Indian J. Hort. 69(4), December 2012: 602-605

Short communication

Effect of plant bioregulators on vegetative and floral attributes of gladiolus

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ABSTRACT

Two plant growth regulators were applied on to gladiolus cultivars, *viz*., Jester and Snow Princess. NAA at 100 ppm gave maximum increment in plant height, number of shoots per m^2. Application of 100 ppm kinetin had positive influence on panicle emergence, while panicle length and rachis length were better with 100 ppm NAA. A maximum of 19.4 florets per spike in Snow Princess, while longer vase-life (15.76 days) was noted with 100 ppm kinetin.

Key words: *Gladiolus*, growth, plant bioregulators, flowering.

Gladiolus popular as "Queen of bulbous ornamentals", is a leading cut flower of India. It is an important cut flower in both domestic and international market. Its attractive spikes which are available in various colour and forms with prolonged vase-life are the main attributes for its increasing demand. Gladiolus is mainly grown as a subsidiary income generating crop (Rai *et al*., 4) but the scope of its commercial cultivation on a wide scale is significant as the demand of the flower is gaining momentum with the increasing aesthetic sense and higher socio-economic standard of the people in the country. Therefore, due to its higher demand in market it is necessary to increase the production. Synthetic growth regulating chemicals were reported to be very effective in manipulating growth, flowering and corm production in gladiolus.

The experiment was carried out at the Model Floriculture Centre of the university during November, 2009 to April, 2010. The experiment was conducted in two factorial RBD design, with five treatments, six replications and two varieties, Jester and Snow Princess. Healthy and uniform sized corm (dia. 5 cm) were selected and used as planting material. There were five spray treatments, *viz*., kinetin (50 ppm) and kinetin (100 ppm), NAA (50 ppm) and NAA (100 ppm) and spray with distilled water as control. The corms were planted at a spacing of 30 cm × 45 cm in each replication having 15 corms per treatment. Standard cultural practices were followed during the entire crop period for all the experimental plots. Five plants, randomly selected, were observed in each replication, leaving the border plant. Data recorded on various parameters were subjected to analysis of variance as applicable to factorial RBD.

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The gladiolus variety Snow Princess was found to be superior in respect of plant height and number of shoots per metre square (Table 1). There was significant influence of plant bio-regulators on plant height and number of shoots per metre square and maximum average plant height (68.31 cm) was observed with NAA (100 ppm), which was statistically at par with that of 100 ppm kinetin (68.01 cm). The variety Snow Princess had significantly higher average plant height (66.75 cm) than variety Jester (65.43 cm). Among interaction, var. Snow Princess with NAA (100 ppm) had maximum plant height (68.78 cm) whereas it was minimum in case of Jester with control (62.20 cm). Irrespective of varieties, treatment of NAA (100 ppm) produced significantly. The highest number of shoots per metre square (30.66), which was significantly higher than rest of the treatments. The spray of growth regulators on Snow Princess recorded the maximum average number of shoots per metre square (28.30) and the lowest number of shoots (25.25) was in Jester. Among interactions, Snow Princess with NAA (100 ppm) produced maximum number of shoots. Maximum plant height was noted with NAA which may be due to activity of auxin to increase shoot growth at relatively higher concentration. Sharma *et al*. (6) and Dutta *et al*. (1) also found increase in plant height with the spray of different concentrations of NAA on chrysanthemum. The number of shoots per metre square with NAA (100 ppm) and kinetin (100 ppm) might be due to the activity of auxin to increase growth at higher concentration or in case of kinetin due to its potential involvement in regulating shoot initiation and apical. These results are in conformity with the results reported by Sunitha *et al*. (9) on African marigold.

The data presented in Table 2 revealed that there was a significant effect of treatments for the days

