International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2017; 5(6): 1362-1364

Received: 19-09-2017
Accepted: 20-10-2017

Shaikh Wasim Chand
M.Sc. (Agronomy), College of Agriculture, Rajendranagar, Pjtsau, Hyderabad, Telangana, India

R Susheela
Senior Scientist (Agronomy), AICRP on Forage Crops & Utilization, ARI, Rajendranagar, Hyderabad, Telangana, India

D Sreelatha
Senior Scientist (Agronomy), AICMIP, Maize research centre, ARI, Rajendranagar, Hyderabad, Telangana, India

M Shanti
Senior Scientist (SSAC), AICRP on Forage Crops & Utilization, ARI, Rajendranagar, Hyderabad, Telangana, India

P Surendra Babu
Principal Scientist (SSAC), AICRP on Micro Nutrients, ARI, Rajendranagar, Hyderabad, Telangana, India

Correspondence
Shaikh Wasim Chand
M.Sc. (Agronomy), College of Agriculture, Rajendranagar, Pjtsau, Hyderabad, Telangana, India

Growth and yield of baby corn (*Zea mays* L.) As influenced by zinc fertilization

Shaikh Wasim Chand, R Susheela, D Sreelatha, M Shanti and P Surendra Babu

Abstract
A field experiment was conducted on sandy clay loam soil at College farm, College of Agriculture, Rajendranagar, Hyderabad during *kharif,* 2016 on "Effect of zinc fertilization on growth, yield and quality of baby corn (*Zea mays* L.)". The experiment was laid out in a randomized block design consisting of twelve treatments and replicated thrice. In the present experiment significantly higher corn yield (1630 kg ha^{-1}), cob yield (6550 kg ha^{-1}), husk yield (4920 kg ha^{-1}), dry matter yield (10855 kg ha^{-1}) and green fodder yield (27.76 t ha^{-1}) was recorded with soil application of $ZnSO_4$ @ 25 kg ha^{-1} + foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS on account of significantly higher plant height (138.27 cm), leaf:stem ratio (0.309), SPAD chlorophyll meter readings (49.09), and leaf area index (4.35). Increasing level of zinc application had a marked effect on all the growth characters and yields. Each increment of zinc application correspondingly improved growth attributes, corn yield, cob yield, husk yield, dry matter yield and green fodder yield.

Keywords: Growth and yield, baby corn, zinc fertilization

Introduction
Baby corn (*Zea mays* L.) is an important crop of Thailand, Taiwan and India; recently, baby corn has gained popularity in Delhi, Uttar Pradesh, Haryana, Maharashtra, Telangana, Karnataka, Andhra Pradesh, Rajasthan and Meghalaya states. Attention is now being paid to explore its potential in India for earning foreign exchange besides higher economic returns to the farmers. Baby corn is the dehusked young cobs of harvested within 2-3 days of silk emergence and are consumed as vegetable due to its sweet flavour. The earliness facilitates crop diversification, increase overall cropping intensity in a year and increases profitability.

Micronutrients can increase grain yield up to 50%, as well as increase macronutrients use efficiency. Among the micronutrients, zinc is an essential nutrient for the standard and healthy growth and development of plants. Zinc deficiency is one of the most widespread micronutrient deficiencies in plants and causes severe reductions in crop production. Generally, zinc affects the synthesis of protein in plants hence is considered to be the most critical micronutrient. Zinc is crucial in taking part in plant development due to its catalytic action in metabolism for all crops especially maize.

Application of Zn fertilizers may be a viable option to fulfill the crop demand for Zn and also to increase its content in edible parts. One third of the world population is reported at the risk of malnutrition due to inadequate dietary intake of zinc (Cakmak, 2009) [3]. About 50% of Indian soils are deficient in zinc causing low level of zinc and yield losses in fodder crops and affecting the health of the livestock (Singh, 2011) [8]. Zinc fortification is essential for keeping sufficient amount of available zinc in soil solution (by soil application of zinc) and in leaf tissue (by foliar application of zinc) which contributes to the maintenance of adequate root zinc uptake.

