Effect of IBA and NAA and their combination on the shooting of stem cuttings of African marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda

Shalini Kaushik and Neeraj Shukla

DOI: [https://doi.org/10.22271/chemi.2020.v8.i3y.9462](https://doi.org/10.22271/chemi.2020.v8.i3y.9462)

Abstract

The experiment was carried out in completely randomized design with three replications and the cuttings were planted on protray and placed at mist chamber and consist of three different concentrations of IBA (100, 200 and 300 ppm), NAA (100, 200 and 300ppm) and IBA+NAA (100+100, 200+200 and 300+300 ppm) along with control were treated for shooting in stem cuttings of marigold under Chhattisgarh plain region. The result revealed that growth regulators IBA and NAA had significantly effect on shooting performance of African marigold. The number of sprouts per cutting (7.55), average length of shoot (8.00 cm), number of leaves per cutting (163.44), fresh weight (1140.55 mg) and dry weight of shoot (159.00 mg) were recorded maximum in NAA 200 ppm at 35 days after planting of cuttings.

Keywords: *Tagetes erecta* L., stem cutting, IBA, NAA, shooting

Introduction

Marigold (*Tagetes erecta* L.) belongs to the family Compositae. This family includes 1,600 genera and 23,000 species, in which herbs, shrubs, climbers and also medicinal plants are included (Hussain *et al.*, 2012). The name *Tagetes* was given after Tages, a demigod, known for his beauty. Neither African Marigold (*Tagetes erecta*) nor French Marigold (*Tagetes patula*) come from Africa or France. It is native to Central and South America specially Mexico. In India Marigold was introduce by Portuguese and it became popular and spread quickly because of its wide adaptability to varying climatic and soil condition. The auxins specially IBA and NAA producing early, easily and healthy shoots in cuttings of Horticultural crops. The information of success of rooting as well as shooting in marigold when cuttings are treated with IBA and NAA and their combination are meager under Chhattisgarh plains. Therefore cuttings of “Pusa Narangi Gainda” had been treated with different concentration of IBA and NAA and their combinations to find out the success of cuttings for shoot initiation and its growth.

Material and method

In this study a commercial cultivar Pusa Narangi Gainda of *Tagetes erecta* L. was used as plant material and two different auxins IBA and NAA were used as plant growth regulator. Three concentrations (100, 200 and 300 ppm) of two plant growth regulator and their combination were tested for shoot growth of marigold cutting. The stem cuttings of the marigold plants were treated with each concentration of each plant growth regulators for 1 min and then simultaneously transferred in the protray under mist chamber. These treatments were compared with the control which did not apply any growth regulator. The experiment was conducted in Completely Randomized Design (CRD) and each treatment was replicated thrice.

Result and discussion

1. Number of sprouts per cutting

   The maximum number of sprouts per cutting (7.55) was recorded under 200 ppm NAA followed by 200 ppm IBA, 300 ppm IBA and 100 ppm IBA which was significantly highest than all the treatments. The lowest number of sprouts (4.44 cm) per cutting was recorded under control. These finding agree with the finding of Singh *et al* (2013) [3] in night queen (*Cestrum*...
noturnum L.), Waseem et al. (2011)\(^1\) in chrysanthemum.

2. **Average length of vegetative shoot per cutting (cm)**
The maximum average length (8.00 cm) of shoot per cutting was recorded under 200 ppm NAA which was significantly highest than all the tested treatments. The lowest average length (3.29 cm) of shoot per cutting was recorded under control. Similar findings were observed by Ullah et al. (2015)\(^6\) in Marigold, Waseem et al. (2011)\(^1\) in Chrysanthemum.

3. **Number of leaves per cutting**
The maximum number (163.44) of leaves per cutting was observed under 200 ppm NAA which was found remarkably more than all the treatments of this study. The lowest number (57.77) of leaves per cutting was recorded in control. Similar findings were observed by Narayan (2015)\(^6\) in Marigold, Waseem et al. (2011)\(^1\) in Chrysanthemum.

4. **Fresh weight of shoots per cutting (mg)**

| Tr. No. | Treatment       | No. of sprouts | Av. length of shoots (cm) |
|---------|----------------|----------------|--------------------------|
|         |                | 25DAP          | 35DAP                    | 25DAP          | 35DAP          |
| T1      | IBA100         | 4.10 (2.25)    | 6.55 (2.74)              | 4.00           | 6.78           |
| T2      | IBA200         | 4.99 (2.43)    | 7.21 (2.86)              | 4.30           | 7.84           |
| T3      | IBA300         | 4.21 (2.28)    | 6.55 (2.74)              | 4.04           | 6.84           |
| T4      | NAA100         | 3.99 (2.22)    | 5.33 (2.15)              | 3.78           | 6.55           |
| T5      | NAA200         | 5.55 (2.55)    | 7.55 (2.92)              | 4.48           | 8.00           |
| T6      | NAA300         | 3.44 (2.10)    | 4.77 (2.39)              | 3.31           | 5.77           |
| T7      | IBA+NAA100     | 3.55 (2.12)    | 4.99 (2.43)              | 3.67           | 6.10           |
| T8      | IBA+NAA200     | 3.77 (2.18)    | 4.99 (2.43)              | 3.68           | 6.21           |
| T9      | IBA+NAA300     | 3.99 (2.22)    | 6.10 (2.65)              | 4.00           | 6.72           |
| T10     | CONTROL        | 2.21 (1.79)    | 4.44 (2.33)              | 2.74           | 3.29           |

SEm ± 0.11, 0.13, 0.35, 0.73, 1.03, 2.15

CD (P=0.05)

