

# **Scientific studies on effective application of some important essential elements Nitrogen (N), Phosphorus (P) and Zinc (Zn) Nutritional values on spike and Floret development in gladiolus crop**

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**ABSTRACT:** Gladiolus is the second most popular flower in the world, specially from the commercial point of view. It has great economic value and wide market in world, however the yield, quality of flower and year round supply have not achieved up to the mark. There is a great scope of establishing a commercial production of corm and cormels. Gladiolus (*Gladiolus grandiflorus* L.) cv. Eurovision was studied in respect of N, P, Zn nutrition for spike growth and development and florets number at D.G. College, Kanpur and Prakrati Bharti, Lucknow during 2006-07 and 2007-08. Single application of N, P, Zn, N<sub>2</sub>, P<sub>2</sub>, Zn<sub>2</sub> produced 36.85, 32.86, 32.17 cm and 35.73, 32.84, 32.36 cm spike length during 2006-07 and 2007-08, respectively. Combined treatments of N<sub>2</sub>xP<sub>2</sub>, N<sub>2</sub>xZn<sub>2</sub> revealed considerable effects for spike length. Application of N<sub>2</sub>xP<sub>2</sub>xZn<sub>2</sub> treatment showed best effect with maximum spike length 47.16 and 48.26 cm in 2006-07 and 2007-08, respectively. Application of N, P, Zn treatments were found to have favorable response to number of florets/spike in gladiolus.

**KEYWORDS :** Gladiolus, Eurovision, Nutrients, Spike, Floret.



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## I. INTRODUCTION

Gladiolus occupies a special rank in flowering bulbous crops (Basu and Bose, 1970; Jakhar 1993). In irridaceae family it is known as "Queen of flowers" and holds position in Indian floriculture industry (Hegde, 2009; Chadha, 1993). Gladiolus botanically known as *Gladiolus hybridus* Hort. The long flower spike bears an economic and aesthetic value for its beauty and excellent elegance (Jankiram, 2009; Sindhu and Kumar 2009). Nutrient elements – Nitrogen and phosphorus alongwith micro nutrients have a special role for production of healthy spike with quality flowers (Sindhu and Arora, 1989; Dadlani, 1996). It has great potential industry for export for earning income (Prasad *et al.*, 1998; Swarup, 1993). The herbaceous plant sprouts from axillary buds of an underground structure, the corm, a condensed vertical root stock covered with dried leaf base.

Zinc functions as an activator of certain enzymes which concerns protein metholism (Kumar, 2003). In recent researches Zn deficiency in soils has been reported in Northern region and its application was observed useful (Kumar, 2003). With this view experiments were conducted for growth and development of spike and florets. Nitrogen is the one of the most important nutrients producing growth and yield responses in gladiolus. The quantity of Phosphorus required by gladiolus is about one-tenth of the nitrogen expressed in terms of foliar analysis. Foliar application with NPK in addition to soil application significantly affects vegetative growth and floral Characters (Ray *et al.*, 1995). Nutrition plays an important role in the overall growth performance of the gladiolus crop. Plant analysis has been found to be a useful diagnostic tool to work out the amount of fertilizers to be applied (Rajhansa *et al.* 2010).

The growers do not have any recommended doses of chemical fertilizers for quality corm and cormel production. Even the flower produces multiply their seeds without applying any chemical fertilizers. As a result, they are deprived to get optimum sized corms and cormels for flower cultivation. So, there is a good scope of increasing the yield and vigorous corm and cormel production of gladiolus from cormel by the use of appropriate amount of N and K under he agro climatic condition of India. However, information regarding nutritional requirement for corm and cormel production in Kanpur is lacing. Keeping these in views, the present study was undertaken to investigate the effect of N, K and Zn on growth and flowering of gladiolus with in short period (Chanda *et al.* 2000).

## II. MATERIAL AND METHODS

In nutrient trials N ( $N_0$ ,  $N_1$ -100,  $N_2$ -200), P ( $P_0$ ,  $P_1$ ,  $P_1$ -25,  $P_2$ -50 kg and Zn ( $Zn_0$ ,  $Zn_1$ -5,  $Zn_2$ -10 kg) per hectare single and combined doses were applied in the soil. Disease free healthy corms of Gladiolus Cv. Eurovision were sown in randomized block design and three replications trials at D.G. College, Kanpur and Prakrati Bharti, Lucknow during 2006-07 and 2007-08. Data were recorded in observations and the same were subjected for statistical analysis as per methods of Panse and Sukhatme (1961).

