RESPONSE OF ROOT PARAMATERS ON THE EFFECT OF PLANT GROWTH REGULATORS ON ROOTING OF SEMI HARDWOOD CUTTINGS IN BETELVINE (*Piper betel)* cv. Vellaikodi

[1]M. Gayathiri, [2]S. Madhavan and [3]S. Sindhu

[1,] Assistant Professor Department of Horticulture Faculty of Agriculture, Annamalai University, Annamalai Nagar-608 002

[2] Assistant Professor, Department of Horticulture Faculty of Agriculture, Annamalai University, Annamalai Nagar-608 002,

[3,] PG Research Scholar, Department of Horticulture Faculty of Agriculture, Annamalai University, Annamalai Nagar-608 002

ABSRACT

An experiment was carried out to study the response of root parameters on the effect of plant growth regulators on rooting of semi hardwood cuttings in betel vine (*Piper betel* L.) cv. Vellaikodi" in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar during November 2019. The experiment was conducted in Completely Randomized Design with thirteen treatments and three replications. The treatments comprised of using three growth regulators *viz*., IBA, IAA and NAA with four different concentrations of 50, 100, 150 and 200 ppm. The betel vine cuttings were dipped in the growth regulators for 12 hours and then planted in the polybags and kept inside the green house. The result of the above experiment revealed that the root parameters *viz.*, rooting percentage (%), number of roots per cuttings, root length (cm), fresh weight of roots (g) and dry weight of roots (g) were recorded the maximum in the treatment where IBA @ 150 ppm was used. The least parameters were observed in the control.

Keywords: Betel vine, IBA, IAA, NAA, growth regulators

INTRODUCTION

Betel vine, also known as 'Pan' is an important cash crop in India which is botanically known as *Piper betel*. It is a perennial, dioecious, creeper belonging to the family Piperaceae. It is originated from Malaysia and widely grown in moist tropical and sub-tropical regions of Asia and the Pacific. Betel leaves are adopted in Indian system of medicine because it contains rich sources of medicinal properties and are able to cure stomach problems, wounds, scales, heal burns, swelling due to sprains, sore throat, boils and gum sores, respiratory disorders and constipation [1]. Naturally Betel vine is propagated through vegetative methods, they show very slow growth. But demand for the crop is high. The common propagation method for *Piper betel* is by means of stem cutting which is inefficient to meet the demand of *Piper betel* leaves. To improve the rooting, different growth regulators at different concentrations was used. With this objective the present investigation

was carried out to study the response of root parameters on the effect of plant growth regulators on rooting of semi hardwood cuttings in betel vine (*Piper betel* L.) cv. Vellaikodi.

MATERIALS AND METHODS

An experiment was carried out in the Medicinal Unit, Department of Horticulture, Faculty of Agriculture, Annamalai University during November 2019. Betel vine cv. Vellaikodi was used for the experiment. The experiment was laid out in Completely Randomized Design with thirteen treatments and three replications. The treatments comprised of using three growth regulators like IBA, IAA and NAA with four different concentrations of 50, 100, 150 and 200 ppm. The betel vine cuttings were dipped in the growth regulators for 12 hours and then planted in the poly bags was kept in the green house. A control was maintained by dipping the cuttings in distilled water. The observations on root parameters like rooting percentage, number of roots per cutting, root length, fresh weight of roots and dry weight of roots were recorded. The data were analyzed statistically following the method suggested by the authors [5].

RESULTS AND DISCUSSION

Root parameters is considered to be the important factors to judge the rooting of a crop. The data on the root parameters was presented in the Table 1.

Rooting percentage (%)

Among the treatments tested, the treatment IBA @ 150 ppm increased the rooting percentage (80.55%). Similar findings on increased rooting percentage due to the soaking of cuttings in IBA were reported by the author [8] .They reported that the increased percentage of rooting in cuttings treated with plant growth regulators over control has been considered to be due to the fact that early initiation of roots due to the application of IBA at higher concentration resulted in more utilization of the nutrients thus resulted in higher rooting percentage.

Number of roots per cutting

The treatment where IBA @ 150 ppm used recorded the maximum number of roots per cutting (10.55). This was followed by the treatment where IBA @ 200 ppm was used which recorded 9.93 number of roots per cutting. The reason for the better rooting is due to the effect of auxins, as they facilitate the synthesis of ribonucleic acid and also induces ethylene production which is necessary for cell division and root initiation. The beneficial effects of exogenous application of auxins in enhancing rooting have been reported by many researchers [3] in lavender

Root length (cm)

Among the treatments tested, the treatment IBA @ 150 ppm recorded the maximum root length (16.18 cm). It was followed by the treatment where IBA @ 200 ppm was used which recorded the root length of 15.09 cm. Increased root length observed by the IBA treatment might be ascribed due to the fact that IBA stimulates the activity of cambium resulting in the mobilization of reserved food materials for the site of root initiation

[2]. Availability of food material to the initiating rootlets might be the reason for the inreased root length. Similar reports also made by the authors [6] in scented geranium.

