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Pradeep Pagaria
Senior Scientist and Head, Krishi
Vigyan Kendra, Gudamalani,
Barmer, Rajasthan, India

Turfan Khan
Farm Manager (G&PB), Krishi
Vigyan Kendra, Gudamalani,
Barmer, Rajasthan, India

Ganga Ram Mali
Programme Assistant (Lab
Tech.) (Agronomy), Krishi
Vigyan Kendra Gudamalani,
Barmer, Rajasthan, India

Effect of sulphur application on oil content in mustard crop in Barmer district of Rajasthan

Pradeep Pagaria, Turfan Khan and Ganga Ram Mali

Abstract

Sulphur (S) deficiency is widespread and on an average 41 per cent Indian soils are deficient in Sulphur. Deficiency of Sulphur is commonly observed in coarse textured alluvial, red and laterite, leached acidic and the hill soils of Rajasthan. Reasons for the deficiency are wide gap between the removal and addition of sulphur, intensive cropping system, lack of organic matter and crop residue recycling, use of S-free fertilizers and use of high yielding varieties etc. During *rabi* in 2018, one FLD on Mustard {Variety: DRMRIJ 31 (Giriraj)} was conducted in the fields of Ten farmers from different villages in Gudamalani blocks. A total 5.0 ha area was covered in the demonstration. The results of FLD show that application of sulphur @ 22.5kg /ha along with NPK (12:32:16) @ 125 kg/ha not only increases the yield but also the net returns to the farmers.

Keywords: Mustard, sulphur, FLD, etc.

Introduction

Sulphur (S) deficiency is widespread and on an average 41 per cent Indian soils are deficient in Sulphur. Deficiency of Sulphur is commonly observed in coarse textured alluvial, red and laterite, leached acidic and the hill soils of Rajasthan. Reasons for the deficiency are wide gap between the removal and addition of sulphur, intensive cropping system, lack of organic matter and crop residue recycling, use of S-free fertilizers and use of high yielding varieties etc.

Sulphur deficiency is known to affect nitrogen metabolism to a large extent and reducing the Protein synthesis. Young leaves deficient in sulphur show inter Venial chlorosis that starts from the apical Part of leaflets and spread towards the base. In rapeseed and mustard, cupped leaves and reddening of underside of the leaves and stem occurs. Research reveals that oilseeds removes about 10-25 kg S/ha annually and it is very essential for oilseeds. Conclusion that could be drawn from the past research conducted in the field of sulphur application in oilseeds has already established the fact that application of recommended doses of sulphur fertilizers can significantly boost up the yield of oilseed crops as well as net return over the existing practices by the farmers. Yellow mustard is one of the important crops for the farmers of the Gudamalani block of Rajasthan State. During the field visits and other activities conducted in last five years, it was found that the farmers of Gudamalani block rarely apply sulphur in yellow mustard. In general, the Farmers follow the Practice of using either 70-75 kg NPK (12:32:16) or 50-75 kg DAP/ha as basal dose and for this reason, the grain as well as oil yield of such crops is not profitable to the farmers of this region. Keeping in mind all these Facts, Front Line Demonstration (F.L.D.) on use of sulphur in Mustard has been fabricated by the scientists of Krishi Vigyan Kendra, Gudamalani Barmer.

Methodology

During *rabi* in 2018, one FLD on Mustard {Variety: DRMRIJ 31 (Giriraj)} was conducted in the fields of Ten farmers from different villages in Gudamalani blocks. A total 5.0 ha area was covered in the demonstration. Farmers were advised to use NPK (12:32: 16) @ 125 kg/ha along with urea 65 kg/ha as the basal dose. Farmers were also suggested to use 98 kg/ha urea as top dressing just after 30 days of sowing. The sulphur fertilizer bentonite sulphur (90% S) was used @ 22.5 kg/ha.

Correspondence
Pradeep Pagaria
Senior Scientist and Head, Krishi
Vigyan Kendra, Gudamalani,
Barmer, Rajasthan, India

The fields of ten farmers from different villages in Gudamalani blocks

S. No	Name of Farmer	Village/Block	Date of Sowing	Date of Harvesting
1	Khima Ram	Bhedana (Gudamalani)	5.11.2018	9.3.2019
2	Raming Ram	Bhedana (Gudamalani)	5.11.2018	10.3.2019
3	Dhana Ram	Bhedana (Gudamalani)	5.11.2018	9.03.2019
4	Ganesh Ram	Bhedana (Gudamalani)	5.11.2018	9.03.2019
5	Babu Ram	Bhedana (Gudamalani)	5.11.2018	9.03.2019
6	Jai Rupa	Band (Gudamalani)	7.11.2018	12.03.2019
7	Haringa Ram	Band (Gudamalani)	7.11.2018	13.03.2019
8	Virdha Ram	Band (Gudamalani)	7.11.2018	12.03.2019
9	Fagalu Ram	Band (Gudamalani)	7.11.2018	15.03.2019
10	Dhana Ram	Band (Gudamalani)	7.11.2018	12.03.2019

