RESEARCH COMMUNICATION

ROOTING RESPONSE OF GUAVA (*PSIDIUM GUAJAVA* L.) THROUGH CUTTING UNDER GARHWAL HIMALAYAN REGION

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Abstract: Rooting response of Guava (*Psidium guajava* L.) through cutting, experiment was done valley region in Garhwal Himalayan. The experiment was laid out in Randomized Block Design (RBD) with three replications. For preparing the rooting media, soil and farm yard manure (FYM) in ratio of 2:1 by v/v were mixed thoroughly, then the mixture was filled in root trainers. Properly prepared hardwood cuttings of about 15-20 cm in length during the month of August were treated with various concentrations of IBA viz., 2000, 3000 and, 4000ppm for 10 second by concentrated solution quick dip method with control, and planted in three different conditions namely Mist chamber, Shade house and open condition. The result shows mist house growing condition was found effective in increasing the rooting performance of the cuttings. The cuttings treated with 4000ppm IBA performed best in all aspects, Survival percentage of cutting, number of sprouts, number of leaves**,** shoot length, shoot diameter, number of primary root, number of secondary root, root length, root diameter, fresh weight of root, dry weight of root and rooting percentage. Overall treatment G_2C_3 (Mist chamber with 4000 ppm IBA) treatment combination was found best in all parameters taken.

Key words: Guava, IBA, Growing condition, Rooting percentage

INTRODUCTION

Guava (*Psidium guajava* L.) belong to Myrtaceae family. Place of origin of guava is tropical America. Guava is one of the important fruits of India. Among different states, guava is widely cultivated in Uttar Pradesh and Bihar state. It is a rich source of Vitamin-C (260mg/100gm) which is the second after aonla (600mg/100gm). Guava can be used in preparation of Juice, Jam and Marmalade (Hossen *et al.*, 2009). In India, total fruits area and production has been estimated at 7216 thousand ha, 88977 thousand MT annually (NHB, 2013-14).

Guava plants can be propagated by several ways such as seeds, cuttings, air layers, grafting. The seed propagation is now restricted to rising of rootstock materials. Although guava is hard-to-root, investigations have indicated that it can be successfully propagated from cuttings under mist. Abdullah *et al.* (2006) showed that the cuttings of guava gave 60 % rooting and 70.9 % survival percentage in the non-mist propagator when treated with 4000ppm concentration of IBA. Tready (1983) observed that rooting percentage could be enhanced from 0 to 30.5 percent in hardwood cuttings of guava treated with 500ppm IBA. Khattak *et al* (1983) reported that the tried different concentration of IBA in semi hardwood cuttings of guava and achieved 4% rooting in cuttings of guava with the treatment of 6000ppm of IBA. Luqman *et al.* (2004) observed that the semi-hard wood guava (*Psidium guajava* L.) in number of leaves, number of branches, branch length, number of roots per cutting, root length, root weight and rooting percentage maximum at 1000ppm and found significantly different. hardwood stem cuttings of guava were noticed hard to root (Luis *et al.*, 1986).

MATERIAL AND METHOD

The present investigation was conducted in month of August 2014 in the mist house located at the Horticultural Research Centre, HNB Garhwal University, Srinagar Garhwal, Uttarakhand, India. The research centre is situated in the Alaknanda valley at 30^0 13' 25.26'' N and 78^0 48' 04.93'' E and 563 m above mean sea level, and exhibits a subtropical climate with dry summer and rigorous winters with occasional dense fog in the morning hours from mid December to mid February. The average temperature inside the mist house during experiment was 74±5% relative humidity and 35±3 ^{0}C temperature. The temperature of the soil measured was around 25±2 ^{0}C.

