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Effect of Various Hormones and Different Rootstocks on Rose Propagation

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Abstract: A study was conducted to observe the effects of two hormones viz., Indole Butyric Acid (IBA) and Seradix-A on growth and rooting percentage of *Rosa bourboniana* cuttings. Experiment was laid out according to Randomized Complete Block Design and there were four treatments, replicated four times. In the second experiment two *Rosa* species i.e. *Rosa bourboniana* and Gruss an teplitz were selected as rootstocks and three hybrid tea rose cultivars, i.e. Kardinal, Gold medal and Whisky mac were budded on them to study their compatibility, growth and development. Experiment was laid out according to Randomized Complete Block Design with factorial arrangements and replicated thrice. Data were collected fortnightly on various growth and development indices. In the first experiment Seradix-A exhibited best results for different parameters of *Rosa bourboniana* followed by 1000 ppm of IBA and 500 ppm of IBA, respectively while control showed the minimum results which indicates positive effect of rooting hormones to increase sprouting and rooting %age. In second experiment cultivars Gold medal, Whisky mac and Kardinal showed maximum growth and flowering when budded on Gruss an teplitz as compared to *Rosa bourboniana*. As for as varieties are concerned, Gold medal performed better than Whisky mac and Kardinal.

Key words: Rooting hormones, *Rosa*, rootstock, propagation

INTRODUCTION

Rose, a woody perennial of various sizes, has a great diversity in its growth habit, flower form, colour, fragrance and period of blooming. Roses are conventionally propagated by cuttings, budding, grafting and layering. Cuttings and budding would be the simplest way to increase the desirable rose varieties. Success rate through cuttings is limited in most of rose varieties due to failure in root formation. This problem can be overcome by use of growth regulators. Auxins have shown great effect on rooting and are commercially used today. Both IBA and NAA are typically the principle auxins used for rooting of cuttings and majority of plant species are responsive to them[1]. The compounds which are commonly used for root induction include IBA and Seradix[2]. Bhujbal and Kale[3] treated cuttings of *Rosa multiflora*, *Rosa bourboniana* and *Rosa moschata* with 500, 1000 and 1500 ppm of IAA, IBA and IAA+IBA before planting. *Rosa multiflora* produced maximum percentage of rooted cuttings (90%) along with more number and length of roots in response to 1000 ppm of IAA+IBA. *Rosa bourboniana* performed relatively poorly through out, doing best in response to IBA at 1000 ppm. Balakrishnamurthy *et al.*[4] dipped soft-wood, semi-hard wood and hard-wood cuttings of the Bourbon hybrid Cv. Edward in IBA at 1000 ppm and observed that hard wood cuttings gave 73.3% rooting and highest plant survival values assessed 30 days after potting. Application of IBA @ 1000 ppm resulted 95.32% rooting as compared to untreated cuttings[5].

For hybrid tea rose propagation, garden cultivars are propagated by budding. Budding is a recognized commercial method of propagating roses throughout the world[6]. Rose cultivars Superstar, Happiness and Queen Elizabeth gave better yield when budded on *R. indica* Var. Oclorata[7]. Varies and Dubois[8] observed that in grafted plants, vigor of the genotype used as a stock is transferred to the scion and thus influences growth and productivity. The best selected varieties of rose were mostly propagated on the most vigorous rootstocks. Keeping in view the above mentioned multifarious characters, these experiments were carried out to study propagational aspects of *Rosa* as influenced by various hormones and different rootstocks. The objective of this study was to find out best compatible rootstock for hybrid tea roses and to improve rooting %age in *Rosa bourboniana* by using various hormones.

MATERIALS AND METHODS

The present research project was carried out in Institute of Horticultural Sciences, University of Agriculture, Faisalabad, during 2003. In first experiment six inches long hard wood stem cuttings of *Rosa bourboniana* were taken from uniform, healthy and vigorous plants of equal age. Two synthetic growth regulators i.e. Indole butyric acid (IBA) and Seradix-A

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were used for treatment of cuttings through quick dip method.

The experiment was laid out according to randomized complete block design with four treatments replicated four times. Each treatment comprised twenty five cuttings. Treatments were T_0 (control), T_1 (500 ppm of IBA), T_2 (1000 ppm of IBA) and T_3 (Seradix-A). All other cultural practices were same during entire period of study and data on mortality percentage, number of sprouted buds, plant height, width of plant, number of flowers, number of branches, length of branches, number of roots and length of roots was collected by adopting standard procedures.

