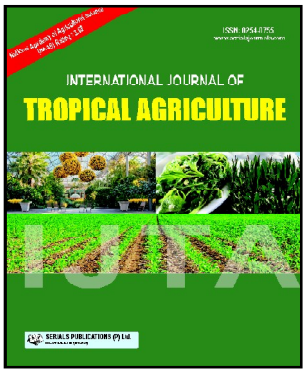

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Effect of GA_3 on growth, Flowering and VASE Life of gladiolus cultivars

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Abstract: An experiment was conducted to study the effect of on growth, flowering and vase life of gladiolus cultivars. The study involved four concentration of GA_3 (control, 100 ppm, 200 ppm, 300 ppm and 400 ppm) was sprayed at 30th and 60th day after planting on five cultivars (Archana, Gunjan, J.V. Gold, Sabnum and Snow Princes) of gladiolus. The results revealed that maximum length of leaf and width of longest leaf were recorded when GA_3 was sprayed at 400 ppm on cvs. Sabnum and Gunjan. Among flowering parameters early spike emergence was noticed in cv. Sabnum when, GA_3 was sprayed at higher concentrations (300-400 ppm). In general, higher size of first and fifth floret was recorded with cv. J.V. Gold at 200-300 ppm GA_3. GA_3 at 300 ppm also exerted maximum length of spike, whereas maximum number of florets/spike was recorded with cv. Snow Princess when GA_3 was applied at 100-200 ppm, while maximum number of florets open at a time (7.33) was noticed with cv. Snow Princess when GA_3 was applied at 200-300 ppm. Maximum vase life (17.00) days was noticed with cv. Sabnum when GA-$_3$ applied at 200-400 ppm. The data from this study indicated that effect of GA_3 on growth, flowering and vase life of gladiolus cultivars.

Key words: Gladiolus, growth regulator, growth, flowering, vase life.

INTRODUCTION

Gladiolus is very popular and important ornamental flowering plant. It is known as queen of bulbous flowers. It belongs to the family iridaceae and is a native of Mediterranean region. It is excellent for cut flowers as it lasts long in flower vase and has magnificent florets with variety of colours (Singh, 2006). Selections suitable variety for the region is

one of the important factors that influence the yield and quality of gladiolus spikes. The growth and development of plant is governed by internal factors namely hormonal and nutritional balance. The balanced development of plant is governed by the growth regulators, which are being increasingly used to manipulate the sprouting, growth and flowering of Gladiolus cultivars (Bhujbal *et al.,* 2014). Beneficial effect of growth promoting chemical have been observed in flowering and bulbous plants i.e. tuberose and calendula (Singh, 1999). Therefore, the present study was undertaken to find out the influence of gibberellic acid on growth, flowering and vase life of various cultivars of gladiolus flower.

MATERIALS AND METHODS

A field experiment was carried out at Horticulture Research Farm, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, India during the year of 2008-09. Varanasi is situated in the sub-tropical zone at a latitude of 28°18' N and longitude of 83°03' E. The altitude of the place is 128.93 meters above the mean sea level. The climate of the place is semi-arid and characterized by three distinct seasons viz. hot and dry summer from February to May, warm rainy monsoon from June to September and moderate winter from October to January. The mean annual precipitation on the basis of last fifteen years is 1000 mm which is received almost from the South-West monsoon during June to October. The mean annual minimum and maximum temperatures are 16.9 °C and 34.8 °C, respectively. The humidity ranges from 29.75 per cent in summer to 91.23 per cent in rainy season. The experiment was laid out in randomized block design with three replications and twenty five treatment combinations. The factor comprised of GA_3 at 100, 200, 300, 400 ppm alongwith control (Distilled water) on five gladiolus varieties viz. Archana, Gunjan, J.V. Gold, Sabnum and Snow Princes. Thus there were twenty five treatment combinations. The rested, cold stored, uniform and bigger size gladiolus corms of five varieties were selected and placed at room temperature for 15 days and treated with 0.3% captan fungicide for 15 minutes before planting. After drying in shade, the corms were planted at 20 cm spacing. Solution of plant growth regulator was sprayed at different concentrations to run- off stage at 30th and 60th day after planting. Control plants were sprayed with distilled water in the same manner and all the intercultural operations were followed as and when required. The various observations on growth, flowering attributes and vase life were recorded and the data was statistically analyzed by adopting the standard procedures of Panse and Sukhatme (1985) and the results were interpreted.

