INFLUENCE OF PLANT GROWTH REGULATORS ON GROWTH AND FLOWER QUALITY OF GERBERA (*GERBERA JAMESONII* L.) CV. GOLIATH.

Ajish Muraleedharan[1], Ramesh Kumar[1] and J. L. Joshi[2]

[1]Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai nagar, [2] Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Annamalai nagar, Tamil Nadu, India - 608002.

ABSTRACT

An experiment was conducted to evaluate the effect of plant growth regulators on growth, yield, and flower quality of gerbera (*Gerbera jamesonii* L.) cv. Goliath under naturally ventilated shade house in the Floriculture area, Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu during October 2014 to march 2015. The experiment was laid out in Randomized Block Design with three replications and nine treatments. In this study gerbera plants were sprayed with 100, 150, 200, 250 ppm of GA and 100, 150, 200, 250 ppm of NAA along with control (water spray). The results of five months experimentation revealed that maximum plant height (43.24 cm), number of leaves per plant (25.29), plant spread (51.74 cm), days to first flower bud emergence (41.03 days), flower diameter (13.81 cm), stalk length (46.92 cm), stalk girth (1.92 cm) and number of flowers per plant (9.46) were produced in treatment (T_4) GA at 250ppm. Maximum vase life of flower with 13.19 days was recorded in the treatment (T_4) GA_3 at 250 ppm. T_4 was found to be the best treatment for good vegetative growth as well as for quality flowers.

Key words: Gerbera, GA, NAA

INTRODUCTION

Gerbera (*Gerbera jamesonii*) belongs to family Asteraceae. It is used in fresh and dry flower arrangement, floral decoration and in bouquet. Gerbera is an important cut flower in the world market having single and double flowers and is native to tropical Asia and Africa The colour variation, size of flowers, long lasting behavior and wide adaptability made gerbera a flower of choice for cultivation. The flowers are available in wide range of colours including yellow, red, orange, cream, white, pink, brick red, scarlet, salmon peach, maroon and various other intermediate shades. Gerbera is a dwarf herbaceous perennial and grows in clump with solitary flower heads on a long slender stalk, which grows well in protected structures. They grow faster and produce larger and greener leaves with high dry matter content. Commercial production of gerbera as cut flower has a great demand in both national as well as international markets. The demand of cut flower production in the country is increasing rapidly. The use of plant growth regulators has brought a revolution in the floriculture industry and has been found to be of great significance in the commercial cultivation of many ornamental crops.

Plant growth regulators 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). Plant growth regulators play important role in commercial cut flowers are growth control, prevention of bud dormancy, promotes flowering, prolonging the vase life of the flower and retarding the

senescence (Vettakkorumakankav, 1999 and Sanap, 2000). Growth regulators are used to overcome the factors limiting the growth and yield. Foliar application of growth regulators can stimulates flowering to get maximum yield. In gerbera it stimulates cellular elongation and plants grow fast. Plant growth regulators also influence the vegetative growth and flowering in gerbera. Thus, keeping in view the present study was undertaken to find out the suitable concentration of GA and NAA for better growth and quality of gerbera under shade house.

MATERIALS AND METHODS

The experiment was conducted during October 2014 to March 2015 at the Floriculture area, Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu. The experiment was laid out in Randomized Block Design with three replications and nine treatments. The seedlings of cv. Goliath with 3 to 4 leaves were planted in raised beds at the spacing of 30cm x 30cm without burying the crown. The two growth regulators namely gibberellic acid and naphthalene acetic acid were used in four concentrations. The details of the treatments are as follows, T_1 - GA_3 @ 100 ppm, T_2 - GA_3 @150 ppm, T_3 - GA_3 @200 ppm, T_4 - GA_3 @250 ppm, T_5 - NAA @100 ppm, T_6 - NAA @150 ppm, T_7 - NAA @200 ppm, T_8 - NAA @250 ppm and T_9 - Control (Water spray).

