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RESPONSE OF VARIOUS ROOTING HORMONES ON THE ROOTING OF ROSE CUTTINGS

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Abstract

The present study was conducted at the post graduate research laboratory at Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu, India, during march 2016. The experiment was laid out in Completely Randomized Block design with three replications to determine the rose cuttings response to auxins i.e. indole-3-butyric acid (IBA) and naphthalene acetic acid (NAA) at 15, 30, 45, 60 and 75 ppm concentrations. Both auxins shown significant results on all rooting and growth parameters. Among the different concentrations used 75 ppm IBA recorded best results in number of leaves, shoot fresh weight (g), root length (cm) and number of visible roots in polyantha rose cuttings.

Introduction

Roses are best known as ornamental plants grown for their attractive flowers in the garden and indoors and are used for commercial perfumery and commercial cut flower crops. Some are used as landscape plants, production of petals, making rose oil, rose water, rose wine, rose marmalade, rose jam, rose crystallized petals, rose honey, extraction of perfumes, extraction of vitamin C from hips, for medicinal uses and for sale as cut flowers. Some are used as landscape plants, for hedging and for game cover and slope stabilization. These plant species are propagated true to type from somatic cells through cutting, budding, grafting, layering etc. Among these the use of stem cuttings is the most easy and common method for growing roses (Anderson and Woods, 1999). The establishment and success rate of cutting depends on many factors like season of cutting, age, portion of the branch, growth media, moisture and nutrient status.

Provision of optimal growing conditions and proper timing may enhance the establishment and growth of cutting (Steel and Torrie, 1980). Root development is highly dependent on auxin and auxin transport. Auxin is essential for root development. Synthetic root promoting chemicals that have been found most reliable in stimulating adventitious root production in cuttings. Therefore, many kinds of chemicals have been used with the aim to induce root formation in species which are difficult to propagate or increase the number and extent of roots in others that develop slowly (Arteca, 1996). Synthetic auxin compounds are available in commercial preparations, like talc or concentrated liquid formulations and can be diluted with water to the proper strength. Keeping in view the role of plant growth regulators and growing media, indole-3-butyric acid (IBA) and naphthalene acetic acid (NAA) were taken to evaluate their effect on the growth of rose cuttings.

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Materials and Methods

The research study was conducted at the post graduate research laboratory at Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu, India during March 2016. The experiment was laid out in Completely Randomized Block design with three replications. Disease free uniform semi hardwood rose cuttings of 15 cm long were applied with dilute solution of growth regulators using dip method for 24 hours at room temperature. These cuttings were planted

Table 1: Effect of Growth Regulator on Plant Growth Parameters on 20 th day of the experiment.

Growth Regulator	Number of Bud sprouts	Number of Leaves	Shoot fresh weight (g)	Number of visible root	Root length (cm)
T_1 - 15 ppm IBA	1.91	2.35	2.87	3.71	2.06
T_2 - 30 ppm IBA	1.82	3.57	3.01	3.78	2.52
T_3 - 45 ppm IBA	2.68	3.84	2.98	4.12	2.78
T_4 - 60 ppm IBA	2.19	4.52	2.78	4.34	3.03
T_5 - 75 ppm IBA	2.78	4.94	3.76	5.23	3.16
T_6 - 15 ppm NAA	1.01	3.10	2.56	2.99	2.67
T_7 - 30 ppm NAA	1.23	3.28	2.61	3.61	2.12
T_8 - 45 ppm NAA	1.91	3.37	2.11	3.89	2.45
T_9 - 60 ppm NAA	2.13	4.86	3.12	4.86	3.01
T_{10} - 75 ppm NAA	2.71	4.67	2.96	5.02	2.87
T_{11} - Control	0.76	1.98	1.03	1.76	1.08
S.Ed.	0.07	0.12	0.09	0.13	0.10
CD (P=0.05)	0.15	0.25	0.19	0.27	0.21

Table 2: Effect of Growth Regulator on Plant Growth Parameters on 30 th day of the experiment.

Growth Regulator	Number of Bud sprouts	Number of Leaves	Shoot fresh weight (g)	Number of visible root	Root length (cm)
T_1 - 15 ppm IBA	4.12	6.98	5.99	7.59	4.21
T_2 - 30 ppm IBA	4.89	7.12	6.12	8.67	3.97
T_3 - 45 ppm IBA	5.67	8.91	6.74	8.21	4.23
T_4 - 60 ppm IBA	5.23	8.56	6.65	9.02	4.87
T_5 - 75 ppm IBA	6.03	9.34	7.02	9.12	5.32
T_6 - 15 ppm NAA	3.82	7.38	5.81	7.49	3.96
T_7 - 30 ppm NAA	4.22	7.97	5.86	7.11	4.85
T_8 - 45 ppm NAA	4.71	8.13	5.12	7.56	4.23
T_9 - 60 ppm NAA	5.72	9.04	6.93	8.13	4.56
T_{10} - 75 ppm NAA	5.78	8.94	6.89	8.92	5.12
T_{11} - Control	2.05	3.82	2.79	2.87	1.35
S.Ed.	0.12	0.15	0.11	0.19	0.14
CD (P=0.05)	0.25	0.29	0.23	0.29	0.29

