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Original Research Article

Impact of Indole butyric acid and Bio-Inoculants on Rooting and Leaf Nutrient Status of Transplanted Air Layered Plants of Guava (*Psidium guajava* L.)

Kanchan Bhandulkar[1], Rajesh Lekhi[1], Ashish Mannade[2] and Arjun Kashyap[1*]

[1]Department of Horticulture, College of Agriculture, Gwalior, India
[2]Department of Soil science, College of Agriculture, Raipur, India
**Corresponding author*

Keywords

Soil, Sand, Vermiculture, Azatobacter

A B S T R A C T

Field trial conducted during 2015-16 at research orchard of horticulture, college of agriculture, Gwalior to evaluate the “Impact of Indole butyric acid and bio-inoculants on rooting and leaf nutrient status of transplanted air layered plants of guava (*Psidium guajava* L.)”. The experiment comprising for source of bio-inoculant media viz., B_o (Control), B_1 (Soil + Sand + Vermiculture + Azatobacter), B_2 (Soil + Sand + Vermiculture + PSB) and B_3 (Soil + Sand + Vermiculture + Azatobacter + PSB) and five concentration of Indole butyric acid viz., I_o (Control), I_1 (600 ppm), I_2 (1200 ppm), I_3 (1800 ppm) and I_4 (2400 ppm), were laid out in factorial randomize block design with three replication. Result revealed that maximum value of number of primary root (7.71), number of secondary root (13), length of primary root (2.77 cm) and length of secondary root (2.00 cm) and leaf nutrient status of N (2.53 %), leaf nutrient status of P (0.25 %) are recorded in B_3, highest value of all these parameters were recorded with use of I_4 (2400 ppm IBA)

Introduction

The Guava, botanically known as *Psidium guajava L.* belongs to the family Myrtaceae. Guava is considered to be one of the most exquisite and nutritionally valuable remunerative crops. Guava fruits are used for both eating a fresh and also for processing. It becomes the most delicious and the most fascinating fruit for consumers and it also excels most of the other fruit trees in respects of its productivity, hardiness, adaptability and its Vitamin “C” contents. Besides its high nutritive value, it yields a heavy crop every year and gives handsome economic returns involving very little inputs. The rooting ability of air layered shoots is decided by several factors like cultivar, biochemical constituents of the clone (*viz*., carbohydrates, nitrogen, sugars, starch, phenols, auxins levels *etc*.) and climatic conditions prevailing in the season (*viz*., temperature, relative humidity, rain fall *etc*.) of the layering. All these factors should be at optimum level to attain better rooting of a guava layers.

IBA is the most promising growth regulator which induces only root initiation. Exogenous application of IBA accelerates the rate of rooting, increases final root percentage and number of roots. However, high concentrations of IBA have been reported to be inhibitory to rooting (Leakey, 1990). While using growth regulators, use of their proper concentration is also important factor because growth regulators used in excessive concentration for the species may result in cell injury or toxicity. This may nearly inhibit development or it may cause yellowing and dropping of leaves, blackening of stem and eventual death of cuttings. From standardization point of view, it is necessary to determine the suitable concentration of plant growth regulators for better performance of a layered plant by way of experimentation.

Air layering is one of the most important commercial methods in practice for propagation of guava. On account of the high population of mother plants per unit area, the shoots remain juvenile for long periods which affect the rooting ability of shoots. Air layering is a successful method of propagation in guava. Use of bio-regulators has helped in overcoming these problems. In the modern times, propagation techniques using growth regulators are being used to achieve more success. The rooting media like Sand, Soil, Peat moss, Vermi-compost, FYM, Coconut pith, Sphagnum moss are used to improve the scope of air layering in various fruit crops. Among different growth regulators, IBA, NAA in varied concentrations and mixtures have been found to be very effective in stimulation root initiation of layers of various fruit species (Sadhu *et al.*, 1972 and Ray and Chaterjee, 1996).

