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Effect of biofertilizers with reduced doses of nitrogen on growth and flowering of gladiolus

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ABSTRACT

An experiment entitled "Effect of biofertilizers with reduced doses of nitrogen on growth and flowering of gladiolus" was conducted during 2005-06 at the field of Floriculture Nursery Unit, Central Research Station, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Results obtained in experiment suggested that use of biofertilizers with reduced doses of nitrogen significantly influenced the vegetative growth and flowering of gladiolus. It was maximum under reduced dose of nitrogenous fertilizer incombination of biofertilizers 75%N+ 100% PK (375: 200: 200kg NPK ha^{-1}) + *Azotobacter* + *Azospirillum* and it was found at par with 100% NPK (500:200:200 kg NPK ha^{-1}) *Azotobacter* + *Azospirillum.*

Key words :

INTRODUCTION

Gladiolus (*Gladiolus* sp.) is herbaceous plant belonging to family Iridaceae. It is one of the most important bulbous floral crop grown for its magnificent spike and useful both as cut flower and garden display. For obtaining good quality flowers, nutrition plays an important role and preferably nitrogen and phosphorus has been found more effective in improving vegetative growth of many flowering plants as reported by Bankar and Mukhopadhyay (1985). Indiscriminate use of chemical fertilizers has caused serious damage to the soil rendering them, often times, saline and less suitable for cultivation. On the other hand, biofertilizers offer an economically attractive and ecologically sound mean of improving quality and quantity of internal sources. Biofertilizers are less expensive and improve crop growth and quality of crops by production of plant hormones. Hence, the present study was undertaken to study the effect of biofertilizers on growth and flowering of gladiolus.

MATERIALS AND METHODS

The experiment was conducted at Floriculture Nursery, Parks and Garden Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2005-06. The trial was laid out in Randomized Block Design with thirteen treatments replicated thrice. Treatments were undertaken by using *Azotobacter* and *Azospirillum* with reduced doses of nitrogen. Preplanning treatment of application of biofertilizers to corms was given 15 minutes before sowing and kept in shade. Corms selected for planting were about 25-30g in weight were planted in flat bed giving spacing 30 x 30cm and gross plot was 2.10 x 2.10m^2 accommodating 49 plants. One third dose of nitrogen as per treatments and the complete dose of phosphorus and potash was given at the time of planting. Remaining two third dose of nitrogen was given at two leaf stage and four leaf stage of the crop. Five plants were randomly selected from each treatment and observations regarding growth and flowering were recorded. All package of practices were followed during conduction of trial.

RESULTS AND DISCUSSION

The data in respect of growth and flowering attributes were record and presented in Table 1.

The Days required for sprouting of corms:

It is revealed from data presented in Table 1 that there were non-significant differences among the treatments in case of sprouting of corms. Non significant results might be due to presence of store food in corms, which resulted near about in equal sprouting.

Number of leaves per plant:

The maximum number of leaves per plant 21.00 were recorded under treatment T_3 (100% NPK + *Azotobacter* + *Azospirillium*) followed by reduced dose of nitrogen treatment T_6 (75% N + 100% PK + *Azotobacter* + *Azospirillum*) *i.e.* 20.67 leaves and these treatments were at par with each other. The minimum number of leaves 16.33 were observed under the control treatment T_{13} (0% RDF). Also the increased number of leaves were observed by alone application of *Azotobacter* (T_{10}), *Azospirillum* (T_{11}) and in combination (T_{12}) without N, as compared to Control treatment T_{13} (0% RDF). Increase in number of leaves particularly may be due to the production of more nitrogen by *Azotobacter* and

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Azospirillum continuously through out the growth period resulting into abundant vegetative growth. Similar results were observed by Deshmukh (1998) in gaillardia who stated that all the growth parameters showed positive effect with application of *Azotobacter.* Kaloti (1998) in aster concluded that number of leaves were maximum under the *Azotobacter* treatment as compare to uninoculated .

Height of plant (cm) :

Application of 100% NPK + *Azotobacter* + *Azospiirillum* (T_3) and 75% N + 100% PK + *Azotobacter* + *Azospirillium* (T_6) were found more effective for increasing plant height *i.e.* 57.67cm and 57.12 cm, respectively. The minimum plant height (49.17cm) was recorded under control treatment T_{13} (0% RDF). Addition of *Azotobacter* and *Azospirillum* with nitrogen resulted in more N accumulation in soil, where plants may have absorbed more N which resulted into more plant height. Similar results were recorded by Chandrikapure (1998) in marigold, Deshmukh (1998) in Gaillardia and Prabhat Kumar *et al*. (2003) in China aster.

