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GROWTH REGULATOR EFFECTS ON THE DEVELOPMENT AND YIELD OF *ANTHURIUM ANDREANUM* PLANTS CV. TROPICAL

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Abstract

Anthurium is the largest and diverse genus of the Araceae family. As a cut flower, anthurium is one of the main tropical species due to its beauty and increased postharvest life. Present experiment was carried out in completely randomized design with three replications to study the response of growth regulators on the growth, yield and quality of flowers in anthurium plants. The present experiment was conducted with eleven different treatments by using five growth regulators *i.e.* Benzyladenine, Triiodobenzoic Acid, Gibberellic acid, Napthelene Acetic Acid and Salicilic acid in two concentrations 250 ppm and 500 ppm and one control without using growth regulator. From the present investigation, foliar application of gibberllic acid @ 500 ppm gives maximum results in growth, flowering and quality characters on *Anthurium andraeanum* plants followed by Napthelene Acetic Acid 500 PPM. Days taken for flower bud appearance was earlier in gibberllic acid @ 500 ppm and flowers remain fresh for more number of days.

***Keywords*:** Growth regulator, anthurium.

Introduction

Anthuriums are tropical plants grown for their showy cut flowers and attractive foliage (Laws and Galinsky, 1996). They were very popular with flower arrangers because of bold effect and long lasting qualities of flowers (Higaki, 1994). Anthurium is a slow growing perennial that requires shady, humid conditions as found in tropical forests (Prasad *et al.,* 1997). The application of growth regulators show difference in the production, developmental process, yield and quality of flowers (Swapna, 2000 and Havale *et al*., 2008). Growth regulators are the chemical substance which alters the growth and development in plants and regulate the physiological process in an appreciable manner when used in small concentrations.

Plant hormones are not nutrients, but chemical substances that are used in small amount to promote and influence the growth, development and differentiation of cells and tissues (Opik Helgi, 2005). Not all plant cells respond to hormones, but those cells that are programmed to respond at specific points in their growth cycle. Plants need this hormones at very specific times during plant growth and at specific locations. Although studies on the effect of growth regulators in anthurium plants has been done earlier, but information available about their effect on anthurium growth and development is limited. Hence, the present investigation was conducted to evaluate the effect of growth regulators *i.e.* Benzyladenine, Triiodobenzoic Acid, Gibberellic acid, Napthelene Acetic Acid, Salicilic acid on growth, flowering and postharvest characteristics of *Anthurium andreanum* plants.

Materials and Methods

The present study was carried out in Flora-tech floriculture unit at Kottarakara, Kollam Dist, Kerala state, India during 2012- 2014. The treatments with three replications were carried out in completely randomized design. The plants used for the present experiment were provided with 75 per cent shade net and a growing medium mixture of cocopeat + FYM. The variety of Anthurium (*Anthurium andreanum* L.) used in the experiment is 'Tropical'. Four months old tissue cultured uniform size plants were planted in 12 inch pots. During the study eleven treatments were finalized with five growth regulators *i.e.* Benzyladenine, Triiodobenzoic Acid, Gibberellic acid, Napthelene Acetic Acid and Salicilic acid were used in two concentrations 250 ppm and 500 ppm and one control without using growth regulator. Growth regulators were applied as foliar spray using knapsack sprayer as per treatment schedule at monthly intervals. Observations were recorded on Plant height, plant spread, number of flowers per plant, flower stalk length, spathe length, spathe breadth and other characters like vase life, flower longevity and days taken for flower bud appearance were also recorded at 240, 360 and 480 days after planting.

