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Influence of varieties to foliar application of Zn and Fe for growth, yield and quality of okra

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Abstract
A two-year experiment on "Influence of varieties to foliar application of Zn and Fe for growth, yield and quality of okra" was carried out at Horticultural Research Farm, College of Horticulture, Anand Agricultural University, Anand in *Kharif* season during the year 2020 and 2021. The experiment was laid out in randomized block design with factorial concept with three replications and fourteen treatment combinations comprising of two varieties *i.e.*, V_1: GAO 5 and V_2: GO 6 and seven level of foliar application of Zn and Fe *viz.*, M_1: $FeSO_4$ @ 0.50%, M_2: $ZnSO_4$ @ 0.50%, M_3: Fe EDDHA @ 0.1%, M_4: Fe EDDHA @ 0.2%, M_5: Zn EDTA @ 0.1%, M_6: Zn EDTA @ 0.2% and M_7: Control (Water spray). The foliar application of Fe and Zn were sprayed in four frequencies at 30, 40, 50 and 60 DAS. The influence of varieties and foliar application of Zn and Fe as well as their interactions on growth, yield and quality of okra were recorded. Variety GAO 5 recorded significantly, maximum leaf area at 60 DAS (479.99 cm^2), dry weight of plant at 90 DAS (37.75 g), pod length (12.98 cm), yield (13.91 t/ha), fiber content (2.56%), chlorophyll content (0.496 mg/100 g), phenol content (0.122%) with minimum leaf membrane Injury (32.72%) in pooled data. However, variety did not manifest its significant effect on different growth parameters *viz*., leaf area at 45 and 90 DAS, fresh as well as dry weight of plant expect 90 DAS, yield parameters *viz*., days to first picking, pod girth, pod weight and quality parameter moisture content of okra pod. Foliar application of Fe and Zn had significant effect on growth, yield and quality parameters. Maximum leaf area (497.03, 547.00 and 804.27 cm^2) at 45, 60 and 90 DAS, respectively, fresh weight of plant (169.62, 265.25 and 357.58 g) and dry weight of plant (19.73, 29.33 and 41.98 g) at 45, 60 and 90 DAS, respectively in pooled data and pod length (13.63 cm), pod girth (65.72 mm), pod weight (14.43 g), yield (14.64 t/ha), fiber content (2.62%), chlorophyll content (0.504 mg/100 g), phenol content (0.119%) and minimum leaf membrane injury (26.92%) were observed with treatment M_6, respectively in pooled data. While, foliar application of Zn and Fe did not show it significant effect on days to first picking and moisture content of okra pod. Interaction effect of varieties and foliar application of Zn and Fe with respect to yield and quality parameters like maximum pod length (13.75 cm) and chlorophyll content of pod (0.509 mg/100 g) was recorded with combination V_1M_6 in pooled analysis.

Keywords: Okra, Zn EDTA, varieties, phenol, leaf membrane injury

Introduction
Okra [*Abelmoschus esculentus* (L.) Moench] is one of the most important vegetable crop of tropical and subtropical region. The green tender pod of okra contains oxalic acid, thiamine, riboflavin, nicotinic acid. It provides some human supplementary vitamins such as vitamin C, A, B- complex, minerals like calcium, potassium, iron and others (Adebooye and Opunta, 1996) [1]. In India, mostly okra is grown in Gujarat, West Bengal, Bihar, Madhya Pradesh, Uttar Pradesh etc.

Micronutrient disorder appears to be the most wide spread and frequent problem in crop production worldwide, resulting in severe losses in yield and nutritional values. Micronutrients like, copper (Cu), zinc (Zn) and iron (Fe) are important for proper functioning of biological systems of plant but their deficiency and toxicity lead various disorders. Although, the requirement of micronutrients like Zn and Fe are relatively less but their role in normal crop production is indispensable.

