PRODUCTION OF PINEAPPLE SUCKERS BY DECAPITATION USING DIFFERENT SIZES OF MOTHER PLANTS RAISED FROM SUCKERS AND CROWNS

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ABSTRACT

Suckers, slips, ratoon suckers and crowns are used as planting material in pineapple cultivation. Suckers are the common material used in Sri Lanka. The major pineapple variety 'Kew' which is mainly used in the processing industry, is facing a problem of planting material scarcity because it produces only 1-2 suckers per plant. Even if available, there is a high degree of risk of diseases when suckers are used as planting material. Expansion of 'Kew' cultivation is hampered by lack of high quality planting material; therefore, mechanical decapitation has been recommended for rapid multiplication of pineapple. An experiment was conducted at the Agricultural Research Station, Bibile during 1993-1995 to compare the suitability of using crowns and suckers as parent material to raise mother plants of 'Kew' by mechanical decapitation method. Mother plants were decapitated at 10-15, 16-20, 21-25 and 26-30 mature leaf stage (with reference to the position of the youngest mature leaf which is frequently called as the 'D' leaf) and time taken to produce first three consecutive suckers of required size for field planting (300-400 g) was determined. There was no interaction between the type of propagules used to raise mother plants and the maturity stage at decapitation, in the time taken for the first three consecutive suckers to attain required size for field planting and mean total sucker yield. However, the first sucker attained the required size in the plants decapitated at 16-20 leaf stage (73.7 days after decapitation) irrespective of the type of material used to raise them. Highest mean sucker yield of 17.2 suckers/plant was recorded in plants raised from crowns and decapitated at 21-25-leaf stage. Crowns are better than suckers to raise mother plants of 'Kew' pineapple. The mother plants should be decapitated after attaining 21-leaf stage.

KEY WORDS: Decapitation, Pineapple, Rapid multiplication

INTRODUCTION

Pineapple is placed among the first three priority crops identified in the Fruit Crop Production and Productivity Improvement Programmes of the Department of Agriculture, Sri Lanka (Anonymous, 1998). It has been planned to increase the area under pineapple from 4100 ha in year 1996 to 5000 ha in year 2005 to meet the increasing demand for fresh and processed products in local and export markets (Anonymous, 1998). According to projections, pineapple production programme needs more than 50 million suckers at the rate of 13000 plants/ ha. Insufficient supply of disease-free and high quality planting material is the major problem that adversely affects the production and expansion programmes. The problem is more severe in the pineapple variety, Kew as it usually produces only 1-2 suckers per plant. Hence, meeting the growing demand for healthy and quality planting material to achieve the targeted production of pineapple fruits has become a major challenge.

Mechanical decapitation technique was recommended as a rapid multiplication system for pineapple particularly, when planting material is scarce (Heenkenda, 1993; Heenkenda and Samaratunga, 1993). This method has also been recommended for the production of healthy and high quality suckers of pineapple.

Generally, suckers are used for field planting as well as to establish nurseries by the decapitation method of propagation. Crowns are rarely used in Sri Lanka for this purpose though they are extensively used as ordinary planting material in major pineapple growing countries. As crowns bear more number of axillary buds than suckers, there is a great potential to produce large number of suckers from crowns by promoting the axillary buds to develop into suckers through mechanical decapitation. The present study was undertaken during 1993-1995 to compare the suitability of crowns and suckers as parent material to raise mother plants of Kew variety and to study the effect of size of mother plants to produce suckers by decapitation technique.

MATERIALS AND METHODS

A field experiment was carried out at the Agricultural Research Station, Bibile using crowns and suckers of the variety Kew of uniform size and appearance. They were cleaned and treated with Mancozeb (64%) + Metalaxyl (8%) and Oxydemeton-methyl (250 g/l EC) to prevent fungal infections before field planting. Both crowns and suckers were planted at a spacing of 1.0 x 0.40 x 0.30 m (double rows) in the raised beds of size 5 x 4 m. The following treatments were tested in two factor factorial (2 x 4) in randomized complete block design with 3 replicates. Suckers and crowns were the main plot treatments while four growth stages at decapitation (10-15, 16-20, 21-25 and 26-30 mature leaves) were the sub-plot treatments.

The plants were applied with the fertilizer mixture at 4 month intervals as recommended by the Department of Agriculture. Mulching with coir dust was done at 6 months after planting. Beds were irrigated once in 5 days during the dry spell. The plants were decapitated once using a specially designed decapitator (Heenkenda and Samaratunga, 1993). Time taken for the first three consecutive suckers to attain suitable size for field planting (300-400 g) and total number of suckers produced were recorded.

RESULTS

Time taken to produce first three consecutive suckers

There was no interaction between the type of propagule (crowns and suckers) used to raise mother plants and size of mother plants at decapitation on time taken to produce suckers. However, the age of the mother plant in terms of number of mature leaves at the time of decapitation has significantly affected the duration required to produce second and third suckers in sequence (Fig.1). The first sucker attained the required size for planting at 73.7 days after decapitation and it was almost similar in both types of mother plants.

