Original Research Article

Effect oOf NPK AndAnd Nano Fertilizers OnOn Plant Growth, Yield AndAnd Quality OfOf Gladiolus *(Gladiolus Grandiflorus L.)*

ABSTRACT:

The current experiment was conducted in the Research Field of the Department of Horticulture, SHUATS, Prayagraj, from November 2021 to March 2022. The goal of the experiment, which used a Randomized Block Design (RBD) with eight treatments and three replications, was to determine which variety will grow best in Prayagraj agroclimatic conditions. It is determined from the current experimental results that the eight treatments in the American beauty variety under consideration demonstrated substantial diversity in all the parameters noted. to investigate "The Effect of NPK and Nano Fertilizer on Growth, Yield, and Quality of Gladiolus (*Gladiolus grandiflorus* L)". The best growth (116.22), number of leaves (14.0), number of shoots 50% sprouting (19.73 cm), spike length (72.33 cm), and first spike emergence were all recorded (86.77 cm), days it took for the first flower to bloom (118.44 cm) 50% florets (106.88 cm), spike weight (12.77 cm), and first and second floret flower diameter (6.27, 6.01 cm) Corms per plant (2.33 cm), corms per plot (20.31 cm), vase life (11.5 cm), spikes (1.83 cm), and florets (number of) (12.77cm) compared to other treatments, T5 nano iron 0.25g/l offered the best results in terms of gladiolus growth, yield, and quality. The highest T5 nano iron 0.25g/l net income was (1563017) Rs./Ha, the highest gross return was (2187165) Rs./Ha, and the highest BC ratio was (1:2.5).

Key words: Gladiolus, T5 nano iron, 0.25g/l, treatment effectiveness

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1.INTRODUCTION

The Latin word "Gladius," which means sword, is where the name "gladiolus" originates. It goes by the names "com flag" or "sword lily." Due to the presence of Gladiolus Illyricum as a wild weed in com fields, com flag has another name throughout Europe. came up with the term "gladiolus" to characterize the leaves' sword-like design. The gladiolus, or Gladiolus grandiflorus, is a well-known flowering plant from the Iridaceae family and subfamily Ixodidae. There are roughly 180 species in the genus Gladiolus, and there are more than 10,000 cultivars, of which about 20 are bred for cut flowers on a commercial scale. Many others are also employed in gardens, exhibitions, and other spaces as seasonal flowering plants.

It is found throughout Africa and Mediterranean region with its greatest concentration in South Africa. Gladiolus ({*Gladiolus grandiflorus*) is said to be the “Queen of bulbous plant” because the gladiolus is top in the list of its beauty, glamour keeping quality various ~~colour~~color like white, crimson, pink, orange, salmon, red, purple cream and rose etc. shades and shapes.

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Gladiolus is grown under varying climatic condition. It is cultivated during rainy and winter season for obtaining good quality cut flowers and corms of gladiolus. It grows well in good drained sandy loam soil, with sufficient organic matter. ~~It's~~Its cultivation ~~start~~starts from June-December. ~~Generally~~Generally, gladiolus is planted from corms. The plant grows to a height of about 80 to 90 cm. The flowers are irregular and funnel shaped. They are boom on branched spikes. **Ilapogu, V. 2012.[1].** The plant start flowering from 60 to 90 days after planting of conns. The spikes remain fresh for about 10 to 12 days depending upon the season. The gladiolus cut flowers stands well for transportation to long-distance. Hence, its cultivation for cut flowers can be taken up in far off areas.

Iron NPs due to their nano size as well as magnetic characteristics are considered as special nano fertilizers. The bio-compatibility as well as interaction between plants and the Fe nanoparticles had ~~lead~~led to a great deal of attentions According to the records, the Fe nanoparticles effects on plants are of two kinds like concentrations in lower doses of Fe NPs were found to have positive effects on the growth and physiology of crop plants, whereas high concentrations of Fe NPs application ~~seems~~seem have resulted in toxic effects on plants (harmful). **Tayade et al. (2018).**[2]. Fe nanoparticles were reported with nutrient absorption promotion as well as photosynthetic efficiency enhancement whereas the information on anatomical as well as ultra-structural responses at the cellular level of plants under Fe NPs application is still lacking When Fe nanoparticles are absorbed by plants, their absorption, distribution, and accumulation have also attracted significantly higher interest when used as fertilizers in agricultural.