Foliar spray of microelements is very helpful when the roots cannot provide necessary nutrients. It is found that foliar application of micronutrients significantly increased growth and development of Okra (Surendra *et al*., 2006) [18]. Zinc and Iron can be apply in the form of $FeSO_4$, $ZnSO_4$, Fe EDDHA and Zn EDTA as a foliar spray. Zinc is the most essential micronutrient which considered significant in activating number of enzymes. It is also needed by plant for formation tryptophan, which consists of the Indole Acetic Acid (IAA) hormones,

which is necessary to cells elongate. Iron (Fe) is another micronutrient that is a cofactor for approximately 140 enzymes that catalyze unique biochemical reactions. Iron act as catalyst in synthesis of chlorophyll molecule and helps in the absorption of other elements (Pandav *et al.* 2016) [11]. Chelating agents are organic molecules that can trap or encapsulate certain metal ions like Ca, Mg, Fe, Co, Cu, Zn and Mn and then release these metal ions slowly so that they become available to plants (Sekhon, 2003) [15]. Foliar spray of micronutrients facilitates efficient consumption of nutrients straightly through leaves, the effect of which can show its importance soon (Kiran, 2006) [9]. Therefore, the present investigation was conducted to study the "Influence of varieties to foliar application of Zn and Fe for growth, yield and quality of okra".

Materials and Methods

The present investigation on "Influence of varieties to foliar application of Zn and Fe for growth, yield and quality of okra" was conducted in *Kharif* season during the year 2020 and 2021 at Horticultural Research Farm, College of Horticulture, Anand Agricultural University, Anand. The experiment was laid out in randomized block design with factorial concept with three replications and fourteen treatment combinations comprising of two varieties i.e., V_1: Gujarat Anand okra 5 and V_2: Gujarat okra 6 and seven level of foliar application of Zn and Fe *viz.*, M_1: FeSO4 @ 0.50%, M_2: ZnSO4 @ 0.50%, M_3: Fe EDDHA @ 0.1%, M_4: Fe EDDHA @ 0.2%, M_5: Zn EDTA @ 0.1%, M_6: Zn EDTA @ 0.2% and M_7: Control (Water spray). The foliar application of Fe and Zn were sprayed in four frequencies at 30, 40, 50 and 60 DAS. The recommended dose of FYM 10 t/ha and 100: 50: 50 kg NPK/ha] were applied.

Observations of growth, yield and quality parameters were recorded from the five tagged plants. The five pod per treatment were randomly selected and all observations regarding physical and biochemical parameters of pod were recorded. Leaf area measured at the 45, 60 and 90 DAS, five randomly selected large, medium and small leaves of treated plants were used to calculate the leaf area per plant and their average was worked out. It was measured with the help of leaf area meter (Systronics, leaf area meter 211). Randomly selected three plants from each plot was uprooted at 45, 60 and 90 days after sowing and weighed for fresh and dry weight and expressed in gram. Number of days taken from the date of sowing to first picking were counted from in each plot and were average out. Length of the randomly selected five pods from each tagged plant were measured in centimeters from the base of calyx to the tip of the pod by using measuring scale and average value was worked out. Girth of the randomly selected five pods from each tagged plant were measured in centimeters from the middle portion of pod by using thread and after thread reading measured by measuring scale and average value was worked out.

Harvested five green pods from randomly selected five tagged plants were weighed at 4th picking. The mean of five green pods weight was calculated and was expressed in grams. The weight of all the harvested pods during each picking from individual net plot was summed and converted into tonne per hectare. Moisture content of pods in different treatments was determined using the method described by Sadasivam and Manickam, (1992) [13]. Fiber content of sample was determined according to Sadasivam and Manickam (1992) [13]. Total chlorophyll content in pod was determined by DMSO (Di Methyl Sulphoxide) method (Hiscox and Israelstam, 1979) [8]. Phenol content from pods was estimated by the method as described by Sadasivam and Manickam (1992) [13]. Leaf membrane injury (LMI) was determined by using the method of with some modification. Data for individual years were analyzed and in order to study the average effect of different treatments over the years, the pooled analysis was also carried out as suggested by Panse and Sukhatme (1967) [12].

