Indian Journal of Agronomy **47** (1) : 94–97 (March 2002)

Response of lentil (*Lens culinaris*) cultivars to sources and levels of sulphur

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Received : July 2000

ABSTRACT

A field experiment was conducted during winter season of 1993–95 to study the response of lentil (*Lens culinaris* Medikus) cultivars to sources and levels of sulphur. Among the sources of sulphur, gypsum proved significantly superior with respect to yield attributes (pods/plant and 1,000-grain weight), grain and straw yields and harvest index. Yield and yield attributes, protein content in grain and total protein production increased significantly with increasing levels of sulphur up to 40 kg/ha. Among the cultivars, 'Pant L 406' performed better than others in respect of yield and quality.

Key words : Lentil, Cultivar, Sulphur, Source

The adoption of old and low yielding varieties, imbalance fertilization besides other practices are the major causes of low yield in lentil crops. Selection of variety is the single factor, which can determine the production of lentil to a considerable extent. In order to sustain the crop production in the areas showing widespread deficiency of sulphur in sites addition of this nutrient is required. Adequate information on the choice of sulphur fertilizers for lentil crop is also needed. The present investigaiton was, therefore, undertaken to evaluate the yield potential of 3 cultivars, and to determine the optimum dose and suitable source of sulphur for maximization of the lentil yield.

MATERIALS AND METHODS

A field experiement was conducted at Lakhaoti (28.4°N and 77.1°E with 207.3 msl) during winter *(rabi)* season of 1993–94 and 1994–95. The soil was sandy loam (typic ustochrest), containing 185.0 kg/ha available N, 6.5 and 7.0 kg/ha available P, 150.0 and 151.5 kg/ha available K and 15.0 and 15.5 kg/ha available S during 1993-94 and 1994-95 respectively, with pH 8.3. The experiment was laid out in split-plot design replicated thrice with 3 varieties ('L9-12', 'Pant L 406' and 'K 75') and 3 sources of S (elemental sulphur, pyrite and gypsum) as main plots and 4 levels of S (0, 20, 40, and 60 kg S/ha) as sub-plots. The crop was

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sown on 17 and 14 November in 1993 and 1994 in furrows 30 cm apart. Sulphur from each source as per treatment was applied one week before sowing of the crop. Other cultural operations were done as per recommendations and crop requirement.

RESULTS AND DISCUSSION

Yield attributes

Lentil cv. 'Pant L 406' produced the maximum pods/plant, while 'L9-12' and 'K 75' were at par. Among the sources of S, gypsum produced the maximum pods/plant. The number of pods/plant increased significantly by sulphur application up to 40 kg S/ha. 'Pant L 406' had significantly more grains/pod than 'L9-12' and 'K 75'. Sources of S had no effect on grains/pod. The number of grains/pod increased markedly at 40 kg S/ha in 1993–94 and at 60 kg S/ha in 1994–95. The 1,000-grain weight of cultivar 'K 75' was significantly more than other cultivars. Gypsum recorded the maximum 1,000-grain weight, being significantly higher over other sources of S. The 1,000-grain weight increased significantly with increasing levels of S up to 40 kg/ha (Table 1).

Yields

The maximum grain production was registered with 'Pant L 406', being significantly superior to other cultivars. Cultivar 'K 75' gave significantly higher grain yield than 'L 9-12'. Lal (1985) and Sharma *et al.* (1985) also suggested growing of 'Pant L 406' and 'K 75' for increasing the lentil production in northern India. Among the sources of S, gypsum was found to be the best source. Singh *et al.* (1996) also

Table 1. Effect of variety, source and level of sulphur on yield attributes of lentil

