Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(4): 1996-1998
Received: 04-05-2019
Accepted: 06-06-2019

Miss RV Bhangare
Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

PG Totewad
Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

VS Pawar
Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Correspondence
Miss RV Bhangare
Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Effect of micronutrients (Mg, Zn & B) on morphological characters of Sweet corns

Miss RV Bhangare, PG Totewad and VS Pawar

Abstract
The experiment was conducted on experimental site of Wheat and Maize Research Unit, VNMKV, Parbhani during *kharif* season 2016-17. The soil was medium black with moderate moisture retention capacity. The land having uniform topography was used to study the responses of micronutrient's (Mg, Zn and B) to crop hybrid (Phule Madhu) under irrigated condition, by using soil and foliar application of (Mg, Zn and B) micronutrients in presence of RDF @ 120:60:50 NPK kg/ha. The experiment was laid out in RBD with three replication and ten treatments. The biometric observations i.e. plant height at flowering and harvesting (cm), chlorophyll index (SPAD), days to 50 % tassels & silk (DAS), cob height (cm) at flowering & harvesting and leaf area (dm^2) at flowering & harvesting. Results for days to 50% pollen shedding, days to silking, plant height differences and cob height differences were found non - significant. The results for leaf area (dm^2) were found significant at flowering and at harvesting results were found significant. It is apparent from the data that significantly highest leaf area was attained by plants under treatment T_7 (RDF+ Mg + Zn+ B @ 1% spraying 30 and 45 DAS) at both growth stages than treatment T_1 (control) and T_2 (RDF 120:60:50 kg NPK ha^{-1}) and at par with rest of the treatments. The differences for chlorophyll content were found significant. The chlorophyll content in leaves was progressively increased with advancement in growth period and the maximum was attained at flowering stage and also the chlorophyll content was recorded the highest in treatment T_7 (RDF + Mg + Zn + B @ 1% spraying at 30 and 45 DAS) (64.87 SPAD) followed by T_8 (RDF +Mg @ 20 kg ha^{-1} 1% spraying at 30 and 45 DAS) (64.19 SPAD) and T_9 (RDF+ Zn @ 20 kg ha^{-1} 1% spraying at 30 and 45 DAS) (63.36 SPAD) and significantly superior over rest of the treatment.

Keywords: Sweet corn, micronutrient and morphological characters

Introduction
Sweet corn (*Zea mays* L.) is the world's most widely cultivated food crop providing ample food calories and protein for more than one thousand million human beings in the world. The demand for maize grain is increasing because of its use as poultry feed and industrial uses. Micronutrient play an active role in the plant metabolic process starting from cell development to respiration, photosynthesis, chlorophyll formation, enzyme activity, hormones synthesis, nitrogen fixation etc. The micronutrients are going to play a major protective role in bringing stability and sustainability in food production. The role of macro and micronutrients is crucial in yields. Nitrogen is a primary constituent of proteins and thus all enzymes (Raun and Johnson, 1999) [1]. P is involved in almost all biochemical pathways as a component part of energy carrier compounds, ATP and ADP (Khalil and Jan, 2003) [2]. Six micronutrients i.e. Mn, Fe, Cu, Zn, B and Mo are known to be required for all higher plants (Welch, 1995) [3]. These have been well documented to be involved in photosynthesis, N- fixation, respiration and other biochemical pathways (Marschner and Romheld, 1991 and Warman, 1992) [4]. Micronutrient requirements of the maize (*Zea mays L.*) crops are relatively small and ranges between their deficiencies and toxicities in plants and soils are rather narrow. Maize is a plant with a high productivity potential, which requires a much larger amount of nutrients during its growth and development compared to other cereal crops. Magnesium (Mg) is one of 18 nutrients essential for plant growth. It is actively involved in Photosynthesis as a component of chlorophyll and also plays an important role in plant respiration and energy metabolism. Zinc required in small but critical concentrations to allow several key plant physiological pathways to function normally. Uniform application of boron in the field is very important. However, growing suitable varieties with proper dose of fertilizer increase growth and yield of crop.

Material and Methods
Sweet corn seeds of hybrid Phule Madhu were used for the experiment. Seed of sweet corn hybrid (Phule Madhu) was obtained from Wheat & Maize Research Unit, VNMKV Parbhani. The recommended seed rate 15-20 kg ha^1 used for sowing.

