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# INFLUENCE OF PLANT GROWTH REGULATORS AND ORGANIC SUBSTANCES ON ROOTING OF GUAVA CUTTING CV. LUCKNOW-49

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## Abstract

The experiment was conducted in Floriculture unit, Department of Horticulture, Faculty of Agriculture, Annamalai University to study the influence of plant growth regulators and organic substances on rooting of Guava cutting Cv. Lucknow-49. The experiment was laid out by completely randomized design (CRD) with 13 treatments which were replicated thrice. The treatment schedule consisted of different growth regulators and organic substances *viz.,* Indole butyric acid with the concentrations of 3000, 4000, 5000 ppm, Naphthalene acidic acid with the concentration of 1000, 2000, 3000 ppm, Humic acid @ 1 %, 2 %, 3% and Seaweed extract @ 1 %, 2%, 3%. The results of study revealed that the cuttings treated with Indole butyric acid @ 5000 ppm significantly increased the root length, number of roots, fresh weight of roots, percentage of rotting and leaf length when compared to control. From the above results, it can be concluded that the cuttings dipped in IBA @ 5000 ppm induced earlier sprouting in guava cv. Lucknow-49.

***Key words :*** Humic acid, *Psidium guajava*, Growth regulators, organic substances.

## Introduction

Guava (*Psidium guajava* L.) a member of family Myrtaceae which is widely grown all over the tropics and sub tropics, popularly known as "Poor man's apple" or "Apple of tropics". In India guava cultivation started in early 17$^{th}$ century and gradually became a crop of commercial significance. It is grown in the homestead gardens throughout the country even without or with little care. Guava fruit is a rich source of Vitamins A, $B_1$, $B_2$, and vitamin C, and contains approximately 260 mg of vitamin C in 100 grams of guava fruit and good source of calcium and phosphorous. Moreover, guava bears highly economic crop every year. It succeeds under a wide range of climatic conditions ranging from sea level to an altitude of 1515 m (5000 ft). Thus, there is need to standardize vegetative propagation methods, especially cutting is the most economical method of vegetative propagation (Hartman and Kester, 1983). Organic substances like seaweed extract and Humic acid offer an economically attractive and ecologically sound means of reducing external inputs and improving the quality and quantity of internal resources (Bhagat *et al.,* 1998). Organic substances are inputs containing micro-organism which are capable of mobilizing nutritive elements from non-usable to usable biological processes. They are less expensive, eco-friendly and sustainable and do not require non-renewable source of energy during their production and improve crop growth and quality by producing growth regulators.

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## Materials and Methods

An experiment was carried out to "Study the influence of plant growth regulators and organic substances on rooting of Guava cv. Lucknow-49" in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar. The experiment was laid out by following the principles of completely randomized design (CRD) with 13 treatments which were replicated thrice. The treatment schedule consisted of different plant growth regulators an organic substances *viz.,* Indole butyric acid with the concentrations of 3000,

4000, 5000 ppm, Naphthalene acidic acid with the concentration of 1000, 2000, 3000 ppm, Humic acid @ 1 %, 2 %, 3% and Seaweed extract @ 1 %, 2%, 3%.

## Results and Discussion

Among the 13 treatments, time taken for appearance of first sprout (17.02 days) was earliest in the treatment ($T_3$) IBA @ 5000 ppm. Time taken for appearance of first sprout (34.02 days) was delayed in control. The increases in number of sprouts might be due to better utilization of stored carbohydrates, nitrogen, increased level of auxins and other factors with the help of growth regulators, the auxin treatments stimulate the hydrolysis of nutritional reserves and their mobilization of sprouting as reported by Jan *et al*.( 2003). The Maximum length of root (9.45 and 13.89) at 45 and 60 DAP was observed in the treatment ($T_3$) IBA @ 5000 ppm. The lowest root length (3.23 and 6.25) was observed in control. The length of root was increased might be due to the application of auxin had been enhance the histological features like formation of callus, enhanced hydrolysis of carbohydrates, synthesis of new proteins, cell enlargement and cell division and differentiation of vascular tissues (Tripathi and Shukla, 2004).

