GROWTH OF SINGLE AND MULTINODAL CUTTINGS OF TEA UNDER POLYETHYLENE

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INTRODUCTION

Tea is propagated extensively by "single-node" cuttings consisting of a leaf with the axillary bud at the node and a portion of the internode below it (Tubbs, 1939; 1946). For this purpose suitable cuttings are taken from aperiodic shoots obtained after pruning mature tea bushes (Bond, 1945). Although other vegetative propagation methods can be used, for commercial propagation the most convenient and practical method is the use of the single-node cutting (Visser and Kehl, 1958; Green, 1964; Richards, 1967).

Green (1970) suggested propagation by multinodal cuttings when there is an excess of cutting material available so that larger or standard-size plants can be obtained in a shorter period. Visser (1959a) showed that although double-node cuttings have potentially greater root and axillary shoot growth, their growth was affected under sub-optimal nursery conditions.

For successful propagation of cuttings, shading to minimize the effects of high temperature and the maintenance of sufficient humidity over the cuttings are essential (Visser, 1962). Tea nurseries shaded by coir matting and watered 1-3 times daily need about 0.64 cm - 1.02 cm of water per day during warm weather (Visser, 1959b). Any reduction in the quantity of water applied will therefore result in a saving of water and labour resulting in the pro-

duction of cheaper plants. Sealed polyethylene covers which conserve moisture and maintain a humid atmosphere over the cuttings have been used in the propagation of Cacao cuttings (McKelvie, 1957; Gnanaratnam, 1964).

This article describes a comparative study of the growth of single-node and multinodal cuttings under sealed polyethylene cover with that of the performance of single-node cuttings raised by the normal method.

METHOD OF PROPAGATION

Cuttings with 1, 2, 3, 4 and 5 nodes, taken from comparable leader shoots of clone TRI 2025, were planted in polyethylene sleeves filled with soil, one cutting being inserted in each bag. There were 60 plants of each node number. After planting, the bags as well as the nursery bed were thoroughly watered and covered with a transparent 300 gauge polyethylene sheet which rested on semicircular iron hoops placed at intervals along the length of the bed so that the polyethylene tent was well above the 5-node cuttings while the single-node cuttings propagated by the normal method were laid outside the tent. The free ends of the tent were buried in the trench and covered with soil so as to make the tent airtight. Sixty single-node cuttings were raised by the normal method and served as the control.

The temperature and humidity within the tent were recorded by a thermometer and hygrometer respectively, suspended inside the tent while a thermometer suspended outside the tent recorded the ambient air temperature. Light intensity was measured by a light meter. The entire bed was covered by coir matting which was above the level of the tent. The cuttings propagated by the normal method continued to be watered 3-4 times a day. The polyethylene cover was removed 60 days after planting and the cuttings watered daily until 90 days when half the number of plants were uprooted and their dry weights taken. The dry weights of the remaining plants were taken when they were 210 days old.

ADVANTAGES OF PROPAGATION UNDER SEALED TENT

The use of a sealed polyethylene cover to propagate cuttings has the advantage that it effects considerable saving of water and of labour. This method could be expected to promote faster vegetative growth due to the higher temperature and humidity that prevails within. The use of this method, however, involves an initial outlay on polyethylene which, with proper care, can be used repeatedly. The supports may be of any convenient material. The two sets of supports used in this study are those used in normal propagation and therefore, should, not be considered as an additional expenditure.

Cuttings raised by the normal method need watering 3-4 times daily for the first two months, which involves the use of labour and a high requirement of water particularly during dry periods.

At the 90th day the single and 2-node cuttings that were under polyethylene for 60 days showed increased shoot length, leaf area and dry weight of new leaves and of roots resulting in better growth than the cuttings with more nodes or those raised outside. They produced more roots that were longer and had a greater dry weight than the roots of the single-node cuttings raised outside. Green (1970) using cuttings up to 4 nodes showed that the rate of root and shoot growth increased markedly as node number increased from 1-3. Venkataramani (1957) showed that single-node cuttings under a polyethylene cover had a higher percentage of rooted cuttings than those raised by the normal method. Overall, much improved growth was seen with the single-node cuttings under the tent compared to any of the multi-nodal cuttings under the tent or of those raised outside. The fact that the general growth of the cuttings was better under the tent than outside could be due to the somewhat higher temperatures under the sealed polyethylene tent than outside.

The 5-node cuttings showed greater mortality. Green (1970) found no difference in the percentage survival of cuttings up to 3 nodes which was confirmed in this study. Cuttings with 2-5 nodes produced greater number and weight of the floral buds and weight of callus than the

single-node cuttings raised by the two methods. It is known that flowering retards axillary shoot growth (Visser, 1962). It is conceivable that the flowering in multinodal cuttings may have been due to the greater amount of carbohydrate resources in them associated with the forcing growth conditions and comparatively slower root growth in the early stages in relation to the size of these cuttings. Although the multinodal cuttings produced less new shoot growth during this period, the plant dry weight was greater because of their large initial size and more leaves of larger area.

Often the polyethylene sheet appears misty due to the water condensing on the inside which would restrict the amount of light entering through the sheet. This can be overcome by gently tapping the sheet at different points. Even then, the plants may appear somewhat chlorotic at the 60th day when the cover is removed. However, a foliar spray of 0.5-1% urea solution would quickly restore the green colour of the leaves.

The second assessment was done at 210 days after planting when the plants are normally ready for field planting. At this stage there was no difference in total length of the new shoots amongst the treatments indicating that shoot growth in the multinodal cuttings had improved. There were more new shoots when the cuttings had more nodes but the individual shoots were smaller. However, since the plant and root weight of multinodal cuttings were greater, this may be a factor influencing its subsequent growth.

It has been suggested that when there is an excess of cutting material available multinodal cuttings could be propagated in order to raise standard-sized plants in a shorter time (Green, 1970). While propagation of single-node cuttings by the normal method appears to be the most convenient and efficient method for raising plants on a large scale it should be noted that the growth of plants raised under the polyethylene cover, either by single or multinodal cuttings was good and was not inferior when the plants were ready for field planting. In fact the multinodal cuttings showed improved growth with time and their performance in the field needs to be evaluated.

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