To find out the best concentration of the growth regulators and suitable bio-fertilizer for growing media treatment this can induce better survival of guava after detachment. Keeping in view the potentialities of growth promoting hormone and bio-fertilizers, the present experiment entitled "Impact of Indole butyric acid and bio-inoculants on rooting and leaf nutrient status of transplanted air layered plants of guava (*Psidium guajava* L.*)"*

Materials and Methods

The present experiment entitled, "Impact of Indole butyric acid and bio-inoculants on rooting and leaf nutrient status of transplanted air layered plants of guava (*Psidium guajava* L.)" was carried out in the nursery area of Research Farm, Department of Horticulture, College of Agriculture, Gwalior during 2016-17. The experiment comparasing for source of bio-inoculant media viz., B_o (Control), B_1 (Soil + Sand + Vermiculture + Azatobacter), B_2 (Soil + Sand + Vermiculture + PSB) and B_3 (Soil + Sand + Vermiculture +Azatobacter + PSB) and five concentration of Indole butyric acid viz., I_o (Control), I_1 (600 ppm), I_2 (1200 ppm), I_3 (1800 ppm) and I_4 (2400 ppm), were laid out in factorial randomize block design with three replication. IBA concentration was prepared by mixing required volume at experimental site. The growing media were prepared after mixing the soil, vermi compost and sand in the ratio 2:1:1 and bio fertilizer are mixed *Azotobacter* 1ml per poly bag, however, PSB (Phosphate Solubilizing Bacteria) powder 10 gm per poly bag. The twenty air layered plants of guava were taken in each treatment. The leafless air layering's were dipped in different IBA solutions for about two minutes and planted in the intended growing media filled poly bags thereafter. After their planting the poly bags were placed in open conditions and irrigated in individually.

Results and Discussion

The data present in table revealed that the maximum number of primary and secondary roots per plant found (7.71 and 13.00) in B_3 (Soil + Sand + Vermiculture + Azatobacter + PSB) which was significantly superior to other rooting media viz., B_1 (Soil + Sand + Vermiculture + Azatobacter), B_2 (Soil + Sand + Vermiculture + PSB).

	Observations					
Treatments	**Number of primary roots per plant**	**Number of secondary roots per plant**	**Length of primary roots (cm)**	**Length of secondary roots (cm)**	**Leaf nutrient status (N)**	**Leaf nutrient status (P)**
Bio-innoculant						
B_0	6.03	8.22	2.42	1.47	2.03	0.16
B_1	6.76	9.64	2.68	1.71	1.96	0.23
B_2	6.83	9.35	2.06	1.62	2.44	0.24
B_3	7.71	13.00	2.77	2.00	2.53	0.25
S.Em ±	**0.30**	**0.43**	**0.08**	**0.12**	**0.09**	**0.01**
CD (at 5%)	**0.85**	**1.23**	**0.22**	**0.36**	**0.26**	**0.04**
IBA concentration						
I_0	5.78	8.91	2.03	1.37	1.85	0.20
I_1	6.92	9.61	2.27	1.57	2.19	0.21
I_2	6.82	9.83	2.33	1.64	2.36	0.22
I_3	7.05	10.72	2.74	1.84	2.23	0.24
I_4	7.58	11.19	3.05	2.08	2.57	0.23
S.Em ±	**0.33**	**0.48**	**0.09**	**0.14**	**0.10**	**0.01**
CD (at 5%)	**0.95**	**1.38**	**0.25**	**0.40**	**0.29**	**0.04**

I_o - Control
I_1 - 600 ppm
I_2 - 1200 ppm
I_3 - 1800 ppm
I_4 - 2400 ppm

B_o - Control
B_1 - Soil + Sand + Vermiculture + Azatobacter
B_2 - Soil + Sand + Vermiculture + PSB
B_3 - Soil + Sand + Vermiculture +Azatobacter + PSB

The minimum number of primary and secondary roots was found (6.03 and 8.22) in B_0 (Control). The application of I_4 (2400 ppm) of IBA showed significant influence on number of primary and secondary roots per plant as a compare to other concentrations of IBA viz., I_1 (600 ppm), I_2 (1200 ppm) and I_3 (1800 ppm). Maximum number of primary and secondary roots observed (7.58 and 11.19) in I_4 (2400 ppm) and minimum observed (5.78 and 8.91) in control.

