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## Effect of biostimulants on growth and yield in gladiolus

Saryu Trivedi, Bhavesh B Patel and Jayti Jadav

### Abstract

An experiment was conducted during *Rabi*, 2019-2020 to study the various biostimulants effect on gladiolus var. *Psittacinus* Hybrid. An experiment was laid out in Randomized Block Design with three replications and ten treatments. Among all the treatments, T<sub>6</sub> - Humic acid 0.2% + *Panchgavya* 3% obtained maximum plant height (62.83 cm, 63.23 cm and 63.49 cm, respectively) at 60, 90 and 120 days after planting and maximum number of leaves per plant (16.93). Number of spikes per plant (2.60), number of corms per plant (3.36) and number of cormels per plant (4.38) were also observed in T<sub>6</sub> - Humic acid 0.2% + *Panchgavya* 3%.

**Keywords:** Gladiolus, biostimulants, *Panchgavya*, corms, cormels

### 1. Introduction

Gladiolus is a “Queen of bulbous flowers”, grown almost all over the world. Gladiolus (*Gladiolus grandiflorus* L.) belongs to the family Iridaceae and is native to South Africa and Asia minor. Popularity of this flower is increasing day by day for its majestic spikes having attractive florets, dazzling colour which covers the spectrum of white, pink, red, purple, yellow, orange, salmon and even green are available along with many bicolour and multicolors. A biostimulant is defined as an organic material and/or micro-organism that is applied to enhance an organic nutrient uptake, stimulate growth and enhance stress tolerance or crop quality. There are many stimulants like *panchgavya*, *jivamrit*, humic acid, *amritpani*, *Novel* organic liquid nutrient (banana pseudostem enriched sap) etc. Humic acid is a commercial product which is produced by decaying organic compounds. It contains elements that improve soil fertility, reduces soil nutrient deficiency, increases water and nutrient availability by forming chelates of various nutrients. *Panchgavya* is a rich source of essential nutrients, growth hormones and beneficial micro-organisms. Vermiwash is a rich source of vitamins, hormones, enzymes, macro and micro nutrients when applied to plants help in efficient growth. *Novel* organic liquid nutrient is rich source of nitrogen, phosphorus, potassium, sulphur, calcium, magnesium, iron, manganese, zinc, copper, soluble sugars, phenols, amino acids and plant growth regulators. Seaweed and seaweed-derived products have been widely used as biostimulants in crop production due to presence of multiple growth regulators. Keeping in view the above facts, an investigation entitled “Effect of biostimulants on growth and yield in gladiolus”.

### 2. Material and Methods

An experiment entitled “Effect of biostimulants on growth and yield in gladiolus” was conducted at the Floriculture Research Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari. The climate of South Gujarat, where the experiment site is situated, is typically tropical characterized by fairly hot summer, moderately cold winter and warm humid monsoon. Generally, monsoon in this region commences in the second week of June and retreats by the end of September. Pre- monsoon rains in the last week of May or in the first week of June are not uncommon. Most of the precipitation is received from South West monsoon, concentrating in the month of July and August. The winter season sets in usually towards the end of October. The lowest temperature of season is recorded either in December or January and hence these two months are the coldest months of the season. From the February onwards the temperature starts rising and reaches the maximum in the month of the summer season.

### 3. Treatment Details

Treatment Details

T <sub>1</sub>	Humic acid 0.2%
T <sub>2</sub>	<i>Panchgavya</i> 3%
T <sub>3</sub>	Vermiwash 3%
T <sub>4</sub>	<i>Novel organic liquid nutrient</i> 1%
T <sub>5</sub>	Sea weed extract 1%
T <sub>6</sub>	Humic acid 0.2% + <i>Panchgavya</i> 3%
T <sub>7</sub>	Humic acid 0.2% + Vermiwash 3%
T <sub>8</sub>	Humic acid 0.2% + <i>Novel organic liquid nutrient</i> 1%
T <sub>9</sub>	Humic acid 0.2% + Sea weed extract 1%
T <sub>10</sub>	Control

Humic acid 0.2% was prepared by dissolving 2 g humic acid in 1 liter of water. The required quantity of *Panchgavya* 3% (30 ml) was dissolved in water and final volume was made up to one litre in volumetric cylinder. Vermiwash of 3% solution was prepared by dissolving 30 ml vermiwash in one litre of water. *Novel organic liquid nutrient* of 1% solution was prepared by dissolving 10 ml *Novel organic liquid nutrient* in one litre of water. Sea weed extract of 1% solution was prepared by dissolving 10 ml sea weed extract in one litre of water. Different biostimulants were applied at 30, 45 and 60 days after planting.

