Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(3): 1460-1461
Received: 18-03-2020
Accepted: 23-04-2020

Shalini Kaushik
Department of Floriculture and Landscape architecture, College of Agriculture, Raipur, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Neeraj Shukla
Department of Floriculture and Landscape architecture, College of Agriculture, Raipur, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Corresponding Author:
Shalini Kaushik
Department of Floriculture and Landscape architecture, College of Agriculture, Raipur, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

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

Shalini Kaushik and Neeraj Shukla

DOI: https://doi.org/10.22271/phyto.2020.v9.i3x.11517

Abstract
The present investigation entitled "Effect of IBA and NAA and their combination on rooting in stem cuttings of African Marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda" was conducted in the Horticultural Research cum Instructional Farm at Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalya, Raipur (C. G.), season 2017. The experiment consisted 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 which were treated for root initiation in stem cutting of marigold under Chhattisgarh plain region. The experiment was laid out in a Completely Randomized Design with three replications and the cuttings were planted on protray and placed in mist chamber.
The result revealed that growth regulators IBA and NAA had significantly effect on rooting and shooting performance of marigold. The maximum survival percentage (88.33%) of rooted cuttings were recorded under 200 ppm IBA and 300 ppm IBA at 35 days after planting of cuttings. While 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 and the number of roots (93.44), fresh weight (404 mg) and dry weight of root (34.11 mg) were recorded maximum under 300 ppm IBA whereas, average length of roots (12.23 cm) were observed maximum under IBA 100 ppm.

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

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) [3]. 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. IBA has been found to occur naturally. The formation of root primordium cells depends on the endogenous auxins in the cutting and on a synergic compound such as a diphenol. These substances lead to the synthesis of ribonucleic acid (RNA), which act upon root primordium initiation (Hartmann et al., 2002) [2]. The indole compounds usually produce a more fibrous root system than the naphthalene compound. A mixture of IBA and NAA is more effective on both IBA and NAA sensitive cuttings.

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 root initiation 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 portray 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 roots:** The maximum number of root of cuttings (93.44) were recorded in 300 ppm IBA followed by 100 ppm IBA, which was found significantly superior than all other treatments. The lowest number (35.44) of roots per cutting was noted in control. These finding have been obtained by Ullah *et al.* in marigold.
2. **Average length of roots (cm):** The maximum average length of roots per cutting was observed under 100 ppm of IBA (12.23 cm) which was at par with the 200 ppm of NAA followed by 100 ppm of NAA. The lowest average length (4.42 cm) of root per cutting was recorded in untreated cutting. Similar findings were observed by Sharma in marigold.
3. **Fresh weight of roots (mg):** The maximum fresh weight (404.44 mg) of roots per cutting was recorded for IBA with the concentration of 300 ppm. and the lowest fresh weight (86.77 mg) of roots per cutting was recorded under control. The optimum concentration of rooting hormone is promote to production of food material in roots therefore biomass of root is superior in 300 ppm of IBA. The reason for this may be the more rapid translocation of hormone along the way of cell division and elongation and enhanced enzymatic activity (Debnath and Maiti, 1990) [1].
4. **Dry weight of roots (mg):** The maximum dry weight (34.11 mg) of roots per cutting was observed with the 300 ppm IBA whereas it was the lowest (8.88mg) in untreated cuttings (control) Similar finding by Swamy *et al.* (2002) [6] in *Grewia optiva.*

Table 1: Effect of IBA and NAA and their combination on number of roots and average length of root (cm) per cutting after 25 and 35 days.

