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Effect of Iron on Vegetative Growth, Flowering, Corm and Cormel Production in Gladiolus (*Gladiolus grandiflorus* L.) cv. White Prosperity

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ABSTRACT

Gladiolus is an important cut flower crop in the domestic as well as international flower markets. It is a popular cut flower owing to its versatile colours and varieties having large keeping quality of flower. Flower crops are very much responsive to fertilizers. It requires higher amount of chemical fertilizers in balance proportion for ensuring maximizing flower production. The present investigation was carried out at Horticultural College and Research Institute, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari district, Andhra Pradesh during 2011-2012 to study the effect of iron on vegetative growth, flowering, corm and cormel production in Gladiolus cultivar White prosperity. In this experiment cv. White Prosperity was cultivated with three treatments viz., Control, Iron EDTA 1 % and Iron EDTA 1.5%. Iron EDTA@1.5 % has significantly influenced in giving maximum plant height (70.84 cm), highest numbers of spikes per plant (1.80), maximum spike length (96.53 cm), more number of florets per spikes (14.0) and maximum number of corms per mother corm (1.66).

Key words: *Gladiolus, Iron EDTA 1%, Iron EDTA 1.5 %, Fertilizers*

INTRODUCTION

Gladiolus (*Gladiolus grandiflorus* L.) is an important cut flower crop in the domestic flower markets of Delhi, Bangalore, Hyderabad, Kolkata and Mumbai for making bouquets, vases, flower decorates and to get high market returns. Gladiolus is popularly known as 'Queen of the bulbous flowers' because of attractive spikes, having florets of different colours and better keeping quality for 7 to 10 days. It is also known as "Sword lily" because of the shape of its leaves. Gladiolus is valued for its majestic and beautiful spikes with flowers of different attractive colours and shapes.

In India, Gladiolus is commercially grown in the hills and the plains in nearly 300 ha and about 54 million spikes, are being produced annually[7].

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It occupies third place in area and production of cut flowers grown in India after the Rose and carnation. Gladiolus is in fifth place in the international flower market. It has occupied fourth position in world's bulbous flower trade[11]. It has great economic value for cut flower trade and much valued by the aesthetic world for beauty and loving people because its prettiness and unparallel elegance. The long flower spikes are excellent as cut flower for table decoration when arranged in vases. For its attractiveness and assortment of colours, gladiolus captured the domestic and world market economy.

Due to its aesthetic value for mankind and economic importance, the area and production of gladiolus flower crop increases substantially day by day like tuberose. But unfortunately the producers even do not have any recommended dose of integrated fertilizer package. Resulting, they are not getting desired and expected yield of flower. Flower crops are very much responsive to fertilizers. It is highly capable of exhausting huge nutrients from native soil. So, it requires higher amount of chemical fertilizers in balance proportion for ensuring maximizing flower production. Major nutrients like nitrogen, phosphorus, potassium along with micronutrients noticeably increase the number of flowers, florets/spike, the longest spike and flowering stem of gladiolus[1]. Gladiolus has prolonged vase life and ability to withstand long distance transport[2]. Availability of gladiolus cut flowers round the year helps in better flower production and marketing on commercial basis. In recent years, it was found that the micronutrient iron play an important role in regulating the flower production in Gladiolus to catch the early and late demands in the cut flower market besides increasing the production of corms and cormel production[4].

Keeping the above points in view, the present investigations have been conducted to see the effect of iron on vegetative growth, flowering, corm and cormel production in gladiolus (*Gladiolus grandiflorus* L.) Cultivar white prosperity, at Horticultural College and Research Institute, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari district, Andhra Pradesh.

MATERIAL AND METHODS

The present investigation was carried out during 2011-2012 at Horticultural College and Research Institute, Dr.YSR. Horticultural University, Venkataramannagudem, West Godavari District, Andhra Pradesh. The site is located at an altitude of 34 m (112 feet) above mean sea level. The geographical situation is 16.8°N latitude and 81.5°E longitude. The experiment was conducted with RBD, three treatments each replicated three times during rabi season. The treatments were Control, Iron EDTA 1% and Iron EDTA 1.5% and the Cultivar is White Prosperity. The net plot size followed is 1.8 m X 1.8 m with spacing of 30 cm X 20 cm. The obtained data was statistically analyzed and presented.

