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Yield and Quality of Mustard (*Brassica Juncea* Subsp. *Juncea*) as Influenced by Levels and Sources of Sulphur

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Mustard (*Brassica Juncea* (Linn.) Czern. & Coss. subsp. *Juncea* (Linn.) is recently introduced as important winter oilseed crop in Western Gujarat. It removes comparable amounts of sulphur to that of phosphorus (Tandon, 1984). Sulphur has been found to promote the oil synthesis as it is essential constituent of mustard oil. Sulphur response studies on groundnut were conducted in Saurashtra region but the information on other oilseeds are lacking (Patel *et al.*,1987). Therefore, efforts were made to investigate and to elucidate information on response of mustard to sulphur fertilization.

A field experiment was conducted during the winter 1987-88 on a medium black calcareous soil (*Vertic Ustochrept*) marginal in available sulphur (11 ppm), to know the effect of levels (0, 30, 60 and 90 kg S/ha) and sources (elemental sulphur, gypsum and potassium sulphate) of sulphur on yield and quality of mustard (variety 'Varuna'). The treatments were quadruplicated in a randomized block design. A basal dose of 25 kg N and 50 kg P_2O_5/ha as diammonium phosphate and urea was applied at sowing. The remaining quantity of 25 kg N/ha was top dressed at 30 days after sowing. Calcium of gypsum and potassium of potassium sulphate were balanced by adding required quantities of their chloride salts in other treatments. The chemical analysis of the experimental plot indicated that the soil had pH (1:2.5) 8.0, EC (1:2.5) 0.50 dS/m, $CaCO_3$ 9.5%, CEC 59.0 me/100 g, OC 1.29%, Olsen's P 26.3 kg/ha, available K 225 kg/ha and heat soluble (available) sulphur 11.0 ppm. During the life time of crop 7 irrigations were applied. The crop was harvested at maturity and the oil content in mustard seeds was determined with the help of nuclear magnetic resonance, nitrogen content by micro kjeldahl method and crude protein content was calculated by multiplying total N content with a factor of 5.83.

The reults revealed that, irrespective of the levels and sources of sulphur, its application did not influence the yield and quality parameters of mustard (Table 1). However, the increasing trend in all the parameters studied was observed due to the application of sulphur except the crude protein content which was significantly influenced by the different sources of sulphur of which gypsum out yielded the rest.

The addition of about 84 kg S/ha through 7 irrigations each of 6 cm depth

TABLE 1
Response of sulphur sources and levels on yield and quality of mustard.

Treatment	Yield (q/ha)			Oil content (%)	Crude protein content (%)
	Grain	Stover	Oil		
Control vs Sulphur					
Control	11.51	38.27	3.84	33.40	14.75
Sulphur	12.46	40.09	4.18	33.55	16.34
S Em ±	0.85	2.01	0.29	0.16	0.95
CD (P=0.05)	NS	NS	NS	NS	NS
Levels of Sulphur (kg S/ha)					
0	11.51	38.27	3.84	33.40	14.75
30	12.05	39.45	4.03	33.47	16.43
60	12.66	40.25	4.24	33.49	16.12
90	12.67	40.57	4.27	33.70	16.47
S Em ±	0.57	1.35	0.20	0.11	0.64
CD (P=0.05)	NS	NS	NS	NS	NS
Sources of Sulphur					
Elemental sulphur (S)	12.72	38.60	4.27	33.55	15.07
Gypsum ($CaSO_4.2H_2O$)	12.53	42.06	4.20	33.54	17.81
Potassium Sulphate (K_2SO_4)	12.13	39.61	4.07	33.57	16.14
S Em ±	0.46	1.10	0.16	0.09	0.52
CD (P=0.05)	NS	NS	NS	NS	1.51

NS = Nonsignificant

(Irrigation water had 1.25 m.e. SO_4-S/litre) and relatively high organic carbon content (1.29%) of the experimental plot may be the main causes for the nonresponse of mustard to various levels and sources of S. It is pertinent to mention here that at an early stage of the crop growth, there were slight visual differences in growth of the crop among different treatments but such differences disappeared after the flowering stage, most probably due to the reasons stated earlier. Thus, it can be concluded from the present investigation that before making recommedation of S fertilization, the sources of S addition through irrigation, precipitation and crop residues as well as losses through leaching and crop removal should be taken into consideration.

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