IMPORTANCE OF TIMING OF AIR-LAYERING IN RAMBUTAN (*NEPHELIUM LAPPACEUM L.*) PROPAGATION

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ABSTRACT

An experiment was conducted to determine the best month to air-layer rambutan (*Nephelium lappaceum* L.) twigs at the Fruit Research Station, Eraminigolla during 1983 — 1984.

Maximum success in layering was recorded in November, 1983 which was significantly better than those achieved in the other months. There was no significant difference in the number of twigs rooted when twigs were layered in July, 1983 and January, 1984. The lowest number of twigs rooted was obtained when twigs were layered in March, 1983. Adventitious root formation was significantly speeded up when layered in July, 1983 and December, 1983 while it was significantly reduced in March, 1983 and February, 1984.

While there was no immediate effect of rainfall on the number of twigs rooted and the time taken for adventitious root formation, the amount of rain in the month immediately preceding layering had a distinct positive effect. Higher rainfall resulted in higher values and lower rainfall resulted in lower values with regard to number of twigs rooted. Higher rainfall reduced the number of days for the formation of adventitious roots. Thus the success of layering seems to depend largely on the rainfall of the month preceding layering. There may be other factors such as temperature and light intensity influencing air-layering of rambutan but these need investigation.

KEY WORDS: Air-layering, Malwana Variety, Rambutan (*Nephelium lappaceum* L), Rambutan propagation

INTRODUCTION

Rambutan (*Nephelium lappaceum* L.) belongs to the family Sapindaceae. Even though it originated in the Malayan peninsula, it has gained widespread popularity in the South-East Asian region. There is an expanding demand for this delicious fruit in the local market and therefore cultivation of rambutan is being now popularized among the growers in Sri Lanka. Consequently, the demand from the growers for more planting materials of this crop has markedly increased. Hence great emphasis has been given to increase the production of planting materials which come into bearing early, by using less time-consuming techniques.

Rambutan can be propagated by seed and budding method and by layering or marcottage. Propagation by seeds, unless for stock plants, is not recommended since it creates several disadvantages as indicated below:

i. Seedling trees have a longer vegetative phase prior to reproductive phase.

ii. Uncertainity of genetic uniformity due to open pollination.

iii. The possibility of increasing the proportion of male trees since rambutan is dioecious.

iv. Decrease in the number of trees per unit area due to wider spacing between trees.

Stock plant production by seeds for budding and grafting is restricted due to seasonal availability of seed and inability to handle large quantities of seed which have a very short period of viability.

Vegetative methods of propagation are used to overcome these disadvantages. Air-layering or marcotting technique is defined as a method of vegetative propagation by which adventitious roots are caused to form on a twig while it is still attached to the parent tree. Air-layering can be used as a successful propagation method for a number of tropical and sub-tropical trees and shrubs including litchi (*Litchi chinensis*) and rambutan. The marcotted plants will come to bear fruit in a shorter period of time than budded plants; hence the method of air-layering can be adopted. Mortality rate after potting of rooted twigs can be reduced by marking a shallow notch just above a dormant plump bud at the time of potting (Pinto and Heenkenda, 1985).

It is found that research with respect to rambutan air-layering is yet scanty and imperfect. Therefore, a trial was conducted to study the importance of timing of air-layering in rambutan for obtaining maximum rooting within the shortest period of time.

MATERIALS AND METHODS

This experiment was conducted at the Fruit Research Station, Department of Agriculture, Eraminigolla from February, 1983 to February, 1984. Five mother trees of uniform size were selected from *Malwana* variety from the clonal garden at the station. Each tree was treated as a replicate and the experiment was in a randomized complete block design with 5 replicates. Ten twigs which were more or less uniform in size, growing in an upright manner, approximately 10 month old and 1 cm in diameter were selected for each treatment from each tree. The treatments were as follows:

T_1 ring barked in February, 1983 layered in March, 1983
T_2 ring barked in March, 1983 layered in April, 1983
T_3 ring barked in April, 1983 layered in May, 1983
T_4 ring barked in May, 1983 layered in June, 1983
T_5 ring barked in June, 1983 layered in July, 1983
T_6 ring barked in July, 1983 layered in August, 1983
T_7 ring barked in August, 1983 layered in September, 1983
T_8 ring barked in September, 1983 layered in October, 1983
T_9 ring barked in October, 1983 layered in November, 1983
T_{10} ring barked in November, 1983 layered in December, 1983
T_{11} ring barked in December, 1983 layered in January, 1984
T_{12} ring barked in January, 1984 layered in February, 1984

