

Quality of a soybean as influenced by differential water soluble phosphatic fertilizer

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ABSTRACT

A field experiment on soybean cv. DS-228 was conducted at Department of Soil Science and Agril. Chemistry, Post Graduate Institute, MPKV, Rahuri during *Kharif* season of 2005-06. The treatments were nitrophosphate 30, 50 and 60 % WSP and SSP (100 % WSP). There was a significant increase in protein content with an increased soluble phosphatic fertilizer. Application of 100 per cent water soluble phosphatic fertilizer i.e. SSP + Urea + MOP + FYM @ 5 t ha⁻¹ + Biofertilizers (T₄) significantly increased the protein content of 40.7 per cent and oil content to 20.5 per cent in soybean seed over rest of the treatments. The treatment T₈ i.e. application of fertilizer with 100 per cent WSP without application of FYM and biofertilizers was found to be next superior treatment to improve oil content in soybean. The maximum iodine value of 97.0 mg per 100 g of oil was recorded by the treatment T₄ and it was significantly higher than rest of the treatments. Acid value of soybean oil declined with increasing levels of water soluble phosphorus content in phosphatic fertilizers ranging from 30 per cent to 100 per cent WSP. The lowest acid value of 0.62 mg 100 g⁻¹ of oil was observed in 100 per cent WSP (T₈) followed by 50 and 60 per cent water soluble phosphorus in phosphatic fertilizers.

Key words : Protein, Acid value, Iodine value, Quality, Soybean.

Soybean has paramount importance in human and animal nutrition. It is the cheapest source for high quality protein. The soy-proteins are superior to most of other plant proteins by virtue of its high biological value (74.4 per cent) and protein efficiency ratio with essential amino acid pattern which resembles to that of cow milk.

Area and production under soybean in Maharashtra were 23.89 lakh ha and 19.35 lakh tonnes, respectively while the productivity was 810 kg ha⁻¹ (Anonymous, 2006). The use efficiency of phosphorus from fertilizer is very low due to its nature of chemical fixation within a short period of its application in the soil complex. Besides sparingly soluble nature of poor solubility of native phosphorus, sometimes there is a buildup of insoluble phosphorus due to application of phosphatic fertilizers over a long period. In this situation, seed or soil inoculation with phosphate solubilizing micro-organism may benefit the crops by increasing phosphorus availability from insoluble source (Gaur, 1990). Application of phosphorus significantly increases the seed yield, number of pods per plant, seed yield per plant and oil yield (Kesavan and Morachan, 1973). A commercial phosphorus fertilizer contains 60 to 80 per cent water soluble phosphorus. The black soils of Maharashtra are mostly calcareous and alkaline in nature where the availability of phosphorus is

a major constraint. The soluble phosphorus added to such soil gets converted into less soluble form (Zende, 1983). The availability and uptake of phosphorus, however, is greatly influenced by soil properties and degree of water soluble forms of phosphorus in the fertilizers. Both phosphorus in fertilizers and farm yard manures have been found to affect the nutrient status of biochemical health of soil (Sandhu and Meelu, 1974). Since the limited information is available on these aspects the present investigation was planned.

MATERIALS AND METHODS

A field experiment was conducted at the Post Graduate Farm of the Department of Soil Science and Agril. Chemistry, MPKV, Rahuri during the year 2005-06. The soil was clay loam with pH 8.2, EC 0.29 dS m⁻¹, available N, P and K were 164, 8.1 and 324.0 kg ha⁻¹ and bulk density was 1.29 Mg m⁻³. The experiment was laid out in a randomized block design with nine treatments viz., Suphala 15:15:15 (30 % and 50 % WSP), Suphala 20:20:0 (60 % WSP), SSP (100 % WSP) with combination of FYM @ 5 ton ha⁻¹, urea and biofertilizers. The cv. DS-228 of soybean was used. The spacing was 30 cm x 10 cm in plot size 3.9 m x 3.0 m. The fertilizer dose was 50:75:00 N, P₂O₅ and K₂O kg ha⁻¹ respectively. The fertilizer was applied 50 % N and 100 % P₂O₅ at the time of sowing and 50 % N one month after sowing. The composite soil sample was collected from 0-15 cm layer