The maximum number of roots (15.5 and 21.23) per cuttings at 45 and 60 DAP was observed in the treatment ($T_3$) IBA @ 5000 ppm, followed by $T_2$ (IBA @ 4000 ppm) (14.6 and 20.32) at 45 and 60 DAP. The increasing number of roots was probably due to the effect of auxin, auxin promoted cell division and cell elongation and the differentiation of cambial root primordial in the mobilization of reserve food material to sites of root initiation thus produced higher number of roots per cutting. The minimum number of roots per cuttings was observed in $T_{13}$ (Control) (6.2 and 10.52) at 45 and 60 DAP (Reddy *et al.,* 2008). Maximum fresh weight of roots (1.82, 3.65) at 45 and 60 DAP was observed in the treatment ($T_3$) IBA @ 5000 ppm. Followed by $T_2$ (IBA @ 4000 ppm) (14.6 and 20.32) at 45 and 60 DAP. The maximum root

**Treatment details**

| Treatment No. | Particulars |
|---|---|
| $T_1$ | Indole butyric acid (IBA) @ 3000 ppm |
| $T_2$ | Indole butyric acid (IBA) @ 4000 ppm |
| $T_3$ | Indole butyric acid (IBA) @ 5000 ppm |
| $T_4$ | Naphthalene acetic acid (NAA) @ 1000 ppm |
| $T_5$ | Naphthalene acetic acid (NAA) @ 2000 ppm |
| $T_6$ | Naphthalene acetic acid (NAA) @ 3000 ppm |
| $T_7$ | Humic acid @ 1% |
| $T_8$ | Humic acid @ 2% |
| $T_9$ | Humic acid @ 3% |
| $T_{10}$ | Seaweed extract @ 1% |
| $T_{11}$ | Seaweed extract @ 2% |
| $T_{12}$ | Seaweed extract @ 3% |
| $T_{13}$ | Control |

**Table 2:** Effect of growth regulators and organic substance on percentage of rooting, fresh weight of roots, length of leaf per cuttings in guava (*Psidium guajava* L.) cv. Lucknow-49.

| Treatments | Percentage of rooting (%) | Fresh weight of roots | | Length of loot (cm) | |
|---|---|---|---|---|---|
| | | 45th day | 60th day | 45th day | 60th day |
| $T_1$ - IBA @ 3000 ppm | 78.21 | 1.55 | 2.93 | 7.52 | 11.54 |
| $T_2$ - IBA @ 4000 ppm | 89.62 | 1.76 | 3.49 | 8.94 | 13.87 |
| $T_3$ - IBA @ 5000 ppm | 93.25 | 1.82 | 3.65 | 9.34 | 14.56 |
| $T_4$ - NAA @ 1000 ppm | 70.17 | 1.40 | 2.55 | 6.56 | 10.05 |
| $T_5$ - NAA @ 2000 ppm | 77.71 | 1.57 | 2.96 | 7.61 | 11.63 |
| $T_6$ - NAA @ 3000 ppm | 82.08 | 1.63 | 3.11 | 8.05 | 12.38 |
| $T_7$ - Humic acid @ 1% | 58.72 | 1.27 | 2.28 | 5.62 | 8.43 |
| $T_8$ - Humic acid @ 2% | 62.62 | 1.34 | 2.42 | 6.02 | 9.22 |
| $T_9$ - Humic acid @ 3% | 85.84 | 1.69 | 3.31 | 8.42 | 13.12 |
| $T_{10}$ - Seaweed extract @ 1% | 54.82 | 1.21 | 2.15 | 5.16 | 7.71 |
| $T_{11}$ - Seaweed extract @ 2% | 66.30 | 1.42 | 2.57 | 6.48 | 9.96 |
| $T_{12}$ - Seaweed extract@ 3% | 74.07 | 1.48 | 2.75 | 7.04 | 10.78 |
| $T_{13}$ – Control | 45.07 | 1.12 | 2.04 | 4.77 | 6.43 |
| Mean | 72.23 | 1.48 | 2.78 | 7.04 | 10.04 |
| SE (d) | 3.513 | 0.053 | 0.123 | 0.351 | 0.625 |
| CD at 0.05% | 7.026 | 0.107 | 0.247 | 0.703 | 1.250 |

**Table 1:** Effect of growth regulators and organic substance on days required for sprouting, length of root, number of roots per cuttings in guava (*Psidium guajava* L.) cv. Lucknow-49.

