Journal of Pharmacognosy and Phytochemistry 2018; 7(4): 2372-2374

Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(4): 2372-2374
Received: 21-05-2018
Accepted: 25-06-2018

Abdul Shakoor Karrimi
Department of Agronomy, S.V Agricultural College, Tirupati, ANGRAU, Andhra Pradesh, India

APK Reddy
Department of Agronomy, S.V Agricultural College, Tirupati, ANGRAU, Andhra Pradesh, India

Feroz Babazoi
Department of Agronomy, S.V Agricultural College, Tirupati, ANGRAU, Andhra Pradesh, India

Tamana Kohistani
Department of Agronomy, S.V Agricultural College, Tirupati, ANGRAU, Andhra Pradesh, India

Correspondence
Abdul Shakoor Karrimi
Department of Agronomy, S.V Agricultural College, Tirupati, ANGRAU, Andhra Pradesh, India

Growth, yield and post-harvest soil available nutrients in sweet corn (*Zea mays* L.) as influenced by zinc and iron nutrition

Abdul Shakoor Karrimi, APK Reddy, Feroz Babazoi and Tamana Kohistani

Abstract
A field experiment was conducted during *kharif*, 2017 to study the Growth, Yield and Post-harvest soil available nutrients in Sweet corn (*Zea mays* L.) as Influenced by Zinc and Iron Nutrition. The Growth parameters of sweet corn *viz*., plant height, leaf area index and dry matter production were influenced favorably 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 green cob and fodder yield were produced 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}) compared to rest of the treatments. Lower growth and yield were observed with recommended dose of fertilizer alone.

Keywords: nutrients, sweet corn, iron nutrition, *Zea mays*

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 tones with 2452 kg ha^{-1} of productivity (DACNET, 2014) [2].

Materials and Methods
A field experiment entitled Growth, Yield and Post-harvest soil available nutrients in Sweet corn (*Zea mays* L.) as Influenced by Zinc and Iron Nutrition 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}) (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% foliar application of $ZnSO_4$ at booting (T_5), RDF + 0.5% foliar application of $ZnSO_4$ at booting and silking (T_6), RDF + 0.2% foliar application of $FeSO_4$ at booting (T_7), RDF + 0.2 % foliar application of $FeSO_4$ at booting and silking (T_8), RDF + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting (T_9), RDF + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting and silking (T_{10}). The sweet corn (sugar – 75) was tested in the present experiment.

Results and Discussion
Growth parameters
Plant height
Maximum plant height with application of 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}) might be due to supply of adequate quantity of zinc and iron nutrients. Increase in plant height might be attributed to internodal distance as reported by with Zn application. Also, Badshah and Ayub (2013) [1] and El-Badawy and Mehasen (2011) [4] reported significant increase in plant height with the foliar application of zinc. It might be due to the role zinc plays

in metabolic activity and physiological reaction and act as a catalyzing enzymes, transformation of carbohydrates, chlorophyll and protein synthesis.

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. Increased in leaf area index by Zn application might be due to increase in tryptophan amino acid and indole acetic acid hormone which are two main factors in leaf area expansion (Seifi-Nadergholi *et al*., 2011) [15]. Safyan *et al*. (2012) [14] reported increase in leaf area index (LAI) of maize with foliar applied Zn. More crop growth rate and net assimilation rate may be attributed to significant increase in leaf expansion due to better growth of plants as affected by Zn application at early growth stages of crop which finally increased the dry matter of plant.

Dry matter production

Higher dry matter production associated 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}) 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

Green cob yield

The highest green cob yield of sweet corn (15211 kg ha^{-1}) was recorded with foliar application of 0.5 % 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}). was significantly superior over the rest treatments tried. Foliar application of 0.5 % 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}), 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. These results are corroborated with the findings of Ramachandrappa *et al.* (2007) [13] and Duraisami *et al.* (2007) [3].

Green fodder yield

Green fodder yield of sweet corn was maximum with foliar application of 0.5% 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}), 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) [8], and Mona (2015) [10].

Post-harvest soil fertility status

Nitrogen

Soil application of $FeSO_4$ @ 25 kg ha^{-1} + RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_3), recorded the highest post-harvest soil available nitrogen (163 kg ha^{-1}), which was significantly superior over rest of the micronutrient management tried. It is not unusual to notice higher residual soil fertility when the crop is supplied with ample amount of nutrients during the crop growing period (Jyothi *et al.,* 2015) [5].

Phosphorus

The highest post-harvest soil available phosphorus status (33.5 kg ha^{-1}) was recorded with Soil application of $FeSO_4$ @ 25 kg ha^{-1}soil applications of $ZnSO_4$@ 50 kg ha^{-1} + RDF(N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}). The increase in level of phosphorus assured the availability of phosphorus to the crop plants in adequate amount and the excess is remained in the soil in substantial quantity. It was also confirmed by findings of Saha and Mondal (2006) [11].

Potassium

There is no significant influence of zinc and iron nutrition on post-harvest potassium available in the soil. However, The lowest post-harvest soil available phosphorus (380 kg ha^{-1}) was observed with application of soil $ZnSO_4$@ 50 kg ha^{-1} along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_2). More potassium (419 kg ha^{-1}) availability in the post-harvest treatment with 0.5% foliar application of $ZnSO_4$ at booting and silking along with RDF (N, P_2O_5 and K_2O 180:60:50 kg ha^{-1}) (T_6).