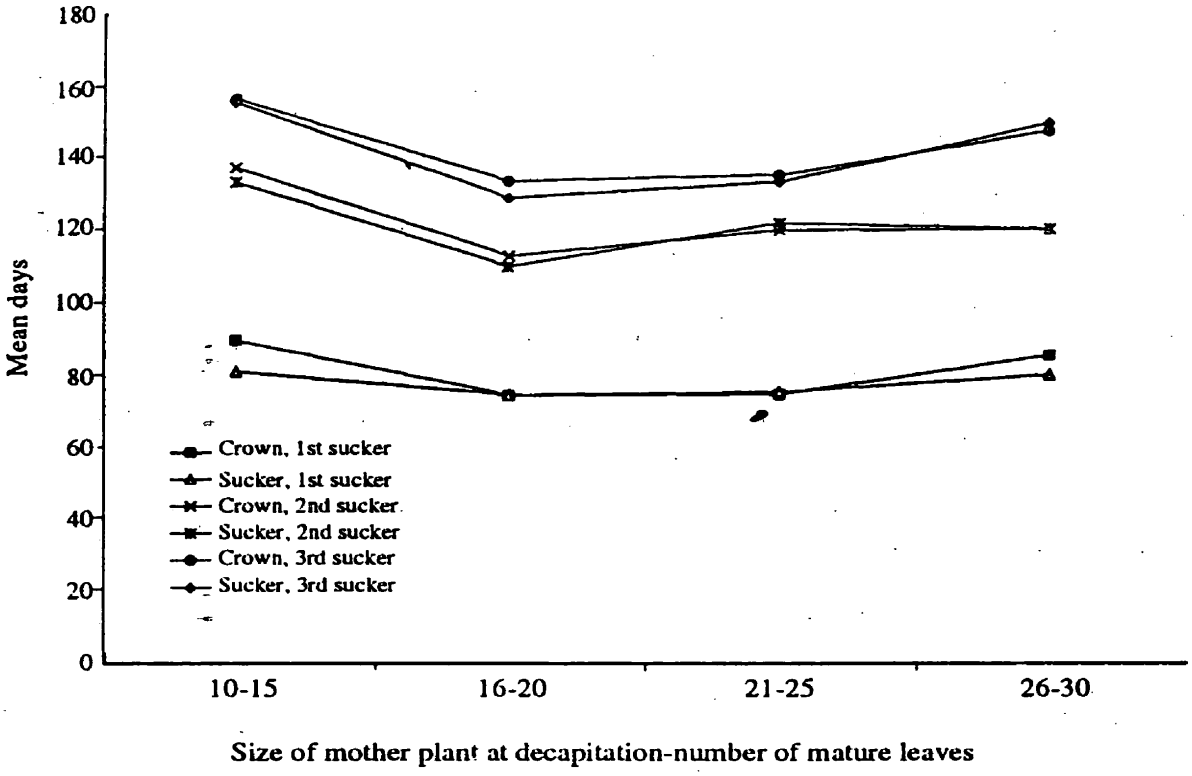

Fig.1. Days taken to produce first three consecutive suckers

The period taken for the second sucker to attain the size required for planting changed slightly though the change is not significant. There was a difference between the type of material used to raise mother plants and the size of the plant at decapitation on the said duration. The least duration of 108.6 days for the mother plants raised from suckers and 112.6 days for the mother plants raised from the crowns was recorded when they were decapitated at 16-20 leaf stage.

Similar trend was seen for the third sucker too. When the mother plant size was 16-20 leaf stage, the third sucker attained the required size 128.5 days after decapitation of the mother plants raised from suckers and it was 133.1 days when mother plants were raised from crowns. However, when the mother plant size was 10-15 leaf stage the time taken to attain the required size was 156.1 days after decapitation of mother plants raised from crowns and this was the longest duration recorded. It was 154.1 days with the plants grown from suckers.

Sucker growth was faster when the mother plant was at 16-20-leaf stage. However, there was no significant difference between the mother plants raised from crowns or suckers. The smaller the mother plants at decapitation the longer the duration required for the subsequent suckers to appear.

Total sucker yield

There was no interaction between the type of propagule used to raise mother plants and size of the mother plants at decapitation on sucker yield (Fig.2). Mother plants raised from crowns produced significantly more number of suckers than that raised from suckers. Both produced highest number of suckers when decapitated at 21-25 mature leaf stage.

