POLYBAG NURSERY FOR PRODUCTION OF VIGOROUS SEEDLINGS IN COCONUT

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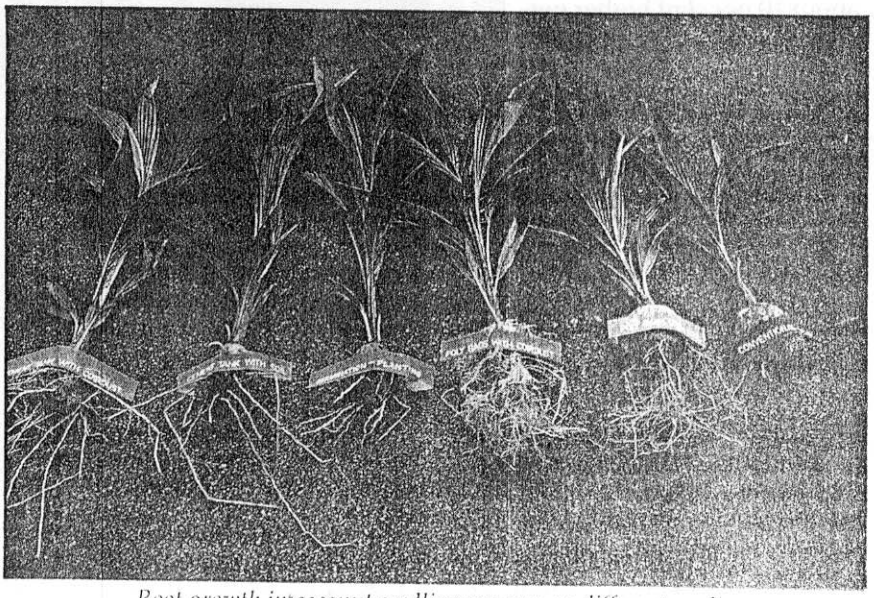
Introduction

In coconut, seedling vigour is highly correlated with adult palm characters such as early flowering, nut yield and copra production (Liyanage and Abeywardena, 1957). Therefore, raising coconut seedlings under careful maintenance is indispensable for selection of vigorous seedlings. In a conventional nursery, seed nuts are sown in beds at a spacing of 45cm between rows and 15cm within row and remain there for about 12 months until seedlings are selected for field planting. Raising of coconut seedlings in polybags was introduced in 1969 in the Ivory Coast (Wuidart, 1981), superseding the technique of field nurseries and is now popular in major coconut growing countries except India.

Polybag nursery is preferred over the conventional field nursery because of many advantages such as reduced transplanting shock at field due to the absence of root damage (Wuidart, 1981), and ease of irrigation and fertilizer application in the bag. The improved water holding capacity of the potting medium would also help to maintain required moisture for early germination. Apart from these, the polybag nursery receives intensive care and management of individual seedlings which helps to produce vigorous seedlings with better root system resulting in better establishment and earlier bearing (Wuidart, 1981). At CPCRI, while studying the different methods of sowing in coconut nursery,



Root growth in coconut seedlings grown on different media

more number of roots (16/seedling) and better root growth were recorded in polybags (Fig.1) compared to conventional method of sowing (6.75/seedling). The dry matter accumulation was 583 g/seedling in polybag seedlings compared to 559 g/seedling in conventional method at one years age (CPCRI, Unpublished data).

However, this technique has certain drawbacks, unless seedlings are raised in close proximity to the planting site the cost of transportation would be more. Besides, the extra labour for filling bags and material costs are the major constraints in the polybag nursery system.

Technique of raising polybag nursery

Selection of site:

The nursery must be located near a dependable water source to facilitate satisfactory irrigation throughout the year. Moreover, to reduce the transportation cost, it should be near the site of field planting. The land should be generally flat. It is to be weeded, levelled and top soil compacted. About 25,000 seedlings can be accommodated in one hectare nursery area at a spacing of 60x60cm.

Filling the bags and sowing

The bags are made of black polyethylene of 500 guage thickness and 60x40cm size for bigger nuts and 40x40cm for smaller nuts. The bottom portion of bag should be provided with 8 to 10 holes for draining excess water.