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

Treatment	Plant height (Cm)	LAI	Drymatter production (kg ha^{-1})	Green cob yield (kg ha^{-1})	Green fodder yield (kg ha^{-1})
T_1 – Recommended dose of fertilisers (180 N-60 P_2O_5- 50 K_2O kg ha^{-1})	152	1.08	7510	6611	11750
T_2 – T_1 + soil applications of $ZnSO_4$ @ 50 kg ha^{-1}	166	1.47	8100	8302	13401
T_3 – T_1 + soil application of $FeSO_4$ @ 25 kg ha^{-1}	168	1.49	8300	8560	13790
T_4 – T_1 + soil application of $ZnSO_4$ @ 50 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1}	203	2.16	9794	12830	16581
T_5 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting	181	1.91	9025	10200	14708
T_6 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting and silking	183	1.84	8985	10691	14991
T_7 – T_1 + 0.2% foliar application of $FeSO_4$ at booting	186	1.92	9189	10819	15781
T_8 – T_1 + 0.2 % foliar application of $FeSO_4$ at booting and silking	191	2.28	9739	12520	16571
T_9 – T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting	198	2.42	10154	13258	18363
T_{10}- T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$ at booting and silking	213	2.98	11186	15211	20467
SEm±	4.14	0.076	237.5	535	648
CD (P=0.05)	12.3	0.22	705.68	1591	1926

Table 2: Post-harvest soil available nutrient status (kg ha^{-1}) of sweet corn as influenced by zinc and iron nutrition

Treatments	Available Nitrogen	Available Phosphorus	Available Potassium	Available Zinc	Available Iron
T_1 –Recommended dose of fertilisers (180 N-60 P_2O_5- 50K_2O kg ha^{-1})	154	28.6	404	0.96	2.94
T_2 – T_1 + soil applications of $ZnSO_4$@ 50 kg ha^{-1}	161	33.5	380	1.59	3.12
T_3 – T_1 + soil application of $FeSO_4$ @ 25 kg ha^{-1}	163	32.5	386	1.36	3.61
T_4 – T_1 + soil application of $ZnSO_4$ @ 50 kg ha^{-1} + $FeSO_4$@ 25 kg ha^{-1}	146	29.4	385	1.60	3.39
T_5 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting	153	31.0	394	1.40	2.58
T_6 – T_1 + 0.5% foliar application of $ZnSO_4$ at booting andsilking	154	29.1	419	1.53	2.47
T_7 – T_1 + 0.2% foliar application of $FeSO_4$ at booting	150	31.5	385	1.49	2.67
T_8 – T_1 + 0.2% foliar application of $FeSO_4$ at booting andsilking	150	27.2	398	1.30	3.00
T_9 – T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$at booting	153	24.8	397	1.33	2.54
T_{10}- T_1 + 0.5% foliar application of $ZnSO_4$ + 0.2% $FeSO_4$at booting and silking	141	22.4	397	1.31	2.43
SEm±	3.0	1.1	7.99	0.09	0.14
CD (P=0.05)	8.9	3.2	NS	0.27	0.44

References

1. Badshah NL, Ayub G. Effect of different concentrations of nitrogen and zinc on the growth of pecan nut seedlings. ARPN J Agric. Biol. Sci. 2013; 8(4):337-343.
2. DACNET. Directorate of Economics and Statistics, DAC, Ministry of Agriculture, Government of India, New Delhi, 2014. http://eands.dacnet.nic. in/state Data_12-13Year.htm.
3. Duraisami VP, Chitdeshwari T, Subramanian KS, Rajeswari R. Effect of micronutrients and sulphur on yield and nutrient uptake by Maize in an alfisol. Madras Agricultural Journal. 2007; 94(7-12):283-288.
4. El-Badawy MElM, Mehasen SAS. Multivariate analysis for yield and its components in maize under zinc and nitrogen fertilization levels. Australian Journal of Basic and Applied Sciences. 2011; 5(12):3008-3015.
5. Jyothi KJ, Ramana AV, Murthy KVR. Nutrient uptake and post-harvest soil nutrient status of *rabi* maize as affected by different nutrients levels. Journal of Soils and Crop. 2015; 25(2):253-258.
6. Kaya, Heggs. Zinc efficiency of maize cultivars grown on a saline calcareous soil. Journal of Plant Nutrition. 2002; 27:1953-1962.
7. 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.
8. Mahdi SS, Hasan 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.
9. Mohsin AU, Ahmed AUH, Farooq M, Ullah S. Influence of zinc application through seed treatment and foliar spray on growth, productivity and quality of hybrid maize. The Journal of Animal and Plant Sciences. 2014; 24(5):1494-1503.
10. 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.
11. Saha M, Mondal SS. Influence of integrated plant nutrient supply on growth, productivity and quality of baby corn (*Zea mays*) in Indo-Gangetic Plains. Indian Journal of Agronomy. 2006; 51(3):202-205.
12. Paramasivan M, Kumaresan KR, Malarvizhi S, Velayudham K. 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. 2011; 98(10-12):334-338.
13. Ramachandrappa BK, Nanjappa HV, Soumya TM. Sensory parameters, nutrient content, yield and yield attributes of baby corn varieties as influenced by stages of harvest. Mysore Journal of Agricultural Sciences. 2007; 41(1):1-7.
14. Safyan N, Naderidarbaghshahi MR, Bahari B. The effect of microelements spraying on growth, qualitative and quantitative grain corn in iran. Int. R. J Appl. Basic Sci. 2012; 3(S):2780-2784.
15. Seifi-Nadergholi M, Yarnia M, Rahimzade KF. Effect of zinc and manganese and their application method on yield and yield components of common bean (*Phaseolusvulgaris* L. CV. Khomein). 2011; 8(5):859-865.