### 3. Results and Discussion

The observations regarding vegetative attributes are shown in Table 1. From various treatments, significantly maximum plant height at 60, 90 and 120 days after planting (62.83 cm, 63.23 and 63.49 cm, respectively) were recorded in which

was statistically at par with T<sub>2</sub>, T<sub>4</sub>, T<sub>8</sub> whereas maximum number of leaves per plant (16.93) was recorded with the application of T<sub>6</sub>. Increase in plant height might be due to humic acid as it promotes hormonal activity. Foliar spray of humic acid helps in quick absorption of nutrients, which enhances the growth of root and shoot effectively resulting in higher uptake of nutrients. Similar results regarding the effect of humic acid on plant height were also reported by Sankari *et al.* (2015) [13] and Keisam *et al.* (2014) [8] in gladiolus, Gawade *et al.* (2019) [7] in chrysanthemum, Aghera *et al.* (2019) [11] and Pamela and Sudhagar (2019) [10] in tuberose, Sharma *et al.* (2017) [15] in French bean, Paramsivan *et al.* (2015) [12] in brinjal. Similar result of maximum plant height with *panchgavya* was found by Barad *et al.* (2019) [4] in rose, Naik *et al.* (2015) [9] in orchids, Anburani *et al.* (2008) [3] in jasmine in carnation. Presence of growth promoting substances such as GA and Cytokinins, which is present in *panchgavya* might be responsible for the elongation of plant height.

Increase in number of leaves might be due to humic acid which has the optimum C:N ratio which on decomposition releases nitrogen in the form of usable nitrogen ions such as ammonium and nitrates. This is in concurrence with the findings of Sankari *et al.* (2015) [13] and Pansuriya *et al.* (2018) [11] in gladiolus. *Panchgavya* contains gibberellins that cause stem elongation which may not due to increased number of nodes and internodes but results from rapid elongation of internodes due to cell division and cell elongation leading to the production of a greater number of leaves. Results are in accordance with the finding of Senthilanthan *et al.* (2017) in jasmine.

Table 1: Effect of biostimulants on vegetative attributes

Treatments	Plant height (cm) (60 days)	Plant height (cm) (90 days)	Plant height (cm) (120 days)	No. of leaves per plant
T <sub>1</sub> = Humic acid 0.2%	47.59	48.08	48.33	9.93
T <sub>2</sub> = <i>Panchgavya</i> 3%	58.31	58.95	59.20	16.80
T <sub>3</sub> = Vermiwash 3%	54.42	54.88	55.14	14.93
T <sub>4</sub> = <i>Novel organic liquid fertilizer</i> 1%	56.39	56.79	57.02	16.73
T <sub>5</sub> = Sea weed extract 1%	54.67	55.07	55.19	15.07
T <sub>6</sub> = Humic acid 0.2% + <i>Panchgavya</i> 3%	62.83	63.23	63.49	16.93
T <sub>7</sub> = Humic acid 0.2% + Vermiwash 3%	52.02	52.59	52.85	12.07
T <sub>8</sub> = Humic acid 0.2% + <i>Novel organic liquid fertilizer</i> 1%	55.31	55.59	55.63	16.20
T <sub>9</sub> = Humic acid 0.2% + Sea weed extract 1%	53.63	54.33	54.65	12.80
T <sub>10</sub> = Control	42.52	42.54	42.77	8.40
S.E.m.	2.74	2.74	2.67	0.90
C.D. AT 5%	8.14	8.15	7.93	2.69
CV%	8.83	8.76	8.50	11.20