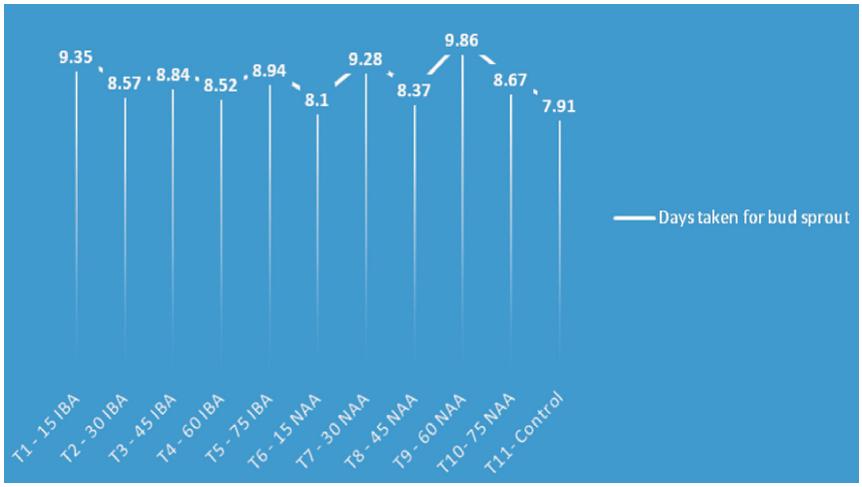

Fig. 1: Days taken for bud sprout.

on a growing medium consisted of sand, red soil and dried FYM at a ratio of 1:1:1 and planted in black grow bag of 7 × 9 cm size as one cutting planted in each bag and were placed in open air. Irrigation water was sprayed by hand sprayers without disturbing the cuttings during the rooting period. The data pertaining to the study were recorded at 10th, 20th and 30th days, data was recorded on certain parameters like days taken to bud sprouting, number of leaves, number of visible roots, root length (cm) and shoot weight (g).

Results and Discussion

Days taken for bud sprouting was significantly affected with growth regulator application and minimum number of days to sprouting of 7.91 days (Fig. 1) was noted in control indicating the effect of growth regulators in delaying the bud sprouting. The maximum days to sprouting was observed in IBA 60 ppm. The delay in sprouting on account of growth regulator application is due to higher metabolic activity causing a greater flow of metabolites to the growing bud (Sun and Chen, 1998). Number of bud sprouts was highest in treatment applied with 75 ppm IBA (Table 1 & 2) (Fig. 1). Application of IBA shown to produce a higher yield of roots compared to the other auxins (Rout, 2006). The effect of IBA is in concurrence with other studies where IBA is the most commonly used auxin for root formation (Pooja Goyal, 2012). *When rooting becomes faster it induces shoot growth and produces new* bud sprouts.

Number of Leaves gradually increased with increase in growth regulator concentration. The maximum number of leaves 9.34 was recorded at 30th day, when the cuttings were treated with 75 ppm IBA (Table 1 & 2) (Fig. 1). The control treatments significantly produced the lowest number of leaves (3.82) per cutting. Increase in leaf number may be due to their significant effect on inducing vigorous rooting

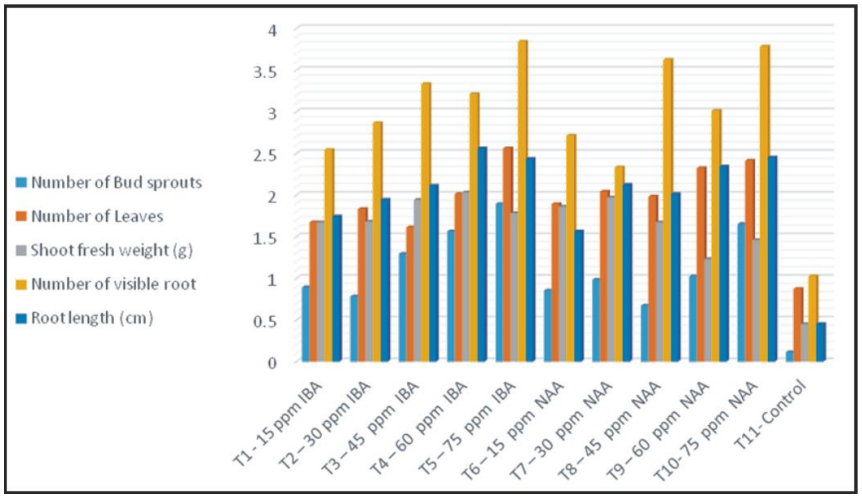

Fig. 2: Effect of Growth Regulator on Plant Growth Parameters on 10 th day of the experiment.

system by growth regulators thus enabling the cuttings to absorb more nutrients thereby producing more leaves as reported by Prati *et al.,* (1999) and Stancato *et al.,* (2003). Shoot fresh weight increased with increase in growth regulator and maximum weight recorded in 75 ppm IBA appropriate distribution of auxin has been shown to be necessary for a number of developmental processes Cooke *et al*., 1993.

Number of visible roots and length of the roots significantly affect growth regulator application and roots increase with increased concentration of growth regulator application (Table 1 & 2) (Fig. 1). Root development is highly dependent on auxin and auxin transport (Uma and Gowda, 1991). Lateral roots originate in the root pericycle, in which individual quiescent cells are stimulated to dedifferentiate and proliferate to form the lateral root primordium and it differentiate and elongate, causing the lateral root to emerge through the primary root epidermis (Blakely and Evans, 1979). Several lines of evidence indicate that auxin is necessary for the development of lateral roots. Application of IBA to growing plants stimulates lateral root development and lateral root elongation (Torrey, 1950; Blakely *et al*., 1982).

Conclusion

Application of both growth regulators have a significant effect on the rooting and development of rose cutting. IBA have more strong beneficial effect and effective concentration of IBA recorded maximum performance was 75 ppm. This may be due to the dynamic and environment responsive pattern of auxin distribution within the plant. Auxin distribution is a key factor for plant growth, its reaction to its environment and specifically for development of plant organs. This is achieved through very complex, coordinated and active transport of auxin molecules from cell to cell throughout the plant body.

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