Results and discussion

Growth characters: The results of the experiment revealed that the treatments significantly influenced the growth characters of *anthurium andreanum* plants. The treatment applied with gibberellic acid @ 500 ppm recorded the maximum value in the growth characters like plant height and plant spread, this was followed by napthelene acetic acid 500 ppm at 240, 360 and 480 days after planting (Table 1, 2 & 3). The maximum growth attributes in this study might be due to the interaction effect of suitable shade, appropriate growing media along with application of growth regulator on the various stages of anthurium growth. Gibberellins are group of plant hormones responsible for growth and development. The increased results by gibberellic acid spray @ 500 ppm may be due to its cells begin a process of elongation. Since plants are composed of single cells stacked

on top of one another, this elongation of thousands of individual cells results in the overall growth of the plant have been reported by Hedden, 2012. Konl and kofranek (1957) were among the first to investigate possible use of gibberallic acid on floricultural crops and reported that application of GA resulted into the maximum plant height, plant spread and number of leaves per plant of flower crops. Similar findings were done by Aytoun and Hay (1958). Gibberellins are extremely significant for growth characters in the greenhouse and florist industry throughout the world (Srinivasa, 2006).

Yield characters : Among the treatments, foliar application of gibberellic acid @ 500 ppm recorded effective in yield characteristics like number of flowers per plant, flower stalk length, spathe length and spathe breadth, this was followed by napthelene acetic acid @ 500 ppm at 240, 360 and 480 days after planting (Table 1, 2 & 3). The best flowering attributes of anthurium might be due to appropriate combination of shade, growing media composed of cocopeat + FYM and growth regulator. The treatments are significantly influenced by the application of growth regulators on flowering characters in anthurium plants. According to Anand and Jawaharlal (2004) flowering behaviour of Anthurium plants has been drastically modified by the foliar spray of growth regulators. Among the various growth regulators tested gibberellic acid was found to reduce the time taken for flowering in *Anthurium andreanum* var. Temptation under 75 % shade net house conditions (Von Henting, 1960). According to Anand and Jawaharlal (2004), flowering behaviour of anthurium plants had been drastically modified by the foliar spray of growth regulators. Henny and Hamilton (1992) reported that *Anthurium scherzeranum* 'Renate' produced significantly more number of flowers per plot at 500 ppm of gibberellic acid spray compared to lower concentrations. Application of foliar spray of 0 - 1000 ppm gibberellic acid to s*pathiphyllum* cv. Mauna Loa increased flowering with the best concentration of 500 ppm compared to other concentrations (Shibata and Endo, 1990). Similar results were recorded by Syamal *et al*. (1990) and Rana *et al*. (2005).

Flowering characters Foliar application of gibberellic acid @ 500 recorded the best results in early flowering characters like minimum number of days for flower bud appearance and number of days taken for flower opening (Fig. 1). The early flowering in anthurium might be due to the appropriate combination of growth conditions along with the flowering hormone gibberellic acid. *Anthurium andreanum* cv. Temptation plants grown under 75 % shade and sprayed with gibberellic acid 100 ppm took the minimum number of days to emerge first flower Jawaharlal *et al.* (2001). Henny *et al* .(1999) reported that a single foliar spray of GA 250 ppm to 2000 ppm helped the *Syngonium podophyllum* variety 'White butterfly' belonging to araceae family to flower early. Data and Ramdas (1997) confirmed that chrysanthemum showed significant difference to the growth regulators and among the different growth regulators and gibberellic acid was found to be most effective.

Vase life: Among the treatments, appropriate shade and ideal growing media along with proper growth regulation of gibberellic acid @ 500 ppm was found to be effective in prolonging the vaselife in anthurium plants (Fig. 1). Dhaduk *et al*. (2007) reported the application of gibberellic acid can increase the postharvest life. Sharma *et al*. (2006) revealed that gibberellic acid @ 200 ppm in gladiolus variety Red beauty showed the highest vase life. Julita, (2015) concluded that gibberellic acid prolonged the vase life of lily hybrid 'Richmond'.

Conclusion

Based on the performance of *Anthurium andreanum* cv. Tropical it can be concluded that the foliar application of gibberellic acid @ 500 ppm (T_6) can be effectively used for the improvement on growth, flowering, yield, quality attributes and for extending the vase life followed by Napthelene Acetic Acid 500 PPM (T_8). The best performance might be due to appropriate combination of shade, growing media and growth regulator.

