

Effect of source and level of sulphur on yield attributes and seed yield of clusterbean (*Cyamopsis tetragonoloba*) under rainfed conditions

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ABSTRACT

A field experiment was conducted during the rainy season (*kharij*) of 1992 and 1993 on sandy-loam soil of Fatehpur-Shekhawati, to study the effect of source and level of sulphur on yield attributes and seed yield of clusterbean [*Cyamopsis tetragonoloba* (L.) Taubert]. Sources and levels of sulphur significantly affected the seed yield of clusterbean in both the years. Application of sulphur at 30 and 40 kg/ha through gypsum and pyrite, respectively significantly increased seed yield of clusterbean compared with no sulphur during both the years, the increase respective being 33.5 and 30.3% by gypsum and 42 and 37.5% by pyrite during 1992 and 1993. The increasing levels of sulphur from 0 to 40 kg/ha either through gypsum or pyrite increased the branches/plant during 1993. Application of S 30 kg/ha through gypsum and pyrite significantly increased the grains/pod over no sulphur in both the years.

Clusterbean or (*guar*) [*Cyamopsis tetragonoloba* (L.) Taubert] among leguminous crops is comparatively more drought-tolerant crop and generally grown for feed, fodder and vegetable purposes.

In Rajasthan the clusterbean is being sown on marginal and unfertile soil with inadequate dose of high analysis fertilizers like diammonium phosphate (DAP), which supplies only nitrogen and phosphorus elements. Farmers also usually do not use organic manures for growing clusterbean or other leguminous crops. The soils of the state are mostly deficient in nitrogen and sulphur that causes reduction in number of root nodules and poor vegetative growth. The maturity of seed is also delayed in the absence of adequate sulphur, ultimately

poor seed yield of clusterbean is obtained. The average productivity of this crop in Rajasthan state is 320 kg/ha, which is too low. Keeping in view of the low productivity of clusterbean, an experiment was conducted on the response of clusterbean to sources and levels of sulphur on seed yield of this crop under transitional plain of inland drainage Zone II a of Rajasthan for augmenting its productivity.

MATERIALS AND METHODS

A field experiment was conducted during the rainy season of 1992 and 1993 at Fatehpur-Shekhawati. Experimental soil was sandy loam in texture having pH 9.7. The available N, P and K contents were 120, 34.2 and 354 kg/ha respectively and sulphur

Table 1. Effect of source and level of sulphur on yield and yield attributes of clusterbean

Treatment	Plant population/m		Branches/ plant		pods/ plant		Grains/ pod		Test weight (g)		Seed yield (kg/ha)		Harvest index (%)	
	1992	1993	1992	1993	1992	1993	1992	1993	1992	1993	1992	1993	1992	1993
Control (no sulphur)	10.16	10.50	9.6	2.0	37.3	30.1	8.33	7.33	30.9	30.0	1,303	909	33.04	26.87
10 kg S/ha (G)	9.33	10.00	10.6	2.7	37.6	33.9	8.66	7.66	31.5	30.6	1,644	965	37.86	26.59
20 kg S/ha (G)	10.00	10.50	10.6	2.7	38.3	34.4	9.66	8.00	31.1	30.4	1,651	1,032	36.05	29.13
30 kg S/ha (G)	10.33	10.66	11.2	3.1	44.6	35.9	11.66	9.33	31.3	29.9	1,740	1,185	36.37	28.39
40 kg S/ha (G)	10.00	10.50	11.8	4.6	45.5	43.7	12.00	10.00	31.2	30.0	2,007	1,264	37.94	29.77
10 kg S/ha (P)	10.33	10.66	10.4	2.6	35.2	33.2	8.66	7.66	31.3	30.4	1,444	938	33.71	26.53
20 kg/ha (P)	9.33	10.00	10.2	2.7	38.9	33.8	9.66	8.33	30.3	29.6	1,488	988	33.15	26.71
30 kg S/ha (P)	9.66	10.33	10.8	2.9	41.5	34.9	11.33	9.00	31.0	30.2	1,592	1,101	33.94	28.12
40 kg S/ha (P)	9.66	10.33	11.6	3.4	43.7	38.2	11.66	9.66	30.2	30.0	1,851	1,234	36.66	28.72
CD (P = 0.05)	NS	NS	NS	1.46	NS	NS	1.53	1.01	NS	NS	400.00	96.90		

G, Gypsum; P, pyrite

content 8.7 ppm. The experiment was laid out in randomized block design with 3 replications. The treatments comprised 8 combinations of 4 levels of sulphur (10, 20, 30 and 40 kg/ha) and 2 sources of sulphur (gypsum and pyrite) applied at 15–20 days before sowing, along with an absolute control (no sulphur). Fertilizer doses of N and P_2O_5 @ 10 and 30 kg/ha respectively were applied basal at sowing through DAP. Clusterbean ('RGC 936') was sown in rows 30 cm apart using the seed rate of 20 kg/ha on 15 and 20 July in respective years. The crop was harvested on 29 and 15 October in respective years. The monsoon mainly concentrated from July to September.

RESULTS AND DISCUSSION

Effect on seed yield

Sulphur fertilization significantly influenced the seed yield of clusterbean in both the years. Application of sulphur at 30 kg/ha through gypsum significantly increased the seed yield of clusterbean over that of no sulphur both in 1992 and 1993, the increases being 33.5 (437 kg/ha) and 30.3 (276 kg/ha) % respectively. Although the higher seed yield of 2,007 and 1,264 kg/ha were recorded under 40 kg S/ha through gypsum in respective years, but it was at par with 30 kg S/ha. The beneficial effect of sulphur fertilization on yield attributes may be due to better availability of S and its translocation which in turns increased the seed yield of clusterbean significantly. Similar results

were also reported in pulses by Ram and Dwivedi (1992) and Patel *et al.* (1992).

Application of sulphur at 40 kg/ha through pyrite significantly increased the seed yield of clusterbean over no sulphur, the increases being 42 and 37.5% during 1992 and 1993, respectively (Table 1).

Effect on yield attributes

Sulphur fertilization through gypsum and pyrite significantly increased the yield attributes, viz. branches/plant and grains/pod (Table 1). The branches/plant were affected significantly due to sulphur application through gypsum at 40 kg/ha over that of no sulphur in 1993 only. Application of 30 kg S/ha through gypsum and pyrite significantly increased the grains/pod over no sulphur in both the years, the increases being 40 and 36% in 1992 and 27.2 and 22.8% in 1993, respectively. Similar results were also reported in Indian mustard by Khanpara *et al.* (1993).

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