



Nursery Practices and Seedling Selection in Coconut

31/05/2014 12:02

Samsudeen, K., Niral, V., Ranjini, T. N. and Sudha, R.
ICAR- CPCRI, Kasargod

Introduction

Best quality coconut seedlings should be selected to start a plantation since the crop will be in the field for many years. The long life span and large capital outlay involved in establishing a coconut plantation, necessitates the selection of good quality seed nuts and seedlings, as a first step for the successful cultivation of the crop. If poor quality planting materials are used for planting, the new plantation can prove to be uneconomic, causing considerable loss of time and money to the grower. Therefore, selection of good quality seed nuts and seedlings is of great importance in the establishment of coconut plantations. Further, as coconut is cross pollinated, the palms do not breed true making the selection of seed nuts and seedlings more difficult and at the same time, important. It is possible to improve the quality of the planting materials through a series of selections at the various stages of seed and seedling production. The various aspects of nursery techniques and selection procedures are discussed in the this article.

Mother palm selection

For production of quality planting material, it is essential to have good quality mother palms of the desired varieties. In the absence of commercially viable vegetative propagation techniques, only seed propagation is possible. Therefore, mother palm selection is a key factor in planting material production of coconut. Trees growing near cattle sheds, wells and other favored conditions should be avoided, as their true genetic potential may be masked because of favorable environment.

Mother palms should be aged 22 years or more since it will be necessary to observe their yield for at least 10 years after stabilization of yield. From young seed gardens, seed nuts can be collected irrespective of the age of the mother palms, since only high yielding palms with known genetic potential are maintained in the seed gardens. (Patel, 1938).

Collection and Storage of nuts

Seed nuts can be collected throughout the year.

However, it is preferable to collect seed nuts during the period from January to May in the West Coast region, so that sowing can be taken up with the onset of south west monsoon. In the East Coast, seed nuts are collected during the period from May to September and are sown during October–November with the onset of north east monsoon. Fully matured nuts i.e. about 12 months old should be harvested. Care should be taken not to damage the seed nuts while harvesting. Nuts which are too big or too small in the bunch and also the nuts of irregular shape and size should be discarded. Seed nuts of tall varieties are to be sown 2-3 months after collection, whereas dwarfs should be sown within 15-30 days after harvest (Liyana, 1950). For storing, arrange the seed nuts with the stalk-end up over an 8 cm layer of sand in a shed and cover with sand to prevent drying of nut water. The nuts can also be stored in plots, provided the soil is sandy and the ground is sufficiently shaded. (John and Narayana, 1942).

The important feature of a good motherpalm

- | |
|---|
| a) Regular bearer, |
| b) Straight stout trunk with even growth and closely spaced leaf scars, |
| c) Spherical or semi-spherical crown with short fronds, |
| d) Short and stout inflorescence stalk with bunches, preferably resting on the leaf petioles of the lower whorl, |
| e) More than 30 leaves and 12 inflorescences carried evenly on the crown, |
| f) Inflorescence with 25 or more female flowers, |
| g) Consistent high nut yield (about 70 to 80 nuts/annum under rainfed conditions or 100-120 nuts under irrigated conditions), |
| g) More than 150g copra per nut, |
| h) Absence of disease and pest incidence. |

Nursery site selection

A good nursery should be open, level and well-drained have loose or slightly textured soil to facilitate nursery operations. It should have a good source of water for irrigation, proper shade and accessible to transportation. It should be far from potential sources of coconut insect pests and diseases. A fence for security, a shed for implements and supplies and trained manpower are the other requirements for a coconut nursery.

a. Soil: Coconut is adapted to a wide range of soil types from coarse sand to deep soils. However, well-drained friable sandy, sandy loam/loam soils are best suited for coconut nursery due to the relative

ease in removing the seedlings from the nursery. In laterite soils, sand has to be applied to the nursery beds. Heavy/clayey soils and waterlogged soils are to be avoided. The ideal soil pH ranges from 5.5 to 7.0 and the seedlings are tolerant to a pH range from 4.5 to 8.5. Under irrigation, coconut seedlings tolerate saline and alkaline soils.

b. Climate: Coconut palms are cultivated in humid regions lying between latitude 27°N and 27°S. They are well adapted to full sunlight. However, the nursery area is to be preferably shaded to get good quality seedlings without sun scorch. The optimum temperature range for better growth of seedlings is from 21°C to 35°C. Though coconut can withstand temperatures beyond this range, the growth, development and yield will be affected. Coconut palms are well adapted to areas receiving an annual rainfall ranging from 600mm to 4000mm. Seedlings can be produced at an altitude ranging from sea level to an elevation 800m above mean sea level.

