



**EFFECT OF DIFFERENT CONCENTRATIONS OF IBA ON ROOTING AND SPROUTING PERFORMANCE OF POMEGRANATE (*PUNICA GRANATUM L.*) CUTTINGS CV. KANDHARI.**

Neeraj Baloni<sup>1</sup>, Manju Rawat<sup>2</sup>, V.K. Purohit<sup>1</sup> and B.S. Mengwal<sup>1\*</sup>

<sup>1</sup>High Altitude Plant Physiology Research Centre Post Box No. -14, H. N. B Garhwal University Srinagar Garhwal – 246174, Uttarakhand, India.

<sup>2</sup>VCSG collage of Horticulture, University of Horticulture and Forestry, Bharsar-246123, District Pauri Garhwal Uttarakhand, India.

**Corresponding Author: Dr. B.S. Mengwal**

High Altitude Plant Physiology Research Centre Post Box No. -14, H. N. B Garhwal University Srinagar Garhwal – 246174, Uttarakhand, India.

Article Received on 19/11/2016

Article Revised on 09/12/2016

Article Accepted on 29/12/2016

**ABSTRACT**

Vegetative propagation of pomegranate (*Punica granatum L.*) through cutting is the most best and cheap method of obtaining true to the type. Among various concentrations of IBA, treatment T<sub>5</sub>(2500ppm) showed the best performance in terms of number of sprouted cuttings(6.67), minimum number of dead cutting(1.66), un sprouted cuttings(1.67), number of sprouts/cutting(10.53), length and diameter of sprouts(20.66,0.41), percentage of rooted cuttings(73.33), number of primary roots(42.80), secondary roots(91.40), and fresh weight(1.88) and dry weight of roots(1.02).

**KEYWORDS:-** *Punica granatum L.*, Vegetative propagation, IBA, stem cuttings, rooting percentage.

**INTRODUCTION**

Horticulture has a vast potential for socio-economic development and overall well-being of people in the country. In recent years, it has received attention and has been recognized as a potentially important source of growth, employment generation and foreign exchange carrying. It also contributes towards health, happiness and prosperity of people. In fruits production, India ranks second after China and its share in the world of fruit is about 10%. India produce about 41% of the world o of the world bananas and ranking first in both the fruits. Recent that India has about 107 ha of land under the cultivation of with a total annual production of 743Th MT and productivity of 6.90 MT/ha (National Horticulture Board 2011). Among large number of fruits cultivated in India pomegranate has its own importance. The pomegranate tree is native to Iran to the Himalayas in northern India and has been cultivated since ancient times throughout the Mediterranean region of Asia, Africa and Europe. It reached to central and southern India from Iran during the first century A.D. and was reported growing in Indonesia in 1416. It has been widely cultivated throughout India and drier parts of Southeast Asia, Malaya, the East Indies and tropical Africa. The most important growing regions of pomegranate are Egypt, China, Afghanistan, Pakistan, Bangladesh, Iran, Iraq, India, Burma and Saudi Arabia. Among large number of fruits cultivated in India

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Tree requires hot and dry climate during the period of fruit amid ripening. The optimum temperature for fruit development is about 38°C. Pomegranate is winter-hardy and drought tolerant plant and can thrive conditions. It is not very particular about its soil requirement and can be grown on diverse type of soils. The tree gives very good yield in deep loamy or although it thrives well on comparatively poor soils where other fruits It can tolerant soils which are limy and slightly alkaline, though it it grown in medium or light black soils of at least 60cm depth. Vegetative propagation is one of the potential and useful methods that need to be tried for those species, which are economically important, difficult to raise through seeds and other means. Plant propagation through vegetative means multiplies these plants and preserves their essential genetic characters. In vegetative propagation of fruits, bio regulators play a very important role. Since the discovery of indole-3acetic acid(IAA) as an active plant growth regulator, indole-3butyric acid(IBA) and NAA have been freely used to boost vegetative propagation of plants specially rooting of cuttings. Among all the bio regulators IBA is more effective, cause no damage to cuttings.

#### MATERIAL AND METHODS

The Present investigation was conducted under the open condition at Horticultural research centre in 2012. Physically, the Srinagar valley is spread between latitude 30° 12' 0" to 30° 13' 4" North and longitude 78° 0' 45" to 78° 0' 50" East. at 540 meter above MSL in Himalayan region. It exhibits dry summer and rigorous winter with occasional dense fog in the morning up to 10 AM from December to mid February. Except during rainy season, rests of the months are usually dry, with exception of occasional showers during winter or early spring. The average minimum and maximum temperature, relative humidity and rainfall vary from 7.6 °C to 27.5°C, 39.29% to 79.83% and 2.50 to 235.29 mm. respectively.

