



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2017; 6(6): 1848-1852  
Received: 04-09-2017  
Accepted: 05-10-2017

**TK Chowdhuri**  
Department of Floriculture &  
Landscape Architecture, BCKV,  
Mohanpur, Nadia, West Bengal,  
India

**R Sadhukhan**  
Department of Genetics and  
Plant breeding, BCKV,  
Mohanpur, Nadia, West Bengal,  
India

## Performance evaluation of different growth regulators on propagation of *Eranthemum* (*Eranthemum bicolor* and *Eranthemum tricolor*)

**TK Chowdhuri and R Sadhukhan**

### Abstract

The present investigation was carried out to study the effect of different growth regulators on propagation of *Eranthemum* (*Eranthemum bicolor* and *Eranthemum tricolor*) in subtropical zone of West Bengal under naturally ventilated polyhouse equipped with foggers at Instructional Farm, Jaguli, Bidhan Chandra Krishi Viswavidyalaya, West Bengal. Significant differences among the treatments (IAA @1000ppm, IAA@2000ppm, IAA @3000ppm, IBA @1000ppm, IBA @2000ppm, IBA @3000ppm, NAA @1000ppm, NAA @2000ppm, NAA @3000ppm, locally available rooting hormone and Control) on root emergence and proliferation were noticed. After two consecutive years of studied, *Eranthemum bicolor* can successfully propagated by tip cutting with the treatment of IAA @ 2000 ppm and IBA @ 3000ppm, whereas *Eranthemum tricolor* responded well in all growth regulators of higher concentration (3000ppm) for rapid multiplication of this plant in sub-tropical zone of West Bengal.

**Keywords:** *Eranthemum* (*Eranthemum bicolor* and *Eranthemum tricolor*), Propagation, Growth regulators, Sub-tropical zone

### 1. Introduction

*Eranthemum* (*Eranthemum bicolor* and *Eranthemum tricolor*) 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 for garden decoration in the shrubbery border, as potted plant for home gardening, parks and public gardens or along roadsides, streets, byways and highways and as a graceful indoor plant. It is also great for landscaping as a single decorative specimen or amidst a crowd of low-growing plants in a border. There is a tremendous demand of this plant due to rapid urbanization. Besides these advantages, this plant is very hardy and easy to maintain in garden. However, rapid multiplication of this plant is a problem and wastage of propagating material very often takes place due to sparse rooting and unavailability of a suitable combination of variety and growth regulator in the sub-tropical environment. Horace and James (1987) [3] reported that best method of propagation for *Pseuderanthemum carruthersii* Var. atropurpureum is cutting and Randhawa and Mukhapadhaya (2000) [4] said that *Eranthemum spp.* are propagated by cutting, whereas Bose *et al.* (2008) [1] clearly reported that *Eranthemum spp.* can successfully propagated by tip cutting.



**Fig.1:** *Eranthemum bicolor*



**Fig.2:** *Eranthemum tricolor*

**Correspondence**  
**TK Chowdhuri**  
Department of Floriculture &  
Landscape Architecture, BCKV,  
Mohanpur, Nadia, West Bengal,  
India

## Materials and Methods

The experiment was carried out under naturally ventilated poly house at Jaguli farm of Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, during 2014-15 and 2015-16. The cuttings of two species namely bicolor and tricolor were taken from the mother block of germplasm collection under instructional farm of BCKV in the month of 15<sup>th</sup> June. New growth of tip portion of the branches up to 4-5 inches (three to four leaves) were taken for cuttings. After cutting, the cut ends were treated with 0.2% Copper oxy-chloride for 15 minutes followed by treatment with different growth regulator solutions. A cutting bed was prepared with sterilized coarse sand containing up to a depth of 6 inches. Then cut end of cuttings were placed inside sand bed up to a depth of one inch. During investigation micro-environment of the cuttings bed had temperature range of around 25-32°C, light intensity 1500-1750 foot candle and humidity 85-90%. Every day misting with water was provided through forgers in the evening hours. The experiment was laid out in Randomized Block Design with eleven treatments replicated thrice and the statistical analysis of the data was carried out following Fisher's Analysis of Variance Technique as described by Gomez and Gomez (1984)<sup>[2]</sup>. The treatments comprised under mentioned of different concentrations of IAA, IBA, NAA along with the locally

available brand Rootex and without any treatment.

