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Role of Micronutrients in Enhancing Floral Quality and Postharvest Shelf Life in Ixora †

Kuna Karthik [1,*], Mathian Ganga [1], Shaik Sumera [1] and Devanakonda Venkata Sai Chakradhar Reddy [2]

[1] Department of Floriculture and Landscaping, Tamil Nadu Agricultural University, Coimbatore 641003, India; gangasivakumar@yahoo.com (M.G.); shaik.phdfls2022@tnau.ac.in (S.S.)
[2] Division of Agricultural Physics, Indian Council of Agricultural Research (ICAR), Indian Agricultural Research Institute (IARI), Pusa, New Delhi 110012, India; devanakonda.chakri9@gmail.com
* Correspondence: k1113karthik@gmail.com
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Abstract

In the burgeoning floriculture sector of Indian agriculture, optimizing yields of loose flowers like Ixora is crucial. This study investigates the impact of micronutrient management on floral quality, physiological attributes, and postharvest shelf life using four Ixora varieties treated with $FeSO_4$, $ZnSO_4$, and boric acid. The Pink variety (V_2) excelled in flower bud length (5.15 cm), bud width (0.38 cm), and corolla tube length (3.73 cm), and also demonstrated the longest shelf life (5.20 days at room temperature, 6.21 days refrigerated). Foliar spray of NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%) on the Pink variety ($V_2 \times T_4$) further maximized bud length (5.44 cm), bud width (0.44 cm), corolla tube length (3.95 cm), and shelf life (6.09 days room temperature, 7.13 days refrigerated). These improvements are linked to zinc's role in photosynthesis, iron's role in chlorophyll synthesis, and boron's role in cell wall strength, enhancing flower quality and marketability.

Keywords: ixora; micronutrients; floral quality; postharvest shelf life

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1. Introduction

India's diverse agroclimatic conditions provide an ideal setting for cultivating a wide range of flower crops throughout the year. Floriculture has emerged as one of the fastest-growing sectors in Indian agriculture [1]. According to the National Horticulture Database (2019–2020), floriculture was practiced on approximately 305,000 hectares, yielding 2.3 million tonnes of loose flowers and 762,000 tonnes of cut flowers. Major contributors to floriculture exports, such as Andhra Pradesh, Tamil Nadu, and Madhya Pradesh, played a pivotal role in achieving exports of 23,597 MT, valued at INR 771.41 crores, in 2021–2022 (APEDA). Among the various ornamental crops, Ixora coccinea, commonly referred to as "West Indian Jasmine" or "Flame of the Woods," has gained prominence for its aesthetic appeal and year-round flowering potential [2,3].

Ixora coccinea, belonging to the Rubiaceae family, encompasses over 500 species and is extensively cultivated across Asia for its ornamental value. This evergreen shrub is characterized by its densely branched growth, glossy foliage, and clusters of vibrant blooms in shades of red, orange, yellow, pink, and white [4]. Its adaptability and ease of maintenance make it an excellent choice for landscaping, hedges, borders, and container gardening. Dwarf varieties are particularly suited for pot cultivation. Additionally, the brightly colored

flowers attract pollinators such as birds and butterflies, providing ecological benefits to urban green spaces [5].

In Tamil Nadu, Ixora has emerged as a significant loose-flower crop in recent years due to its rising commercial value. Its ability to bloom throughout the year, with peak flowering observed during April and May, coupled with the long shelf life of its flowers, makes it well-suited for loose-flower production [5]. Cultivars like Bandhura, Lancasteria, Magnifica, New Pink, and Pilgrimii, known for their vibrant red and orange–red flowers, are highly sought after in the market. These flowers are commonly used in religious rituals, garland-making, and floral decorations, and are often paired with blooms from *Jasminum* spp., *Agave amica*, and *Tabernaemontana* spp.

