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STUDIES ON EFFECT OF ZINC SPRAYS ON GROWTH AND YIELD OF ROSE CV. CENTENARY

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Abstract

A field trial on "Effect of zinc spray on growth and yield of rose cv. Centenary" was carried out during *rabi* season of the year 2015-16 at Horticulture Section, College of Agriculture, Nagpur to find out suitable concentrations of zinc spray for higher production of better quality flowers of rose cv. Centenary with seven treatments in Randomized Block Design with three replications. The treatments comprised of different concentrations of zinc *viz*., T_1- control *i.e.* water spray, T_2 - 0.25% zinc, T_3 - 0.5% zinc, T_4 - 0.75% zinc, T_5 - 1.00% zinc, T_6 – 1.25% zinc, T_7 -1.5% zinc and T_8- 2.0% zinc. The results revealed that the treatment of foliar spray of 0.5% zinc followed by 0.75% zinc recorded significantly maximum vegetative growth in respect of plant height, leave branch^{-1} and stem diameter of plant, yield in respect of number of flowers plant^{-1} and quality in respect of diameter and length of flower bud, weight of flower and vase life of flower. The earliest first flower bud initiation and 50 per cent flowering in rose was also registered with the same treatments.

Key words : Rose, zinc, growth, flower yield, quality.

Introduction

Rose is one of the most beautiful creations of nature and is universally acclaimed as "Queen of flowers". It belongs to the family '*Rosaceae*' and genus *Rosa*. It is one of the most important flower crop in commercial flower trade. It is therefore necessary to increase flower yields. In successful production of good quality cut roses, micronutrients play a vital role for production of quality flowers; increase the yield by involving in oxidation reduction process, photosynthesis and energy transfer. Zinc is an important micronutrient for the formation and activity of chlorophyll and in the functioning of several enzymes and the growth hormone, auxin. Various research workers have reported that, the foliar application of proper concentration of zinc helps to increase the yield of good quality flowers of different flower crops. The present investigation was therefore carried out to study the response of rose cv. 'Centenary' to zinc and find out its suitable concentration for higher production of better quality flowers.

Materials and Methods

The present study was carried out at Floriculture Unit of Horticulture Section, College of Agriculture, Nagpur during *rabi* season of the year 2015-16 to study the effect of foliar sprays of zinc on growth, flowering, flower yield and quality of rose cv. 'Centenary' and find out suitable concentration of zinc for production of higher yield of better quality flowers with eight treatments in Randomized Block Design with three replications. The treatments comprised of different levels of zinc (T_1- control *i.e.* water spray, T_2 - 0.25% zinc, T_3 -0.5% zinc, T_4 -0.75% zinc, T_5 -1.00% zinc, T_6 - 1.25% zinc, T_7 -1.5% zinc and T_8 - 2.0% zinc).

Three years old rose plants of cv. Centenary already planted at Floriculture unit of Horticulture section were selected for investigation. Individual plots of 1.20 m × 3 m size were demarcated in experimental field. Light digging operation was carried out prior to pruning so as to loosen the soil for better aeration. The plants were pruned in the first week of October, 2015. Solutions of zinc having different concentrations as per the treatment were prepared by dissolving respective amount of zinc sulphate in distilled water after calculation of total quantity required on the basis of molecular weight. Then the prepared solutions were sprayed at 15th day after pruning as per the treatment. The various observations on growth, flowering, yield and quality parameters of rose were recorded at appropriate stages and data analysed statistically.

Results and Discussion

The data presented in tables 1 and 2 revealed that different levels of zinc had significant effect on all growth, flowering, yield and quality parameters of rose studied in this experiment.

Growth parameters

Significantly maximum plant height (99.07 cm), number of leaves branch^{-1} (35.67) and stem diameter (1.64 cm) of rose plant were recorded with foliar application of 0.5% zinc which was found to be at par with 0.75% zinc (97.87 cm, 34.00 and 1.62 cm, respectively). It was also found statistically at par with 0.25% zinc and 1.00% zinc (96.53 and 94.10 cm, respectively) in respect of plant height. However, the lowest plant height (87.87 cm) and number of leaves branch^{-1} (28.00) were noticed with control *i.e.* water spray and the lowest stem diameter was recorded with 2.00% zinc spray (1.37 cm).

An increased vegetative growth with foliar spray of 0.5% zinc might be on account of synthesis of tryptophan, a precursor of indole acetic acid (auxin) which is accelerated by zinc and as such helps the plant to maintain apical dominance, polarity and growth (Chatopadhyay, 1994). Zinc influences the Auxin and nucleic acid levels in plants and activates the enzymes involved in protein synthesis (Mahesh kumar and Sen, 2005). It is in conformity with the observations of Kode *et al.* (2015) in rose.

