

Effect of sulphur and phosphorus on nutrient uptake in soybean

M.B. IJGUDE AND J.R. KADAM

See end of the article for authors' affiliations

Correspondence to :

J.R. KADAM

Department of Soil Science and Agricultural Chemistry, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

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ABSTRACT

A field experiment conducted at Post Graduate Institute Farm during *khariif*, 2005 (*Vertic Haplustept*) showed that the field experiment was laid out in a Factorial Randomized Block Design having sixteen treatment combinations with two replications. There were four levels of sulphur (0, 20, 30 and 40 kg ha⁻¹) through elemental sulphur along with four levels of phosphorus (0, 50, 75 and 100 kg ha⁻¹) through diammonium phosphate and their various combinations. The sulphur and phosphorus application significantly increase the total uptake of N, P, K and S. Synergistic effects of sulphur and phosphorus application of total uptake of N, P, K and S were observed. The combined application of 40 kg S ha⁻¹ and 75 kg P₂O₅ ha⁻¹ proved to be the best and superior for significant increase in total uptake of N, P, K and S.

Key words : Sulphur, Phosphorus, Nutrient uptake, Soybean

Sulphur is considered as major factor responsible for soil seed production in India. The interaction sulphur and phosphorus may affect the critical level of available P and S below which responses to their application could be observed. The present experiment was designed to study the effect of S and P on uptake of nutrients *i.e.* N, P, K and S.

MATERIALS AND METHODS

A field experiment was conducted in medium black soil having shrink and swell property. The experimental field was clayey in texture, moderately alkaline, low in available nitrogen and phosphorus, high in potassium and medium in sulphur.

The experiment was laid out in a factorial randomized block design with two replications and sixteen treatments having four levels of each of S (0,20,30 and 40 kg ha⁻¹) applied through elemental sulphur and diammonium phosphate. A basal dose of 50 kg N ha⁻¹ through urea was applied uniformly with the treatments. The soybean seed *Phule kalyani* (DS-228) was sown @ 75 kg ha⁻¹. The treatment effects were evaluated in terms of total uptake of N, P, K and S. Total N was determined by Micro-Kjeldhal method, total P by Vanadomolybdate yellow colour method and total K by flame photometer (Jackson, 1973). Total S uptake in plant was determined by turbidimetry (Blanchal *et al.* 1965).

RESULTS AND DISCUSSION

Total N uptake:

The total N uptake was influenced significantly due to the application of different levels of sulphur and phosphorus (Table 1). Total N uptake was found highest (183.81 kg ha⁻¹) with the application of 40 kg S ha⁻¹. The application of 100 kg P₂O₅ ha⁻¹ resulted into the highest total N uptake (145.99 kg ha⁻¹) which was significantly superior over all other treatments. Similar results with respect to N uptake by soybean crop were reported by Bhakare and Sonar (2000). A combined application of 40 kg S and 75 kg P₂O₅ ha⁻¹ resulted into the highest total N uptake (228.90 kg ha⁻¹) which was significant over all other treatments. These results are in close agreement with results of Majumdar *et al.* (2001).

Total P uptake:

The total P uptake was influenced significantly by the application of sulphur and phosphorus (Table 2). The highest total P uptake was recorded (22.10 kg ha⁻¹) with application of 40 kg S ha⁻¹ being significant over all other treatments. This might be due to the increased phosphorus absorption due to sulphur application. The highest total P uptake (16.78 kg ha⁻¹) was recorded due to the application of 100 kg P₂O₅ ha⁻¹ which was significantly superior over rest of treatments. These results are in close conformity with the results of Reddy *et al.* (1990). A combined application of 40 kg S ha⁻¹ and 75 kg P₂O₅ ha⁻¹ recorded the highest total P uptake (28.21 kg ha⁻¹). The increased uptake of P with the combined application of P and S might be due to their mutually competitive effect on the