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PERFORMANCE OF FIVE DIFFERENT GLADIOLUS VARIETIES WITH RESPECT TO GROWTH, FLOWERING AND YIELD ATTRIBUTES UNDER NAGPUR CONDITION

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ABSTRACT

The study was conducted to find out the performance of five different gladiolus varieties viz., Snow Princess, Princess Morgarate Rose, Yellow Stone, Novalux and American Beauty under the Nagpur condition. The three GA₃ concentrations (0, 100 and 200 ppm) were sprayed at 30th, 45th and 60th day after planting. Among the varieties, American Beauty has recorded early sprouting (66.6 days), maximum number sprouts plant⁻¹ (4.18), maximum height (58.78 cm) and maximum number of leaves (22) whereas, Princess Morgarate has recorded maximum leaf area (78.10 cm²) under 200 ppm GA₃. The study of floral attributes reveals that the variety Princess Morgarate Rose has recorded minimum days to first spike emergence (55.21 days), minimum days to opening of floret (64.83 days) and minimum days for 50% flowering (57.63 days) whereas, the variety Snow Princess has recorded maximum flowering span (26.12 days) and Yellow Stone has recorded maximum longevity of flowering on plant (15.68 days) sprayed with 200 ppm GA₃. Variety American Beauty and Princess Morgarate Rose showed superiority among all varieties with respect growth and flowering attributes respectively sprayed with 200 ppm GA₃.

INTRODUCTION

Gladiolus (*Gladiolus* spp.) is a popular cut flower belongs to family Iridaceae, which is originated from South Africa. It is attributed as 'Queen of Bulbous ornamentals' due to its popularity among the bulbous ornamental cultivated in the world. This flower bears an economic and aesthetic value for its beauty and elegance. The long flower spikes are excellent as cut flower for ornamentation when arranged in vases. In India, it is commercially cultivated in West Bengal, Himachal Pradesh, Sikkim, Karnataka, Uttar Pradesh, Tamil Nadu, Punjab and Delhi over an area of 9.37 thousand ha with a production of 707 million spikes (2013). Now, it has been trading in domestic and international markets having great demand.

Any attempt made to encourage cut flower production in the region not only helps the florists and consumers to get fresh and quality cut flowers regularly, but also helps the small and marginal farmers in the region to improve their economic condition (Naresh *et al.*, 2015). The performance of varieties for attributes of growth, flowering, spike yield and corm yield were differed among the varieties (Chorasia *et al.*, 2015). There was a great variation in reproductive structures of the flower among the varieties (Akansha *et al.*, 2014). The phenotypic expression is lessened under the influence of environment and that genotypes have substantial diversity and variability for most of the characters (Malik and Pal, 2015). Gibberellic acid has been found to increase the plant height, leaves and shoots per plant and improve the spike quality (Sable *et al.*, 2015), stimulate flowering and increase the yield of gladiolus spikes (Aier *et al.* 2015). Therefore, the aim of present study was undertaken to find out the suitable variety of gladiolus for the region and concentration of the growth regulators like gibberellic acid and for the better growth and flowering of gladiolus.

MATERIALS AND METHODS

The experiment was carried out at Horticulture unit, Department of Horticulture, College of Agriculture, Nagpur (M.S.) during *rabi* season of the year 2015-16. The location of experiment site was at latitude of 21°10' N and longitude of 79°19' E and with the elevation of 321.26 meters above the mean sea level. The experiment was laid out in factorial randomized block design with three replications and fifteen treatment combinations. The first factor including of five gladiolus varieties viz. Snow Princess (V₁), Princess Morgarate Rose (V₂), Yellow Stone (V₃), Novalux (V₄) and American Beauty (V₅) and second factor comprise of three foliar spraying treatments of GA₃@ G₁, G₂ and G₃ as represented by Control (water spray), 100 ppm and 200 ppm respectively. Solution of plant growth regulators was sprayed as per the treatment along with control (water spray) at 30th, 45th and 60th day after planting. All the intercultural operations were followed as and when required. Randomly five plants were selected from each plot and labeled for the purpose of recording various growth parameters viz. Days for sprouting of corms, Sprouts

