DOI: 10.15740/HAS/AU/12.TECHSEAR(4)2017/1049-1052 **Agriculture Update**
Volume **12** | TECHSEAR-4 | 2017 | 1049-1052
Visit us : *www.researchjournal.co.in*

RESEARCH ARTICLE :

Response of sweet corn to micronutrient (Mg, Zn and B) application

V.D. SALUNKE, A.G. MUNDHE, R.M. KOKATE AND R.V. BHANGARE

ARTICLE CHRONICLE :
Received :
14.07.2017;
Accepted :
29.07.2017

SUMMARY : Present investigations was undertaken in sweet corn to study the effect of micronutrient on yield and yield contributing characters. The experiment was laid out in Randomized Block Design (RBD) with three replications and ten treatments *viz.*, Control (T_1), RDF (120:60:50 kg NPK ha^{-1}) (T_2), RDF + 3 Content, through soil (Mg + Zn + B) (20 kg, 20 kg, 5 kg ha^{-1}), respectively (T_3), RDF + Mg (20 kg ha^{-1}) soil application at the time of sowing (T_4), RDF + Zn (20 kg ha^{-1}) soil application at the time of sowing (T_5), RDF + B (5 kg ha^{-1}) soil application at the time of sowing (T_6), RDF + foliar application at 30 and 45 DAS of Mg + Zn + B @ 1% (T_7), RDF+ foliar application of Mg at 30 and 45 DAS @ 1% (T_8), RDF + foliar application of Zn at 35 and 45 DAS @ 1% (T_9) and RDF + foliar application of B at 30 and 45 DAS @ 1% (T_{10}). Yield contributing parameter such as cob length, cob girth, cob weight with husk/ without husk, cob yield plot^{-1} and cob yield ha^{-1} also was recorded. Results revealed that treatment differences were found significant for all the traits except brix reading. Maximum cob yield (41.93 kg plot^{-1}) was found in T_7. Treatment T_7 (RDF+ Mg SO_4+ Zn SO_4+ B @ 1% spraying at 30 and 45 DAS) was found significantly superior over rest of treatments, in respect of cob yield (41.93 kg plot^{-1}) and cob yield (436.80 q ha^{-1}) and at par with treatment T_8 (RDF+ Foliar application of Mg @ 1% at 30 and 45 DAS) (36.42 kg plot^{-1} and 379.39 q ha^{-1} cob yield) and significantly superior over rest of the treatments.

KEY WORDS :
Sweet corn, Micronutrient, Mg, Zn and B

How to cite this article : Salunke, V.D., Mundhe, A. G., Kokate, R. M. and Bhangare, R. V. (2017). Response of sweet corn to micronutrient (Mg, Zn and B) application. *Agric. Update*, **12** (TECHSEAR-4): 1049-1052; **DOI: 10.15740/HAS/AU/12.TECHSEAR (4)2017/1049-1052.**

Author for correspondence :
A.G. MUNDHE
Wheat and Maize Research Unit (V.N.M.K.V.), PARBHANI (M.S.) INDIA
Email: anil.gm143@gmail.com
See end of the article for authors' affiliations

BACKGROUND AND OBJECTIVES

Sweet corn (*Zea mays* L.) is an important cereal crop of global importance after wheat and rice. Maize is a coarse grain and is now being accepted as staple diet and its demand is increasing year by year. The demand for maize grain is increasing because of its use as poultry feed and industrial uses. Maize, otherwise known as corn, is important to the economy due to its wide range of uses. Maize is primarily used as feed for livestock, suggesting the dependence of the livestock industry on corn production. It is also used to create a variety of food and non food products, such as corn meal, sweeteners, corn oil, starch and ethanol, which is used as a cleaner-burning alternative to gasoline.

The micronutrients play an important role in increasing crop yield. Micronutrients have prominent affects on dry matter, grain yield and straw yield (Asad and Rafique, 2000).

Iron plays role in biological redox system, enzyme activation and oxygen carrier in nitrogen fixation (Marschner and Romheld, 1991); zinc is important to membrane integrity and phytochrome activities (Shkoinik, 1984); magnesium is vital for physiological chlorophyll formation processes, pollen viability and lignifications (Marschner, 1991) and boron is required for reproductive plant parts cell wall formation and stabilization, membrane integrity, carbohydrate utilization, stomatal regulation and pollen tube formation (Marschner,1991). Therefore much attention is needed for adequate and balanced use of macronutrients along with micronutrients to enhance the response of maize to organic fertilizers (Baddaruddin *et al.*,1999).