One month after the ring barking, the calloused wound was covered with moistened coir dust made into a ball around the part where the ring of bark was removed. To keep the ball of coir dust in position around the wound, it was wrapped with a piece of transparent polythene and tied firmly with metal binding wire. Once the twig is rooted the correct stage for separation can be determined since the roots can be seen through the polythene film. Following records were collected: (*1*) Number of twigs rooted, (*2*) Time taken for adventitious roots to appear under the polythene film and (*3*) Monthly precipitation at the station.

RESULTS AND DISCUSSION

Number of twigs rooted: Mean number of twigs rooted for each treatment is given in Table 1. The highest rooting was obtained when layering was done in the month of November, 1983. This was significantly higher than

the next highest where the layering was done in July, 1983. There was no significant difference between July, 1983 and January, 1984 layering. The lowest rooting was recorded when the layering was done in March, 1983.

Time taken for roots to appear: Table 2 gives the mean number of days for roots to appear. The shortest period of time required for roots to appear was recorded when the shoots were marcotted in the months of July 1983 and December 1983, there being no significant difference between them. On the other hand, the longest time taken for roots to appear was recorded when the twigs were marcotted in March 1983. There appears to be an inverse relationship between number of twigs rooted and time taken for roots to appear. When number of twigs rooted is high, the time taken is low and vice versa.

Precipitation during the study: The rainfall experienced in the Eraminigolla area during the course of this study is given in Table 3. Rooting ability and the time required to form adventitious roots seemed to be influenced by the rainfall received during the month immediately prior to marcotting which was the month when ring barking was done.

High precipitation (over 200 mm) occurred during June 1983, October 1983 and January 1984. The lowest rainfall was received in March, 1983 and slightly higher amount in February, 1983. It was clearly observed that the rainfall had a positive effect, that is in increasing success of rooting and in decreasing the time requirement to form roots (Figs. 1 and 2).

Higher rainfall resulted in higher values and lower rainfall resulted in lower values with regard to number of twigs rooted (Fig. 1). Higher rainfall reduced the time requirement for the formation of adventitious roots (Fig. 2).

Information on the effect of climatic factors on air-layering is limited. Excessively high temperature in the upper layers of soil during the dry spell may reduce the soil moisture content. This results in compaction of soil in the vicinity of the mother tree causing not only inhibition of layer but also injury to shoots (Thomas, 1933). Growth flushes of rambutan trees occur during or just after the rainy season.

Valmayer *et al.* (1970) found that the rate of growth of rambutan in the Philippines was rapid from October to December, which was the rainy season, but declined with the onset of the dry season in January and February. Growth continued to slow down during the succeeding dry months but resumed when the rains started in May. They also reported that the vegetative growth was most active after the fruits were harvested when soil moisture was still abundant. During flowering and fruit-setting season, the growth rate was acutely retarded.

Under Eraminigolla conditions rambutan trees produced flowers in February/March 1983 and the fruits were harvested in July/August 1983. Peak dry spell was in February/March and the flowering period started in the same month. During this time the number of rooted twigs and speed of rooting was drastically reduced. This is in line with the findings of Valmayer *et al.* (1970). On the other hand, very high rainfall in the immediately succeeding month not only increased the number of rooted twigs, but also reduced the number of days for the formation of adventitious roots.

CONCLUSIONS

Any factor which accelerates the growth rate of rambutan trees would increase the success of air-layering and accelerate the rate of formation of adventitious roots on the air-layered twigs in rambutan.

It is concluded that the success of air-layering of rambutan under natural conditions will depend on the rainfall of the month preceding layering. There may be other factors such as temperature and light intensity, influencing air-layering but these need investigation.