taken to spike emergence. Irrespect of variety, among all the treatments the earliest spike emergence (68.16 days) occurred with kinetin (100 ppm) treatment. The positive effect of growth regulators on spike emergence has been advocated by Singh (7) in tuberose. The earliest spike emergence was recorded with variety Snow Princess (87.59 days). Among the interaction the earliest spike emergence (84.48 days) was recorded in Snow Princess with kinetin (100 ppm). Irrespective of the varieties the average spike length was maximum (85.91 cm) with control (Table 2). The spray of growth regulators on Snow Princess recorded maximum spike length (85.76 cm), whereas the minimum spike length was recorded in Jester (76.20 cm). The interaction between the growth regulators and varieties indicate that maximum spike length with NAA (100 ppm) in Snow Princess. The data show in Table 2 that irrespect of variety, the rachis length was superior (50.08 cm) in control which was significantly higher than rest of treatments. Among varieties, maximum rachis length (54.36 cm) was recorded in Snow Princess. In combination of both growth regulators and varieties, significantly higher rachis length (59.66 cm) was recorded in Snow Princess over control whereas the minimum rachis length (33.50 cm) was observed in Jester with NAA (100 ppm). The results obtained from the experiment conducted by Singh *et al*. (8) are in congruence of the above result which showed the antagonistic effect of NAA on spike length and rachis length in tuberose.

Table 1. Effect of plant bio-regulators on plant height and number of shoots per m^2.

Treatment / Variety	Plant height (cm)			No. of shoot per m^2		
	Jester (V_1)	Snow Princess (V_2)	Mean	Jester (V_1)	Snow Princess (V_2)	Mean
T_1: Kinetin (50 ppm)	64.66	66.09	65.38	25.31	30.42	27.87
T_2: Kinetin (100 ppm)	67.29	68.72	68.01	25.88	26.06	25.97
T_3: NAA (50 ppm)	65.13	66.54	65.84	25.21	22.93	24.07
T_4: NAA (100 ppm)	67.85	68.78	68.31	27.23	34.10	30.66
T_5: Control (water spray)	62.20	63.63	62.92	22.63	27.98	25.31
Mean	65.43	66.75		25.25	28.30	
		CD at 5%			CD at 5%	
Variety (V)		1.05			1.82	
Treatment (T)		1.66			2.89	
Interaction (V × T)		2.34			4.09	

Table 2. Effect of plant bio-regulators on days to spike emergence, spike length and rachis length.

Treatment / Variety	Days to spike emergence			Spike length (cm)			Rachis length (cm)		
	Jester (V_1)	Snow Princess (V_2)	Mean	Jester (V_1)	Snow Princess (V_2)	Mean	Jester (V_1)	Snow Princess (V_2)	Mean
T_1: Kinetin (50 ppm)	90.14	87.64	88.89	68.16	83.50	75.83	34.83	54.50	44.66
T_2: Kinetin (100 ppm)	87.85	84.48	86.16	76.83	84.33	80.58	36.50	53.33	44.91
T_3: NAA (50 ppm)	90.61	88.54	89.57	83.83	79.00	81.41	42.66	46.00	44.33
T_4: NAA (100 ppm)	88.25	87.41	87.83	70.16	92.16	81.16	33.50	58.33	45.91
T_5: Control (water spray)	89.48	89.86	89.67	82.00	89.83	85.91	40.50	59.66	50.08
Mean	89.27	87.59		76.20	85.76		37.60	54.36	
		CD at 5%			CD at 5%			CD at 5%	
Variety (V)		1.02			2.43			2.36	
Treatment (T)		1.62			3.84			3.74	
Interaction (V × T)		2.29			5.43			5.29	

Irrespect of varieties, the maximum number of florets per spike (15.20) was recorded in kinetin (100 ppm) treated plants which was significantly higher than rest of the treatments, followed by Kin (50 ppm) (14.04) (Table 3). Among varieties, the maximum number of florets per spike (18.12) was found in var. Snow Princess. In case of interaction, maximum number of florets (17.88) was observed in Snow Princess with kinetin (100 ppm).

Among the treatments and irrespect of varieties, there was non-significant effect of sprays on duration of first floret opening. The treatment with (100 ppm) kinetin took longest time period (4.41 days) for the withering of first floret which was significantly higher than rest of the treatments followed by NAA (100 ppm) treatment (4.00 days) (Table 3). The delay in first floret opening due to the application of growth regulators might be as a result of growth inhibition rather than a

Table 3. Effect of plant bio-regulators on number of floret per spike, days to opening of first floret and days to withering of first floret.

