Middle East Journal of Applied Sciences
ISSN 2077-4613

Volume : 08 | Issue :01 |Jan.-Mar.| 2018
Pages: 135-140

Effect of spraying with Ethrel, benzyladenine (BA) and seaweed on the growth and flowering of rose plants cv. (Eiffel Tower)

El-Shoura, H. A. S.

Dept. of Hort. Fac. of Agric., Ain shams Univ. Shoubra El-Kheima, Cairo, Egypt.

Received: 15 July 2017 / Accepted: 28 Dec. 2017 / Publication date: 20 Feb. 2018

ABSTRACT

Open field experiment was conducted on five- years old rose plants, cv. (Eiffel Tower). The plants were pruned to a height of 40 cm, at mid Feb. 2016 and 2017 and sprayed at March 15th with Ethrel at 1000 ppm, or BA at 100 ppm or Seaweed at 1000 ppm separately at three sites, the top of the plant, the grafting union and the whole plant. Data were recorded till May 1st. Spraying the top of rose plants with Ethrel or seaweed increased significantly bottom break numbers than BA or the control treatments. The whole plant which sprayed with seaweed or BA increased significantly the number of flowers than Ethrel or control treatments. Spraying the top of the plants with BA, and the control treatment significantly increased the length and the weight of the flowers.

Key words: Rose plants, Ethrel, benzyladenine (BA) , seaweed.

Introduction

Roses are woody perennial species, the development of new basal shoots and axillary buds are necessary to maintain plant vigor and high flower production. The ability of rose plants to produce new shoots depend on the genetic properties of rose cultivars and the rootstocks and correlate with changes in the content and activity of endogenous plant hormones (Zieslin *et al*. (1973) the use of plant growth regulators play an important role in controlling the physiological processes in rose plants. The objective of this study is to improve the productivity of rose plant through using plant growth regulators such as Ethrel (ethephon), BA and seaweed. Zieslin *et al*. (1972) showed that ethephon promoted sprouting of the basal buds in roses. Kohl and Rundle (1974) showed that application of BA to the stump, above the uppermost bud promoted its sprouting and the development of young shoots in rose plants.

Raviv (1985) showed that extract of seaweed presumed to contain cytokinin, applied as a spray to the lower part of the plant, promoted formation of renewal shoots in roses.

Materials and Methods:

This study was carried out in the Ornamental farm of the Department of Horticulture, faculty of Agriculture, Ain Shams Univ., at Shoubra El-Kheima in Cairo, Egypt, for two successive seasons 2016-2017.

Five- years old Eiffel Tower rose plants budded on *Rosa Canina* were used in the experiment. On Feb. 15th 2016, in the open field, the branches were pruned to a height of 40 cm and at March 15th plants were sprayed for one time with Ethrel at 1000 ppm or benzyladenine (BA) at 100 ppm or Seaweed (SW) at 1000 ppm. (Table 1), separately at three sites, the top of the plants (T), the grafting union (G) or the whole plant (WP). Data were recorded till May 1st 2016 or 2017.

The experiment was laid out in factorial experiment in a randomized complete block design with three replicate and each replicate contain 6 rose plants. The following data were recorded:

- Number of flowers produced per plant.
- Number of leaves per flowering stem.
- Length of the flowering stem.
- Fresh weight of the cut flower.
- Diameter of the flowering stem at the base.

Corresponding Author: El-Shoura, H.A.S., Dept. of Hort. Fac. of Agric., Ain shams Univ., Shoubra El-Kheima, Cairo, Egypt. E-mail:hesham.shoura@yahoo.com

- Diameter of the flower bud.
- Number of bottom break

Statistical Analysis:

All Data of this study were statistically analyzed using the analysis of variance method as reported by Senedecor and Cochran (1980) and the differences between means were differentiated by using Duncan's multiple range tests.

Table 1: Chemical analysis of the utilized commercial seaweed extract powder.

Chemical analysis (W/W)	
Alginic acid	16.1%
P_2O_5	3.2 %
K_2O	18.7%
Sugar Alcohol	10.2%
Total	47.2%

Results

First season

Number of flowers (N.F).

Results in Table (2) showed that spraying Eiffel Tower rose plants with (SW) or (BA) significantly increased (N.F) than control or Ethrel treatments. While there were no significant differences between the sites of spraying (T), or (G), or (WP), of the plants. The interaction between treatments and the sites of spraying showed that spraying rose plants with (SW) significantly increased (N.F) Than Control or the other treatments.