In second experiment two *Rosa* species, i.e. *Rosa bourboniana* and Gruss an teplitz were used as rootstock. One-year-old plants were uprooted, roots were trimmed and bare rooted plants were transplanted. One hundred and twenty plants of two rootstocks (sixty each) were planted in the field in three replications. There were twenty plants of each rootstock in each replication. After transplanting three scion cultivars i.e. Kardinal (V_1), Gold medal (V_2) and Whisky mac (V_3) were budded on the rootstocks by using T-budding method at a height of 8 inches from soil level. The plants were allowed to grow and data on their growth performance regarding mortality percentage, plant height, number of branches, number of flowers and flower stem length were recorded. The experiment was laid out according to RCBD with factorial arrangements. All the data were analyzed statistically and means were separated using Duncan's Multiple Range Test at 5% probability level[9].

RESULTS AND DISCUSSION

Influence of hormones on growth and flowering: As for as mortality percentage is concerned, it was minimum with T_3 (Seradix-A) followed by T_2 (1000 ppm of IBA) and T_1 (500 ppm of IBA), respectively whereas T_0 (control) exhibited maximum mortality rate which indicates positive effect of using rooting hormones to increase survival rate. These results are in accordance with the findings of Balakrishnamurthy *et al.*[4]. In case of number of sprouted buds T_3 (Seradix-A) excelled rest of the treatments by producing 4.0 buds whereas T_0 (control) lies at the bottom. Results pertaining to plant height revealed significant superiority of T_3 (Seradix-A) over rest of the treatments by producing 57.1 cm tall plants. T_1 (500 ppm) of IBA) and T2 (1000 ppm of IBA) secured second and third positions, respectively while control produced only 46.8 cm height of plants. Akhtar[10] has also reported similar findings. For plant width T_2 (1000 ppm of IBA) expressed its significant superiority over all other treatments by producing 11.1 cm width of plant followed

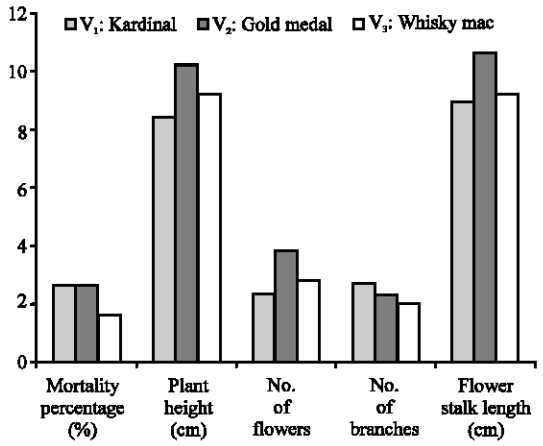

Fig. 1: Growth and development of Kardinal (V_1), Gold medal (V_2) and Whisky mac (V_3) as influenced by *Rosa bourboniana* rootstock

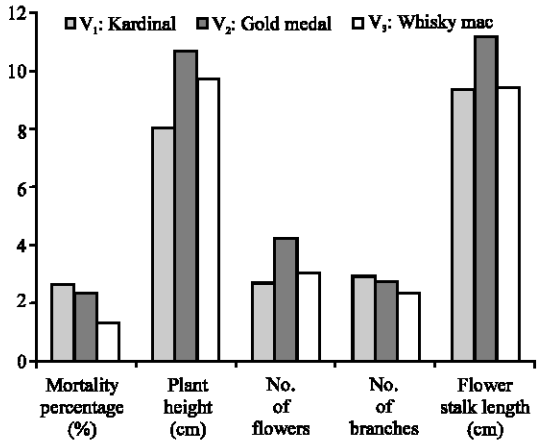

Fig. 2: Growth and development of Kardinal (V_1), Gold medal (V_2) and Whisky mac (V_3) as influenced by *Rosa* Gruss-an-teplitz rootstock

by T_3 (Seradix-A) and T_1 (500 ppm of IBA) with width of 9.1 and 7.9 cm, respectively. Control produced only 6.9 cm width (Table 1). These results are in line with the findings of Rathore *et al.*[11].

