# INFLUENCE OF SHOOT PARAMATERS ON THE EFFECT OF PLANT GROWTH REGULATORS ON ROOTING OF SEMI HARDWOOD CUTTINGS IN BETELVINE (*Piper betel. L)* cv. Vellaikodi

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## ABSTRACT

An experiment was carried out to study the influence of shoot 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 shoot parameters *viz*., number of sprouts per cuttings, number of leaves per cutting (cm), fresh weight of shoot (g), dry weight of shoot (g), and survival percentage of rooted cuttings were recorded the maximum in the treatment where IBA @ 150 ppm was used. The least parameters were observed in the control where the cuttings are dipped in distilled water.

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

## INTRODUCTION

The betel (*Piper betel*) is a vine of the family Piperaceae. Betel leaf is mostly consumed in Asia, and elsewhere in the world by some Asian emigrants, as betel *quid* or in paan, with arecanut and tobacco. In India and Sri Lanka, a sheaf of betel leaves is traditionally offered as a mark of respect and auspicious beginnings. Occasions include greeting elders at wedding ceremonies, celebrating the New Year and offering payment to Ayurvedic physicians and astrologers. The betel leaf is cultivated mostly in South and Southeast Asia, from Pakistan to Papua New Guinea. It needs a compatible tree or a long pole for support. Betel requires well-drained fertile soil for its cultivation. 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 influence of shoot 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 shoot parameters like number of sprouts per cuttings, number of leaves per cutting (cm), fresh weight of shoot (g), dry weight of shoot (g) and survival percentage of rooted cuttings were recorded. The data were analyzed statistically following the method suggested by the authors [5].

## RESULTS AND DISCUSSION

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

### Number of sprouts per cutting

Among the treatments tested, the treatment IBA @ 150 ppm resulted in the highest number of sprouts (2.87 sprouts per cutting), closely followed by IBA @ 200 ppm (2.49 sprouts per cutting). The least number of sprouts was recorded in the control. Earliness in sprouting, increase in number of shoots and shoot length may be due to utilization of stored carbohydrates present in cuttings, nitrogen and other factors with the aid of growth regulators [2]

### Number of leaves per cutting

The treatment where IBA @ 150 ppm used recorded maximum number of leaves per cutting (6.21). This was followed by the treatment where IBA @ 200 ppm was used which recorded 5.68 number of leaves per cutting. The minimum number of leaves per cutting was noticed in control (2.23). This might be due to the fact that IBA alone had effectively resulted in early sprouting of shoots, higher number of shoots per cutting and leaves per shoot in various crops as reported by the authors [4] in vanilla.

**Fresh weight of shoots per cutting (g)**

The growth regulators tried at different concentrations significantly increased the fresh weight of shoots per cuttings. Application of IBA @ 150 ppm produced the maximum fresh weight (11.01 g) and was followed by (10.77 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 [6] in *Piper longum.*

**Dry weight of shoots per cutting (g)**

Application of IBA @ 150 ppm recorded the maximum dry weight of shoot (3.52 g) and was followed by ($T_4$) IBA @ 200 ppm is (3.22 g). The minimum dry weight of shoots (1.57 g) was recorded in the control. 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 [3] in *Tinospora cordifolia.*

**Survival percentage of rooted cuttings**

The highest field survival percentage was recorded in IBA 150 ppm (90.69 %) and the least was observed in control (30.29 %) at 180 DAP which is mainly due to better rooting and other shoot parameters in IBA 150 ppm treatment. Having recorded highest fresh and dry weight of roots and maximum stored carbohydrates, the physiologically matured cuttings were able to survive better. These results are in comparison with the findings of the author [7] in *Jasminum sambac.*

## CONCLUSION

Hence, the results of the experiment revealed that the shoot parameters *viz.*, number of sprouts per cuttings, number of leaves per cutting (cm), fresh weight of shoot (g), dry weight of shoot (g), and survival percentage of rooted cuttings were recorded the highest when IBA @ 150 ppm was used.

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**Table 1: Influence of shoot parameters on the effect of plant growth regulators on rooting of semi hardwood cuttings in betel vine cv. Vellaikodi**

| Treatment details | Number of sprouts cutting$^{-1}$ | Number of leaves cutting$^{-1}$ | Fresh weight of shoot cutting$^{-1}$(g) | Dry weight of shoot cutting$^{-1}$ (g) | Survival percentage of rooted cuttings (%) |
|---|---|---|---|---|---|
| $T_1$ – IBA @ 50 ppm- 12 hours | 2.11 | 5.01 | 10.49 | 2.95 | 82.79 |
| $T_2$ – IBA @ 100 ppm- 12 hours | 1.65 | 4.55 | 10.18 | 2.60 | 67.21 |
| $T_3$ – IBA @ 150 ppm- 12 hours | 2.87 | 6.21 | 11.01 | 3.52 | 90.69 |
| $T_4$ – IBA @ 200 ppm- 12 hours | 2.49 | 5.68 | 10.77 | 3.22 | 87.51 |
| $T_5$ – IAA @ 50 ppm- 12 hours | 1.84 | 4.65 | 10.25 | 2.69 | 75.69 |
| $T_6$ – IAA @ 100 ppm- 12 hours | 1.30 | 3.96 | 9.76 | 2.36 | 52.59 |
| $T_7$ – IAA @ 150 ppm- 12 hours | 2.24 | 5.31 | 10.53 | 3.01 | 85.39 |
| $T_8$ – IAA @ 200 ppm- 12 hours | 1.07 | 3.60 | 9.53 | 2.18 | 49.66 |
| $T_9$- NAA @ 50 ppm- 12 hours | 0.84 | 3.24 | 9.01 | 2.01 | 45.92 |
| $T_{10}$- NAA @ 100 ppm- 12 hours | 0.51 | 2.82 | 8.66 | 1.76 | 40.38 |
| $T_{11}$- NAA @ 150 ppm- 12 hours | 1.52 | 4.32 | 10.03 | 2.53 | 56.29 |
| $T_{12}$- NAA @ 200 ppm- 12 hours | 0.76 | 3.21 | 8.94 | 1.95 | 43.01 |
| $T_{13}$- Control (Distilled water) | 0.08 | 2.23 | 8.16 | 1.57 | 30.29 |
| Mean | 1.48 | 4.21 | 9.79 | 2.48 | 62.10 |
| **S.Ed** | 0.05 | 0.01 | 0.01 | 0.02 | 0.78 |
| **CD (P=0.05)** | 0.12 | 0.03 | 0.03 | 0.05 | 1.62 |

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