

Original Research Article

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Evaluation of IBA Labels on Vegetative and Rooting Performance of Dormant Cuttings of Plum Cv Santa Rosa under Mist

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ABSTRACT

Commercially plum is multiplied by budding and grafting which is a difficult exercise for unskilled farmers. Therefore, multiplication through semi hard wood stem cuttings in mist house has been studied with six treatments of indole-3-butyric acid concentrations (0, 1000, 1500, 2000, 2500 and 3000 ppm) at Horticulture Research Center, HNBGU, Srinagar Garhwal, Uttarakhand during the year 2016-17 under Ph.D. discipline. Cuttings were treated by quick dip (2 minute) method and planted in disposable glass. All observations were registered after 90 days of planting the cuttings under mist chamber. Among all the IBA treatments, cuttings treated with 1000 ppm IBA concentration resulted significantly highest in respect of fresh weight of shoot (0.26g), dry weight of shoot (0.099g), rooting percentage (71.67%), fresh weight of root (0.123g) and dry weight of root (0.028g) followed by 1500 ppm IBA treatment. The pattern of root and shoot growth indicated that their growth is affected by IBA level as well as by the growth of each other.

Keywords

Indole 3-butyric acid (IBA), Santa Rosa plum, Cuttings

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Introduction

Plums are one of the widely cultivated stone fruits and characterized as a firm flesh with sweet, sour, juicy and delicious flavour fruit. They can be consumed fresh but are commonly processed, mostly into prunes or distilled drinks (Catherine and Ginies, 2009). Japanese plums are well adapted in the hills of

northern states of India. Among different cultivars Santa Rosa is delicious fruit cultivar of Japanese plum. It requires 400-700 hrs of chilling temperature. Multiplication of these progeny for Propagation is important aspect in fruit cultivation because it is required for multiplication of progeny of same cultivar. Commercially plum is propagated by budding and grafting which requires high skilled man

power where as rate of success is very less (Ananda 1993). Besides this the availability and selection of correct scion and rootstock makes it bottle neck of propagation. Stem cutting is the simplest method of propagation which needs very less care and skill, and helps for shallow rooted plant which causes dwarfing effect and makes it suitable for high density plantation. But some woody plants have limitation in regeneration of rooting through cuttings. There are several factors known which affect rooting in woody species such as wounding of cuttings, air environment, substrate, genotype, season and plant growth regulators. Among all these factors auxins play important role in rooting regeneration of stem cutting of fruit plants (Canli and Bozkurt, 2009). In a study Narula (2018) reported that stem cuttings of Kala Amritsari plum regenerate maximum shoot and root growth in 2000 ppm IBA treatment among all of the IBA treatments. In temperate region Santa Rosa plants grow very well but are found less successful in juvenile stage due to frost injury. So these plants may be grown under mist in subtropical and temperate condition. Therefore, keeping the above factors in view, the present study has been planned to check the performance of auxin concentration levels in plum cuttings for having true plant progenies.

Materials and Methods

The present investigation has been carried out in the Horticultural Research Centre, and Department of Horticulture, H.N.B. Garhwal University, Srinagar (Garhwal), Uttarakhand, during the year 2016-17. Santa Rosa plum cuttings were prepared of 16 cm length and 0.4 to 0.6 mm diameter from more than 10 year old trees of Santa Rosa plum established at Horticultural Research Centre, Chauras Srinagar Garhwal. Prepared cuttings were treated with six IBA concentrations (0, 1000, 1500, 2000, 2500 and 3000 ppm) and planted

on 1st December under the mist chamber. The cuttings were planted in disposable glass of 200 gm capacity filled with (Coco peat, Vermi compost, sand and soil @ 2:2:1:1 portion) rooting media. An intermittent mist system was set at 22 ± 2 °C temperature and 79-85 % relative humidity and mist were relayed at 30 minute interval for 20 second. The experiment was organized according to randomized block design (RBD). All observations of cuttings were recorded after 90 days of planting the cuttings under mist of each treatment.

Results and Discussion

In the present study, different IBA concentrations in term of fresh and dry weight of shoot, rooting percentage, fresh and dry weight of root has been noticed significantly which are presented in Table 1 with the mean values of the observations.

