

## Effect of Bio Fertilizer on Various Growth Parameters of *Gladiolus* cv. American Beauty

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Received: 6.05.2020 | Revised: 11.06.2020 | Accepted: 18.06.2020

### ABSTRACT

A field experiment was carried out during the successive seasons of 2018/2019. The aim of this study was to investigate the effect of bio fertilizer on various growth parameters of *gladiolus* cv. American Beauty. The experiment was laid out in a Randomized Block Design with Factorial concept (FRBD) with three replications and 24 Twenty four treatment combinations, comprising of four fertilizer treatments  $F_0$ Control (No fertilizer),  $F_1$ RDF,  $F_2$ 85% RDF, and  $F_3$ 70% RDF and six treatments of bio fertilizers ( $T_1$ Un-inoculated,  $T_2$  Azotobacter,  $T_3$ Phosphobacteria,  $T_4$ Azospirillum,  $T_5$  Azospirillum + Phosphobacteria, and  $T_6$ Azotobacter + Phosphobacteria ).The salient features of the results presented, fertilizer showed that minimum days taken to sprouting(17.02), Sprouting percentage (93.74), Number of sprouts per hill (2.13), length of longest leaf (59.52), width of longest leaf(4.94), number of leaves per hill (7.87), maximum plant height (86.97 cm), leaf area (1863.37), leaf area index (3.1) were registered in  $F_1$  (RDF).and bio -fertilizer showed that minimum days taken to sprouting (17.77), Sprouting percentage (32.84), Number of sprouts per hill (2.45), length of longest leaf (58.09), width of longest leaf(4.84), number of leaves per hill (7.66), maximum plant height (85.35 cm), leaf area (1818.03), leaf area index(3.02) were registered  $T_6$ (Azotobacter + phosphobacteria).

**Keyword:** Bio- fertilizer, Plant growth, Azotobacter, Phosphobacteria, Azospirillum,

### INTRODUCTION

*Gladiolus* (*Gladiolus grandiflorus*), generally called “Glad”, a member of family Iridaceae and sub-family Ixiodeae, originated from South Africa, is a prominent bulbous cut flower plant. It is also known as the Sword Lily, due to its sword shaped leaves, or Corm

Lily. Being an important bulbous ornamental plant, it occupies a prime position among commercial flower crops which has high demand in both domestic and international markets. It occupies eighth position in the world’s cut flower trade and has a global history (Ahmad et al., 2013).

**Cite this article:** Pandey, D.K., Singh, K.K., & Pandey, A. (2020). Effect of Bio Fertilizer on Various Growth Parameters of *Gladiolus* cv. American Beauty, *Ind. J. Pure App. Biosci.* 8(3), 737-741. doi: <http://dx.doi.org/10.18782/2582-2845.8207>

The major gladiolus producing countries are the United States (Florida and California), Holland, Italy, France, Poland, Bulgaria, Brazil, India, Australia and Israel. The fascinating spike bears a large number of florets with varying sizes and forms with smooth ruffle of deeply crinkled sepals. Presently, in India the area under bulbous crop is about 3500 ha of which gladiolus occupies about more than 1200 ha. The main gladiolus growing places are suited to the north Indian plains. It is grown in the plains as well as hills up to elevation of 2400 m from mean sea levels (Singh et al., 2012).

Flower crops are highly receptive to fertilizer. It is very much capable of exhausting huge nutrients from indigenous soil. So, it requires huge amount of chemical fertilizer in equally balance proportion for ensuring more flower production. Fertilizer requirements of gladiolus like different crops, plays a vital role in growth, quality, corm and cormel production. There are some kind of reports on the requirement of Nitrogen (N), phosphorus (P), potassium (K) and other fertilization in different countries. Major nutrients like nitrogen, phosphorus, potassium increase the number of flowers, florets/spike, length of spike and flowering stem of gladiolus (Afify, 1989).

The ability of the “Plants” to produce more yields is dependent on the availability of adequate plant nutrients, because cultivation of high yielding varieties of crop coupled with intensive cropping systems has depleted the soil fertility, resulting in multi-nutrient

deficiencies in soil-plant system. Under such situation, use of only one or two primary nutrients will not be sufficient for maintaining the long term sustainability of crop production. Moreover, use of balanced fertilization is a key component of the crop production technology.

