RESPONSE AND EFFECT OF AUXINS ON THE ROOTING AND GROWTH OF *Dendranthema grandiflora* CUTTINGS

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ABSTRACT

Chrysanthemum is one of the most popular cut flower in the world belongs to the family Asteraceae. They are native to Asia and north eastern Europe. It is the second most popular flower next to rose. The present study was conducted at the Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu, India, during September 2016. The experiment was laid out in Completely Randomized Block design with three replications to determine the chrysanthemum cuttings response to auxin i.e. indole-3-butyric acid (IBA) and naphthalene acetic acid (NAA) at 30, 50, 75, 100 and 125 ppm concentrations. Both auxin shown significant results on all rooting and growth parameters. Among the different concentrations used, 100 ppm IBA recorded best results in number of leaves, shoot weight (g), root weight (g), root length (cm), and number of visible roots in chrysanthemum cuttings. Days taken for rooting and bud sprouting were early in IBA treated with 100 ppm.

Keywords: Chrysanthemum, IBA, NAA

INTRODUCTION

Chrysanthemum (*Dendranthema grandiflora*) is one of the major cut flowers in the world trade. Among the most popular flowers chrysanthemum stands next to rose. Chrysanthemums start blooming early in the autumn. There are 40 wild species and thousands of varieties of chrysanthemums are available. The varieties can differ in size, colour, and number of flowers per stem. Flower of chrysanthemum is a compound inflorescence. It consists of many individual flowers called florets. The plant has the ability to grow from stem cuttings. Each cutting should be minimum 7 cm long and have some foliage so that photosynthesis can occur, and each cutting produce energy to generate roots. The fast and dynamic trend changes in the floriculture market have made quality and performance as the determining factors in grading and pricing. This is in addition to the consumer preferences on color, size, and flower types.

Due to lack of good planting material and cultivation method, cut flowers produced by traditional growers have poor physical performance and quality. The rooting capacity is not only determined by the genotype, but also by environmental conditions (Horridge and Chockshull 1989). For optimal growth of plants, media must contain enough water, air and mainly with good physical and chemical properties. Favorable environment conditions which facilitate good rooting process of the cuttings are physical environments and edaphic factors that may act solely or simultaneously to the cuttings in root initiation and further root growth (Mass and Anderson, 1975 and Pal and Rajeevan, 1992).

MATERIALS AND METHODS

The experiment was conducted at Department of Horticulture, Faculty of Agriculture, Annamalai University on September 2016. Chrysanthemum cuttings with uniform size of 13 cm long were planted in grow bag of 6 x 10 cm size as one cutting planted in each bag. The variety used in the experiment was Co 1 having yellow coloured flowers. The study was conducted in completely randomized block design with eleven treatments replicated thrice. The treatment consist of indole-3-butyric acid (IBA) and naphthalene acetic acid (NAA) at 30, 50, 75, 100 and 125 ppm concentrations. The performances of the cuttings were recorded at 15 th and 30 th day. Parameters evaluated were number of leaves, shoot weight (g), root weight (g), root length (cm), number of visible roots, days taken for rooting and days taken for bud sprouting. To facilitate the humidity for the cuttings, water was sprayed to each planting bags before the cuttings were planted and the cuttings were kept in nursery with shade net.

RESULTS AND DISCUSSION

Rooting media significantly affect the rooting capacity and performance of the cuttings after planting. Chrysanthemum cuttings treated with 100 ppm IBA produced better rooting capacity as compared with other concentrations and growth regulator on the 15 th and 30 th days followed by IBA 125 ppm and least rooting was observed in control, without growth regulator application (Table 1 & 2). This might be due to the fact that external application of auxin promotes growth and produce more favorable condition for sprouting. Number of Leaves increased in the growth regulator concentration of 100 ppm IBA than other treatments. The maximum number of leaves 3.34 and 4.49 was recorded at 15 th and 30 th day respectively (Table 1 & 2). The control treatment produced the lowest number of leaves per cutting. Increase in leaf number may be due to their significant effect on inducing vigorous rooting system by growth regulators thus enabling the cuttings to absorb more nutrients thereby producing more leaves as reported by Prati *et al.* (1999) and Stancato *et al.* (2003). Shoot fresh weight increased with increase in growth regulator and maximum weight recorded in IBA concentration of 100 ppm. Appropriate distribution of auxin has been shown to be necessary for a number of developmental processes Cooke *et al*., 1993.

Number of visible roots and length of the roots significantly affect growth regulator application. IBA 100 ppm concentration recorded more number of visible roots and increased root length on growth regulator application (Table 2 & 3). Root development is highly dependent on auxin and auxin transport (Uma and Gowda, 1991). Lateral roots originate in the root pericycle, in which individual quiescent cells are stimulated to dedifferentiate and proliferate to form the lateral root primordium and it differentiate and elongate, causing the lateral root to emerge through the primary root epidermis (Blakely and Evans, 1979). Several lines of evidence indicate that auxin is necessary for the development of lateral roots. Application of IBA to growing plants stimulates lateral root development and lateral root elongation (Torrey, 1950; Blakely *et al*., 1982).

