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Effect of biostimulants on flowering qualities 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 at Floriculture Research farm, Navsari Agricultural University, Navsari. Among all the treatments, T_6 - Humic acid 0.2% + *Panchgavya* 3% obtained early 50% spike emergence (60.67 days), least days to harvesting from spike initiation (17.50 days) whereas maximum spike length (84.21 cm), rachis length (55.56 cm), number of florets per spike (10.93) and vase life (9.50 days).

Keywords: Gladiolus, biostimulants, panchgavya, spike, rachis

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 during *Rabi*, 2019 - 2020. 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_1	Humic acid 0.2%
T_2	*Panchgavya* 3%
T_3	Vermiwash 3%
T_4	*Novel* organic liquid nutrient 1%
T_5	Sea weed extract 1%
T_6	Humic acid 0.2% + *Panchgavya* 3%
T_7	Humic acid 0.2% + Vermiwash 3%
T_8	Humic acid 0.2% + *Novel* organic liquid nutrient 1%
T_9	Humic acid 0.2% + Sea weed extract 1%
T_{10}	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.

4. Results and Discussion

The observations regarding flowering attributes are shown in Table 1. Early spike initiation (60.67 days) and harvesting of spike (17.50 days) were found in T_6. Application of humic acid had taken lesser number of days for spike emergence due to the increased synthesis and enhanced activity of cytokynin and auxin in the root tissue. This would have helped in early initiation harvesting of spikes. These results corroborate with the findings of Sankari *et al*. (2015) [7] and in gladiolus and Palanisamy *et al.* in gerbera (2015) [4]. *Panchgavya* reduces juvenile period due to gibberellins and conversion of apical meristem into flowering primodia instead of production of leaves at the determination of juvenile phase, Sendhilanthan *et al.* (2017) [8] in jasmine.

The significantly maximum spike length *i.e.,* 84.21 cm was obtained with the application of T_6, which was statistically at par with T_2 and T_4. Similarly, T_6 was recorded significantly higher in rachis length *i.e.,* 55.56 cm which was at par with T_2, T_4 and T_8. Increased spike length as well as rachis length might be due to the slow release of nutrients from soil resulting in greater uptake of nutrients which might have exerted greater spike and rachis length whereas *Panchgavya* causes rapid internode elongation as a result of increased cell division and cell elongation, Sable *et al*. (2015) [6] in gladiolus. Gibberellic acid promotes vegetative growth and increases the photosynthetic and metabolic activities causing more transport and utilization of photosynthetic products (Dogra *et al*. (2012) [2] in gladiolus). The present findings thus agreed with Naik *et al.* (2015) [3] in orchids and Pamela and Sudhagar (2019) [5] in tuberose.

Significantly maximum number of florets was produced with T_6 (10.93), which was at par with T_2, T_4 and T_8. This might be due to activity of humic acid consisting of active phenolic group that might have inhibited oxidase activity and prolonged persistence of IAA in plants whereas *Panchgavya* includes coconut that contains kinetin which increases the biomass of the plant. Similar results were also obtained by Shrikant and Jawaharlal (2014) in gerbera and Ahmad *et al.* (2013) [1] in gladiolus.

T_6 - Humic acid 0.2% + *Panchgavya* 3% was recorded significantly higher with respect to vase life (9.50 days), which was statistically at par T_2. The beneficial effects of biostimulants on vase life were might be due to the humic acid that imparts resistance to certain phytopathogens. It retained within the tissue might have prevented bacterial accumulation in the tissue during post harvest life and it makes cell membrane more permeable helped in improving the vase life of gladiolus whereas *panchgavya* contains cow ghee that acts as an anti-transpirant and slows down the natural evaporation rate and made cells more turgid. The results of present study are in close conformity with findings of Ahmad *et al.* (2013) [1] in gladiolus.

Table 1: Effect of biostimulants flowering attributes

Treatments	Days to 50% spike initiation	Days to harvesting from spike initiation	Spike length (cm)	Rachis length (cm)	Number of florets per spike	Vase life (days)
T_1 = Humic acid 0.2%	73.67	23.27	62.73	46.42	8.07	7.17
T_2 = *Panchgavya* 3%	61.67	19.80	81.44	53.03	10.60	8.67
T_3 = Vermiwash 3%	65.33	21.30	68.92	48.07	9.27	7.83
T_4 = *Novel* organic liquid nutrient 1%	62.00	20.37	78.51	52.25	10.47	8.17
T_5 = Sea weed extract 1%	64.67	20.87	71.74	49.72	9.47	7.83
T_6 = Humic acid 0.2% + *Panchgavya* 3%	60.67	17.50	84.21	55.56	10.93	9.50
T_7 = Humic acid 0.2% + Vermiwash 3%	72.33	22.70	64.51	47.78	8.93	7.33
T_8 = Humic acid 0.2% + *Novel* organic liquid nutrient 1%	63.67	20.70	73.81	50.51	10.40	8.00
T_9 = Humic acid 0.2% + Sea weed extract 1%	71.33	21.80	66.48	48.14	9.13	7.67
T_{10} = Control	74.33	23.60	57.43	42.88	7.93	7.00
S.Em.	3.23	1.04	2.95	2.07	0.48	0.35
C.D. AT 5%	9.61	3.09	8.75	6.14	1.42	1.03
CV %	8.36	8.51	7.19	7.24	8.69	7.56

5. 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 ravishing flowers with immense quality in gladiolus.

6. References

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