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Short Communication

EFFECTS OF SULPHUR ON GROWTH AND YIELD OF SOYBEAN, *GLYCINE MAX*

R. M. MORSHED*, M. M. RAHMAN AND M. A. RAHMAN[1]

Department of Botany, Jahangirnagar University, Savar, Dhaka -1342, Bangladesh.
E-mail: rathimorshed@Yahoo.com

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Sulphur (S) plays a pivotal role in various plant growth and development processes being a constituent of S containing amino acids and other metabolites. It is increasingly being recognized as the fourth major plant nutrient after nitrogen, phosphorus and potassium. The role of S in the seed production of soybean has been reported by several investigators.(1-3) Sulphur deficiency affects the quality of food for human beings. Application of sulphur improved nitrogenase activity, nitrogen fixation, plant dry matter and quality of soybean grain in S-deficient soil.(4) There is a lack of sufficient work on sulphur in presence of seed inoculation with effective strains of bradyrhizobia for successful soybean cultivation in Bangladesh. Therefore the present investigation was undertaken to find out the optimum level of S for better growth and yield of soybean.

A pot experiment was conducted at of Botany Department, Jahangirnagar University, Savar, during rabi season of 2004-2005. The soil of the experimental site belongs to Bhatpara series under the agro ecological zone, Madhupur Tract (AEZ - 28). The chemical properties of the experimental soil were total nitrogen 0.04, (%): available phosphorus 16.36, (ppm): exchangeable potassium (meq. /100 g soil): 0.32, available sulphur 27.82, (ppm): soil pH: 5.3. The experiment was laid out in a complete randomized design with six levels of S treatments. Three replications were there for each treatment. Each treatment was replicated three times. The treatments and their levels were: S_1 = No application of S, S_2= 50% S of BARC recommendation, S_3 = 75% S of BARC recommendation, S_4=100% S of BARC recommendation, S_5 = 125% S of BARC recommendation, S_6=150% S of BARC recommendation. In addition to S, other nutrients such as N, P and K were applied as per Fertilizer Recommendation Guide-1997, BARC. Sulphur was applied as gypsum. Fertilizers were applied in each pot according to treatments as basal dose. Soybean variety G-2 (Bangladesh Soybean-4) was used as the test crop in the experiment. Required amount of soybean seeds were inoculated with peat based inoculant of *Bradyrhizobium* strain (BARI RGm-902) immediately before sowing. Three to four seeds per pot were sown on December 16, 2004. Initially 3 plants were allowed to grow, but two weaker plants were uprooted at 10 days after germination

* Auther to whom correspondence may be made.
[1] Soil Resource Development Institute, Regional Laboratory, Mymensingh, Bangladesh.

keeping the healthiest one to grow. The plant was collected from each pot at harvesting stage after 123 days from the date of sowing (DAS). Data on different plant parameters was statistically analysed by using Analysis of Variance (ANOVA) and Duncan's Multiple Range Test (DMRT) as outlined by Gomez and Gomez.[5]

The effect of S on plant height, shoot weight, number of seed and pod, pod weight and seed yield of soybean was found significantly positive (Table 1). The tallest plant (60.33 cm) was observed in S_4 treatment, which was 29.27% higher than that of control treatment and statistically superior to the rest of the treatments. The lowest plant height (46.67 cm) was recorded in control treatment. Mohanti *et al.*[6] reported that application of S at 30 kg ha^{-1} produced the highest plant height of soybean.

Table 1.
Effects of sulphur on growth and yield of soybean

Treatment	Plant height (cm)	Shoot dry weight (g $plant^{-1}$)	Number of Pods $plant^{-1}$	Pod weight (g $plant^{-1}$)	Number of seed $plant^{-1}$	Seed weight (g $plant^{-1}$)
S_1	46.67 c	2.07 d	30.33 e	6.32 d	54.33 d	4.03 d
S_2	48.33 bc	2.31 cd	34.00 de	7.20 cd	62.00 d	4.53 cd
S_3	53.00 b	2.74 bc	40.33 cd	8.74 bc	74.67 c	5.38 bc
S_4	60.33 a	3.60 a	54.00 a	11.92 a	101.67 a	7.19 a
S_5	54.00 b	3.22 ab	48.00 ab	10.53 ab	89.67 ab	6.37 ab
S_6	53.33 b	2.86 bc	42.67 bc	9.36 b	79.33 bc	5.72 b
LSD	5.594	0.641	7.263	1.718	12.30	0.970
CV (%)	5.98	12.86	9.82	10.72	8.98	9.83

Means in a column followed by the same letter (s) are not significantly different at the 5% level of DMRT
NS = Not significant

The influence of different levels of sulphur with the association of *Bradyrhizobium* inoculation on the dry weight of shoot of soybean was found significant (Table 1). Treatment S_4 produced the maximum dry weight of shoot (3.60 g), which was 73.91% higher than that of control treatment. With increase of sulphur levels of dry weight of shoot increased up to certain level and then declined. The lowest dry weight of shoot, 2.07 g, was produced tue to control treatment and the highest, g, was in — treatment.

Number of pod and pod weight increased with increasing level of S upto certain level (Table 1). The maximum number of pods (54.00) and pod weight (11.92 g) per plant were found due to/following S_4 treatment which was statistically superior to the rest of the treatments except S_5. The lowest number of pods per plant (30.33) was observed in the control plants. Sriramachandrasekharan and Muthukkaruppan[8] recorded the maximum number of pods (51.7) and pod weight per plant of soybean with 30 kg S ha^{-1} treatment.

The number of seed and seed weight of soybean varied significantly with the difference of sulphur fertilizer levels with *Bradyrhizobium* inoculation (Table 1). It was found that the seed number and seed weight per plant of soybean increased significantly with the increase of sulphur levels up to recommended dose (S_4 treatment) and then declined. Treatment S_4 and S_5 are statistically identical but superior to the rest of the treatments. The highest number of seeds per plant (101.67) was found in S_4 treatment. The lowest number of seeds (54.33) per plant was recorded by control treatment. Kedar Prasad and Rajendra Prasad[9] found that S at 30 kg/ha treated pea plants had higher number of grains per plant (16.12) which was 24.18% higher than the control ones. The maximum seed weight (7.19 g) per plant was produced by S_4 treatment which was 78.41 % higher than that of control treatment. With the increase of sulphur levels the seed weight of soybean increased up to certain level and then declined. The lowest seed weight (4.03 g) per plant was recorded by control treatment. In Soybean Bhuiyan *et al.*[10] found that application of S at 20 kg ha^{-1} produced the highest seed yield, but Mohanti *et al.*[6] reported S at 30 kg ha^{-1} produced the highest seed yield.

Results obtained in this study, ubducated that Soybean plant positively response to S fertilization. Application of sulphur up at BARC recommendation dose produce the highest growth and yield of soybean as compared to other treatments including the control. So, S should be applied at give the figure, and which is 100 % BARC recommended dose.

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