As for as number of branches was concerned, T_3 (Seradix-A) exhibited significant superiority over all other treatments. T_2 (1000 ppm of IBA) and T_1 (500 ppm of IBA) behaved significantly alike while control lies at the bottom. These results confirmed the findings of Al-Rawi[12]. Number of flowers was maximum with T_3 (Seradix-A) followed by T_2 (1000 ppm of IBA) and T_1 (500 ppm of IBA), respectively. Control produced fewer flowers as compared to treatments where rooting hormones were applied. The length of branches was maximum with T_2 (1000 ppm of IBA), i.e. 30.0 cm. T_3 (Seradix-A) and T_1 (500 ppm of IBA) produced average

Table 1: Mean efficacy of various hormones on different growth indices of *Rosa bourboniana*

	Mortality percentage (%)	No. of sprouted buds	Plant height (cm)	Width of plant (cm)	No. of flowers	No. of branches	Length of branches (cm)	No. of roots	Length of roots (cm)
T_0 (0ppm IBA)	8.5a	2.2c	46.8c	6.9c	1.4c	1.7c	20.2c	6.3d	2.7b
T_1 (500 ppm IBA)	6.5b	3.1b	51.6b	7.9c	2.1b	2.4b	22.8b	7.4c	2.8b
T_2(1000 ppm IBA)	4.8b	3.3b	50.8b	11.1a	2.3b	2.7b	30.0a	11.1a	4.1a
T_3 (Seradix-A)	3.2c	4.0a	57.1a	9.1b	2.9a	3.5a	24.3b	9.4b	3.9a

Means with same letter in a column are statistically non-significant at $p<0.05$

length of branches 24.3 and 22.8 cm, respectively. Control produced only 20.2 cm long branches (Table 1). Al-Rawi[12] and Akhtar[10] has reported similar findings.

Effect of hormones on rooting: Results regarding number of roots showed that T_2 (1000 ppm of IBA) produced maximum average number of roots per cutting. T_3 (Seradix-A) and T_1(500 ppm of IBA) followed as second and third position, respectively while control produced least number of roots. These results are in accordance with the findings of Davies *et al.*[13]. As regarding length of roots, T_2 (1000 ppm of IBA) excelled rest of the treatments followed by T_3 (Seradix-A) and T_1 (500 ppm of IBA), respectively while control produced least average length of roots. However, T_2 and T_3 exhibited almost equal root length which was significantly more than T_0 and T_1 which are statistically non significant with each other (Table 1). These results are in line with the findings of Balakrishnamurthy *et al.*[3] and Pivetta *et al.*[5].

Effect of rootstock on growth and development: As for as varieties were concerned, mortality percentage was 1.3, 2.3 and 2.6% in Whisky mac, Gold medal and Kardinal, respectively when budded on Gruss an teplitz (Fig. 2) whereas in case of *Rosa bourboniana* it was 1.6, 2.6 and 2.6 for Whisky mac, Gold medal and Kardinal, respectively (Fig. 1). The rootstock Gruss an teplitz produced the promising results as compared with *Rosa bourboniana* whereas Whisky mac produced less mortality percentage 1.5% followed by Gold medal and Kardinal with 2.5 and 2.6%, respectively. In case of plant height, cultivars budded on Gruss-an-teplitz produced more height as compared to *Rosa bourboniana.* Cultivars Gold medal, Whisky mac and Kardinal produced 10.6, 9.7 and 8.0 cm height, respectively when budded on Gruss an teplitz (Fig. 2). The height in case of *Rosa bourboniana* was 10.2, 9.2 and 8.4 cm for Gold medal, Whisky mac and Kardinal, respectively. The rootstock Gruss an teplitz produced the promising results as compared to *Rosa bourboniana* whereas Gold medal produced maximum plant height (10.2 cm) followed by Whisky mac and Kardinal with 9.2 and 8.4 cm, respectively (Fig. 1). These findings are in agreement with Aslam[14] and Singh[15].

Different cultivars produced more average number of branches on Gruss an teplitz (2.6) as compared with *Rosa bourboniana* (2.3). Among the cultivars Kardinal produced maximum number of branches (2.9) followed by Gold medal (2.7) and Whisky mac (2.3). Kardinal exhibited best results as compared to other cultivars. On the other hand Gruss an teplitz produced maximum number of branches per plant when compared with *Rosa bourboniana.* These results confirmed the findings of Meneve and Moermans[16]. Flower stalk length for Gruss an teplitz was 11.1, 9.4 and 9.3 for Gold medal, Whisky mac and Kardinal, respectively (Fig. 2). In case of *Rosa bourboniana,* results were 10.6, 9.2 and 8.9 cm for Gold medal, Whisky mac and Kardinal, respectively (Fig. 1).