Results and Discussion

Influence of varieties on growth, yield and quality parameters of okra

Among different growth parameters, leaf area at 60 DAS and dry weight of plant at 90 DAS was affected significantly by the variety and as shown in Table 1. Variety V_1 (GAO 5) recorded maximum leaf area (479.99 cm^2) at 60 DAS and dry weight of plant at 90 DAS (37.75 g) in pooled analysis. Varieties show non-significant effect on different growth parameters *viz.*, Leaf area at 45 and 90 DAS and fresh as well as dry weight of plant except 90 DAS in pooled analysis. Yield parameters *viz.*, maximum pod length (12.98 cm) and yield (13.91 t/ha) was observed with variety V_1 (GAO 5) in pooled analysis. However, days to first picking, pod girth and pod weight were remained non-significant in pooled analysis. It might be due to genetical differences in varieties. Similar findings were also reported by Maliha *et al.* (2022) [10] and Badini *et al.* (2019) [5] in okra and Tawab *et al.* (2015) [19] in brinjal.

Quality parameters *viz.*, maximum fiber content (2.56%), chlorophyll content (0.496 mg/100 g), phenol content (0.122%) and minimum leaf membrane injury (32.72%) was observed with variety V1 (GAO 5) in pooled analysis. However, non- significant difference observed for moisture content of okra pod in pooled data.

Influence of foliar application of Zn and Fe on growth, yield and quality parameters of okra: Among the different growth parameters, treatment M_6 (Zn EDTA @ 0.2%) recorded maximum leaf area (497.03, 547.00 and 804.27 cm^2) at 45, 60 and 90 DAS, respectively in pooled data. Same treatment showed maximum fresh weight of plant (169.62, 265.25 and 357.58 g) and dry weight of plant (19.73, 29.33 and 41.98 g) at 45, 60 and 90 DAS, respectively in pooled analysis. It might be due to foliar application of Zn EDTA increased the efficient absorbent of all essential nutrient that resulted in increases cell division and meristematic activity of plant tissue, expansion and elongation of cell and cell wall by active synthesis of tryptophan which stimulate growth of plant that resulted in higher leaf area. Increased leaf area is in accordance with the findings of Datir *et al.* (2010) [6] in okra and Al-Tameemi *et al.* (2019) [2] in broccoli.

Table 1: Influence of varieties to foliar application of Zn and Fe on growth parameters of okra (pooled of two years)

Code	Treatments	Leaf area (cm^2)			Fresh weight of plant (g)			Dry weight of plant (g)		
		45 DAS	60 DAS	90 DAS	45 DAS	60 DAS	90 DAS	45 DAS	60 DAS	90 DAS
Varieties (V)										
V_1	GAO 5	414.25	479.99	685.13	146.75	230.64	320.17	16.96	26.56	37.75
V_2	GO 6	397.70	448.96	656.99	141.08	224.22	306.45	16.30	25.62	36.09
S.Em.±		6.28	5.70	10.01	2.01	3.48	4.86	0.23	0.39	0.58
CD at 5%		NS	16.17	NS	NS	NS	NS	NS	NS	1.67
Foliar application of Zn and Fe (M)										
M_1	$FeSO_4$ @ 0.50%	355.90	411.95	593.76	129.80	207.18	288.80	14.69	23.73	33.87
M_2	$ZnSO_4$ @ 0.50%	377.53	428.95	627.01	135.60	215.15	297.07	15.39	24.80	35.17
M_3	Fe EDDHA @ 0.1%	395.48	461.03	657.81	141.22	218.57	307.09	16.43	25.88	36.40
M_4	Fe EDDHA @ 0.2%	455.58	511.97	763.57	159.45	249.62	340.23	18.90	28.17	39.57
M_5	Zn EDTA @ 0.1%	428.08	487.07	701.10	149.88	233.57	326.82	17.23	27.20	38.03
M_6	Zn EDTA @ 0.2%	497.03	547.00	804.27	169.62	265.25	357.58	19.73	29.33	41.98
M_7	Control (water spray)	332.22	403.37	549.92	121.83	202.68	275.59	14.04	23.50	33.43
S.Em.±		12.74	10.66	18.73	3.75	6.51	9.09	0.44	0.72	1.10
CD at 5%		33.35	30.26	53.15	10.65	18.48	25.79	1.25	2.04	3.12
V × M		NS	NS	NS	NS	NS	NS	NS	NS	NS
Y × V		NS	NS	NS	NS	NS	NS	NS	NS	NS
Y × M		NS	NS	NS	NS	NS	NS	NS	NS	NS
Y × V × M		NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%		10.02	7.95	9.67	9.03	9.91	10.05	9.15	9.56	10.31

