# "THE EFFECT OF ORGANIC MANURES AND BIOFERTILIZERS ON GROWTH, FLOWERING AND YIELD OF GLADIOLUS *(Gladiolus grandiflorus)* cv. PusaSrijana"


## ABSTRACT

The experiment was conducted on "The effect of organic manures and biofertilizers on growth, flowering and yield of gladiolus *(Gladiolus grandiflorus)* cv. PusaSrijana" conducted during the period of October,2021 to March, 2022 at Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom, University of Agriculture, Technology and Sciences, Prayagraj (Uttar Pradesh). The experiment was planned in randomized block design with three replications and eight treatments. The observations were recorded on various growth, flowering and yield contributing characters. Based on the results obtained from the present investigation, it is concluded that the $T_7$(RDF + Vermicompost + Azotobacter @ 5Kg/ha+ PSB @ 5Kg/ha) was found superior followed by $T_6$ (RDF + Vermicompost + Azotobacter @ 4.5Kg/ha+ PSB @ 4.5Kg/ha) and $T_5$(RDF + Vermicompost + Azotobacter @ 4Kg/ha+ PSB @ 4Kg/ha) in growth and flowering with higher yield factors. In this investigation the $T_7$ was found most suitable for cultivation for better yield per hectare of corms, cormels and spike and best returns in terms of economics of the crop with high net returns and Benefit cost ratio.


## INTRODUCTION

The total world area under bulbous crops is around 50,000 ha out of which over 3500 ha is in India (Raj, 2005).Gladiolus stands 4th in the international cut flower trade after rose, carnation andchrysanthemum. The flowers are of various colours.Gladiolus can be cultivated on all types of soil having good structure and drainage.A soil pH between 6 and 7 is ideal; however, a soil with pH ranging from 5 to 7 can also be used for gladiolus cultivation. In soil by adding organic manures and microbial agents make easy uptake of nutrients when crop required comparing to chemical fertilizers (Vanilarasu and Balakrishnamurthy, 2014).The beneficial effect of Azotobacter is attributed to its N fixing capacity (15-30 kg/ha) and ability to produce growth promoting substances like auxins, gibberellins and cytokinins (Azcon and Barea, 1975).Phosphate Solubilizing Bacteria are useful for all the crops i.e., cereals, cash crops, leguminous crops, horticultural crops, vegetables, flowers etc. The effective strain of Phosphate Solubilized Bacteria increased the level of available P□O5 in the soil. With the increase in available P□O5 level, overall plant growth can be increased. In certain condition they also exhibit anti-fungal activities and thereby fungal diseases may be controlled indirectly.VarietyPusaSrijana is a gladiolus hybrid variety released from Indian Agricultural Research Institute, New Delhi and is a cross between Berlew × Heady Wine. PusaSrijana attains

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a height of 103.22 cm having spike length of 85.25 cm, rachis length of 49.55 cm with 16.66 number of florets per spike.

## MATERIAL AND METHODS

### Experimental site

The present investigation "The effect of organic manures and biofertilizers on growth, flowering and yield of Gladiolus *(Gladiolus grandiflorus)* cv. PusaSrijana" was conducted during October,2021-March,2022 at Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom, University of Agriculture, Technology and Sciences, Prayagraj (Uttar Pradesh). All the facilities necessary for cultivation, including labour were made available in the department. Prayagraj is situated at an elevation of 78 meters above sea level at 25.87˚ North latitude and 81.15˚ E longitudes. This region has a sub-tropical climate prevailing in the South-East part of U.P. with both the extremes in temperature, i.e., the winter and the summer. In cold winters, the temperature sometimes is as low as 0˚C in December – January and very hot summer with temperature reaching up to 46˚C in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The average rainfall is around 1013.4 (cm) with maximum concentration during July to September months with occasional showers in winters. The meteorological data for the experimental period collected from Meteorological Observatory at College of Forestry and Environment, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj.

### Chart 1 :Treatment details

| Treatment | Treatment details |
|---|---|
| $T_0$ | RDF only |
| $T_1$ | Vermicompost + azotobacter @2kg/ha + PSB @2kg/ha |
| $T_2$ | Vermicompost + azotobacter @2.5kg/ha + PSB @2.5kg/ha |
| $T_3$ | Vermicompost + azotobacter @3kg/ha + PSB @3kg/ha |
| $T_4$ | Vermicompost + azotobacter @3.5kg/ha + PSB @3.5kg/ha |
| $T_5$ | Vermicompost + azotobacter @4kg/ha + PSB @4kg/ha |
| $T_6$ | Vermicompost+ azotobacter @4.5kg/ha + PSB @4.5kg/ha |
| $T_7$ | Vermicompost +azotobacter @5kg/ha + PSB @5kg/ha |