#### Preparation of IBA solution

For the preparation of IBA solution of 1500 ppm, 2500 ppm, 3500 ppm, 4500 ppm and 5500 ppm, the required the amount of IBA (375 mg, 625 mg, 875 mg, 1125 mg, 1375 mg. respectively) was weighted. These amounts of IBA, then dissolved in small amount of alcohol containing few drops of ammonium hydroxide and finally diluted with distilled water. The final volume of each solution was maintained 250 ml.

#### Treatment and planting of cuttings

Quick dip method was adopted for treatment of the cuttings with IBA solutions. The basal portions of cuttings up to 2.5 to 3.0 cm were soaked with solution for 2 minutes. The treated cuttings with different IBA concentration were planted carefully in the 1 kg polythene bags with the help of dibbler without any injury to the buds. One third basal portion of the cuttings was inserted into the rooting media of sandy soil and farm yard manure (FYM) in 1:1 were mixed thoroughly

Each polythene bag was planted with two cuttings were maintained and thus 5 bags with 10 cuttings were maintained under each treatment of each replication. The soil around the cuttings was tightly pressed and watered immediately. For individual treatments three replicates with 10 cuttings each included control were used. After three month april 2012 number of sprouting and rooting were recorded in each treatment Data recorded during the course of investigations were subjected to statistical analysis under Randomized block design. Valid conciliations were drawn after the determination, of significance of difference between the treatments, at 5 and 1 per cent level of probability. Critical difference was calculated in order to compare the treatment means. The experimental results are presented with the help of tables, and diagrams, wherever found necessary.

#### RESULTS AND DISCUSSION

Sprouting and rooting performance of different concentration of IBA of stem cuttings of pomegranate showed in Table 1 and 2. A perusal of Table 1 indicated the no of sprouted cuttings, no of un sprouted cuttings, no of sprouts/cutting, length of sprouts/cuttings(cm), diameter of sprouts/cuttings(cm) and average no of leaves on new cuttings was significantly found but no of dead cuttings was found non significant with respect of IBA concentration and the table 2 showed that all the rooting characters was significantly found with respect of IBA concentration.

In the present investigation, the maximum number of sprouted cuttings (6.67) were recorded under T<sub>5</sub> (2500 ppm) treatment followed by T<sub>4</sub> (2000ppm). The minimum number of sprouted cuttings (4.33) were recorded under T<sub>0</sub>(control) treatments. Bose and Mandal (1972) reported the same result in pomegranate. Bhagat et al.(1998) also observed best performance of IBA treatments in hard wood cuttings of guava with respect the survival percentage.

The present study of revealed that in respect the un sprouted cutting T<sub>1</sub>(500)ppm, T<sub>2</sub>(1000)ppm and T<sub>5</sub> (2500)were observed best with minimum number of (1.66) unsprouted cuttings, followed by T<sub>4</sub> (2000 ppm) treatment with an average of 2.00 un sprouted cuttings. While the maximum number of unsprouted cuttings (3.00) were recorded under T<sub>0</sub>(control) treatment.

Finding of present investigation are more or less match with the result of Bose and Mandal (1972), who observed the best survival of pomegranate cuttings under IBA treatment. Singh et al. (1971)

Treatment T<sub>5</sub> (2500 ppm) with an average of (1.66) dead cuttings showed the best survival of the cuttings. While, the treatments T<sub>3</sub> (1500 ppm) and T<sub>4</sub> (2000 ppm) with an average of (2.00) dead cuttings obtained second rank. The maximum number of dead cuttings(3.33) were recorded under the treatment T<sub>2</sub>(2500ppm).The present findings are similar to the findings of Singh et al. (1971)

Patil *et al.* (2000) also recorded 80% survival of hard wood cuttings of grape treated with IBA.