The faster rooting took place in cuttings treated with IBA 100 ppm and slower in control (Fig 1). Application of IBA shown to produce a higher rooting as compared to the other auxins (Rout, 2006). The effect of IBA is in concurrence with other studies where IBA is the most commonly used auxin for root formation (Pooja Goyal, 2012). When rooting becomes faster it induces shoot growth and produces new bud sprouts. Days taken for bud sprouting was significantly affected with growth regulator application and minimum number of days to sprouting was 4.89 days (Fig. 2) noted in IBA 100 ppm indicating the effect of growth regulators in early bud sprouting. The maximum days to sprouting was observed in control (12.34 days). The earlier sprouting on account of growth regulator application is due to higher metabolic activity causing a greater flow of metabolites to the growing bud (Sun & Chen. 1998).

Table 1 - Effect of auxins on the rooting and growth of *Dendranthema grandiflora* cuttings on 15 th day

Growth Regulator	weight of root(g)	weight of shoot(g)	Number of visible root	Root length (cm)	Number of leaves
T_1 - 30 ppm IBA	2.87	2.35	3.71	2.06	1.65
T_2 – 50 ppm IBA	3.01	2.57	3.78	2.52	2.89
T_3 – 75 ppm IBA	2.68	2.84	4.12	2.78	3.02
T_4 – 100 ppm IBA	2.78	3.02	4.34	3.13	3.34
T_5 – 125 ppm IBA	2.76	2.94	4.23	3.06	3.01
T_6 – 30 ppm NAA	2.56	2.10	2.99	2.67	1.54
T_7 – 50 ppm NAA	2.61	2.28	3.61	2.12	2.09
T_8 – 75 ppm NAA	2.11	2.37	3.89	2.45	2.67
T_9 – 100 ppm NAA	3.12	2.86	4.86	3.01	2.94
T_{10}- 125 ppm NAA	2.96	2.67	5.02	2.87	2.89
T_{11}- Control	0.83	0.98	1.76	1.08	0.76
S.Ed.	0.09	0.12	0.13	0.10	0.07
CD (P=0.05)	0.19	0.25	0.27	0.21	0.14

Fig 1 - Effect of auxin on days taken for rooting of *Dendranthema grandiflora* cuttings on 15 th day