Table 2: Influence of varieties to foliar application of Zn and Fe on yield and quality parameters of okra (pooled of two years)

Code	Treatments	Days to first picking	Pod girth (mm)	Pod weight (g)	Yield (t/ha)	Moisture content (%)	Fiber content (%)	Phenol content (%)	Leaf membrane injury (%)
Varieties (V)									
V_1	GAO 5	49.50	56.51	13.04	13.91	82.01	2.56	0.122	32.72
V_2	GO 6	51.79	54.35	12.56	11.81	81.24	2.32	0.104	35.25
S.Em.±		0.81	0.78	0.17	0.15	0.51	0.02	0.001	0.08
CD at 5%		NS	NS	NS	0.41	NS	0.06	0.002	0.24
Foliar application of Zn and Fe (M)									
M_1	$FeSO_4$ @ 0.50%	52.12	49.93	11.92	11.73	80.49	2.33	0.108	37.71
M_2	$ZnSO_4$ @ 0.50%	51.44	51.90	12.29	11.82	81.20	2.39	0.111	35.36
M_3	Fe EDDHA @ 0.1%	50.91	53.68	12.68	13.63	81.98	2.41	0.113	33.79
M_4	Fe EDDHA @ 0.2%	49.05	60.95	13.67	14.21	82.68	2.56	0.117	30.86
M_5	Zn EDTA @ 0.1%	49.78	58.20	13.14	13.95	82.25	2.48	0.115	31.88
M_6	Zn EDTA @ 0.2%	48.13	65.72	14.43	14.64	83.26	2.62	0.119	26.92
M_7	Control (water spray)	53.09	47.63	11.47	10.03	79.53	2.28	0.105	41.36
S.Em.±		1.51	1.45	0.32	0.27	0.96	0.04	0.001	0.16
CD at 5%		NS	4.13	0.91	0.77	NS	0.12	0.004	0.45
V × M		NS	NS	NS	NS	NS	NS	NS	NS
Y × V		NS	NS	NS	NS	NS	NS	NS	NS
Y × M		NS	NS	NS	NS	NS	NS	NS	NS
Y × V × M		NS	NS	NS	NS	NS	NS	NS	NS
CV%		10.35	9.09	8.72	7.34	4.06	5.87	3.81	1.61

Table 3: Influence of varieties to foliar application of Zn and Fe on pod length and chlorophyll content of okra pod (pooled of two years)

Foliar application of Zn and Fe (M)		Varieties (V)					
		Pod length (cm)			Chlorophyll content (mg/100 g) of pod		
		V_1 (GAO 5)	V_2 (GO 6)	Mean	V_1 (GAO 5)	V_2 (GO 6)	Mean
M_1	$FeSO_4$ @ 0.50%	12.69	10.03	11.36	0.489	0.458	0.473
M_2	$ZnSO_4$ @ 0.50%	12.74	10.74	11.74	0.489	0.457	0.473
M_3	Fe EDDHA @ 0.1%	12.87	11.10	11.99	0.489	0.475	0.482
M_4	Fe EDDHA @ 0.2%	13.27	12.65	12.96	0.505	0.485	0.495
M_5	Zn EDTA @ 0.1%	12.98	11.93	12.46	0.503	0.480	0.491
M_6	Zn EDTA @ 0.2%	13.75	13.51	13.63	0.509	0.499	0.504
M_7	Control (water spray)	12.56	9.33	10.95	0.487	0.438	0.462
Mean		12.98	11.33		0.496	0.470	
		V	M	V × M	V	M	V × M
S.Em.±		0.15	0.28	0.39	0.002	0.004	0.006
C. D at 5%		0.42	0.79	1.11	0.006	0.012	0.017
Y × V		NS			NS		
Y × M		NS			NS		
Y × V × M		NS			NS		
CV%		7.89			2.96		

Increasing in fresh weight and dry weight may be due to important role in chlorophyll formation, it also influences on cell division, meristematic activity of plant tissues and expansion of cells as well as active synthesis of tryptophane, which is the primary precursor of auxin that stimulate the growth of plant tissues which ultimately increases the fresh weight of okra plant and resulted into higher dry weight. Similar results were reported by Arjun *et al.* (2018) [3] in okra and Awad *et al.* (2021) [4] in carrot.