RESULTS AND DISCUSSION

Growth characters

Application of plant growth regulators resulted pronounced effect on growth characteristics in gladiolus (Table 1). The length of longest leaf was increased significantly due to GA_3 treatment. Application of GA_3 400 ppm produced maximum length of longest leaf (77.21 cm) in cultivar cv. Sabnam. This finding is in agreement with the observations made by Singh and Sharma (2004) in calendula. The present finding is lent credence to the observation of Tyagi and Singh (2008) in tuberose. Width of longest leaf was significantly increased due to GA_3 treatment. Maximum width of longest leaf was observed at GA_3 400 ppm and in respect to cultivars cv. Gunjan produced maximum width of longest leaf (3.67 cm) in gladiolus.

Flowering attributes

Foliar application of different concentrations of GA_3 exerted conspicuous effect on various cultivars of gladiolus (Table 1&2). GA_3 spray at 400 ppm had pronounced effect on early spike emergence (64.88 days) in cv. Sabnum followed by 100 ppm GA_3 application in cv. Sabnum, but this treatment was

statistically superior to all the treatments. In general, late spike emergence was observed in control plants. Devadanam *et al.,* (2007), Panwar *et al.*, (2006) also noticed that GA_3 was found best for resulting early initiation of spike. In respect to varieties, variety Sabnum produced earliest bud initiation. Application of GA_3 400 ppm produced earliest flowering. Present findings are lent credence to the observation of Jana and Biswas (2003). Cultivar J.V. Gold showed significant early flowering over cultivars Archana and Snow Princess. Similar report was investigated by Chang *et al.,* (1999) and Singh (1999) in tuberose.

Table 1

Influence of ga_3 and varieties on length of longest leaf (cm), width of longest leaf (cm), days taken to spike emergence, days taken to colour show, length of spike at first, fifth and ninth day (cm) and no. of florets/spike

Treatment	*Length of longest leaf (cm)*	*Width of longest leaf (cm)*	*Days taken to spike emergence*	*Days taken to colour show*	*Length of spike at first day (cm)*	*Length of spike at fifth day (cm)*	*Length of spike at ninth day (cm)*	*No. of florets/ spike*
Control Archana	53.03	2.14	72.88	82.21	75.47	78.40	75.67	8.00
Control Gunjan	63.33	2.54	74.50	80.50	62.17	65.50	63.33	9.00
Control J.V. Gold	60.68	2.55	74.44	83.33	56.07	59.47	56.23	10.33
Control Sabnum	49.51	2.09	72.38	80.55	61.77	66.33	63.13	11.33
Control Snow Princess	61.63	2.03	72.99	82.33	56.70	61.27	57.40	11.00
GA_3 100 ppm Archana	54.38	2.26	72.88	83.66	64.50	67.63	65.10	7.33
GA_3 100 ppm Gunjan	67.25	2.83	73.16	78.33	67.67	70.67	67.67	6.67
GA_3 100 ppm J.V. Gold	62.00	2.33	74.77	82.77	69.00	73.93	70.60	10.67
GA_3 100 ppm Sabnum	76.66	1.99	67.63	80.11	72.50	77.23	74.00	10.33
GA_3 100 ppm Snow Princess	71.50	2.06	70.77	81.88	57.23	63.67	60.13	12.67
GA_3 200 ppm Archana	62.16	2.22	75.88	84.77	55.50	59.23	56.53	7.67
GA_3 200 ppm Gunjan	66.75	2.63	73.33	80.33	61.53	65.53	61.33	7.00
GA_3 200 ppm J.V. Gold	53.99	2.06	75.66	85.44	54.60	58.23	55.77	8.33
GA_3 200 ppm Sabnum	67.10	1.83	68.77	78.88	68.10	72.43	69.33	8.33
GA_3 200 ppm Snow Princess	68.06	1.80	71.66	81.77	69.33	75.50	73.00	13.00
GA_3 300 ppm Archana	52.77	1.31	81.00	84.77	54.77	71.83	68.67	6.33
GA_3 300 ppm Gunjan	63.66	2.33	72.83	78.33	48.50	52.17	48.53	5.67
GA_3 300 ppm J.V. Gold	57.45	2.29	75.77	86.10	52.33	56.80	53.33	7.33
GA_3 300 ppm Sabnum	72.32	1.82	68.77	79.22	65.67	70.30	67.17	9.33
GA_3 300 ppm Snow Princess	70.86	2.20	73.77	84.55	57.30	61.53	70.17	9.33
GA_3 400 ppm Archana	53.33	1.51	81.21	87.55	51.33	54.93	51.33	6.00
GA_3 400 ppm Gunjan	61.16	3.67	73.83	78.33	48.67	58.73	54.57	6.67
GA_3 400 ppm J.V. Gold	59.10	1.93	75.10	87.22	66.33	70.83	68.00	9.00
GA_3 400 ppm Sabnum	77.21	1.45	64.88	79.33	75.83	79.87	77.27	7.33
GA_3 400 ppm Snow Princess	66.66	1.70	75.55	86.22	53.47	58.73	56.00	11.67
SE(d)	7.49	0.27	1.27	1.16	6.30	6.62	6.92	1.23
C.D. at 5%	15.11	0.55	2.57	2.33	12.72	13.35	13.97	2.47

