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Postharvest Life and Bulb Yield of Lilium as Influenced by Foliar Application of Zinc and Iron

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Abstract A study was carried out on lilium which is one of most popular cut flowers in the world. Flowering plants require micronutrients for their optimum growth and development and their deficiency can have a deteriorating impact on production and quality of flowers. This trial is concerned with influence of foliar application of zinc and iron at 0.2% and 0.4%, on postharvest and yield characters of gladiolus. The results showed that $ZnSO_4$ at 0.2% and 0.4% enhanced days to opening of 2nd bud, uptake of vase solution and no. of scales/bulb. $FeSO_4$ 0.2% improved weight of bulbs/plant and diameter of bulb. Combination of zinc and iron increased diameter of 2nd and 3rd flower, no . and weight of bulblets/plant. Both zinc sulfate and iron sulfate showed significant results over control.

Keywords Lilium, Zinc, Iron, Postharvest, Yield.

Introduction

Lilium is a bulbous plant of Liliaceae family constitution of approximately 110 species that are distributed , mainly in Asia, North America and Europe [1]. Lilium ranks 6th in the after rose, chrysanthemum, carnation, gerbera and tulip for cut flowers in the world. Appropriate amount of nutrients is imperative for proper growth and development of plants and their deficiency can induce physiological disorders. Iron (Fe) plays vital role in synthesis of chlorophyll, carbohydrate production, cell respiration, chemical reduction of nitrate and sulfate and in assimilation of nitrogen. Zinc (Zn) is a prerequisite in synthesis of auxins and proteins and also promotes RNA syn-

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Table 1. Effect of application of zinc and iron on post-harvest parameters in lilium.

Treatments	Days to opening of 2nd bud	Days to opening of 3rd bud	Diameter of 2nd flower (cm)	Diameter of 3rd flower (cm)	Solution uptake (ml)
Control (Distilled water)	1.67	3.00	14.50	14.07	12.00
$ZnSO_4$ 0.2%	2.67	4.00	15.00	13.93	20.33
$ZnSO_4$ 0.4%	1.50	3.00	14.82	13.50	24.00
$FeSO_4$ 0.2%	1.50	3.50	15.17	14.52	14.67
$FeSO_4$ 0.4%	2.50	4.50	14.90	14.32	15.33
$ZnSO_4$ 0.2% + $FeSO_4$ 0.2%	2.00	4.50	13.82	13.90	20.00
$ZnSO_4$ 0.2% + $FeSO_4$ 0.4%	1.00	3.50	15.30	14.55	20.67
$ZnSO_4$ 0.4% + $FeSO_4$ 0.2%	1.67	3.50	14.37	14.22	14.67
$ZnSO_4$ 0.4% + $FeSO_4$ 0.4%	1.33	4.00	15.50	14.62	21.33
CD	0.38	NA	0.62	0.46	3.52

thesis [2]. There are only few concrete studies on essentiality of micronutrients in flower crops. Hence, this study was executed with the objective to find out effect of zinc and iron on postharvest life and bulb yield in lilium cv Navona.

Materials and Methods

Lilium cv Navona is an Asiatic hybrid lily. Healthy and disease-free bulbs of lilium cv Novona were planted at 25 cm × 20 cm spacing in October , 2015. Field experiment was carried out under polyhouse at Horticulture Research Farm and postharvest study at Post harvest Lab of Department of Horticulture, IAS, BHU, Varanasi. Lilium cv Navona plants were sprayed with 0.2% and 4% zinc sulfate and iron sulfate, individually and in various combinations at 30 and 45 days after planting. There were 9 treatments as follows $ZnSO_4$ 0.2%, $ZnSO_4$ 0.4%, $FeSO_4$ 0.2%, $FeSO_4$ 0.4%, $ZnSO_4$ 0.2% + $FeSO_4$ 0.2%, $ZnSO_4$ 0.2% + $FeSO_4$ 0.4%, $ZnSO_4$ 0.4% + $FeSO_4$ 0.2%, $ZnSO_4$ 0.4% + $FeSO_4$ 0.4% and distilled water as control. The study was carried out in randomized block design with three replications. Cultural operations were deployed as when required. Observations were made on postharvest characters and yield parameters. Lilium stems were cut when 1st bud was fully opened and kept in vase solution of 2% sucrose + 200 ppm 8-HQC. The data recorded were subjected to statistical analysis.