Tr. No.	Treatment	No. of roots		Av. length of Roots (cm)	
		25DAP	35DAP	25DAP	35DAP
T1	IBA100	45.77 (6.80)	87.55 (9.40)	6.74 (2.75)	12.23 (3.60)
T2	IBA200	41.88 (6.52)	86.89 (9.36)	5.57 (2.56)	8.19 (3.01)
T3	IBA300	47.33 (6.76)	93.44 (9.78)	5.37 (2.52)	7.96 (2.97)
T4	NAA100	32.77 (5.75)	66.55 (8.02)	5.89 (2.55)	8.54 (3.08)
T5	NAA200	40.55 (6.39)	70.22 (8.40)	6.30 (2.69)	11.52 (3.53)
T6	NAA300	39.11 (6.39)	68.66 (8.32)	4.80 (2.38)	7.76 (2.94)
T7	IBA+NAA100	27.88 (5.34)	65.44 (8.13)	4.52 (2.32)	6.90 (2.78)
T8	IBA+NAA200	32.99 (5.82)	66.78 (8.18)	4.52 (2.33)	6.48 (2.72)
T9	IBA+NAA300	40.77 (6.40)	76.44 (8.64)	4.72 (2.37)	7.31 (2.87)
T10	CONTROL	14.33 (2.25)	35.44 (4.40)	2.47 (1.24)	4.42 (2.29)
SEm ±		0.59	0.63	0.22	0.21
CD (P=0.05)		1.76	1.88	0.66	0.64

Table 2: Effect of IBA and NAA and their combination on fresh weight and Dry weight of root (cm) per cutting after 25 and 35 days.

Tr. No.	Treatment	Fresh wt. of root		Dry wt. of Roots	
		25DAP	35DAP	25DAP	35DAP
T1	IBA100	94.33 (9.73)	359.00 (18.80)	8.66 (3.10)	30.66 (5.60)
T2	IBA200	93.00 (9.64)	338.22 (18.37)	8.44 (3.06)	25.00 (5.07)
T3	IBA300	95.11 (9.75)	404.44 (19.88)	9.33 (3.16)	34.11 (5.91)
T4	NAA100	68.11 (8.27)	166.22 (12.75)	6.78 (2.78)	17.22 (4.17)
T5	NAA200	83.77 (9.10)	296.77 (16.96)	8.33 (3.05)	22.55 (4.74)
T6	NAA300	77.89 (8.69)	240.44 (15.37)	7.89 (2.97)	22.34 (4.81)
T7	IBA+NAA100	64.33 (8.00)	161.66 (12.58)	6.22 (2.66)	13.78 (3.83)
T8	IBA+NAA200	68.88 (8.17)	238.66 (15.32)	6.89 (2.79)	20.78 (4.65)
T9	IBA+NAA300	91.11 (9.57)	302.00 (17.13)	8.33 (3.01)	23.00 (4.89)
T10	CONTROL	27.11 (5.30)	86.77 (9.33)	2.88 (1.96)	8.88 (2.97)
SEm ±		0.81	1.67	0.21	0.44
CD (P=0.05)		2.41	4.98	0.62	1.32

Conclusion

This study indicated that the IBA 200 ppm and IBA 300 ppm is best for survival percentage whereas IBA 300 ppm is best for number of roots, fresh and dry weight of roots. While, average length of root is highest in IBA 100 ppm. The root parameters are found more in IBA treated cuttings whereas, the vegetative growth like number of sprouts, average length of shoot, number of leaves, fresh and dry weight of shoot is recorded maximum under NAA treated cuttings.

References

1. Debnath GC, Maiti SC. Effect of the growth regulators on rooting of softwood cuttings of Guava under mist. Haryana J Hort. Sci. 1990; 19:79- 85.
2. Hartmann HT, Kester DE, Davies JR, Geneve RL. Hartmann and Kester's plant propagation: Principles and practices, 7th ed. Prentice hall, Upper Saddle. NJ, 2002.
3. Hussain A, Latif M. *In vitro* studies in Tagetes erecta (Marigold) under auxins (IAA, NAA) and cytokinins (BAP, Kinetin) effect for callus formation by different explants. Biol. Pakistan. 2012; 58:41-46.
4. Sharma R. Study on the effect of Auxins on Rooting, Growth and Flowering of African Marigold (*Tagetes erecta* L.) propagated through stem cuttings. M. Sc. (Hort.) thesis. I.G.K.V., Raipur, 2014.
5. Ullah Z, Abbas SJ, Naeem N, Lutfullah G, Malik T, Khan U, Mallik A, Khan I. 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.
6. Swamy SL, Puri S, Singh AK. Effect of auxins (IBA and NAA) and season on rooting of juvenile and mature hardwood cuttings of Robinia pseudoacacia and Grewia optiva. New Forests. 2002; 23:143-157.