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EFFECT OF FOLIAR APPLICATION OF ZINC AND IRON ON GROWTH, YIELD AND QUALITY OF GLADIOLUS

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Abstract

The present investigation "Effect of foliar application zinc and iron on growth yield and quality of gladiolus grown on Vertisol" was carried out during *Rabi* season 2013-14 at Bhajiwadi of Horticulture, College of Agriculture, Nagpur (Maharashtra), India. The experiment was laid out in FRBD with three replication consistent four levels of zinc and iron *viz*., Zn_0 -l (water spray) Zn_1 - 0.5%, Zn_2 - 1.0%, Zn_3 -1.5% and Fe_0 - (water spray), Fe_1- 0.5%, Fe_2 - 1.0% and Fe_3 - 1.5%. In respect to growth parameters, zinc level @ 1.0% reported highest growth parameters like, days of first spike emergence (71.25 mg g^{-1}), spike plot (67.03) and spike ha^{-1} (1.99 mg) followed by zinc @ 1.5% days of first spike emergence (68.91), spike plot (63.78) and spike ha^{-1} (1.89 mg) over other treatments like Zn_1Fe_1 and control. The quality parameter like diameter of spike (0.63 cm) and length of spike (82.20 cm) were recorded significantly highest in zinc level @ 1.0% followed by iron @ 1.5%, which was significantly superior over control.

Key words : Foliar, zinc, iron, yield and quality.

Introduction

Flowers are the symbol of beauty, peace, love and friendship. Flowers are the crowning glory of the god's creation and an inseparable part of human life. They have always had a charm unmatched. Hence, floriculture is an art and knowledge of growing flowers to perfection. They are synonymous with prosperity, happiness, delicacy and sorrow too. Flowers give the feeling of peace and tranquility reduces stress and sense of esteem. Gladiolus (*Gladiolus grandiflorus* L.) is an herbaceous plant which belongs to the family Iridaceae. It has its natural habitat in the Mediterranean region and South Africa. It is one of the most popular cut flowers. It is commonly grown for garden use and for cut flowers. It is popularly known as Sword Lily as well as Queen of bulbous plants. For the maximization of yield and quality of any flower crop selection of suitable variety, soil type, cultural and management practice like optimum dose of manures, fertilizers, spacing, irrigation, plant protection and the effect of micronutrients is very important.

Materials and Methods

The field experiment was carried out at College Garden, Horticulture Section, College of Agriculture; Nagpur during the *Rabi* season of 2013-2014, to study effect of foliar application of zinc and iron on growth, yield and quality of gladiolus. The field selected for conducting the experiment was fairly uniform and leveled. An experiment was conducted in factorial randomized block design with sixteen treatment combinations comprising of with four levels of zinc *viz*. Zn_0 -Control (water spray), Zn_1 -Zinc 0.5%, Zn_2-Zinc 1.0%, Zn_3- Zinc 1.5% and four levels of iron *viz*. Fe_0- Control (water spray), Fe_1- Iron 0.5%, Fe_2 - Iron 1.0%, Fe_3-Iron 1.5%. Each treatment combination was replicated for three times. The allotment of treatments to the various plots was done randomly in each replication. A recommended fertilizer dose of gladiolus *i.e.* 300:200:200 kg ha^{-1} was applied. Nitrogen was applied through urea, phosphorus through single super phosphate and potash through muriate of potash. 1/3 dose of nitrogen and full dose of phosphorus and potash was applied at the time of planting and the remaining 1/3 dose each of nitrogen was applied at two leaf and four leaf stages, respectively.

Results and Discussion

Effect of foliar application of zinc and iron on days required to first spike emergence

The days required for first spike emergence in gladiolus was significantly influenced by application of

various levels of zinc and the treatment Zn_2 took required significantly minimum days (63.17 days) for emergence, which was of first spike and it found statistically at par with the treatments Zn_1 (67.83 days) and the treatment Zn_3 (66 days). Whereas, the treatment Zn_0 took maximum days for emergence of first spike (71.25 days). Application of zinc resulted in early in flowering in gladiolus and the first spike emergence was noted with application 1.0% zinc, which might be due to the fact that, zinc plays vital role in growth and development of plant because of its stimulatory and catalyst effect in various physiological and metabolic process of plant. Zinc favors the storage of more carbohydrates through photosynthesis, which may be the attributing factor for the positive effectiveness of zinc on early flowering. Similarly, the promotion of early flowering initiation due to zinc application may be because of its involvement in the synthesis of plant hormones. These findings can be correlated with those of similar findings reported by Balkrishnan *et al*. (2007) in marigold and Kakde *et al*. (2009) in China aster. Treatment Fe_2 had recorded significantly minimum days (62.91 days) for emergence of first spike in gladiolus which was found statistically at par with the treatment Fe_3 (68.16 days) as was reported by Ganga *et al*. (2008) in chrysanthemum. The interaction effect between Zn and Fe was, however, non-significant The data presented in table 1 revealed that the effect of iron on days to the first spike emergence in gladiolus was found significant and however, the maximum days to first spike emergence were required under the treatment Fe_0 (71.25 days). Iron is involved in the synthesis of plant hormones and also plays an important role in chlorophyll synthesis, photosynthesis and respiration. This might have been the reason for earlier flowering with application of iron. Similar results were also obtained.

