International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

Effect of Nitrogen, Phosphorus and Zinc Nutrition on Spike and Floret Development in Gladiolus

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Abstract— *Gladiolus (Gladiolus grandiflorus L.) cv. Eurovision was studied in respect of N, P, Zn nutrition for spike growth and development and florets number at K.A.D. College, Allahabad, C.S.J.M. University during 2006-07 and 2007-08. Single application of N, P, Zn, N_2, P_2, Zn_2 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_2xP_2, N_2xZn_2 revealed considerable effects for spike length. Application of $N_2xP_2xZn_2$ 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*.

I. INTRODUCTION

Gladiolus occupies a special rank in flowering bulbous crops (Basu and Bose, 1910; Jakhar 1993). In irridaceae family it is known as "Queen of flowers" and holds position in Indian floriculture industry (Hegde, 2009; Chadha, 1993). 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 heathy spike with quality flowers (Sindhu and Arora, 1989; Chadha, 1993; Dadlani, 1996). It has great potential industry for export for earning income (Prasad *et al.*, 1998; Swarup, 1993).

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.

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 Kulbhaskar Asharam P.G. Degree College, Allahabad 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).

III. RESULTS AND DISCUSSION

Data of table I-II, 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. Stought plant growth was product 36.85, 32.86 and 32.17 in 2006-07 and NxP, NxZn PxZn in combinations gave encouraging effect of spike growth and development. This might be due to the reason that nitrogen, being the growth enhancing element, has the tendency to enforce the growth of plant. Present findings are in agreement with those of Sidhu and Arora (11).

More plant height was produced in all treatments were found better than control treatments. In combination P_2xZn_2 produced 18.800 and 18.967 florets/spike were recorded during 2006-07 and 2007-08, respectively. Similarly N_2xZn_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 kg of N and 10 kg Zn per hectare. Present findings are in congruence with the observations of Ahir *et al.* (1).

REFERENCE

[1] T. R. Ahir, R. B. Patel, S. L. Chawla, and D.M. Rathod, "Effect of integrated nutrient management in gladiolus (*Gladiolus grandiflorus* L.)," *J. Orna. Hort.*, vol. 14, issue 1-2, pp. 83-86, 2011.
[2] A. Basu and T. K. Bose, "The Ornamental plants," *Indian Hort.*, vol. 27, pp. 21-22, 1970.
[3] K. L. Chadha, "Floriculture research," *J. Orna. Hort.*, vol. 1, issue 1, pp. 1-12, 1993.
[4] N. K. Dadlani, "Prospects of floriculture industry in India," *Floriculture Today*, vol. 1, pp. 15-17, 1996.
[5] S. N. Hegde, "Diversification in floriculture," *Nat. Conf. Flori.* livelihood and Profitability, pp. 14-21, 2009.
[6] B. R. Jabhar, *New Horizans in Agriculture in India*, pp. 1-306, 1993.
[7] P. Kumar, "Effect of boran, calcium and zinc on gladiolus," *J. Orna. Hort.*, vol. 6, issue 1, pp. 83-84. 2003.
[8] T. Jankiram, "Performance of I. I.H.R. Orchids, gladiolus cultivars," *Indian J. Hort.*, vol. 9, issue 1, pp. 61-62, 2009.
[9] P. G. Panse and P.V. Sukhatme, Statistical methods for agricultural Workers, I.C.A.R., New Delhi, 1961.
[10] A. Prasad, R. Kumar, and S. Arya, "Export potentiality of floricultural Products," *Sci. J. Hort.* vol. 1, pp. 38-40, 1998.
[11] S. S. Sidhu and J.S. Arora, "Response of gladiolus varieties to nitrogen application," *Indian J. Hort.*, vol. 42, issue 2, pp. 250-254, 1989.
[12] S. S. Sidhu and P. N. Kumar, "Research highlights in floriculture," *Nat. Conf. Flori.* livelihood and Profitability, pp. 74-82, 2009.
[13] V. Swarup, "Floriculture industry in India," *J. Orna. Hort.*, vol. 1, pp. 18-25, 1993.

R. L. Rao, Ram Rakha, Rannajay Singh, Rajeev Kumar, and Kiran Singh, "Effect of nitrogen, phosphorus and zinc nutrition on spike and floret development in gladiolus," *International Research Journal of Advanced Engineering and Science*, Volume 2, Issue 2, pp. 1-3, 2017.