RESULTS AND DISCUSSION

INFLUENCE OF PLANT GROWTH REGULATORS ON GROWTH PARAMETERS

The data on growth parameters presented in Table 1 and maximum plant height (43.24 cm), number of leaves (25.29) and plant spread (51.74 cm) was found to be in treatment applied with GA 250 ppm (T_4). While minimum plant height of 22.12 cm, number of leaves (17.58) and plant spread of 29.48 cm was recorded in control (T_9). Significantly maximum plant height, number of leaves and plant spread may be due to gibberellic acid which has resulted in cell division and cell elongation resulting in enhanced vegetative growth. Similar observation in maximum plant height were also obtained by Dalal *et al.,* (2009) and maximum plant spread at 150ppm were also obtained by Patra *et al.,* (2015) in gerbera. Sharma *et al*., (2004) envisaged that GA_3 at 100 ppm found most effective for enhancing vegetative growth. Porwal *et al.,* (2002) found the influence of plant growth regulators on Damask Rose and GA_3 at 250 ppm recorded the maximum plant height, number of shoots per plant and plant spread.

The data on qualitative parameters show that minimum number of days for first flower bud emergence which took 41.03 days was found in T_4 (GA_3@150ppm) to produce visible flower bud and maximum number of days in control (64.02 days). Maximum flower diameter (13.81 cm), maximum stalk length (46.92 cm), maximum stalk girth (1.92 cm), was recorded with the application of GA 250 ppm. However, minimum flower diameter, minimum stalk length, minimum stalk girth were found lowest in T_9 (control). This parameter is due to fact that GA_3 increased cell division and cell elongation. It also accumulates more carbohydrate in plant body which leads to early flower bud initiation as well as bud opening, later which results in lengthening of flowering span. The plants receiving required gibberellic acid in an optimum proportion could have results in flowering quality by increasing number of cells. GA_3 also produced higher number of sucker, foliar application of 250 ppm GA_3 was the best for obtaining better growth of plants, maximum number of cut blooms with longer stalk as well as bigger flower size obtained by Sharifuzzaman *et al.,* (2011) in chrysanthemum. Chauhan *et al.,* (2014) observed that GA 250 ppm showed lowest number of days to the appearance of first flower bud and diameter of flower in gerbera. Salem *et al.,* (2015) reported that in gerbera maximum yield and quality parameters (number of flowers per plant, stalk length,

flower bud diameter and stalk diameter) and days to flower bud emergence and days to first flowering were observed with treatment of GA at 250 ppm.

