Cocoa Planting Techniques

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Over recent years it has become common practice to use plastic bags for the germination of seedlings in the nursery. In the Gazelle Peninsula the plastic bags give the added advantage of protection from the Giant Snail. Germination in the bag, however, causes a distortion of the roots which may be a severe disadvantage.

A study of the use of plastic bags in cocoa nurseries was made by John Kouta Konimor, a final year student at Vudal Agricultural College.

MOST agricultural extension officers recommend the use of plastic bags for cocoa at the nursery stage, especially in the Gazelle Peninsula, where the Giant Snail (*Achatina fulica*) causes extra trouble in nursery practice. At the time of planting out in the field the bottom of the plastic bag is cut off and the entire contents, seedling and soil, are placed into the prepared hole. The soil around the roots is not disturbed so the roots are not damaged during the transplanting. Because of this lessening of transplanting shock, it is possible to transplant when the seedling is older. At the later time it is easier to select the best plants and weed out those showing poor growth. The later time of transplanting also means a reduction in field maintenance costs. If a seedling is planted out in the field at an early stage it will be greatly in danger of being smothered by weeds. So clean-weeding will be necessary until the seedling has become well established. If transplanting is delayed, it will be a shorter time before the need for weeding is past.

In spite of these advantages however, the root system of the cocoa tree does not always establish well since the bag inhibits its growth. This is not immediately apparent but it is noticeable that trees aged 2 to 4 years which started life in bags are more likely to fall down during high winds or earthquakes than trees grown from seeds planted at stake. The distortion of roots caused by the bags probably gives rise to points of weakness in the root system.

To test this theory an area of approximately ¼ acre was divided into two halves.

In one half cocoa seeds were planted out at stake, the spacing being 6ft on the triangle. At the same time a large number of seeds were planted in plastic bags in the nursery.

After 3 months 12 seedlings were transplanted from the plastic bags into the second half of the area. At the same time 12 seedlings planted in the field and 12 seedlings from the bags were pulled up and examined for root straightness. These seedlings were not replanted.

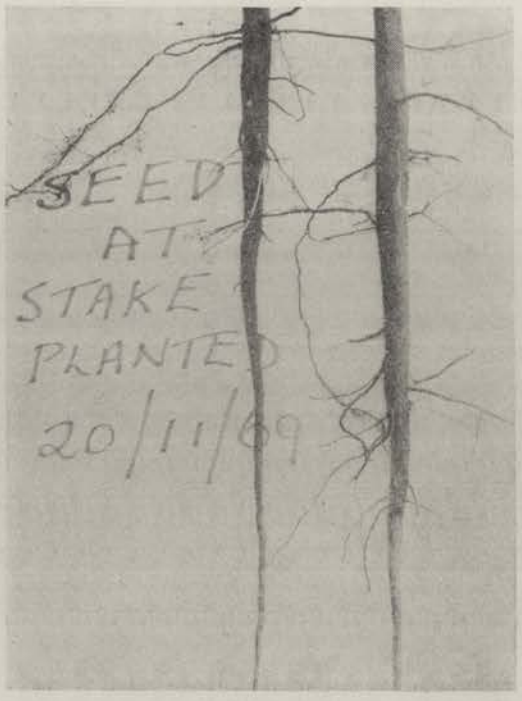

Plate I.—Seed planted at stake in the field—development of roots 8 months after planting

*At Vudal Agricultural College, each final year student has his own research project. Much useful information comes to light through these. This is the first of these reports to be published in *Harvest*. Others will appear from time to time. Mr Konimor is now at Mosa Plantation, West New Britain.

Table 1.—Root distortion after 8 months

	Root Condition							
	Straight		Slightly Twisted		Badly Twisted		Average Height of Plant Above Ground	Average Depth of Roots
	No.	per cent	No.	per cent	No.	per cent	Inches	Inches
Planted at stake	38	82	6	12	3	6	26.1	38.4
Transplanted from plastic bag								
5.2.1970	—	—	4	33	8	67	27.6	21.8
2.3.1970	—	—	1	8	11	92	26.4	19.9
6.4.1970	—	—	2	16	10	84	25.8	19.5
5.5.1970	—	—	1	8	11	92	25.6	17.4

These practices were repeated at 4, 5 and 6 months after the initial planting. At 8 months all the seedlings were pulled up and examined for root straightness.

The photographs and table give the results of the trials.

The photographs were all taken 8 months after the trial commenced. They show the straight roots of the seedlings planted at stake in the field and the distorted roots of those transplanted from plastic bags. *Table* 1 gives the final results after 8 months.

Of the plants grown from seeds planted out directly in the field 82 per cent had straight roots, 12 per cent had slightly twisted roots and 6 per cent had badly twisted roots. By contrast, there were no straight roots amongst the seedlings transplanted from plastic bags and more than two-thirds of the seedlings had roots which were badly twisted.

The twisted root system did not seem to affect the height of the plant above ground after 8 months but it certainly did affect the depth of the roots. The straight roots penetrated to an average depth of 38.4 inches whereas the twisted roots reached only to about half that depth. Thus the seedlings grown from direct planting of seed have deeper, stronger tap roots and thus are better able to absorb water and nutrients from the soil and are better able to stand against a high wind or during an earthquake.

Before a decision is made to use plastic bags therefore, the disadvantages shown up by the project should be weighed against the advantages mentioned earlier.

Plate II.—Development of roots in an 8-months old seedling—transplanted after 3 months in a plastic bag with a subsequent 5 months in the field

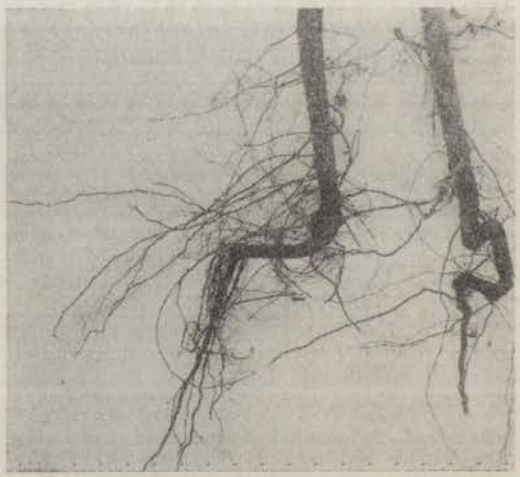

Plate III.—Development of roots in an 8-months old seedling transplanted after 6 months in a plastic bag with a subsequent period of 2 months in the field