The maximum number of sprout per cutting (10.53) were recorded under the treatment T<sub>5</sub> (2500 ppm) followed by the number of sprout/cutting (9.03) under the treatment T<sub>4</sub> (2000ppm), while the minimum number of sprout per cutting (5.76) were recorded under the treatment T<sub>1</sub> (500 ppm). Similar results have been obtained by earlier workers for other plant species Singh *et al.* (1971) and Tahir *et al.* (1998)

The maximum average length of sprouts per cutting (20.66cm) was recorded under treatment T<sub>5</sub> (2500 ppm) followed by the average length of sprouts is (19.70cm) T<sub>4</sub> (4500ppm) treatment. While, the shortest sprout per cutting (15.83 cm) were recorded under the treatment T<sub>0</sub> (control) treatment. These finding are very much on the line with the results Bose and Mandal (1972).

In the present study the thickest sprout/cutting (0.41 cm) were observed under the treatment T<sub>5</sub>(2500 ppm ) while, with (0.27cm) diameter treatment T<sub>4</sub> ( 2000 ppm ) obtained second rank. The minimum average diameter of sprout per cutting (0.20cm) were recorded under the treatment T<sub>0</sub> (control).Finding of Bose and Mandal (1972) in pomegranate, Singh *et al.* (1971) Patilet *al.* (2000) in grape and Tahir *et al.* (1998) in guava justified the result of present investigation.

The maximum average number of leaves per cutting (81.90) were observed under the treatment T<sub>5</sub> (2500 ppm) followed by the treatment T<sub>4</sub> (2000 ppm) with (66.10) leaves per cutting. While, the minimum number of leaves per cutting (22.23) were recorded under the treatment T<sub>0</sub> (control ).Similar result of Singh *et al.* (1971) in grapes and Tahier *et al.* (1998) in guava cuttings.

Among all the treatments of the present study, T<sub>5</sub> (2500 ppm) showed the highest percentage of rooted cutting (73.33 %) followed by the number of rooted cuttings (56.66 %) under the treatment T<sub>4</sub> (2000ppm). The minimum percentage of rooted cutting (23.33) were recorded under the T<sub>0</sub> (control) treatment. Singh *et al.* (1971) and Bose and Mandal (1972), reported that the hard wood cuttings of pomegranate rooted well when treated with the IBA. Findings of these scientists very much match with the result of present investigation.

A perusal of the data revealed that the number of primary roots were found significant in respect of IBA

concentrations. The highest number of primary roots per cutting (42.80) were recorded under the treatment T<sub>5</sub>(2500 ppm ), followed by the number (38.15)under the treatment T<sub>4</sub>(2000 ppm) while the minimum number of primary roots per cutting (28.76) were recorded under the treatment of T<sub>1</sub> ( 500 ppm ).The present findings are similar to the findings of Bajwa *et al.* (1978) in sweet lime. Similarly Singh and Kumar (1967) also reported maximum number of primary roots in the cuttings of phalsa treated with IBA.

The maximum number of secondary roots per cutting (91.40) were recorded under T<sub>5</sub>(2500 ppm) treatment followed by (76.35) treatment T<sub>0</sub> (control) while the minimum number of secondary roots per cutting (74.18) were recorded under T<sub>2</sub>(1000 ppm) treatment. The present findings are similar to the findings of Bajwa *et al.* (1978) in phalsa tree.

In the present investigation, the longest length of roots per cutting (28.12 cm) was recorded under the treatment T<sub>5</sub> (5500 ppm) followed by the treatment T<sub>4</sub> ( 4500 ppm) with an average length of 26.28 cm. while the minimum average length of roots per cutting (22.16cm) were recorded under the treatment T<sub>0</sub> (control).

The maximum average diameter of thickest root per cutting (0.21cm) was recorded under the treatment T<sub>5</sub> (2500 ppm) followed by the diameter of root (0.20cm) under the treatment T<sub>4</sub> (2000 ppm) while, the minimum diameter of thickest roots per cutting (0.17cm) were found under the treatment T<sub>0</sub> (control. The result of present study in respect to length and thickness of roots are more or less match with finding of above scientist with a little variation due to the in concentration and species.

Fresh weight of root per cutting was recorded maximum (1.88gm) under the treatment T<sub>5</sub> (2500 ppm) followed by the treatment T<sub>1</sub> (500 ppm). The minimum fresh weight of root per cutting (0.71g) were recorded under the treatment T<sub>2</sub> (1000 ppm).

The maximum average dry weight of roots per cutting (1.02 gm) was recorded under the treatment T<sub>5</sub>(2500 ppm), followed by the weight (0.68 gm) obtained under the treatment T<sub>3</sub>(1500 ppm). The minimum average dry weight of roots per cutting (0.36g) was recorded under T<sub>0</sub> (control) treatment.