Results and Discussion

Postharvest parameters

The results have been depicted in Table 1. Accordingly, days to opening of 2nd bud was delayed (2.67 days) with $ZnSO_4$ 0.2% treatment which was significant over all treatments including control. Maximum uptake of vase solution (24 ml) was recorded with $ZnSO_4$ 0.4%, which was significant to $ZnSO_4$ 0.2% $ZnSO_4$ 0.4% $FeSO_4$ 0.2% $FeSO_4$ 0.4% $ZnSO_4$ 0.2% + $FeSO_4$ 0.4%, $ZnSO_4$ 0.4% + $FeSO_4$ 0.2% and control. Zinc has given better postharvest results compared to iron because iron produces reactive oxygen species which degrades flower quality [3]. These outcomes are supported by findings of singh et al. [4]. $ZnSO_4$ 0.4% + $FeSO_4$ 0.4% exhibited maximum diameter of 2nd flower (13.82 cm), significant to $ZnSO_4$ 0.4%, $ZnSO_4$ 0.2% + $FeSO_4$ 0.2%, $ZnSO_4$ 0.4% + $FeSO_4$ 0.2% including control and also maximum diameter of 3rd flower (13.50 cm), significant to $ZnSO_4$ 0.2%, $ZnSO_4$ 0.4%, $ZnSO_4$ 0.2% + $FeSO_4$ 0.2% and control. These results were in agreement with findings of Khosa et al [5] in gerbera. Days to Opening of 3rd remained unaffected.

Yield parameters

Effect on yield parameters has been presented in Table 2. According to data recorded, zinc at 0.4% has increased no. of scales / bulb (12.67) which was significant to $ZnSO_4$ 0.2%, $ZnSO_4$ 0.2% + $FeSO_4$ 0.2%,$ZnSO_4$ 0.2% + $FeSO_4$ 0.4%, $ZnSO_4$ 0.4 + $FeSO_4$ 0.2% and control. $ZnSO_4$ 0.2% + $FeSO_4$ 0.4% produced superior results for no. of bulblets/plant (3.00), which was significant to all treatments except $ZnSO_4$ 0.4% + $FeSO_4$ 0.4% Zinc is inevitable in amino acid synthesis in plants which helps in seed germination and development. Similar results were also reported by Hembrom et al. [6]. $FeSO_4$ 0.2% enhanced weight of bulbs/plant (15.44 g) and diam-

Table 2. Effect of application of zinc and iron on bulb yield parameters in lilium.

Treatments	No. of bulbs/ plant	No. of bulblets/ plant	No. of scales/ bulb	Weight of bulbs/ plant (g)	Weight of bulblets/ plant (g)	Diameter of bulb (cm)
Distilled water	1.00	1.00	10.00	9.77	0.13	2.99
$ZnSO_4$ 0.2%	1.00	1.33	9.33	11.28	0.17	3.30
$ZnSO_4$ 0.4%	1.00	1.33	12.67	13.21	0.16	3.36
$FeSO_4$ 0.2%	1.00	1.67	12.00	15.44	0.18	3.80
$FeSO_4$ 0.4%	1.00	2.00	12.33	7.19	0.27	3.06
$ZnSO_4$ 0.2% + $FeSO_4$ 0.2%	1.00	1.67	9.67	10.50	0.18	3.19
$ZnSO_4$ 0.2% + $FeSO_4$ 0.4%	1.00	3.00	10.67	10.10	0.49	3.07
$ZnSO_4$ 0.4% + $FeSO_4$ 0.2%	1.33	1.67	9.00	8.66	0.20	2.94
$ZnSO_4$ 0.4% + $FeSO_4$ 0.4%	1.00	2.67	12.67	10.92	0.38	3.53
CD	NA	0.68	1.28	2.36	NA	0.23

eter of bulb (3.80 cm) proving to be significant over all treatments. Iron is involved in chlorophyll synthesis which increases photosynthetic capacity of plants and hence results in better development of sink [3]. These outcomes were in accord with Chopde et al. [7]. No. of bulbs/plant and weight of bulblets/plant were not significantly affected.

References

1. Wang JM, Ma SLY, Li WQ, Wang Q, Cao HY, Gu JH, Lu YM (2015) Genetic variability and diversity of the main resources of lily assessed via phenotypic characters, pollen morphology and ISSR markers. Genet and Mol Res 15 : 1—14.
2. Roy RN, Finck A, Blair GJ, Tandon HLS (2006) Plant nutrition for food security-A guide for integrated nutrient management. Fao Fertil and Pl Nutri Bull, pp 32-34.
3. Roschzttardtz H, Conejero G, Divol F, Alcon C, Verdeil JL, Curie C, Mari S (2013) New insights into Fe localization in plant tissues. Frontiers Pl Sci 4 : 1—11.
4. Singh AK, Hembrom R, Singh J, Sisodia A, Pal AK (2015) Effect of iron and zinc on growth and postharvest life in lilium cv Tresor. Environ Ecol 33 : 625—628.
5. Khosa SS, Adnan Y, Adnan R, Shahina Y, Atif R (2011) Effect of foliar application of macro and micronutrients on growth and flowering of *Gerbera jamesonii* L. Am Euras J Agric Environ Sci 11 : 736—757.
6. Hembrom R, Singh AK, Sisodia A, Singh J, Asmita (2015) Influence of foliar application of iron and zinc on growth, corm and cormel yield in gladiolus cv American beauty. Environ Ecol 33 : 1544—1546.
7. Chopde N, Nehare N, Maske SR, Lokhande S, Bhute PN (2015) Effect of foliar application of zinc and iron on growth, yield and quality of galdiolus. Pl Archives 15 : 417—419.