| Treatments                   | Treatments                   | Treatments                   |
|------------------------------|------------------------------|------------------------------|
| T <sub>1</sub> :IAA @1000ppm | T <sub>4</sub> :IBA @1000ppm | T <sub>7</sub> :NAA @1000ppm |
| T <sub>2</sub> :IAA @2000ppm | T <sub>5</sub> :IBA @2000ppm | T <sub>8</sub> :NAA @2000ppm |
| T <sub>3</sub> :IAA @3000ppm | T <sub>6</sub> :IBA @3000ppm | T <sub>9</sub> :NAA @3000ppm |
|                              |                              | T <sub>10</sub> :Rootex      |
|                              |                              | T <sub>11</sub> :Control     |

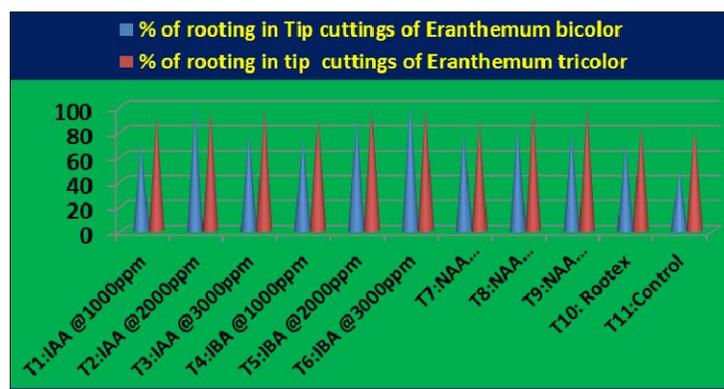
Observation was recorded up to one and half months (30 days for rooting and 15 days for plant survivability in pots) with the parameters of percentage of rooting, number of roots per cutting, root length, days required for root initiation and percentage of plant survivability in pots. The different concentrations of growth regulators (1000, 2000 and 3000ppm) like IAA, IBA and NAA were prepared in the laboratory of Bidhan Chandra Krishi Viswavidyalaya.

## Results and Discussion

The effect of different growth regulators with various concentration were significantly differ among the treatments on percentage of rooting, number of roots per cutting, root length, days required for root initiation and plant survivability in pots of tip cutting of *Eranthemum (Eranthemum bicolor and Eranthemum tricolor)* reflected in Table1 and 2.

**Table 1:** Effects of different growth regulators on rooting behaviour of *Eranthemum (Eranthemum bicolor and Eranthemum tricolor)*.

| Treatments                   | % of rooting of Erathemum |          | No. Of roots/cutting of Erathemum |          | Root length(cm) of Erathemum |          |
|------------------------------|---------------------------|----------|-----------------------------------|----------|------------------------------|----------|
|                              | Bicolor                   | Tricolor | Bicolor                           | Tricolor | Bicolor                      | Tricolor |
| T <sub>1</sub> :IAA @1000ppm | 70.00                     | 93.67    | 4.67                              | 10.33    | 2.67                         | 6.43     |
| T <sub>2</sub> :IAA @2000ppm | 100.00                    | 98.00    | 8.67                              | 12.33    | 4.83                         | 8.40     |
| T <sub>3</sub> :IAA @3000ppm | 80.00                     | 100.00   | 6.67                              | 16.67    | 4.33                         | 8.93     |
| T <sub>4</sub> :IBA @1000ppm | 75.67                     | 90.67    | 8.33                              | 11.00    | 6.50                         | 5.63     |
| T <sub>5</sub> :IBA @2000ppm | 90.00                     | 97.33    | 10.33                             | 13.33    | 8.60                         | 6.43     |
| T <sub>6</sub> :IBA @3000ppm | 100.00                    | 100.00   | 13.33                             | 15.33    | 9.20                         | 8.77     |
| T <sub>7</sub> :NAA @1000ppm | 80.00                     | 88.00    | 11.67                             | 9.67     | 2.77                         | 5.00     |
| T <sub>8</sub> :NAA @2000ppm | 85.00                     | 99.00    | 8.33                              | 24.33    | 4.57                         | 6.87     |
| T <sub>9</sub> :NAA @3000ppm | 81.00                     | 100.00   | 7.33                              | 21.67    | 5.03                         | 8.07     |
| T <sub>10</sub> :Rootex      | 70.00                     | 84.33    | 7.67                              | 11.00    | 3.67                         | 4.50     |
| T <sub>11</sub> :Control     | 48.33                     | 80.00    | 3.67                              | 5.33     | 1.90                         | 2.80     |
| SE(±)                        | 1.56                      | 0.88     | 0.34                              | 0.48     | 0.21                         | 0.21     |
| CD at 5%                     | 4.64                      | 2.6      | 1.02                              | 1.43     | 0.62                         | 0.62     |
| CV(%)                        | 3.38                      | 1.62     | 7.22                              | 6.06     | 7.33                         | 5.55     |



