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Dr. AD Ashok

Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Trichy, Tamil Nadu, India

J Ravivarman

Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Trichy, Tamil Nadu, India

Stimulating capability of IBA on rooting in stem cuttings of *Pseuderanthemum carruthersii* var. *atropurpureum*

Dr. AD Ashok and J Ravivarman

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Abstract

The current study was aimed to find the effect of IBA on rooting of cuttings in *Pseuderanthemum carruthersii* var. *atropurpureum* 'Variegatum'. The experiment was laid out in Completely Randomized Block Design (CRD) with 3 replications, including six treatments of various concentration of Indole 3-Butyric Acid (IBA) solutions viz., 250 ppm, 500 ppm, 1000 ppm, 2000 ppm, 3000 ppm and control (without any treatment). Minimum days for sprouting (7.12 days), number of roots per cutting (14.23) and root length (9.79 cm) are recorded maximum IBA 3000 ppm. All the IBA treatments are on par with each other and significantly higher than control in survival percentage. From this experiment we conclude that, the rooting and survival capacity of terminal stem cuttings of *Eranthemum bicolor* under mist chamber conditions, can be improved by quick dipping of basal portion of cuttings on IBA with 3000 ppm concentration.

Keywords: IBA, Eranthemum bicolor, root hormone, quick dip method, terminal cutting

Introduction

Eranthemum, commonly called as *Eranthemum bicolor*, scientifically *Pseuderanthemum carruthersii* var. *atropurpureum* 'Variegatum' (W.Bull) Fosberg (syn.: *Eranthemum bicolor* Schrank, *Eranthemum albomarginatum* B.S.Williams), belonging to family Acanthaceae, is an important colourful ornamental foliage shrub, native to South-Eastern Africa, grows well under wide range of climate all over the world. This plant is used landscaping as shrubby border, potted plant, for home gardening etc. It is valued mainly for its attractive foliage with variegation and easy maintenance in garden. Rapid multiplication using stem cuttings are followed commercially in eranthemum. Horace and James (1987) [1] reported that best method of propagation for *Pseuderanthemum carruthersii* var. *atropurpureum* is cutting and Randhawa and Mukhapadhaya (2000) [2] said that *Eranthemum* spp. are propagated by cutting, whereas Bose *et al.* (2008) [3] clearly reported that *Eranthemum* spp. can successfully propagated by tip cutting.

Among the vegetative propagation methods, stem cutting is the easiest and cost effective method of multiplication mainly for ornamental shrubs. The rooting ability and success percentage of cuttings depends on many factors. Among them, plant growth regulators play an important role in formation of roots and shoot growth in cuttings. Root commencement with the exogenous application of plant growth regulators occupies a significant role in the field of plant propagation (Mukherjee *et al.*, 1976) [4]. With this, current study was aimed to find the effect of IBA on rooting of cuttings in *Pseuderanthemum carruthersii* var. *atropurpureum* 'Variegatum'.

Materials and Methods

The experiment was conducted at Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Tiruchirappalli district of Tamilnadu, India. The experiment was laid out in Completely Randomized Block Design (CRD) with 3 replications, including six treatments of various concentration of Indole 3-Butyric Acid (IBA) solutions viz., 250 ppm, 500 ppm, 1000 ppm, 2000 ppm, 3000 ppm and control (without any treatment). Terminal stem cuttings were collected from healthy mother plants, available in the institute.

Corresponding Author:**Dr. AD Ashok**

Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Trichy, Tamil Nadu, India

Terminal cuttings of 20 cm length with minimum 3-4 nodes were taken. A slant cut was given at the basal end and a transverse cut at the top of each cutting. The basal end (2.5-3.0 cm) of the cuttings was dipped for 30 seconds with IBA solutions of fixed treatment. Then, the treated cuttings were planted vertically in sterilized inert sand media under mist chamber condition to promote rooting. All cuttings were maintained under mist chamber and watered regularly. Relative humidity in the mist chamber was maintained at $\geq 85\%$ and temperature at $30\pm 2^{\circ}\text{C}$. Further observations were

recorded at 30 days after planting (DAP) on various root parameters such as days taken for sprouting, rooting percentage (%), number of rooted per cutting and root length (cm). Survival percentage (%) of the rooted cutting was recorded at 60 DAP. The inference was drawn after comparing the calculated F values with the tabulated F values at 5% ($P=0.05$) level of significance. The estimates of mean, variance and standard error were done as per Panse and Sukhatme (1978)^[5].