White Prosperity

White prosperity has large, pure white flowers with ruffled petals**.** Florets are white in color with purple spots on throat. It is a open faced, late season cultivar bearing a long spike of 90-95 cm. The number of florets per spike is 13-15 and the floret size is 10-11cm. It is an excellent cormel producer. The cultivars belongs to late maturity group and has erect growing nature. The long sword-shaped leaves are equitant, overlap and unfold like a fan. The showy blooms are densely born on one sided of spike. The spikes are generally at a height of 100 cm to 125 cm. Flowers are funnel shaped and six lobed which open from the bottom of the spike up, with many openings simultaneously.

RESULTS AND DISCUSSION

Vegetative parameters

The data regarding vegetative parameters were presented in Table 1. Among the three treatments, maximum (70.84 cm) plant height was recorded with Iron EDTA 1.5 % whereas minimum (63.64 cm) was seen in control. It is clear that the increased concentration of iron significantly increased the plant height. Maximum plant height due to higher concentration of iron might be due to its role

in synthesis of proteins.[13] stated that iron being associated with chlorophyll formation and activity of several enzyme systems and plant compounds such as catalase, cytochrome oxidase causes shoot growth. The differential response of micronutrients with respect to plant height might be due to the fact that these nutrients activate several enzymes like catalase, peroxidase, alcohol dehydrogenase, tryptophan synthatase etc and involve themselves in chlorophyll synthesis and various physiological activities by which plant growth and development are encouraged[9].

Regarding number of leaves, more number of leaves (9.36) were noted with Iron EDTA 1.5% whereas less (7.80) were seen in control.[8], stated that the spray of various micronutrients caused significant increase in number of green leaves. The length and width of leaf was significantly higher in the plants sprayed with iron 1.5 per cent. Similar increase in length was observed by Kumar *et al.*[12] in gladiolus with boron 0.2 per cent. Tibabishov (1970) reported that pre sowing treatment of onion with 0.2% boron resulted vigorous leaf development.

Table 1: Vegetative parameters of cv. White Prosperity under different treatments

Sl. No	Treatments	Plant height	No. of leaves	Length of Leaf	Width of Leaf
1	**Control**	63.64 ± 2.0	7.80 ± 0.10	44.93 ± 2.19	2.34 ± 0.34
2	**Iron EDTA 1 %**	67.38 ± 1.0	8.86 ± 0.10	45.18 ± 6.29	2.30 ± 0.54
3	**Iron EDTA 1.5 %**	70.84 ± 2.0	9.36 ± 0.10	48.30 ± 0.98	2.36 ± 0.27
CV		2.86	2.86	2.86	2.86
CD		4.04	0.23	9.09	0.94

Values are means ± SEM of five independent determinations

Flowering parameters

The data regarding flowering parameters were presented in Figures 1, 2 & 3. Among the three treatments, control (92.66 days) recorded less number of days for first flower appearance whereas more (97.20 days) were noted with Iron EDTA 1.5%. The increase in concentration of iron delayed number of days taken for first flower appearance. The results were in conformity with Gulatay and Krone[6], Sharga and Motial[15] and Chaturvedi *et al.*[5] who noticed delayed flowering in gladiolus with the application of micronutrients. Control and iron 1% of low concentration induced early flowering. The findings are in confirmity with Sharga and Motilal[15], Chaturvedi *et al.*[5]. Regarding number of days to first harvest, less (99.52 days) were noted in control whereas more (103.21 days) were recorded with Iron EDTA 1.5%. The spray of micronutrients delayed the number of days to first harvest which may be attributed to its varietal character. Iron at 1.5 per cent recorded highest number of days to first harvest over the other treatments.

