

Effect of shoot maturity and time of operation on litchi air layering

D. Hossain, M.S.H. Choudhury, M. Hasan, R. Yeasmin and A. Islam

Department of Horticulture, Bangladesh Agricultural University, Mymensingh

Abstract: An investigation to study the effects of shoot maturity and time of operation on the success and survivability of detached litchi air layers through different techniques was carried out at the Fruit Tree Improvement Project, Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from June, 2006 to March, 2007. The experiment was carried out in two phases, the first phase included a two-factor experiment consisting of (i) shoot maturity viz., juvenile shoot and old shoot and (ii) time of operations viz., 1st week of June, July and August and in the second phase there was a three-factor experiment consisting above 2 factors and techniques adopted in the detached layers i.e. immediate planting and hardening before planting. The experiment was laid out in the Randomized Complete Block Design (RCBD) with three replications. Shoot maturity, time of operation and techniques adopted on the detached layer showed significant effect on almost all parameters. Juvenile shoot showed the best performance regarding all parameters except number of roots per layer. Juvenile shoot showed maximum percentage of success (77.80) in rooting. The highest percentage of rooting success (80.83), the longest root (8.21 cm) per layer and maximum percentage of survivability (77.72) were achieved from the operation of 1st week of July.

Key words: Shoot, Maturity, Litchi, Air layering

Introduction

Litchi (*Litchi chinensis* Sonn.), originated in Southern China belonging to the family Sapindaceae is one of the most important subtropical evergreen fruit trees. The most important litchi producing areas of the world are China, Taiwan, Thailand, India, South Africa, Madagascar, Indonesia, Brazil, New Zealand, Australia, West Indies, etc. (Singh, 1995). Vegetative propagation is probably the most widely used commercial method of propagation of litchi (Menzel, 1985). In air layering, a stem is induced to root while it is attached to and sustained by mother plant. Generally air layering is performed on the juvenile shoots in litchi. But very few number of juvenile shoots are available in a litchi plant for air layering. For the extensive cultivation, old shoot may also be used for air layering. But rooting performance of old shoots has remained unknown. Age of the shoots plays a key role in the rooting success and survivability of air layers. Older branches were slower to root and re-establish less readily when detached than juvenile shoot (Adriance and Brison, 1955). Time of operation in layering is an important factor for rooting success and survivability of litchi layers. It can be done in summer and rainy seasons starting from February to August i.e. during active period of growth. Dry summer is not suitable for air layering as because it is difficult to keep the rooting media moist. The present REASERCH has, therefore, been undertaken to observe the effect of mature shoot and time of operation on the success of air layering.

Materials and Methods

An experiment was conducted at the Germplasm Centre, Fruit Tree Improvement Project, Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from June, 2006 to April, 2007 to study the effect of shoot maturity and time of operation on the success and survivability of detached litchi air layer through different techniques. The experiment was conducted in two different phases one for preparation of air layers and other for techniques adopted on detached layers before planting

the layers in the nursery bed. The 1st phase consisting of two factors: (i) shoot maturity viz., Juvenile shoot, old shoot (ii) time of operation viz., 1st week of June, 1st week of July, 1st week of August and the second phase of the study, involved techniques of planting the detached layers as the 3rd factor. The experiment was laid out in the Randomized Complete Block Design (RCBD) with three replications. For air layering healthy, disease free, lateral shoots of green to deep brown coloured of the immediate past season growth branch showing diameter from 0.846 to 2.54 cm were selected as juvenile shoot. One year old mature light brown to greyish coloured branches were selected as old shoot. Layering was done in three times viz., 1st week of June, July and August by removing 3 cm bark and scrapping to remove the cambium layer. The wood was then covered with moistened rooting medium with the help of a piece of clear polythene sheet (size: 20 × 15 cm). The two ends of the wrapping material were carefully tied up thoroughly with thin rope and left for rooting. Data were recorded on percentage of success in rooting, number of roots per layer, length of roots per layer, number of shoots per layer, number of leaves per layer and thus percentage of survivability were recorded. The differences between treatment means were adjudged by Least Significance Difference (LSD) test at 5 and 1% levels of probability (Gomez and Gomez, 1984).

