

Response of sulphur fertilizers on the yield and oil content of mustard in sandy loam soils of Uttar Pradesh

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Abstract

Field experiments were conducted at farm of KVK Ujhani (Badaun) during Rabi season of 2010-11 and 2011-12 in RBD in with mustard variety Pusa bold having six treatments. The treatments consisting commercial grade sulphur fertilizers viz. use of sulphur 90 % DP @ 25 kg/ha basal, sulphur 80 % WP @5 kg/ha applied with urea broadcasting at 45 DAS, sulphur 80 % WP @ 1.25 kg/ha foliar sprayed at 75 DAS, sulphur 80 % WP @5 kg/ha, sulphur basal + 80 % WP @5 kg/ha applied with urea broadcasting at 45 DAS, sulphur basal + 80 % WP @ 1.25 kg/ha foliar sprayed at 75 DAS, no use of sulphur (farmers practice). The experimental fields was sandy loam with slightly alkaline in nature (pH 7.7), low organic carbon and potash, medium in phosphorus. The results showed that application of sulphur had significant influence on yield attributes, grain & oil yield of mustard. Maximum values of plant height (150.2 cm), seeds per pod (17), thousand grain weight (6.54 g), grain yield (21.94 q/ha) and oil content (42.4 %) were recorded with dual application basal along with 80 % WP @ 1.25 kg/ha foliar sprayed at 75 DAS closely followed by application sulphur basal + 80 % WP @ 5 kg/ha applied with urea broadcasting at 45 DAS and minimum values under farmers practice.

Key words: Mustard, Yield, Sulphur 90 %DP, Sulphur 80% WP, oil yield, foliar application.

Introduction

Rapeseed and mustard are the third most important edible oilseed crops of the world after soybean and oil palm. These crops are grown under a wide range of agro-climatic conditions. Indian mustard is the most important member of the group, accounting for more than 70% of the area under rapeseed-mustard, followed by toria, yellow sarson and brown sarson. Mustard and sarson group of plants, however, are grown both on sandy and heavy soils under irrigated as well as rainfed conditions. These crops are commonly cultivated in areas of marginal and sub-marginal productivity, either mixed or intercropped with wheat, barley, gram, pea, sugarcane, lentil etc. In areas of advanced agronomy, they are chiefly grown as pure crop. The oil content varies from 38 to 45%. The oil is utilized for human consumption throughout the northern India. The leaves of young plants are used as green vegetables as they supply sulphur and minerals in the diet. In the tanning industry, mustard oil is used for softening leather. The productivity of mustard is very low (11.23 q/ha) in Rohilkhand Division of Uttar Pradesh mainly because of imbalanced use of fertilizers. Most of the farmers are not aware of importance and application time of commercially available sulphur containing fertilizers in nearby market.

To aware the farmers of this region these experiments have been conducted. Sulphur is essential for synthesis of proteins, vitamins and sulphur containing essential amino acids and is also associate with nitrogen metabolism. Besides, sulphur application in mustard has also been reported to increase the yield and oil percentage. Keeping this in view, the present study was undertaken to evaluate the response of mustard to commercially available sulphur in the market as need of farmers. Jamal *et al.* 2010 said to minimize the gap between the demand and supply of oilseeds, intensive efforts are being made to increase their production. To achieve this objective, agricultural scientists have laid more emphasis on improving production of oilseeds through proper nutrition. Sulphur (S) requirement of plants has become increasingly importance in India as well as world agriculture. However, to achieve high yields and the rates of S fertilizer should be recommended on the basis of available soil S and crop requirement.

Materials and Methods

The field experiments were conducted at the Farm of *Krishi Vigyan Kendra, Budaun* (Sardar Vallabhbai Patel University of Agricultural & Technology, Meerut) during two consecutive *Rabi* seasons of 2010-11 to 2011-12 in Randomized Block Design with six treatments and four replications. The

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treatments mainly consisting commercial grade sulphur containing fertilizers available in the market as under-

Treatment details:

| Symbol | Treatment | Quantity kg/ha | Time of application Days after sowing | Method of application |
|--------|--|----------------|--|-----------------------|
| T1 | Sulphur 90 % DP | 25.00 | Just before sowing | Basal application |
| T2 | Sulphur 80 % WP | 5.00 | 45 DAS | Broad cast with urea |
| T3 | Sulphur 80 % WP | 1.25 | 75 DAS | Foliar application |
| T4 | T1+ Sulphur 80 % WP | 25.00+ 5.00 | 45 DAS | Broad cast with urea |
| T5 | T1+ Sulphur 80 % WP | 25.00+ 1.25 | 75 DAS | Foliar application |
| T6 | Farmer practice (No use of Sulphur) | 0.00 | --- | --- |