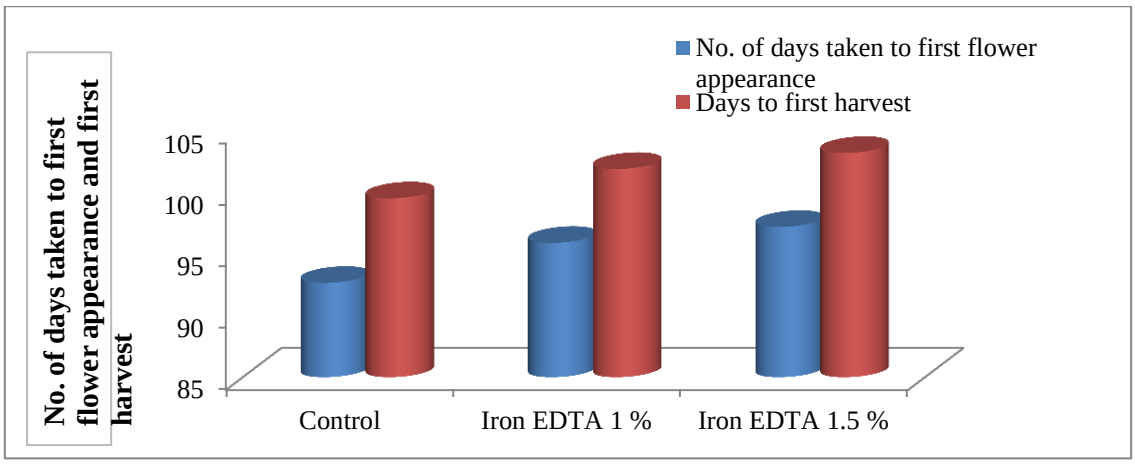

Fig. 1: No. of days taken to first flower appearance and days to first harvest of Cv. White Prosperity under different treatments

More number of florets per spikes (14.0) was noted with Iron EDTA 1.5% whereas less (9.46) number was seen in control. Maximum number of florets may be probably due to enhanced plant height and spike length. Bala *et al*.[3] recorded longer spikes with more number of florets with foliar spray of iron (0, 0.5 and 1%). Highest numbers of spikes per plant (1.80) were seen with Iron EDTA 1.5% whereas lowest (1.40) noted in control. Kumar *et al*.[10] observed that foliar application of ferrous sulphate, FeSO4. 7H2O on chrysanthemum at 0.2 per cent recorded the maximum number of flowers per spray over the control.

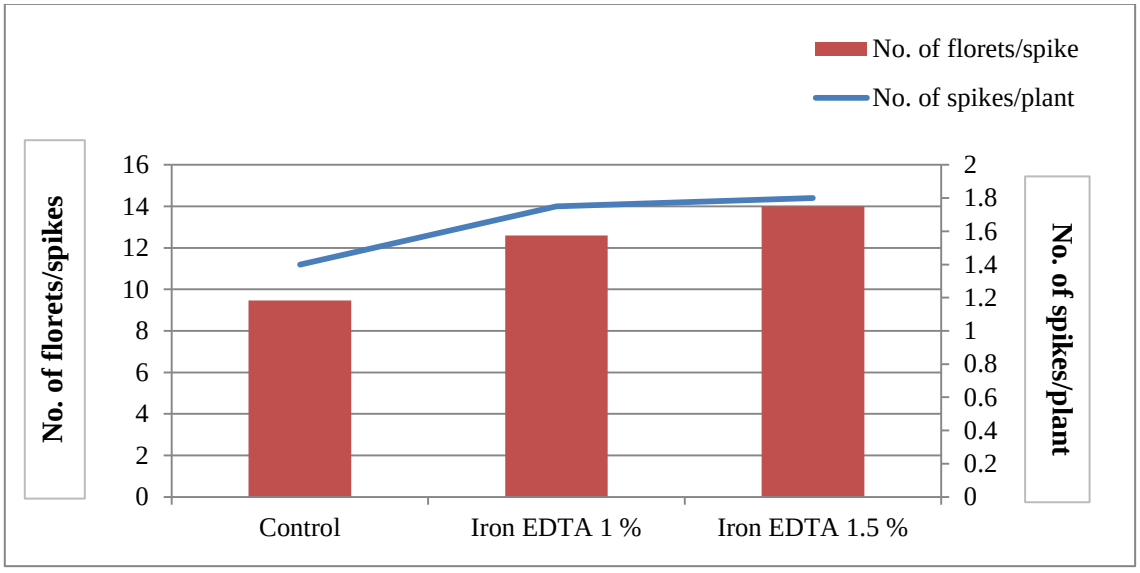

Fig. 2: No. of florets/spike and No. of spikes/plant of Cv. White Prosperity under different treatments

Maximum spike length (96.53 cm) was recorded with Iron EDTA 1.5 % whereas minimum (91.03 cm). Iron being involved in chlorophyll synthesis might have improved photosynthetic product which in turn increased spike length. Similar results were reported by Kumar and Arora[9] and Bala *et al*.[3], who noticed maximum spike length with foliar spray of FeSO4 and ZnSO4 each at 2% concentration.