Results and Discussion

Effect of shoot maturity: Shoot maturity showed significant influences in all parameters (Table 1). The highest percentages of success in rooting (77.88%) were produced by the Juvenile shoot and the lowest percentage of success in rooting (73.33%) was with the old shoot. The higher number of roots (33.75) per layer was obtained from old shoot and the lowest number of roots (31.86) per layer was found from the Juvenile shoot. Juvenile shoot produced higher root length (8.65 cm) and old shoot gave the lower root length (7.16 cm).

Table 1. Effect of shoot maturity on the percentage of success in rooting, number of roots, length of roots in litchi air layers

Shoot maturity	Percentage of success in rooting	Number of roots	Length of roots (cm)
M ₁	73.33	33.75	7.16
M ₂	77.88	31.86	8.65
LSD _{0.01}	25.77	6.83	5.86
Level of significance	**	**	**

M₁: Old shoot, M₂: Juvenile shoot, **: Significant at 1% level of probability

Effect of time of operation: Time of operation showed significant influences on all parameters (Table 2). Layering done in the 1st week of July (T₂) showed the highest percentage (80.83) of success on rooting and 1st week of August (T₃) gave the lowest percentage of success on rooting (68.33). Layering in 1st week of

June (T₁) produced the highest number of roots (36.80) per layer. The 1st week of August (T₃) gave the lowest number of roots (28.66) per layer. 1st week of July (T₂) gave the highest length of roots (8.21 cm) and the lowest length root (7.52 cm) per layer was in 1st week of June (T₁).

Table 2. Effect of time of operation on the percentage of success in rooting, number of roots, length of roots in litchi air layers

Time of operation	Percentage of success in rooting	Number of roots	Length of roots (cm)
T ₁	77.66	36.80	7.52
T ₂	80.83	28.66	8.21
T ₃	68.33	32.96	7.99
LSD _{0.01}	4.69	1.24	1.06
Level of significance	**	**	NS

T₁: 1st week of June, T₂: 1st week of July, T₃: 1st week of August,

Combined effect of shoot maturity and time of operation: The combined effect of shoot maturity and time of operation showed significant effect on all parameters (Table 3). The maximum percentage of success in rooting (83.33%) was obtained from the 1st week July (T₂) with Juvenile shoot. The lowest percentage of success in rooting (66.67%) was

obtained from the 1st week August (T₃) with the old shoot. The highest number of roots (39.00) per layer was recorded from the Juvenile shoot with the operation of 1st week of June (T₁). The longest root was obtained from the treatment combination of Juvenile shoot and layering done in the 1st week of August (T₃).

Table 3. Combined effect of shoot maturity and time of operation on the percentage of success in rooting, number of roots, length of roots in litchi air layers

Treatment of combination	Percentage of success in rooting	Number of roots	Length of roots (cm)
M ₁ T ₁	75.00	34.60	6.15
M ₁ T ₂	78.33	29.33	7.20
M ₁ T ₃	66.67	37.33	8.13
M ₂ T ₁	80.00	39.00	8.89
M ₂ T ₂	83.33	28.00	9.23
M ₂ T ₃	70.00	28.60	7.85
LSD _{0.01}	6.644	1.761	1.551
Level of significance	NS	**	**

**: Significant at 1% level of probability, NS: Non-significant

The overall results obtained from this study facilitated to draw the conclusion that Juvenile shoot, layering done in the 1st week July may be considered in litchi propagation through air layering.

References

Adriance, G.W. and F.R. Brison. 1955. Layerage. In: Propagation of Horticultural Plants. McGraw Hill Book Company, Inc. New York. pp. 106-108.

Gomez, K.A. and A.A. Gomez. 1993. Statistical Procedure for Agricultural Research (2nd ed.). Jhan Willey and Sons, New York. pp. 272-279.

Singh, S.P. 1995. Commercial Fruits. Kalyani Publishers, New Delhi Ludhiana. p. 234.