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Studies on the composition of rooting media for air layering in litchi

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Abstract

Composition of rooting media exhibited pronounced influence on the development of roots i.e. number of main roots, number of side roots, root length and the success of rooted layers in litchi nursery. Rooting media comprising of soil and FYM in the ratio of 2:1 (150g) with 20g of moss grass wrapped around it, was noticed to be the best combination to get appropriate results.

Keywords: Rooting media, air layering, litchi.

Introduction

Litchi is an important fruit of our country grown successfully in parts of Bihar, West Bengal, Uttar Pradesh, Punjab and Haryana. It is becoming a favourite fruit with the orchardists of lower hills and valley areas of Himachal Pradesh because of more remunerative returns. Though it can be propagated by different methods with little success, air layering done during monsoons is the most common and successful method (Anonymous, 1998). However, attention has not been paid earlier towards the composition of rooting media required for proper rooting of the layers. Generally, soil, FYM and moss grass is mixed in equal proportions with enough water to make it suitable to be used as a rooting media for layering. Therefore, the present studies were undertaken to work out use and proper proportion of ingredients of rooting media.

Material and Methods

The present studies were carried out at Litchi and Mango Research Station, Nagrota Bagwan, Distt. Kangra, Himachal Pradesh during 2003-04 and 2004-05 on 20 year old plants of litchi cv. Dehradun. Air layering was done in the month of July on one year old, 25-30 cm long shoots by removing a bark ring of 2-3 cm from the base. Rooting media comprised of soil and FYM (150g) in the ratio of 1:1, 2:1 or 3:1, covered with moist sphagnum moss weighing 15, 20 or 25g. Under control, three components were mixed in equal quantity. Adequate water was used to moisten the rooting media in each case. In all, there were 10 treatments, each of 100 layers, replicated thrice under RBD. Data pertaining to the influence of composition of rooting media on the development of roots i.e. number of main roots, number of side roots, root length were recorded at the time of detachment of rooted layers from the mother plants while shifting to the nursery beds, during the second week of June in the following year. Success of layers in the nursery beds was recorded later after three months of their plantation.

Results and Discussion

Data pertaining to the influence of composition of rooting media on the development of roots and success of the rooted layers in the litchi nursery are presented in table 1.

A. Root development

i) Main roots: Media used in different proportions proved to be quite influential in improving the formation of main roots when compared with control. Its number increased from 43.5 to 53.6 during the first year, and 45.3 to 52.1 during the second year of observation. Increased ratio of soil in the media decreased the number of main roots of the layers from 56.5 (M_1) to 49.1 (M_3), though M_1 and M_2 did not differ significantly from each other. Increased quantity of moss in the media increased the number of main roots from 48.2(m_1) to 57.4(m_3) during the first year, though the difference between m_2 and m_3 was statistically at par. Similar were the results during the second year of study. Interaction between media M and m was noticed to be non-significant.

ii) Side roots: FYM as well as the quantity of moss grass used under different treatments had a significant influence on the formation of side roots in the litchi layers. Number of side roots, which was 48.6 and 42.5 under control during both the years, increased respectively to 63.9 and 59.9

Table 1. Effect of composition of rooting media on the development of roots and success of layers in litchi nursery