Treatment	Pods/plant		Grains/pod		1,000-grain weight (g)	
	1993–94	1994–95	1993–94	1994–95	1993–94	1994–95
Variety						
'L9-12'	70.70	72.72	1.48	20.23	20.26	
'Pant L 406'	78.08	76.82	1.56	1.58	19.18	19.60
'K 76'	71.90	73.84	1.50	1.52	23.12	22.32
CD (P=0.05)	1.60	1.34	0.05	0.05	0.58	0.58
Sources of S						
Elemental S	72.04	72.86	1.49	1.51	19.94	20.18
Pyrites	73.40	74.14	1.50	1.52	20.58	20.34
Gypsum	75.12	76.36	1.54	1.56	21.96	21.56
CD (P = 0.05)	1.60	1.34	NS	NS	0.58	0.58
S (kg/ha)						
0	69.52	70.30	1.44	1.46	19.18	19.12
20	73.24	73.66	1.50	1.50	20.56	20.54
40	75.36	76.64	1.52	1.53	21.72	21.48
60	76.14	77.10	1.54	154	21.86	21.64
CD (P=0.05)	1.72	1.54	0.08	0.08	0.74	0.58

Table 2. Effect of variety, source and level of sulphur on grain and straw yields, harvest index, protein content in grain and total protein production

Treatment	Grain yield (q/ha)		Straw yield (q/ha) (%)		Harvest index grain (%)		Protein content in production (kg/ha)		Total protein	
	1993–94	1994–95	1993–94	1994–95	1993–94	1994–95	1993–94	1994–95	1993–94	1994–95
Variety										
'L9-12'	16.20	17.00	34.78	34.86	31.78	32.78	21.64	21.51	557.9	561.6
'Pant L 406'	18.46	19.18	33.32	33.76	35.65	36.09	21.63	21.10	592.2	589.7
'K 75'	17.22	17.60	35.26	36.08	32.81	33.54	21.22	21.46	575.5	586.2
CD (P = 0.05)	0.34	0.28	0.34	0.40	0.37	0.34	NS	NS	30.40	24.12
Sources of S										
Elemental S	16.56	17.12	34.00	34.00	32.75	33.47	21.54	21.36	557.3	563.6
Pyrites	17.14	18.02	34.38	34.62	33.28	34.23	21.46	21.52	566.5	590.0
Gypsum	18.34	19.04	35.48	35.52	34.07	34.89	21.48	21.16	597.2	602.5
CD (P = 0.05)	0.34	0.28	0.34	0.40	0.37	0.34	NS	NS	30.40	24.12
S (kg/ha)										
0	14.46	15.50	31.00	31.42	32.08	33.02	19.48	19.42	464.8	439.9
20	16.00	17.60	33.62	35.66	32.24	33.04	20.80	20.72	513.7	556.6
40	19.32	19.50	36.84	36.64	34.40	34.73	22.60	22.26	681.2	659.1
60	19.62	19.72	37.00	36.76	34.65	34.91	23.10	22.68	712.9	688.3
CD (P = 0.05)	0.50	0.34	0.46	0.52	0.46	0.46	0.84	0.84	52.19	43.15

reported similar results. A significant increase in grain yield was noted with increasing levels of sulphur up to 40 kg/ha. 'K 75' gave the highest straw yield followed by 'L9-12'. The maximum straw production was recorded with gypsum as a source of S. It may be because gypsum improves physical condition of the soil, which results in better growth of crop. Sulphur application up to 40 kg/ha resulted in significant increase in straw production. The harvest index was the highest in 'Pant L 406' followed by 'K 75'. Gypsum as a source of S recorded markedly higher harvest index. Harvest index incresed with increasing levels of S up to 40 kg/ha (Table 2). The higher yield with S application may be ascribed to medium status of available S in soil. Singh and Singh (1990) also reported similar results.

Quality

Protein content in grain among the among the cultivars and sources of S did not differ significantly. The protein content in grain showed marked increase up to 40 kg S/ha. Similar results were also reported by Singh *et al.* (1996). Cultivar 'Pant L 406' being par with 'K 75' recorded higher protein production over 'L 9-12'. Gypsum proved superior source of S to elemental sulphur. The protein production increased significantly up to 40 kg S/ha (Table 2).

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