Table 1 : Growth regulator effects Anthurium plants on the development and yield at 240 days.

Treatments	Plant height	Plant spread	Number of flowers per plant	Flower stalk length	Spathe length	Spathe breadth
T_1 – Benzyladenine 250 PPM	17.92	22.01	2.80	19.81	3.58	3.67
T_2 – Benzyladenine 500 PPM	16.99	21.03	2.27	20.45	3.57	3.49
T_3 - Triiodobenzoic Acid 250 PPM	16.87	20.89	2.07	18.71	3.12	3.65
T_4 - Triiodobenzoic Acid 500 PPM	16.65	20.78	2.31	19.52	3.23	3.12
T_5 - Gibberellic acid 250 PPM	17.56	22.32	2.12	19.99	4.17	4.56
T_6 - Gibberellic acid 500 PPM	18.79	24.39	2.88	22.39	4.89	4.91
T_7 - Napthelene Acetic Acid 250 PPM	17.26	22.12	2.02	24.19	4.10	4.34
T_8 - Napthelene Acetic Acid 500 PPM	18.01	23.11	2.81	21.98	4.65	4.77
T_9 - Salicilic acid, 250 PPM	15.23	21.83	2.10	21.41	3.01	3.13
T_{10} - Salicilic acid, 500 PPM	15.47	21.32	2.16	21.38	3.11	3.32
T_{11} - Control (No growth regulator).	9.17	15.12	1.21	14.45	2.01	2.12
SE (d)	0.71	1.10	0.10	1.13	0.14	0.15
CD (p=0.05)	1.41	2.20	0.21	2.25	0.27	0.29

Table 2 : Growth regulator effects Anthurium plants on the development and yield at 360 days

Treatments	Plant height	Plant spread	Number of flowers per plant	Flower stalk length	Spathe length	Spathe breadth
T1 – Benzyladenine 250 PPM	27.10	48.99	3.01	21.78	6.10	6.15
T2 – Benzyladenine 500 PPM	28.13	50.13	3.14	21.23	6.87	6.98
T3 - Triiodobenzoic Acid 250 PPM	24.87	44.12	2.87	20.81	5.46	5.48
T4 - Triiodobenzoic Acid 500 PPM	30.04	5291	3.87	23.56	7.23	7.21
T5 - Gibberellic acid 250 PPM	29.65	51.21	3.58	22.57	7.02	7.12
T6 - Gibberellic acid 500 PPM	32.46	55.74	4.02	26.47	7.87	7.98
T7 - Napthelene Acetic Acid 250 PPM	27.83	49.11	3.12	22.09	6.13	6.19
T8 - Napthelene Acetic Acid 500 PPM	30.89	53.21	3.91	24.82	7.21	7.34
T9 - Salicilic acid 250 PPM	23.18	42.88	2.18	22.01	5.15	5.26
T10 - Salicilic acid 500 PPM	26.41	46.99	3.09	22.12	6.08	6.12
T11 - Control (No growth regulator).	16.78	26.45	1.89	14.99	2.78	2.99
SE (d)	1.10	1.31	0.10	1.13	0.12	0.11
CD (p=0.05)	2.20	2.62	0.21	2.25	0.25	0.23

Table 3 : Growth regulator effects of Anthurium plants on the development and yield at 480 days