Table 2
Influence of GA_3 and varieties on maxi. no. of florets open at a time, weight of spike at first, fifth and ninth day (g), days taken to withering, solution uptake (ml) and vase life (days)

Treatment	*Maxi. no. of florets open at a time*	*Wight of spike at first day (g)*	*Wight of spike at fifth day (g)*	*Wight of spike at ninth day (g)*	*Duration of flowering*	*Days taken to withering*	*Solution uptake (ml)*	*Vase life (days)*
Control Archana	7.00	35.67	42.00	35.00	12.36	98.633	53.67	11.33
Control Gunjan	5.33	33.33	38.67	31.33	13.90	100.533	60.00	14.00
Control J.V. Gold	6.33	37.33	43.00	39.00	14.10	96.233	85.00	13.67
Control Sabnum	6.00	36.00	40.67	33.33	15.66	99.000	93.33	15.33
Control Snow Princess	5.67	33.33	38.33	31.67	13.56	100.567	35.00	13.33
GA_3 100 ppm Archana	6.00	42.00	45.67	37.67	11.23	98.900	46.67	11.00
GA_3 100 ppm Gunjan	4.67	29.00	35.00	28.33	14.66	104.300	63.33	14.00
GA_3 100 ppm J.V. Gold	6.00	32.67	38.00	35.33	15.10	97.800	95.00	16.67
GA_3 100 ppm Sabnum	5.00	28.33	30.33	23.00	15.56	96.167	56.67	14.67
GA_3 100 ppm Snow Princess	6.33	48.67	53.33	46.67	12.93	95.567	35.33	16.33
GA_3 200 ppm Archana	7.00	30.00	36.67	29.33	11.20	101.800	36.67	11.33
GA_3 200 ppm Gunjan	5.00	35.67	41.00	32.67	14.06	109.533	60.00	14.00
GA_3 200 ppm J.V. Gold	5.33	31.33	36.67	29.33	14.10	97.300	74.67	13.00
GA_3 200 ppm Sabnum	5.00	23.67	28.67	20.00	14.03	93.533	43.33	17.00
GA_3 200 ppm Snow Princess	7.00	41.33	46.33	40.33	13.33	93.867	25.00	13.00
GA_3 300 ppm Archana	5.33	31.33	38.00	31.67	11.16	103.000	35.00	16.67
GA_3 300 ppm Gunjan	5.33	32.33	38.33	31.00	14.06	96.967	43.33	13.67
GA_3 300 ppm J.V. Gold	6.33	40.67	45.67	39.00	14.96	94.167	74.33	14.33
GA_3 300 ppm Sabnum	5.00	29.67	28.67	26.67	14.50	93.533	63.00	16.00
GA_3 300 ppm Snow Princess	7.33	38.33	33.33	36.67	14.16	91.833	60.00	13.33
GA_3 400 ppm Archana	6.00	42.33	49.33	40.67	11.03	104.267	31.67	10.33
GA_3 400 ppm Gunjan	6.00	37.00	43.00	35.33	14.90	98.500	38.33	15.00
GA_3 400 ppm J.V. Gold	6.67	42.33	47.33	40.33	14.76	93.467	85.33	12.33
GA_3 400 ppm Sabnum	5.33	35.67	40.33	34.33	13.73	93.333	76.67	17.00
GA_3 400 ppm Snow Princess	6.67	42.33	47.33	40.33	13.66	95.100	54.67	11.67
SE(d)	0.78	4.77	4.42	4.55	0.92	2.12	6.44	0.84
C.D. at 5%	1.58	9.62	8.91	9.18	1.85	4.27	13.00	1.70