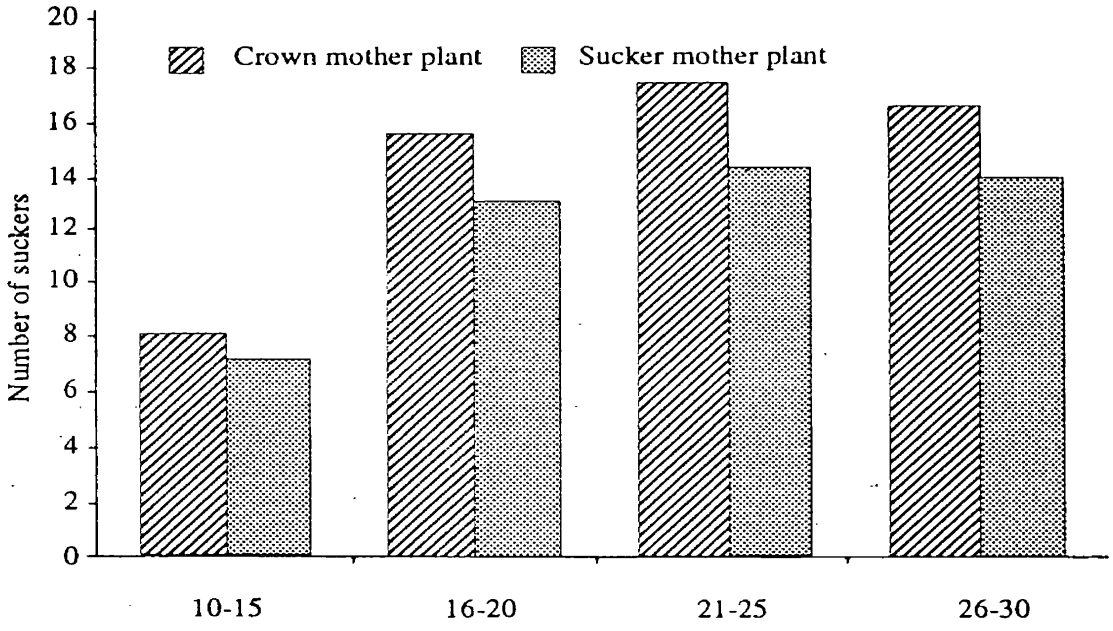

Fig.2. Mean total sucker production per mother plant

The highest number of suckers per plant of 17.2 was recorded in the mother plants raised from crowns while mother plants raised from suckers yielded 14.1 suckers per plant when decapitated at 21-25-leaf stage. Sucker yield recorded in the mother plants raised from the suckers was always less than that recorded from crowns. The minimum sucker yield was given by the mother plants decapitated at 10-15 leaf stage.

Results showed that smaller the mother plant at decapitation, lower the sucker yield irrespective of the type of propagule used to raise the mother plants.

DISCUSSION

Crowns are the major type of planting material used to establish pineapple plantations in most of the pineapple producing countries of the world. However, initial growth rate of the crowns after field planting has been reported to be slower than that of the suckers (Kotalawala, 1971); but it recovers few months after planting in the field when it attains a certain stage of growth (more than 16 mature leaf stage).

Since crown is botanically a juvenile structure unlike suckers (Bartholomew and Kadzimin, 1977), the apical dominance is expected to be stronger in crowns. Also, the apical dominance is very effective when the plants are small and young

(Philips, 1975). Therefore, it can be expected that the axillary buds in the mother plants raised from crowns are relatively immature compared to the mother plants raised from suckers. This may be a reason for slightly longer time taken for the crown suckers to attain the required size.

Usually crowns have more number of leaves than suckers (Bartholomew and Kadzimin, 1977), resulting in more number of axillary buds in the mother plants raised from crowns. Therefore, the former can support further outgrowth of many axillary buds into suckers. Most of these axillary buds are activated when the mother plants grow bigger. Hence, total number of suckers produced per plant was higher in the mother plants raised from crowns than in the mother plants raised from suckers. This situation is more effective when a mother plant possesses 16-30 mature leaves.

CONCLUSIONS

Duration between decapitation of mother plants and production of first three consecutive suckers was independent of the type of propagule used to raise the mother plant but dependent on the size of the mother plant at decapitation. Earliest appearance of the suckers was observed when the plants were decapitated at 16-20 leaf stage.

Highest sucker yield was obtained in plants decapitated at 21-25 leaf stage. Mother plants raised from crowns yielded higher number of suckers than mother plants raised from suckers. Crowns are more suitable to raise mother plants for the decapitation method of 'Kew' pineapple propagation.

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REFERENCES

Anonymous. 1998. Year-round production of vegetables and fruits in Sri Lanka. Council for Agricultural Research Policy, 114/9, Wijerama Mawatha, Colombo, Sri Lanka.

Bartholomew, D.P. and S.B. Kadzimin. 1977. Pineapple. *In* Ecophysiology of Tropical Crops. Eds. P. de Alwim and K. Kozlowski. pp. 123-137. Academic Press, New York, USA.

Heenkenda, H.M.S. 1993. Effect of plant size on sucker promotion in 'Mauritius' pineapple by mechanical decapitation. Acta Hort. 334: 331-336.

Heenkenda, H.M.S. and H.Samaratunga. 1993. Mechanical decapitation technique for rapid multiplication of pineapple planting material. *In* Biotechnology in Agricultural Development. Eds. P.Ganashan and S.Balendira. pp. 61-66. Department of Agriculture, Peradeniya, Sri Lanka.

Kotalawala, J. 1971. Mass production of pineapple planting materials. Tropical Agriculturist 127:199-201.

Philips, I.D.J. 1975. Apical dominance. Ann. Rev. Plant Physiol. 26:342-367.

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