Himachal Journal of Agricultural Research 34 (1):53-55, 2008

Effect of triacontanol on the growth and success of litchi nursery plants

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Abstract

Triacontanol (0-25 ppm) was sprayed (1 to 3) on the nursery plants of litchi cv. Dehradun in the months of May, June and July. The chemical had a pronounced effect on the growth as well as on the establishment of the plants. Plant growth in terms of girth, height, shoot growth, as well as success of the plants was recorded to be better with 20 ppm triacontanol applied during May and June.

Keywords: Triacontanol, litchi, growth, success.

Introduction

Triacontanol is one of the important plant growth regulators used for modification of various growth and developmental processes of the plants. It was isolated as a crystalline substance from lucerne and noticed to stimulate respiration, water uptake and dry weight (Ries *et al.*, 1977). Beneficial effects of triacontanol have also been reported in some fruit plants i.e. improved fruit set in litchi (Zhuang *et al.*,1984); better fruit size and quality in apricot (Sud and Parmar, 1990), plum (Parmar *et al.*,1991), peach (Sud and Thakur,1998) and litchi (Rana *et al.*2004). As triacontanol has not been tried earlier on fruit nursery, the present studies were undertaken to study the impact of this chemical sprayed at different stages on the growth and success of litchi nursery plants.

Material and Methods

The present studies were undertaken at Litchi and Mango Research Station, Nagrota Bagwan, during 2005 and 2006 on the nursery plants of litchi cv. Dehradun. Five concentrations of triacontanol (5,10,15,20,25 ppm) were sprayed at three stages i.e. once in the month of May, twice (May and June) or thrice (May, June and July). The plants under control were kept unsprayed. In all, there were 16 treatments each comprising of 400 plants, replicated thrice under RBD. Plant growth in terms of girth, height, shoot growth and final success of plants in the nursery was worked out during the end of August in each year.

Results and Discussion

Data pertaining to the influence of triacontanol on the plant girth, height, shoot growth and success of plants in the nursery are presented in table 1.

***Plant girth*:** Plant girth in general, improved by the application of triacontanol (0.98cm, 0.94 cm) irrespective of different treatments in comparison to control (0.82 cm, 0.80 cm), during the two years of study. Different concentrations of the chemical as well as the number of sprays applied had a pronounced influence on the girth of litchi plants. Plant girth increased with the increased concentration of triacontanol and was maximum (1.08 cm, 1.03 cm) with the highest dose of 25 ppm which was at par with that of 20 ppm during the study period. Similarly, it enhanced with the number of sprays applied at different times, though the maximum girth (1.00 cm, 0.97 cm) observed under 3 or 2 sprays did not differ statistically during the two years. Interactions due to concentrations of triacontanol and the number of sprays applied were non-significant.

***Plant height*:** As in case of plant girth, the height was influenced considerably with the application of triacontanol. It increased significantly (40.74 cm, 45.74 cm) irrespective of various treatments in comparison to control. Increased concentration of the chemical increased the plant height considerably and was noticed to be maximum (44.12 cm, 50.30 cm) with its highest concentration of 25 ppm though it was at par with the next lower dose of 20 ppm, during two years of observation. Increased number of its sprays applied at monthly intervals also resulted in improvement of plant height though under the higher number of 2 or 3 sprays, the results did not differ significantly. Interaction effects between the concentrations and the number of sprays were seen to be non-significant.

Table 1. Effect of triacontanol on the growth and success of litchi nursery plants (cv. Dehradun)