The crop was supplied with recommended of major nutrients (NPK) through fertilization NPK (12:32:16) at the rate of 200 kg per hectare as basal application and remaining amount of nitrogen was applied as top dress through urea at 45 and 75 DAS of crop for all the treatment plots. The soil of the experimental field was sandy loam in texture, with slightly alkaline in reaction (pH 7.7) and low in organic carbon (0.24%) and medium in available phosphorus (32 kg P₂O₅ ha⁻¹) and low in available potassium (120 kg ha⁻¹). Mustard (*Brassica juncea* L.) variety Pusa bold variety was sown in first week of November during both the years using the seed rate of 6.5 kg ha⁻¹. All the agronomical practices like weeding, irrigation, plant protection measures were conducted same in all the treatment plots. Crop was harvested manually in third week of March during both the years of investigation. Data on yield attributes and yield were recorded at the time of maturity and oil content after the crop using standard techniques and subjected for statistical analysis.

Results and Discussions

The yield attributing characters (plant height, seeds per pod and thousand grain weights) and yield of mustard was influenced significantly duo to application of different sulphur containing fertilizers.

Maximum plant height (150.2 cm) was observed from application of 25 kg/ ha 90 % DP sulphur as basal supplemented with 1.25 kg/ ha 80% WP sulphur as foliar application at 75 DAS of plant growth followed by (149.7 cm) basal application of 25 kg/ ha 90 % DP sulphur along with broad casting of 5 kg 80 % WP with urea at 45 days of sulphur and both were significantly more as compared to control treatment. The pod length was highest (6.5 cm) with dual applied sulphur fertilizers compared to single dose of fertilizer but it could not reach up to significant level of difference and control treatment. Maximum number of seeds (17) per pod were recorded with the T4 and T5 treatments followed by broad cast of 5 kg sulphur 80 % WP with urea at 45 DAS and there were significantly high as compared to other treatments and control. Khalid et al (2009) reported that three S fertilizers increased the rapeseed yield and yield parameters in their effect were at par with each another. The 40 kg S/ ha produced highest biomass, seed yield. Significant and higher grain yield received (21.94 q/ha) with basal and foliar application, followed by 21.45 q/ ha with sulphur application basal and broad cast with urea, 20.52 q/ ha from basal application, 19.73 q/ ha from basal application. Lowest yield (17.83 q/ ha) was observed from farmers practice in sandy loam soil. Yadav *et al*

Table 1: Effect of sulphur containing fertilizers on yield attributes, grain and oil yield of mustard

| Treatments | Plant height(cm.) | Pod length (cm.) | Seeds /pod | Yield (q/ha) | Thousand grain wt. (gm.) | Oil content (%) | Oil yield (q/ha) |
|--------------|-------------------|------------------|------------|--------------|--------------------------|-----------------|------------------|
| T1 | 146.2 | 6.1 | 15 | 19.73 | 6.35 | 41.4 | 8.16 |
| T2 | 147.5 | 6.3 | 16 | 20.52 | 6.41 | 41.6 | 8.53 |
| T3 | 144.5 | 5.8 | 14 | 18.41 | 6.15 | 40.6 | 7.47 |
| T4 | 149.7 | 6.5 | 17 | 21.45 | 6.52 | 42.2 | 9.03 |
| T5 | 150.2 | 6.5 | 17 | 21.94 | 6.54 | 42.4 | 9.30 |
| T6 | 141.2 | 5.3 | 13 | 17.83 | 5.82 | 39.8 | 7.09 |
| CD (P= 0.50) | 6.56 | NS | 2.96 | 0.95 | 0.68 | 1.85 | 1.45 |

(2010) said the grain yield was significantly increased by the application of both sulphur and source of bio-fertilizer. Issa *et al* (2012) also observed that application of sulphur increased mustard yield significantly with the successive increase in the level of applied sulphur up to 30 kg/ ha. Thousand grain weights (6.5 gm.) were recorded with dual application of sulphur fertilizers. The oil content was varies from 39.8 (control) to 42.4 percent (basal and foliar application). This clearly shows that contribution of sulphur was 2.6 %, and was significant over to control. Malhi *et. al.* (2007) also revealed that oil concentration in seed increased with S fertilization for all Brassica species/cultivars. This also reflects in productivity of total oil content received from one hectare as highest 9.30 q/ ha with basal and foliar applied sulphur and lowest 7.09 q/ ha from control plots where sulphur was not applied to the crop.

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