Hence, the present investigations was undertaken in sweet corn to study the effect of micronutrient on yield and yield contributing characters.

RESOURCES AND METHODS

The experiment was laid out in Randomized Block Design (RBD) with three replications at Wheat and Maize Research Unit, VNMKV, Parbhani.Total 10 treatments *viz.*, Control (T_1), RDF (120:60:50 kg NPK ha^{-1}) (T_2), RDF + 3 Content, through soil (Mg + Zn + B) (20 kg, 20 kg, 5 kg ha^{-1}), respectively (T_3), RDF + Mg (20 kg ha^{-1}) soil application at the time of sowing (T_4), RDF + Zn (20 kg ha^{-1}) soil application at the time of sowing (T_5), RDF + B (5 kg ha^{-1}) soil application at the time of sowing (T_6), RDF + foliar application at 30 and 45 DAS of Mg + Zn + B @ 1% (T_7), RDF+ foliar application of Mg at 30 and 45 DAS @ 1% (T_8), RDF + foliar application of Zn at 35 and 45 DAS @ 1% (T_9), and RDF + foliar application of B at 30 and 45 DAS @ 1% (T_{10}). Plot size of individual treatment was gross 3.60 m x 4.00 m and net 2.40 m x 3.60 m. seed were sown at spacing of 60 cm x 20 cm during *Kharif* 2016 after receiving the sufficient rainfall. Only one healthy seedling was maintained. Yield contributing parameter such as cob length, cob girth, cob weight with husk/ without husk, cob yield plot^{-1} and cob yield ha^{-1} were also recorded.

The result obtained were statistically analyzed and appropriately interpreted as per the methods described in “Statistical method for Agricultural Workers” by Panse and Sukhatme (1985). Appropriate standard error (S.E.) critical differences (C.D.) at 5 per cent levels were worked out for interpretation of result.

OBSERVATIONS AND ANALYSIS

The data presented in Table 1indicates that, the treatment differences were found significant for all the traits under evaluation. Treatment T_7(RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (28.00 cm) was significantly superior over rest the treatments and at par with T_8 (RDF+ foliar application of Mg @ 1% at 30 and 45 DAS) (27.56 cm) and significantly superior over rest of the treatments. These results are in agreement with Arya *et al.* (2005) and Potarzycki and Grzebisz (2009) reported that cob length may increase due to availability of nutrients.

For cob girth (cm) at harvest, treatment T_7 (RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (22.45 cm) was significantly superior over rest of the treatments and at par with treatment T_8 (RDF+ foliar application of Mg @ 1% at 30 and 45 DAS) (21.81cm). Similar findings were recorded by Kumar*et al.* (2009) and Arya *et al.* (2005), it might be due to application of micronutrient which results in increase cob girth. Whereas for treatment T_7(RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (17.20) which was significantly superior over rest of the treatments and at par with T_8 (RDF+ foliar application of Mg @ 1% at 30 and 45 DAS) (16.72). Present results are supported by Kumar *et al.* (2009) and Arya *et al.* (2005).

Result pertaining to number of karnels per row revealed that treatment T_7(RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (36.13) was significantly superior over rest of the treatments and it was at par with T_8 (RDF+ foliar application of Mg @ 1% at 30 and 45 DAS) (35.77) and T_9 (RDF+ Zn @ 20 kg ha^{-1} 1% spraying at 30 and 45 DAS) (63.36 SPAD). Similar results reported by Potarzycki and Grzebisz (2009) and Moghadam *et al.*(2012).With regards to number of cobs per plot, the treatment T_7 (RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (77.01) which was significantly superior for number of cobs per plot and at par with T_8 (RDF+ foliar application of Mg @ 1% at 30 and 45 DAS) (75.67), similar results were reported by Kumar *et al.* (2009) and Arya *et al.* (2005).

Treatment T_7(RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (0.623 kg/plot) was at par with T_8 (RDF+ foliar application of Mg @ 1% at 30 and 45 DAS) (0.566 kg/plot), for green cob weight with husk.

