



Interaction Effect of Sulphur and Phosphorus on Growth and Nutrient Content of Black gram (*Phaseolus mungo* L.)

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Abstract: Sulphur-phosphorus interaction has been studied in field experiments on a soil, deficient in S and medium in P with black gram (*Phaseolus mungo*) as the test crop. The treatments were taken in factorial combination of three levels of S (0, 30, and 60 kg ha⁻¹) and four levels of P (0, 30, 60 and 90 kg ha⁻¹) applied through gypsum (CaSO₄·2H₂O) and triple superphosphate, respectively. A uniform dose of N was applied with the treatments. The grain, straw and total dry matter yield increased with the application of S and P individually, but decreased when S and P were applied in different combinations. Sulphur application increased S and P content in seed as well as in straw. Total P content increased with applied P and decreased with S application. Applied S increased and P decreased the protein content in grains. Changes in N:S ratio in grain were affected by S and P application. The antagonistic effect of S and P fertilizers on uptake and utilization of each other was more conspicuous when both were applied together. (**Key words:** S x P interaction, growth, nutrient uptake, content, black gram).

Sulphur deficiency is widespread in light textured soils and areas where source of irrigation is other than tube well (Cheema and Arora 1984). Oil seeds, pulses as well as cereals grown on these soils do respond to sulphur application (Arora *et al.* 1983). Reports on the depressing effect of applied S on the availability and uptake of P by different crops have appeared with increasing frequency (Aulakh and Dev 1976) but the information regarding effect of P on uptake of S and their combined application is rather limited. It is observed that when P and S are present in critical amounts in the soil, the plant growth, quality and total production of crop are adversely affected (Jones *et al.* 1972). Depressing effect of applied P and S on the uptake of each other and their mutual antagonistic effect further reduced the dry matter yield and their content in mustard (Singh *et al.* 1986). The interaction of these nutrient elements 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 inter-

action effect of S and P on the (a) yield and quality of black gram, and (b) uptake and utilization of S and P by black gram.

Materials and Methods

A field experiment was conducted on a sandy loam soil, slightly alkaline in nature having pH 8.5, low in organic carbon (0.31%), low in available N (190 kg ha⁻¹), medium in available P (22 kg ha⁻¹), rich in available K (285 kg ha⁻¹) and deficient in available S (9 mg kg⁻¹) with electrical conductivity 1.75 dS m⁻¹ and cation exchange capacity 8.2 cmol(p⁺) kg⁻¹. The experiment was laid out in a factorial combination with three levels of S (0, 30 and 60 kg ha⁻¹) and four levels of P (0, 30, 60 and 90 kg ha⁻¹) applied through gypsum (CaSO₄·2H₂O) and triple superphosphate, respectively. A basal dose of 20 kg N ha⁻¹ through urea was applied uniformly with all the treatments. Black gram seed (Pant U-19) was sown @ 18 kg ha⁻¹. Since the experiment was conducted under rainfed conditions during *kharif* season, no irrigation was given to crop and special care was taken to prevent overflowing of rainwater from one plot to another. The treatment effects were evaluated in terms of yield of grain, straw and total produce. Available N was determined by alkaline permanganate method

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