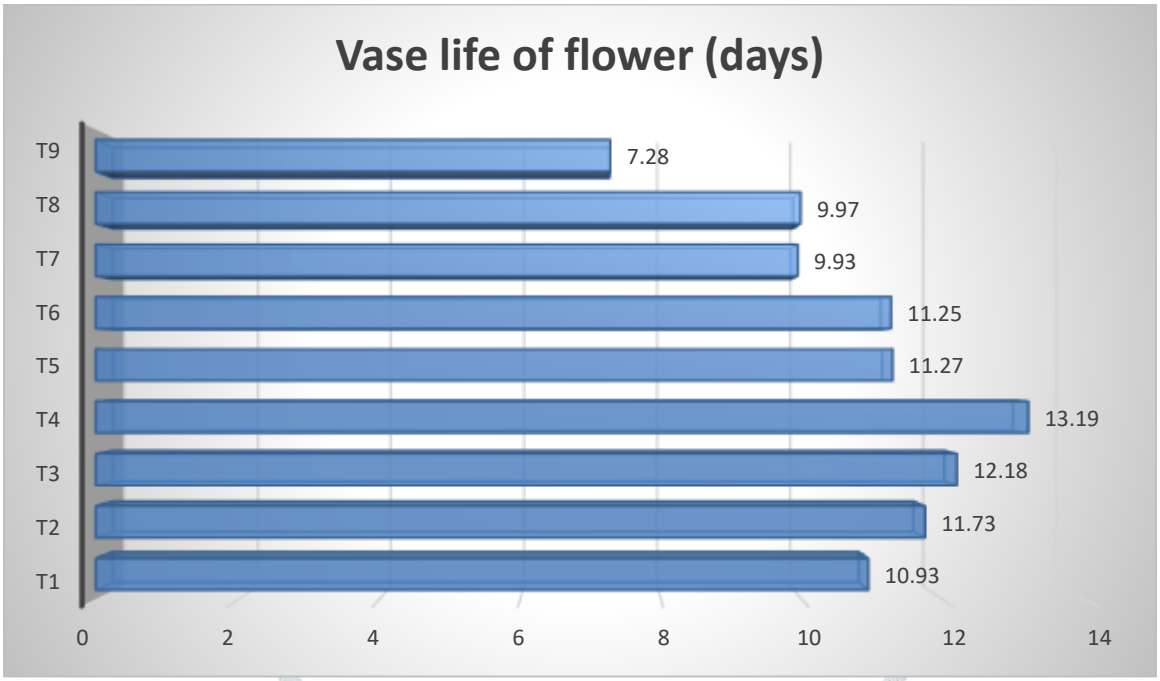
INFLUENCE OF PLANT GROWTH REGULATORS ON YIELD PARAMETERS

The data on yield parameters show that the maximum number of cut flowers per plant (9.46), was recorded to be in treatment T_4 (GA 250 ppm), vase life of the flowers was also prolonged in this treatment (Fig. 1). Minimum number of cut flowers per plant and less vase life was recorded in treatment (T_9) control. Gibberellic acid (GA) induces flowering of plants of various genera of the Asteraceae family. These results are in close conformity with the findings of Dalal *et al.,* (2009) in gerbera and Patel *et al.,* (2010) in chrysanthemum. Similar findings also obtained by Singh *et al.,* (1991) in African marigold, Tripathi *et al.,* (2003) in French marigold, Deotale *et al.,* (1994) and Dutta *et al.,* (1998) in chrysanthemum. The foliar spray of 500 ppm GA for anthurium showed significantly the highest number of flowers per plant, stalk length, spathe size and increased shoot length, number of branches and the size of flowers (Dhaduk *et al*., 2007), similar findings were done by Aytoun and Hay, (1958). According to Anand and Jawaharlal (2004), flowering behaviour of anthurium plants has been modified by the foliar application of growth regulators. The increase in flower number has been reported even at 10 ppm GA. Maximum number of flowers yield per plant was recorded with application of GA_3 at 200 ppm sprayed plants. These results are in accordance with the findings of Verma and Arha, (2004), Sunita *et al. (*2007), Amithkumar *et al. (*2012), Mithilesh kumar *et al. (*2014) and Suvalaxmi *et al.,* (2015) in African marigold.

Table -1: Influence of plant growth regulators on growth and quality of gerbera (*gerbera jamesonii*) cv. Goliath.

Treatments	Plant height (cm)	Plant spread (cm)	Number of leaves	Days of first flower bud emergence	Flower diameter (cm)	Stalk length (cm)	Stalk girth (cm)	Number of flowers per plant
T_1	41.56	49.59	24.91	47.59	10.43	40.59	1.81	8.67
T_2	41.19	49.82	24.18	49.61	10.92	42.67	1.72	8.13
T_3	40.49	48.21	23.82	46.81	11.73	45.19	1.89	7.72
T_4	43.24	51.74	25.29	41.03	13.81	46.92	1.92	9.46
T_5	40.19	50.29	23.58	50.89	12.03	43.89	1.48	7.98
T_6	38.97	48.42	22.43	47.68	11.58	40.28	1.74	8.18
T_7	38.15	46.29	21.92	46.32	11.67	38.46	1.32	7.07
T_8	35.18	45.77	2..17	54.29	12.48	39.91	1.21	7.62
T_9	22.12	29.48	17.58	64.02	9.62	31.83	0.94	5.07
S. Ed.	0.76	0.62	0.48	0.73	0.26	0.31	0.17	0.19
CD	1.59	1.37	0.97	1.58	0.52	0.75	0.38	0.41

Fig -1: Influence of plant growth regulators on the vase life of gerbera (*gerbera jamesonii*) cv. Goliath.



REFERENCES

Amit Kumar, Jitendra Kumar, Braj Mohan, J.P. Singh, Nathi Ram.2012.Studies on effect of plant growth regulators on growth flowering and yield of African marigold (*Tagetes erecta L.*) cv. Pusa Narangi Gainda, Annuals of Horticulture.5(1):47-52.

Anand.S and M.Jawaharlal. 2004. Effect of foliar spray of nutrients and growth regulators on inflorescence and spathe unfurling in Anthurium andreanum var. Temptation. *Journal of Ornamental Horticulture*, 7 (3-4) : 117-121.

Aytoun, R.S.C and G.L. Hey. 1958. Gibberellins can help and this is how. Grower., 416 – 421.

Chauhan, R.V., Kav, K.P., Babariya, V.J., Pansuria, P.B. and Savaliya, A.B. 2014. Effect of gibberellic acid on flowering and cut flower yield in Gerbera under protected condition. *Asian Journal of Horticulture* 9 (2):404 - 407.