Treatment / Variety	No. of floret per spike			Days to opening/ of first floret			Days to withering of first floret		
	Jester (V_1)	Snow Princess (V_2)	Mean	Jester (V_1)	Snow Princess (V_2)	Mean	Jester (V_1)	Snow Princess (V_2)	Mean
T_1: Kinetin (50 ppm)	10.30	17.78	14.04	104.42	103.28	103.85	3.50	3.50	3.50
T_2: Kinetin (100 ppm)	11.00	19.40	15.20	104.05	100.39	102.70	3.66	5.16	4.41
T_3: NAA (50 ppm)	10.05	17.45	13.75	104.45	100.68	102.50	3.66	3.83	3.75
T_4: NAA (100 ppm)	10.17	17.88	14.02	104.98	102.42	103.70	4.16	3.83	4.00
T_5: Control (water spray)	9.80	18.13	13.96	104.82	103.03	103.92	3.16	3.50	3.33
Mean	10.26	18.12		104.74	101.96		3.63	3.96	
		CD at 5%			CD at 5%			CD at 5%	
Variety (V)		0.50			0.91			0.22	
Treatment (T)		0.79			1.45			0.35	
Interaction (V × T)		1.12			2.05			0.49	

Table 4. Effect of plant bio-regulators on vase life, number of daughter corms/corm and number of cormels per corm.

Treatment / Variety	Vase-life (days)			No. of daughter corms/ corm			No. of cormels/ corm		
	Jester (V_1)	Snow Princess (V_2)	Mean	Jester (V_1)	Snow Princess (V_2)	Mean	Jester (V_1)	Snow Princess (V_2)	Mean
T_1: Kinetin (50 ppm)	14.50	14.59	14.54	2.21	1.71	1.96	38.26	60.56	49.41
T_2: Kinetin (100 ppm)	14.00	15.76	14.88	2.43	1.99	2.21	40.90	63.88	52.39
T_3: NAA (50 ppm)	13.66	13.93	13.79	2.16	1.70	1.93	46.60	77.61	62.10
T_4: NAA (100 ppm)	14.50	14.93	14.71	2.29	1.86	2.08	49.05	79.21	64.13
T_5: Control (water spray)	12.16	14.23	13.21	2.15	1.68	1.91	36.20	59.63	47.92
Mean	13.76	14.69		2.25	1.79		42.20	68.18	
		CD at 5%			CD at 5%			CD at 5%	
Varieties (V)		0.70			0.074			1.07	
Treatment (T)		1.11			0.111			1.69	
Interaction (V × T)		1.58			0.157			2.39	

direct effect upon flowering stimulus Table 4 shows that all the treatments significantly increased the vase-life over control which recorded the minimum (13.21 days) vase-life. Irrespect of variety, the maximum vase-life was recorded within with spikes treated kinetin (100 ppm). Among the varieties, the variety Snow Princess showed maximum (14.69 days) vase-life. Among interaction, variety Snow Princess with kinetin (100 ppm) treatment had maximum (15.76 days) vase-life. The increase in vase life by kinetin (100 ppm) might be due to presence of ethylene inhibitor kinetin, which delays senescence of florets.

The yield of the corm increased significantly due to various treatments as compared to the control (Table 4). Irrespective of variety the maximum (2.21) number of daughter corms per corm was recorded with kinetin (100 ppm) whereas the minimum (1.91) was observed in control. The variety Snow Princess irrespective of hormonal treatments had maximum (2.25) number of daughter corms per corms as compared to Snow Princess (1.79). The interaction shows the highest number of daughter corms per corm in variety Jester treated with kinetin (100 ppm). In Snow Princess, kinetin stimulates protein synthesis and can also induce nutrient mobilization is well documented. High concentration of kinetin and NAA treatments promoted the sink activity of developing corm at the expense of flower spike or inflorescence. Similar observations were earlier reported by Singh *et al*. (8) in tuberose.

All the treatments significantly increased the number of cormels per corm as compared to control (Table 4). Barring the varieties, the maximum number of cormels per corm (64.13) was obtained in NAA (100 ppm) treatment. Irrespect of hormonal treatments, variety Snow Princess observed the maximum number of cormels per corm (68.18) as compared to variety Jester (42.20). Among interaction, the maximum number of cormels per corm (79.21) were observed in variety Snow Princess with NAA (100 ppm) treatment which was significantly higher than rest of the treatments. The minimum number The treatment of growth regulators promote the sprouting of lateral buds resulting in splitting of corm and cormels per plant (Havale *et al.*, 2; Saini *et al.*, 5).

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Received : November, 2010; Revised : March, 2011;
Accepted : July, 2012