It was also found significantly superior over rest of treatments, these results are confined by Ziaeiann and Malakouti (2001) and Soleimani (2006). The significant variations in cob weight with husk were evident due to application of NPK along with micronutrients. The data indicated that was decrease in cob weight decreased with the NPK along with micronutrients by soil application. green cob weight without husk at harvest (kg cob[1]) further result also indicated that, for green cob weight treatment T_7(RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (0.533 kg/plot) was at par with treatment T_8 (RDF+ Foliar application of Mg @ 1% at

Table 1: Influence of different treatment on yield and yield contributing traits in sweet corn

Treatments	Cob length (cm)	Cob girth (cm)	No. of rows/ cob	No. of kernels/ row	No. of cobs/ plot	Cob wt. with husk (kg/cob)	Cob wt. without husk (kg/cob)	Mean green cob sweetness Brix reading (%)	Cob yield ($kg.plot^{-1}$)	Cob yield ($qt.ha^{-1}$)
T_1 : Control	23.83	16.90	13.06	30.00	74.33	0.321	0.230	17.74	17.38	181.02
T_2 : RDF (120:60:50 kg NPK ha^{-1})	24.50	17.70	13.63	32.53	75.33	0.346	0.244	18.11	18.75	195.27
T_3 : RDF +3 Content, through soil (Mg + Zn + B) (20 kg, 20kg, 5kg ha^{-1}), respectively.	25.97	19.69	15.00	34.13	75.33	0.504	0.414	19.91	31.72	330.39
T_4 : RDF + Mg (20kg ha^{-1}) soil application at the time of sowing	25.57	18.85	14.60	33.53	76.01	0.470	0.366	19.07	28.32	295.03
T_5 : RDF + Zn (20kg ha^{-1}) soil application at the time of sowing	25.06	18.70	13.97	33.31	76.00	0.442	0.342	18.91	26.49	275.92
T_6 : RDF + B (5kg ha^{-1}) soil application at the time of sowing	24.89	17.95	13.69	33.10	75.66	0.378	0.288	18.45	22.24	231.67
T_7: RDF + foliar application at 30 and 45 DAS of Mg + Zn + B @ 1%	28.00	22.45	17.20	36.13	77.01	0.623	0.533	22.28	41.93	436.80
T_8 : RDF+ foliar application of Mg at 30 and 45 DAS @ 1%	27.56	21.81	16.72	35.77	75.67	0.566	0.473	21.23	36.42	379.39
T_9 : RDF + foliar application of Zn at 30 and 45 DAS @ 1%	26.46	20.57	15.46	34.67	76.00	0.536	0.433	20.31	33.48	348.71
T_{10} : RDF + foliar application of B at 30 and 45 DAS @ 1%	26.15	19.79	15.22	34.53	75.33	0.519	0.422	20.29	32.36	337.12
S.E.$\pm$	0.331	0.243	0.276	0.594	0.601	0.027	0.029	1.419	2.274	23.70
C.D. (P=0.05)	0.984	0.723	0.820	1.764	1.784	0.081	0.086	NS	6.747	70.31
C.V %	2.228	2.171	3.224	3.051	1.376	9.951	13.49	12.52	13.63	13.63
GM.	25.79	19.44	14.85	33.77	75.66	0.470	0.374	19.62	28.90	301.13

NS= Non-significant

30 and 45 DAS) (0.473 kg/plot) and significantly superior over rest of the treatments, similar findings Ziaeiann and Malakouti (2001) and Soleimani (2006).

The significant variations in cob weight without husk were evident due to application of NPK along with micronutrients. The data indicated that was decrease in cob weight decreased with the NPK along with micronutrients by soil application. However, green cob sweetness (brix) reading (%) (22.28%) was found non-significant in the present investigation.

For cob yield (kg $plot^{-1}$), cob yield (q ha^{1}) the data presented in Table 1 and Fig.1 indicates that, the maximum cob yield (41.93 kg $plot^{-1}$) and cob yield (436.80q ha^{-1}) was found in $T_{7.}$ Treatment T_7 (RDF+ Mg SO_4+ Zn SO_4+ B @ 1% spraying at 30 and 45 DAS) was found significantly superior over rest of treatments, in respect of cob yield (41.93 kg $plot^{-1}$) and cob yield (436.80 q ha^{-1}), and at par with treatment T_8 (RDF+ Foliar application of Mg @ 1% at 30 and 45 DAS) (36.42 kg $plot^{-1}$ and 379.39 q ha^{-1} cob yield) and significantly superior over rest of the treatments, these results are confined by Ziaeiann and Malakouti (2001) and Soleimani (2006).