Number of leaves per flowering stem (N.L):

Results in Table (2) showed that there were no significant differences between treatments or the sites of spraying or the interaction between treatments.

Length of the flowering stem (F.L):

Results in Table (2) showed that (BA) treatment or control significantly increased (F.L) than the other treatments while there were no significant differences between the sites of spraying (T), or (G) or (WP) of the plants. The interaction between treatments and the sites of spraying showed that (BA) treatment significantly increased (F.L) than (ETH) or the other treatments.

Flower weight (F.W):

Results in Table (2) showed that (BA) or control treatment significantly increased (F.W) than the other treatments. While there were no significant differences between the sites of spraying (T), or (G), or (WP).

The interaction between treatments and the sites of spraying showed that control treatment significantly increased (F.W) than all the other treatments.

Diameter of the flowering stem (S.D):

Data presented in Table (2) showed that there were no significant differences between treatments or the sites of spraying or the interaction between treatments.

Diameter of the flower bud (F.D):

Data presented in Table (2) showed that there were no significant differences between treatments or the sites of spraying or the interaction between treatments.

Number of bottom break (B.B):

Results in Table (2) showed the (Ethrel) and (SW) treatments significantly increased number of (B.B) per plant than (BA) or control treatments. While the sites showed significant increase concerning spraying the top of the plant than (G), or (WP) sites, the interaction between treatments and the sites of the plant showed that spraying rose plants with (CW) or Ethrel significantly increased number of (B.B) than the other treatments. Results in Table (3) showed similar results with the first season.

Table 2: Effect of spraying with Ethrel, Benzladenine (BA) and seaweed on the growth and flowering of Eiffel Tower rose plants during 2016 season.

Treatments	Flower length (cm)			
	Plant top	Grafting union	Whole plant	Mean
Control	60.3 ABC	60.5 BC	58.5 ABC	59.7 A
Seaweed	60.3 ABC	55.53 BCD	55.8 BCD	57.2 AB
Ethrel	49.83 D	50.5 D	53.53 CD	51.2 C
Benzyladenine (BA)	65.3 A	63.1 B	58.2 ABC	62.2 A
Mean	58.93 A	57.4 A	56.5 A	-

Table 2: Cont.

Treatments	No. of leaves			
	Plant top	Grafting union	Whole plant	Mean
Control	10.06 A	8.5 A	10.5 A	9.68 A
Seaweed	9.7 A	8.7 A	9.03 A	9.14 A
Ethrel	8.26 A	8.56 A	8.36 A	8.4 A
Benzyladenine (BA)	9.4 A	10.1 A	8.7 A	9.4 A
Mean	9.35 A	9.15 A	8.96 A	-

Table 2: Cont.

Treatments	Stem diameter (cm)			
	Plant top	Grafting union	Whole plant	Mean
Control	0.7 A	0.57 A	0.6 A	0.62 A
Seaweed	0.67 A	0.59 A	0.6 A	062 A
Ethrel	0.6 A	0.57 A	0.6 A	0.59 A
Benzyladenine (BA)	0.6 A	0.66 A	0.5 A	0.58 A
Mean	0.64 A	0.59A	0.57 A	-

Table 2: Cont.

Treatments	Flower weight (g)			
	Plant top	Grafting union	Whole plant	Mean
Control	35.23 AB	27.5 CD	38.33 A	33.6 A
Seaweed	28.87 CD	26.6 CD	25.4 D	26.9 B
Ethrel	26.2 CD	22.63 D	26.46 CD	25.1 B
Benzyladenine (BA)	26.8 CD	30.4 BC	26.8 CD	33.6 A
Mean	29.25 A	29. 23 A	26.78 A	-

Table 2: Cont.

Treatments	Flower bud diameter (cm)			
	Plant top	Grafting union	Whole plant	Mean
Control	2.0 A	2.0 A	2.0 A	2.0 A
Seaweed	2.0 A	2.0 A	1.9 A	1.96 A
Ethrel	2.0 A	1.9 A	2.0 A	1.96 A
Benzyladenine (BA)	2.1 A	19 A	2.1 A	2.03 A
Mean	2.02 A	2.0 A	1.95 A	-

Table 2: Cont.