Polybags of the above sizes usually take in about 13-16 kg top soil for filling two-third portion of the bag. The commonly recommended media are top soil mixed with sand in the ratio of 3:1, loose friable soil, river sand in combination with cattle manure and coir dust and

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soil and compost mixture in 1:1 ratio. Decomposed saw dust, corn cobs, rice hull or similar organic materials can also be used. At CPCRI, using of coir dust as potting mixture in cement tanks and polybags was found to give about 10 per cent higher germination and 1 or 2 more number of leaves per seedling besides increasing the girth of seedling compared to conventional method of sowing (CPCRI, unpublished data).

In the conventional nursery system there should be more than 80 per cent germination in 20 weeks with optimum management and seed nuts that do not germinate by then are discarded as failures (Harries, 1983). In polybag system, seed nuts are allowed to germinate in a pre-nursery bed, sown very closely and transplanted in polybags when the sprouts are 8-10cm long. The germinated nuts are picked out from the nursery once a week until 80 per cent of nuts are germinated or upto 5 months from sowing whichever is earlier. The germinated nut is placed in the half filled bags with the sprout planted vertically in the center of the bag and enough potting mixture is added to fill the bag upto two-third portion and the sides slightly pressed to keep the nut firm so that it is not bared during watering (Fig.2). Care must be taken not to cover the collar of the young seedling. The seednuts may be dipped in carbaryl 0.2 per cent solution prior to planting as precaution against termite attack.

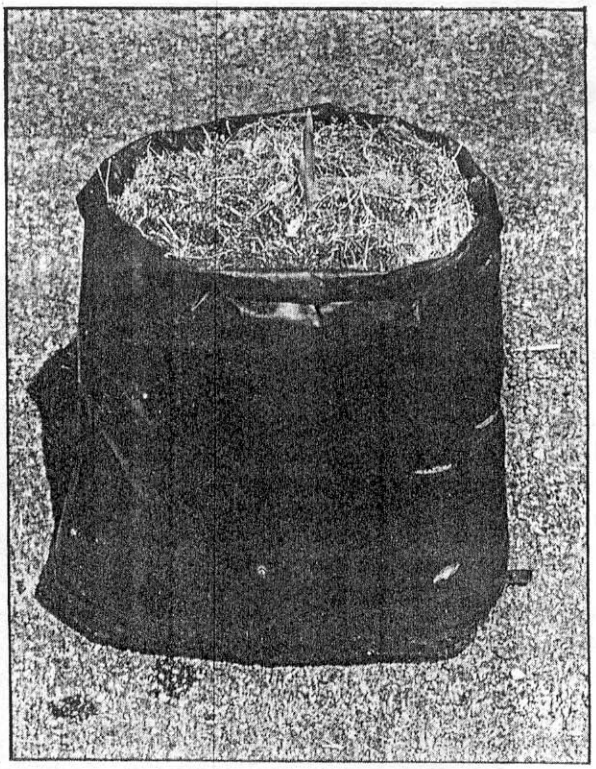

Fig. 2. Filled polybag with coirdust

Laying out of polybag nursery:

The size and lay-out on the land depends on the irrigation system adopted and spacing of bags. Spacing of the bags, mainly depends on the time the seedlings are to remain in the nursery. The size of the polybag nursery bed can be 3x6m with about 1.5m spacing between beds. Each bed can accommodate 115 seedlings and these bags are arranged in a triangular manner with 60cm space between bags.

Maintenance:

Irrigation:

Regular watering of the polybag nursery is very important to ensure proper growth of seedlings. The frequency of watering should be adjusted depending upon rainfall and other weather conditions, age of the seedlings and type of potting mixture used. Irrigation may be required every alternate day during the summer months on the west coast. Several irrigation systems are available, and the choice must take various factors like ease of use, size of nursery, movement between the seedlings and capital investment into consideration. Sprinkler irrigation is preferable for larger nurseries. In smaller nurseries, hose irrigation is commonly practiced (Fig.3). However, care must be taken not to wash the medium out of the bag.

Fig. 3. Polybags irrigating with hose

Weeding:

Weeds adversely affect the growth of seedlings and therefore, it is essential to have weed-free nursery and also keep the surroundings clean by controlling the weeds as and when required.

Fertilization:

The coconut has considerable reserves of essential plant nutrients in its nut. However, the roots are capable of absorbing the nutrients one month after their initiation and therefore benefit from fertilizer application. Thus, an optimum fertilizer schedule to derive the best benefit from substrate in polybags is worthy of further investigation. At the moment, application of 20g ammonium sulphate and 25g potassium chloride after 2 months of germination and 45g ammonium sulphate and 45g potassium chloride after 4 months of germination per bag as recommended in Indonesia may be adopted (Ratnambal, 1995). The fertilizer is spread around the seedlings and forked into the medium. The polybag must be watered on the same day.

