

Effect of integrated nutrient management on quality and yield of soybean

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ABSTRACT

A field experiment was conducted to study the effect of integrated nutrient management on quality and yield of soybean. The experimental soil was alkaline (pH 8.18), having low salt content (EC) 0.26 dSm⁻¹. As regards available nutrients the available nitrogen (194.4 kg ha⁻¹), phosphorus (20.8 kg ha⁻¹) and potassium (392 kg ha⁻¹) were low, medium and high, respectively. Application of fertilizer for 20 q ha⁻¹ target with 5 t FYM and biofertilizers, soybean grains showed significant increase in concentration of N, P and Mg. However, for 25 q ha⁻¹ target with 5 t FYM and biofertilizers showed higher concentration of Ca(0.71 %) and S (0.47 %). Crude protein content in soybean grain was higher (39.18) in combined application of organic, inorganic and biofertilizers (T₆). Per cent oil content was maximum (19.54) in T₆ as compared to control. The value of methionine and tryptophan content varied from 1.36 to 1.41 and 1.11 – 1.19 g/16g N, respectively. The thousand-grain weight was increased with application of nitrogen and phosphorus dose from 125.69 to 156.86 g. Specific gravity of soybean oil was at par in all treatment. In treatment T₃ fertilizers were applied as per soil test showed least percent of shriveled grains (3.12) ultimately results were higher grains weight. In targeted yield treatment the yield target of 20 ha⁻¹ and 25 q ha⁻¹ were fulfilled. It was observed that there was significant positive correlation between nitrogen and phosphorus content in soybean grain and calcium, magnesium, sulphur, crude protein, thousand-grain weight. Whereas potassium content in soybean grain was significantly and positively correlated with magnesium and crude protein.

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Soybean is an important pulse as well as oil seed crop. Among the oil seed crops, soybean has occupied fourth place in the edible oil scenario of India, next to groundnut, rapeseed and mustard. It's production in India is 7.6 million tonnes (Anonymous, 2004). In Maharashtra State, it is grown on an area of about 11.05 lakh hectare with annual production of about 13.85 lakh tonnes (Anonymous, 2002). Although, the soybean is a new crop in the states the area under this crop is increasing day by day, as it can profitably replace the Kharif sorghum in Western Maharashtra. It has been proved beyond doubt that Rhizobium inoculation to seeds of pulse crop enhances the yield from 15 to 20 per cent and also enhances the protein content of seed through the symbiotic nitrogen fixation over that of non treated seeds. However, meagre work has been done on effect of integrated nutrient management on quality and yield of soybean, hence above experiment was conducted.

MATERIAL AND METHODS

The field experiment was conducted at STCRC farm on Survey No. 68-B at Mahatma Phule Krishi Vidyapeeth, Rahuri during *Kharif* season of 2002-03 using soybean

(Cv. JS-335) as a test crop. The experiment was conducted in RBD and comprising four replications and eight treatments viz., T₁ (Control), T₂ [GRD (50:75:0 NPK kg ha⁻¹)], T₃ [AST (63:75:0 NPK Kg ha⁻¹)], T₄ [20 q ha⁻¹ target (7:44:41 NPK kg ha⁻¹)], T₅ [25 q ha⁻¹ target (22:69:52 NPK kg ha⁻¹)], T₆ [20 q ha⁻¹ target (14:54:36 NPK kg ha⁻¹) + 5t FYM ha⁻¹ + biofertilizer], T₇ [25 q ha⁻¹ target (28:57:51 NPK kg ha⁻¹) + 5t FYM ha⁻¹ + biofertilizer] and T₈ (FYM @ 5 t ha⁻¹). The fertilizers required for targeted yield of soybean were calculated based on STCR-prescription equation developed (FN = 4.30 T – 0.34 SN, F P₂O₅ = 9.76 T – 8.17 SP, F K₂O = 2.80 T – 0.06 SK). The soil samples were analyzed initially, while plant samples were analyzed after harvest by standard procedures. Correlation among the nutrient concentration and quality parameters was studied by using methods prescribed by Panse and Sukhatme (1999).

RESULTS AND DISCUSSION

Nitrogen

The data in respect of nitrogen content of soybean grain at harvest showed that the treated plots significantly increased the nitrogen content over control (without fertilizer) and influenced by different treatments. Application of inorganic fertilizer, manure, besides biofertilizer (T₆) had increased the nitrogen content (6.86