Fresh weight of roots per cutting (g)

The growth regulators tried at different concentrations significantly increased the fresh weight of roots per cuttings. Application of IBA @ 150 ppm produced the maximum fresh weight (2.71 g) and was followed by (2.44 g) IBA @ 200 ppm. This may be due to more number of roots, highest root length and effective utilization of stored food materials like carbohydrates, nitrogen and other rooting co-factors. The results are in conformity with the findings of the authors [7] in *Piper longum*.

Dry weight of roots per cutting (g)

Application of IBA @ 150 ppm recorded the maximum dry weight of root (1.02 g) and was followed by (T_4) IBA @ 200 ppm is (0.96 g). This may be due to better physiological maturity of the cuttings along with the mobilization of secondary metabolites towards better root formation with the aid of growth regulators and hence more number of roots and highest root length which in turn improved the dry weight of roots per cutting. The results in the present investigations are similar to those of the author [4] in *Tinospora cordifolia*.

CONCLUSION

Hence, the results of the experiment revealed that the root parameters *viz* rooting percentage, number of roots per cutting, root length, fresh weight of roots and dry weight of roots were recorded the highest when IBA @ 150 ppm was used.

REFERENCES

[1] Chopra, I.C., K.S. Jamwal and B.N. Khajuria. 1954. Pharmacological action of some common essential/oil-bearing plants used in indigenous medicine. II. Pharmacological action of *Alpinia galanga, Pistacia integrima, Piper betel* and *Nardostychas jatamansi*. *The Indian journal of medical research*,**42(3)**:385-388.

[2] Gurumurti, K., B.B. Gupta and K. Adarsh. 1984. Hormonal regulation of root formation. In the monal Regulation of Plant Growth and Development (Ed. S.S. Purohit). Agrobotanical Publishers (India). pp. 387-400.

[3] Kumar, N and K.V. Sreeja. 1996. Effect of growth regulator on the rooting ability of lavender (*Lavendula angustifolia* Mill). *Indian Perfumer*,**40**: 93-94.

[4] Mishra, Y., G. Usmani., P.H. Chawhaan and A.K. Mandal. 2010. Propagation of *Tinospora cordifolia* (willd.) Miers Ex Hook. F. and Thoms. through mature vine cuttings and their field performance. *Indian For.*, **136 (1)**: 88-94.

[5] Panse, V.G. and P.V. Sukhatme.1985. Statistical methods for Agricultural workers. **Indian Council of Agrl. Res.,** New Delhi.

[6] Shukla, H.Y., K.S. Negi., H.S. Maural., G.P. Pandey and A.K. Sharma. 2004. Role of auxin on the vegetative propagation of scented geranium (*Pelargonium gravelons* cv. Egyptian) through herbaceous stem cuttings. *Scientia Agricola.*, **56**: 185-190.

[7] Singh, A. K., Rajesh Singh, A. K. Mittal, Y. P. Singh and Shiva Jauhari. 2003. Effect of plant growth regulators on survival, rooting and growth characters in long pepper (*Piper longum* L.) *Prog. Hort.*,**35(2)**:208-211.

[8] Singh, A.K. 2001. Effect of auxins on rooting and survival of Jasmine (*Jasminum sambac*) stem cuttings. *Prog. Hort.*,**33(2)**: 174-177.

Table 1: Response of root parameters on the effect of plant growth regulators on rooting of semi hardwood cuttings in betel vine

Treatment details	Rooting percentage	Number of roots cutting^{-1}	Root length (cm)	Fresh weight of roots cutting^{-1} (g)	Dry weight of roots cutting^{-1} (g)
T_1 – IBA @ 50 ppm- 12 hours	71.56	8.92	13.72	2.03	0.85
T_2 – IBA @ 100 ppm- 12 hours	66.51	7.65	12.38	1.85	0.78
T_3 – IBA @ 150 ppm- 12 hours	80.55	10.55	16.18	2.71	1.02
T_4 – IBA @ 200 ppm- 12 hours	77.01	9.93	15.09	2.44	0.96
T_5 – IAA @ 50 ppm- 12 hours	68.49	7.99	12.73	1.90	0.80
T_6 – IAA @ 100 ppm- 12 hours	59.94	6.54	11.18	1.65	0.70
T_7 – IAA @ 150 ppm- 12 hours	73.99	9.21	14.08	2.12	0.88
T_8 – IAA @ 200 ppm- 12 hours	56.04	5.92	10.31	1.51	0.64
T_9- NAA @ 50 ppm- 12 hours	52.92	4.89	9.61	1.38	0.52
T_{10}- NAA @ 100 ppm- 12 hours	46.37	3.69	8.69	1.19	0.41
T_{11}- NAA @ 150 ppm- 12 hours	63.96	7.18	11.99	1.79	0.75
T_{12}- NAA @ 200 ppm- 12 hours	50.37	4.41	9.37	1.32	0.49
T_{13}- Control (Distilled water)	45.18	3.03	8.12	1.05	0.39
Mean	62.53	6.91	11.80	1.76	0.70
S.Ed	1.13	0.13	0.16	0.03	0.01
CD (P=0.05)	2.33	0.27	0.34	0.08	0.02

IBA - Indole-3-Butyric Acid, IAA - Indole-3-Acetic Acid, NAA - Naphthalene Acetic Acid