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Influence of Zinc and Spacing on Growth and Yield of Baby Corn (*Zea mays* L.)

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A B S T R A C T

The Treatments consists of 3 foliar sprayings *viz.* Zn_1 (15 DAS), Zn_2 (15 & 30 DAS) and Zn_3 (15 & 30 & 45), 3 different Spacing's *viz*. S_1 (40 cm ×20 cm), S_2 (45 cm ×20 cm), S_3 (50 cm ×20 cm). There were 10 treatments and replicated thrice. The experiment was laid out in Randomized Block Design. The results revealed that treatment $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm recorded maximum Plant height, dry weight, Cob yield with husk, Green fodder and B:C ratio.

Introduction

Maize, of all the cereal grains is the most highly valued for its multifarious uses, being utilized as human food, animal feed and raw materials in industry. Maize is the third most important cereal crop next to rice and wheat and has the highest production potential among the cereals. For diversification and value addition, as well as growth of food processing industries, an interesting recent development is of growing maize for vegetable purpose, which is known as 'baby corn'. It is so called because young, fresh and finger like green ears are harvested when the silk length is of 2-3 cm but prior to fertilization (Pandey *et al.,* 2000). Zinc is an essential nutrient for the standard and healthy growth and development of plants. Zinc deficiency is the one of the most widespread micronutrient deficiencies in plants and cause severe reductions in crop production. Zinc plays an important role in various plant metabolism processes such as, development of cell wall, respiration, carbohydrate metabolism and gene regulation. Zinc fertilization is essential for keeping sufficient amount of available in leaf tissue (By foliar application of Zinc) which contributes the maintenance of adequate root zinc uptake. Plant spacing plays an important role in the competitive balance between the weeds and

baby corn. The narrow row spacing limits the weed growth and increase crop yield. Close spacing leads to overcrowding and more plant competition for growth factors whereas, wider spacing reduce the plant population and enhances the vegetative growth and provide favorable condition to weed growth, thereby decreasing the total yield.

Materials and Methods

The field experiment was conducted during Zaid 2020 at CRF (Crop Research Farm). Department of Agronomy, SHUATS, Prayagraj (UP). The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.3), low in organic carbon (0.57%), available N (230kg/ha), available P (32.10kg/ha) and available K(346kg/ha). The Treatments consists of 3 foliar sprayings *viz.* Zn_1 (15 DAS), Zn_2 (15 & 30 DAS) and Zn_3 (15 & 30 & 45), 3 different Spacing's *viz*. S_1(40 cm ×20 cm), S_2(45 cm ×20 cm), S_3(50 cm ×20 cm) viz: whose effect is observed on Baby corn (var. G5414). There were 10 treatments and replicated thrice. The crop was sown on 2nd August 2020 using variety G5414 with a seed rate of 20 kg/ha. The recommended dose of 120 kg N, 60 kg P, 40 kg K_2O & 10 kg Zn per ha was applied. Foliar spray of Zn was applied according to the treatment details through $ZnSO_4$.

Results and Discussion

Data presented in Table 1 revealed that plant height was observed with the application of Foliar spray of ZnSO4 @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm (169.40 cm) which was significantly higher over rest of the treatments except Foliar spray of ZnSO4 @ 0.2% at 15 & 30 DAS + Spacing 50 cm × 20 cm (151.67 cm), Foliar spray of ZnSO4 @ 0.2% at 15 & 30 & 45 DAS + Spacing 40 cm × 20 cm (159.0 cm), Foliar spray of ZnSO4 @ 0.2% at 15 & 30 & 45 DAS + Spacing 50 cm × 20 cm (164.23 cm) which are statistically at par. This may be due to the favourable influence of the micronutrient on the growth of baby corn might be due to rapid cell division and cell elongation with balanced nutrient (NPK) supply. Variable plant height was found due to differences in crop geometry in maize, Rakesh Kumar and Bohra (2014).

Data presented in Table 1 revealed that Plant dry weight(g/plant) was higher in Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm (132.00g) which was significantly superior over rest of the treatments and lowest was obtained in Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 DAS + Spacing 40 cm × 20 cm (68.67g). The possible reason for this might be due to the fact that the favourable increase in dry weight of baby corn might be due to Zinc involvement in auxin synthesis which played a major role in photosynthetic activity of the crop (as in other C_4 plants) Amutham *et al.*, 2019.

Data presented in Table 1 maximum yield with husk (10.11 t/ha) was observed in Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm which is significantly superior over rest of the treatments except Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 40 cm × 20 cm (8.95 t/ha), Folia r spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 50 cm × 20 cm (9.25 t/ha) which are statistically at par.

Foliar application of $ZnSO_4$ led to increase in the cob yield by 10% to 35% over control no Zinc yield is an ultimate end product of many yield contributing components, physiological and morphological process taking place in plants during growth and development Mona, (2015).

Table.1 Influence of zinc and spacing on growth and yield of baby corn (*Zea mays* L.)

Treatment	Plant height at harvest (cm)	Dry weight g/plant at harvest	Yield with husk(t/ha)	Green fodder(t/ha)	B:C ratio
Control (standard spacing) + RDF	102.30	80.33	6.88	29.00	1.00
Foliar spray of $ZnSO_4$ @ 0.2% at 15 DAS + Spacing 40 cm × 20 cm	112.70	77.67	7.21	30.67	1.15
Foliar spray of $ZnSO_4$ @ 0.2% at 15 DAS + Spacing 45 cm × 20 cm	117.10	86.33	7.88	32.00	1.28
Foliar spray of $ZnSO_4$ @ 0.2% at 15 DAS + Spacing 50 cm × 20 cm	117.90	78.67	8.27	37.00	1.46
Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 DAS + Spacing 40 cm × 20 cm	133.50	68.67	7.71	31.33	1.16
Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 DAS + Spacing 45 cm × 20 cm	149.30	73.33	8.11	35.00	1.31
Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 DAS + Spacing 50 cm × 20 cm	151.67	92.33	8.15	35.67	1.34
Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 40 cm × 20 cm	159.10	96.00	8.95	38.00	1.42
Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm	169.40	132.00	10.11	43.33	1.80
Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 50 cm × 20 cm	164.23	106.33	9.25	40.67	1.62
SEm(±)	6.00	3.35	0.40	2.54	-
CD (P = 0.05)	17.81	9.94	1.19	7.54	-

Data presented in Table 1 revealed that maximum green fodder yield (43.33 t/ha) was observed in Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm which is significantly superior over rest of the treatments except Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 50 cm × 20 cm (40.67 t/ha) and Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 40 cm × 20 cm (38.00 t/ha).

Increase in a green fodder yield might be due to the enhanced translocation of photosynthates with applied Zinc, which resulted in a higher production of green fodder in a respective level of nutrient. Similar results of significantly higher fodder yield with Zn application was also reported by Mahdi *et al.,* 2012.

Data presented in Table 1 revealed that B:C Ratio was obtained for Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm(1.80) which is significantly superior over rest of the treatments. Increase in gross returns, net returns and benefit cost ratio due to higher baby corn yield and green fodder yield. Increase in gross returns, net returns and benefit cost ratio due to higher baby corn yield and green fodder yield. These results are positively corroborating with findings of Rakesh Kumar and Bohra (2014).

Based on the findings, of this experiment can be concluded that treatment with Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm is the best and economically profitable. Spraying of (Foliar spray of $ZnSO_4$ @ 0.2% at 15 & 30 & 45 DAS + Spacing 45 cm × 20 cm is profitable for farmers.

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