The higher rate of phosphorus and potassium tended to improve the flower quality, cormel growth and corm production. The application of potassium plays vital role in regulating the opening and closing stomata and water retention **Hembrom , ~~R.~~ and Singh , ~~A.~~[3]**. Potassium has works catalyst of many biosynthetic reactions of the photosynthesis and there by assumed to affect the biomass production. **Barman D, Rajni K, Ram P.[4].** The deficiency of potassium in gladiolus reduces the number of ~~floret~~florets in ~~there~~their spike, shortens the spikes length and delay the flowering. Lack of potassium causes the less flowering of gladiolus

2. MATERIALS AND METHODS

The field experiment entitled **"Effect of NPK and Nano fertilizers on the growth, yield and quality of gladiolus** *(Gladiolus grandiflorus* L.*)*" cv.-American Beauty" was carried out during the year 2021-2022 at Sam Higginbottom University of Agriculture Technology ~~And~~and Sciences Allahabad.

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2.1 Geographical location of the experimental site:

The experimental site is being located at a latitude of 25.41º North and longitude of 81.84 º East, with an altitude of 98 meters above the mean sea level (MSL).

2.2 Climatic conditions in the experimental area:

The area of Prayagraj comes under humid sub-tropical climate, which experiences warm humid monsoon, hot dry summer and cold dry winter. The annual mean temperature is 26.1ºC while monthly mean temperatures are 18-29ºC. The daily average maximum temperature is about 22ºC and the minimum temperature is 9ºC. The average annual rainfall received is 1042.2 mm. At this location, the temperature reaches upto 46ºC-48ºC and the minimum temperature recorded was 4ºC-5ºC. The relative humidity ranges in this location ranges between 20-94%.~~,~~ The meteorological data (October2021-March2022) with respective to total rainfall, maximum and minimum temperature, relative humidity.

2.3 The experimental design and parameters determined

21. Experimental layout

Eight treatments, each replicated three times, were used in the Randomized block design (RBD) that was used to lay out the trial. Acquisition of Varieties: Only American beauty varieties were employed for this experiment. bought from the Flora Nursery in Bareilly, Uttar Pradesh.

2.3.2 Growth Conditions

Plant height (in centimeters) and the number of leaves were measured at 30, 60~~,~~ and 90 days following transplanting as growth indicators. Number of shoots per plant, days needed for 50% of them to sprout, Spike size (cm).~~,~~

2.3.3 Flowering conditions.

Days needed for the first spike to appear (d), 50% of the florets, and the size of the first and second florets (cm)

2.4 Statistical investigation

Separate statistical analyses of the data and outcomes were performed using the analysis of variance method (ANOVA). The least significant difference test was used to compare the treatment mean differences at 5% probability levels.

RESULTS AND DISCUSSION

3.1 Growth Parameter

Significantly, the maximum plant height was recorded in the plant height in (Table.1). The Maximum Plant height at 90 days (116.22 cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (112.55cm) and the minimum Plant Height at 90 days (94.55cm) was recorded in. T_2 (Nano Iron 0.10g/l). Similar results were found in plants **(Ghafari and Razmjoo,2015).[5].**

Significantly, the maximum number of leaves was recorded in the (Table.1). The Maximum no.of leaves at 90 days (10.22cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (8.66 cm) and the minimum no.of leaves at 90 days (6.11 cm) was recorded in T_2 (Nano Iron 0.10g/l). **(Pirzad and Shokrani, 2012).[6]**

Significantly, the maximum number of shoots was recorded in the (Table.1),. The Maximum no.of shoots at 90 days (2.44cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (2.1cm) and the minimum no.of shoots at 90 days (1.00 cm) was recorded in T_2 (Nano Iron 0.10g/l). Similar results were found in **Memon, S. A., Bangulzai.[7].** Effect of humic acid and iron sulphate on growth and yield of Zinnia (*Zinnia elegans)*. *Journal of Agriculture Technology,* **10**(6):1517-1529.