Yield parameters *viz.*, maximum pod length (13.63 cm), pod girth (65.72 mm), pod weight (14.43 g) and yield (14.64 t/ha) was observed with treatment M_6 (Zn EDTA @ 0.2%) in pooled data. However, non-significant results was obtained in days to first picking with foliar application of Zn and Fe. Zinc source through the foliar application of Zn EDTA @ 0.2% helps in cellular mechanism that leads to more cell division and elongation that leads to accumulation of photosynthates which were synthesized in the leaf and translocated towards pod that contribute to the greater pod length, girth and weight of okra which ultimately increased the yield of okra. This finding is supported by Awad *et al.* (2021) [4] in carrot and Elayaraja and Singaravel (2017) [7] in okra.

In terms of quality of okra pods treatment M_6 (Zn EDTA @ 0.2%) gave maximum fiber content (2.62%), chlorophyll content (0.504 mg/100 g), phenol content (0.119%) with minimum leaf membrane injury (26.92%), respectively in pooled analysis. While, foliar application of Zn and Fe for moisture content of okra pod show non-significant. Foliar application of Zn provide the better absorption and translocation of nutrients and increase accumulation of starch reserve in developing pod resulted in higher fiber content in okra pod. These results are in close conformity with the findings of Sharma *et al.* (2018) [16] and Singh (2006) [17] in okra. Zinc is an important component for development of chloroplast and it plays a prominent role in photosynthesis which helps in production of chlorophyll content of okra pod as well as develop resistant to abiotic and biotic stresses, protection against oxidative damage, membrane integrity and phytochrome activities which resulted into reduction of leaf membrane injury. These results are supported by Sharma *et al.* (2018) [16] and Singh (2006) [17] in okra.

Interaction effect of varieties and foliar application of Zn and Fe on growth, yield and quality parameters of okra

Interaction effect of varieties and foliar application of Zn and Fe with respect to growth parameters *viz.*, leaf area and fresh and dry weight of plant at 45, 60 and 90 DAS was remained non-significant in both the years and pooled result. With respect to yield parameters, Interaction effect of varieties and foliar application of Zn and Fe on days to first picking, pod girth, pod weight and yield remained non-significant. Whereas, maximum pod length (13.75) was recorded with V_1M_6 *i.e.*, (GAO 5 + Zn EDTA @ 0.2%) in pooled data. Interaction effect of variety GAO 5 and Zn EDTA @ 0.2% through foliar application which helps in more accumulation of photosynthates which were synthesized in the leaf and translocated towards pod that contribute to the greater pod length of okra. These results are in conformity with Maliha *et al.* (2022) [10], Badini *et al.* (2019) [5] and Elayaraja and Singaravel (2017) [7] in okra and Awad *et al.* (2021) [4] in carrot**.**

In quality attributes, maximum chlorophyll content of pod (0.509 mg/100 g) was observed with combine effect of variety and foliar application of Zn i.e., V_1M_6 (GAO 5 + Zn EDTA @ 0.2%) in pooled analysis. Combine effect of variety GAO 5 and Zn EDTA @ 0.2% which is important component for development of chloroplast and it plays a prominent role in photosynthesis which helps in production of chlorophyll content of okra pod. While, moisture content, fiber content, phenol content and leaf membrane injury was found non-significant.

Conclusion

From the two years of field study, it can be concluded that variety GAO 5 is found better with regards to growth, yield and quality attributes. Foliar application of Zn EDTA @ 0.2% at 30, 40, 50 and 60 days after sowing improves growth, yield parameters as well as quality of okra pods. Interaction effect of variety GAO 5 and foliar application of Zn EDTA @ 0.2% at 30, 40, 50 and 60 days after sowing improves yield and quality parameters *i.e*., maximum pod length and chlorophyll content of okra.