Table 2: Effect of IBA and NAA and their combination on number of leaves per cutting after 25 and 35 days of planting.

| Tr. No. | Treatment       | 25DAP | 35DAP |
|---------|----------------|-------|-------|
| T1      | IBA100         | 71.33 (8.47) | 123.66 (11.15) |
| T2      | IBA200         | 75.11 (8.71) | 151.33 (12.28) |
| T3      | IBA300         | 71.77 (8.46) | 144.44 (12.05) |
| T4      | NAA100         | 66.66 (8.11) | 121.89 (11.05) |
| T5      | NAA200         | 87.11 (9.37) | 163.44 (12.73) |
| T6      | NAA300         | 53.55 (7.06) | 110.22 (10.53) |
| T7      | IBA+NAA100     | 64.89 (8.11) | 112.33 (10.60) |
| T8      | IBA+NAA200     | 66.66 (8.21) | 114.44 (10.65) |
| T9      | IBA+NAA300     | 67.11 (8.23) | 123.33 (11.12) |
| T10     | CONTROL        | 22.77 (4.86) | 57.77 (7.56) |

SEm ± 0.68, 0.71
CD (P=0.05)

Table 3: Effect of IBA and NAA and their combination on fresh and dry weight of cutting after 25 and 35 days of planting.

| Tr. No. | Treatment       | Fresh wt. of shoot | Dry wt. of shoot (mg) |
|---------|----------------|--------------------|-----------------------|
| T1      | IBA100         | 577.78 (24.03)     | 925.89 (30.26)        |
| T2      | IBA200         | 679.66 (26.00)     | 1096.66 (32.99)       |
| T3      | IBA300         | 671.66 (25.88)     | 1000.33 (31.59)       |
| T4      | NAA100         | 532.00 (23.01)     | 879.33 (29.56)        |
| T5      | NAA200         | 699.66 (26.46)     | 1140.55 (33.73)       |
| T6      | NAA300         | 476.89 (21.75)     | 611.00 (24.52)        |
| T7      | IBA+NAA100     | 481.33 (22.35)     | 811.11 (28.38)        |
| T8      | IBA+NAA200     | 501.11 (21.70)     | 815.44 (28.48)        |
| T9      | IBA+NAA300     | 560.55 (23.67)     | 889.88 (29.48)        |
| T10     | CONTROL        | 417.55 (20.45)     | 569.33 (23.76)        |

SEm ± 1.25, 2.01, 7.28, 17.48
CD (P=0.05)

The maximum fresh weight (1140.55 mg) of shoot per cutting was recorded with the application of 200 ppm NAA, followed by IBA 200 ppm, IBA 300 ppm, IBA 100 ppm and IBA+NAA 300 ppm which were at par with each other. While fresh weight of shoot per cutting was lowest (569.33 mg) in untreated cuttings (control). The results are in line with the findings observed by Narayan (2015 a)\(^6\) in Marigold cv. Basanti local and Narayan (2015 b)\(^6\) in Marigold cv. Pusa Narangi.

5. **Dry weight of shoots per cutting (mg)**
The maximum dry weight (159.00 mg) of shoot per cutting was recorded with the application of 200 ppm NAA, followed by IBA 200 ppm, IBA 300 ppm, IBA 100 ppm, IBA+NAA 300 ppm and NAA 100 ppm. While dry weight of shoot per cutting was lowest (86.66 mg) in untreated cuttings (control). This result is also supported by Wazir (2014)\(^3\) in his experiment on camellia.

---

\(^{1}\) International Journal of Chemical Studies

\(^{2}\) CD (P=0.05)

\(^{3}\) http://www.chemijournal.com
Conclusion
This study indicated that, the vegetative growth like number of sprouts, average length of shoot, number of leaves, fresh and dry weight of shoot is recorded maximum under 200 ppm NAA treated cuttings. Fresh and dry weight of shoot portion per cutting were observed maximum with the treatment of NAA 200 ppm, which was found significantly similar with IBA 200 ppm, IBA 300 ppm and IBA 100 ppm.

References
1. Waseem K, Jilani MS, Jaskani MJ, Khan MS, Kiran M, Khan GU. Significance of Different Plant Growth Regulators on the Regeneration of Chrysanthemum Plantlets (Dendranthema morifolium L.) through Shoot Tip Culture. Pak. J. Bot. 2011; 43(4):1843-1848.
2. Girisha R, Shirol AM, Reddy BS, Patil VK, Krishnamurthy GH. Growth, quality and yield characteristics of Daisy (Aster amellus L.) cultivar Dwarf Pink as influenced by different plant growth regulators. Karnataka J. Agric. Sci. 2012; 25(1):163-165.
3. Singh KK, Rawat V, Rawat JMS, Tomar YK, Kumar P. Effect of IBA and NAA concentrations on rooting in stem cuttings of Night Queen (Cestrum nocturnum L) under sub-tropical valley conditions. HortFlora Res. Spectrum. 2013; 2(1):81-83.
4. Ullah Z, Abbas SJ, Naeem N, Lutfullah G, Malik T, Khan U et al. Effect of indole butyric acid (IBA) and naphthalene acetic acid (NAA) plant growth regulators on Marigold (Tagetes erecta L.). African J. of Agri. Res. 2013; 8(29):4015-4019.
5. Wazir JS. Effect of NAA and IBA on Rooting of Camellia Cuttings. Int. J. Agric. Sc & Vet. Med. 2014; 2:1.
6. Narayan, Surya. Effect of foliar application of cultar and NAA on marigold (Tagetes erecta L.) cv. Basanti Local. Hort Flora Res. Spectrum. 2015; 4(4):370-373ref.12.