off and Culling

A few weeks or months before field planting starts, seedlings should be hardened off. This means that the

quantity of water to each plant should be reduced to condition it to environment which is likely to encounter after planting. The reduction of must be done gradually though. Culling on the other hand means the separation of healthy vigorous plants from stunted, abnormal and weak ones. The objective here is to get the best seedlings to the field.

### Transport to Planting Sites

The plants should be thoroughly watered a night before transporting to the field. They should be carefully handled at the time of lifting in the nursery, during transportation and at the planting site. The transporting exercise should be undertaken early in the morning to ensure planting is done in the early morning hours. On the farm, if the planting site is secure from animals, it is also possible to transport seedlings in the evening and plant them the following day.

Polythene tubes must be removed at the time of planting.

### Selection of Species

In different areas, people have differing opinions about specific species and thus for one reason will opt to plant a given species instead of another. Consequently as an extension worker it is of paramount importance to try

to meet the people's requirement rather than going out with a well documented package for them. Actually people will be more responsive to an indigenous technique with the associated modification as opposed to imposed packages.