Number of flowers produced per plant was 4.2, 3.0 and 2.7 in case of Gold medal, Whisky mac and Kardinal respectively when budded on Gruss an teplitz whereas in case of *Rosa bourboniana* the number of flowers per plant was 3.8, 2.8 and 2.3 for Gold medal, Whisky mac and Kardinal, respectively. Gruss an teplitz produced maximum number of flowers as compared to *Rosa bourboniana*. As for as varieties are concerned, Gold medal produced maximum flowers (4.0) as compared to Whisky mac and Kardinal with 2.9 and 2.5 flowers, respectively. These results are supported by the work of Malik[7], Alam and Khan[17].

Seradix-A resulted more rooting percentage as compared to control and different levels of IBA in *Rosa bourboniana.* More rooting also promoted growth and development in *Rosa bourboniana.* As for as varieties are concerned, mortality %age was 1.33, 2.33 and 2.67 in Gold medal, Whisky mac and Kardinal, respectively on Gruss an teplitz. Moreover Gruss an teplitz is more compatible with hybrid tea roses as compared to *Rosa bourboniana.* Gold medal exhibited more response to both rootstocks as compared to Whisky mac and Kardinal. For good quality cut flower production, best rootstock and scion cultivars should be selected which best suits to agro-climatic conditions of the area and have high market demand to get maximum yield.

REFERENCES

1. Arteca, R.N., 1996. Plant Growth Substances. Chapman and Hall Inc., New York, USA., pp: 131-140.

2. Pandy, S.N. and B.K. Sinha, 1997. Plant Physiology. Vikas Publishing House Pvt. Ltd., New Dehli, India, pp: 428-514.
3. Bhujbal, B.G. and P.N. Kale, 1973. Effect of some growth regulators on rooting of cutting of different rootstocks of rose (*Rosa* sp.). Punjab Hort., 13: 50-53.
4. Balakrishnamurthy, G., V.N.M. Roa and Shanmugavelu, 1988. Effect of season and woodiness on the rooting ability of Edward rose cuttings. South Indian Hort., 34: 362-366.
5. Pivetta, K.F.L., A.G. Martin, F.K. Ruffini, L.R. Ledra, G. Fisher and A. Angrivata, 1999. Effect of rooting media, indole buteric acid and fertilization on rooting of rose (*Rosa* sp. Dalas) leafy cuttings. Acta Hort., 482: 339-342.
6. Gault, S.M. and P.M. Synge, 1987. The dictionary of roses on colours. Published on collaboration with the Royal Horticultural Society and the National Rose Society, pp: 31-32.
7. Malik, R.S., 1980. Studies on production of rose for cut flowers. Proc. National Seminar on Production Technology for Commercial Flower Crops. Tamil Nadu Agri. Univ., Coimbatore, India, pp: 51-54.
8. Varies, D.P. and L.A.M. Dubois, 1990. Shoot production of 'sonia' on hybrid tea rootstock clones of different vigour. Gartenabuwissenschaft, 55: 268-271.
9. Steel, R.G.D. and J.H. Torrie, 1980. Principles and Procedures of Statistics. 2nd Edn. McGraw Hill Book Co., New York.
10. Akhtar, M.S., 1996. Response of different rose cultivars to a root promoting hormone. M.Sc. Thesis, Univ. Agri., Faisalabad, Pakistan.
11. Rathore, H.S., S.M. Singh and A.D. Chabra, 1975. Effect of plant regulators and their concentrations on the performance of soft-wood cuttings of guava. Haryana Agri. Univ. J.Res., 5: 146-147.
12. Al-Rawi, A.K., 1976. Influence of IBA on rooting of soft wood cuttings of *Olea europea* Cv. Ashrosy. Mesopotamia J. Agri., 11: 37-43.
13. Davies, F.T., Jr. Lazarte and J.N. Joiner, 1982. Initiation and development of roots in juvenile and mature leaf cuttings of *Ficus pumila* L. Amer. J. Bot., 69: 804-811.
14. Aslam, M., 1969. Studies on the influence of 5 different rootstocks on vegetative growth, productivity and flower quality of garden cultivars of roses. M.Sc. Thesis, WPAU., Lyallpur, Pakistan.
15. Singh, S.N., 1980. Effect of rootstock on growth, flowering and disease resistance of H.T. Roses. Progressive Hort., 12: 5-15.
16. Meneve, I. and R.J. Moermans. 1979. A grafting trial with Cv. Sonia grafted on three rootstocks. Revue de 1, Agriculture, 32: 1773-1782.
17. Alam, Z. and D.A. Khan, 1969. Influence of different rootstocks on vegetative growth, productivity and flower quality in roses. Pak. J. Agri. Sci., 6: 170-176.