A field experiment was conducted at Instructional Farm, Department of Agronomy, Junagadh Agricultural University, Junagadh during rabi 2015-16 to study the “Effect of sources and levels of sulphur on the growth, yield and quality of Indian mustard (Brassica juncea L.)”. This experiment was conducted with three sources of sulphur (Elemental S, Bentonite and Cosavet) and four levels of sulphur (0, 15, 30, 45 kg S ha\(^{-1}\)) in factorial randomized block design replicated three times.

6.1 **EFFECT OF SOURCES OF SULPHUR**

- Plant population ha\(^{-1}\) recorded initial and at harvest were found non significant under different sources of sulphur.
- Among different sources of sulphur, elemental S (S\(_1\)) exhibited significantly higher plant height (118.94 cm, 156.06 cm and 187.31 cm at 60 DAS, 90 DAS and at harvest, respectively) which was statistically at par with S\(_3\) (Cosavet S).
- When sulphur was applied in elemental form (S\(_1\)), it has recorded significantly higher primary (6.84) and secondary branches (10.95) per plant at harvest and it was statistically at par with S\(_3\) (Cosavet) with the value of 6.42 and 10.86, respectively.
- The yield attributing characters viz., number of silique per plant, number of seeds per silique, test weight and length of silique were found significant under different sources of sulphur. Application of elemental S (S\(_1\)) recorded significantly higher number of silique per plant (215.83), number of seeds per silique (12.50), test weight (4.22 g) and length of silique (4.49 cm) and remain statistically at par with S\(_3\) (Cosavet) in case of number of silique per plant, length of silique and test weight.
- Seed and stover yield was found significant under the different sources of sulphur. Seed yield (2124 kg ha\(^{-1}\)) and stover yield (4090 kg ha\(^{-1}\)) was significantly higher under Elemental S (S\(_1\)) and remain statistically at par with S\(_3\) (Cosavet) in case of stover yield.
Various sources of sulphur did not significantly affect oil and protein contents in mustard seed.

N, P and K content in seed and stover was found non-significant, while sulphur content in seed (0.31%) was significantly under elemental S (S₁).

N, P, K and S sulphur uptake by seed and stover (kg ha⁻¹) significantly influenced by different sources of sulphur. Elemental S (S₁) recorded maximum uptake of N by seed (65.90) and stover (15.23), P uptake by seed (15.09) and stover (10.63), K uptake by seed (20.08), S uptake by seed (6.70) and stover (20.75) and remain statistically at par with S₃ (Cosavet S) in case of N and S uptake by stover.

Available Nitrogen, Phosphorus, Potassium and Sulphur in soil after harvest was found non-significant under different sources of sulphur.

Application of elemental S (S₁) earned the maximum net realization of ₹ 38122 ha⁻¹ with B:C ratio of 1.94 followed by S₂ (Cosavet S). However S₂ (Bentonite S) recorded the minimum values of net realization of ₹ 25844 with lowest B:C ratio of 1.62.

6.2 EFFECT OF LEVELS OF SULPHUR

Various levels of sulphur did not influence significantly on initial and final plant population.

Different levels of sulphur application significantly influenced plant height at 60, 90 DAS and at harvest. Application of 45 kg S ha⁻¹ (L₃) resulted in significantly higher plant height at 60, 90 DAS and harvest (121.21, 153.94, 189.17 cm respectively) but it was statistically at par with L₁ (15 kg S ha⁻¹) and L₂ (30 kg S ha⁻¹).

Application of 45 kg S ha⁻¹ (L₃) produced significantly higher number of primary (6.89) and secondary branches (11.53) per plant but remain statistically at par with L₁ (15 kg S ha⁻¹) and L₂ (30 kg S ha⁻¹).

The significant influence of various levels of sulphur was found on yield attributing characters viz., number of silique per plant, number of seeds per silique, test weight and length of silique. The highest number of silique per plant (227.22), number of seeds per silique (12.78) test weight (4.34 g) and length of silique (4.73 cm) were recorded under L₃ (45 kg S ha⁻¹) but it was statistically at par with L₂ (30 kg S ha⁻¹).
Seed and stover yield was significantly influenced by varying levels of sulphur. Significantly higher seed (2277 kg ha\(^{-1}\)) and stover yield (4500 kg ha\(^{-1}\)) was achieved under L\(_3\) (45 kg S ha\(^{-1}\)).

Various levels of sulphur significantly affect oil contents in mustard seed. L\(_3\) (45 kg S ha\(^{-1}\)) recorded significantly higher oil content in mustard seed (41.27%) but statistically at par with L\(_2\) (30 kg S ha\(^{-1}\)) and L\(_1\) (15 kg S ha\(^{-1}\)). Various levels of sulphur do not significantly affect protein content in mustard seed.

An application of 45 kg S ha\(^{-1}\) (L\(_3\)) significantly improved the N content in stover (0.39%), S content in seed (0.32%) and stover (0.52%). While different levels do not have any significant effect on N content in seed, P and K content in seed and stover.

Various levels of sulphur significantly improve the uptake of N, P, K and S by both seed and stover. L\(_3\) (45 kg S ha\(^{-1}\)) recorded maximum uptake of N, P, K and S by seed, which were 71.23, 16.58, 22.02 and 7.31 kg ha\(^{-1}\) respectively. L\(_3\) (45 kg S ha\(^{-1}\)) recorded maximum uptake of N (17.50), P (11.77), K (30.63) and S (23.44) kg ha\(^{-1}\) by stover.

Available nitrogen and potassium status in soil after harvest of mustard crop found non-significant under different levels of sulphur while phosphorus and sulphur status after harvest was found significant under L\(_3\) (45 kg S ha\(^{-1}\)) which was at par with L\(_2\) (30 kg S ha\(^{-1}\)) and L\(_1\) (15 kg S ha\(^{-1}\)) except phosphorus content in soil.

When sulphur was applied @ 45 kg ha\(^{-1}\) it earned the maximum net realization of ₹ 39765 ha\(^{-1}\) with B:C ratio of 1.89 followed by L\(_2\) (30 kg S ha\(^{-1}\)). However the minimum value of net realization (₹ 23417) with B:C ratio of 1.65 was obtained under L\(_0\).

### 6.3 INTERACTION EFFECT

The interaction effect of sources and levels of sulphur was found non-significant in all the parameters recorded during course of investigation.

### 6.4 CONCLUSION

Based on the one year field experiment results, it can be concluded that better crop yield and highest net returns could be obtained from mustard (cv. Gujarat Mustard-4) by fertilizing the crop with 45 kg S ha\(^{-1}\) through elemental sulphur in
addition of RDF (50-50-00 kg NPK ha⁻¹) in the medium black calcareous soil of South Saurashtra Agro-climatic Zone of Gujarat.

**Future line of work**

The following suggestions are made for future line work on the basis of present findings.

1. Large scale field demonstration should be made for evaluating consistency and applicability of the conclusion of this study.
2. The experiment should be conducted at least for three years for consistant result and meaningful conclusion.
3. New varieties of mustard need to be included in the study for better comparison.