Material and Methods
The present experiment was conducted at College Farm, College of Agriculture, Rajendranagar, Hyderabad, Telangana State, during *kharif* season, 2016. The experiment was laid out in a randomized block design consisting of twelve treatments and replicated thrice. The treatments of zinc fertilization are, T_1: Control (No zinc), T_2: Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS, T_3: Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS, T_4: Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS, T_5: Soil application of $ZnSO_4$ @ 12.5 kg ha^{-1}, T_6: T_5 + Foliar

spray of $ZnSO_4$ @ 0.2% at 25 DAS, T7: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS, T8: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS, T9: Soil application of $ZnSO_4$ @ 25 kg ha^{-1}, T10: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS, T11: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS, T12: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS. A short duration baby corn variety, VL-1 was used by adopting a spacing of 40 cm x 20 cm. The recommended dose of 150:60:50 N, P2O5 and K2O kg ha^{-1} was applied. The experimental soil was sandy clay loam in texture, slightly alkaline in reaction. The fertility status of the experimental soil was low in organic carbon, available nitrogen as well as low in available zinc content, medium in available phosphorus and high in potassium. Observations on growth attributes growth attributes, corn yield, cob yield, husk yield, dry matter yield and green fodder yield were recorded as the standard procedure.

Observations on growth attributes *viz.*, plant height, leaf: stem ratio, leaf area index and SPAD chlorophyll meter readings were measured at harvest. Similarly, yields *viz.*, corn yield, cob yield, husk yield, dry matter yield and green fodder yield. Data were statistically analyzed as suggested by Panse and Sukhatme (1978) [6].

Result and Discussion

The results obtained were significantly differed with zinc fertilization treatments. The growth attributes *viz.*, plant height, leaf: stem ratio, leaf area index and SPAD chlorophyll meter readings were significantly influenced by different zinc fertilization treatments (Table. 1). Soil application of $ZnSO_4$ @ 25 kg ha^{-1} + foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS recorded higher growth attributes i.e. taller plant height, maximum leaf: stem ratio, leaf area and higher chlorophyll content which is comparable with treatments T_9: soil application of $ZnSO_4$ @ 25 kg ha^{-1}, T_{10}: soil application of $ZnSO_4$ @ 25 kg ha^{-1} + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS, T_{11}: soil application of $ZnSO_4$ @ 25 kg ha^{-1} + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS, whereas no zinc treatment resulted lower growth attributes. Increase might be due to rapid division and elongation of cells with balanced and adequate NPK supply, which seemed to be the reason behind the favourable influence on all the growth attributes of baby corn (Rakesh kumar and Bohra, 2014) [7].

Highest yields *viz.*, corn yield, cob yield, husk yield, dry matter yield and green fodder yield (Table. 2) was found with soil application of $ZnSO_4$ @ 25 kg ha^{-1} + foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS but remained on par with treatments T_9: soil application of $ZnSO_4$ @ 25 kg ha^{-1}, T_{10}: soil application of $ZnSO_4$ @ 25 kg ha^{-1} + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS, T_{11}: soil application of $ZnSO_4$ @ 25 kg ha^{-1} + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS whereas no zinc treatment resulted lower yields. Similar results was also recorded by Aravinth *et al.* (2011) [1] and Rakesh kumar and Bohra (2014) [7].

Yield is an ultimate end product of many yield contributing components, physiological and morphological processes taking place in plants during growth and development (Mona, 2015) [5]. Zinc fertilization has beneficial effect on physiological process, plant metabolism and plant growth, which leads to higher yield. Increase in green fodder yield might be due to the enhanced translocation of photosynthates with applied zinc, which resulted in higher production of green fodder in the respective levels of nutrient. Similar results of significantly higher fodder yield with Zn application was also reported by Mahdi *et al.* (2012) [4], Balwinder kumar *et al.* (2013) [2] and Mona (2015) [5].