* RDF(150kg : 120kg : 120kg per ha) is common in all the treatments with Vermicompost (8t/ha)

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**Table 1 Growth parameters**:

| Treatments | Sprouting (no of days) | Sprouting % | Days to 7 leaf stage | Plant height 30 days (cm) | Plant height 45 days (cm) | Plant height 75 days (cm) |
|---|---|---|---|---|---|---|
| $T_0$ | 14.22 | 85 | 63.53 | 33.56 | 52.53 | 76.06 |
| $T_1$ | 14.17 | 88.39 | 58.16 | 38.63 | 59.96 | 80.36 |
| $T_2$ | 13.87 | 88.72 | 57.33 | 43.63 | 66.33 | 83.36 |
| $T_3$ | 13.07 | 90.13 | 56.65 | 41.7 | 67.16 | 85.86 |
| $T_4$ | 11.59 | 91.84 | 56.26 | 45.13 | 67.53 | 85.86 |
| $T_5$ | 11.26 | 93.98 | 51.14 | 46.13 | 70.16 | 94.83 |
| $T_6$ | 9.2 | 96.14 | 48.4 | 46.63 | 72.2 | 96.33 |
| $T_7$ | 7 | 97.14 | 44.76 | 52.86 | 78.3 | 103.23 |
| SEM± | 0.31 | 0.43 | 1.02 | 2.61 | 2.96 | 2.66 |
| CD (5%) | 0.92 | 1.26 | 3.00 | 7.65 | 8.65 | 7.77 |
| CV | 4.60 | 0.82 | 3.25 | 10.4 | 7.67 | 5.21 |

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**Table2 Floral parameters**:

| Treatments | 50% flowering | No. of florets/spike | Diameter of 1st flower(cm) | Diameter of 2nd flower(cm) | Spike length (cm) | Spike weight (gm) | Shelf life in days |
|---|---|---|---|---|---|---|---|
| $T_0$ | 121.62 | 7.58 | 8.07 | 7.43 | 64.4 | 60.16 | 5.66 |
| $T_1$ | 121 | 10.1 | 8.17 | 7.56 | 66.76 | 62.4 | 6.44 |
| $T_2$ | 120.66 | 13.95 | 8.37 | 8 | 75.76 | 63.13 | 7.28 |
| $T_3$ | 116 | 10.89 | 9.43 | 8.53 | 77.86 | 69.23 | 9.32 |
| $T_4$ | 114.66 | 11.69 | 10.2 | 8.66 | 76.96 | 64.36 | 10.14 |
| $T_5$ | 113.36 | 12.52 | 10.53 | 9.13 | 81.46 | 75.8 | 12.83 |
| $T_6$ | 112.33 | 13.79 | 10.77 | 9.4 | 84.26 | 83.73 | 14.29 |
| $T_7$ | 108 | 15.39 | 11.13 | 9.7 | 84.96 | 84.16 | 14.79 |
| SEM± | 0.51 | 0.28 | 0.53 | 0.39 | 3.44 | 4.51 | 0.20 |
| CD (5%) | 1.48 | 0.82 | 1.56 | 1.13 | 10.06 | 13.20 | 0.59 |
| CV | 0.75 | 4.06 | 9.66 | 7.80 | 7.78 | 11.11 | 3.47 |

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**Table 3 Yield attributing characters**:

| Treatments | No. corms/plant | Weight of corms/plant (gm) | No. of cormels/plant | Weight of cormels/plant (gm) |
|---|---|---|---|---|
| $T_0$ | 1.33 | 30.4 | 19.69 | 12.65 |
| $T_1$ | 1.77 | 31.71 | 21.08 | 12.71 |
| $T_2$ | 2.2 | 33.48 | 21.85 | 15.00 |
| $T_3$ | 2.23 | 44.05 | 22.77 | 16.05 |
| $T_4$ | 2.42 | 46.00 | 24.12 | 17.25 |
| $T_5$ | 2.46 | 46.95 | 25.19 | 18.75 |
| $T_6$ | 2.79 | 49.32 | 26.21 | 19.80 |
| $T_7$ | 3.00 | 52.00 | 26.45 | 21.32 |
| SEM± | 0.13 | 0.39 | 0.19 | 0.23 |
| CD (5%) | 0.38 | 1.15 | 0.57 | 0.66 |
| CV | 9.92 | 1.68 | 1.44 | 2.35 |

