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PRODUCTIVITY AND QUALITY OF SWEET CORN (*Zea mays* L.) AS INFLUENCED BY AGRONOMIC FORTIFICATION WITH ZINC AND IRON

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ABSTRACT

A field experiment was conducted during *kharif*, 2017 to study the agronomic fortification of zinc and iron as influenced by yield and quality of sweet corn (*Zea mays* L.). The yield of sweet corn was higher with 0.5 per cent foliar application of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) compared to rest of the treatments. Maximum grain protein content was recorded with the application of recommended dose of fertilizer (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}). The higher zinc and iron content (83.1mg kg^{-1}, 99.77 mg $kg^{-}1$) in the seed was recorded with foliar application 0.5 per cent of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}).

INTRODUCTION

Sweet corn (*Zea mays* L.) assume tremendous market potential not only in India but also in the international market. Hungary is the leading sweet corn producing country in the European Union, having an area of 31,000 ha, constituting 40 per cent of the production area of field vegetable crops. Sweet corn is gaining importance in the star/big hotels, big shopping malls and departmental stores etc. It is used for preparation of special soups, sweets, jams, cream pastes and other delicious eatables in urban areas. So now a day's sweet corn industry is expanding because of increasing domestic consumption, export development and import replacement. Since, three to four crops can be harvested in a year and green fodder is highly succulent, palatable and digestible for dairy animals. Hence it is becoming increasingly popular in India and other Asian countries. Large population of human beings in developing countries is mainly reliant on a staple diet of cereals such as rice, wheat and maize. Unfortunately all of our major cereal food crops lack of certain essential vitamins and minerals, as milled cereal grains are poor sources of lysine, vitamin A, folic acid, iron, zinc and selenium which are essential for normal growth and metabolism of human beings. In Asia about 35 per cent of children between age group of 0 and 5 years suffer from Zn or Fe-deficiencies, 250 million suffer from vitamin A deficiency and 58 per cent of pregnant women in developing countries are anemic from iron deficiency. So, agronomic fortification is a holistic approach to eliminate micronutrient deficiency in food crops through agronomic practices by means of soil and foliar application. Hence the present investigation was undertaken to study the agronomic fortification with zinc and iron nutrition in sweet corn.

MATERIALS AND METHODS

A field experiment entitled Productivity and quality of Sweet corn (*Zea mays* L.) as Influenced by Agronomic Fortification with Zinc and Iron was carried out during *kharif*, 2017 on sandy loam soils of wetland farm of S.V. Agricultural College, Tirupati.

The experiment was laid out in a randomized block design with ten treatments and replicated thrice. The treatments consisted of RDF alone (180-60-50 kg N, P_2O_5 and K_2O ha^{-1}) (T_1), RDF + soil application of $ZnSO_4$ @ 50 kg ha^{-1} (Basal) (T_2), RDF + soil application of $FeSO_4$ @ 25 kg ha^{-1} (Basal) (T_3), RDF + soil application of $ZnSO_4$ @ 50 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1}) (Basal) (T_4), RDF + 0.5 per cent foliar application of $ZnSO_4$ at booting (T_5), RDF + 0.5 per cent foliar application of $ZnSO_4$ at booting

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and silking (T_6), RDF + 0.2 per cent foliar application of $FeSO_4$ at booting (T_7), RDF + 0.2 per cent foliar application of $FeSO_4$ at booting and silking (T_8), RDF + 0.5 per cent foliar application of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting (T_9), RDF + 0.5 per cent foliar application of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting and silking (T_{10}). The sweet corn (Sugar – 75) was tested in the present experiment.

RESULTS AND DISCUSSION

YIELD

The highest green cob yield of sweet corn (15211 kg ha^{-1}) was recorded with foliar application of 0.5 per cent of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_{10}) and was significantly superior over the rest treatments tried. Foliar application of 0.5 per cent of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_{10}), resulted in the highest green cob yield of sweet corn. It is obvious that the increase in green cob yield is ascribed to the reason that application of zinc and iron along with nitrogen, phosphorus and potassium resulted in vigorous root development, which promotes growth and development of plant leading to higher photosynthetic activity, which inturn results in better development of yield attributes and finally higher seed yield (Paramasivan *et al.,* 2011). These results are corroborated with the findings of Ramachandrappa *et al.* (2007) and Duraisami *et al.* (2007).

QUALITY PARAMETERS

PROTEIN CONTENT IN KERNEL

Application of recommended dose of fertilizer (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_1), recorded significantly higher protein content (12.8%), which was significantly superior over rest of the treatments. However, Ortiz- Monasterio *et al*. (2007) reported Zn application significantly reduced grain protein contents. Reduction in grain protein contents with Zn application was possibly due to the dilution effect caused by marked increases in grain yield. Duvick and Ed-meades (1997) reported linear decrease in grain protein per cent as grain yield increased.