**Fig 3:** Effects of different growth regulators on percentage rooting of *Eranthemum (Eranthemum bicolor and Eranthemum tricolor)*

After one months of observation, the highest percentage (fig. 3) of rooting in *Eranthemum bicolor* (100%) in tip cutting were obtained in T<sub>2</sub>: IAA @2000ppm followed by T<sub>6</sub>: IBA @3000ppm, whereas 100 % rooting obtained in *Eranthemum*

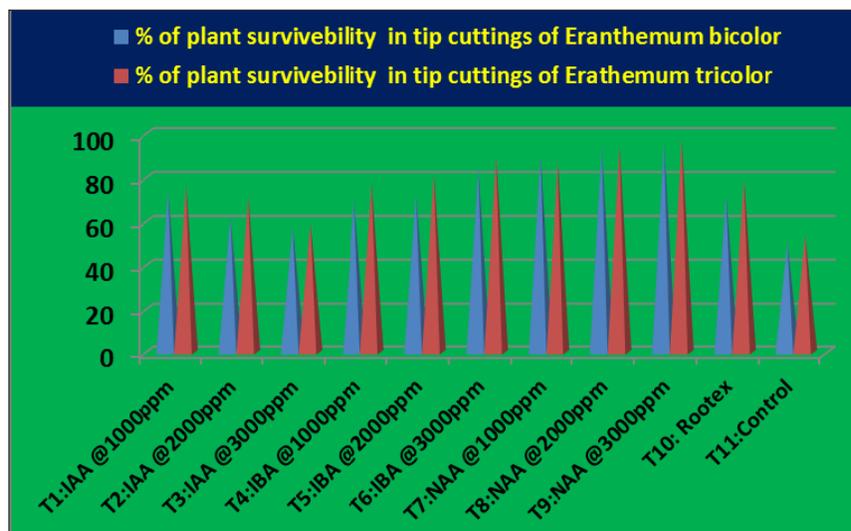
*tricolor* with treatment of T<sub>3</sub>: IAA @3000ppm, T<sub>6</sub>:IBA @3000ppm and T<sub>9</sub>:NAA @3000ppm and both the cases, very poor performance was recorded in control (48.33 and 80 respectively) over others treatments. Production of roots in

terms of number per plant is an important factor to plant survivability in pots, here it has been found that profuse rooting was found in *Eranthemum bicolor* (13.33), when treated with IBA @ 3000ppm and in case of *Eranthemum tricolor*, excellent rooting (21.67) was observed in treatment of NAA @3000ppm incomparision to others treatments. The growth of the roots in term of length was markedly

influenced(9.20cm) by IBA @3000ppm (*Eranthemum bicolor*) and there are so many treatments performed all most at par (IAA @2000 and 3000ppm, IBA@3000ppm and NAA@3000ppm) influenced to the cutting of *Eranthemum tricolor* for promotion of root length, whereas very stunted growth was noticed in control (1.9 and 2.8cm respectively).