Although required in small quantities, micronutrients play an essential role in plant growth and flower production. Elements such as boron (B), copper (Cu), iron (Fe), manganese (Mn), and zinc (Zn) are critical for improving plant health and enhancing bloom quality and yield [6]. For example, calcium (Ca) facilitates flower opening and delays senescence, while zinc aids in stem elongation and pollen production. Iron is indispensable for photosynthesis, and boron supports cell division and hormone transport [7]. The application of these micronutrients has been shown to significantly improve flowering performance and yield in Ixora [5].

Despite the increasing demand for traditional flowers like Ixora, India's floriculture industry remains largely focused on cut flowers such as roses, lilies, and orchids. This emphasis has limited government support for loose-flower cultivation, as subsidies and infrastructure primarily target modern cut-flower crops. Nevertheless, Ixora holds significant potential for small and marginal farmers due to its low input requirements and adaptability. Given its commercial, ornamental, and medicinal importance, there is an urgent need to optimize cultivation practices, particularly concerning micronutrient management. Promoting Ixora cultivation through sustainable practices could provide substantial economic benefits to small and marginal farming communities.

2. Materials and Methods

The present study was carried out at the Department of Floriculture and Landscape Architecture, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during 2021–2022. Four varieties of *Ixora coccinea* namely, Red (V_1), Pink (V_2), Orange (V_3), and Yellow (V_4) were involved in the study. Three micronutrients viz., $FeSO_4$, $ZnSO_4$, and Boric acid in various concentrations and combinations were applied as foliar spray at monthly intervals. The experimental site is located at 11° N latitude, 76.5° E longitude, and an altitude of 430 m above Mean Sea Level (MSL). The main objective of this study is to investigate the role of micronutrient management (specifically foliar application of $FeSO_4$, $ZnSO_4$, and boric acid) on floral quality, physiological attributes and postharvest shelf life of four *Ixora coccinea* varieties. The study aims to optimize micronutrient treatments to enhance flower bud dimensions, corolla tube length, shelf life, leaf area, and chlorophyll content, thereby improving the economic viability and quality of Ixora flowers for the floriculture sector.

Two-year-old plants of the four Ixora varieties were planted at spacings of 1.8 × 1.8 m. The experiment was laid out in Factorial Randomized Block Design (FRBD) with five treatments and two replications, with each treatment having ten plants. The micronutrient treatments include (recommended dose @ 75:150:150 g plant^{-1}) + Water Spray (T_1 − Control), 0.5% $FeSO_4$ + 0.5% $ZnSO_4$ (T_2), 1.0% $FeSO_4$ + 0.5% $ZnSO_4$ (T_3), 0.5% $FeSO_4$+ 0.5% $ZnSO_4$ + 0.2% Boric acid (T_4), 1.0% $FeSO_4$ @ + 0.5% $ZnSO_4$ + 0.2% Boric acid (T_5). Different quality parameters (color of the flower, flower bud length and flower bud width, corolla tube length, shelf life) and physiological parameters (leaf area and chlorophyll content) were

collected at monthly intervals. Each plant is provided with 75:150:150 g/plant NPK as basal dosage [4]. Foliar spray was given at 30-day intervals in the morning hours, with each Ixora plant receiving approximately 250–300 mL of micronutrient solution, ensuring complete coverage of all plant surfaces until the foliage was thoroughly wetted. Cultural operations were carried out at regular intervals for optimum development and establishment of the crop.

3. Results and Discussion

3.1. Quality Parameters

3.1.1. Color of the Flower

The color of the flower in different varieties of ixora viz., Red, Pink, Orange, and Yellow was identified using the Royal Horticultural Society Colour Chart (RHS color chart) and presented in Table 1.

Table 1. Color of the flower in each variety, according to Royal Horticultural Society Colour Chart.