The observations regarding yield attributes are shown in Table 2. Result obtained in the present investigation, indicated that application of the T<sub>6</sub> resulted in maximum number of spikes per plant (2.60), per net plot (42.67) and per hectare (1.58 lakh) which was followed by T<sub>2</sub> and T<sub>4</sub>. The presence of cytokinin in coconut water, a constituent of *panchgavya* might have increased the biomass and flower yield. The results obtained in the current study are in accordance with Sankari *et al.* (2015) [13] and Pansuriya *et al.* (2018) [11] in gladiolus and Bini Sundar *et al.* (2014) [6] in jasmine.

Number of corms per plant, per net plot and per hectare of gladiolus were influenced by biostimulants. The maximum values of number of corms per plant (3.36) per plot (61.67) and per hectare (2.28 lakh) were recorded with T<sub>6</sub> - Humic acid 0.2% + *Panchgavya* 3%. Similarly, maximum values of

number of corms per plant (4.38), per net plot (97.33) and per hectare (3.60 lakh) were recorded with T<sub>6</sub> - Humic acid 0.2% + *Panchgavya* 3%. Increase in corm yield might be due to corms used for planting as reserved food material in the initial stage and photosynthesis in leaves.

Regarding the weight of corms per plant and per plot was also differed significantly and higher value of weight of corms per plant (60.32 g) and per net plot (1146.02 g) was noted in T<sub>6</sub>. The result might be due to increased corm size and production might be due to easy availability of nutrients with the help of humic acid and *Panchgavya* to the plants that increases the biomass of the corms in gladiolus. Similar results were found by Sankari *et al.* (2015) [13], Bashir *et al.* (2016) [5] and Ahmad *et al.* (2013) [2] in gladiolus.

**Table 2:** Effect of biostimulants yield attributes

Treatments	No. of spikes			Number of corms			Number of cormels			Weight of corms (gm)	
	Per plant	Per plot	Per ha (lakh)	Per plant	Per plot	Per ha (lakh)	Per plant	Per plot	Per ha	Per plant	Per plot
T <sub>1</sub>	1.53	29.67	1.10	2.41	44.33	1.64	3.32	67.67	2.51	45.50	614.25
T <sub>2</sub>	2.40	41.67	1.54	2.77	55.00	2.04	4.16	91.33	3.38	57.23	1058.82
T <sub>3</sub>	2.07	35.33	1.31	2.44	47.67	1.77	3.69	73.00	2.70	52.95	820.73
T <sub>4</sub>	2.27	38.00	1.41	2.48	53.33	1.98	4.01	86.00	3.19	56.28	956.82
T <sub>5</sub>	2.13	36.00	1.33	2.48	49.67	1.84	3.71	74.67	2.77	55.24	883.89
T <sub>6</sub>	2.60	42.67	1.58	3.36	61.67	2.28	4.38	97.33	3.60	60.32	1146.02
T <sub>7</sub>	1.67	32.00	1.19	2.28	45.00	1.67	3.45	70.33	2.60	48.39	701.70
T <sub>8</sub>	2.13	37.00	1.37	2.56	52.00	1.93	3.91	84.67	3.14	56.19	927.19
T <sub>9</sub>	1.73	32.33	1.20	2.23	46.33	1.72	3.55	71.10	2.63	50.42	756.25
T <sub>10</sub>	1.40	26.33	0.98	2.18	42.67	1.58	3.18	65.67	2.43	43.94	593.24
S.Em.	0.15	1.81	0.07	0.21	2.46	0.089	0.22	4.47	0.17	3.00	47.86
C.D. at 5%	0.44	5.39	0.20	0.62	7.30	0.27	0.65	13.29	0.49	8.91	142.20
CV%	12.82	8.94	8.94	14.27	8.56	8.56	10.07	9.91	9.91	9.86	9.80

### Conclusion

On the basis of results obtained, it can be concluded that foliar application of Humic acid 0.2% + Panchgavya 3% at 60, 90 and 120 days after planting gives better growth and superior yield in gladiolus.

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