**Table 2:** Effects of different growth regulators on days required for rooting and plant survivability of Eranthemum (*Eranthemum bicolor* and *Eranthemum tricolor*) in pots.

| Treatments                   | Days required for root initiation of Erathemum cuttings |          | % of plant survivability Erathemum in pots |          |
|------------------------------|---|----------|--|----------|
|                              | Bicolor   | Tricolor | Bicolor                                    | Tricolor |
| T <sub>1</sub> :IAA @1000ppm | 16.33   | 10.33    | 83.67                                      | 93.67    |
| T <sub>2</sub> :IAA @2000ppm | 12.33   | 8.67     | 100.00                                     | 100.00   |
| T <sub>3</sub> :IAA @3000ppm | 14.33   | 7.33     | 90.00                                      | 100.00   |
| T <sub>4</sub> :IBA @1000ppm | 12.33   | 11.67    | 85.00                                      | 95.00    |
| T <sub>5</sub> :IBA @2000ppm | 11.00   | 10.33    | 98.33                                      | 100.00   |
| T <sub>6</sub> :IBA @3000ppm | 10.00   | 7.00     | 100.00                                     | 100.00   |
| T <sub>7</sub> :NAA @1000ppm | 14.00   | 13.00    | 82.00                                      | 95.00    |
| T <sub>8</sub> :NAA @2000ppm | 13.33   | 10.67    | 92.33                                      | 100.00   |
| T <sub>9</sub> :NAA @3000ppm | 11.67   | 7.00     | 84.00                                      | 100.00   |
| T <sub>10</sub> :Rootex      | 15.33   | 13.00    | 82.00                                      | 83.67    |
| T <sub>11</sub> :Control     | 21.00   | 15.00    | 66.67                                      | 74.33    |
| SE(±)                        | 0.67  | 0.38     | 1.35                                       | 0.66     |
| CD at 5%                     | 1.98  | 1.13     | 4.01                                       | 1.96     |
| CV(%)                        | 8.39  | 6.37     | 2.67                                       | 1.21     |



**Fig 4:** Effects of different growth regulators on percentage of plant survivability of Eranthemum (*Eranthemum bicolor* and *Eranthemum tricolor*)

