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Influence of pre cut foliar application of plant growth substances on propagation of pomegranate

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ABSTRACT

An experiment entitled, Influence of pre cut foliar application of plant growth substances on multiplication of pomegranate through sub apical cutting was carried out with two factors *viz*., time of cutting three levels and plant growth substances with four repetitions.The results of the study revealed that, significantly early sprouting (9.61 days), maximum number of shoots (2.41) and shoot length (10.85 cm) per cutting at 60 days after planting, maximum number of roots (8.40) and root length (7.61 cm) per cutting at 60 days after planting was recorded with treatment c_1 (Cutting taken at 3 days after spraying). Among the treatments of growth substances, significantly early sprouting (9.27 days), highest survival percentage (80.98) at 45 days after planting, highest length shoot per cutting at 60 days after planting (12.08 cm), maximum number of roots (9.36) and root length (8.47 cm) per cutting at 60 days after planting was recorded with treatment p_1 (spray of ethrel 1000 ppm). Use of pomegranate cutting after three days of foliar spray of ethrel 1000 ppm on mother plant for getting early sprouting, highest survival, maximum number and length of shoots and roots of cutting under green house.

Key word*: Plant growth substances, Pomegranate, Propagation, Time of cutting.*

Introduction

Pomegranate (*Punicagranatum*.L) belongs to family Punicaceaeand it is one of the popular fruit of tropical and subtropical regions of the world. It is extensively cultivated in Mediterranean region of India, China and Japan (Owais, 2010).

Propagation of pomegranate is done by seeds, cuttings, and air layering. Although seed propagation is cheaper than other methods seedling plants show high variability with respect to tree vigor, precocity, and quality in seedlings as pomegranate has cross pollination ability (Sharma *et al*., 2009). As pomegranate has been described variously as self-pollinated, self and cross pollinated, highly cross pollinated or often cross pollinated; seedlings are not considered as a favorable propagation method (Mars, 2000). Although, air layering is successful it is often considered expensive. The other drawback of this method is weakening of mother plant when continuing the process and therefore, production of large amount of plants is not practical (Anon, 2006).

The most convenient and cheapest method in considerably lesser time is by cuttings. In order to reduce the high mortality of rooted cuttings under field conditions it is highly desirable to build a healthy and well developed root system by treating with plant growth regulators (Sharma *et al*., 2009).

Propagation of pomegranate by hardwood cuttings has been attempted by various workers in India but, influence of growth substances on mother plant was not tested so far. Therefore, this pioneer study was conducted on influence of precutfoliar application of plant growth substances on multipli-

cation of pomegranate through sub apical cutting.

Materials and Methods

An experiment entitled, Influence of precutfoliar application of plant growth substances on multiplication of pomegranate through sub apical cutting was carried out under greenhouse condition. The present experiment were evaluated with two factors *viz*., time of cutting three levels and plant growth substances with five levels thus making total fifteen treatment combinations *viz*; cutting taken at 3 days after spraying (c_1), cutting taken at 6 days after spraying (c_2), cutting taken at 9 days after spraying (c_3) and different plant growth substances *viz*., no spray (p_0), spray of ethrel 1000 ppm (p_1), spray of ethrel 2000 ppm (p_2), spray of CCC 1000 ppm (p_3),spray of CCC 2000 ppm (p_4).

The three trials were carried out *viz*., first trial: 25th May to 25th July, second trial: 30th July to 30th September, third trial: 5thOctober to 5th December were carried out in plug tray under greenhouse condition. Sub apical cuttings were taken and treated with 2000 ppm of IBA throughquick dip method as a common treatment and standard media *i.e.* Vermiculite: Perlite: Poultry Manure (2:1:1) used in plug tray.

The experiment was laid out in Factorial Completely Randomized Design as described by Nigam and Gupta (1979) with three replications. The treatments evaluated and observations were recorded periodically in relation to days to sprouting, sprouting percentage, shoot and root characters.

Results and Discussion

Sprouting and survival

Influence of time of cutting

On the basis of pooled data, the significantly early sprouting (9.61 days) was recorded with treatment c_1 (Cutting taken at 3 days after spraying) and it was found statistically at par with treatment c_3 (Cutting taken at 9 days after spraying), *i.e.* 9.76 days. Whereas, maximum number of shoots per cutting at 60 days after planting (2.41) and length of shoot (10.85 cm) per cutting at 60 days after planting was recorded with treatment c_1 (Cutting taken at 3 days after spraying) and which was found significantly superior over all other treatments.

Influence of time of cutting on survival percentage at 45 days after planting was found non-significant.