Fresh and dry weight of shoot

The analyzed data reveals that fresh and dry weight of shoot in Santa Rosa plum cutting under mist condition has significantly been influenced by auxin concentration level. The maximum fresh weight of shoot (0.26 g) was observed in 1000 ppm IBA followed by 1500 ppm (0.25 g), 2000 ppm (0.23 g) while minimum was in 3000 ppm (0.13 g) followed by 2500 ppm (0.20g) and control (0.21 g). Dry weight of shoot was recorded maximum in 1000 ppm IBA (0.099 g) followed by 1500 ppm (0.096 g), control (0.089 g) and minimum in 3000 ppm (0.038 g) followed by 2500 ppm (0.083 g) and 2000 ppm (0.088 g).

Growth in weight may probably be due to increased number of leaves and girth of shoot which could have resulted in more amount of dry matter accumulation as a consequence of higher amount of photosynthesis. Similar findings were observed by Jana *et al.* (2015) who reported maximum 75.40 g fresh weight

of shoot in Asian pear cutting with 1000 ppm IBA concentration followed by 500 ppm and 1500 ppm, while the minimum was in control. In another study, Rajeshwari *et al.* (2015) reported the maximum 9.64 g fresh weight and 6.41 g dry weight of shoot in drumstick cuttings in 1500 ppm concentration among four treatments (0, 500, 1000 and 1500 ppm IBA) of IBA.

Rooting percentage

Rooting percentage has been found significantly maximum in 1000 ppm (71.67%) followed by 1500 ppm (68.33%), 2000 ppm (63.33%) and minimum rooting percentage was in 3000 ppm IBA (28.33%) followed by 2500 ppm (55%) and control (60%). However, in relation to the present findings, Jana *et al.*

(2015) and Ibrahim *et al.* (2015) found that among different IBA concentrations, 1500 ppm was highest in rooting percentage followed by 2000 ppm and 2500 ppm while the minimum was in control of lemon verbena cuttings. Canli and Bozkurt (2009) also noticed that 1500 ppm had best (87.5%) rooting percentage followed by 2000 ppm (75.0%) of IBA treatment in semi hardwood cutting of ‘Sarierik’ plum. The rooting percentage decreased with the increasing concentration of IBA beyond an optimal level probably due to its inhibitory effect at higher concentration. The increase in rooting percentage may possibly be attributed to division of the root initial cells, which are dependent either upon applied or endogenous auxin content.

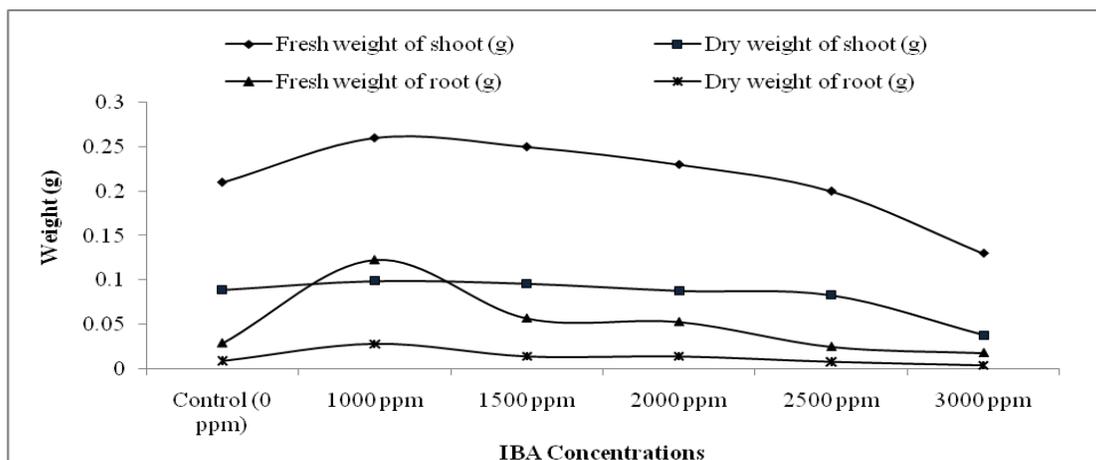
Table.1 Effect of IBA level on fresh and dry weight of shoot, rooting percentage and fresh and dry weight of root of Santa Rosa plum cuttings under mist environment

