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Economics on enhancing yield through application of biostimulants in gladiolus

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Abstract
A study of the effects of several biostimulants on Gladiolus var. Psittacinus Hybrid was undertaken during Rabi, 2019–2020. Three replications and ten treatments were used in a Randomized Block Design experiment. Total ten treatments were applied thrice at 30, 60 and 120 days after planting among which, T6 (Humic acid 0.2% + Panchgavya 3%), which was the best treatment overall, had the highest net realisation (Rs. 6,34,279 per hectare) and BCR (1.72).

Keywords: Corms, cormels, panchgavya, corms and biostimulants

1. Introduction

The gladiolus, known as the "Queen of bulbous flowers," is cultivated practically everywhere. Gladiolus (*Gladiolus grandiflorus* L.), a plant native to South Africa and Asia Minor, is a member of the Iridaceae family. The popularity of this flower is rising steadily because of its magnificent spikes with lovely florets, brilliant colour that ranges from white to pink to red to purple to yellow to orange to salmon and even green, as well as several bicolors and multicolors. A biostimulant is described as an organic substance and/or microorganism that is used to improve the uptake of organic nutrients, stimulate growth, and improve crop quality or stress tolerance (Saryu Trivedi, 2020[a&b]). Numerous stimulants exist, including panchgavya, jivamrit, humic acid, amritpani, and Novel Organic Liquid Nutrient (enhanced sap from a banana pseudostem). 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 (Zambare *et al*., 2008) [2]. *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. Because seaweed contains a variety of growth regulators, it has been frequently employed as a biostimulant in crop development (Begum *et al*., 2018) [1]. In light of the aforementioned information, a study named "Effect of biostimulants on growth and yield in gladiolus" was conducted.

2. Materials and Methods: At the ASPEE College of Horticulture and Forestry, Floriculture Research Farm, Navsari Agricultural University, an experiment named "Effect of biostimulants on growth and yield in gladiolus" was carried out. The experiment site is located in South Gujarat, which has a tropical climate with a reasonably hot summer, a somewhat chilly winter, and a warm, humid monsoon. In this region, the monsoon typically starts in the second week of June and ends by the end of September. It is not unusual to get pre-monsoon showers in the final week of May or the first week of June. The South West monsoon is responsible for the majority of the precipitation, which mainly falls in the months of July and August. Typically, the winter season begins towards the end of October. These two months are the coldest of the season because they either record the season's lowest temperature in December or January. The temperature begins to rise in February and increases steadily until it reaches its peak in June.

Treatment details

T_1	HA 0.2%	HA: Humic acid PG: Panchgavya VW: Vermiwash NOLN: *Novel* organic liquid nutrient SWE: Sea weed extract
T_2	PG 3%	
T_3	VW 3%	
T_4	NOLN 1%	
T_5	SWE 1%	
T_6	HA 0.2% + PG 3%	
T_7	HA 0.2% + VW 3%	
T_8	HA 0.2% + NOLN 1%	
T_9	HA 0.2% + SWE 1%	
T_{10}	Control	

The experiment's economics were determined by taking into account the going rates for the various inputs and outputs. By taking into account the costs of labour, fertilisers, stimulants, and other auxiliary inputs, the overall cost of production was calculated. Based on the principal yield for each treatment and the going market price, the gross income in terms of Rs. per hectare was calculated. Net revenue was calculated by subtracting cultivation costs from gross income per hectare. Additionally, the benefit cost ratio (BCR) was calculated using the formula below:

$$BCR = \frac{\text{Net realization (Rs. ha}^{-1})}{\text{Total cost of cultivation (Rs. ha}^{-1})}$$

3. Results and Discussion

Cost economics is crucial to the development of any crop since the ultimate goal is to generate the greatest amount of cash from the fewest resources. Table No. 1 contains the information about the costs of various therapies. The statistics clearly show that treatment T6 (humic acid 0.2% + panchgavya 3%), which had the highest income per hectare, and treatment T10, which had the lowest, were the two treatments (Control). However, T6 (Humic acid 0.2% + Panchgavya 3%) had the greatest BCR (1.72) and T10 had the lowest (0.84). (Control).

Table 1: Economics of spikes, corms and cormels production per hectare of gladiolus

Treatments	Yield ha^{-1}			Income (Rs.)			Fixed cost (Rs.)	Variable cost (Rs.)	Total cost (Rs.)	Gross realization (Rs.)	Net realization (Rs.)	BCR
	Number of spikes	Number of corms	Cormels (kg)	Spikes	Corms	Cormels						
T_1	109877	164198	1099	219753	410494	109900	344356	550	344906	366428	373719	1.02
T_2	154321	203704	1118	308642	509259	111800	344356	1530	345886	367408	562293	1.53
T_3	130864	176543	916	261728	441358	91600	344356	510	344866	366388	428298	1.17
T_4	140741	197531	1015	281481	493827	101500	344356	1105	345461	366983	509825	1.39
T_5	133333	183951	982	266667	459877	98200	344356	850	345206	366728	458015	1.25
T_6	158025	228395	1152	316049	570988	115200	344356	2080	346436	367958	634279	1.72
T_7	118519	166667	815	237037	416667	81500	344356	1060	345416	366938	368265	1.00
T_8	137037	192593	870	274074	481481	87000	344356	1655	346011	367533	475022	1.29
T_9	119753	171605	852	239506	429012	85200	344356	1400	345756	367278	386440	1.05
T_{10}	97531	158025	833	195062	395063	83300	344356	0	344356	365878	307546	0.84

4. Conclusion

According to the findings, foliar applications of humic acid 0.2% + Panchgavya 3% at 60, 90, and 120 days after planting result in enhanced growth, quality, and production in gladiolus and the highest net return.

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6. Conflict of Interest

The authors affirm that they do not have any competing claims.

7. Data availability statement

Legal restrictions are imposed on the public sharing of raw data. However, authors have full right to transfer or share the data in raw form upon request subject to either meeting the conditions of the original consents and the original research study. Further, access of data needs to meet whether the user complies with the ethical and legal obligations as data controllers to allow for secondary use of the data outside of the original study.

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