Variety	Group	Sub-Group
V_1—Red	Red N45	Moderate red B
V_2—Pink	Red-purple 58	Strong purplish red C
V_3—Orange	Orange-red 33	Vivid reddish orange A
V_4—Yellow	Orange 24	Strong orange yellow B

3.1.2. Flower Bud Length and Flower Bud Width

The data pertaining to the flower bud length and width are furnished in Table 2. Among the four varieties, Pink (V_2) showed the maximum mean flower bud length (5.15 cm) and mean flower bud length (4.03 cm). Among the five micronutrient combinations, foliar spraying of 0.5% $ZnSO_4$ + 0.5% $FeSO_4$ + 0.2% boric acid resulted in the highest mean flower bud length (4.42 cm) and mean flower bud width (0.36 cm). The treatment combination of ($V_2 \times T_4$), i.e., Pink (V_2) with foliar spray of NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%), resulted in maximum flower bud length (5.44 cm) and flower bud width (0.44 cm) (Figure 1).

Table 2. Flower bud length and flower bud width in Ixora, as influenced by variety and micronutrients.

Factors	Flower Bud Length (cm)					Flower Bud Width (cm)				
Varieties / Treatments	V_1 Red	V_2 Pink	V_3 Orange	V_4 Yellow	Mean	V_1 Red	V_2 Pink	V_3 Orange	V_4 Yellow	Mean
T_1—Control (NPK * + Water spray)	3.78	4.93	3.48	3.52	3.92	0.29	0.33	0.29	0.26	0.29
T_2—NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%)	4.14	5.22	3.80	4.10	4.31	0.33	0.42	0.34	0.30	0.34
T_3—NPK + $FeSO_4$ (1.0%) + $ZnSO_4$ (0.5%)	3.90	5.07	3.54	3.82	4.08	0.30	0.34	0.30	0.28	0.30
T_4—NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%)	4.25	5.44	3.79	4.22	4.42	0.34	0.44	0.36	0.31	0.36
T_5—NPK + $FeSO_4$ (1.0%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%)	4.09	5.08	3.59	3.96	4.18	0.32	0.37	0.32	0.29	0.32
Mean	4.03	5.15	3.64	3.92		0.31	0.38	0.32	0.28	
Treatments	V	T	V × T			V	T	V × T		
Sed	0.022	0.025	0.049			0.004	0.004	0.008		
CD (p = 0.05)	0.046	0.052	0.103			0.008	0.009	0.017		

* NPK at recommended dose: 75:75:150 g plant^{-1}.

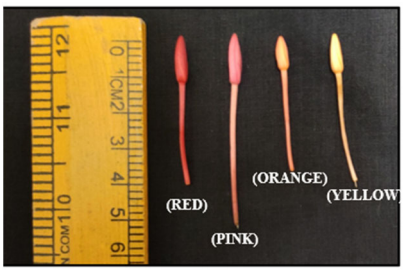


Figure 1. Comparison of the flower bud length in the best treatment (V_2T_4).

3.1.3. Corolla Tube Length (Cm)

Among the four varieties, Pink (V_2) showed the maximum mean corolla tube length (3.73 cm). Of the five micronutrient combinations, foliar spraying of 0.5% $ZnSO_4$ + 0.5% $FeSO_4$ + 0.2% boric acid resulted in the highest mean corolla tube length (3.13 cm). The treatment combination of ($V_2 \times T_4$) i.e., Pink (V_2) with foliar spray of NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%), resulted in the maximum corolla tube length (3.95 cm) (Figure 2).