Treatments	Fresh weight of shoot (g)	Dry weight of shoot (g)	Rooting %	Fresh weight of root (g)	Dry weight of root (g)
Control (0 ppm)	0.21	0.089	60.00	0.029	0.009
1000 ppm	0.26	0.099	71.67	0.123	0.028
1500 ppm	0.25	0.096	68.33	0.057	0.014
2000 ppm	0.23	0.088	63.33	0.053	0.014
2500 ppm	0.20	0.083	55.00	0.025	0.008
3000 ppm	0.13	0.038	28.33	0.018	0.004
CD (5 %)	0.06	0.026	13.96	0.022	0.007
SEm±	0.02	0.008	4.43	0.007	0.002

Fig.1 Rooting in different IBA concentrations of 1st December planted cuttings



Fig.2 Root and Shoot growth of Santa Rosa plum cuttings under different IBA levels in mist environment



Fresh and dry weight of root

In fresh weight of root 1000 ppm accounted maximum weight (0.123g) followed by 1500 ppm (0.057g), 2000 ppm (0.053g) where as minimum fresh weight of root was in 3000 ppm (0.018g) followed by 2500 ppm (0.025g) and control (0.029g). Dry weight of root was maximum in 1000 ppm (0.028g) followed by 1500 ppm (0.014g), 2000 ppm (0.014g) where as minimum dry weight of root was in 3000 ppm (0.004g) followed by 2500 ppm (0.008g) and control (0.009g). Similar findings were observed by Jana *et al.* (2015) who reported that 1000 ppm had maximum (17.31 g) root weight followed by 500 ppm, and the minimum was in control. However, Rajeshwari *et al.* (2015) observed in their findings that 1500 ppm IBA treatment increased root fresh and dry weight of drumstick cuttings along with coco-peat as media. Galavi *et al.* (2013) noticed that among four IBA treatments (0, 2000, 4000, 6000 mg/L) in grape cutting, 4000 mg/L contained highest (0.1125 g) dry weight of root followed by 2000 mg/L (0.0985 g), while the minimum (0.0685 g) was in 8000 mg/L.

More fresh as well as dry weight of root may be due to factors leading to better

development of roots including the influence of IBA which helps in promoting root formation.

A trend was noticed in the growth of shoot and roots of Santa Rosa plum cuttings after being treated with different IBA levels and it was found that the cuttings increased in rooting growth and at the same time increment in shoot growth was also observed (Fig.2). This indicates that the proportion of shoots and roots growth increases together and are influenced by the growth of each other.

Hence on the basis of above investigation it may be concluded that among all IBA levels 1000 ppm concentration is the best treatment with respect to rooting and vegetative growth of Santa Rosa plum cutting. Therefore, keeping in view the various advantages of IBA concentration responses in rooting and growth potential of cuttings, IBA application @1000 ppm has been recommended for multiplication of Santa Rosa plum.

References

Ananda, S. A. (1993) Rootstocks of stone fruits. *Advances in Horticulture* (Ed. K.L. Chadha and O.P. Pareek)

- Malhotra Pub. House, New Delhi. 2: 599-606.
- Canli, F.A. and Bozkurt, S. (2009) Effects of indolebutyric acid on adventitious root formation from semi-hardwood cuttings of 'Sariarik' plum. *J. Applied Biol. Sci.*, 3(1): 45-48.
- Catherine, M.G.C. and Ginies, R.C. (2009) Comparison of the cell wall composition for flesh and skin from five different plums. *Food Chem.*, 114: 1042-1049.
- Galavi, M., Karimian, M.A. and Mousavi, S.R. (2013) Effects of different auxin (IBA) concentrations and planting-beds on rooting grape cuttings (*Vitis vinifera*). *Annual Review Res. Bio.*, 3(4): 517-523.
- Ibrahim, M.E., Mohamed, M.E. and Khalid, K.A. (2015) Effect of plant growth regulators on the rooting of lemon verbena cutting. *Mater. Environ. Sci.*, 6(1): 28-33.
- Jana, B.R., Das, B. and Kumar, S. (2015) Efficacy of IBA and determination of cuttings size in Asian pear (*Pyrus pyrifolia* L.). *Int. J. Plant Res.*, 5(3): 64-67.
- Narula, S. (2018) Effect of growth regulators on rooting of cuttings in plum cv. Kala Amritsari. *Scholarly Research Journal for Interdisciplinary Studies*, 5/25: 6889-6896.
- Rajeshwari, V., Elango, B., Kumar, A.K. and Swaminathan, V. (2015) Impact of IBA on growth and dry matter partitioning of air-layers in annual moringa cv PKM-1. *Int. J. Agric. Sci. Res.*, 5(5): 335-360.

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