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RESPONSE OF ROSE CUTTINGS AGAINST ROOT PROMOTING HORMONES DURING SPRING AND AUTUMN

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ABSTRACT

A field experiment was conducted on rose varieties, *Rosa damascena* and *R. centifolia*, to assess the effect of growth hormones, Indole butyric acid (IBA) and Seradix-A, on root induction. The data on sprouting of first bud, number of shoots, length of shoots, number of roots, length of roots and survival rate was recorded in two seasons (spring and autumn). It was found that both varieties behaved differently in different seasons. *Rosa centifolia* produced maximum shoot length and number of roots in spring, whereas *R. damascena* produced maximum shoot length in autumn and maximum number of roots in spring when treated with Seradix-A. These results envisaged that autumn season is the best for planting *R. damascena* and spring for *R. centifolia*. Seradix-A showed better results as compared to IBA.

Key-words: Rose varieties, *Rosa damascene, R. centifolia*, cutting, hormones, spring, autumn

INTRODUCTION

Rose is used since ancient times as a symbol of perfection, elegance, love and is grown for its aesthetic, medicinal and economic value (Randhawa and Mukhopadhyay, 1994). Roses are woody perennials, conventionally propagated by cuttings, budding, grafting and layering methods. Except cutting, all such methods are cumbersome and quite expensive. Cuttings would be the simplest way to increase the desirable rose varieties but the success rate is quite low due to the failure in root formation, but success could be achieved by the use of plant growth regulators (Panday and Sinha, 1997).

The commonly used synthetic compounds for root induction of roses and other plants of ornamental values are auxins. Bhujbal and Kale (1973) treated cuttings of *R. multiflora*, *R. bourboriana* and *R. moschata* with Indole acetic acid (IAA), IBA and IAA+IBA and obtained the best rooting in *R. multiflora* with IAA + IBA followed by *R. bourboriana* and *R. moschata*. Azimi and Bisgrave (1975) tested IBA on *R. multiflora* and *R. cania* cutting and reported that *R. multiflora* rooted better with IBA at 750 ppm while rooting decreased at higher concentration of IBA (1500-3000 ppm). In contrast, *R. cania* rooted the best with IBA at 3000 ppm. Thomson (1984) dipped cuttings of *R. chinensis* cv. Indicia Major in IAA and IBA at 500 or 1000 ppm and rooted under mist conditions. The number and length of adventitious roots increased with IBA as compared to IAA.

Dabois and Varies (1985) observed 100% rooting in green rose cv. Sonia, when dipped in IAA at 500-1000 ppm and IBA at 250-500 ppm concentrations. Fuchs (1985) conducted experiment on *R. multiflora* cv. Kamagowa cuttings treated with IBA at 250 ppm and observed that new roots developed after 21 days of treatment with a total length of 4-6 times greater than those in untreated control. Varies and Dubois (1988) also reported that time and frequency of sprouting of roses inhibited as IBA concentration increased. Tukey and Brase (1936) found that the soft woodcuttings gave good results in propagation of *R. multiflora*. They further indicated that cuttings obtained in the first week of July showed better root formation. Keeping in view the growth promoting efficiency of IBA and Seradix-A the present research was conducted to compare their performance regarding root induction in two different rose species and growing season, spring and autumn.

MATERIALS AND METHODS

Two rose species *Rosa damascena* (V1) and *R. centifolia* (V2) were experimented to induce rooting by the application of growth regulators. Six inches long hard wood stem cuttings were taken from uniform, healthy and vigorous plants. Two synthetic growth regulators *i.e*. indole butyric acid (IBA) and Seradix-A were used. IBA solution was prepared by dissolving IBA powder in 95% ethyl alcohol (1g/5ml) and then diluted with distilled water. Two concentrations of IBA, 500 ppm (500 mgl^{-1}, w/v) and 1000 ppm (1000 mgl^{-1}, w/v) were tested in this experiment. The basal portion of stem cuttings (3.0 cm) was dipped for 12 h in IBA solution prior to plantation in the nursery.

For Seradix-A the basal portion of cuttings was touched with Seradix-A and excess powder was removed by shaking or tapping the excess powder. About 400 stem cuttings of each species were planted in spring and autumn seasons. The experiment was laid out according to RCBD with four replications.

Following treatments were applied on cuttings of both species during autumn and spring season.

T1= Seradix-A
T2= IBA 500 ppm
T3= IBA 1000 ppm
T4= Control

Parameters studied were time of sprouting of first bud, total number of shoots, length of sprouted shoots, number of roots and the length of roots. The data were analyzed statistically by analysis of variance and means were compared by Duncan's Multiple Range (DMR) test as described by Steel and Torrie (1980).