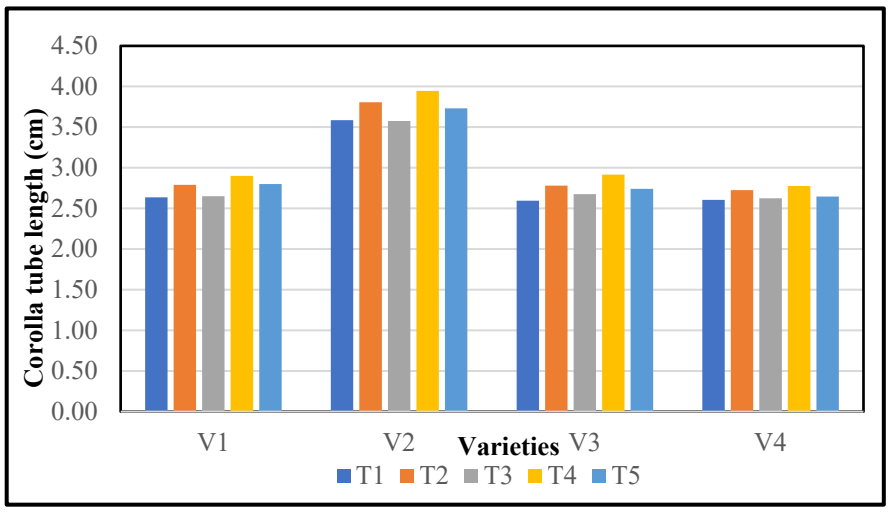


Figure 2. Corolla tube length of Ixora as influenced by variety and micronutrients.

It was observed that the maximum flower bud length, flower bud width, and corolla tube length were recorded in the treatment combination of ($V_2 \times T_4$) i.e., Pink (V_2) with foliar spray of NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%). The increase in flowering attributes might be due to the beneficial role of zinc and iron in enhancing the translocation of carbohydrates, minerals, water, and amino acids from the site of synthesis to the various plant parts, including flowers, which in turn aids in increasing the number, size, and weight of flowers [8,9]. The application of $FeSO_4$ and $ZnSO_4$ enhanced vegetative growth, leading to the production of more food material which in turn is utilized for better development of flowers of annual chrysanthemum [10,11]. The results of the present study are also in close conformity with the findings obtained from gladiolus and marigold [12,13].

3.2. Shelf Life

The data pertaining to shelf life of Ixora is furnished in Table 3. Among the four varieties, Pink (V_2) showed the maximum mean shelf life (5.20 and 6.21), followed by Red (V_1) with mean shelf life (4.89 and 5.85) under room temperature and cold storage, respectively. Of the five micronutrient combinations, foliar spraying of 0.5% $ZnSO_4$ + 0.5% $FeSO_4$ + 0.2% boric acid resulted in the highest mean shelf life (5.48 and 6.57). The treatment combination of ($V_2 \times T_4$), i.e., Pink (V_2) with foliar spray of NPK + $FeSO_4$ (0.5%)

+ $ZnSO_4$ (0.5%) + Boric acid (0.2%), resulted in maximum shelf life at room temperature (6.09) and cold storage (7.13). The shelf life of flowers is a critical issue in postharvest flower management, and it is especially important in flowers like Ixora, which are highly sensitive to ethylene [5]. A steady supply of micronutrients would have aided in maintaining leaf and flower turgor, thereby extending the shelf life [14].

Table 3. Shelf life of Ixora as influenced by variety and micronutrients.

Factors	Room Temperature					Cold Storage				
Varieties / Treatments	V_1 (Red)	V_2 (Pink)	V_3 (Orange)	V_4 (Yellow)	Mean	V_1 (Red)	V_2 (Pink)	V_3 (Orange)	V_4 (Yellow)	Mean
T_1—Control (NPK * + Water spray)	3.91	4.11	3.86	3.80	3.92	4.79	5.29	4.60	4.48	4.79
T_2—NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%)	4.97	5.21	4.72	4.44	4.83	6.01	6.17	5.70	5.39	5.82
T_3—NPK + $FeSO_4$ (1.0%) + $ZnSO_4$ (0.5%)	4.59	4.94	4.31	4.17	4.50	5.61	5.79	5.29	5.28	5.49
T_4—NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%)	5.66	6.09	5.26	4.93	5.48	6.64	7.13	6.43	6.10	6.57
T_5—NPK + $FeSO_4$ (1.0%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%)	5.35	5.66	5.08	4.65	5.18	6.23	6.68	6.10	5.55	6.14
Mean	4.89	5.20	4.64	4.40		5.85	6.21	5.62	5.36	
Treatments	V		T		V × T	V		T		V × T
SEd	0.024		0.027		0.054	0.057		0.064		0.129
CD (p = 0.05)	0.05		0.05		0.11	0.12		0.13		0.27

* NPK at recommended dose: 75:75:150 g $plant^{-1}$.