Media (Soil:FYM) + Moss (g)	Root development						Success of layers (%)	
	Main roots (No.)		Side roots (No.)		Root length (cm)			
	I	II	I	II	I	II	I	II
(1:1) 15	49.7	50.2	55.2	50.0	8.20	8.08	73.30 (58.90)*	76.0 (60.0)
(1:1) 20	51.1	58.1	74.6	69.7	8.55	8.38	87.40 (69.28)	89.6 (71.41)
(1:1) 25	60.8	60.3	79.6	73.1	8.83	8.55	90.8 (72.75)	92.7 (74.38)
(2:1) 15	49.7	47.2	53.6	48.0	7.82	7.65	70.4 (57.05)	72.2 (58.19)
(2:1) 20	56.9	55.4	71.4	66.4	8.26	8.25	85.7 (67.82)	88.0 (70.14)
(2:1) 25	59.0	57.3	75.7	70.8	8.60	8.40	88.1 (69.93)	90.0 (71.72)
(3:1) 15	45.3	42.4	50.2	44.7	7.62	6.52	64.1 (53.21)	62.0 (52.04)
(3:1) 20	49.6	47.3	55.8	57.6	7.80	7.68	82.2 (65.09)	81.6 (64.76)
(3:1) 25	52.4	50.4	58.9	58.3	8.18	8.05	86.4 (68.37)	86.3 (68.59)
Mean (for media)	53.6	52.1	63.9	59.9	8.09	7.95	80.9 (64.71)	82.0 (67.77)
Control	43.5	45.3	48.6	42.5	7.51	7.31	68.5 (55.87)	70.0 (58.60)
Mean for:								
Soil:FYM (M)								
M_1 (1:1)	56.5	56.2	69.8	64.3	8.53	8.34	83.8 (65.97)	86.1 (68.83)
M_2 (2:1)	55.2	53.3	66.9	61.7	8.23	8.10	81.4 (64.93)	83.4 (66.68)
M_3 (3:1)	49.1	46.7	55.0	53.6	7.53	7.42	77.6 (62.22)	76.6 (61.79)
Moss (m)								
m_1 (15 g)	48.2	46.6	53.0	47.6	7.55	7.42	69.3 (56.38)	70.1 (56.97)
m_2 (20 g)	55.2	53.6	67.3	64.6	8.20	8.10	85.1 (67.40)	86.4 (68.77)
m_3 (25 g)	57.4	56.0	71.4	67.4	8.54	8.33	88.4 (70.35)	89.7 (71.56)
CD (P=0.05)								
M	4.6	3.4	5.7	2.9	0.35	0.33	3.59	3.94
m	4.6	3.4	5.7	2.9	0.35	0.33	3.59	3.94
M x m)	NS	NS	NS	NS	NS	NS	NS	NS
Control v/s Media	2.0	2.7	4.4	1.6	0.27	0.26	2.13	3.05

* Figures in parentheses are angular transformed values; I= Year 2003-04; II= Year 2004-05

under each rooted layer. The lowest number of side roots was recorded (55.0, 53.6) when the ratio of soil: FYM was the highest (M_3), and it improved with its successive lower ratio during the two years, though the media M_1 and M_2 did not differ significantly during the study period. Increased quantity of moss grass in the media, increased the number of side roots considerably, and it was maximum (71.4, 67.4) with 25g of sphagnum moss used (m_3) during the study, though m_2 and m_3 did not differ from each other. Interaction due to soil:FYM ratio(M) and moss grass (m) was noticed to be non-significant during both the years under study.

iii) Root length: Rooting media exhibited a pronounced influence on the development of root length in the layers. Mean value for root length was observed to be 8.09 cm and 7.95 cm under different treatments in comparison to 7.51 and 7.31 respectively under control during the two years of study. It was noticed to be maximum (8.53 cm and 8.34 cm) when soil and FYM was used in equal quantity (M_1) and decreased with higher ratio of soil, though M_1 and M_2 were at par. Root length improved with increased quantity of moss in media though m_2 and m_3 remained statistically at par with each other during the two years of experimentation. Interaction effects were found to be non-significant.

B. Success percentage

Survival of the layers in the nursery was found to be greatly influenced by the components of the media used for propagation. The percentage of success was much higher (80.9 and 82.0) during the two years in comparison to control (68.5, 70.0). It was highest (83.8%) during the first year when soil: FYM was used in equal proportion (M_1) and further increase in soil component decreased the percentage of success, though the media M_1 and M_2 were at par with each other. However, the rate increased with increased moss component, though m_2 and m_3 also, did not differ significantly from

each other. Similar observations were recorded during the second year of study. Interaction effects were found to be non-significant.

The study reveals that the composition of rooting media had a pronounced influence on the development of roots in terms of number of main roots, number of side roots, average root length and the final success of rooted layers in the litchi nursery. It was noticed that rooting media comprising of soil and FYM (2: 1) with 20g of moss grass wrapped around it was the best combination to get the desired results. Mixing moss grass with soil and FYM, as is the general practice, is of no use, as the basic purpose of the moss used is to hold water and keep the media wet, under the polythene used as wrapper. Bose (1985) suggested that rooting media consisting of two parts of soil, one part of sand and one part of leaf mould or cow dung manure or sphagnum moss properly soaked in water should be used in the form of a ball, as a media for layering in litchi. Sinha and Ray (2002) while studying the effects of growth regulators on air layering in litchi, covered the prepared layers simply with mud and later wrapped it in polythene sheet. Sharma and Grewal (1989) used a ball of sphagnum moss as media for litchi rooting while studying propagation techniques in litchi.

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