15 cm long Hardwood stem cuttings of Guava (*Psidium guajava* L.) were collected from five year old plants and stem cuttings were prepared. For rooting media, soil and farm yard manure (FYM) in ratio of 2:1 by v/v were mixed thoroughly, then the mixture was filled in root trainers. The basal ends of the cuttings were dipped in dilute solutions of Indole-3-Butyric Acid (2000ppm, 3000ppm, 4000ppm with Control) by quick dip method for 10 seconds before planting in the rooting medium (Singh *et al*. 2011). After the treatment, the cuttings were immediately planted in root trainers and inserted 7.5 cm deep in the rooting media. The experiment was replicated thrice with 10 cuttings in each treatment and a total of 120 cuttings were planted in shade house (G_1), 120 cuttings were planted in mist chamber (G_2) and

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120 cuttings were planted in open condition (G_3). The planted cuttings were allowed to root for 30 days. After 30 days cuttings nine number of cutting per treatment were carefully removed from the pots and dipped in water to remove the soil particles adhering to roots to record the observations pertaining to roots viz., number of primary root, number of secondary root, root length, root diameter, fresh weight of root, dry weight of root, rooting percentage, except for the observations on various stem leaf characters and all other were recorded after planting. The data pertaining to root and shoot character were tabulated and statistically analysed as per the methods outlined by Cochran and Cox (1992).

RESULT AND DISCUSSION

The survival and rooting response of *Guava* cuttings treated with different concentration of IBA is shown in table 1. Significantly the maximum survival percentage of cutting (70.00), number of sprouts (4.00), number of leaves (11.00), shoot length (9.667 cm), shoot diameter (3.00 mm), number of primary root (22.00), number of secondary root (60.0), root length (10.00 cm), root diameter (2.333 mm), fresh weight of root (1.047 gm), dry weight of root (0.643 gm), rooting percentage (66.667) was observed under G_1C_3 treatments (Mist chamber growing condition with 4000ppm concentration of IBA), while the minimum survival percentage of cutting (10.00), number of leaves (2.00), shoot length (2.633 cm), shoot diameter (0.667 mm), number of primary root (4.667), number of secondary root (9.00), root length (3.50 cm), fresh weight of root (0.490 gm), dry weight of root (0.217 gm), rooting percentage (10.00) was recorded under G_3C_0 (Open condition with control) treatment and the lowest number of sprouts (1.00) was observed under G_1C_0, G_3C_0 (Mist chamber and open condition with control) treatment and the minimum root diameter (1.667 mm) was show under G_2C_3 and G_3C_0 (Shade house with 4000 ppm concentration of IBA and open condition with control). The enhanced hydrolytic activity in presence of applied IBA coupled with appropriate planting time might be responsible for the increased percentage of rooted cuttings. High carbohydrate and low nitrogen have been reported to favour root formation (Carlson, 1929). These finding are agreed with the finding of El-Shazyl and El-Sabrout (1994) in Leconte pear and Singh *et al.* (2014) in *Morus alba* under mist chamber. The rooting behavior of cuttings may have varied with the seasons and low temperature adversely affecting rooting (Shafrir and Mendel, 1970). It may be due to the action of auxin which might have caused hydrolysis and translocation of carbohydrates and nitrogenous substances at the base of cuttings and resulted in accelerated cell elongation and cell division in suitable environment (Hartmann *et al*., 2007). Junior *et al.* (2004) have found an increment of rooting and number of roots with the increase of concentration of IBA. The cuttings presented high survival (90%), with conditions planted in the field after the sixth month (from the cutting) or grafted in the eighth month. The effects of indole-3-butyric acid (IBA) on the rooting of semi-hardwood cuttings from the kiwifruit (*Actinidia deliciosa*) were investigated by Ucler *et al*. (2004). Singh *et al*. (2014) observed that the stem cuttings of *Morus alba* were treated with 1000, 1500 and 2000 mg l^{-1} indole-3-butyric acid (IBA) and Naphthalene acetic acid (NAA) solutions by quick dip method. Among all the treatments, numbers of sprouted cuttings, length of the roots, percentage of rooted cutting, lengths of longest sprouts of root were higher in IBA 2000 mg l^{-1}.