Micronutrients enable increased nutrient uptake, photosynthetic rate, metabolic activities, early breaking of apical dominance followed by easy and better translocation of nutrients to the flower [15]. Application of micronutrients stimulates metabolic activity in terms of cell wall loosening, cell elongation, and cell enlargement, resulting in increased bud length, bud diameter, flower diameter, and corolla tube length [16]. In the present study, the application of micronutrients significantly influenced the shelf life of flower buds also.

3.3. Physiological Parameters

3.3.1. Leaf Area and Chlorophyll Content

Among the four varieties, Yellow (V_4) showed the maximum mean leaf area (48.83 cm^2) and Pink (V_2) showed the maximum mean chlorophyll content (44.62). Of the five micronutrient combinations, foliar spraying of 0.5% $ZnSO_4$ + 0.5% $FeSO_4$ + 0.2% boric acid resulted in the highest mean leaf area (49.15 cm^2) and highest mean chlorophyll content (43.93). The treatment combination of ($V_4 \times T_4$) i.e., Yellow (V_4) with foliar spray of NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%) resulted in maximum leaf area (50.54 cm^2) (Figure 3) and the treatment combination of ($V_2 \times T_4$) i.e., Pink (V_2) with foliar spray of NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%) resulted in maximum chlorophyll content (49.13).

Micronutrients like zinc and iron play a crucial role in plant physiology, influencing parameters such as fresh and dry leaf weight, leaf area, and chlorophyll content, which directly correlate to plant yield [17]. These micronutrients facilitate carbohydrate accumulation in leaves, boosting photosynthetic activities and subsequently increasing leaf weight [18,19]. They also contribute to the synthesis of amino acids, proteins, chlorophyll, alkaloids, and amides, which are essential for developing new tissues and enhancing vital metabolic processes, ultimately expanding the surface area of leaves [20].

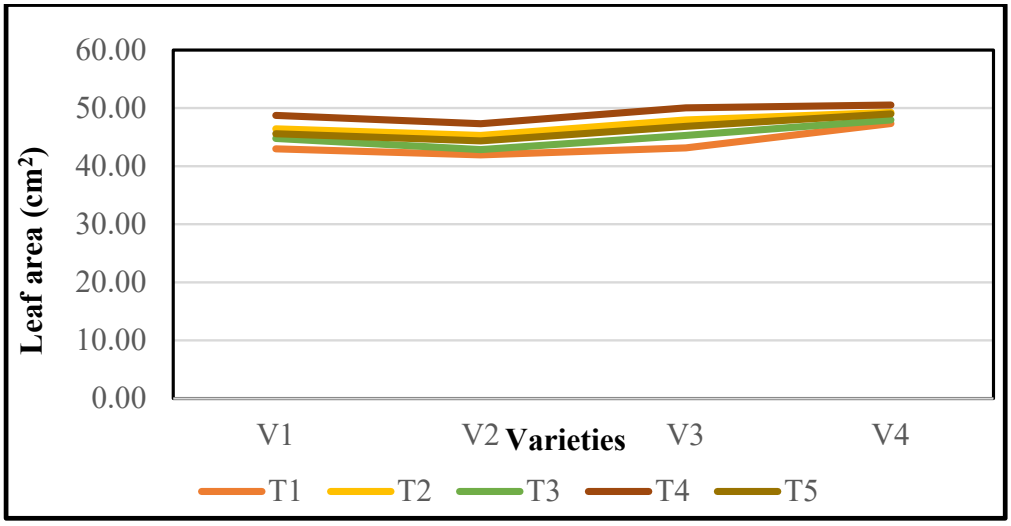


Figure 3. Leaf area (cm^2) in Ixora as influenced by variety and micronutrients.