FYM was applied @ 16-20 t ha^{-1} at the time of land preparation. Recommended dose of fertilizer were applied @ 120 Kg N, 60 Kg P_2O_5 and 50 Kg K_2O ha^{-1} as under 1/3 N + complete P_2O_5 and K_2O was given the time of sowing while the remaining 2/3 N was given in two split doses at an interval of 30 days. Basal dose of fertilizer was applied by using 10:26:26 (mixed fertilizer), Urea, MOP etc. Micronutrients viz. Mg, Zn and B applied @ (Zn =20 kg ha^{-1}, B = 5 kg ha^{-1} & Mg =20 kg ha^{-1}) at the time of sowing and spraying of Zn, Mg & B @ 1 % at 30 and 45 days after sowing.

Treatments details

T_1: Control
T_2: RDF (120:60:50 kg NPK ha^{-1})
T_3: RDF + 3 Content, through soil (Mg + Zn + B) (20 kg, 20 kg, 5 kg ha^{-1}) respectively.
T_4: RDF + Mg (20 kg ha^{-1}) soil application at the time of sowing
T_5: RDF + Zn (20 kg ha^{-1}) soil application at the time of sowing
T_6: RDF + B (5 kg ha^{-1}) soil application at the time of sowing
T_7: RDF + foliar application of Mg + Zn + B at 30 & 45 DAS @ 1%
T_8: RDF+ foliar application of Mg at 30 & 45 DAS @ 1%
T_9: RDF + foliar application of Zn at 30 & 45DAS @ 1%
T_{10}: RDF + foliar application of B at 30 & 45 DAS @ 1%
(Soil application Dose: Zn = 20 kg ha^{-1}, B = 5 kg ha^{-1} & Mg = 20 kg ha^{-1})

Result and discussion

Days to 50% pollen shedding (DAS)

The data presented in Table no. 1 indicates that, the results for days to 50% pollen shedding were found non-significant (51.01DAS).

Days to silking (DAS)

The data presented in Table no. 2 indicates that, the results for days to silking were found non-significant (61.01DAS).

Plant height (cm) at flowering and harvesting

The plant height increased continuously up to the physiological maturity and reached (173.07 cm) at harvesting. The rate of increase in plant height was increasing up to the flowering.

The data also indicated that there was constant increase in plant height with the commencement of growth flowering to harvesting. It was also noted that the effect of only NPK was found less as compared to combination of micronutrients along with recommended chemical fertilizer.

The data presented in Table no. 1 indicates that, the plant height (cm) at flowering (157.07) and harvesting (173.73) were found non-significant. These results accordance with Kamble and londe (2008) [5] observed that application of zinc and boron resulted in increase in the plant height.

Cob height (cm) at flowering and harvesting

The data presented in Table no. 1 indicates that, the cob height (cm) at flowering (104.55) and harvesting (119.55) were found non-significant.

It is revealed from the data that plants grown under dose of fertilizers level (NPK) supported with micronutrients have showed beneficial effects to earliness in harvesting in maize.

Leaf area at flowering and maturity (dm^2)

The data presented in Table no. 1 indicates that, the treatment differences were found significant. The data pertaining to the leaf area were recorded at flowering and harvesting stage. There was increase in leaf area of plant in preceding growth stages. It is apparent from the data that significantly highest leaf area was attained by plants under treatment T_7 (RDF+ Mg SO_4 + Zn SO_4+ B @ 1% spraying 30 and 45 DAS) at both growth stages and at par with treatment T_8 (RDF +Mg @ 20 kg ha^{-1} 1% spraying at 30 and 45 DAS) and significantly superior over rest of the treatments.

Considering the concentration of NPK and the source of micronutrients application in combination gave highest leaf area than control. It might have accelerated the metabolic and physiological activity of plant and put up more growth by assimilating more amounts of major nutrients and ultimately increased the leaf area $plant^{-1}$ in present investigation. It was predicted that the leaf area was increased with recommended dose of NPK along with micronutrients at both crop growth stages. Similar results were reported by Choudhary *et al.* (2013), Hussain *et al.* (2005) and Asif *et al.* (2013) [8, 9].