Days required for emergence of spike:

The early emergence of spike 63 days was observed under the Control treatment T_{13} (0% RDF). The maximum days required for spike emergence *i.e.* 69.99 days was under treatment T_3 (100% NPK + *Azotobacter* + *Azospirillum*) followed by T_6 (75% N + 100% PK + *Azotobacter* + *Azospirillum*) *i.e.* 68.99 days (Table 1). It is also observed that more number of days required for emergence of spike where biofertilizers alone (T_{11} and T_{10}) and or incombination (T_{12}) were applied as compared to Control treatment T_{13} (0% RDF). This may be due to the fact that application of biofertilizes alone and incombination of in organic fertilizers supply the nutrients to the plants which prolonged the vegetative growth and spike emergence. These results are similar with Bankar and Mukhopadhyay (1985) who reported that increased in number of days for spike emergence with increased dose of fertilizers in tuberose.

Days required for opening of first pair of florets on spike and 50% flowering:

The data presented in Table 1 revealed that the early opening of first pair of florets (73.07 days) and fifty per cent flowering (77.01 days) was recorded in control treatment T_{13} (0% RDF). The late opening of first pair of florets (78.84 days) and 50 % flowering

Table 1 : Effect of biofertilizers with reduced doses of nitrogen on growth and flowering of gladilous

	Treatment details	Days required for sprouting of corms	Number of leaves plant^{-1}	Plant height (cm)	Days required for spike emergence	Days required for opening of first floret	Days required for 50% flowering.
T_1	500kg N ha^{-1} + *Azotobacter*	6.00	19.55	55.14	67.34	75.63	80.54
T_2	500kg N ha^{-1} + *Azospirillum*	6.00	19.57	55.34	67.67	76.67	80.54
T_3	500kg N ha^{-1} + *Azotobacter* + *Azospirillum*	5.34	21.00	57.67	69.99	78.84	83.76
T_4	375kg N ha^{-1} + *Azotobacter*	6.34	19.54	54.76	67.33	76.59	80.71
T_5	375kg N ha^{-1} + *Azospirillum*	6.00	19.55	54.89	67.67	76.61	81.18
T_6	375kg N ha^{-1} + *Azotobacter* + *Azospirillum*	5.67	20.67	57.12	68.99	78.34	83.34
T_7	250kg N ha^{-1} + *Azotobacter*	6.34	18.55	52.81	65.98	75.41	79.29
T_8	250kg N ha^{-1} + *Azospirillum*	6.00	18.57	52.84	65.99	75.44	79.31
T_9	250kg N ha^{-1} + *Azotobacter* + *Azospirillum*	6.00	18.63	52.87	65.99	75.47	79.34
T_{10}	0kg N ha^{-1} + *Azotobacter*	6.67	17.57	50.97	64.34	74.19	78.13
T_{11}	0kg N ha^{-1} + *Azospirillum*	6.34	17.61	50.99	64.34	74.21	78.15
T_{12}	0kg N ha^{-1} + *Azotobacter* + *Azospirillum*	6.34	17.63	51.02	64.37	74.27	78.17
T_{13}	Control (0% RDF)	7.34	16.33	49.17	63.00	73.07	77.01
F Test		N.S.	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. ±		0.526	0.321	0.639	0.370	0.395	0.329
C.D. (P=0.05)		-	0.9	1.79	1.04	1.11	1.10

500 kg N ha^{-1} (100% recommended dose), 375kg N (75% N) and 250kg N (50% N) common dose of P and K (200:200kg ha^{-1}) was applied to all the treatments except control
NS-Non significant

(83.76days) in treatment T_3 (100% NPK + *Azotobacter* + *Azospirillum*) followed by T_6 (75% N + 100% NP + *Azotobacter* + *Azospirillum*) *i.e.* 78.34 and 83.34 days, respectively. The above results are due to the fact that plants prolonged the vegetative growth and delay flowering. Similar results were recorded by Pandhre (2003) in tuberose and Gayithri *et al.* (2004) in statice.

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