Leaf area is directly related to photosynthetic efficiency. Chlorophyll, a vital component for photosynthesis, is enhanced by zinc and iron supplementation, which boosts green pigments in leaves. The level of plant pigments significantly increases after treatment with these micronutrients, making chlorophyll content a key determinant of the rate of photosynthesis and a measure of the plant's metabolic efficiency [17]. Iron, in particular, acts as a catalyst in chlorophyll synthesis, improving growth by increasing oxygen transport for chlorophyll production. Furthermore, micronutrients move easily within plant tissues, regulating mitotic processes and increasing cell division, elongation, and cell wall permeability. The presence of iron improves photosystem function, increasing the chlorophyll content of leaves. Zinc application may also increase chlorophyll content by increasing the conversion of phylloxanthin to chlorophyll in leaves [19].

3.3.2. Consumer Preference Analysis

The results indicated that variety Pink (V_2) recorded the highest consumer preference % (98.75%), followed by variety Red (V_1). Consumer preference analysis of loose flowers is generally decided based on criteria such as overall appeal, color, freshness, and attractiveness. The variety Pink (V_2) was rated best by 98.75% of consumers. This is attributed to the novel color of variety Pink. Furthermore, other quality parameters, namely long corolla tube, make this variety ideal for value addition; its freshness and overall appeal are also considered reasons for the superior consumer preference rating of this Pink variety.

4. Conclusions

In this study, the application of the recommended dose of NPK along with foliar spraying of $FeSO_4$ (0.5%), $ZnSO_4$ (0.5%), and boric acid (0.2%) significantly enhanced the flower quality and physiological parameters of *Ixora* varieties. The treatment combination of ($V_2 \times T_4$) i.e., Pink (V_2) with foliar spray of NPK + $FeSO_4$ (0.5%) + $ZnSO_4$ (0.5%) + Boric acid (0.2%), resulted in highest flower bud length (5.44 cm), flower bud width (0.44 cm), corolla tube length (3.95 cm), and chlorophyll content (49.13), and maximum shelf life at room temperature (6.09) and cold storage (7.13). Thus, the Pink and Red varieties of Ixora have proven to respond positively to micronutrients, offering a promising strategy to boost Ixora productivity and enhance its economic viability for small farmers.