Treatments	Plant height	Plant spread	Number of flowers per plant	Flower stalk length	Spathe length	Spathe breadth
T_1 – Benzyladenine 250 PPM	42.14	64.92	4.30	29.87	7.78	7.81
T_2 – Benzyladenine 500 PPM	38.83	61.00	3.89	26.67	7.67	7.82
T_3 - Triiodobenzoic Acid 250 PPM	35.78	57.52	3.51	23.69	7.12	7.26
T_4 - Triiodobenzoic Acid 500 PPM	32.70	54.01	3.12	27.68	6.56	6.69
T_5 - Gibberellic acid 250 PPM	40.52	62.23	4.21	25.71	7.12	7.87
T_6 - Gibberellic acid 500 PPM	46.45	71.85	5.46	35.84	8.92	8.99
T_7 - Napthelene Acetic Acid 250 PPM	43.15	69.55	5.12	33.47	8.23	8.35
T_8 - Napthelene Acetic Acid 500 PPM	45.56	68.84	4.72	33.21	8.56	8.65
T_9 - Salicilic acid, 250 PPM	32.37	53.47	3.09	23.41	6.50	6.63
T_{10} - Salicilic acid, 500 PPM	32.34	53.41	3.09	26.38	6.49	6.62
T_{11} - Control (No growth regulator).	25.91	37.81	2.81	16.18	4.67	4.78
SE (d)	1.31	1.71	0.12	1.36	0.24	0.14
CD (p=0.05)	2.62	2.41	0.23	2.71	0.47	0.27

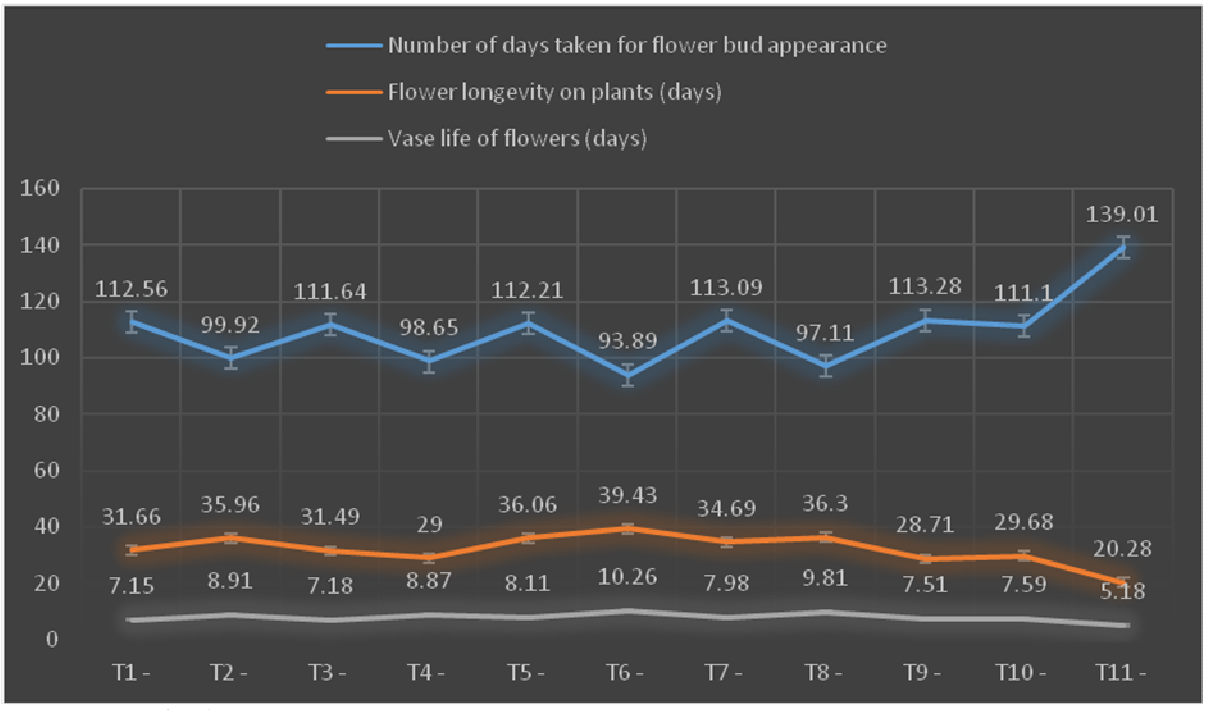

Fig. 1: Growth regulator effects on Anthurium plants on flowering characteristics

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