Table 1: Effect of different concentrations of IBA on rooting of *Pseuderanthemum carruthersii* var. *atropurpureum* 'Variegatum'

Concentrations	Days for sprouting	Rooting percentage (%)	Number of roots per cutting	Root length (cm)	Survival percentage (%)
IBA 250 ppm	14.20	71.70	5.13	3.10	82.50
IBA 500 ppm	13.50	75.70	5.97	3.50	88.30
IBA 1000 ppm	11.50	79.90	8.76	6.55	91.50
IBA 2000 ppm	9.40	91.70	11.33	7.87	99.00
IBA 3000 ppm	7.12	95.60	14.23	9.79	99.00
Control	15.50	55.33	4.76	2.90	75.50
Mean	11.87	78.32	8.36	5.62	89.30
SE.d	1.22	7.94	0.91	0.62	8.97
CD @ 0.05	2.58	16.76	1.9	1.31	18.93

Result and Discussion

On analysing the parameters taken for observation in this experiment, all shows significance among the treatment, which are shown in table 1. Minimum days for sprouting was recorded in the 3000 ppm (7.12 days), followed by 2000 ppm (9.40 days) which are on par with each other. On comparing with control, all the treatments have significant effect in early sprouting. It assures that the treatment of cuttings with IBA induce rooting of cutting much faster than untreated one. On examining after 30 DAP, higher rooting percentage was recorded in 3000 ppm (95.60%), followed by 2000 ppm (91.70%) and 1000 ppm (79.90%) which are on par with each other. Number of roots per cutting (14.23) and root length (9.79 cm) are recorded maximum in 3000 ppm IBA. Our findings are in line with experimental reports of Hossain and Urbi (2016)^[6] on adventitious rooting of shoot cuttings in *Andrographis paniculata*. They stated that higher concentration of Auxin resulted in an increased number of adventitious rooting per cutting. Similar reports were given by Raji and Osman (2012)^[7] and Dash *et al.*, (2011)^[8] as that the higher dosages of auxins induced increased number of roots within a short time.

Shenoy, 1992^[9] in *Rosa damascena* reported that the increase in root length over control may be due to the enhanced hydrolysis of carbohydrates, metabolites accumulation and cell division induced by Auxin. These results were in line with the findings of Patil *et al.*, 1998^[10] in *Jasminum sambac* (Jasmine), Singh *et al.*, 2010^[11] in *Bougainvillea glabra* (bougainvillea), Grewal *et al.*, 2005^[12] in *Dendranthema grandiflora* cv. Snowball, Singh *et al.*, 2013^[13] in *Cestrum nocturnum* (night jasmine) and Sharma, 2014^[14] in *Tagetes erecta* (marigold), though the type of stem cutting utilized were varied. All this findings are in line with the results of IBA 1000, 2000, 3000 ppm by Chowdhuri and Sadhukhan (2017)^[15] on *Eranthemum bicolor*.

On observing survival percentage after 60 DAP, all the IBA concentrations shows higher survival, significantly higher than control. The survival capability of the rooted cutting in a inert sand media might be due to the action of plant growth hormones on the stem cuttings and the growth of sprouted roots. This was supported by the statement Abidin and Baker (1984)^[16] that plant growth hormones also have effects on

cell elongation and cell division thereby boosting root length, thus enhancing overall growth of cuttings; which improves the survival capacity of the rooted cutting.

In all parameters such as days for sprouting (15.50 days), rooting percentage (55.33%), number of roots per cutting (4.76), root length (2.90 cm), and survival percentage (75.50%), control recorded the minimum value among the treatments. The production of roots in the control group may be caused by endogenous auxin, which might influence and play important role for root primordia formation in the cuttings (Hossain and Urbi, 2016)^[6].

Conclusion

From this experiment we conclude that, the rooting and survival capacity of terminal stem cuttings of *Eranthemum bicolor* under mist chamber conditions, can be improved by quick dipping of basal portion of cuttings on IBA with 3000 ppm concentration. Further study may be conducted to find out and standardize the maximum concentration of IBA, below toxic level, to be used to get maximum effect of rooting and root promotion in *Eranthemum bicolor*.

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