Intermittent mist is often used on cuttings because it reduces the temperature of the leaves, lowers respiration, and increases relative humidity around the leaf surface (Langhans, 1955). Significant variations in shoot and root parameters have been observed in hardwood cuttings of grape varieties kept under different propagating structures including open condition (Ravindran *et al*., 2006). Kumar *et al.* (2007) in which they have tried different seasons and found best rooting of Phalsa cuttings in the month of July in mist and open conditions followed by the month of August and June in mist and open conditions respectively. Selvarajan and Madhava Rao (1982) reported that mist chamber provides most favorable environment for better rooting of patchouli cuttings. High humidity and suitable temperature maintained inside the plastic tunnel rather than outside provides good vegetative growth (Whitecomb, 1983). This may be due to effect of environmental factors, light, air temperature and soil temperature, seems to be mediated through enzymatic activation, mobilization of reserve food materials. Such changes in activity of enzymes under different environmental conditions have been earlier reported by Nanda and Kochar, (1985).

Table 1. Effect of growing condition and IBA on the rooting and survival performance of Guava (*Psidium guajava*)

Treatments	Survival % of cutting	Number of sprouts	Number of leaves	Shoot length (cm)	Shoot diameter (cm)	Number of primary root	Number of secondary root	Root length (cm)	Root diameter (cm)	Fresh weight of root	Dry weight of root	Rooting %
G_1C_1	43.333	2.333	7.000	6.333	1.333	14.667	45.333	7.000	1.167	0.860	0.477	40.000
G_1C_2	50.000	3.333	8.000	8.867	2.333	16.000	46.333	9.000	1.667	0.920	0.577	46.667
G_1C_3	70.000	4.000	11.000	9.667	3.000	22.000	60.667	10.000	2.333	1.047	0.643	66.667
G_1C_0	23.333	1.000	2.333	3.533	1.000	6.333	25.667	4.333	0.833	0.590	0.320	20.000

G_2C_1	40.000	2.333	4.333	5.167	1.333	9.000	36.667	6.333	1.333	0.757	0.370	36.667
G_2C_2	43.333	2.000	6.333	6.400	2.000	12.000	34.667	6.667	2.000	0.810	0.407	40.000
G_2C_3	46.667	3.333	6.333	7.167	2.333	13.667	44.333	7.000	1.667	0.747	0.383	43.333
G_2C_0	13.333	1.333	3.000	3.933	0.933	5.000	14.667	3.667	0.667	0.553	0.283	13.333
G_3C_1	23.333	2.000	3.333	4.900	1.667	8.667	37.333	6.000	1.167	0.650	0.320	23.333
G_3C_2	36.667	2.667	3.000	4.767	1.667	11.667	30.667	5.667	1.167	0.660	0.303	33.333
G_3C_3	30.000	2.000	5.000	5.667	2.000	11.333	35.333	6.333	1.333	0.600	0.293	26.667
G_3C_0	10.000	1.000	2.000	2.633	0.667	4.667	9.000	3.500	0.667	0.490	0.217	10.000
CD at 5%	6.753	0.716	7.000	6.333	1.333	14.667	45.333	7.000	1.167	0.860	0.477	3.056
S.Em	2.302	0.2444	8.000	8.867	2.333	16.000	46.333	9.000	1.667	0.920	0.577	8.964

C1 = 2000 ppm, C1 = 2000 ppm, C3 = 4000 ppm, C0 = Control, G1 = Mist chamber, G2 = Shade house, G3 = Open condition

CONCLUSION

Among various concentration of IBA, 4000 ppm concentration show the best performance in terms on survival percentage of cutting, number of sprouts, number of leaves**,** shoot length, shoot diameter, number of primary root, number of secondary root, root length, root diameter, fresh weight of root, dry weight of root and rooting percentage. While among the various growing condition of guava, mist chamber was shown best result in present study. It is suggested that mist chamber growing condition and 4000ppm concentration of IBA give the overall best performance of *Guava* within a short time and recommended for commercial vegetative multiplication of *guava*.

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