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plant⁻¹, Plant height, Leaves plant⁻¹, Leaf area, flowering parameters viz. days to spike emergence, days for opening of first floret, Longevity of flower on plant, Flowering span and Days for 50 per cent flowering (days). The mean value of the five selected plants from each treatment and the data was statistically analysed by the method suggested by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

Growth parameters

The varietal differences were significant in respect of days to sprouting of gladiolus (Table 1). Significantly early sprouting was observed in American Beauty (6.66 days) followed by Snow Princess (7.78 days), Novalux (8.67 days) and Princess Morgarate Rose (9.67 days), whereas, Yellow Stone took maximum days to sprouting (10.56 days). Sprouting of corms is controlled by genetic composition of cultivars. The differences in time taken for sprouting might be attributed due to the different genetic material of varieties. The effect of GA₃ on days to sprouting of gladiolus was found to be non-significant. The interaction effect due to different varieties and GA₃ on number of days to sprouting of gladiolus was found to be non-significant. These findings were correlated with Safiullah and Ahmad (2001) and Chourasia *et al.* (2015) in gladiolus. The various varieties were significantly influenced in respect of number of sprouts plant⁻¹ in gladiolus (Table 1). American Beauty was found significantly superior over all varieties with maximum number of sprouts (4.12) followed by Novalux (2.28) which was found to be at par with Yellow Stone (2.06), Snow Princess (2.04) and Princess Morgarate Rose (1.96). The effect of GA₃ on number of sprouts plant⁻¹ of different gladiolus varieties was found to be non significant. These findings are in close agreement with Bhujbal *et al.* (2013) and Shaukat *et al.* (2013) in gladiolus. The height was found to be significant among the different varieties of gladiolus (Table 1). The variety American Beauty has recorded maximum plant height (61.11 cm) which was statistically found to be at par with Novalux (58.78 cm).

However, minimum plant height was recorded in the variety Princess Morgarate Rose (53.33 cm) which found to be at par with Snow Princess (54.78 cm) and Yellow Stone (56.78 cm). Similar result was obtained by Swaroop (2010) and Bhujbal *et al.* (2013). At the stage of 60 DAP, effect of GA₃ on plant height was found to be significant. Significantly maximum plant height was registered with treatment GA₃ 200 ppm (64.26 cm) which was found to be on par with treatment GA₃ 100 ppm (62.19 cm), whereas, minimum plant height was recorded in the control treatment (57.97 cm). Similar results were also found by Maurya and Nagada (2004) and Sajjad (2014) in gladiolus. The interaction effect due to different varieties and GA₃ on plant height of gladiolus was found to be non-significant at all the growth stages. The variety American Beauty has recorded significantly highest leaves plant⁻¹ (22) followed by Novalux (15.17) and Yellow Stone (11.83) which was found to be at par with Snow Princess (11.56) (Table 1). However, minimum leaves plant⁻¹ were recorded in the variety Princess Morgarate Rose (10.7). These findings are in close agreement with the findings of Bhujbal (2013) and Chourasia (2015) in gladiolus. Whereas the interaction effect due to different varieties and GA₃ on leaves plant⁻¹ of gladiolus was found to be non-significant. The significantly maximum leaves plant⁻¹ were observed in the treatment GA₃ - 200 ppm (14.8) which was statistically found to be at par with the treatment, GA₃ - 100 ppm (14.6), whereas, minimum leaves plant⁻¹ were observed in the control treatment (13.37). Similar findings were reported by Sable *et al.* (2015) and Aier *et al.* (2015) in gladiolus. Variety Princess Morgarate Rose was found significantly superior over all varieties with maximum leaf area (78.10 cm²) which was found to be at par with American Beauty (76.71 cm²), Yellow Stone (76.18 cm²) and Snow Princess (75.31 cm²). However, minimum leaf area was observed in the variety Novalux (60.23 cm²) (Table 1). The variation in the leaf area of gladiolus varieties might be attributed due to the genetic differences of the varieties used, as the most of the characters are governed by the genetic makeup of the plant. These findings can be correlated with Naresh *et al.* (2015) in gladiolus. The treatment GA₃ - 200 ppm recorded maximum