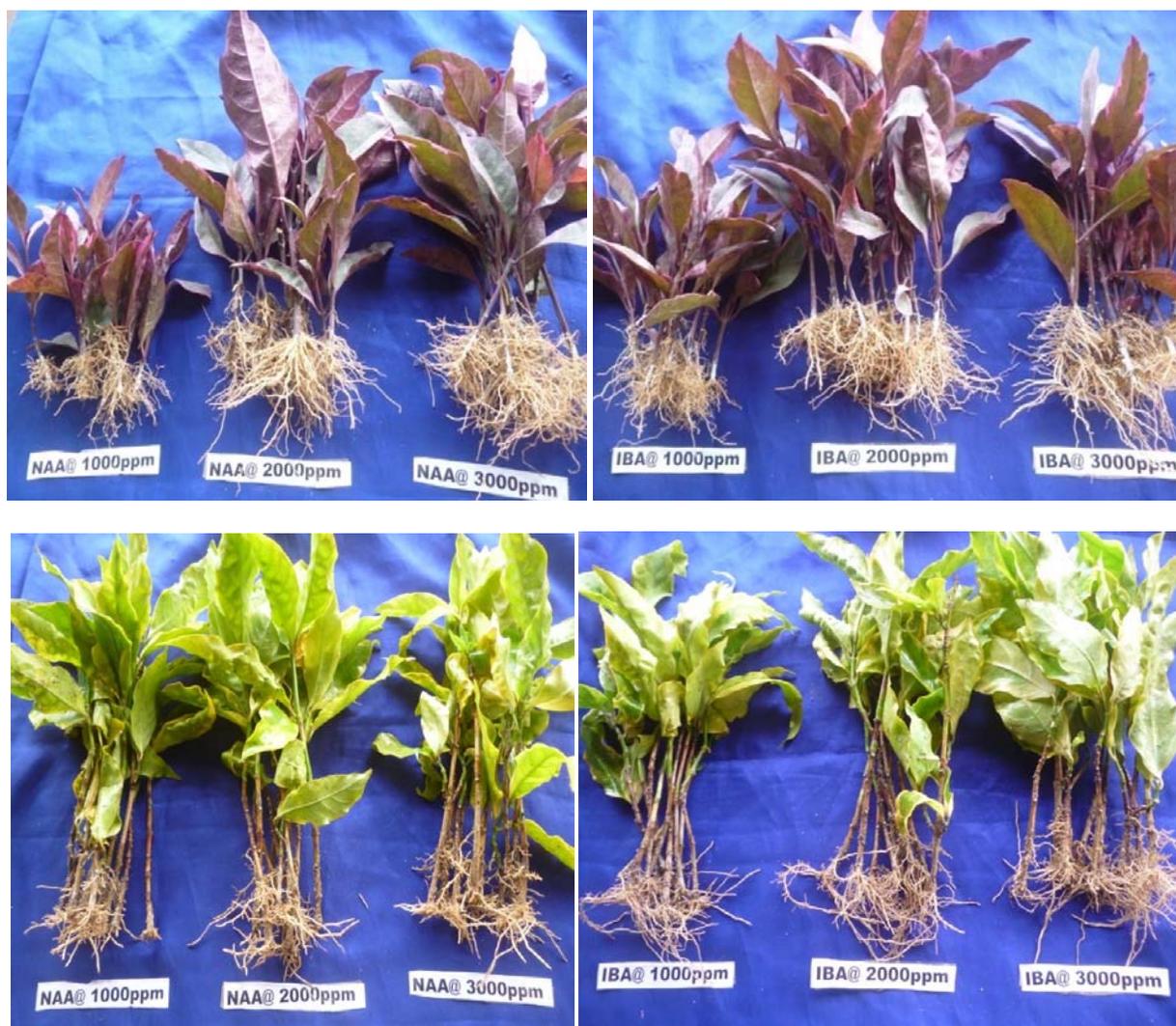
Higher concentration of all the growth regulators (3000ppm) brought early emergence of root within a week was observed in *Eranthemum tricolor*, whereas only IBA @ 3000ppm started root development process earlier in *Eranthemum bicolor* by 10 days and both the cases delayed rooting was noted in control by 15 and 21 days respectively. Regarding new plant survivability in pots, when rooted cuttings were potted in the earthen pots (pot containing 3 parts soil + one part cowdung manure), highest plant survivability of 100% was recorded from cuttings were treated with IAA @2000 and IBA@3000ppm (fig.4) in *Eranthemum bicolor*, but in case of *Eranthemum tricolor*, growth regulators of IAA, IBA and NAA (2000-3000ppm) were markedly influence (100%) in this aspect over others treatments (Fig. 5, 6, 7, 8, 9 and 10). From above results in *Eranthemum tricolor* cuttings, with increase of IAA, IBA and NAA doses from 1000 to 3000 ppm

simultaneously increase of percentage of rooting, number of roots/cutting and root length, but in case of *Eranthemum bicolor*, the effect of growth regulators is something different like IAA and NAA up to 2000ppm is beneficial for rooting and IBA at higher concentration was best. All most all the growth regulators of lower doses showed delaying of root initiation and too much delayed was noticed in without any treatment and higher doses accelerated the root development process. During 15 days of observation, when new plants (*Eranthemum bicolor*) were established in earthen pots, IAA @ 2000ppm and IBA of 3000ppm treated tip cuttings were showed 49.25% more plant survivability than control. Similarly in case of *Eranthemum tricolor*, all growth regulators of 2000-3000ppm obtained 34.53% more success of plant survivability than control.

**Photographs showing the Performance of different growth regulators on propagation of *Eranthemum* (*Eranthemum bicolor* and *Eranthemum tricolor*)**



**Fig 5-6:** Effect of different IAA concentrations on rooting of *Eranthemum* (*Eranthemum bicolor*)



**Fig 7-8:** Effect of different IBA concentrations on rooting of *Eranthemum* (*Eranthemum bicolor*)

**Conclusion**

From the above results it may be concluded that all growth regulators have positive response on all parameters studied

related to propagation of *Eranthemum*. The most remarkable findings were noted that tip cutting of *Eranthemum bicolor* with IAA @ 2000ppm, IBA @ 3000 and *Eranthemum*

*tricolor* with all growth regulators of higher concentration are beneficial for rapid multiplication of this plant in sub-tropical zone of West Bengal.

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