Dalal, S.R., Somavanshi, A.V. and Karale, G.D. 2009. Effect of gibberellic acid on growth, flowering, yield and quality of Gerbera under polyhouse condition; *International journal of agriculture sciences* 5(2): 355-356.

Deotale, A.B., P.Y. Belorka Patil, V.N. Zade, and M.B. Keche.1994. Effect of date of planting and foliar spray of GA3 on flowering and yield of *Chrysanthemum.* J. Soil and Crops, 4: 148-51.

Dhaduk, B.K., S. Kumari, A. Singh and J.R. Desai. 2007. Response of gibberellic acid on growth and flowering attributes in anthurium. Journal of Ornamental Horticulture., 10 (3): 187 – 189.

Dutta, J.P., M.D. Khadre Abdul and S. Ramadas.1998. Regulation of flowering in *Chrysanthemum cv.* Co.1 by Artificial Photoperiod and gibberellic acid. Karnataka J. Agri. Sci. 11: 251-53.

Mithilesh Kumar, A. K. Singh, Ashok Kumar. 2014. Effect of plant growth regulators on flowering and yield attributes of African marigold (*Tagetes erecta L.*) cv. Pusa Narangi Gainda. Plant Archives, 14(1):363-365.

Opik Helgi, A., Rolfe Stephen, Willis Arthur John and Street Herbert Edward. 2005. The physiology of flowering plants (4th ed.). Cambridge University Press. pp: 191.

Patra, S.K., Beura, S., and T. Shasani. 2015. Efficacy of GA_3 on growth and flowering regulation of in vitro raised hybrid Gerbera under shade net. *Agric. Sci. Digest*., 35 (3):173-177.

Porwal, R., C.L. Nagda and J.P.S. Pundir. 2002. Influence of plant growth regulator on vegetative growth and flower earliness of Damask rose. South Indian Hort., 50 (1-3): 119 - 123.

Salem, R.A.A., Saravanan, S., and V.M. Prasad. 2015. Effect of gibberellic acid spraying on yield and flowers of Gerbera (*Gerbera jamesonii*) c.v Dennis. *International journal of scientific research*5 (3):2277-8179.

Sanap, P.B., B.A. Patil and B.V. Gondhali. 2000. Effect of growth regulators on quality and yield of flowers in tuberose cv. Single. The Orissa J. Hort., 28 (1): 68 – 72.

Sharifuzzaman, S.M., Ara, K.A., Rahman, M.H., Kabir, K. and M.B, Talukdar. 2011. Effect of Ga_3, CCC and MH on vegetative growth, flower yield and quality of Chrysanthemum. *Int. J. Expt. Agric.* 2(1):17-20.

Sharma, J.R., R.B. Gupta and R.D. Panwar. 2004. Growth, flowering and corm production of gladiolus cv. Friendship as influenced by foliar application of nutrients and growth regulators. Journal of Ornamental Horticulture., 7 (3-4): 154 – 158.

Singh, R.P., M.P. Singh, and G.N.Singh. 1991. Effect of GA_3 and Ethrel on the growth and flowering of African marigold (*Tagetes erecta*). Haryana J. Hort. Sci. 20: 81-84.

Sunitha, H.M., Ravi Hunje, B.S.Vyakaranahal and H.B. Bablad. 2007. Effect of pinching and growth regulators on plant growth, flowering and seed yield in African marigold (*Tagetes erecta*). Journal of Ornamental Horticulture., 10(2): 90-95.

Suvalaxmi Patel, A. K. Das and D. K. Dash. 2015. Effect of Plant Growth Regulators on Growth and Yield Attributes of African Marigold (*Tagetes erecta L.*) International Education & Res. J. 2(6):44-45.

Tripathi, A.N., S.N. Tripathi, R.K. Shukla, and G. Pandey. 2003. Effect of GA_3 NAA and CCC on growth and flowering of French marigold. J. Applied Horti. 5: 112-13.

Varma, L.R and Arha. 2004. Regulation of flowering in African marigold by the application of GA_3, etherl and MH. Journal of Ornamental Horticulture., 7 (3-4): 168 – 170.

Vettakkorumakankav, N.N., D. Falk, P. Saxena and R.A. Fletcher. 1999. A crucial role for gibberellins in stress protection of plants. Plant and Cell Physiology, 40 (5): 542–548.