c. Water Source: A perennial source of water is required for maintenance of coconut palms and irrigation is essential for obtaining good coconut yield. Further, the nursery has to be irrigated regularly for production of planting material. Sprinkler/ micro jet sprinkler/hose irrigation systems are well suited for irrigating coconut nurseries.

d. Nursery Structures: Nursery can be raised in the interspaces of the coconut plantation. The nursery area is to be provided with shade using 50-75% shade net if the nursery area is in an open space. About 120m² area would be required to sow 1000 nuts in flat or raised beds whereas larger area of 200m² would be required to maintain 1000 poly bag coconut seedlings.

Seedling Production:

a. Time of sowing: The time of sowing seed nuts in the nursery will vary depending on the location (agro-climatic zone) and the monsoon. The most appropriate time for sowing seed nuts in the West Coast region is May-June. However, seed nuts can be sown all round the year under favorable climatic conditions and good irrigation facilities.

b. Nursery bed preparation: Seedbeds should be prepared in an area having loose and well-drained soil. Raised beds of 10-20 cm height are made to provide good drainage. Seedbeds are generally of 1m width and convenient length with 75cm space between beds. The seedbeds should be drenched with Chlorpyrifos @ 0.05% before sowing of seed

nuts, in areas having termite problem. To prevent bud rot in seedlings, the nursery can be drenched with 1% Bordeaux mixture, in bud rot endemic areas.

c. Sowing of nuts: Plant the seed nuts at a spacing of 30 cm (between rows) x 30 cm (between nuts) with four or five rows per bed. The nuts may be planted either horizontally with the widest of the segments at the top or vertically with stalk-end up. While sowing vertically, set the nuts firmly in either upright or slightly tilted position with the germ end at the top. Then cover them with soil, with about 2/3 of their size buried or plant the seed nuts in the beds in trenches 25-30 cm deep and cover with soil so that top portion of husk alone is visible. Keep a record file and a sign board placed in front of each bed indicating the: name of variety/type sown, date of sowing, number of nuts sown, seedbed number and date of harvest.

d. Irrigation: The seed beds should be irrigated regularly to ensure that the soil is moist. After sowing, the seed beds should be irrigated thoroughly to saturation levels and repeated as frequently as necessary. During summer months, the beds may be irrigated on alternate days. Irrigation can be provided through hose/micro sprinklers.

e. Mulching: The seed beds can be covered with suitable mulch (coconut leaves, straw or green leaves etc.) to conserve moisture and check the weed growth.

f. Weeding: The nursery should be kept free of weeds to allow good growth of the seedlings.

g. Management: A record should be maintained indicating the name of variety sown, date of sowing, number of nuts sown, seedbed number and date of seed nut harvest. A signboard should be placed preferably in front of each bed indicating the name of variety sown along with the date of sowing.

Seed nuts of tall varieties begin germination within 60-130 days after sowing and seed nuts of dwarf varieties germinate 30-95 days after sowing. Generally, germination is recorded till the fifth month of sowing and a good seed lot will give 80 to 90% germination. Seed nuts that do not germinate within 5 months after sowing as well as those with dead sprouts can be removed from the nursery. Such rejected seed nuts can be used for production of copra.

Chemical fertilizers need not be applied

to the seedlings in the nursery since the seedlings are usually nourished by the endosperm. Moreover, application of chemical fertilizers can mask the true genetic potential of seedlings, making the selection of genetically superior seedlings difficult.

Poly bag seedling production

Poly bag nursery can be adopted for producing more vigorous seedlings with better root system. Compared to the nursery in the field, watering, weeding and roguing operations for the elimination of unwanted seedlings are easier in poly bag nursery. The seedlings can be raised in black polythene bags (500-gauge thickness) of 60 cm x 45 cm size for bigger nuts and 45 cm x 45 cm for smaller nuts. The bottom of the bags is to be provided with 8-10 holes for draining the excess water. To fill 100 bags, around 2-2.5m³ of potting mixture will be required. The commonly recommended potting media are top soil mixed with sand in 3:1 ratio or fertile top soil, sand and well rotten and powdered cattle manure/vermicompost in the ratio of 3:1:1. Red earth, well rotten and powdered cattle manure/vermicompost and sand in 1:1:1 ratio can also be used. Fertilizers can be applied in the poly bags @ 20g ammonium sulphate and 25g muriate of potash per bag after two months of germination and 45g of ammonium sulphate and 45g of muriate of potash per bag after four months of germination. Seedlings are to be watered after application of fertilizers.

