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Theme: Agro-Bio Sciences and Botanical Sciences Growth, yield and quality of rose as influenced by foliar application of zinc

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Abstract

Aninvestigation on "Growth, yield and quality of foliar application of zinc" was carried out during *rabi* season of the year 2015-16 at Floriculture Unit, Horticulture Section, College of Agriculture, Nagpur to find out suitable concentrations of zinc sprays 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 application of 0.5 % zinc followed by 0.75 % zinc recorded significantly maximum vegetative growth in respect of branches plant^{-1} and leaf area, yield in respect of number of flowers ha^{-1}and quality in respect of diameter of fully opened flower, stalk length of flower, stalk girth of flower and number of petals flower^{-1}The largest flowering span in rosewas also registered with the same treatments. However, the treatment differences in respect of days for opening of flower from bud initiation were found to be non-significant.

Keywords: Rose, foliar application, zinc, growth, yield, quality.

Introduction

Rose (*Rosa spp.*) "Queen of Flowers" belongs to the family Rosaceae and is one of the most important woody perennials.Rose is the most popular of all the flowers because of its beauty and fragrance.It is one of the most important flower crop in commercial flower trade. It is therefore necessary to increase flower yields. In our country, most of the soils have high pH ultimately binding naturally present micronutrients withsoil particles and make them unavailable to plants required for various metabolic processes. Due to this,flower development and quality of roses is badly affected. To overcome this situation, alternate mean isprovision of these micronutrients in the form of foliar spray. Keeping in view the socio economic value of cut rose flowers and emerging needs to standardize the agro technology for commercial rose cultivation, this experiment was designed to study the response of rose cv. 'Centenary' to foliar application of zinc and optimize pre-harvest zinc requirement to obtain better flower yield and quality.

Material 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 application 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 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.

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 x 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 solution was 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 analyzed statistically.

Result and Discussion

The data presented in Table 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 except days required for opening of flower from bud initiation.

Growth

Significantly maximum number of branches plant^{-1} (18.67) and leaf area (45.60 cm^2) of rose were recorded with foliar application of 0.5 % zinc and it was found to be at par with 0.75 % zinc (17.67 and 44.80 cm^2, respectively).However,the lowest number of branches plant^{-1} (15.00) and leaf area (38.33 cm^2) were noted with control treatment i.e. water spray and foliar application of 2% zinc, respectively.

Maximum vegetative growth in respect of branches plant^{-1} and leafarea in rose due to foliar application of 0.5 % zinc followed by 0.75 % zinc might be due to the fact that, zinc applied at optimum concentration is closely involved in metabolism of RNA and ribosomal content in plant cell which leads to stimulation of carbohydrates, proteins and DNA formation. It also helps in synthesis of tryptophan which acts as a growth

promoting substance. This ultimately would have helped in larger biosynthesis of photoassymilates, thereby enhanced vegetative growth of plant. The results are in line with the findings ofKode*et al.* (2015) in rose and Jat*et al.* (2007) in African marigold.

Flowering

The treatment of foliar spray of 0.5 % zinc registered significantly maximum flowering span (168.21 days) as compared to other levels of zinc and it was found to be at par with 0.75 % (162.13 days) and 1.00 % (159.09 days) zinc, whereas, the control treatment (water spray)recorded minimum flowering span in rose (142.88 days). Though the treatment differences were non-significant in respect of days for opening of flower from bud initiation, minimum dayswere required for opening of flower bud in rose whenthe plants were treated with foliar application of 0.5 % zinc (9.43 days).

Maximum flowering span in rose due to foliar application of 0.5% 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.Similar results are also obtained by Kode*et al.* (2015) who reported that, 0.5 % zinc recorded an early floweringin rose as compared to other levels of zinc.

Flower yield and quality

Total number of flowers ha^{-1} in rosewas noticed significantly maximum with the foliar treatment of 0.5 % zinc (4.98 lakh) which was statistically at par with 0.75 % zinc (4.80 lakh) and 1.00 % zinc (4.71 lakh), whereas, the control treatment i.e. water spray counted significantly lowest number of flowers ha^{-1}(4.23 lakh).

In respect of the flower quality parameters in rose, the treatment of foliar spray of 0.5 % zinc exhibited significantly maximum diameter of fully opened flower (7.23 cm),stalk length of flower (31.19 cm), stalk girth of flower (2.70 cm) and number of petals $flower^{-1}$(25.67) which were found statistically at par with 0.75 % zinc (7.03 cm, 30.73 cm, 2.43 cm and 24.67, respectively) and 0.25 % zinc (6.97 cm, 30.22 cm, 2.27 cm and 24.00, respectively), however, the foliar spray of 2.00 % zinc recorded minimum values in respect of diameter of fully opened flower (6.60 cm) and stalk length of flower (26.09 cm) and the control treatment i.e. water spray registered minimum stalk girth of flower (1.70 cm) and number of petals $flower^{-1}$ (20.00). The increase in flowering attributes might be due to the beneficial role of zinc in enhancing the translocation of carbohydrates, minerals, water and amino acids from the site of synthesis to the storage tissue especially on flowers which in turn increase the number, size and other quality parameters of flowers.The results are in close conformity with the findings of Ahmad*et al.* (2010) in *Rosa hybrida*L.Shah*et al.* (2016) alsoreported that, 0.5 % of zinc should be sprayed for higher yield of good quality flower production of marigold under Peshawar (Pakistan) conditions.

Conclusion

Thus, from the present investigation it can be concluded 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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Table 1.Growth, flowering and yield of rose as influenced by foliar application of zinc

Treatments	Branches plant^{-1}	Leaf area (cm^2)	Days for opening of flower from bud initiation	Flowering span (days)	Flowers ha^{-1} (lakh)
T_1- Control (water spray)	15.00	38.87	11.67	142.88	4.23
T_2- 0.25 % Zinc	15.67	41.40	10.20	156.05	4.62
T_3- 0.50 % Zinc	18.67	45.60	9.43	168.21	4.98
T_4- 0.75 % Zinc	17.67	44.80	9.67	162.13	4.80
T_5- 1.00 % Zinc	16.00	42.53	10.67	159.09	4.71
T_6- 1.25 % Zinc	15.67	40.50	10.67	153.01	4.53
T_7- 1.50 % Zinc	15.33	38.63	11.20	150.99	4.47
T_8- 2.00 % Zinc	15.33	38.33	11.53	149.97	4.44
SE (m) ±	0.71	1.32	0.68	3.39	0.10
CD (p=0.05)	2.14	4.01	NS	10.27	0.30

Table 2. Flower quality of rose as influenced by foliar application ofzinc

Treatments	Diameter of fully opened flower(cm)	Stalk length of flower (cm)	Stalk girth of flower (cm)	Petals flower^{-1}
T_1- Control (water spray)	6.70	26.22	1.70	20.00
T_2- 0.25 % Zinc	6.97	30.22	2.27	24.00
T_3- 0.50 % Zinc	7.23	31.19	2.70	25.67
T_4- 0.75 % Zinc	7.03	30.73	2.43	24.67
T_5- 1.00 % Zinc	6.87	26.73	2.17	22.33
T_6- 1.25 % Zinc	6.77	26.60	2.13	21.33
T_7- 1.50 % Zinc	6.63	26.22	2.07	21.00
T_8- 2.00 % Zinc	6.60	26.09	1.97	20.33
SE (m) ±	0.12	0.56	0.17	0.89
CD (p=0.05)	0.36	1.70	0.52	2.69

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