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References

1. Adebooye CO, Opunta CO. Effect of Gelex on growth and fruit nutrient composition of okra [*Abelmoschus esculentus* (L.) Moench]. Int. Foodeng. J Agric. 1996;18:1-9.
2. Al-Tameemi AJH, AL-Aloosy YAM, Al-Saedi NJJ. Effect of spraying chelated and nano of both iron and zinc on the growth and yield of broccoli (*Brassica oleracea* var. italica). Plant Archives. 2019;19(1):11783-1790.
3. Arjun MA, Singh T, Shukla M, Namdeo KN. Integrated nutrient management on growth, yield, and quality of okra (*Abelmoschus esculentus* L. Moench). Annals of Plant and Soil Research. 2018;20(4):344-348.
4. Awad AAM, Rady MM, Semida WM, Belal EE, Omran WM, Al-Yasi HM, *et al*. Foliar nourishment with different zinc-containing forms effectively sustains carrot performance in zinc-deficient soil. Agron. 2021;11:1853.
5. Badini MA, Qadir G, Jakhro MI, Aziz T, Ahmed S, Mengal MI, *et al*. Response of okra varieties to zinc and boron supplement under the agro-climatic condition of Tandojam-Pakistan. Pure and Applied Biol. 2019;1(8):601-608.
6. Datir RB, Laware SL, Apparao BJ. Effect of organically chelated micronutrients on growth and productivity in okra. Asian J Exp. Biol. Sci. 2010;SPL:115-117.
7. Elayaraja D, Singaravel R. Effect of different levels and sources of zinc fertilizers on the growth and yield of okra in coastal sandy soil. Int J Agric Sci. 2017;2(13):282-287.
8. Hiscox JD, Israelstam GF. A method for extraction of chlorophyll from leaf tissue without maceration. Can J Bot. 1979;57:1332-1334.
9. Kiran J. Effect of fertilizer, bio-fertilizer and micronutrients on seed yield and quality of Brinjal

(*Solanum melongena* L.). Thesis, Department of seed science and technology, College of Agriculture, Dharwad, India. 2006:1-2.
10. Maliha MBJ, Nuruzzaman M, Hossain B, Trina FA, Uddin N, Sarker AK. Assessment of varietal attributes of okra under foliar application of zinc and boron. Int J Hort Sci Techno. 2022;9(2):143-149.
11. Pandav AK, Nalla AT, Rana MK, Bommesh JC. Effect of foliar application of micronutrients on growth and yield parameters in eggplant cv. HLB 12. J Environ and Ecol. 2016;35(3):1745-1748.
12. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi; c1967.
13. Sadasivam S, Manickam A. Biochemical methods for agricultural sciences. Wiley Eastern Ltd., New Delhi; c1992.
14. Saifullah M, Rabbani MG. Evaluation and characterization of okra (*Abelmoschus esculentus* L. Moench.) genotypes. SAARC J Agric. 2009;7:92-99.
15. Sekhon B. Chelates for micronutrient nutrition among crops. Resonance. 2003;8(7):46-53.
16. Sharma LN, Bairwa AL, Ola KL, Atmaram M. Effect of zinc on growth, yield and quality of okra [*Abelmoschus esculentus* (L.) Moench] cv. Parbhani Kranti. J Pharmacogn and Phytochem. 2018;7(1):2519-2521.
17. Singh S. Effect of bioregulators and zinc on growth, yield and quality of okra [*Abelmoschus esculentus* (L.) Moench.]. Rajasthan Agricultural University, Bikaner, S. K. N. College of Agriculture, Jobner; c2006.
18. Surendra P, Nawalagatti CM, Chetti MB, Hiremath SM. Effect of plant growth regulators and micronutrients on morpho-physiological and biochemical traits and yield in okra. Karnataka J Agric Sci. 2006;19(3):694-697.
19. Tawab S, Ayub G, Tawab F, Khan O, Bostan N, Ruby S, *et al*. Response of Brinjal (*Solanum melongena* L.) cultivars to zinc levels. J Agri and Bio Sci. 2015;10(5):171-178.