Treatments	No. of bottom break			
	Plant top	Grafting union	Whole plant	Mean
Control	0.5 B	1.0 AB	0.5 B	0.66 AB
Seaweed	2.0 A	0.5 B	0.8 B	1.10 A
Ethrel	1.5 A	0.5 B	1.4 B	1.13 A
Benzyladenine (BA)	0.5 B	0.5 B	0.5 B	0.50 B
Mean	1.12 A	0.8 AB	0.62 B	-

Table 2: Cont.

Treatments	No. of flower			
	Plant top	Grafting union	Whole plant	Mean
Control	2.9 D	2.7 D	3.2 D	2.93 D
Seaweed	10.0 ABCD	10.5 ABC	13.5 A	11.33 A
Ethrel	7.13 BCD	7.2 BCD	5.3 CD	6.54B
Benzyladenine (BA)	10.5 ABC	9.5 ABCD	11.5 AB	10.5 A
Mean	8.37 A	7.63 A	7.47 A	-

Means with the same letters are not significantly different

Table 3: Effect of spraying with Ethrel, Benzladenine (BA) and seaweed on the growth and flowering of Eiffel Tower rose plants during the 2017 season.

Treatments	Flower length (cm)			
	Plant top	Grafting union	Whole plant	Mean
Control	55.5 CDEF	57.5 BCDE	53.2 DEF	55.4 B
Seaweed	60.0 ABC	55.5 CDEF	62.5 ABC	59.4 A
Ethrel	50.33 EF	48.6 F	49.9 F	`49.61 C
Benzyladenine (BA)	63.33 A	65.0 A	61.0 ABC	63.11 A
Mean	57.3 A	56.65 A	56.65 A	-

Table 3: Cont.

Treatments	No. of leaves			
	Plant top	Grafting union	Whole plant	Mean
Control	8.2 A	9.0 A	9.2 A	8.8 A
Seaweed	9.6 A	8.4 A	9.1 A	9.2 A
Ethrel	9.5 A	8.0 A	8.4 A	8.6 A
Benzyladenine (BA)	8.4 A	9.9 A	9.7 A	9.33 A
Mean	8.92 A	8.83 A	9.1 A	-

Table 3: Cont.

Treatments	Stem diameter (cm)			
	Plant top	Grafting union	Whole plant	Mean
Control	0.55 A	0.62 A	0.6 A	0.59 A
Seaweed	0.63 A	0.62 A	0.6 A	0.61 A
Ethrel	0.58 A	0.54 A	0.6 A	0.57 A
Benzyladenine (BA)	0.57 A	0.64 A	0.6 A	0.60 A
Mean	0.58 A	0.60 A	0.6 A	-

Table 3: Cont.

Treatments	Flower weight (g)			
	Plant top	Grafting union	Whole plant	Mean
Control	27.5 AB	26.5 AB	27.56 AB	27.18 A
Seaweed	27.4 AB	25.1 AB	30.8 A	27.76 A
Ethrel	23.1 B	25.36 AB	24.13 AB	24.2 A
Benzyladenine (BA)	26.06 AB	28.3 B	28.3 B	27.55 A
Mean	26.01 A	26.31 A	27.7 A	-

Table 3: Cont.

Treatments	Flower bud diameter (cm)			
	Plant top	Grafting union	Whole plant	Mean
Control	2.0 A	2.0 A	1.9A	1.96A
Seaweed	2.0 A	2.17 A	2.0A	2.05A
Ethrel	2.1 A	2.0 A	2.1A	2.06A
Benzyladenine (BA)	1.9 A	1.9 A	2.1A	1.96A
Mean	2.0 A	2.2 A	2.01 A	-

Table 3: Cont.

Treatments	No. of bottom break			
	Plant top	Grafting union	Whole plant	Mean
Control	0.5 B	1.0 B	0.5 B	0.66 B
Seaweed	0.5 B	1.0 B	1.0 B	0.83 B
Ethrel	0.5 B	1.0 B	1.0 B	0.83 B
Benzyladenine (BA)	1.0 B	2.0 A	1.0 B	1.33 A
Mean	0.62 B	1.25 A	0.87 B	-

Table 3: Cont.

Treatments	No. of flower			
	Plant top	Grafting union	Whole plant	Mean
Control	3.10 D	5.5 BCD	4.5 CD	4.36 B
Seaweed	9.5 AB	9.0 ABC	10.5 A	9.66 A
Ethrel	5.9 ABCD	6.6 ABCD	5.6 BCD	6.03 B
Benzyladenine (BA)	8.5 ABC	7.5 ABCD	9.5 AB	8.5 A
Mean	6.75 A	7.15 A	7.52 A	-

Means with the same letters are not significantly different

Discussion

Results of this experiment showed that Ethrel treatment increased bottom break and diameter of the flowering stem. Benzyledenin (BA) treatment increased number of flowers, diameter of the flowering stem, fresh weight of the flowers and length of the flowering stem.

