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Effect of variety and time of operation on the success, growth and survivability of air-layers in two varieties of litchi

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Abstract: An experiment was conducted at BAU-Germplasm centre of Fruit Tree Improvement Project, Department of Horticulture, Bangladesh Agricultural University (FTIP-BAU-DH), Mymensingh during the period from March 2006 to April 2007 to study the effect of variety and time of operation on the success, growth and survivability of Air-Layers in two varieties of Litchi. Two varieties (China-3 & Mongalbari) 14 times of layering (starting from March 12 to 18 June 2006) were included in the study. China-3 showed better success in rooting (85%) than Mongalbari (75%). Layering done in 16 April gave the best result on the percentage of success in the survivability of detached air-layer. China-3 significantly increased the number of shoots, leaves and percentage of survivability of air-layers. Combined effect of variety and time of operation (layering done on 9 April) had increased the percentage of survivability of air-layers as well as also increased the number of shoots and leaves of air-layers. It may the concluded that air-layering should be done in the month of April under Mymensingh condition for better success, growth and survivability of litchi layers. Air-layering done in the month of April give better survivability and growth performance.

Key words: Litchi, air-layer, survivability, growth

Introduction

The pan city of good quality planting materials of improve varieties of litchi is the main hurdle in the expansion of litchi cultivation. Air layering is the most convenient method of propagating litchi plants in out country (Bose and Mitra, 1990; Scanlan, 1995; Mitra, 2004;). But the success in layering is not at satisfactory level. A certain percentage of layers die after separation from mother plant is one of the serious problems in litchi. Different workers recorded varying success in different time and variety of litchi and observed that success varied in the cultivar depending on the layering season. However, information regarding time of layering applicable for a particular variety of litchi is lacking. Therefore, the present experiment has been undertaken to investigate the effect of varieties of time of layering on their success, growth and survivability of air layering of litchi.

Materials and Methods

The experiment was conducted at the Germplasm Centre of Fruit Tree Improvement Project (FTIP), Bangladesh Agricultural University, Mymensingh during the period from March, 2006 to April, 2007 to study the effect of variety and time of operation on the survivability and growth performance of air-layers of two varieties of litchi. The varieties taken for the study were China-3 & Mongalbari. Fourteen litchi trees of the variety Mongalbari and fourteen that of China-3 were selected for air-layering.The approximately diameter of the branches were taken as 0.847 cm to 2.54 cm and this was done according to Li and Li (1949). The two-factor experiment consisted of two types of variety (Factor A) and fourteen levels of time of layering (Factor B). Variety (Factor A): China-3 (V_1); Mongalbari (V_2); Time of layering (Factor B): For the propagation of litchi fourteen times of layering were used: i) T_1=March 12, ii) T_2 = March 19, iii) T_3=April 2, iv) T_4=April 9, v) T_5=April 16, vi) T_6 = April 23, vii) T_7=April 30, viii)T_8=May 7, ix)T_9=May 14, x)T_{10}=May 21, xi)T_{11}=May28, xii)T_{12}=June 4, xiii) T_{13}= June 11 and xiv) T_{14}=June 18.The layers were separated from the mother plant when the outer surface of rooting medium and inner surface of the polyethylene sheet was full of newly formed roots. The rooted litchi layers were separated from the mother plant in one chance. Then the layers were planted in polybag and after two months, the polybags were transferred in the nursery bed. Rooting media consisting of well-decomposed cowdung and soil were used in this present research work. Soil and well-decomposed cowdung were taken in 1:1 ratio and mixed thoroughly with sufficient water to make mud dough. On the detachment of air-layers from the mother plant, observation and related data were collected to assess different parameters of propagation. Data on number of leaves and shoots were counted at 15 days interval. The collected data on different parameters under different experiments were statistically analyzed wherever necessary following factorial experiment in Randomized Complete Block Design (RCBD) with three replication.

Results and Discussion

Effect of varieties: The study revealed that among the variety China-3 and Mongalbair, the highest percentage of success (85%) in rooting was obtained in the variety China-3 and varieties Mongalbari gave the lowest percent rate (70%) of success in rooting. Percentage of survivability was recorded after planting. It was observed that China-3 showed the highest percentage (73.89%) of survivability and Mongalbari showed the lowest (62.35%) percentage of survivability in the nursery bed. The varieties China-3 gave highest number of shoots per plant and number leaves per layer at different days after planting and the lowest number of shoots per layer and number of levers per layers was found in Mongalbari varieties at different days after planting except 20 DAP (Table 1).