Significantly, the maximum number of days for 50% sprouting was recorded in the , at 90 DAT. The Maximum no.of days for 50% sprouting at 90 days (19.73 cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (20.55cm) and the minimum no.of days for 50% sprouting at 90 days (25.00 cm) was recorded in T_2 (Nano Iron 0.10g/l). Similar results were found in in **Askary, M., Amirjani, M. R., and Saberi, T. 2017[8].**

Significantly, the maximum length of spike was recorded in the, at 90 DAT. The Maximum length of spike at 90 days (72.33 cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (66.22 cm) and the minimum length of spike at 90 days (48.33 cm) was recorded in T_2 (Nano Iron 0.10g/l). in **Saberi, T. 2017 [9].**

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3.2 Flowering parameters

Significantly, the maximum first spike emergence was recorded in the , at 90 DAT. The Maximum first spike emergence at 90 days (86.77 cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (84.66 cm) and the minimum first spike emergence at 90 days (76.8 cm) was recorded in T_2 (Nano Iron 0.10g/l) Similar results were found in. **Tayade *et al.* (2018).**

Significantly, the maximum number of days for 50% florets was recorded in the , at 90 DAT. The Maximum no.of days for 50% florets at 90 days (106.88cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (108.55cm) and the minimum no.of days for 50% florets at 90 days (115.00 cm) was recorded in T_2 (Nano Iron 0.10g/l). 7. Similar results were found in **Ilapogu, V. 2012..**

Significantly, the maximum flower diameter of first and second floret was recorded in the, at 90 DAT. The Maximum flower diameter of first and second floret at 90 days (6.27, 6.01 cm) was recorded in the T_5 (Nano Iron 0.25g/l) followed by T_6 (Nano Iron 0.30g/l) with (6.04, 6.01 cm) and the minimum flower diameter of first and second floret at 90 days (5.31, 5.15 cm) was recorded in T_2 (Nano Iron 0.10g/l). Similar results were found in **Shokrani (2012).[10].**

Table 1. Growth performance parameters of different treatments, at different days after planting (DAT)

Treatment Details		Plant height (cm)			No. of leaves			No. of shoots per plant	Days to 50% sprouting	Spike length (cm)
		30 DAP	**60 DAP**	**90 DAP**	**30 DAP**	**60 DAP**	**90 DAP**	**90DAP**	**90 DAP**	**90 DAP**
T_1	NPK 120:150:150	71.66	101.2	37.97	2.77	6.11	9.55	1.11	21.77	55.88
T_2	Nano Iron 0.10g/l	62.88	94.55	33.22	2.33	6.44	7.62	1.00	25.00	48.33
T_3	Nano Iron 0.15g/l	68.77	97.11	34.94	2.66	6.88	8	1.33	24.22	50.44
T_4	Nano Iron 0.20g/l	70.11	103.4	35.66	3.11	7.22	9.22	1.33	22.77	52.66
T_5	Nano Iron 0.25g/l	82.55	116.2	41.77	4.55	10.22	14	2.44	19.73	72.33
T_6	Nano Iron 0.30g/l	77.77	112.5	40.66	4.22	8.66	12.55	1.88	20.55	66.22
T_7	Nano Iron 0.35g/l	74.88	107.6	36.11	3.44	8.33	11.27	1.55	20.77	64.00
T_8	Nano Iron 0.40g/l	73.55	100.33	35.77	3.44	7.44	10.61	1.44	21.00	59.00
	F-Test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
	SED(≠)	1.65	3.88	3.43	0.16	0.43	0.758	0.166	0.75	7.180
	CD@5%	3.37	7.93	7.02	0.34	0.88	1.54	0.34	1.55	14.67
	CV	5.45	6.53	4.04	6.24	6.94	8.96	13.48	4.22	15.004

