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FORTIFICATION EFFECT OF ZINC AND IRON ON GROWTH AND YIELD OF SWEET CORN (*ZEA MAYS* L.)

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ABSTRACT

A field experiment was conducted during kharif, 2017 to study the fortification effect of zinc and iron on growth yield of sweet corn (*Zea mays* L.).The Growth parameters of sweet corn viz., plant height, leaf area index and dry matter production were influenced favourably with foliar application of 0.5 % $ZnSO_4$ + 0.2 % $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha-1). The yield and yield components viz., cob length, cob girth were significantly superior with 0.5 % foliar application of $ZnSO_4$ + 0.2 % $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha-1) (T10) compared to rest of the treatments. Lower growth and yield were observed with recommended dose of fertilizer alone.

INTRODUCTION

Maize (*Zea mays* L.) is the third most important cereal crop next to rice and wheat in the world's agricultural economy, both as a food for human and as feed for livestock. It is known as "queen of cereals" because of its maximum yield potential (22 t ha-1) among the cereals and expanded use in different agro-industries. It is recognized as a leading commercial crop of great economic value. It is grown worldwide over an area of 185 million hectares with a production of 1018 million tonnes and productivity of 5.49 tonnes ha-1. In India, it is grown over an area of 9.5 million hectares with a production of 23.3 million tonnes with 2452 kg ha-1of productivity (DACNET, 2014).

MATERIALS AND METHODS

A field experiment entitled Fortification effect of zinc and iron on yield and quality of sweet corn *Zea mays* L.) was carried out during kharif, 2017 on sandy loam soils of wetland farm of S.V. Agricultural College, Tirupati campus of Acharya N.G. Ranga Agricultural University.

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) (T1), RDF + soil application of $ZnSO_4$ @ 50 kg ha-1 (Basal) (T2), RDF + soil application of $FeSO_4$ @ 25 kg ha-1 (Basal) (T3), RDF + soil application of $ZnSO_4$ @ 50 kg ha-1 + $FeSO_4$ @ 25 kg ha-1) (Basal) (T4), RDF + 0.5% foliar application of $ZnSO_4$ at booting (T5), RDF + 0.5% foliar application of $ZnSO_4$ at booting and silking (T6), RDF + 0.2% foliar application of $FeSO_4$ at booting (T7), RDF + 0.2 % foliar application of $FeSO_4$ at booting and silking (T8), RDF + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting (T9), RDF + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting and silking (T10). The sweet corn (sugar – 75) was tested in the present experiment.

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RESULTS AND DISCUSSION

GROWTH PARAMETERS

LEAF AREA INDEX

At harvest maximum leaf area index was recorded with 0.5 % foliar application of $ZnSO_4$ + 0.2 % $FeSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_{10}). Higher leaf area index recorded with foliar application of zinc and iron at booting and silking along with RDF was due to better absorption and translocation of foliar applied nutrients leading to delayed senescence and abscission. Increase in leaf area index by Zn application might be due to increase in tryptophan amino acid and indole acetic acid hormone which are responsible for leaf area expansion (Seifi Nadergholi *et al*., 2011). Safyan *et al*. (2012) reported increase in leaf area index (LAI) with foliar application of Zn in maize.

Dry matter production

Higher dry matter production associated with 0.5 % foliar application of ZnSO4 + 0.2 % FeSO4 at booting and silking along with RDF (N, P2O5 and K2O 180:60:50 kg ha-1) might be due to the significant role of zinc, iron and NPK in better root and shoot development and which inturn increased dry matter production. The improvement in dry matter production with application of zinc was due to the fact that zinc is an essential component of several enzymes and plays an important role in nitrogen metabolism there by higher uptake of nitrogen in plants, resulting in increased amino acids and protein synthesis in plant cell owing to better growth and development.

YIELD COMPONENTS

COB LENGTH AND GIRTH (CM)

Increase in cob length and cob diameter with combined application of Zn as soil application and foliar spray might have been the result of increase in the availability of Zn due to direct absorption of the Zn by the foliar spray. Increase in cob girth with foliar spray might have been the result of increase in availability of zinc caused by the direct absorption of the zinc by the foliar spray (Mohsin *et al.,* 2014).

Yield 146

The highest green cob yield of sweet corn (15211 kg ha-1) was recorded with foliar application of 0.5 % of ZnSO4 + 0.2 % FeSO4 at booting and silking along with RDF (N, P2O5 and K2O 180:60:50 kg ha-1) (T10).Foliar application of 0.5 % of ZnSO4 + 0.2 % FeSO4 at booting and silking along with RDF (N, P2O5 and K2O 180:60:50 kg ha-1) (T10), resulted in the highest green cob yield of sweet corn and was significantly superior over the rest treatments tried. 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 promoted growth and development of plant leading to higher photosynthetic activity, which in turn resulted in better development of yield attributes and finally higher seed yield (Paramasivam *et al.,* 2011). These results are corroborated with the findings of Ramachandrappa *et al.* (2007) and Duraisami *et al.* (2007).

.**Table 1. Effect of fortification withzinc and iron as influenced by yield and yield components of sweet corn.**

Treatments	LAI	Drymatter production (kg ha^{-1})	Cob Length (cm)	Cob girth (cm)	Green cob yield (kg ha^{-1})
T_1 – Recommended dose of fertilisers (180 N-60 P_2O_5- 50 K_2O kg ha^{-1})	1.08	7510	11	10	6611
T_2 – T_1 + soil applications of $ZnSO_4$ @ 50 kg ha^{-1}	1.47	8100	13	11	8302
T_3 – T_1 + soil application of $FeSO_4$ @ 25 kg ha^{-1}	1.49	8300	13	12	8560
T_4 – T_1 + soil application of $ZnSO_4$ @ 50 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1}	2.16	9794	19	16	12830
T_5 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting	1.91	9025	16	14	10200
T_6 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting and silking	1.84	8985	15	14	10691
T_7 – T_1 + 0.2% foliar application of $FeSO_4$ at booting	1.92	9189	16	14	10819
T_8 – T_1 + 0.2 % foliar application of $FeSO_4$ at booting and silking	2.28	9739	18	16	12520
T_9 – T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting	2.42	10154	19	16	13258
T_{10}- T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting and silking	2.98	11186	22	17	15211
SEm±	0.076	237.5	0.62	0.28	535
CD (P=0.05)	**0.22**	**705.68**	**1.86**	**0.85**	**1591**

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