ZINC CONTENT IN KERNEL

The highest zinc content (83.1mg kg^{-1}) in the seed was registered with foliar application 0.5 per cent of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_{10}), which was significantly superior over rest of the micronutrient management tried. This might be due to the fact that foliar applied zinc ions possess high mobility within the plants leading to increased concentration of zinc in the seed. Foliar application of $ZnSO_4$ leads to increase in concentration of zinc in both seed and vegetative parts of the plants, which was mainly due to the vital physiological role of zinc in the plant cell (Alloway, 2004). Zinc content recorded with soil application of $ZnSO_4$ @ 50 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + RDF(T_4), followed by 0.5 per cent foliar application of $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting + RDF and 0.5 per cent foliar application of $ZnSO_4$ at booting and silking + RDF(T_9 and T_6),were statistically comparable with each other and were the next best treatments.

IRON CONTENT IN KERNEL

The maximum iron content (99.77mg kg^{-1}) of seed was registered with foliar application 0.5 per cent of $ZnSO_4$+ 0.2 per cent $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) might be due to better absorption of foliar applied iron in the leaves and it is translocated to the source and largely stored as ferric phosphoproteins called phytoproteins (Prasad, 2006).

CONCLUSION:

The present study revealed that productivity and quality of sweet corn was increased with foliar application of 0.5 per cent $ZnSO_4$ + 0.2 per cent $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}).

Table 1. Effect of fortification with zinc and iron as influenced by yield and quality of sweet corn.

Treatment	Green cob yield (kg ha^{-1})	Protein content (%)	Zinc content (mg kg^{-1})	Iron content (mg kg^{-1})
T_1 – Recommended dose of fertilisers (180 N-60 P_2O_5- 50 K_2O kg ha^{-1})	6611	12.8	41.3	68.13
T_2 – T_1 + soil applications of $ZnSO_4$ @ 50 kg ha^{-1}	8302	10.0	53.0	75.67
T_3 – T_1 + soil application of $FeSO_4$ @ 25 kg ha^{-1}	8560	11.0	43.0	93.97
T_4 – T_1 + soil application of $ZnSO_4$ @ 50 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1}	12830	10.5	75.0	95.47
T_5 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting	10200	10.2	60.1	56.37
T_6 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting and silking	10691	10.0	62.0	62.17
T_7 – T_1 + 0.2% foliar application of $FeSO_4$ at booting	10819	11.1	44.0	65.93
T_8 – T_1 + 0.2 % foliar application of $FeSO_4$ at booting and silking	12520	11.0	44.0	93.90
T_9 – T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting	13258	10.4	67.0	62.87
T_{10}- T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting and silking	15211	10.7	83.1	99.77
SEm±	535	0.25	2.35	2.50
CD (P=0.05)	1591	0.76	7.00	7.44

REFERENCES

Alloway, B. J. 2004. Zinc in soils and crop nutrition. *International Zinc Association*, Brussels, Belgium. 2: 101-107.

Duraisami, V.P., Chitdeshwari, T., Subramanian, K.S and Rajeswari, R. 2007.Effect of micronutrients and sulphur on yield and nutrient uptake by Maize in an alfisol.*Madras Agricultural Journal.*94 (7-12): 283-288.

Duvick, D. N and Ed-meades, G.O (Eds.), Developing Drought- and Low N-Toler-ant. 1997. Maize Proceedings of a Symposium, *CIMMYT, El Batan, Mexico. CIMMYT, México, D. F.* 332-335

Ortiz-Monasterio, J. I., N. Palacios-Rojas, E. Meng, K. Pixley, R. Trethowan and R. J. Pena. 2007. Enhancing the mineral and vitamin content of wheat and maize through plant breeding. *Journal of Cereal* Science. 46(3): 293-307.

Paramasivan, M., Kumaresan, K.R., Malarvizhi, S and Velayudham, K. 2011.Effect of different levels of NPK and Zn on yield and nutrient uptake by hybrid maize (COHM 5) in pilamedu and palaviduthi series of Tamil Nadu. *Madras Agricultural Journal.* 98 (10 - 12): 334-338.

Prasad, R. 2006. Zn in soils and in plant, human and animal nutrition. *Indian Journal of Fertilizers*. 2 (9): 103-119.

Ramachandrappa, B.K., Nanjappa, H.V and Soumya T.M. 2007. Sensory parameters, nutrient content, yield and yield attributes of baby corn varieties as influenced by stages of harvest. *Mysore Journal of Agricultural Sciences*. 41 (1): 1-7.