## MATERIALS AND METHODS

The present experiment entitled “**Effect of bio fertilizer on various growth parameters of gladiolus CV. American Beauty**” was carried out, during consecutive Rabi seasons of 2018-19 at the **School of Agriculture Sciences Career Point University Kota, Rajasthan, India**. The research farm is situated at 25.365 “ North latitude and 76.0274” East longitudes and at an altitude of 271 meters above the mean sea level. It is situated in northern tract of Rajasthan. The experimental field at farm having homogenous fertility and uniform textural make up was selected for the field experimentation. It is clear from the data given that, in general, both maximum and minimum temperatures ranged between 20.1 to 40.9 and 6.2 to 23.3 during 2018-19 respectively, during the cropping season.

### Experimental details:

The experiment was conducted at the same location of farm of School of agriculture sciences Career Point University Kota, Rajasthan, India during the rabiseasons of 2018-19 with same treatments and same site. The layout plan of the experiment is illustrated in and the details of experiments are given in and treatment details with their symbol in.

**Table 1: Experimental details of field**

1.	<b>Crop</b>	:	Gladiolus
2.	<b>Variety</b>	:	American Beauty
3.	<b>Experimental design</b>	:	Factorial Randomized Block design
4.	<b>Replications</b>	:	3
5.	<b>Main plot treatment bio - fertilizer</b>	:	6
6.	<b>Treatment Combination</b>	:	4
7.	<b>Total Number of Plots</b>	:	72
8.	<b>Gross plot size</b>	:	30 × 20

**Table 2: Treatment Details**

Sr No	Treatment
<b>Fertilizers</b>	
F <sub>0</sub>	Control (No fertilizer)
F <sub>1</sub>	RDF
F <sub>2</sub>	85% RDF
F <sub>3</sub>	70% RDF
<b>Bio- fertilizers</b>	
T <sub>1</sub>	Control
T <sub>2</sub>	Azotobacter
T <sub>3</sub>	Phosphobacteria
T <sub>4</sub>	Azospirillum
T <sub>5</sub>	Azospirillum + Phosphobacteria
T <sub>6</sub>	Azotobacter + Phosphobacteria

**Observation details:**

Performance of crop as affected by various treatments was assessed by the following studies:

**Results and discussion**

The results of the current study “**Effect of bio fertilizer on various growth parameters of gladiolus CV. American Beauty**” related to the impact of various bio-fertilizers treatments, mainly on growth, floral characters, spike yield, nutrients content, quality of flower and corms production embodied and explained in this chapter. The data of the final observations of the various parameters during growth and flowering phase were subjected to statistical analysis and the results have, therefore, been presented through tables. All findings of the experiments were recorded and have been described under following heads:

**Effect on growth characters****Effect of fertilizer**

The data given with fertilizer showed that minimum days taken to sprouting (17.02), Sprouting percentage (93.74), Number of sprouts per hill (2.13), length of longest leaf (59.52), width of the longest leaf (4.94), number of leaves per hill (7.87), maximum plant height (86.97 cm), leaf area (1863.37), leaf area index (3.1) were registered in F<sub>2</sub> 85% RDF was at par with 100% F<sub>1</sub> RDF and was significantly superior over rest of the treatment these findings were in line with The significant increase in these parameters might be due to active and quick at a higher rate through nitrogen supply by nitrogenous

fertilizers and supply of other nutrients, bacterial secretion, hormone production and supply of antibacterial and antifungal compounds, which were favorable for growth and ultimately increased yield. Fertilizer contains growth-promoting substances viz., GA, cytokine, and different micronutrients like Fe, Zn, Mn, and Cu. the treatment these finding were in line with effect of high fertilizer rates on the growth flowering of three gladiolus cultivars (Afify, M. M. (1989), Abou El-yazeid A et al. 2013.