The observations on different parameters and biochemical parameters were recorded in field and pot both. The pots were filled by the medium (Soil : Sand : FYM – 1:1:1) @ 5 kg per pot. One healthy corm was planted in on pot. Nutrients were applied as per treatments at planting time and two split doses of N at 30 and 60 days after planting. For the vase life out flowers were kept in flask containing distilled water and number of days up to wilting was counted. Length of spike was calculated by measuring the length from the base of spike to the last of the florets. Diameters and length of floret was measured by electronic digital caliper in cm, horizontal at full bloom stage.

## III. RESULTS AND DISCUSSION

Data of table 1-2, showed favourable results of N, P and Zn on spike development and florets production. Treatments in single and combination of N, P and Zn revealed positive and significant effect. Plant growth was found 36.85, 32.86 and 32.17 cm with  $N \times P$ ,  $N \times Zn$  and  $P \times Zn$  in combinations gave encouraging effect of spike growth and development respectively. This might be due to the reason that nitrogen, being the growth enha'ncing element, has the tendency to enforce the growth of plant. Present findings are in agreement with those of Singh and Singh (2000), Sewedon *et al.* (2012) and Chauhan *et al.* (2014).

More plant height was produced in all treatments were found better than control treatments. In combination  $P_2 \times Zn_2$  produced 18.800 and 18.967 florets/spike were recorded during 2006-07 and 2007-08, respectively. These results are in congruence with Mishra (2004) and Burman *et al.* (2005). Similarly  $N_2 \times Zn_1$  produced 19.33 and 19.925 florets/spike in 2006-07 and 2007-08, respectively. 200 kg of N along with 5 kg of Zn produced better results than 200

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kg of N and 10 kg Zn per hectare. Present findings are in congruence with the observations of Singh and Bijimal (2013), Sharma *et al.* (2010); Ahir *et al.* (2011); Amin *et al.* (2012) are in tube rose.

**Table 1 : Effect of nitrogen, phosphorus, zinc and their interactions on length of spike.**  
**Main effects**

	2006-07	2007-08		2006-07	2007-08		2006-07	2007-08
N <sub>0</sub>	26.19	28.62	P <sub>0</sub>	30.18	30.17	Zn <sub>0</sub>	31.39	30.90
N <sub>1</sub>	31.76	30.46	P <sub>1</sub>	31.85	31.83	Zn <sub>1</sub>	31.64	31.50
N <sub>2</sub>	36.85	35.73	P <sub>2</sub>	32.86	32.84	Zn <sub>2</sub>	32.17	32.36
CD at 5%	2.6	2.1		1.9	1.8		1.5	1.9

### N x P

	2006-07			2007-08		
	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>
N <sub>0</sub>	26.12	25.81	26.50	28.77	28.28	28.81
N <sub>1</sub>	30.24	32.85	32.26	28.65	31.65	31.19
N <sub>2</sub>	33.96	36.17	39.81	32.83	35.62	38.84
CD at 5%	1.8	1.6	1.7	2.0	1.9	1.8

### P x Zn

	2006-07			2007-08		
	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>
P <sub>0</sub>	29.90	30.18	30.29	29.38	30.32	30.55
P <sub>1</sub>	30.96	30.99	32.23	31.19	31.41	32.54
P <sub>2</sub>	32.35	32.74	33.44	32.46	32.86	33.48
CD at 5%	2.3	2.6	2.8	1.9	1.7	2.0

### N x Zn

	2006-07			2007-08		
	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>
N <sub>0</sub>	26.11	26.37	26.12	28.78	28.71	28.50
N <sub>1</sub>	31.23	31.45	32.53	29.72	30.13	31.42
N <sub>2</sub>	35.91	37.12	37.45	34.73	35.75	36.84
CD at 5%	1.9	1.6	1.8	1.2	1.6	1.7