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References

1. Anumala, N.V.; Kumar, R. Floriculture sector in India: Current status and export potential. *J. Hortic. Sci. Biotechnol.* **2021**, *96*, 673–680. [CrossRef]
2. Sinha, D.; Sharma, R. Impact of the National Horticulture Mission on the growth of the Indian floriculture industry. *Int. J. Account. Bus. Financ.* **2022**, *1*, 1–10. [CrossRef]
3. Terry, N. Limiting factors in photosynthesis: I. Use of iron stress to control photochemical capacity in vivo. *Plant Physiol.* **1980**, *65*, 114–120. [CrossRef] [PubMed]
4. Indu, C.R.; Neelavathi, R.; Masilamani, P. Studies on optimization of spacing and nutrient levels on growth and flower yield of Ixora (*Ixora coccinea* L.). *Plant Sci. Today* **2025**, *12*, 1900–2348. [CrossRef]
5. Reshma, R.; Ganga, M.; Visalakshi, M.; Irene Vethamoni, P.; Chitdeshwari, T. Standardization of Post-Harvest Management Techniques for Ixora (*Ixora* spp.). *Int. J. Environ. Clim. Change* **2023**, *13*, 1267–1280.
6. Ahmed, N.; Zhang, B.; Chachar, Z.; Li, J.; Xiao, G.; Wang, Q.; Hayat, F.; Deng, L.; Narejo, M.-U.-N.; Bozdar, B.; et al. Micronutrients and their effects on horticultural crop quality, productivity and sustainability. *Sci. Hortic.* **2024**, *323*, 112512. [CrossRef]
7. Karuppaiah, P. Effect of zinc and iron on growth, yield and quality of chrysanthemum (*Dendrathemum grandiflorum* Tzeuleu). *Asian J. Hortic.* **2014**, *9*, 232–236.
8. Shoram, S.; Parekh, N.; Upadhyay, N.; Karapatiya, B.; Patel, H. Effect of nitrogen and phosphorus on vegetative growth and flower yield of Jasmine. *Asian J. Hortic.* **2012**, *7*, 52–54.
9. Neha, C.; Kuchanwar, O.; Borse, G.; Ghodke, A. Studies on Effect of Micro Nutrients on Growth, Yield and Quality of Gladiolus. *BIOINFOLET-A Q. J. Life Sci.* **2016**, *13*, 398–400.
10. Ganga, M.; Jegadeeswari, V.; Padmadevi, K.; Jawaharlal, M. Response of chrysanthemum cv Co. 1 to the application of micronutrients. *J. Ornam. Hortic.* **2008**, *11*, 220–223.
11. Kumar, H.; Singh, S.; Ahlawat, V.; Yadav, B. Influence of nitrogen and zinc application on growth, flowering and chlorophyll content of tuberose (*Polianthes tuberosa* Linn) cv. double. *Haryana J. Hortic. Sci.* **2003**, *32*, 212–215.
12. Lahijie, M. Application of micronutrients Feso4 and Znso4 on the growth and development of Gladiolus variety Oscar. *Int. J. Agric. Crop Sci.* **2012**, *4*, 718–720.
13. Balakrishnan, V. Effect of Micronutrients on Flower Yield and Xanthophylls Content of African Marigold (*Tagetus erecta* L.). Master's Thesis, Tamil Nadu Agricultural University, Coimbatore, India, 2005.
14. Aruna, P.; Rajangam, J.; Rani, P.; Manivannan, M. Nutrient studies in crossandra (*Crossandra infundibuliformis* L. Nees). *Asian J. Hortic.* **2007**, *2*, 169–177.
15. Jagtap, H.; Golliwar, S.V. Thakre. Effect of foliar application of micronutrients on growth and flowering of rose under polyhouse conditions. *Asian J. Hortic.* **2012**, *7*, 25–27.
16. Sahu, M.K.; Tirkey, T.; Sharma, G.; Tiwari, A.; Kushram, T. Effect of foliar application of micronutrients on growth and flower production of gerbera under protected condition. *J. Pure Appl. Microbiol.* **2016**, *10*, 3099–3103. [CrossRef]
17. Pal, S.; Barad, A.; Singh, A.; Khadda, B.; Kumar, D. Effect of foliar application of Fe and Zn on growth, flowering and yield of gerbera (*Gerbera jamesonii*) under protected condition. *Indian J. Agric. Sci.* **2016**, *86*, 394–398. [CrossRef]
18. Ganesh, S.; Kannan, M.; Jawaharlal, M.; Arulmozhiyan, R.; Jeyakumar, P. Enhancement of physiological response in spray chrysanthemum through fertigation. *J. Ornam. Hortic.* **2013**, *16*, 108–116.

19. Nath, M.; Biswas, J. Studies on effect of boron on vegetative and reproductive growth in tuberose (*Polianthes tuberosa*) cv. Single. *Orissa J. Hortic.* **2002**, *30*, 39–42.
20. Kavitha, M.; Kumar, N.; Jeyakumar, P. Effect of zinc and boron on biochemical and quality characters of papaya cv. CO.5. *South Indian Hortic.* **2000**, *48*, 1–5.

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