Table. 2 Flowering parameters performance of different treatments of Gladiolus

Treatment Details		Days taken for first spike emergency	50% Florets	Floret Diameter (First Floret)	Floret Diameter (Second Floret)
T_1	NPK 120:150:150	81.44	111.66	5.66	5.243
T_2	Nano Iron 0.10g/l	82.22	115.00	5.31	5.15
T_3	Nano Iron 0.15g/l	86.77	112.8	5.47	5.611
T_4	Nano Iron 0.20g/l	84.66	112.5	5.65	5.38
T_5	Nano Iron 0.25g/l	76.8	106.88	6.27	6.01
T_6	Nano Iron 0.30g/l	78.22	108.55	6.04	5.78
T_7	Nano Iron 0.35g/l	79.33	109.66	5.86	5.41
T_8	Nano Iron 0.40g/l	80.55	111.00	5.68	5.54
	F-Test	**S**	**S**	**S**	**S**
	SEd (±)	1.78	0.753	0.14	0.199
	CD@5%	3.64	1.53	0.3	0.40
	CV	2.68	0.831	3.12	4.43

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The manuscript lacks a scientific discussion comparing published research; therefore, I suggest incorporating the following paragraphs that would improve the scientific quality of the manuscript.

I continue to add a paragraph that summarizes the importance, usefulness and social relevance, contemporary of the study, specifically pointing out the Impact, Benefit and Social Projection, something like this (for example):

The quality of gladiolus flower depends on the height of the plant, the length of the inflorescence and rachis, number and size of flower. The management of edaphic fertilization with nitrogen (N), phosphorus (P) and potassium (K) is essential to comply with these quality parameters (Olivares, 2016) **[11]**. In addition, some studies indicate that the application of nutrients reduces the risk of diseases (Olivares et al. 2021; Olivares et al. 2021) **[12,13]**. In gladiolus, the nutrient requirement in the early stages of growth is low, since the plant takes advantage of the reserves accumulated in the corm. The highest nutritional requirement occurs in the V3 stage, which includes from the growth phase of the stem and leaves, until the flower is cut (Ocampo-Juárez et al. 2012) **[14]**. N is an essential nutrient for the growth and development of the plant, as well as in its floral differentiation (Olivares et al. 2020) **[15]**. P helps cell division, as well as in the formation and development of roots and stems (Olivares et al. 2022) **[16]**. K improves flower quality and strengthens stems (Olivares et al. 2022) **[17]**. Ocampo-Juarez et al. (2012) **[14]** found that, in the greenhouse, height, number of leaves, leaf length and inflorescence length of gladiolus increased with the application of N, P and K (10, 10 and 5 g pot^{-1}).

Woodson and Boodle (1983) **[18]** in chrysanthemum mention that it is necessary to supply high levels of N during the first seven weeks of growth, otherwise, the quality of the flower is negatively affected and any subsequent addition does not allow the recovery of the plants. Gladiolus producers as well as several producers of other items, in order to achieve quality plants, apply fertilizers empirically, without knowing the most appropriate dose of N, P and K according to the genotype and edaphic conditions of the region (Olivares and Hernández, 2020; Olivares et al. 2020) **[19,20]**.

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4. Conclusion

From the research conducted, it is concluded that among the different treatments combination as planting material gave the best performance in terms of vegetative parameter, floral parameter, yield parameter and quality parameter gave the best result in **T nano iron 0.25g/l** as compared to other treatments in Terms of growth, yield and quality of gladiolus recorded highest BC ratio (1:2.5) in **T nano iron 0.25g/l**

REFERENCE

I suggest the authors update the bibliography, therefore I suggest adding recent references which address the issue in question. Suggested citations are for genuine scientific reasons that emphasize the current topic of study in context.

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