Pre-sowing trainings for the selected farmers were organized before conducting the FLD to enhance their skills. A problem faced by the scientists was reluctance of the farmers for line sowing as farmers found that to be quite time consuming. The farmers followed broadcasting method for Seed sowing. However, they agreed thinning operation soon, after 20-25 days of sowing. Plant protection measures to control aphid used time to time. One day was also organized to acquaint other farmers with this technology.

The results obtained were statistically treated with paired t-test which is used to test the validity of mean of a sample with some confidence value. The average yield or the test statistic was estimated by the formula given below-

Mean +T (N-1, Level of Significance) x Standard Error

The test was used to compare two treatments when applied in a pair of similar experimental units. It is a useful tool to make comparison between technology demonstrated and the farmer's practice methods. Results: Parameters viz. Average yield, Net return and Yield parameters were studied for the demonstration and the farmer's practice methods.

Results

Parameters viz. Average yield, Net return and Yield Parameters were studied for the demonstration and the farmer's practice methods. Details of these results are being presented in three different tables. The average yield is shown in Table 1

Table 1: Average yield from Technology demonstrated (TD) and Farmer Practice (FP)

	Mean yield (q/ha)	Standard deviation	Standard error of mean	Estimated value range with 95% confidence level
Farmer practice (FP)	13.45	0.45	0.21	(12.78,14.12)
Technology demonstrated (TD)	18.05	0.42	0.21	(17.14,18.95)
Difference between TD and FP	4.60	0.47	0.22	(4.37,4.83)

The results presented in table 1 indicate that in the farmers practices method, the yield ranged in between 12.78-14.12 q/ha while in the demonstrated technology method we found an increase in yield ranging between 17.14 and 18.95 q/ha.

The results obtained after conducting the F.L.D. clearly reveal that application of bentonite sulphur along with recommended doses of NPK shows a sufficient increase in the yield of yellow sarson. In the demonstrated technology method, the increase in yield is about 4.60 q/ha i. e. 34.20 per cent over the farmer's practice.

The grain obtained was sold out at the rate of Rs. 4200/q. The cost of cultivation in the farmer's practice was Rs. 24375/ha and that of technology demonstrated was Rs. 33435/ha. The average net return from the farmer's practice was Rs. 32115/ha while that from technology demonstrated was Rs. 42375/ha. The complete calculation means that investing Rs. 9060/ha extra on fertilizer inputs, farmer get an extra income of Rs. 10260/ha. In other words, farmers acquire ten rupees by just investing one Re extra.

Table 2: Estimation of net return [(Rs/ha) obtained in Technology demonstrated (TD) and Farmer practice (FP)

	Mean net return (Rs/ha)	Standard deviation	Standard error of mean	Estimated value range of net return (Rs/ha) with 95% confidence level
Farmer practice (FP)	32115	245.01	4.95	(30509.3,33720.8)
Technology demonstrated(TD)	42375	481.46	6.94	(40256.3,44493.8)
Difference between TD and FP	10260	445.85	6.68	(9747,10773)

Table 3: Comparison of yield parameters between the Technology demonstrated and Farmer practice methods

	Technology demonstrated	Farmer practice
Average plant height	115.3	101.4
Average no. of branching	7.11	4.21
Average no. of silique/ plant	81.05	53.21
Average oil %	42.21	33.15
Average oilcake %	51.12	58.23

The sulphur and NPK application increased the average plant height, number of branching and number of silique per plant. The average oil content increased by 27.33 per cent in the demonstrated technology method. The oilcake percentage was

higher in farmers practice. This shows that the technology demonstrated method was more effective in oil production over the farmer's practice method.

Technical feedback on the technology demonstrated method

- ❖ Application of S increased the plant height.
- ❖ Application of S increased the number of branches per plant over the farmer's practice method.
- ❖ Application of S increased the number of silique/ plant over that of without S treatment.
- ❖ Application of S increased the oil percentage and yield in comparison to without that of S treatment.
- ❖ Oilcake percentage in sulphur treatment was less than that of with- out S treatment.

Conclusion

The results of FLD show that application of sulphur @ 22.5 kg /ha along with NPK (12:32:16) @ 125 kg/ha not only increases the yield but also the net returns to the farmers.

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