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ISSN (Online): 2455-9024

TABLE I. 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_0	26.19	28.62	P_0	30.18	30.17	Zn_0	31.39	30.90
N_1	31.76	30.46	P_1	31.85	31.83	Zn_1	31.64	31.50
N_2	36.85	35.73	P_2	32.86	32.84	Zn_2	32.17	32.36
CD at 5%								

N x P

	2006-07			2007-08		
	P_0	**P_1**	**P_2**	**P_0**	**P_1**	**P_2**
N_0	26.12	25.81	26.50	28.77	28.28	28.81
N_1	30.24	32.85	32.26	28.65	31.65	31.19
N_2	33.96	36.17	39.81	32.83	35.62	38.84
CD at 5%	-	-	-	-	-	-

P x Zn

	2006-07			2007-08		
	Zn_0	**Zn_1**	**Zn_2**	**Zn_0**	**Zn_1**	**Zn_2**
P_0	29.90	30.18	30.29	29.38	30.32	30.55
P_1	30.96	30.99	32.23	31.19	31.41	32.54
P_2	32.35	32.74	33.44	32.46	32.86	33.48
CD at 5%	-	-	-	-	-	-

N x Zn

	2006-07			2007-08		
	Zn_0	**Zn_1**	**Zn_2**	**Zn_0**	**Zn_1**	**Zn_2**
N_0	26.11	26.37	26.12	28.78	28.71	28.50
N_1	31.23	31.45	32.53	29.72	30.13	31.42
N_2	35.91	37.12	37.45	34.73	35.75	36.84
CD at 5%	-	-	-	-	-	-

N x P x Zn

		2006-07			2007-08		
		Zn_0	**Zn_1**	**Zn_2**	**Zn_0**	**Zn_1**	**Zn_2**
N_0	P_0	26.40	25.52	26.24	28.50	28.82	28.81
	P_1	26.31	26.81	25.54	27.91	27.81	28.82
	P_2	25.52	27.63	26.24	29.13	29.53	27.87
N_1	P_0	30.34	30.08	30.23	26.97	28.80	30.75
	P_1	31.41	32.25	33.07	30.85	31.48	32.73
	P_2	32.31	30.16	33.35	31.33	30.14	31.44
N_2	P_0	32.19	35.52	34.46	32.26	33.17	32.66
	P_1	35.34	36.53	38.17	34.55	35.16	37.18
	P_2	39.44	39.67	47.16	38.28	38.91	48.26
CD at 5%		1.46	-	-	1.46	-	-

TABLE II. 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_0	16.733	16.902	P_0	16.633	16.600	Zn_0	17.400	17.300
N_1	17.333	17.200	P_1	16.925	17.133	Zn_1	17.700	17.667
N_2	17.537	17.433	P_2	17.233	17.333	Zn_2	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_0	**P_1**	**P_2**	**P_0**	**P_1**	**P_2**
N_0	16.667	17.415	17.840	17.120	17.533	17.933
N_1	17.267	17.865	17.925	17.485	18.200	18.165
N_2	17.167	18.560	17.950	17.425	18.550	18.025
CD at 5%	1.1114	-	-	1.1050	-	-

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ISSN (Online): 2455-9024

P x Zn

	2006-07			2007-08		
	Zn_0	**Zn_1**	**Zn_2**	**Zn_0**	**Zn_1**	**Zn_2**
P_0	16.133	17.100	18.725	16.133	17.575	18.755
P_1	18.500	18.133	18.67	18.200	18.445	18.367
P_2	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_0	**Zn_1**	**Zn_2**	**Zn_0**	**Zn_1**	**Zn_2**
N_0	16.933	18.033	18.225	17.750	18.455	18.725
N_1	18.067	18.200	17.467	18.750	18.905	17.745
N_2	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_0	**Zn_1**	**Zn_2**	**Zn_0**	**Zn_1**	**Zn_2**
N_0	P_0	17.733	17.065	16.933	16.800	17.367	17.300
	P_1	17.333	17.900	18.433	17.700	17.667	18.300
	P_2	18.033	18.030	18.033	18.045	18.025	18.050
N_1	P_0	18.250	18.345	18.400	18.066	18.460	18.490
	P_1	17.267	18.650	18.250	17.010	18.033	18.055
	P_2	17.010	18.367	18.525	17.125	18.307	18.050
N_2	P_0	16.500	17.550	17.556	16.255	17.210	17.550
	P_1	17.335	17.431	17.985	17.215	17.255	18.023
	P_2	18.500	19.635	20.982	18.200	19.367	20.867
CD at 5%			-	-		-	-

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