In order to produce poly bag seedlings, the seed nuts are initially sown very closely and allowed to germinate in a pre nursery bed. The germinated nuts are picked out from nursery once in a week, until 80% of nuts have germinated or up to 5 months from sowing, whichever is earlier.

The germinated nuts are placed in half filled poly bags with the sprout positioned upwards in the centre of the bag and sufficient potting mixture is added to fill the bags up to two-third portion and the sides slightly pressed to keep the nut firm.

Important diseases/pests and their management

There are no serious pest and diseases in coconut nurseries. However, bud rot affected seedlings are to be avoided for



planting.

Bud rot: The fungus, *Phytophthora palmivora*, causes this disease. The symptoms are yellowing and withering of the spindle leaf followed by drying and death of the seedlings. The spindle of the affected seedlings will easily come out with a gentle pull and rotting can be seen in the lower end of the detached leaf. The affected portion emits a foul smell. Though it is not a major problem in coconut nurseries, the affected seedlings are to be removed and the surrounding seedlings treated with 1% Bordeaux mixture.

Scale insect (*Aspidiotus destructor*): The characteristic symptom is yellowing of leaves and presence of scale insect underneath the leaves. Though the insects do not pose serious threat to the seedlings, this can be controlled by drenching the nursery with Dimethoate @ 0.05% to ensure good quality and healthy foliage of seedlings.

Termite: Drying of the sprouts and leaves are the symptoms of termite damage in the nursery. Drenching the nursery with Chlorpyrifos @ 0.05% will control the termites.

White grub (*Leucopholis coneophora*): This occurs mainly in sandy soils. The characteristic symptom is yellowing of leaves followed by drying of leaves and death of the seedlings due to severe root damage. This can be controlled by application of Phorate 10 G @ 15g/seedling.

Selection of seedlings

Remove seed nuts, which do not germinate within 6 months after sowing as well as those with dead sprouts. Select only good quality seedlings (9-12 months old) by a rigorous selection based on the following characteristics.

- | |
|--|
| 1. Early germination, rapid growth and seedling vigour. |
| 2. Six to eight leaves for 10-12 month old seedlings and at least four leaves for 9-month-old seedlings. |
| 3. Collar girth of 10-12 cm. |
| 4. Early splitting of leaves. 1. (Jack and Sands, 1929 and Liyanage, 1955) |

Since early germination is one of the criteria for the selection of seedlings, the storing and sowing of seed nuts should be in lots according to the harvest and should not be bulked.

Removal and transportation of seedlings

Seedlings should be removed from the nursery by lifting with a spade. Seedlings should never be

Poly bag nursery can be adopted for producing more vigorous seedlings with better root system. Compared to the nursery in the field, watering, weeding and roguing operations for the elimination of unwanted seedlings are easier in poly bag nursery.

lifted from the soil by pulling the leaves or petiole. The seedlings should be planted as early as possible after removal from the nursery. The seedlings can be kept for about four weeks under careful storage after removal from the nursery. In such cases, the seedlings should be kept under shade and also watered.

Seedlings can be compactly packed and transported. For very long distance transportation, special care should be taken to pack the seedlings in moss/coir pith/other moisture retaining material. Poly bag seedlings can be transported as such and planted directly in the field, after cutting and removal of the base of the poly bag to facilitate growth of roots.

References

Chowdappa P., Niral V., Jerard B.A. and Samsudeen K. (Eds.) (2017) *Coconut*. Daya Publishing House, A Division of Astral International Pvt. Ltd. New Delhi, India. 440p.

Chowdappa, P., K. Samsudeen, C. Thamban and M.K. Rajesh (Eds.) (2016). *Planting material production in coconut. Today and Tomorrows Printers and Publishers, New Delhi, India. 130p.*

Jack, H.W and Sands, W.N. (1929). *Observations of the dwarf coconut palm in Malaya. Malay Agric J, 17:140-170.*

John, C. M and Narayana, G-V.1942. *A simple method of preserving seed coconuts. Madras Agric. J.30: 148-49.*

Liyanage D.V. (1950). *Sex life of the coconut palm. Ceylon Coconut Quarterly 11(2): 33 - 35.*

Liyanage, D.V. (1955). *Planting material for coconuts. Paper presented at the coconut conference, 29th August Bandirippuwa Estate, Lunuwila Coconut Research Institute, Ceylon.*

Patel, J.S. (1938) *The coconut: a monograph. Government Press, Madras, p 311*