Chlorophyll content (SPAD)

The data presented in Table no. 1 indicates that the treatment differences were found significant. Treatment T_7 (RDF+ Mg SO_4 + Zn SO_4 + B spraying @ 1% at 30 and 45 DAS) (64.87) recorded significantly higher chlorophyll content and was at par with T_8 (RDF +Mg @ 20 kg ha^{-1} 1% spraying at 30 and 45 DAS) (64.19 SPAD at flowering), T_9 (RDF+ Zn @ 20 kg ha^{-1} 1% spraying at 30 and 45 DAS) (63.36 SPAD) and T_{10} (RDF + Foliar application of B at 30 & 45 DAS @ 1%) (63.09 SPAD) and T_3 (RDF + 3 content, through soil) (Mg + Zn + B) and significantly superior over rest of the treatment. Similar findings for chlorophyll index were recorded by Chaab *et al.* (2010) and Panwar *et al.* (2011).

Table 1: Influence of different treatments on various morphological characters of sweet corn.

Treatments	Days to 50% pollen shedding	Days to silking	Plant height (cm)		Cob height (cm)		Leaf area (dm^2)		Chlorophyll content (SPAD)
			At flowering	At harvesting	At flowering	At flowering	At flowering	At harvesting	At flowering
T_1	49.67	59.67	144.03	169.36	93.18	54.68	50.56	48.37	54.68
T_2	50.00	62.33	144.48	171.14	93.50	61.65	51.33	49.68	61.65
T_3	51.33	62.33	155.58	172.92	96.02	62.88	54.69	52.98	62.88
T_4	52.01	61.33	151.21	172.25	95.36	62.32	53.93	51.84	62.32
T_5	50.00	60.33	149.76	171.43	95.20	62.18	53.22	51.12	62.18
T_6	52.67	63.33	149.66	170.87	94.30	61.95	52.49	50.98	61.95
T_7	51.01	65.01	157.07	174.73	104.55	64.87	57.17	56.45	64.87
T_8	51.00	62.02	156.93	174.43	99.95	64.19	56.86	55.36	64.19
T_9	50.67	63.00	156.57	172.24	98.00	63.36	55.85	54.55	63.36
T_{10}	51.32	60.33	156.54	170.87	97.08	63.09	55.32	53.54	63.09
S.E.±	0.985	1.006	3.827	2.165	4.136	0.727	0.323	0.340	0.727

C.D. 5%	NS	NS	NS	NS	NS	2.159	0.998	1.010	2.159
C.V %	3.356	2.953	4.356	2.185	7.40	2.029	1.035	1.124	2.029
GM.	50.86	59.03	152.18	171.60	96.71	62.11	54.14	52.48	62.11

References

1. Raun PA, Johnson PK. Effects of soil water content and foliar fertilization with nitrogen and phosphorous in late season on the yield and composition of wheat. J Agric. Sci. 1999; 18(3):599-603.
2. Khalil AP. Effect of sowing date on maize varieties. India n Journal of Agron. 2003; 304:512-513.
3. Welch TM. Effect of foliar spraying micronutrients on yield and nutrients uptake of maize plants grown under saline conditions. J Am. Sci. 1995; 6(8):398-404.
4. Marschner JV, Romheld PV. Effect of late application of nitrogen and zinc on the yield and protein content of maiz e. Aus. J Exper. 1995; 54(6):621-622.
5. Kamble PS, Sorte NV, Londe S. Effect of zinc and phosphorus on morpho-physiological traits in maize. Ann. Plant Physiol. 2008; 22(1):43-45.
6. Chaudhary EH, Timmer V, Javed AS, Siddeique MT. Maize response to micronutrients in rainfed areas of Punjab. Soil and Environ. 2007; 26:97-101.
7. Nutrient concentration of corn. Journal of plant Nutrition, 30:4-6.
8. Hussain N, Khan MA, Javed MA. Effect of foliar application of plant micronutrient mixture on growth and yield of maize. Pak. J Bio. Sci. 2005; 8:1096-1099.
9. Asif M, Saleem MF, Anjum SA, Wahid MA, Bilal MF. Effect of nitrogen and zinc sulphate on growth and yield of maize (*Zea mays* L.). J Agric. Res. 2013; 51(4):455-464.