Seaweed treatment increased bottom break, number of flowers and the diameter of the flowering stem, control treatment showed increase in fresh weigh of the flowers and length of the flowering stem.

There were various studies on the activity of plant hormones in Rosa hybrid and the possible use of plant growth regulators in controlling the physiological processes in rose plants.

Khayat and Zieslin (1982) stated that the outgrowth of bottom breaks is a complex phenomenon in which environmental and endogenous factors are involved. Zieslin and Kayat (1983) added that the renewal shoots is prevented by accumulation of inhibitory complex in the basal parts of rose plants. One of the inhibitors was identified as ABA.

They also added that high cytakinin activity was found in the proliferating tissue of the bud union (the crown). Parups (1971), stated that cytokinin and ethylene, are effective in promotion of formation renewal shoots.

Kohl and Rundle (1974) and Ohkawa (1984) Showed That Exogonous Cytokinins can overcome the lateral bud inhibition Zieslin and Halevy (1976) mentioned that spraying the whole shoot or plant with PBA caused a twofold increase in the number of sprouting buds in "Baccara" roses

concerning seaweed, Raviv (1985) showed that extracts of seaweed presumed to contain cytokinin, applied as a spray to the lower part of the plant, promoted formation of renewal shoot in roses.

Van Staden *et al*. (1994) showed that foliar seaweed extracts resulted the maximum number of flower / plant of marigold (Tagetes). Sasikumar *et al*. (2011) Concluded that foliar application of seaweed increased number of flowers/ plant on okra (*Abelmoschus esculents* L.) Concerning Ethylene Zieslin *et al* (1972) showed that Ethephon promoted sprouting of the basal buds in roses.

Conclusion:

Ethrel at 1000 ppm or seaweed at 1000 ppm increased bottom break numbers. Seaweed or BA at 100 ppm increased number of flowers. BA increased the length and the weight of the flowers.

References

Duncan, D.B., 1955. Multiple Range and Multiple F Tests. Biomentrics 11:1-42.

Khayat, E., and N. Zieslin, 1982. Environmental factors in the regulation of sprouting of basal buds in rose plants., J Exp. Bot. 33: 1286- 1292.

Kohl, H. and D. Rundle, 1974. Increased rate of budbreak of 'Cara Mia' roses treated with PBA. Roses Inc. Bull., March, 64-71.

Ohkawa, K., 1984. Effects of benzyladenine on bud break of rose. Sci. Hort. 24: 379-383.

Parups, E.V., 1971. Use of 6-benzylamino purine and adenine to induce bottom breaks in greenhouse roses. Hort. Sci., 6: 456-457.

Raviv, M., 1985. The effect of seaweed concentrate on 'bottom breaks' formation of roses. Hasedeh 65: 952-954 Iin Hebrew, (English abstract).

Sasikumar, K., T. Govindan, C. Anuradha and T. Nadu, 2011. Effect of Seaweed Liquid Fertilizer of Dictyota dichotoma on growth and yield of *Abelmoschus esculantus* L. European Journal of Experimental Biology, 1 (3): 223-227.

Senedecor, G.W. and W.G. Cochran, 1980. Statistical methods 7th Ed. Iowa State, Univ. Press. Ames, Iowa, U.S.A PP: 507

Van Staden, J., S. J. Upfold and F. E. Drewes, 1994. Effect of seaweed concentrate on growth and development of the marigold *Tagetes patula*, J. of Applied phycology, 6, 427-428.

Zieslin, N., A. H Halevy, and I. Birn, 1973. Sources of variability in greenhouse rose flowers production. J. Am. Soc. Hortic. Sci. 98:321-324.

Zieslin, N., and A. H. Halevy, 1976. Components of axillary bud inhibition in rose plants. I. The effect of different plant parts (correlative inhibition). Bot. Gaz. 137: 291-296.

Zieslin, N. and E. Khayt, 1983. Involvement of cytokinin, ABA and endogenous inhibitors in sprouting of basal buds in rose plants. Plant Growth Reg. 1: 279-288.