Table 1: Effect of different gladiolus varieties and GA₃ on growth parameter

Treatments	Days for sprouting of corms	Sprout per plant	Plant height (cm)	Leaves per plant	Leave area (cm ²)
First factor- Varieties (V)					
V1 – Snow Princess	07.78	2.04	54.78	11.56	75.31
V2 – Princess Morgarate Rose	09.67	1.96	53.33	10.70	78.10
V3 – Yellow Stone	10.56	2.06	56.78	11.83	76.18
V4 – Novalux	08.67	2.28	58.78	15.17	60.23
V5 – American Beauty	06.65	4.12	61.11	22.00	76.71
SE(m) ±	0.27	0.16	1.25	0.39	1.37
CD at 5 %	0.78	0.47	3.63	1.13	3.96
Second factor – Gibberellic acid (G)					
G1 – Control	08.77	2.26	55.40	13.37	70.34
G2 – GA3 100 ppm	08.49	2.71	56.87	14.60	73.23
G3 – GA3 200 ppm	08.73	2.5	58.60	14.80	76.34
SE(m) ±	0.21	0.16	0.97	0.30	1.06
CD at 5 %	-	-	-	0.87	3.07
Interaction effect V X G					
SE(m) ±	0.57	0.36	2.66	0.83	2.91
CD at 5 %	-	-	-	-	-

Table 2: Effect of different gladiolus varieties and GA₃ on flower attributes

Treatments	days to spike emergence	days for opening of first floret	Days for 50 per cent flowering	Flowering span (days)	Longevity of flower on plant (days)
First factor- Varieties (V)					
V1 – Snow Princess	55.23	65.54	63.41	26.12	15.10
V2 – Princess Morgarate Rose	55.21	64.83	57.31	23.61	14.32
V3 – Yellow Stone	62.99	70.89	64.29	20.43	15.68
V4 – Novalux	63.06	69.52	64.43	23.07	14.22
V5 – American Beauty	61.61	72.28	63.33	18.87	12.92
SE(m) ±	1.04	1.15	1.15	1.05	0.30
CD at 5 %	3.03	3.35	3.32	3.05	0.88
Second factor – Gibberellic acid (G)					
G1 – Control	61.91	72.17	64.83	20.75	13.71
G2 – GA ₃ 100 ppm	59.00	67.17	61.61	21.99	14.64
G3 – GA ₃ 200 ppm	57.95	66.50	61.23	24.52	14.99
SE(m) ±	0.81	0.89	0.89	0.81	0.23
CD at 5 %	2.34	2.59	2.57	2.36	0.68
Interaction effect V X G					
SE(m) ±	2.22	2.45	2.43	2.23	0.64
CD at 5 %	-	-	-	-	-

leaf area (76.34 cm²) whereas, control treatment recorded minimum leaf area (70.34 cm²) which was found to be at par with GA₃ - 100 ppm (73.33 cm²). The interaction effect due to different varieties and GA₃ on leaf area of gladiolus was found to be non-significant.