| Treatments | Days required for sprouting | Length of root(cm) | | Number of roots per cuttings | |
|---|---|---|---|---|---|
| | | 45th day | 60th day | 45th day | 60th day |
| $T_1$ - IBA @ 3000 ppm | 22.25 | 7.36 | 10.56 | 11.71 | 17.27 |
| $T_2$ - IBA @ 4000 ppm | 18.34 | 8.94 | 13.07 | 14.60 | 20.32 |
| $T_3$ - IBA @ 5000 ppm | 17.02 | 9.45 | 13.89 | 15.50 | 21.23 |
| $T_4$ - NAA @ 1000 ppm | 24.93 | 6.78 | 9.66 | 10.71 | 16.32 |
| $T_5$ - NAA @ 2000 ppm | 22.34 | 7.31 | 10.46 | 11.80 | 17.32 |
| $T_6$ - NAA @ 3000 ppm | 20.99 | 7.89 | 11.26 | 12.60 | 18.35 |
| $T_7$ - Humic acid @ 1% | 27.72 | 5.12 | 7.43 | 7.54 | 12.62 |
| $T_8$ - Humic acid @ 2% | 26.37 | 5.68 | 8.03 | 8.54 | 13.53 |
| $T_9$ - Humic acid @ 3% | 19.65 | 8.42 | 12.21 | 13.5 | 19.39 |
| $T_{10}$ - Seaweed extract @ 1% | 29.06 | 4.59 | 6.93 | 6.64 | 11.69 |
| $T_{11}$ - Seaweed extract @ 2% | 25.03 | 6.19 | 8.60 | 9.44 | 14.43 |
| $T_{12}$ - Seaweed extract@ 3% | 23.59 | 6.25 | 8.90 | 9.64 | 15.34 |
| $T_{13}$ – Control | 34.02 | 3.23 | 6.25 | 6.20 | 10.52 |
| Mean | 23.94 | 6.70 | 9.78 | 10.64 | 16.02 |
| SE (d) | 1.307 | 0.478 | 0.587 | 0.715 | 0.82 |
| CD at 0.05% | 2.165 | 0.956 | 1.175 | 1.43 | 1.64 |

weight was attributed to the fact that auxins naturally occurring or exogenously applied are for initiation and growth of roots (Milind, 2008); (Singh and Tomar, 2015).

The highest percentage of rooting (93.25) was observed in $T_3$ (IBA @ 5000 ppm) followed by $T_2$ (IBA @ 4000 ppm) (89.62) followed by $T_9$ (Humic acid @ 3%) (85.84). The minimum percentage of rooting was observed in $T_{13}$(Control) (45.67). The highest leaf length ((9.34 and 14.56) at 45 and 60 DAP was observed in $T_3$ (IBA @ 5000 ppm). Followed by $T_2$ (IBA @ 4000 ppm) (8.94 and 13.87) at 45 and 60 DAP. (Geiss *et al.,* 2009), (Shukla *et al.,* 2010). The minimum leaf length was seen in $T_{13}$ (Control) (4.77 and 6.43) at 45 and 60 DAP. The results are in agreement with Saroj *et al*., (1997), (Roberto *et al.,* 2004).

From the above results, it can be concluded that the cuttings dipped in IBA @ 5000 ppm induced earlier sprouting in guava cv. Lucknow-49.

## References


Bhagat, B.K., B.P. Jain, C. Singh and B.M. Chaudhary (1998). Propagation of guava (*Psidium guajava* L.) by ground layering. *J. Res. Birsa. Agric. Univ.*, **10(2):** 209-210.

Geiss, G., L. Gutierrez and C. Bellini (2009). Adventitious root for rotation: New Insights and Perspectives. *Ann. Plant Revi.*, **37:** 48-56.

Hartmann, H.T. and D.E. Kester (1983). Plant propagation Principles and Practices 4th edn. Prentice-hall, Inc. Englewood cliffs. *New jersey*, 727.

Jan, N.E., F.K. Wazir, I. Mohammad, H. Mohammad and A. Ali (2003). Effect of different concentrations of IBA on rooting of litchi in air layering. *Sarhad J. Agric*., **19(1):** 47-54.

Milind, R.I. (2008). Effect of growth regulators and environments on rooting of stevia cuttings (*Stevia rebaudiana Bertoni*). M.Sc. (Agri.) Thesis, University of Agriculture Science, Dharwad.

Reddy, K.V., P.C. Reddy and P.V. Goud (2008). Role of auxin synergists in the rooting of hardwood cuttings of fig (*Ficus carica* L.). *Indian J. Agric. Res*., **42:** 47-51.

Roberto, S.R., H.T. Kanai and M.Y.Y. (2004). Rooting and shoot growth of six grapevine rootstocks submitted to the stratification of hardwood cuttings. *Acta Scientiarum Agron*., **26:** 79-84.

Saroj, P.L. and G.S. Prakash (1997). Note on propagation of different grape rootstocks through single node cuttings. *Indian Hort*., **54:** 58-60.

Shukla, H.S., V.K. Tripathi, R.D. Awasthi and A.K Tripathi (2010). Effect of IBA, PHB and Boron on rooting and shoot growth of hard wood stem cuttings of Peach. *Int. J. Applied Agric. Research*, **5:** 467.

Singh, K.K and Y.K. Tomar (2015). Effect of planting time and indole butyric acid levels on rooting of woody cuttings of Phalsa (*Grewia asiatica* L.). *Hort. Flora Res. Spect*., **4(1):** 39-43.

Tripathi, S.N. and H.S. Shukla (2004). Propagation of pomegranate cultivars by Stem cuttings with Indole butyric acid and P hydroxybezoic acid. *Indian J. of Hortic*., **61(4):** 362-365.