Madras Agric. J. 90 (7-9) : 442-443 July-September 2003

Response of blackgram to multi-micronutrients

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Abstract: Field experiments were conducted with blackgram var. COBG 593 and TMV.1 at Alandurai and Mathuvarayapuram in a red sandy loam soil for assessing the efficacy of soi application and seed treatment of Zn, B, S and Mo during 2000 and 2001. The results indicated that soil application of 5 kg Zn + 1.5 kg B + 0.5 kg Mo + 40 kg S ha^{-1} increased the yield of both the varieties and the yield increase was more with COBG 593 (34.1%) than TMV.1 (21%). Soil application was the best as compared to seed treatment. Similar results were observed with nutrient availability.

Key words : Micronutrients, Blackgram, Nutrient availability.

Introduction

The role of legumes in enriching soil fertility has been known through the centuries. They are the cheaper sources of protein and hence their supply should be sustained to overcome the malnutrition problems. Among the legumes, blackgram is an important crop grown throughout the state both as pure crop and as inter / mixed crops. Apart from the major nutrients, Zn and S have been limiting the yield and quality of blackgram. Keeping this in view, field experiments were conducted to evaluate the effect of varying combinations of micronutrients on blackgram.

Materials and Methods

Field experiments were conducted in farmers' holding at Alandurai (red sandy loam soil) deficient in zinc, boron and sulphur and Mathuvarayapuram (red sandy loam soil) of Coimbatore district using blackgram varieties COBG 593 during 2000 and TMV 1 in 2001 respectively to assess their response for soil application and seed treatment of Zn, B, S and Mo.

The initial soil characteristics were:

Alandurai : pH-7.2; DTPA-Zn-0.70 mg kg^{-1}; HWS-B-0.35 mg kg^{-1} and 0.15% $CaCl_2$-S-8.70 mg kg^{-1}

Mathuvarayapuram: pH-7.11; DTPA-Zn-0.65 mg kg^{-1}; HWS-B-0.31 mg kg^{-1} and 0.15% $CaCl_2$-S-7.96 mg kg^{-1})

There were eight treatments replicated four times in a randomized block design. The treatments included

T_1 - Control
T_2 - 5.0 kg Zn ha^{-1}
T_3 - 5.0 kg Zn + 1.5 kg B ha^{-1}
T_4 - 5.0 kg Zn + 40 kg S ha^{-1}
T_5 - 5 kg Zn + 1.5 kg B + 40 kg S ha^{-1}
T_6 - 5.0 kg Zn + 1.5 kg B + 0.5 kg Mo + 40 kg S ha^{-1}
T_7 - 3% ZnO as seed treatment
T_8 - 3% ZnO + 0.5% Borax + 0.05% Na molybdate

Recommended doses of nitrogen and phosphorus were applied as urea and diammonium phosphate. Zinc, boron, sulphur and molybdenum were applied as zinc sulphate, borax, and gypsum and sodium molybdate respectively. The treatments were imposed and the crop was grown as irrigated and harvested at maturity. The grain yield and nutrient availability at harvest were recorded.

Results and Discussion

Addition of multi-micronutrients significantly enhanced the grain yield of blackgram. The data on grain yield ranged from 880 to 1180 kg ha^{-1} for COBG 593 and 1260 to 1525 kg ha^{-1} for TMV 1. The highest mean grain yield of 1353 kg ha^{-1} being associated with 5.0 kg Zn + 1.5 kg B + 0.5 kg Mo + 40 kg S ha^{-1} which was on par with 5

Table 1. Effect of multi micronutrients on the grain yield of blackgram and nutrient availability

Treatments	Grain yield (kg ha^{-1})		DTPA - Zn (mg kg^{-1})		HWS - B (mg kg^{-1})		0.15% $CaCl_2$ - S (mg kg^{-1})	
	2000 CO BG 593	2001 TMV 1	2000 CO BG 593	2001 TMV 1	2000 CO BG 593	2001 TMV 1	2000 CO BG 593	2001 TMV 1
T_1 - Control	880	1260	0.68	0.75	0.35	0.38	10.4	12.0
T_2 - 5.0 kg Zn ha^{-1}	980	1325	1.24	1.30	0.38	0.39	10.5	11.8
T_3 - 5.0 kg Zn + 1.5 kg B ha^{-1}	1000	1420	1.19	1.31	0.49	0.48	11.0	12.1
T_4 - 5.0 kg Zn + 40 kg S ha^{-1}	1020	1450	1.28	1.27	0.34	0.35	14.9	15.9
T_5 - 5 kg Zn + 1.5 kg B + 40 kg S ha^{-1}	1160	1500	1.26	1.21	0.52	0.50	14.6	15.3
T_6 - 5.0 kg Zn + 1.5 kg B + 0.5 kg Mo + 40 kg S ha^{-1}	1180	1525	1.29	1.28	0.55	0.51	15.4	15.8
T_7 - 3% ZnO seed treatment	940	1310	0.96	0.75	0.39	0.39	10.0	11.8
T_8 - 3% ZnO + 0.5% Borax + 0.05% Na molybdate seed treatment	950	1340	0.75	0.82	0.39	0.41	10.3	11.8
CD (P=0.05)	134	159	0.14	0.17	0.07	0.07	0.78	1.04

kg Zn + 1.5 kg B + 40 kg S ha^{-1} (1335 kg ha^{-1}). Comparing the two varieties, the yield increase was found to be on higher side for COBG 593 (34.1%) than TMV 1 (21.0%). The lowest yield was observed with control (880 and 1260 kg ha^{-1} for COBG 593 and TMV 1 respectively). Similar findings were reported by Surendra Singh *et al.* (1998) for sulphur application. Among the two method of application, soil application enhanced the yield and nutrient availability by both the varieties than seed treatment (Table 1). Due to intensification of agriculture, the demand of nutrients in soils has increased with time. As a result, the deficiencies of two or more micronutrients are emerging in specific soils and several field experiments have shown that soil application is the most efficient method for ameliorating Zn, B and Mo deficiencies (Singh, 2001).

Inclusion of micronutrients in the treatments significantly increased their respective nutrient status to sufficiency levels. The available nutrient status of the post harvest soil ranged from 0.72 to 1.29 mg kg^{-1} for Zn, 0.37 to 0.53 mg kg^{-1} for HWS-B and 11.2 to 15.6 mg kg^{-1} for 0.15% $CaCl_2$-S (Table 1). Application of 5.0 kg Zn + 1.5 kg B + 0.5 kg Mo + 40 kg S ha^{-1} significantly enhanced the availability of Zn (1.29 mg kg^{-1}) and B status (0.53 mg kg^{-1}). Inclusion of sulphur in the treatment schedule has increased the sulphur availability when compared to seed treatment. Similar findings were reported by Sreemannarayana and Sreenivasa Raju (1994) and Kumar *et al.* (1996).

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(Received: September 2002; Revised: April 2003)