Table 1. Influence of foliar application of plant growth substances on days taken to sprouting and on survival percentage at 45 days after planting of pomegranate

Treatments	Days taken to sprouting				Survival percentage at 45 days after planting			
Time of cutting (C)	Trial I	Trial II	Trial III	Pooled	Trial I	Trial II	Trial III	Pooled
c_1 (Cutting taken at 3 days after spraying)	8.60	10.45	9.80	9.61	73.60	70.82	74.38	72.93
c_2 (Cutting taken at 6 days after spraying)	9.50	10.80	10.35	10.21	73.88	74.16	72.46	73.50
c_3 (Cutting taken at 9 days after spraying)	8.95	10.45	9.90	9.76	68.60	68.60	73.27	70.16
S.Em.±	0.14	0.19	0.27	0.12	0.98	1.21	1.27	1.15
C.D. at 5 %	0.40	NS	NS	0.36	2.79	3.47	NS	NS
Plant growth substances (P)								
p_0 (No spray)	9.75	11.58	11.33	10.88	54.16	53.70	54.11	53.99
p_1 (Spray of ethrel 1000 ppm)	8.50	10.16	9.16	9.27	81.47	80.08	81.68	80.98
p_2 (Spray of ethrel 2000 ppm)	8.91	9.75	9.50	9.39	78.69	77.77	79.06	78.51
p_3 (Spray of CCC 1000 ppm)	8.91	10.50	9.58	9.66	74.53	71.75	75.45	73.91
p_4 (Spray of CCC 2000 ppm)	9.00	10.83	10.50	10.11	71.19	72.68	76.84	73.00
S.Em.±	0.18	0.25	0.35	0.16	1.26	1.57	1.65	0.86
C.D. at 5 %	0.52	0.72	1.02	0.47	3.60	4.48	4.70	2.44
C X P								
S.Em.±	0.31	0.43	0.62	0.28	2.19	2.72	2.85	1.50
C.D. at 5 %	0.91	1.25	NS	0.82	6.24	7.76	NS	4.23
Season x Treatment								
S.Em.±				0.40				2.60
C.D. at 5 %				NS				NS
CV %	6.77	5.74	12.45	8.41	6.08	7.65	7.79	7.22

Influence of plant growth substances

From the analysis of three trial pooled data, it was observed that significantly early sprouting (9.27 days) was recorded with treatment p_1 (spray of ethrel 1000 ppm) and it was found statistically at par with treatments p_2 (spray of ethrel 2000 ppm) and p_3 (Spray of CCC 1000 ppm) with 9.39 and 9.66 days, respectively.

Highest survival percentage (80.98) at 45 days after planting was recorded with treatment p_1 (spray of ethrel 1000 ppm) and it was found statistically superior over all other treatments.

Shoot and root parameters

Influence of time of cutting

Table 2 and 3 revealed that the significantly maximum number of roots (8.40) and length of root (7.77cm) per cutting at 60 days after planting was recorded with treatment c_1 (Cutting taken at 3 days after spraying) and it was found statistically at par with treatment c_3 (Cutting taken at 9 days after spraying) for number of roots (8.36) and root length (7.61 cm) per cutting at 60 days after planting.

Shooting ability was determined by amount of storage food (Kumari *et al*. 2013). The maturity of cutting play a vital role in initiating and producing better rooting in pomegranate cuttings as is evident from the data given where hard wood cuttings produced significantly higher rooting as compared to semi hard wood cuttings. These results are in agreement with the findings of Panda and Das (1990) who reported that the hard wood cuttings pomegranate gave better rooting than semi hard wood cuttings.

Influence of plant growth substances

Table 2 and 3 revealed that the number of shoots per cutting at 60 days after planting was found non-significant but highest length shoot per cutting at 60 days after planting (12.08 cm) was recorded with treatment p_1(spray of ethre l1000 ppm) and it was statistically at par with treatment p_2 (spray of ethrel 2000 ppm), *i.e*. (11.64 cm). The significantly maximum number of roots (9.36) and length of roots (8.47 cm) per cutting at 60 days after planting was recorded with treatment p_1 (spray of ethrel 1000 ppm) and it was found significantly superior over all other treatments.