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Table 1. Mean number of twigs rooted

Month layered		*Mean number of twigs rooted*
March	1983	1.24
April	1983	3.40
May	1983	5.20
June	1983	5.40
July	1983	7.20
August	1983	2.60
September	1983	2.60
October	1983	5.00
November	1983	8.20
December	1983	5.20
January	1984	6.80
February	1984	3.60
LSD (P=0.05)		0.65
CV (%)		22.0

Table 2. Mean number of days taken for roots to appear

Month layered		*Mean number of days taken for roots to appear*
March	1983	123.0
April	1983	87.8
May	1983	58.4
June	1983	45.8
July	1983	30.0
August	1983	58.6
September	1983	81.8
October	1983	69.2
November	1983	46.6
December	1983	32.0
January	1984	39.6
February	1984	115.4
LSD (P=0.05)		6.1
CV (%)		14.6

Table 3. Rainfall in the Eraminigolla area

Month		*Rainfall (mm)*
February	1983	29.21
March	1983	19.56
April	1983	121.15
May	1983	172.21
June	1983	223.53
July	1983	83.58
August	1983	104.65
September	1983	102.11
October	1983	203.20
November	1983	187.20
December	1983	131.33
January	1984	260.10
February	1984	190.75
March	1984	287.86

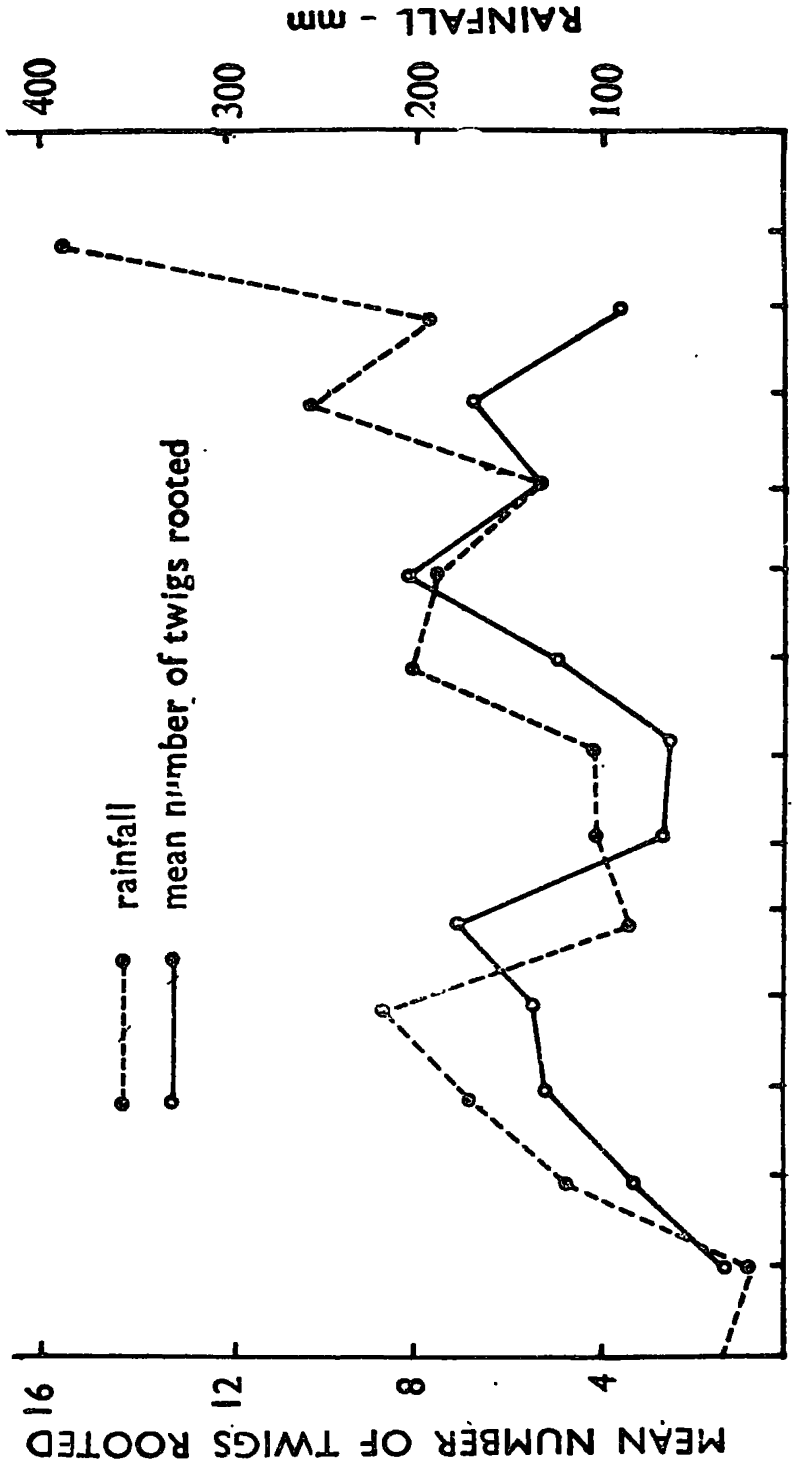

Figure 1. Relationship between rainfall and mean number of twigs

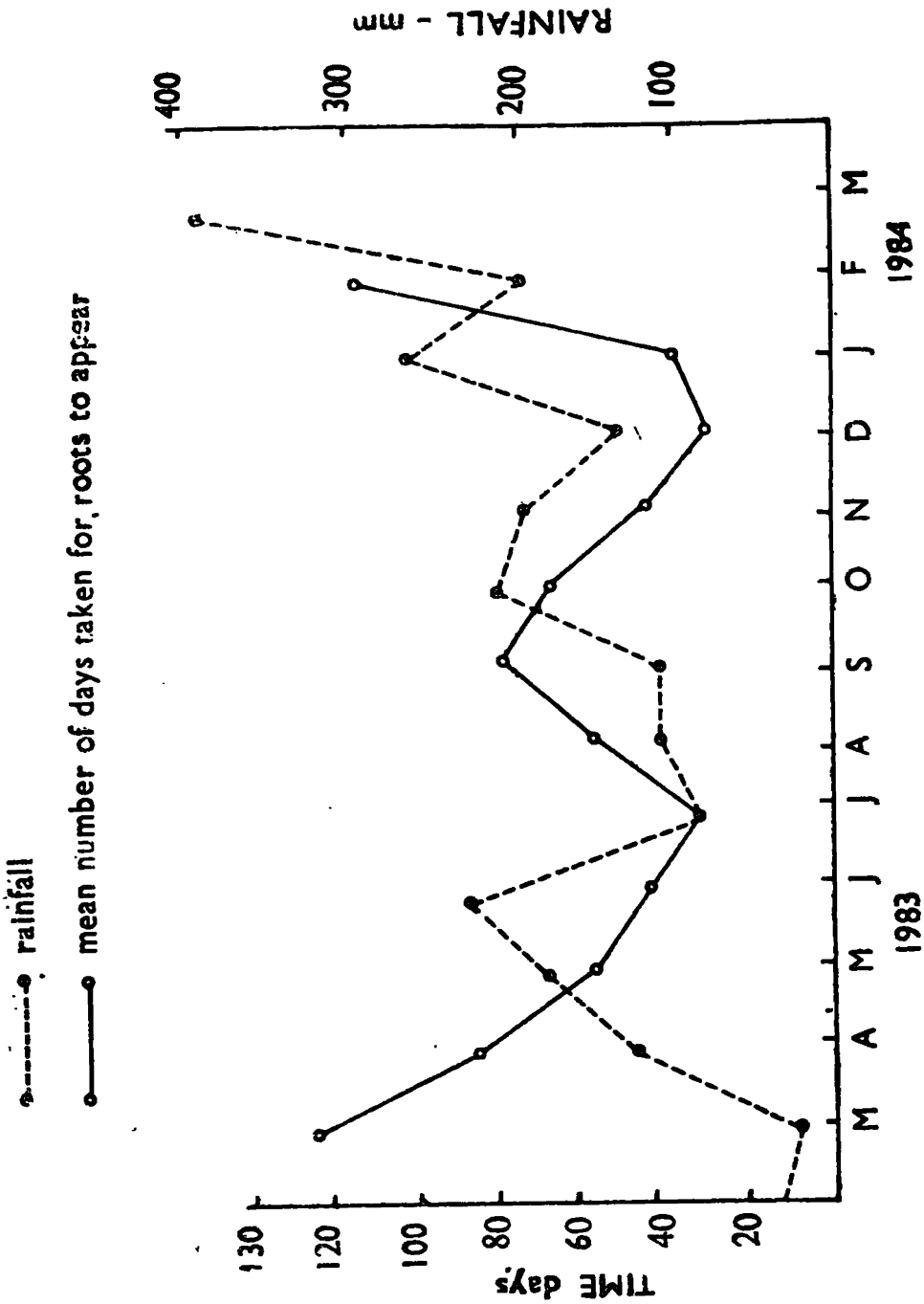

Figure 2. Relationship between rainfall and time taken for roots to appear