Early colour showed (78.33 days) was seen in cv. Gunjan when GA_3 spray at 100 ppm, whereas, cv. Sabnum showed colour (78.33 days) when GA_3 spray at 400 ppm. The earlier work carried out by Singh and Sharma (2004) are also in congruence with these findings. GA_3 treatment produced striking effect in enhancing the number of florets/spikes and maximum number of floret open at a time. GA_3 200 ppm resulted maximum number of florets/spike (13.00) in cv. Snow Princess, while GA_3 300 ppm resulted maximum number of florets open at a time (7.33). Earlier work carried out by Tyagi and Singh

(2008) in tuberose are also in congruence with these findings. The present study is also lent credence with the findings of Prakash and Jha (1998) in gladiolus. In respect to varieties cv. Sabnum exhibited maximum number of florets was reported by Gond (1997) in gladiolus.

Post harvest flower attributes

Pre-soaking of corms in solution of GA_3 had significant effect on length and weight of spike at first, fifth and ninth day and duration of flowering, days taken to withering, solution uptake and vase life in gladiolus cultivars (Table 1&2). Length of spike was significantly increased by GA_3 treatment and GA_3 400 ppm maximum length of spikes at first day (75.83 cm), fifth day (79.87 cm) and ninth day (77.27 cm) were observed in cv. Sabnum. Among varieties, cv. Sabnum and J. V. Gold revealed statistical maximum increased in the length of spike at all days. Spray of GA_3 100 ppm significantly increased the weight of spike at first (48.67 g), fifth (53.33 g) and ninth (46.67 g) day in cultivar cv. Snow Princess. Maximum duration of flowering (15.56 days) was observed in cv. Sabnum when spray of GA_3 at 100 ppm. The results are in close conformity with the findings of Sharma *et al.,* (2006). GA_3 200 ppm significantly induced late withering (109.53 days) of florets in cv. Gunjan. The results are in close conformity with the findings of Padaganur *et al.,* (2005) in tuberose.

Application of plant growth regulators resulted pronounced effect on solution uptake and vase life (day) in gladiolus cultivars (Table 2). Maximum solution uptake (95.00 ml) was noticed with 100 ppm GA_3 followed by 300 ppm cv. J.V. Gold. Among varieties, cv. Sabnum showed maximum vase life (17.00 days) when application of GA_3 concentration at 200 & 400 ppm. It was also superior to other. The results are in closed conformity with the findings of Arora *et al.,* (1992) and Tawar *et al.,* (2007).

CONCLUSION

On the basis of experimental findings described above, it may concluded that the genetic composition of variety and application of growth regulating chemicals GA_3 played important role in deciding the yield of gladiolus under Varanasi conditions. Among varieties, the cultivar Sabnam performed well than other cultivars on growth characteristics followed by Gunjan. However, Sabnam was found more effective in flowering and post harvest characteristics followed by cv. Gunjan. Cultivar Sabnum exhibited maximum vase life and solution uptake. Application of GA_3 at 200 and 300 ppm concentration played significant role in growth of most of given varieties of gladiolus in comparison to its lower concentration, where as GA_3 (300 ppm) and GA_3 (400 ppm) had great effect on different cultivars for flowering characteristics. Applications of GA3 at higher concentrations were found effective in post harvest parameters of gladiolus.

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