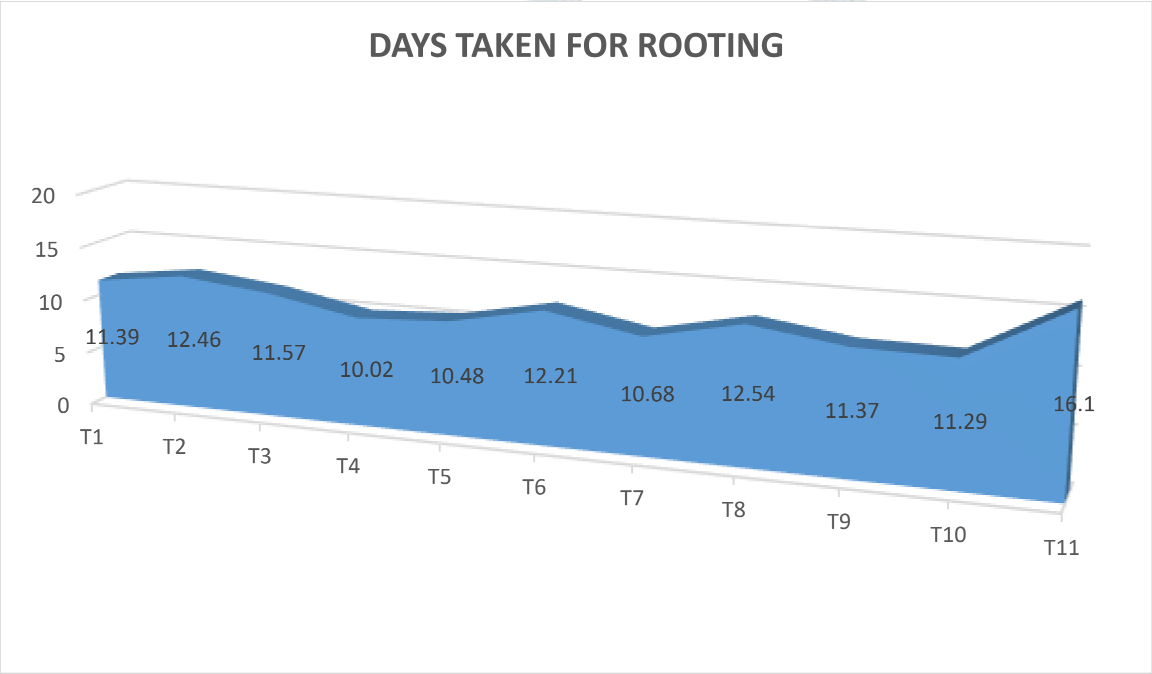
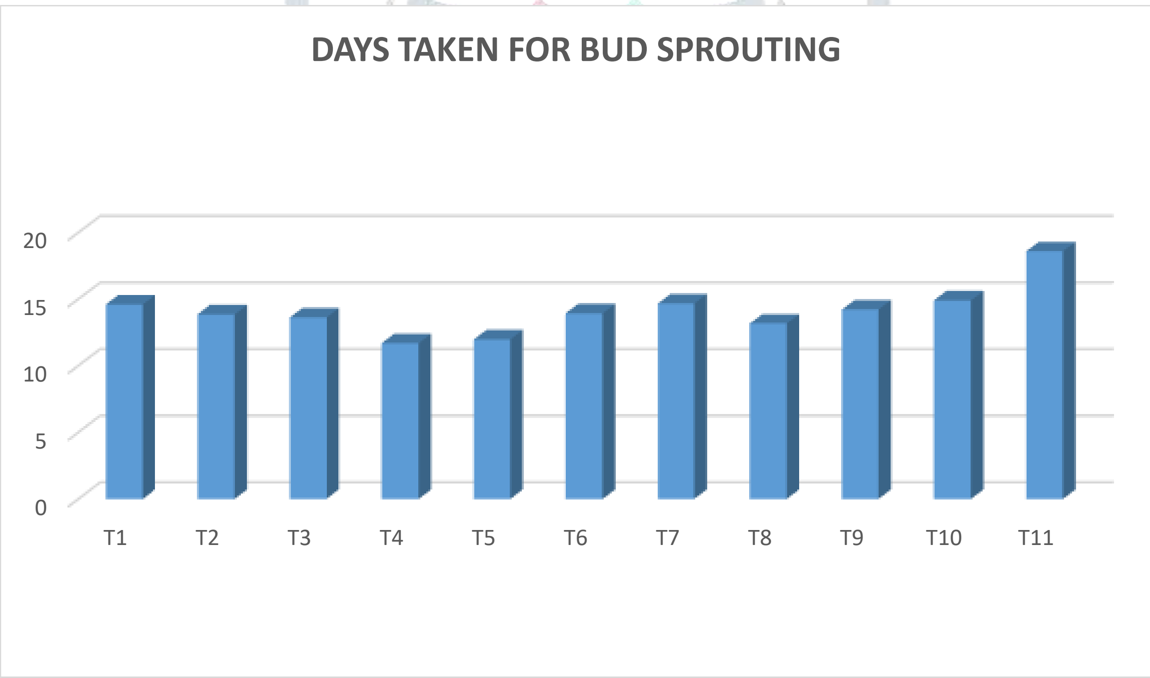


Table 2 - Effect of auxin on the rooting and growth of *Dendranthema grandiflora* cuttings on 30 th day

Growth Regulator	Weight of root (g)	Weight of shoot (g)	Number of visible root	Root length (cm)	Number of leaves
T_1 - 30 ppm IBA	2.21	3.21	7.59	5.43	2.98
T_2 – 50 ppm IBA	2.59	3.69	8.17	5.78	3.42
T_3 – 75 ppm IBA	2.38	4.91	8.78	6.12	3.82
T_4 – 100 ppm IBA	3.23	5.78	9.34	7.03	4.49
T_5 – 125 ppm IBA	3.19	5.42	9.02	6.45	4.23
T_6 – 30 ppm NAA	2.78	3.67	7.56	5.12	3.16
T_7 – 50 ppm NAA	2.41	3.78	7.81	5.67	3.54
T_8 – 75 ppm NAA	2.65	4.29	8.34	6.12	3.76
T_9 – 100 ppm NAA	2.98	5.02	9.13	6.85	4.12
T_{10}- 125 ppm NAA	3.03	4.81	8.82	6.32	4.25
T_{11}- Control	1.58	1.87	2.51	2.91	1.09
S.Ed	0.13	0.11	0.19	0.16	0.15
CD (P=0.05)	0.25	0.23	0.29	0.32	0.31

Fig 2 -Effect of auxin on days taken for bud sprouting of *Dendranthema grandiflora* cuttings on 15 th day



CONCLUSION

Form the research work it can be concluded that the treatment applied with (T_4) 100 ppm IBA was found to be the best for rooting in chrysanthemum cuttings which produced better rooting as indicated by higher number of visible root, higher root length and number of leaves. Days taken for rooting and bud sprouting were also found very early in the cuttings treated with IBA 100 ppm.

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