

Effect of varying levels of sulphur with and without *rhizobium* on yield quality and uptake of nutrient by blackgram [*Vigna mungo* (L) Hepper] cv. PU.30

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Accepted : August, 2008

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ABSTRACT

The effect of four levels of S (0, 20, 40 and 60 Kg S ha⁻¹) with and without *rhizobium* inoculation on yield, quality and nutrient uptake of *vigna mungo* (L) Hepper cv. P.U-30 was studied in sandy clay loam soil of eastern U.P. Pooled analysis of data revealed that application of S and *rhizobium* individually as well as collectively increased the grain and straw yield, protein and carbohydrate % in seeds as well as uptake of N, P and S significantly. The increase in grain and straw yield and protein and carbohydrate % in seeds with 40 and 60 kg S ha⁻¹ in combination with *rhizobium* over control was 28.82, 30.57, 26.42, 28.08, 17.88, 18.16, 3.68 and 3.86%, respectively.

Key words : *Rhizobium*, Sulphur, Black gram, Bio-chemical composition.

Black gram is an important *kharif* pulse grown in India. It is highly nutritious pulse, its grain contains 24% protein, 60% carbohydrate, 1.3% fat, 0.194% Ca, 0.192% Mg, 0.44% P, 0.526% K, 0.09% Fe and 0.0241 mg of vitamin C/100g.

It is consumed in the form of dal whole or split. It is also used in the preparation of Bari (spiced balls), Idli, Dosa, Halwa and Imriti.

However productivity of this crop is very low, as it is cultivated as a marginal crop under reduced rate of fertilizer application mostly without sulphur.

Since sulphur and *rhizobium* play an important role in pulses Saraf *et al.*, 1997. Therefore they not only boost the productivity but can improve the quality of this crop.

Sulphur plays an important role in the synthesis of sulphur containing amino acids, *i.e.* cystine, cysteine and methionine, besides glutathione which is an important detoxicant for compounds unfavourable for growth. In its reduced form glutathione offers protection against various oxidation process. Sulphur is also essential for the synthesis of Co enzyme A, biotin and thiamine or vitamin B₁₂.

Sulphur is also a vital part of ferredoxins which participate in oxidoreduction process and has a significant role in nitrate and sulphate reduction.

Although not a constituent sulphur is needed for the synthesis of chlorophyll.

Rhizobium too can play an important role in improving the yield and yield attributes (Singh and Chauhan, 2004). *Rhizobium* legume symbiosis generally meet the 80% of the N requirement of the legume crop. *Rhizobium* legume association can fix upto 300 Kg N/ha in one crop in one season and in certain situation can leave behind substantial

N for the following crop.

MATERIALS AND METHODS

The experiment was conducted for two consecutive years during *kharif* seasons of 2005 and 2006 at research farm of T.D.(P.G.) College, Jaunpur, U.P. The soil of research farm was sandy loam, low in organic carbon (29%), nitrogen 122.35 kg/ha, medium in phosphorus (28.00 kg/ha) and potassium (220 kg/ha). Low in sulphur (9.76 kg/ha) and slightly alkaline in reaction (pH 7.57).

The experiment was laid out in randomized block design with three replication and four levels of sulphur *i.e.* 0, 20, 40 and 60 Kg/ha with and without seed inoculation with *rhizobium*. Sulphur was applied through gypsum at the time of sowing and a uniform dose of 20 kg/ha was applied through urea at the time of sowing. Recommended doses of P and K and agronomic practices for the crop were also followed.

The protein and carbohydrate % in seeds were estimated by Kjeldal and Anthrone method where as N, uptake was determined/estimated by modified Kjeldhal method as described by Peach and Tracy (1956), S uptake was estimated by digesting plant and seed samples in diacid mixture HCBO₄HNO₃ in the ratio of (2;1) and content was determined by spectronic-20 at 420nm. Whereas P uptake was determined by Vandomolybdo phosphoric yellow colour method as suggested by Jackson (1973).

RESULTS AND DISCUSSION

Application of S through gypsum and seed inoculation with *rhizobium* significantly increased the grain and straw yield and protein and carbohydrate % in seed. This