**Effect of bio-fertilizer**

The data given with bio -fertilizer showed that minimum days taken to sprouting (17.77), Sprouting percentage (32.84), Number of sprouts per hill (2.45), length of longest leaf (58.09), width of longest leaf (4.84), number of leaves per hill (7.66), maximum plant height (85.35 cm), leaf area (1818.03), leaf area index (3.02) were registered T<sub>6</sub> (Azotobacter + phosphobacteria) was at par with T<sub>5</sub> (Azospirillum + Phosphobacteria) and was significantly superior over rest of the treatment these finding were in line with the in these parameters might be due to active and quick increase of bacteria especially in rhizosphere creating favorable condition for nitrogen fixation and phosphorus solubilization at higher rate through nitrogen supply by nitrogenous fertilizers and supply of other nutrients, bacterial secretion, hormone production and supply of antibacterial and antifungal compounds, which were favorable for growth and ultimately increased yield. Bio-

fertilizer contains growth-promoting substances viz., GA, cytokine, and different micronutrients like Fe, Zn, Mn, and Cu. These nutrients play a very important role on the growth and development of gladiolus plants, because of its stimulatory and catalytic effects

on flower yield and metabolic processes. These findings corroborate with those of Basoli et al., (2014) in gladiolus, Ali et al., (2013) in gladiolus and Sunitha et al., (2007) and Mittal et al., (2010) in marigold.

**Table 3: Effect of bio fertilizer on various growth parameters of gladiolus CV. American Beauty**

Sr. no	Treatment	Days taken to sprouting	Sprouting percent	Number of sprouts per hill	Length of longest leaf (cm)	Width of longest leaf(cm)	Number of leaves per hill	Plant height(cm)	Leaf area (cm)	Leaf area Index
<b>Fertilizer</b>										
F <sub>0</sub>	Control (No fertilizer)	22.00	88.37	1.83	43.25	3.60	4.22	61.07	1358.83	2.26
F <sub>1</sub>	RDF	17.02	94.60	2.03	58.07	4.80	7.50	85.20	1826.80	3.04
F <sub>2</sub>	85% RDF	19.60	93.98	1.95	53.75	4.48	6.68	78.92	1690.51	2.81
F <sub>3</sub>	70%RDF	21.02	93.80	1.90	51.40	4.28	6.00	75.27	1617.36	2.69
SE(m)±		0.35	1.51	0.03	0.87	0.06	0.11	0.63	19.07	0.04
CD at 5%		1.02	4.30	0.9	2.49	0.18	0.31	1.80	54.30	0.12
<b>Bio-Fertilizer</b>										
T <sub>1</sub>	Control	21.63	89.38	1.47	46.05	3.83	4.30	64.23	1447.51	2.41
T <sub>2</sub>	Azotobacter	21.10	92.03	1.88	50.70	4.20	6.03	74.23	1593.31	2.65
T <sub>3</sub>	Phosphobacteria	20.83	93.58	1.99	51.60	4.30	6.60	76.60	1623.38	2.70
T <sub>4</sub>	Azospirillum	19.80	93.20	1.79	49.68	4.13	5.38	71.60	1564.75	2.60
T <sub>5</sub>	Azospirillum + Phosphobacteria	18.60	93.68	2.11	55.03	4.58	7.00	80.43	1728.59	2.88
T <sub>6</sub>	Azotobacter + Phosphobacteria	17.50	94.28	2.33	56.65	4.73	7.30	83.60	1782.71	2.97
SE(m)±		0.44	1.85	0.3	1.07	0.08	0.13	0.77	23.36	0.05
CD at 5 %		1.25	5.27	0.9	3.05	0.22	0.38	2.20	66.50	0.15
<b>Interaction (FXB)</b>										
S. E(m)±		0.88	3.70	0.07	2.14	0.16	0.27	1.54	46.72	0.10
C.D at 5%		2.50	10.54	0.21	6.10	0.45	0.77	4.41	133.01	0.30

## CONCLUSION

The results may be concluded as application of bio fertilizer singly and different combinations has significant effect on all growth. Among various bio fertilizer and there combinations, (Azotobacter + phosphobacteria) were found best, followed by Azospirillum + Phosphobacteria and control treatment show least value for these parameters during both the seasons of experiment.

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