Triacontanol	Plant girth (cm)		Plant height (cm)		Shoot growth (cm)		Success (%)	
	I	II	I	II	I	II	I	II
Concentration (ppm)								
5	0.83	0.84	35.46	39.82	8.03	8.40	72.73	70.70
10	0.87	0.88	38.73	43.23	8.13	8.69	76.40	73.80
15	1.03	0.96	41.53	47.17	9.28	9.27	80.10	77.90
20	1.06	1.02	43.87	49.60	11.27	11.75	85.23	82.70
25	1.08	1.03	44.12	50.30	11.36	11.91	85.93	83.10
CD (P=0.05)	0.03	0.03	1.21	1.72	0.36	0.23	1.09	0.89
Sprays(No.)								
1.	0.94	0.90	38.97	42.22	8.52	8.88	78.60	76.18
2.	0.99	0.96	41.20	46.48	10.02	10.40	80.42	78.08
3.	1.00	0.97	42.05	47.37	10.30	10.57	81.22	78.64
CD (P=0.05)	0.02	0.02	0.94	1.34	0.29	0.13	0.83	0.70
Mean for triacontanol								
Control	0.98	0.94	40.74	45.54	9.61	9.96	80.08	77.50
	0.82	0.80	34.30	38.20	7.60	8.10	70.20	68.60
	0.04	0.05	2.09	2.99	0.62	0.40	1.90	1.55
Interaction (Triacontanol x No. of Sprays)								
C1 N1	0.81	0.82	34.10	38.55	7.00	72.10	72.10	70.20
C1 N2	0.84	0.84	35.90	39.80	8.40	8.90	72.70	70.80
C1 N3	0.85	0.85	36.40	41.10	8.70	9.10	73.40	71.20
C2 N1	0.83	0.83	36.70	41.10	7.40	7.90	74.40	72.10
C2 N2	0.88	0.89	39.10	43.70	8.40	8.98	77.00	74.20
C2 N3	0.89	0.91	40.40	44.90	8.60	9.16	77.80	75.00
C3 N1	0.99	0.88	39.60	45.25	8.00	8.30	78.60	76.40
C3 N2	1.04	0.99	42.10	47.90	9.80	9.68	80.30	78.30
C3 N3	1.05	1.01	42.90	48.35	10.03	9.82	81.40	79.00
C4 N1	1.01	0.97	42.20	47.90	10.00	10.10	83.40	80.50
C4 N2	1.08	1.03	44.30	50.10	11.80	12.08	85.90	83.60
C4 N3	1.09	1.05	45.10	50.80	12.02	12.28	86.50	83.90
C5 N1	1.04	0.99	42.30	48.30	10.20	10.90	84.60	81.70
C5 N2	1.09	1.05	44.60	50.90	11.70	12.35	86.20	83.50
C5 N3	1.10	1.06	45.40	51.70	12.17	12.48	87.00	84.10
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS

I: Year 2004 II: Year 2005

Shoot growth: Shoot growth of litchi plants was also found to be influenced with the application of graded doses of triacontanol sprayed in different numbers. Shoot growth increased considerably with the application of this chemical (9.61cm, 9.96 cm) in comparison to control (7.60 cm, 8.10 cm) irrespective of its treatments during the two years. Increased concentrations improved the shoot growth significantly, though the higher doses of 20 ppm and 25 ppm did not differ and remained at par with each other. Similarly, with increased number of foliar sprays, the growth of shoots increased, which was maximum (10.30 cm, 10.57 cm) with the application of three sprays though statistically at par with two sprays. Interactions were found to be non significant.

***Success*:** The success percentage of litchi nursery plants increased significantly (80.08, 77.50 %) with the application of triacontanol during the study period of two years when compared with control (70.20, 68.60 %). Increased concentrations of the chemical resulted in considerable improvement in this respect, though, the higher concentrations of 20 and 25 ppm did not differ statistically from each other. The percentage of success was lowest when a single spray was applied, which increased with the higher number of sprays, though the affects due to 2 or 3 number of sprays were at par.

The study revealed that the growth as well as the success of litchi plants in the nursery are influenced significantly with the application of triacontanol sprayed at different times. 20 ppm of triacontanol applied during May and June was observed to be the best treatment resulting in optimum plant growth in terms of girth, height, shoot growth as well as their establishment in the nursery. Increased growth as well as success of plants in the nursery could be due to increased photosynthesis, as a result of triacontanol application (Ries *et al.*, 1977; Mahajan *et al.*, 1991). Better response of the chemical applied during the first two months of May and June may be attributed to the early and active stage of foliage development resulting in enhanced photosynthetic activity.

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