The length of primary and secondary roots was significantly influenced by bio-inoculants. The maximum length of primary and secondary roots was observed (2.77 and 2.00 cm) in B_3 (Soil + Sand + Vermiculture + Azatobacter + PSB) which was followed by B_1 and B_2 and the minimum length of primary and secondary roots was observed (2.42 and 1.47 cm) in B_0 control.

In the case of IBA concentration I_4 showed the higher length (3.05 and 2.08 cm) of primary and secondary roots. It was followed by I_3, I_2 and I_1 and the minimum length of primary and secondary roots was observed (2.03 and 1.37 cm) in B_0. These findings are in close conformity with those of Costa *et al.,* (2003) in guava cvs. Rica and Kumagai, Lal *et al.,* (2007) in Sardar.

The optimum concentration of IBA must have caused the mobilization of carbohydrate and nitrogen with the presence of cofactors at wounding portion, which help better root initiation, number of roots per shoots and average root length (Lal *et al.,* 2007). The growing of guava air layers in polybags containing B_3 growing media (Soil + Sand + Vermicopost + Azotobacter + PSB) significantly improved the number of primary and secondary root, length of primary and secondary root recorded in the guava plants Singh *et al.,* (2007).

The leaf nutrient status of guava air layered plant N and P are influenced by bio-inoculants and IBA solution. The maximum leaf nutrient status of N and P was recorded (2.53 and 0.25 %) in B_3 (Soil + Sand + Vermicopost + Azotobacter + PSB) which was followed by B_2 and B_1 and the minimum leaf nutrient status of N and P was recorded (2.03 and 0.16 %) in B_0 (Control). In the case of IBA concentration I_4 showed the maximum (2.57 and 0.23 %) leaf nutrient status of N and P and minimum in I_0 (1.81 and 0.20 %). The incorporation of *Azotobacter* and PSB irrespective proportion of soil and sand B_3 has significantly improved the N and P contents in guava leaves. In the studies of Paroha *et al.,* (2001), the seedling of teak inoculated with PSB and *Azotobacter* displayed improved maximum N uptake as compared to control. The leaf nutrient status did not follow any systematic pattern in respect of IBA concentration, I_4 and I_3 proved relatively better in respect of this trait (N and P). Lal *et al.,* (2007) suggested the good success of rooted stooled shoots may be due to well-developed root system, which might cause the better absorption of water and mineral nutrients from the soil.

References

Costa, Jr.; Walter Henrique da; Scarpare Filho; Joao, Alexio and Bastos, Debora Costa (2003). Stock plant shading and indole butyric acid in the rooting of *Psidium guajava L.* cv. Ogawa rootstocks in root plugs. *Brazilian Magazine of fruit Culture*, 25(2):301-304

Lal, S., Tiwari, J. P., Awasthi, P. and Singh, G. (2007). Effect of IBA and NAA on rooting potential of stooled shoots of guava (*Psidium guajava* L.) cv. Sardar. Acta Hort., (735): 193-196.

Leakey, R.R.B. (1990). *Naucleadiderrichii*:

rooting of stem cuttings, clonal variation in shoot dominance, and branch plagiotropism. Trees, 4: 164-169.

Paroha, S., Chandra, K.K and Tiwari, K.P. (2000). Synergistic role of VAM and *Azotobacter* inoculation on growth and biomass production in forestry species, J. of *Trop. For.*, 16: 13-21.

Ray, D.P. and Chatterjee, B.K. (1996). Effect of different concentrations of growth regulators etiolation and vigoration treatments on the rooting of stem cutting of bael (*Aegle marmelos Corse).Orissa J. Hort.*, 24(1&2): 79-82.

Sadhu, M. K., Naskar, B. B. and Basu, R. N. (1972). Auxin synergists in the rooting of air layers of tropical fruit trees. Indian Agri., 16 (3): 251-257.

Singh, Prabhakar; Chandrakar, J.; Singh, A.K.; Jain, Vijay and Agrawal, S. (2007). Effect on rooting in guava cv. Lucknow-49 through PGR and growing media under Chattisgarh condition. *Acta Hort.*, 735: 197-200.