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Short Communication

Sulphur Fertilization in Rainfed Pigeonpea Varieties

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Pigeonpea is grown under rainfed conditions in about 1.3 lakh hectare in Bharuch district of south Gujarat. The delineation of the soils for available sulphur indicated S deficiency ranging from 6 to 45% in different talukas of this district (Trivedi *et al.*, 1995). Sulphur has a key role in symbiotic nitrogen fixation in legumes apart from other important functions in protein synthesis and energy transfer (Kanwar and Mudahar, 1986). Keeping this in view, and for fixing the dose of S, three levels of S were tried on three pigeonpea varieties at Bharuch during *kharif* 1993-94 and 1994-95.

The levels of S were 0, 20 and 40 kg ha^{-1}, while the varieties were BDN-2, Nylon and Bhadbhoot. The design of the experiment was FRBD with six replications. The crop was grown at a spacing of 90 x 20 cm with a seed rate of 15 kg ha^{-1}. Nitrogen (20 kg ha^{-1}), P (17.5 kg ha^{-1}) and S as per treatments were applied at the time of sowing, through DAP and gypsum. The sowing was done after receiving soaking rains in both the years. The rainfall was normal during the years of experimentation. The harvesting was done after complete maturity and the seed yields were recorded. The seed and soil samples from each plot were collected for working out S uptake, and for determining heat-soluble S (Williams and Steinbergs, 1959) at 0-20 and 20-40 cm depths. The S was determined by turbidimetric method from di-acid extracts (HNO_3:$HClO_4$; 10:4) of seeds and soil extracts. The soil belongs to Typic Chromusterts subgroup, clay texture and is low in total N (0.049%), medium in Olsen-P (13.9 kg ha^{-1}) and high in available K (312 kg ha^{-1}) without problems of salinity or sodicity. The heat-soluble S in the soil at start of the experiment was 20.9 mg kg^{-1} at 0-20 cm and 16.7 mg kg^{-1} at 20-40 cm depths.

The pooled effect of S levels on seed yield and S uptake by seeds of three varieties is shown in Table 1, while the heat-soluble S values after harvest of the crop are given in Table 2.

The pigeonpea varieties responded significantly to S application (Table 1). Application of S @ 40 kg ha^{-1} showed significantly higher yield (1025 kg ha^{-1}) and S uptake by seeds (3.3 kg ha^{-1}). In terms of per cent increase over control, the values

Table 1. Pooled effect of sulphur levels on seed yield and S uptake by seeds of pigeonpea varieties

Varieties	Seed yield (kg ha^{-1})				S uptake by seed (kg ha^{-1})			
	S levels (kg ha^{-1})				S levels (kg ha^{-1})			
	0	20	40	Mean	0	20	40	Mean
BDN-2	784	825	949	853	2.5	2.9	3.2	2.9
Nylon	832	947	1068	949	2.6	3.0	3.2	2.9
Bhadbhoot	964	987	1059	1003	3.0	3.2	3.5	3.2
Mean	860	920	1025	–	2.7	3.0	3.3	–
		CD (5%)				CD (5%)		
Varieties		NS				NS		
Sulphur		43				0.2		
V x S		NS				NS		

were 7 and 19 for yield and 11 and 22 for S uptake by seeds, respectively, at 20 and 40 kg ha^{-1} S application rates.

On an average, 22% increase in pigeonpea seed yield has been reported by Tandon (1995) due to S application. The present experiments also showed yield increase in this range. The varieties and their interactions with S levels were not significant for seed yield and S uptake.

The heat-soluble S after harvest at 0-20 and 20-40 cm depths (Table 2) indicated significant effect of only S levels, and with each increase in S application, there was a significant increase. The magnitude of increase was comparatively high at 0-20 cm depth indicating little migration of soluble S to lower depth. From an initial value of 20.9 mg kg^{-1} at 0-20 cm depth, it rose to 23.8 and 25.9 mg kg^{-1} when S was applied @ 20 and 40 kg ha^{-1}, re-

Table 2. Pooled effect of sulphur levels on heat-soluble S at two depths after pigeonpea harvest

Varieties	Heat-soluble S (mg kg^{-1})							
	0-20 cm depth				20-40 cm depth			
	S levels (kg ha^{-1})				S levels (kg ha^{-1})			
	0	20	40	Mean	0	20	40	Mean
BDN-2	22.1	23.6	24.2	23.3	16.5	19.2	22.3	19.3
Nylon	19.9	25.5	27.0	24.1	15.1	18.4	20.5	18.0
Bhadbhoot	17.4	22.5	26.7	22.2	16.5	18.3	19.0	17.9
Mean	19.8	23.8	25.9	–	16.1	18.6	20.6	–
		CD (5%)				CD (5%)		
Varieties		NS				NS		
Sulphur		2.1				1.8		
V x S		NS				NS		

spectively. At 20-40 cm depth, it rose from 15.7 mg kg^{-1} to 18.6 mg kg^{-1} at corresponding S levels. This indicated a need of continuous application of S every year due to nearness of the values of heat-soluble S after harvest to critical value.

The two year study indicated desirability of application of S @ 40 kg ha^{-1} through gypsum to any of the pigeonpea varieties DBN-2, Nylon or Bhadbhoot grown under rainfed conditions in S deficient soil of south Gujarat. The efficacy of sources of S other than gypsum needs to be evaluated.

References

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