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**Table 4 Yield parameters**:

| Treatment | No. of corms/ha | Yield of cormels (q/ha) | No. of spikes/ha |
|---|---|---|---|
| $T_0$ | 126112.5 | 11.94 | 94444.35 |
| $T_1$ | 174601 | 12.48 | 98211.01 |
| $T_2$ | 217138.1 | 14.79 | 98585.09 |
| $T_3$ | 223784 | 16.08 | 100151.8 |
| $T_4$ | 247689.4 | 17.61 | 102048 |
| $T_5$ | 257816.7 | 19.59 | 104422.1 |
| $T_6$ | 298072.8 | 21.15 | 106822.1 |
| $T_7$ | 324293.2 | 23.02 | 107940.6 |
| SEM± | 13009.75 | 0.25 | 479.62 |
| CD (5%) | 38060.32 | 0.73 | 1403.14 |
| CV | 9.86 | 2.52 | 0.82 |

## Results and discussion:

### Growth parameters:

In terms of number of days to sprouting, themaximum days to sprouting (14.22) was recorded in the treatment $T_0$ and minimum days to sprouting (7.0) was found for the treatment $T_7$. In terms of sprouting % the Maximum sprouting% (97.14) was recorded in the treatment $T_7$ and minimum sprouting% (85) was found for the treatment $T_0$. In terms of 7 leaf stage the Maximum days taken to 7 leaf stage (63.53) was recorded in the treatment $T_0$ and minimum days taken to 7 leaf stage (44.76) was found for the treatment $T_7$. In terms of plant height recorded (30DAS) highest was recorded in $T_7$ (52.86cm) whereas lowest was recorded in treatment $T_0$ (33.56 cm). Plant height (45 DAS) was recorded highest in $T_7$ (78.3cm) whereas lowest in $T_0$ (52.53 cm). Plant height (75DAS) highest was recorded in$T_7$ (103.23cm) whereas lowest in $T_0$ (76.06cm) respectively.

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**Floral parameters:**

In terms of days to 50 % flowering the maximum days to 50% flowering (121.62) was recorded in the treatment $T_0$and minimum days (108) was found for the treatment $T_7$. In terms ofno of florets/spike the maximum no of florets/spike (15.39) was recorded in the treatment $T_7$ and minimum florets (7.58) was found for the treatment $T_0$. In terms of diameter of $1^{st}$& $2^{nd}$ flower the maximum diameter (11.13cm & 9.7cm) was recorded in the treatment $T_7$ and minimum diameter of $1^{st}$& $2^{nd}$ flower (8.07cm & 7.43 cm) was found for the treatment $T_0$. In terms of spike length the maximum (84.96cm) was recorded in the treatment $T_7$ and minimum length (64.4cm) was found for the treatment $T_0$. In terms of spike weight the maximum (84.16gm) was recorded in the treatment $T_7$ and minimum weight(60.16gm) was found for the treatment $T_0$respectively.

**Shelf life:**

In terms of shelf lifemaximum shelf life(14.79 days) was recorded in the treatment $T_7$ and minimum shelf life(5.66 days) was found for the treatment $T_0$ respectively.

**Yield attributing characters:**

In terms of no of corms/plant maximum (3) was recorded in the treatment $T_7$ and minimum no. of corms/plant(1.33) was found for the treatment $T_0$. In terms of weight of corms/plant maximum weight of corms (52.0 gm) was recorded in the treatment $T_7$ and minimum weight of corms/plant(30.4 gm) was found for the treatment $T_0$. In terms of no. of cormels/plant maximum (26.45) was recorded in the treatment $T_7$ and minimum no. of cormels/plant(19.69) was found for the treatment $T_0$. In terms of weight of cormels/plant maximum (21.32 gm) was recorded in the treatment $T_7$ and minimum weight of cormels/plant(12.65 gm) was found for the treatment $T_0$ respectively.

**Yield parameters:**

In terms of no. of corms/hectare maximum (324293.2) was recorded in the treatment $T_7$ and minimum no. of corms/hectare (126112.5) was found for the treatment $T_0$. In terms of yield of cormels (q/ha) maximum (23.02 q/ha) was recorded in the treatment $T_7$ and minimum yield of cormels (q/ha)(11.94 q/ha) was found for the treatment $T_0$. In terms of no. of spikes/hectare

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(107940.6) was recorded in the treatment $T_7$ and minimum no. of spikes/hectare (94444.35) was found for the treatment $T_0$ respectively.

**Economics:**

Economically best treatment was $T_7$, gave the highest net return up to 2026917.00 Rs/ha as well as B:C ratio 4.37, and $T_0$ lowest net return was at 864101.00 Rs/ha as well as B:C ratio 2.43.

**Conclusion:**

In this study, $T_7$ was found superior combination in days to sprouting,50% sprouting, days taken to 7 leaf stage, maximum plant height (30,45,75DAS), 50% flowering, florets/spike, flower diameter, length & weight of spike, shelf life, no of corms, weight of corms, no of cormels, weight of cormels with high net return and B:C ratio. From this it can be concluded that the $T_7$, was the most promising treatment amongst all the other treatments.

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