Effect of foliar application of zinc and iron on number of spike ha^{-1}

The data presented in table 1 showed that the number of spike ha^{-1} (1.99 lakh) was more in treatment Zn_2 *i.e.* application of zinc @ 1.0%. However, minimum number of spike hectare^{-1} was counted with the control treatment Zn_0 (1.78 lakh). An increased in spike hectare^{-1} due to the level of zinc may be attributed to increased in growth parameter *viz*, plant height of gladiolus and various yield contributing character viz, spike ha^{-1} and spike plot^{-1} under the treatment of zinc. Maximum numbers of spikes were recorded in the treatment Zn_2. Similar findings were registered by Barman and Pal (1993) in marigold and Kumar *et al*. (2001) and Sharma *et al*. (2013) in gladiolus.

Significantly maximum number of spikes ha^{-1} (1.98 lakh) was recorded with the treatment Fe_2, which found statistically at par with Fe_3. Balkrishanan *et al*. (2007) reported similarly in marigold. The produced significantly maximum length of spike (82.05 cm) was maximum due to the treatment Zn_2, as reported by Saeed *et al*. (2013).

The data presented in table 1 revealed that the spike ha^{-1} in gladiolus was significantly influenced by different level of iron (1.89 lakh). Iron help for the synthesis of chlorophyll, certain enzymes and part of numerous protein which play important role in photochemical reaction.

Effect of foliar application of zinc and iron on length of gladiolus spike

The data from table 1 reaveled that different level of zinc significantly influenced the length of gladiolus spike. Whereas the treatment Zn_0 produced minimum length of spike (74.68 cm). The improvement in length of spike due to level of zinc might be due to an optimum supply of zinc increased the plant growth and involved in photosynthesis and enhanced the chlorophyll, protein content hence, the length of spike is improved in gladiolus. Similar results were closely confirmed with in irish plant.

The data presented in table 1 reaveled that different treatments of iron significantly influenced the length of spike in gladiolus. The treatment Fe_2 produced significantly maximum length of spike (82.20 cm). Whereas, the treatment Fe_0 produced minimum length of spike (74.37 cm). An increased in the length of gladiolus spike with increased in the level of iron might be due to iron contained the component like ferridoxin, enzyme like catalase which physiologically activated the root site, synthesis of hormones hence the length of gladiolus is increased. The results were closely in accordance with Ganga *et al*. (2008) in chrysanthemum.

Effect of foliar application of zinc and iron on diameter of gladiolus spike

The data presented in table 1 exhibited that various level of zinc had significant influenced on the diameter of gladiolus spike. Significantly Maximum diameter of spike was recorded in the treatment Zn_2 (0.63 cm). However, minimum diameter of spike was recorded in the treatment Zn_0 (0.52 cm). The increased diameter of gladiolus spike was noted with level of zinc, which might be due to zinc application also improved the nutritional status within plant. Similar results were in accordance with those obtained by Saeed *et al*. (2013) in gladiolus. Various levels of iron had significant influenced on the diameter of spike. Significantly recorded in treatment Fe_2 (0.59 cm). However, minimum diameter of spike was recorded maximum diameter of spike in the treatment Fe_0 (0.53 cm).

Table 1 : Effect of foliar application of zinc and iron on quality parameter.

Treatment	Days of first spike emergence	Spike ha^{-1} (lakh)	Length of spike (cm)	Diameter of spike (cm)
Zinc				
Zn_0-Control	63.17	1.78	74.68	0.52
Zn_1 -Zinc 0.5%	66.00	1.84	76.15	0.56
Zn_2 -Zinc 1.0%	71.25	1.99	82.05	0.63
Zn_3 -Zinc 1.5%	67.83	1.87	77.77	0.57
F – Test	Sig	Sig	Sig	Sig
S E	1.97	0.024	0.63	0.01
CD @ 5%	5.69	0.069	1.82	0.04
Iron				
Fe_0 -Control	62.91	1.77	74.33	0.53
Fe_1- Iron 0.5%	65.16	1.83	76.07	0.55
Fe_2 - Iron 1.0%	71.25	1.98	82.20	0.59
Fe_3 - Iron 1.5%	68.91	1.89	78.02	0.58
F –Test	Sig	Sig	Sig	Sig
S E	1.97	0.024	0.63	0.01
CD @ 5%	5.69	0.069	1.82	0.04
Interaction				
F –Test	NS	NS	NS	NS
SE	3.94	0.048	1.26	0.03
CD @ 5%	-	-	-	-

Overall scrutinizing the results of one year experiment on gladiolus plant with levels of zinc and iron. The application of zinc and iron not only increased the flower and plant production. From one year data, it is roughly recommended that the application of zinc @ 1.0% and iron @ 1.0% increases the yield of gladiolus. But for the strong conclusion, study will have to be continuing for some years.

It can be thus concluded that the application of zinc and iron enhance the growth, yield and quality by gladiolus.

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