Flowering parameters

The treatment of foliar spray of 0.5% zinc took significantly minimum days for first flower bud initiation (35.33 days) and 50 per cent flowering (52.00 days), which was found to be at par with 0.75% zinc (37.67 and 55.33 days, respectively), whereas, the control treatment (water spray) and 2.00 % zinc recorded maximum days for first flower bud initiation (42.33 and 42.67 days, respectively) and 50 per cent flowering (59.33 days each).

An early flowering with 0.5% each of zinc might be due to enhanced growth and development of plant. Zinc favours the storage of more carbohydrates through photosynthesis and also plays an important role in chlorophyll synthesis and respiration. This may be the

Table 1 : Effect of zinc on growth and flowering of rose cv. 'Centenary'.

Treatments	Plant height (cm)	Number of leaves branch^{-1}	Stem diameter (cm)	Days for first flower bud initiation	Days for 50 per cent flowering
T_1- Control (water spray)	87.87	28.00	1.38	42.33	59.33
T_2- 0.25% Zinc	96.53	32.00	1.59	38.67	56.00
T_3- 0.50% Zinc	99.07	35.67	1.64	35.33	52.00
T_4- 0.75% Zinc	97.87	34.00	1.62	37.67	55.33
T_5- 1.00% Zinc	94.10	31.67	1.41	40.33	58.33
T_6- 1.25% Zinc	90.83	30.33	1.40	41.00	58.67
T_7- 1.50% Zinc	90.07	30.00	1.38	41.67	59.00
T_8- 2.00% Zinc	88.10	28.33	1.37	42.67	59.33
SE (m) ±	2.46	1.20	0.03	1.52	1.47
CD (p=0.05)	7.47	3.64	0.09	4.62	4.47

Table 2 : Effect of zinc on flower yield and quality of rose cv. 'Centenary'.

Treatments	Flowers plant^{-1}	Diameter of flower bud (cm)	Length of flower bud (cm)	Weight of flower (g)	Vase life of flower (days)
T_1- Control (water spray)	47.00	2.58	2.50	12.00	7.33
T_2- 0.25% Zinc	51.33	2.68	2.85	13.53	8.17
T_3- 0.50% Zinc	55.33	2.78	3.20	14.73	8.67
T_4- 0.75% Zinc	53.33	2.71	3.10	13.67	8.25
T_5- 1.00% Zinc	52.33	2.64	2.65	12.67	7.67
T_6- 1.25% Zinc	50.33	2.60	2.50	12.53	7.58
T_7- 1.50% Zinc	49.67	2.55	2.45	12.47	7.50
T_8- 2.00% Zinc	49.33	2.54	2.40	12.47	7.25
SE (m) ±	1.11	0.05	0.15	0.48	0.20
CD (p=0.05)	3.38	0.14	0.47	1.47	0.61

attributing factor for the positive effectiveness of optimum dose of zinc on reducing juvenile phase of the plant. Similar results are also obtained by Kode *et al*. (2015) in rose. They reported that, 0.5% zinc recorded an early flowering in rose as compared to other levels of zinc.

Floral yield and quality parameters

Total number of flowers plant^{-1} in rose was noticed significantly maximum with the foliar treatment of 0.5% zinc (55.33), which was statistically at par with 0.75% zinc (53.33), whereas the control treatment *i.e.* water spray counted significantly lowest number of flowers plant^{-1}(47.00) in rose.

Increase in number of flowers due to 0.5% zinc spray might be due to the fact that, zinc activates several enzymes *viz*. catalyase, tryptophan synthate etc. and involves itself in chlorophyll synthesis and various physiological activities by which plant growth and development are encouraged, which might have induced flowering in rose. Jat *et al*. (2007) also reported higher number of flowers with 0.5% zinc in marigold.

In respect of the flower quality parameters in rose, the treatment of foliar spray of 0.5% zinc exhibited significantly maximum diameter (2.78 cm) and length of flower bud (3.20 cm), weight of flower (14.73 g) and vase life of flower (8.67 days), which were found statistically at par with 0.75% zinc (2.71 cm, 3.10 cm, 13.67 g and 8.25 days, respectively) and 0.25% zinc (2.68 cm, 2.85 cm, 13.53 g and 8.17 days, respectively). The foliar spray of 2.00 % zinc recorded minimum values in respect of diameter of flower bud (2.54 cm), length of flower bud (2.40 cm) and vase life of rose flower (7.25 days), however, the control treatment *i.e*. water spray registered minimum weight of flower (12.00 g). Better quality flowers of rose were produced due to application of 0.5% zinc which might be due to association of zinc in regulating semi permeability of cell walls, thus mobilizing more water into flowers also increased the synthesis of iron which promotes cell size and in turn increases flower diameter, flower weight and vase life of flower. The results are in close conformity with the findings of Ahmad *et al*. (2010) in *Rosa hybrid* L. They concluded that, application of zinc along with other micronutrients could help better to improve flower yield and quality of roses.

Thus, it can be inferred from the present investigation that, foliar application of 0.5% zinc followed by 0.75% zinc increased vegetative growth and flower yield, enhanced flowering and improved flower quality in rose cv. 'Centenary'.

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