Effect of time of operation (layering): Main effect of time of operation was highly significant on the percentage of success in rooting of litchi air layers. Layering done in 4th June (T_{12}) gave the highest percentage (90%) of success in rooting and the lowest percentage (63%) of success in rooting in 16 April (T_6). The highest percentage (87.81%) of success in the survivability of litchi air-layers was observed in 16 April (T_5) and the lowest (43.33) was from 18 June (T_{14}) treatment. Number of shoots per layer and number of leaves per layer were significantly affected by the time of operation (layering) at different days after

planting. Layering done in 2nd April (T_3) produced the highest number of shoots per layer and maximum number of leaves per layer at different days after plating than other treatments (Table 2).

Combined effect of variety and time of operation (layering): The number of shoots per layer was recorded to be the highest at different days after planting from the treatment combination China-3 and time of operation (layering) (V_1T_5) and the lowest number of shoots per layer was observed from the treatment combination Mongalbari and time of operation (V_2T_{13}) (Table 5). The interaction effect of variety and time of operation (layering) was found to be significant at different days after planting. Maximum number of leaves were obtained from the treatment combination China-3 and time of operation (V_1T_5) and the minimum number of leaves were obtained from Mongalbari and time of operation (V_2T_4) (Table 6). The interaction effect of variety and time of operation (layering) was found to be significant.

Table 1. Main effect of variety on the number of shoots per layer and number of leaves per layer of litchi at different days after detachment from the mother plant

Treatment	Number of shoots per layer						Number of shoots per layer					
	Days after planting (DAP) of layers						Days after planting (DAP) of layers					
	35	65	95	125	155	185	35	65	95	125	155	185
V_1 (China-3)	2.97	3.58	4.08	4.69	6.53	9.11	9.06	12.48	14.62	16.70	19.71	22.89
V_2 (Mongalbair)	2.92	3.55	4.02	4.72	5.90	7.24	7.75	9.94	11.29	13.38	16.95	20.36
LSD 0.05	NS	NS	0.051	NS	0.061	0.134	0.619	0.815	0.225	1.010	0.879	0.449

NS=Not significant

Table 2. Main effect of time of operation (layering) on the number of shoots and number of leaves per layer of litchi at different days after detachment from the mother

Treatment	Number of shoots per layer						Number of shoots per layer					
	Days after planting (DAP) of layers						Days after planting (DAP) of layers					
	35	65	95	125	155	185	35	65	95	125	155	185
T_1 (March 12)	3.16	3.38	4.16	4.39	5.56	8.00	9.16	10.83	13.11	15.25	18.64	22.22
T_2 (March 19)	3.16	3.69	3.86	4.27	6.02	8.08	10.16	12.50	13.94	15.19	17.97	21.08
T_3 (April 2)	2.72	3.36	4.16	5.44	7.68	9.50	7.83	10.80	14.80	19.05	21.52	24.77
T_4 (April 9)	6.05	3.55	3.78	4.66	6.46	8.58	7.22	9.72	11.74	14.78	17.72	21.83
T_5 (April 16)	3.61	4.40	5.11	5.77	7.19	9.41	12.27	19.43	21.12	21.74	25.33	28.74
T_6 (April 23)	2.78	3.05	3.27	4.21	6.00	7.17	10.33	11.25	13.50	16.67	19.72	21.61
T_7 (April 30)	2.78	3.52	4.44	5.00	6.86	8.67	9.80	12.11	14.97	18.22	21.75	25.53
T_8 (May 7)	3.05	3.44	4.06	4.72	6.21	8.93	8.33	11.72	12.72	14.44	17.61	21.39
T_9 (May 14)	3.44	4.38	4.61	5.25	6.63	8.28	9.61	13.22	13.83	14.72	18.33	20.94
T_{10} (May 21)	2.22	2.67	3.33	4.06	5.39	7.94	6.36	8.44	9.03	11.91	16.58	19.50
T_{11} (May28)	3.39	4.53	4.91	5.69	7.29	8.72	6.86	10.66	12.47	14.95	17.33	20.72
T_{12} (June 4)	2.33	3.66	3.94	-	6.17	7.91	7.11	9.66	11.27	12.83	17.05	20.50
T_{13} (June 11)	2.61	2.89	3.47	3.91	4.77	6.48	6.80	7.92	9.25	10.42	13.33	16.80
T_{14} (June 18)	2.87	3.43	3.57	3.89	4.83	6.80	5.85	8.65	9.62	10.46	13.79	17.15
LSD 0.05	0.22	0.18	0.14	0.22	0.16	0.36	1.64	2.16	0.60	2.67	2.33	1.19

Table 3. Main effect of time of operation (layering) on the number of shoots per layer and number of leaves per layers of litchi at different days after detachment from the mother plant