Plant Protection:

Careful inspection is a must for detecting the incidence of pests and diseases in the nursery and suitable plant protection measures are to be taken up as soon as insect/ disease symptoms are noticed.

Ants and termites: The medium around the nut is to be treated with chlordane 5 per cent dust in the bags.

Scales and mealy bugs: Spray dimethoate 0.05 percent on the under surface of the leaves.

Mites: Spray dicofol or dimethoate 0.05 per cent on the under surface of the leaves.

Leaf-defoliators: The whole foliage is to be sprayed with carbaryl @ 20g in 15 litres of water.

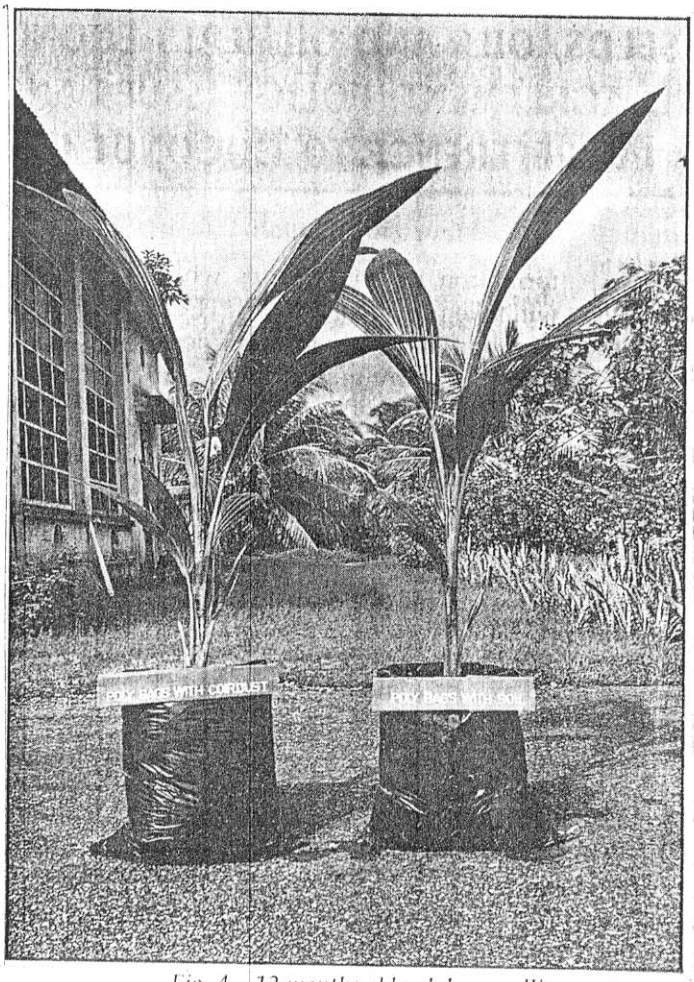

Fig. 4. 12 months old polybag seedling

Fungal diseases: The most widespread fungal diseases are leaf spots caused by *Helminthosporium, Pestalotia and Colletotrichum* and bud-rot caused by *Phytopthera.* In areas where there is a risk of attack, preventive treatments should be given twice a month, spraying both sides of the leaves with a solution of Bordeaux mixture (1 per cent) or Indofil - M45 (0.3%). To back up the treatment, severely infected leaves can be removed and burnt to avoid dissemination of spores.

Preparation of plants for field planting

The selected seedlings (10-12 months old; Fig.4) should be prepared on the eve of their transport to the field for planting. They are abundantly watered to ensure a moisture reserve, handled with care to avoid baring them or tearing the bag. If the roots have grown through the bag, they must be cut before being moved from the nursery. The plant should not be held at the collar, which will unearth it. There is also a scope for introduction of bio-fertilizers like VAM (Vesicular arbuscular mycorrhizae) and phosphate solubilizers in the polybag before field planting for better establishment of organisms.

Summary

The polybag nursery in coconut is agronomically a step forward, providing well developed and vigorous seedlings with excellent rooting. The seedlings may be costlier than the seedlings from the field nurseries, but this is amply compensated by the vigorous seedlings with reduced root damage and absence of transplanting shock, resulting in quicker establishment and early flowering.

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