The Use of Polythene Bags in the Coconut Nursery

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Using polythene bags for seedlings in nurseries for oil palm, cocoa and coffee has been common practice for some years, but the practice has not been adopted for coconuts, presumably because the nut was considered too large. Work done by Foale in the British Solomons prompted further work at the Agricultural Station at Keravat in New Britain.

MOST of the advantages of the polybag system come from the fact that the plant can be left to develop in the bag to a much bigger size than it could be in the nursery. Transplanting is always a time of setback for the young plant and the later it is, the more serious is the setback. Growers may choose to plant out at the 2 to 4 leaf stage, to minimize this setback. Planting at a later stage means that the root system is much more fully developed and suffers greater damage on transplanting. With the bag system, the roots are not damaged at all in transplanting, as the soil surrounding the roots is transplanted as well and the plant is less disturbed.

A further advantage of planting out at a later stage lies in lower field maintenance costs. Seedlings planted out at, say, 3 months, suffer severe competition from weeds, and the Department's recommendation is therefore that the ground should be clean-weeded around the palms until they are at least 18 months old. The longer the seedling remains in the bag, the shorter will be the time it needs weeding in the field.

In many ways the delay in planting out gives better control over the young plants. If there is a dry spell, it is possible to hand-water in the nursery, but this is not practicable once the plants are out in the field. The same argument applies to the application of fertilizer. It is much less trouble to do it while the plants are still in the nursery.

If the soil on the site of the nursery is not satisfactory, soil may be obtained from any other source. Under normal nursery practice, there is always the danger of a build-up of pests and diseases in the soil. With the use of polybags, the soil is planted out with the seedling, so there is no opportunity for such a pest development. The closer proximity of the plants in the polybags in the nursery may mean that a disease, once introduced, is more easily transmitted than in the field, but it is also much easier to apply control measures if the seedlings are close together.

A further advantage of the later planting time is that a better selection of plants can be made. Under the normal nursery practice, seedlings are planted out at the 4 to 6 leaf stage so selection of seedlings must be made at that time. If final selection can be delayed until a later stage, the chance of making a better choice is increased.

The only obvious disadvantage of the polybag system is the cost of the bag, but this is more than compensated for by the reduction of labour costs for weeding. The bag must be a thick durable plastic, and because of the size of the coconut, it must be at least 15 in wide and 20 in high. Such a bag holds about 40 lb of soil, so the plastic needs to be strong. It also needs to withstand weathering in the field, so a light-weight plastic is not satisfactory. Plastic of 500 gauge is necessary. Black plastic is more durable than clear, because of its resistance to ultra-violet light.

A bag that is 15 in wide when empty is 9 in in diameter when filled with soil. It is more convenient to germinate the nut in a vertical position instead of the usual horizontal position.

Trial at Keravat

In the trial at Keravat, the treatments were—

1. Nuts horizontal, 2-leaf transplant—Normal nursery practice.
2. Nuts horizontal, 7-leaf transplant—Normal nursery practice.

Plate 1.—Seedling palms about 11 months old in polybags

3. Nuts upright, 2-leaf transplant—Normal nursery practice.
4. Nuts upright, 7-leaf transplant—Normal nursery practice.
5. Nuts in small polybags transplanted at the age of 11½ months.
6. Nuts in large polybags transplanted at the age of 14 months.

The sizes of the bags were 15 in x 20 in and 18 in x 24 in.

These treatments allowed the following comparisons to be made:—

A. Between nursery transplanted seedlings and polybag seedlings.
B. Between seedling transplants at 2-leaf and 7-leaf stages.
C. Between nuts placed horizontally and vertically.
D. Between large and small bags.
E. Between nuts transplanted and remaining in the nursery.
F. The effectiveness of seedling selection at 2-leaf and 7-leaf stage.

Results

1. Four months after transplanting the last treatment, there was no significant difference in height between any of the six treatments.

2. There was a transplanting shock suffered by seedlings at both the 2-leaf and 7-leaf stages, this being greater at the 7-leaf stage, but after 18 months there was no significant difference in development between the treatments.

3. There was no difference between nuts planted horizontally or vertically.

4. Seedlings selected at the 2-leaf stage showed a greater degree of variability in height (due to poorer selection), particularly with regard to more slowly growing plants.

This was offset, however, by the fact that transplanting at the 7-leaf stage apparently made plants more susceptible to disease and to waterlogging, resulting in more deaths after transplanting.

5. There was much greater early development of roots in the polybag nursery compared with the field nursery.

6. Small polybags were quite effective for up to $11\frac{1}{2}$ months, the larger bags being useful for a somewhat longer period.

7. Field maintenance costs were reduced by the later planting out.

Practical Details

Selected seed nuts are placed in an upright position in a pre-nursery and allowed to germinate. When the developing shoot is about 8 to 12 inches high, a selection of all the healthy and vigorous seedlings is made and these are transplanted to polybags. At this stage virtually no roots will have emerged through the husk. A further selection can be made after about 3 weeks and any reject seedlings should then be destroyed. Generally about 60 per cent of the nuts are selected for planting in the polybag nursery.

The bag is first filled with a good loam and the nut, surrounded by soil, fills the upper half of the bag. The lower half of the bag has drainage holes $\frac{1}{4}$ in in diameter and about 2 in apart. The surface of the soil should be covered with mulch to reduce loss of moisture. Even with this mulch, moisture is lost from the polybag more easily than from the normal nursery bed, so the seedlings should be watered during dry periods. Fertilizer should be added after 5 months to maintain vigorous growth. Mulch should be replaced as required and all weeds should be removed promptly.

Plate II.—Seedling palms germinated in polybags show greater development of roots, and no loss of roots during transplanting

Planting Out

When the plants are ready for transplanting at 9 to 11 months, a final selection can be made and any slow-growing seedlings rejected. A hole is dug, just large enough to take the seedling with its soil. The bottom of the bag is cut off with a knife, removing the bottom inch of soil also, with the matted roots at the bottom of the bag. The plant with its soil is then placed in the hole and the bag is slit and peeled off. Planting out should be done during overcast conditions while the soil is still damp from previous rain.

Availability of Bags

These polybags are the same as those used in oil palm nurseries. They are available from local commercial suppliers, as well as from overseas firms.

Quarantine Booklet

The last thing we want to do in Papua New Guinea is to import other people's troubles; we have enough of our own. So we don't want Foot and Mouth Disease, or Swine Fever, or Rice Blast, or Tea Blister Blight, or Blue Mould of Tobacco. We didn't want Coffee Rust either, but somehow it got in. Thanks to prompt action by DASF staff, it was eradicated before it had spead very far. It it had reached the main coffee growing areas of the highlands we would have had a major economic crisis.

Nobody deliberately intends to bring in these diseases, but it is easy to do it in all innocence. So DASF has recently issued a booklet entitled *Animal and Plant Quarantine in Papua New Guinea—A Guide for Importers*. It gives a brief outline of quarantine regulations concerning specific plants and animals, including timber, straw packing and animal products such as lard and bristles.

The booklet indicates which items may be imported without restriction, which require a permit, and which are totally prohibited. Conditions surrounding the issue of permits are given.

Copies of the booklet may be obtained from DASF offices at each district headquarters, from all DASF Quarantine Officers, and from the Collector of Customs in each port throughout Papua New Guinea. In Port Moresby copies are also available at Jackson's Airport (DASF Quarantine Officer) and at DASF Headquarters, Konedobu from the reception desk.