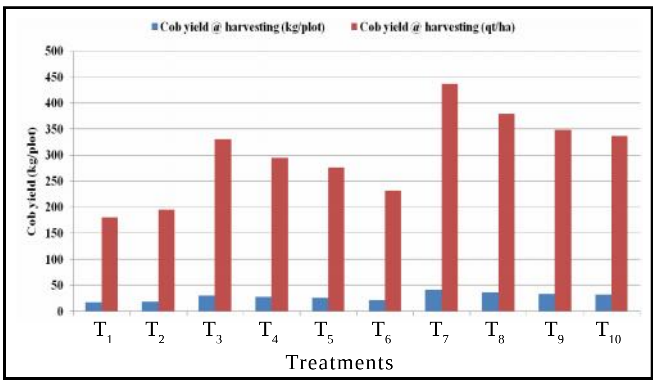

Fig. 1: Influences of different treatments on mean cob yield (kg $plot^1$) and (q ha^{-1}) at harvesting

Authors' affiliations :

V.D. SALUNKE, Wheat and Maize Research Unit (V.N.M.K.V.), PARBHANI (M.S.) INDIA

R. M. KOKATE, Dry Land Agriculture Research Station (V.N.M.K.V.), PARBHANI (M.S.) INDIA

R. V. BHANGARE, Department of Agricultural Botany (V.N.M.K.V.), PARBHANI (M.S.) INDIA

REFERENCES

Arya, K.C., Sarvesh, K. and. Siddique, M. Z. (2005). Response of phosphorus and zinc levels on yield and yield contributing attributes of maize with and without irrigation. *PI. Archiv*, **5** (1): 173- 177.

Asad, F. M. and Rafique, A. D. (2000). Effect of zinc and boron interaction on plant growth and tissue nutrient concentration of corn. *J. Plant Nutr.*, **30** : 4-6.

Baddaruddin, R. J. (1999). Production potential studies of rice and wheat as determined by dates of planting Plant population and fertility levels. *JNKVV Res. J.*,**16**(2): 123-132.

Kumar, R., Mehrotra, N.K., Nautiyal, B. D., Kumar, P. and Singh, P.K. (2009). Effect of copper on growth, yield and concentration of Fe, Mn, Zn and Cu in wheat plants (*Triticum aestivum* L.) *J. Environ. Biol.*, **30** (4) : 485-220.

Marschner, J.V. and Romheld, P.V. (1991). Effect of late application of nitrogen and zinc on the yield and protein content of maize.*Aus. J.Exper.*, **54** (6): 621-622.

Moghadam, M.J., Sharifabad, H.H., Noormohamadi, G., Sadeghian Motahar, Y. and Siadat, S.A. (2012). Effect of zinc, boron and magnesium foliar application on yield and yield components in maize. *Ann. Biolo. Res.*, **3** : 3875-3888.

Panse, V.G. and Sukhatme, P. V. (1985). The result obtained were statistically analyzed and appropriately interpreted as per the methods described in "Statistical method for Agricultural Workers" by appropriate standard error (S.E.) critical differences (C.D.) at 5 per cent levels were worked out for interpretation of result. *Indian J. Agril. Statist.*, **24**: 456-460.

Potarzycki, J. and Grezebisz, W. (2009). Effect of zinc foliar application on grain yield of maize and it's yielding components. *Plant Soil Environ.*,**55** (12): 519- 527.

Soleimani, R. (2006). The effects of integrated application of micronutrient on wheat in low organic carbon conditions of alkaline soils of Western Iran. *Proc.18th World Congress of Soil Sci.*, July 9-15, Philadelphia, USA.

Ziaeiann, A. H. and Malakouti, M. J. (2001). Effect of Fe, Mn, Zn and Cu fertilization on the yield and grain quality of wheat in the calcareous soils of Iran. *Food Security & Sustain. Agro-ecosystem*,840-841.

12th Year of Excellence