Treatment	Number of shoots per layers						Number of shoots per layer					
	Days after planting (DAP) of layers						Days after planting (DAP) of layers					
	35	65	95	125	155	185	35	65	95	125	155	185
V_1T_1	3.00	3.22	4.22	4.45	5.24	8.89	9.89	12.11	14.67	17.28	19.17	22.00
V_1T_2	2.11	2.78	3.11	3.44	5.65	8.44	8.33	11.00	13.00	14.00	15.00	17.33
V_1T_3	2.56	3.28	3.94	4.11	6.70	9.56	8.78	13.11	18.61	21.28	22.87	25.05
V_1T_4	2.67	3.22	3.56	4.33	6.92	9.22	8.11	12.11	15.94	18.89	20.89	24.78
V_1T_5	3.67	4.59	5.34	6.33	7.88	10.50	13.44	23.72	23.91	23.92	26.00	30.59
V_1T_6	2.67	3.00	3.33	4.44	7.11	8.78	11.56	12.83	16.33	19.89	23.33	24.11
V_1T_7	2.56	2.94	3.67	3.89	5.95	7.89	11.83	14.67	19.50	23.00	26.50	30.28
V_1T_8	3.33	3.33	3.45	4.22	6.21	9.98	10.56	12.78	13.44	16.00	19.22	23.22
V_1T_9	3.11	4.44	4.67	5.06	6.87	8.61	7.55	11.78	11.89	12.22	15.22	17.44
V_1T_{10}	1.67	2.34	3.34	4.17	5.35	9.22	3.84	5.44	6.17	8.50	14.17	16.67
V_1T_{11}	4.33	5.17	5.50	6.50	8.47	10.45	8.84	12.66	14.84	18.34	20.33	23.67
V_1T_{12}	2.89	4.00	4.33	5.00	7.12	9.33	7.78	11.22	13.22	14.44	19.78	22.11
V_1T_{13}	3.33	3.67	4.44	5.11	6.10	8.25	8.50	9.84	11.84	13.17	16.00	20.17
V_1T_{14}	3.75	4.25	4.25	4.67	5.94	8.50	7.92	11.42	11.42	12.92	17.89	22.08
V_2T_1	3.33	3.55	4.11	4.33	5.89	7.11	8.44	9.56	11.56	13.22	18.11	22.44
V_2T_2	4.22	4.61	4.61	5.11	6.39	7.72	12.00	14.00	14.89	16.39	20.95	24.83
V_2T_3	2.89	3.44	4.39	6.78	8.67	9.44	6.89	8.50	11.00	16.83	20.17	24.50
V_2T_4	3.44	3.89	4.00	5.00	6.00	7.95	6.33	7.33	7.55	10.67	14.56	18.89
V_2T_5	3.55	4.22	4.89	5.22	6.50	8.33	11.11	15.11	18.33	19.56	24.67	26.89
V_2T_6	2.89	3.11	3.22	3.99	4.89	5.56	9.11	9.67	10.67	13.45	16.11	18.11
V_2T_7	3.22	4.11	5.22	6.11	7.78	9.45	7.78	9.55	10.45	13.44	17.00	20.78
V_2T_8	2.78	3.55	4.67	5.22	6.22	7.89	6.11	10.67	12.00	12.89	16.00	19.56
V_2T_9	3.78	4.33	4.55	5.44	6.39	7.95	11.67	14.67	15.78	17.22	21.45	24.45
V_2T_{10}	2.78	3.00	3.33	3.95	5.44	6.67	8.89	11.44	11.89	15.33	19.00	22.33
V_2T_{11}	2.45	3.89	4.33	4.89	6.11	7.00	4.89	8.66	10.11	11.56	14.33	17.78
V_2T_{12}	1.78	3.33	3.56	4.22	5.22	6.50	6.44	8.11	9.33	11.22	14.33	18.89
V_2T_{13}	1.89	2.11	2.50	2.72	3.45	4.72	5.11	6.00	6.67	7.67	10.67	13.44
V_2T_{14}	2.00	2.61	2.90	3.11	3.72	5.11	3.78	5.89	7.83	8.00	10.00	12.22
LSD 0.05	0.315	0.248	0.194	0.306	0.234	0.505	2.319	3.048	0.843	3.781	3.289	1.689

V_1 = China-3, V_2 = Mongalbair, T_1 = March 12, T_2 =March 19, T_3 =April 2, T_4 =April 9, T_5 =April, T_6= April 23, T_7= April 30, T_8= May 7, T_9 =May 14, T_{10} =May 21, T_{11} =May28, T_{12} =June 4, T_{13} =June 11, T_{14} =June 18

Effects of variety, time of operation (layering), and their combination showed significant influence on the percentage of success in the survivability, number of shoots and number of leaves per layer. The highest survivability was observed in 16 April (T_5) treatment and the T_3 (2^{nd} April) treatment produced the highest number of shoos and leaves per layer. The interaction effect of variety and different time of operation (layering) had significant effect on the percentage of survivability and number of shoots and leaves at different DAP. So, it may be suggested from the present study that the operation (layering) done in the month of April with variety China-3 used in litchi propagation through air-layers should be done for better survivability and growth performance.

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