**Table 1: Effect of different concentration IBA on shoot characters of stem cuttings of pomegranate .**

Treatments	Number of sprouted cuttings	Number of unspotted cutting	Number of dead cutting	No of sprouts per cuttings	Length of sprouts per cuttings(cm)	Diameters of sprouts per cuttings(cm)	Average no of leaves on new cuttings.
T1	5.34	1.67	2.99	5.76	15.95	0.21	33.06
T2	5.00	1.67	<b>3.33</b>	6.40	16.84	0.22	36.26
T3	5.66	2.34	2.00	6.83	17.66	0.25	59.33

T4	6.00	2.00	2.00	9.03	19.70	0.27	66.10
T5	<b>6.67</b>	1.67	1.66	<b>10.53</b>	<b>20.66</b>	<b>0.41</b>	<b>81.90</b>
T0	4.33	<b>3.00</b>	2.67	6.30	15.83	0.20	22.23
S.Em±	0.38	0.44	0.53	0.73	0.78	0.13	2.20
C.D.at 5%	1.19	1.39	1.68	2.30	2.47	0.41	6.95

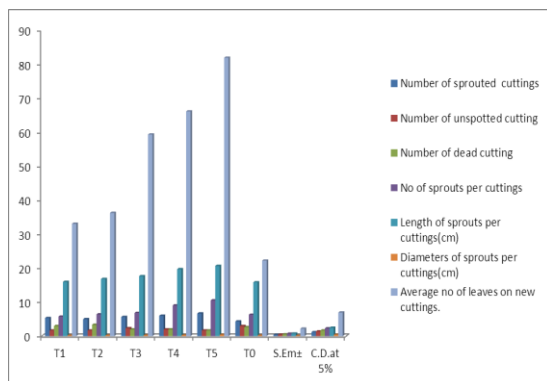
**Table 2: Effect of different concentration IBA on root characters of stem cuttings of pomegranate.**

Treatments	% of rooted cuttings	Number of primary roots/cuttings	Number of secondary roots/cutting	Length of longest roots/cutting(cm)	Diameter of thickest roots/cutting(cm)	Fresh weight of root/cutting(gm)	Dry weight of root/cutting(gm).
T1	36.66	28.76	76.21	24.54	0.17	0.88	0.46
T2	40.00	37.02	74.18	24.67	0.18	0.71	0.36
T3	50.00	37.63	76.35	25.47	0.19	1.22	0.68
T4	56.66	38.15	76.24	26.28	0.20	0.86	0.55
T5	<b>73.33</b>	<b>42.80</b>	<b>91.40</b>	<b>28.12</b>	<b>0.21</b>	<b>1.88</b>	<b>1.02</b>
T0	23.33	29.62	79.00	22.16	0.17	0.74	0.36
S.Em±	3.80	1.60	3.96	1.48	0.73	0.31	0.16
C.D.at 5%	11.97	5.05	12.48	4.68	0.23	0.99	0.50

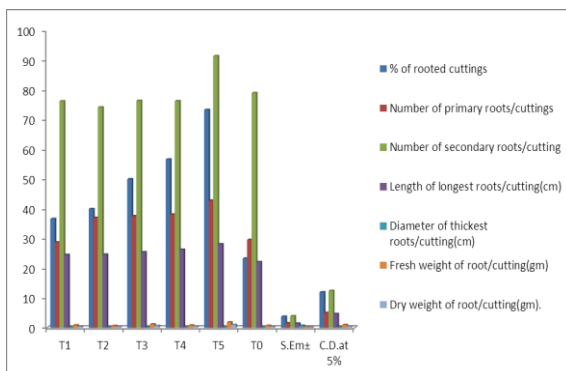
## CONCLUSION

Among various concentrations of IBA, treatment T<sub>5</sub>(2500ppm) showed the best performance in terms of number of sprouted cuttings, minimum number of dead

cutting, un sprouted cuttings, number of sprouts/cutting, length and diameter of sprouts, percentage of rooted cuttings, number of primary roots, secondary roots, and fresh weight and dry weight of roots



**Fig.1 Effect of different concentration IBA on shoot characters of stem cuttings of pomegranate.**



**Fig.2: Effect of different concentration IBA on root characters of stem cuttings of pomegranate.**

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