RESULTS AND DISCUSSION

Sprouting of first bud:

The analysis of variance showed significant results of treatments (Table 1). Seradix-A treated cuttings of *R. centifolia* were the earliest to sprout (12.0 days) in both seasons while *Rosa damascena* took minimum time (14 days) to sprout with the treatment of IBA 1000 ppm in both seasons. According to cultivar means, the *R. centifolia* performed better and took minimum time (12 days) to sprout first bud while *R. damascena* took maximum time (17.2 days) with Seradix-A treatment. Similarly, *R. centifolia* took less time to sprout bud than *R. damascena* when treated with 500 or 1000 ppm IBA during spring. Both varieties behaved similarly in Autumn and Spring. The results are in accordance with the studies of Singh, (1963) for citrus cuttings and Rathore *et al*. (1975) for soft wood cuttings of guava.

Length of shoots:

The analysis of variance and means for length of shoot affected by growth regulators are presented in Table 1. The maximum shoot length (29.8 cm) was recorded in *R. damascena* and *R. centifolia* produced only 10 cm long shoot in Seradix-A treated cuttings during autumn. Cuttings treated with 500 ppm IBA, produced 19.1cm and 9.72 cm long shoots in *R. damascena and R. centifolia*, respectively, during autumn. Length of shoot increased with increase in concentration of IBA (1000 ppm), 26.8cm in *R. damascena* and 13.1 cm in *R. centifolia.* Variable response of species was observed in both planting seasons (Table 1).

Table 1 also shows that cuttings treated with Seradix-A had maximum shoot length in *R. centifolia*. The cutting treated with 500 ppm IBA, showed maximum shoot length (31.7 cm) in *R. damanscena* than that of *R. centifolia* (23.8 cm) during spring. Shoot length was decreased with increase in concentration of IBA during spring season (Table 1). According to treatment means (Table 3), maximum shoot length was observed in spring than autumn season. Our findings are supported by the finding of Al-Rawi (1976).

Number of shoots:

The maximum number of shoot (5.8 shoot/cutting) was observed in *R. damascena* while *R. centifolia* produced only (4.4 shoot/cutting) when treated with Seradix-A during autumn. Cuttings treated with 500 ppm IBA showed that *R. centifolia* produced (4.3 shoot/cutting) and *R. damascena* produced (3.6 shoot/cutting) during autumn. Number of shoots increased due to increase in concentration of growth regulators. The maximum number of shoots/cutting was observed in *R. centifolia* than *R. damascena*, which induced 8.4 and 5.9 shoots/cutting, respectively, treated with 1000 ppm IBA during autumn. According to species mean, *R. damascena* performed better than *R. centifolia* during autumn.

During spring season, the cuttings were also treated with Seradix-A, 500 or 1000 ppm IBA (Table 1). Maximum numbers of shoots were observed in *R. centifolia* than *R. damascena,* treated with 1000 ppm IBA. The lowest number of shoot was observed in *R. damascena* than *R. centifolia* cuttings treated with Seradix-A during spring. *R. centifolia* performed better than *R. damascena* during spring season. Al-Rawi (1976) reported the similar findings for the number of shoots per cutting.

Number of roots:

The results for number of roots affected by growth regulator treatments are presented in Table 2. The results revealed that *R. damascena* produced 8.9 roots per cutting than *R. centifolia*, which produced 3.1 roots per cutting in autumn by Seradix-A treatment. *R. damascena* gave the best results in terms of number of roots per cutting when treated with 500 or 1000 ppm IBA in autumn.

In spring IBA (1000 ppm) proved to be superior in terms of number of roots than with Seradix-A. *R. damascena* performed better and produced maximum (8.5 roots/cutting), treated with 1000 ppm IBA. The lower number of roots was observed in *R. centifolia* by using seradix-A and 500 ppm IBA during spring. Table 3 shows that Seradix-A performed the best than IBA during autumn season. The results are in accordance with previous studies (Singh, 1963; Sen and Hore, 1963; Eriksen, 1968; Rathore, 1975).

Table 1. Effect of different growth regulators on bud sprout, number and length of shoots in rose cuttings.

