

## Effect of sulphur and zinc on yield, quality and its concentration on mustard

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### ABSTRACT

The response of Indian mustard cv. GM-2 to S and Zn was investigated in a field experiment conducted during the winter season of 2002-03 and 2003-04 in Anand loamy sand (Typic Ustochrepts), Gujarat, India. There were 16 treatments consisting of 4 S levels (0, 15, 30 and 45 Kg ha<sup>-1</sup>) through CaSO<sub>4</sub> and 4 Zn levels (0, 2.5, 5.0 and 7.5) through ZnCl<sub>2</sub>, alone or in combination. The seed and straw yield increased significantly with increase in levels of S. Similarly, Zn also enhanced the grain and straw yield. However, the effect was limited to Zn application up to 5.0 kg/ha. The total uptake of S increased significantly with increase in each dose of S up to 45 kg/ha. The per cent increase in total S uptake was 11, 26 and 66 over the control with application of S at 15, 30 and 45 kg/ha, respectively. S uptake also increased from 27.2 to 44.1 kg/ha due to application of Zn at 0 and 7.5 kg Zn/ha, respectively. The maximum S uptake (34.5 kg/ha) and Zn (155 g/ha) uptake was recorded with 45 Kg S and 7.5 Kg Zn per hectare, respectively. The Test weight and protein content were significantly increased with the increasing levels of S and Zn. The oil content increase with increasing levels of S and Zn, but increase was non significant. The interaction effect of S and Zn on yield, quality, yield attributing characters, oil content as well as content and uptake of nutrient were found to be non-significant.

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The deficiencies of secondary and micronutrients in Indian soils and crops are on the increase on account of adoption of modern agricultural practices with an increased use of NPK fertilizers free from micronutrients and limited use of organics as well as restricted recycling of crop residues (Prasad, 1999). Among secondary and micronutrients, the deficiency of sulphur and zinc is on the increase, which restricts the optimum production of cereals, pulses and oil seed crops. The analysis of about 6500 surface soils sample from the different districts of Gujarat revealed average deficiency of sulphur to an extent of 35%, which is more prevalent in light textured soils of middle and north Gujarat. The percentage zinc deficiency reported in the soils of Gujarat was 24 (Patel *et al.*, 1999). The oil seed crops are the most affected as their requirement of sulphur is higher than other crops. Similarly, Zinc also hampers the productivity of cereals and oil seed crops. In the present investigation efforts are made to study the individual and combined effects of S and Zn in mustard for two years under field conditions. The data obtained on yield, quality and nutrients content during the investigation are presented along with statistical inferences.

### MATERIALS AND METHODS

The experimental location was the College Agronomy

Farm of Anand Agricultural University, Anand (Gujarat) having loamy sand soil (Typic Ustochrepts), 7.81 pH, 0.23EC<sub>2.5</sub> (dSm<sup>-1</sup>), 0.28% OC., 0.024% N, 55.0 available P<sub>2</sub>O<sub>5</sub> Kg ha<sup>-1</sup>, 490.0 available K<sub>2</sub>O Kg ha<sup>-1</sup>, 4.55 ppm available S, and 0.45 ppm available Zn. The experiment was laid out in Factorial Randomized Block Design (FRBD) with 3 replications. Each block was further divided into 16 unit plots for placement of 16 treatment combinations. Thus, the total number of plots under the experimental design was 48. The size of the unit plot was 5.0 x 2.7 m<sup>2</sup>. After carrying out the layout as per the standard technique of the design, the half of the recommended N (50 kg ha<sup>-1</sup>) and full dose of P<sub>2</sub>O<sub>5</sub> (50 kg ha<sup>-1</sup>) to the soil through urea (89.33 g plot<sup>-1</sup>) and diammonium phosphate (146.74 g plot<sup>-1</sup>) as basal application were given to each plot. Based on the initial soil analysis, K<sub>2</sub>O was not applied due to adequate available potassium (K<sub>2</sub>O) status of the soil. There were 4 treatments each of S and Zn including a control *viz.*; 0, 15, 30 and 45 kg S kg ha<sup>-1</sup> and 0, 2.5, 5, and 7.5 kg Zn ha<sup>-1</sup>, respectively. Sulphur was used as gypsum (CaSO<sub>4</sub>.2H O) and zinc as ZnCl<sub>2</sub>. The mustard variety GM-2 was selected for sowing. The sowing was done on 23<sup>rd</sup> October 2002 and 10<sup>th</sup> October 2003 in first year and second year, respectively, keeping the seed rate of 3.5 kg ha<sup>-1</sup>. Intercultural operations were done as and when needed to keep the crop free from weeds and to protect from various pests and diseases. The grain and straw