Singh (1994) who obtained the best rooting with IBA treatment in pomegranate cuttings, while Arumugam *et al*. (1996) got the best rooting in softwood, semi-soft wood and hardwood cuttings of

Table 2. Influence of foliar application of plant growth substances on number of shoots per cutting and length of shoot per cutting at 60 days after planting of pomegranate

Treatments	Number of shoots per cutting at 60 days after planting				Length of shoot (cm) per cutting at 60 days after planting			
Time of cutting (C)	Trial I	Trial II	Trial III	Pooled	Trial I	Trial II	Trial III	Pooled
c_1 (Cutting taken at 3 days after spraying)	2.45	2.40	2.40	2.41	10.68	10.80	11.06	10.85
c_2 (Cutting taken at 6 days after spraying)	2.30	2.10	2.20	2.20	10.38	10.66	10.70	10.58
c_3 (Cutting taken at 9 days after spraying)	2.10	2.20	2.25	2.18	10.11	10.98	10.51	10.40
S.Em.±	0.08	0.09	0.09	0.05	0.13	0.18	0.13	0.08
C.D. at 5 %	0.24	NS	NS	0.14	0.37	NS	0.38	0.24
Plant growth substances (P)								
p_0 (No spray)	2.00	2.00	2.00	2.00	7.67	7.39	7.61	7.56
p_1 (Spray of ethrel 1000 ppm)	2.58	2.25	2.25	2.36	12.10	12.05	12.10	12.08
p_2 (Spray of ethrel 2000 ppm)	2.50	2.16	2.30	2.38	11.49	11.65	11.78	11.64
p_3 (Spray of CCC 1000 ppm)	2.33	2.33	2.33	2.33	10.70	11.15	11.14	11.00
p_4 (Spray of CCC 2000 ppm)	2.00	2.41	2.33	2.23	9.98	11.16	11.15	10.76
S.Em.±	0.11	0.11	0.12	0.09	0.17	0.23	0.17	0.17
C.D. at 5 %	0.31	NS	NS	NS	0.48	0.68	0.50	0.58
C X P								
S.Em.±	0.19	0.20	0.21	0.11	0.29	0.41	0.30	0.19
C.D. at 5 %	0.55	0.58	0.61	0.33	0.84	NS	0.86	0.55
Season x Treatment								
S.Em.±				0.20				0.34
C.D. at 5 %				NS				NS
CV %	16.96	18.28	18.75	18.01	5.67	7.75	5.66	6.45

Table 3. Influence of foliar application of plant growth substances on number of roots per cutting and length of root per cutting at 60 days after planting of pomegranate

Treatments	Number of roots per cutting at 60 days after planting				Length of root (cm) per cutting at 60 days after planting			
Time of cutting (C)	Trial I	Trial II	Trial III	Pooled	Trial I	Trial II	Trial III	Pooled
c_1 (Cutting taken at 3 days after spraying)	8.05	8.40	8.75	8.40	7.80	7.82	7.69	7.77
c_2 (Cutting taken at 6 days after spraying)	8.40	8.10	8.60	8.36	7.80	7.55	7.50	7.61
c_3 (Cutting taken at 9 days after spraying)	7.70	8.00	8.15	7.95	7.47	7.62	7.34	7.47
S.Em.±	0.15	0.25	0.19	0.11	0.11	0.10	0.08	0.05
C.D. at 5 %	0.45	NS	NS	0.33	NS	NS	0.24	0.16
Plant growth substances (P)								
p_0 (No spray)	6.91	7.08	7.33	7.11	7.00	6.83	6.66	6.83
p_1 (Spray of ethrel 1000 ppm)	9.33	8.83	9.91	9.36	8.55	8.40	8.46	8.47
p_2 (Spray of ethrel 2000 ppm)	8.50	8.58	9.08	8.72	8.05	7.92	7.97	7.98
p_3 (Spray of CCC 1000 ppm)	6.03	8.08	8.08	8.08	7.39	7.60	7.23	7.40
p_4 (Spray of CCC 2000 ppm)	7.41	8.25	8.08	7.91	7.44	7.55	7.21	7.40
S.Em.±	0.20	0.32	0.25	0.15	0.15	0.13	0.11	0.07
C.D. at 5 %	0.58	0.92	0.79	0.43	0.43	0.37	0.32	0.21
C X P								
S.Em.±	0.35	0.56	0.43	0.26	0.26	0.22	0.19	0.13
C.D. at 5 %	1.01	NS	1.24	0.74	0.74	NS	0.55	0.37
Season x Treatment								
S.Em.±				0.46				0.23
C.D. at 5 %				NS				NS
CV %	8.83	13.78	10.30	11.70	6.82	5.93	5.70	6.02

pomegranate with IBA (quick dip) treatments.

The work of Sandhu *et al*. (1991) also showed that hardwood cuttings of pomegranate produce better rooting than semi hard wood cuttings.

Interaction effect

The interaction effect of time of cutting and plant growth substances was found significant for all the parameters in pooled data.

Conclusion

Use of pomegranate cutting after three days of foliar spray of ethrel 1000 ppm on mother plant for getting early sprouting, highest survival, maximum number and length of shoots and roots of cutting under green house.

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