Treatments	**Sprouting of first bud**				**Length of shoot (cm)**				**No. of shoot**			
	Spring		**Autumn**		**Spring**		**Autumn**		**Spring**		**Autumn**	
	V1	**V2**	**V1**	**V2**	**V1**	**V2**	**V1**	**V2**	**V_1**	**V_2**	**V_1**	**V_2**
Seradix-A	17.2 a	12.0 d	14.0 c	12.0 d	28.0 abc	29.0 abc	29.8 a	10.0 e	2.8 c	5.8 b	4.4 bc	5.8 b
500 ppm IBA	14.2 c	13.8 c	14.2 c	13.8 c	31.7 ab	23.8 bc	19.1 c	9.7 e	3.6 c	4.3 bc	3.6 c	4.3 bc
1000 ppm IBA	14.0 c	12.4 d	14.0 c	12.4 d	29.2 abc	25.9 abc	26.8 b	13.1 d	5.9 b	8.4 a	5.8 b	8.4 a
Control	14.0 c	15.8 b	17.2 a	15.8 b	20.2 c	35.6 a	11.9 de	6.6 f	4.4 bc	3.4 c	2.8 c	3.4 c
CV. Means	14.8 b	13.5 b	14.8 a	13.5 b	27.3 b	28.6 a	21.9 a	9.8 b	4.2 b	5.5 a	4.2 b	5.5 a

V1= *Rosa damascene,* V2= *Rosa centifolia; Similar letters in each column are not significantly different at P<0.05 according to Duncan's Multiple Range Test (DMRT).*

Table 2. Effect of different growth regulators on number and length of roots in rose cuttings.

Treatments	**Number of Roots**				**Length of Roots (cm)**			
	Spring		**Autumn**		**Spring**		**Autumn**	
	V_1	**V_2**	**V_1**	**V_2**	**V_1**	**V_2**	**V_1**	**V_2**
Seradix-A	5.8 ab	3.6 bc	8.9 a	3.1 cd	9.9 a	6.6 ab	9.9 a	6.5 ab
500 ppm IBA	4.3 bc	2.3 c	4.8 b	2.4 dc	7.6 ab	5.0 b	7.62 ab	5.0 b
1000 ppm IBA	8.5 a	3.8 bc	4.7 bc	2.5 de	7.9 ab	5.9 b	7.94 ab	5.9 b
Control	4.8 bc	4.3 bc	2.8 de	1.4 de	7.1 ab	6.5 ab	7.06 ab	6.6 ab
CV. Means	5.9 a	3.5 b	5.3 a	2.3 b	8.1 a	6.0 b	8.12 a	6.0 b

V1= Rosa damascene, V2= Rosa centifolia; Similar letters in each column are not significantly different at P<0.05 according to DMRT.

Length of roots:

The results for length of roots affected by growth regulator treatments are presented in Table 2. The results revealed that *R. damascena* produced 9.9 cm roots than *R. centifolia*, which produced 6.6 cm long roots in autumn by using Seradix-A. *R. damascena* gave the best results in terms of length of roots when treated with 500 or 1000 ppm IBA in autumn. Similar situation was observed during spring season. According to species mean, the *R. damascena* showed better results than *R. centifolia* (Table 2). The results reported in Table 3 indicate that Seradix-A produced the longest roots in both seasons viz 8.2 cm per cuttings, respectively. Kireeva (1967), Bhujbal and Kale (1973) also reported the similar findings for the length of roots.

Table 3. Treatment means for bud sprout, number and length of shoots and roots as affected by growth hormones in rose cuttings.

Treatments	Sprouting of first bud		Length of shoots (cm)		No. of shoots		Length of roots (cm)		Number of roots	
	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn
Seradix-A	14.6 a	13.0 b	28.5 a	19.9 a	4.3 b	5.1 b	8.2 a	8.2 a	4.7 ab	6.0 a
500 ppm IBA	14.0 ab	14.0 b	27.7 a	14.4 b	4.0 b	4.0 bc	6.3 a	6.3 a	3.3 b	3.6 b
1000 ppm IBA	13.2 b	13.2 b	27.6 a	19.9 a	7.1 a	7.1 a	6.9 a	6.9 a	6.2 a	3.6 b
Control	14.9 a	16.5 a	27.9 a	9.3 c	3.9 a	3.1 c	6.8 a	6.8 a	4.6 ab	2.1 bc

Similar letters in each column are not significantly different at P<0.05 according to DMRT.

CONCLUSION

Autumn season was observed better for producing maximum length of shoots while spring season was better for root growth. Both seasons produced the highest root length but species behaved differently in both season. It was also observed that autumn season is the best for planting *R. damascena* while *R. centifolia* gave better results in the spring season. Seradix-A showed clear dominance over IBA by producing maximum shoot and root length in both seasons.

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