Flowering parameters

Significantly early spike emergence was observed in Princess Morgarate Rose (55.21 days) which was statistically found to be at par with Snow Princess (55.23 days) (Table 2). These findings can be correlated with Shriramagond and Hanamashetti (1999) and Safifullah and Ahmad (2001) in gladiolus. The treatment GA₃ - 200 ppm recorded early spike emergence (57.95 days) which was found to be at par with the treatment GA₃ - 100 ppm (59 days), whereas, control treatment was taken maximum days for spike emergence of gladiolus (61.91 days). Interaction effect due to different varieties and GA₃ on number of days to spike emergence of gladiolus was found to be non-significant. This might be due to increased vigour of plant and enhanced vegetative growth due to the treatment of gibberellic acid. These findings can be correlated with Kumar *et al.* (2015) and Chopde *et al.* (2011) in gladiolus. Significantly early floret opening was observed in Princess Morgarate Rose (64.83 days) which was statistically found to be at par with Snow Princess (65.54 days) (Table 2). However, American Beauty took maximum days to opening of first floret (72.28 days) which was found to be at par with Yellow Stone (70.89 days) and Novalux (69.52 days). These findings can be correlated with Poon *et al.* (2009) and Archana and Patil (2013) in gladiolus. The treatment GA₃ - 200 ppm was recorded minimum days to opening of first floret (66.5 days) which was found to be at par with the treatment GA₃ - 100 ppm (67.17 days), whereas, control treatment had taken maximum days for opening of first floret (61.91 days) in gladiolus. The interaction effect due to different varieties and GA₃ on number of days to opening of first floret in gladiolus was found to be non-significant. These findings can be correlated with Aier *et al.* (2015) and Rani *et al.* (2015) in gladiolus.

Variety Princess Morgarate Rose has significantly taken minimum days for 50 % flowering (57.31 days). However, variety Novalux took maximum days to 50 % flowering (64.43 days) which was found to be at par with Yellow Stone (64.29 days), Snow Princess (63.41 days) and American Beauty (63.33 days). The interaction effect due to different varieties and GA₃ on number of days to 50 % flowering in gladiolus was found to be non-significant (Table 2). These findings can be correlated with Bhujbal *et al.* (2013) in gladiolus. These findings can be correlated with Dogra *et al.* (2012) and Sarkar *et al.* (2014) in gladiolus. Variety Snow Princess has significantly recorded maximum flowering duration (26.12 days) which was found to be at par with Princess Morgarate Rose (23.67 days) and Novalux (23.07 days) (Table 2). However, variety American Beauty has recorded minimum flowering duration (18.87 days) which was found to be at par with Yellow Stone (20.43 days). These findings can be correlated with Chourasia *et al.* (2015) in gladiolus. The treatment GA₃ - 200 ppm was recorded significantly maximum flowering duration (24.52 days), whereas, control treatment has recorded minimum flowering duration (20.75 days) which was found to be at par with the treatment GA₃ - 100 ppm (21.99 days) in gladiolus. The interaction effect due to different varieties and GA₃ on flowering span in gladiolus was found to be non-significant. These findings can be correlated with Neetu *et al.* (2013) in gladiolus. Variety Yellow Stone was recorded significantly maximum longevity of flower spikes (15.68 days) which was statistically found to be at par with variety Snow Princess (15.10 days) followed by Princess Morgarate Rose (14.32 days). However, variety American Beauty was recorded minimum longevity of flower spikes (12.92 days) in gladiolus (Table 2). These findings can be correlated with Chopde *et al.* (2011) in gladiolus. The treatment GA₃ - 200 ppm was recorded maximum longevity of flower spike (14.99 days) which was found to be at par with GA₃ - 100 ppm (14.64 days), whereas, control treatment was recorded minimum longevity of flower spike (13.71 days) of gladiolus. An increase in longevity of gladiolus spike with the application of GA₃ might be due to more vegetative growth, early spike emergence, increased

length of spike and rachis and more florets per spike which might have helped the spikes to last longer on plant in the field. These findings are in conformity with the findings of Chopde *et al.* (2011) of gladiolus. The interaction effect due to different varieties and GA₃ on longevity of spikes of gladiolus was found to be non-significant.

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