Table 1: Plant height (cm), leaf: stem ratio, SPAD readings and Leaf area index as influenced by zinc fertilization

Treatments	Plant height (cm)	Leaf: stem ratio	SPAD readings	LAI
T_1: Control (No zinc)	122.30	0.221	43.23	3.03
T_2: Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS	128.40	0.232	44.37	3.08
T_3: Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS	129.27	0.230	43.53	3.17
T_4: Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS	129.40	0.244	44.73	3.47
T_5: Soil application of $ZnSO_4$ @ 12.5 kg ha^{-1}	130.27	0.269	45.30	3.64
T_6: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS	130.50	0.262	46.03	3.69
T7: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS	132.73	0.269	46.50	3.70
T8: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS	132.87	0.275	46.47	3.79
T9: Soil application of $ZnSO_4$ @ 25 kg ha^{-1}	134.73	0.279	46.70	4.01
T10: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS	134.93	0.279	46.83	4.06
T11: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS	137.07	0.286	48.90	4.24
T12: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS	138.27	0.309	49.07	4.35
SEm ±	2.67	0.01	1.15	0.20
CD (P=0.05)	7.82	0.04	3.38	0.59

Table 2: Corn yield, cob yield, dry matter yield, husk yield and green fodder yield as influenced by zinc fertilization

Treatments	Corn yield (kg ha^{-1})	Cob yield (kg ha^{-1})	Dry matter yield (kg ha^{-1})	Husk yield (kg ha^{-1})	Green fodder yield (t ha^{-1})
T_1: Control (No zinc)	1261	4832	7742	3572	22.38
T_2: Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS	1349	5395	8876	4046	23.10
T_3: Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS	1240	5313	8820	4073	23.33
T_4: Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS	1245	5423	9280	4178	23.66
T_5: Soil application of $ZnSO_4$ @ 12.5 kg ha^{-1}	1351	5645	9164	4294	24.57
T_6: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS	1326	5744	9586	4418	24.73
T7: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS	1459	5785	9611	4327	25.81
T8: T_5 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS	1404	5894	10166	4491	25.92
T9: Soil application of $ZnSO_4$ @ 25 kg ha^{-1}	1522	6163	10125	4481	27.06
T10: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS	1500	6250	10007	4751	26.48
T11: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 40 DAS	1566	6311	10649	4744	27.48

T12: T9 + Foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS	1630	6550	10855	4920	27.76
SEm ±	44.54	135	537	71.6	0.70
CD (P=0.05)	130	391	1577	210	2.04

Conclusion

It is concluded that among different zinc fertilization treatments studied in baby corn, soil application of $ZnSO_4$ @ 25 kg ha^{-1} + foliar spray of $ZnSO_4$ @ 0.2% at 25 DAS and at 40 DAS recorded higher growth parameters, baby corn yield, green fodder yield and crude protein yields and proved better in registering higher zinc concentration in green fodder and baby corn was found economically viable with higher net returns and benefit cost ratio.

Reference

1. Aravinth V, Kuppuswamy G, Ganapathy M. Growth and yield of baby corn (*Zea mays*) as influenced by intercropping, planting geometry and nutrient management. Indian Journal of Agronomy. 2011; 81(9): 91-93.
2. Balwinder Kumar, Ram H, Dhaliwal SS, Singh ST. Productivity and quality of fodder corn (*Zea mays* L.) under soil and foliar zinc application. *XVII International* Plant Nutrition Colloquium and Boron Satellite Meeting Proceeding Book. 2013, 752-753.
3. Cakmak I. Enrichment of fertilizers with zinc: An excellent investment for humanity and crop production in India. Journal of trace elements in medicine and biology. 2009; 23:281-289.
4. Mahdi SS, Husain B, Singh L. Influence of seed rate, nitrogen and zinc on fodder maize (*Zea mays*) in temperate conditions of western Himalayas. Indian Journal of Agronomy. 2012; 57(1):85-88.
5. Mona EA. Increasing Zn ratio in a compound foliar NPK fertilizer in relation to growth, yield and quality of corn plant. Journal of Innovations in Pharmaceuticals and Biological Sciences. 2015; 2(4):451-468.
6. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. ICAR, New Delhi. 2nd Edition. 1978, 381.
7. Rakesh kumar, Bohra JS. Effect of NPKS and Zn application on growth, yield, economics and quality of baby corn. Achives of Agronomy and Soil science. 2014; 60(9):1193-1206.
8. Singh MV. Assessing extent of zinc deficiency for soil fertility mapping and nutrition security in humans and animals. Indian Journal of Fertilizer. 2011; 7:36-43.