### N x P x Zn

		2006-07			2007-08		
		Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>
N <sub>0</sub>	P <sub>0</sub>	26.40	25.52	26.24	28.50	28.82	28.81
	P <sub>1</sub>	26.31	26.81	25.54	27.91	27.81	28.82
	P <sub>2</sub>	25.52	27.63	26.24	29.13	29.53	27.87
N <sub>1</sub>	P <sub>0</sub>	30.34	30.08	30.23	26.97	28.80	30.75
	P <sub>1</sub>	31.41	32.25	33.07	30.85	31.48	32.73
	P <sub>2</sub>	32.31	30.16	33.35	31.33	30.14	31.44
N <sub>2</sub>	P <sub>0</sub>	32.19	35.52	34.46	32.26	33.17	32.66
	P <sub>1</sub>	35.34	36.53	38.17	34.55	35.16	37.18
	P <sub>2</sub>	39.44	39.67	47.16	38.28	38.91	48.26
CD at 5%		1.46	-	-	1.46	-	-

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**Table 2 :** Effect of nitrogen, phosphorus, zinc and their interactions on number of florets/spike.  
Main effect

	2006-07	2007-08		2006-07	2007-08		2006-07	2007-08
N <sub>0</sub>	16.733	16.902	P <sub>0</sub>	16.633	16.600	Zn <sub>0</sub>	17.400	17.300
N <sub>1</sub>	17.333	17.200	P <sub>1</sub>	16.925	17.133	Zn <sub>1</sub>	17.700	17.667
N <sub>2</sub>	17.537	17.433	P <sub>2</sub>	17.233	17.333	Zn <sub>2</sub>	17.233	17.420
CD at 5%	1.1121	1.2510		1.1414	1.1140		1.1151	1.0535

### N x P

	2006-07			2007-08		
	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>
N <sub>0</sub>	16.667	17.415	17.840	17.120	17.533	17.933
N <sub>1</sub>	17.267	17.865	17.925	17.485	18.200	18.165
N <sub>2</sub>	17.167	18.560	17.950	17.425	18.550	18.025
CD at 5%	1.1114	-	-	1.1050	-	-

### P x Zn

	2006-07			2007-08		
	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>
P <sub>0</sub>	16.133	17.100	18.725	16.133	17.575	18.755
P <sub>1</sub>	18.500	18.133	18.67	18.200	18.445	18.367
P <sub>2</sub>	18.167	18.190	18.800	18.910	18.933	18.967
CD at 5%	1.1052	-	-	1.141	-	-

### N x Zn

	2006-07			2007-08		
	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>
N <sub>0</sub>	16.933	18.033	18.225	17.750	18.455	18.725
N <sub>1</sub>	18.067	18.200	17.467	18.750	18.905	17.745
N <sub>2</sub>	18.867	19.633	19.033	18.833	19.925	19.740
CD at 5%	1.1414	-	-	1.1121	-	-

### N x P x Zn

		2006-07			2007-08		
		Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>	Zn <sub>0</sub>	Zn <sub>1</sub>	Zn <sub>2</sub>
N <sub>0</sub>	P <sub>0</sub>	17.733	17.065	16.933	16.800	17.367	17.300
	P <sub>1</sub>	17.333	17.900	18.433	17.700	17.667	18.300
	P <sub>2</sub>	18.033	18.030	18.033	18.045	18.025	18.050
N <sub>1</sub>	P <sub>0</sub>	18.250	18.345	18.400	18.066	18.460	18.490
	P <sub>1</sub>	17.267	18.650	18.250	17.010	18.033	18.055
	P <sub>2</sub>	17.010	18.367	18.525	17.125	18.307	18.050
N <sub>2</sub>	P <sub>0</sub>	16.500	17.550	17.556	16.255	17.210	17.550
	P <sub>1</sub>	17.335	17.431	17.985	17.215	17.255	18.023
	P <sub>2</sub>	18.500	19.635	20.982	18.200	19.367	20.867
CD at 5%		1.68	-	-	1.95	-	-

## IV. CONCLUSION

Different levels of nitrogen-fertigation affect the different characters of gladiolus cv. eurovisoin. Cultivar under the study showed better performance at comparatively medium fertigation level 100 kg per hectare (N<sub>2</sub>) than lowest and control treatment. It may also concluded that excessive use of nitrogen beyond a certain limit is not only

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wasteful but also results in adverse affects on both plant and soil structure. Phosphorus 25 kg and Zn 5 Kg per hectare also showed signficiant results during investigation period.

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