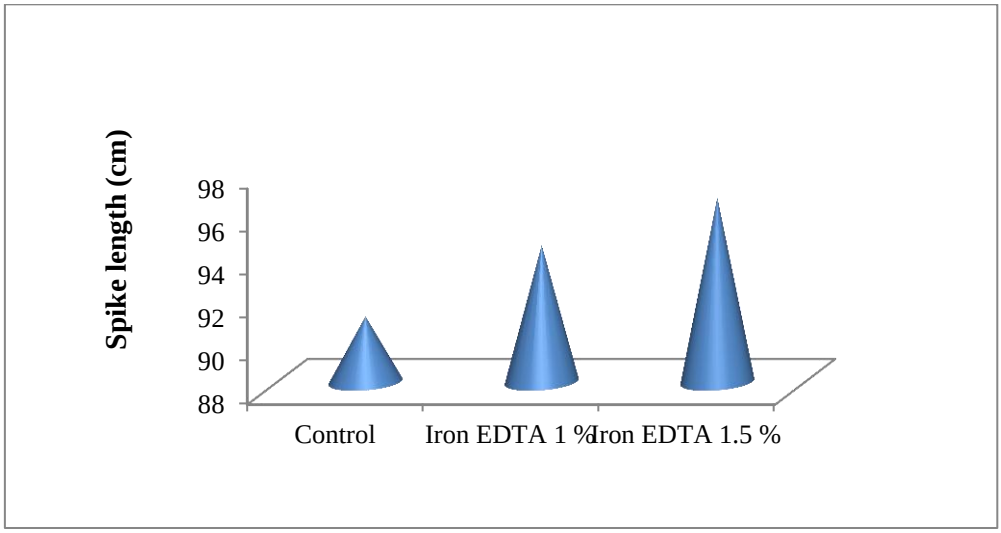

Fig. 3: Spike length (cm) of Cv. White Prosperity under different treatments

Corm and Cormel parameters

The data regarding corm and cormel parameters were presented in Table 2. Maximum number of corms per mother corm (1.66) was noted with Iron EDTA 1.5 % whereas Iron EDTA 1 % and control (1.13) are on par with each other. Rao *et al.*[14] proved that the foliar spray of FeSO4 @ 0.6 per cent concentration significantly increased the corm yield. Similar findings were reported by Kumar and Arora[9].

Iron EDTA 1.5 % recorded maximum (5.92 cm) of corm size whereas least (5.19 cm) was noted in control. The increased corm size with iron and boron sprays might be due to increased cell division reported by Sharova *et al.*[16] and due to greater mobilization of photosynthates to the places where the corms are formed. Similar results were reported by Bala *et al.*[3]. More (35.40) number of cormels per plant were noted in Iron EDTA 1 % whereas less (26.62) were seen in control. Bala *et al*.[3] stated that foliar application of iron at higher concentrations (1.0 %) recorded maximum values for number of cormels per plant.

Table 2: Corm parameters of Cv. White Prosperity under different treatments

Sl. No	Treatments	No. of corms/mother corm	Size of corm	No. of cormels/plant
1	**Control**	1.13 ± 0.11	5.19 ± 0.50	26.62 ± 0.97
2	**Iron EDTA 1 %**	1.13 ± 0.23	5.77 ± 0.10	32.80 ± 1.99
3	**Iron EDTA 1.5 %**	1.66 ± 0.64	5.92 ± 0.10	35.40 ± 1.99
CV		2.86	2.86	2.86
CD		0.93	0.70	4.02

Values are means ± SEM of five independent determinations

CONCLUSION

From this investigation study it was proved that the foliar spray of Iron EDTA at 1.5 % concentration significantly improved gladiolus growth, floral characters and corm cormel production in cultivar White prosperity when compared to Iron EDTA 1% and Control. Out of the micronutrient concentrations, the iron EDTA at 1.5 % which improved the flowering and spike production, can be regulated to fetch better price in the off season market. This would be a practical utility to the florist community.

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