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Research Paper

# Response of Sesamum (*Sesamum indicum* L.) to different levels of potash and sulphur under south Saurashtra region

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## ABSTRACT

A field experiment was conducted during *Kharif* season of 2008 at the Instructional Farm, Junagadh Agricultural University, Junagadh to study the response of sesamum (*Sesamum indicum* L.) to different levels of potash and sulphur under south saurashtra region. Result of the experiment revealed that an application of potash @ 50 kg ha$^{-1}$ recorded significantly higher yield attributes and yield, quality parameters, nutrient uptake by seed and economics *i.e.* number of capsules per plant (39.17), length of capsule (2.30 cm), number of seeds per capsule (57.13), seed weight per plant (3.94 g), test weight (2.96 g) Seed yield (813 kg ha$^{-1}$) and Stover (1165 kg ha$^{-1}$).Similarly sulphur application @ 40 kg ha$^{-1}$ recorded significant effect in increasing all these yield attributes and yield, quality parameters, nutrient uptake by seed and economics of sesamum.

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**Key words :** Sesamum, Potash, Sulphur, Yield, Quality, Economics

## INTRODUCTION

*Sesamum indicum* L. (Syn. *Sesamum orientale* L.), which is known variously as *sesamum, til, gingelly, simsim, gergelim* etc. is one of the most important oilseed crop grown extensively in India. Sesamum is the oldest indigenous oil plant with longest history of its cultivation in India. India is still the world leader. India, China, Burma, Sudan, Pakistan and Mexico are the main sesamum producing countries of the world. In India, sesamum is an important edible oilseed crop, stands next to groundnut. It is mainly grown in Gujarat, Uttar Pradesh, Madhya Pradesh, Karnataka, Orissa, Bihar, Jharkhand, Andhra Pradesh, Kerala and Tamil Nadu.

Fertilizers, even though comparatively a costly input of production are essential for securing higher yields. The prudent use of fertilizers with appropriate method and time of application are the prime importance in securing higher and economic yields. The potassium is one of the major plant nutrients for the growth and development of plants. The major functions are enzymes involved in photosynthesis, metabolism of carbohydrate and protein. The potassium also improve crop quality and yield characteristics by increasing disease resistance in a number of crops. Sulphur as a plant nutrient can play a key role in augmenting the production and productivity of oilseeds in the country as it has a significant influence on quality and development of oil seeds.

## MATERIALS AND METHODS

A field experiment was conducted during *Kharif* season of 2008 at the Instructional Farm, Junagadh Agricultural University, Junagadh to study the response of sesamum (*Sesamum indicum* L.) to different levels of potash and sulphur under south saurashtra region. The soil of the experiment field was clayey in texture, medium in available nitrogen (266.5 kg ha$^{-1}$), medium in available phosphorus (38.3 kg ha$^{-1}$), available sulphur (19.85 kg ha$^{-1}$) and fairly rich in available potassium (232.4 kg ha$^{-1}$) with 7.9 pH. Nine treatment combinations comprising three levels of potash *viz.*, no potash ($K_0$), 25

kg $K_2O$ ha$^{-1}$ ($K_1$), 50 kg $K_2O$ ha$^{-1}$ ($K_2$) and three levels of sulphur *viz.*, no sulphur ($S_0$), 20 kg S ha$^{-1}$ ($S_1$), and 40 kg S ha$^{-1}$ ($S_2$) were tried in factorial randomized block design with four replications. Sesamum was fertilized with recommended dose of fertilizer *i.e.* 25: 25: 00 NPK kg ha$^{-1}$ , respectively. Out of recommended dose, full dose of phosphorus and half dose of nitrogen uniformly applied in form of DAP and urea at the time of sowing. Remaining half dose of nitrogen through urea was applied at 30 DAS to crop. However, potash and sulphur applied through muriate of potash and gypsum, respectively at the time of sowing as per treatment combinations in the experiment. The sesamum variety Gujarat Til-2 was sown on 7 July 2008 by keeping 45 cm inter-row spacing and intra-row spacing of 15 cm was maintained by thinning operation and other cultural practices were also adopted as per need of crop.

## RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below:

**Effect on yield attributes and yield:**

Data presented in Table 1 revealed that, different levels of potash had significant effect on yield attributes and yield. Significantly higher number of capsules per plant (39.17), length of capsules (2.30 cm), number of seed per capsule (57.13) seed weight per plant (3.94 g) and test weight (2.96 g) was recorded under application of potash @ 50 kg $K_2O$ ha$^{-1}$ but it was at par with application of potash @ 25 Kg $K_2O$ ha$^{-1}$. Similarly significantly highest seed yield (813 kg ha$^{-1}$) and stover (1165 kg ha$^{-1}$) yield were recorded with 50 kg $K_2O$ ha$^{-1}$ over control. This trend might be attributed due to the fact that soil under experiment was fairly rich in available potash and response was restricted upto 50 Kg $K_2O$ ha$^{-1}$. The improvement in growth characters favourably modified the yield attributes reflected significant and positive correlation with seed and stover yield. Positive effect of potash on seed and stover yields might have been due to its requirement in carbohydrate synthesis, the pronounced role in photosynthesis and cell elongation. Similar results were obtained by Dasmahapatra *et al.* (1990); Mandal *et al.* (1990) on sesamum.

Similarly sulphur application influenced the growth, yield and quality of sesamum. The data on yield attributes and yield *viz.,* number of capsules per plant, length of capsules, number of seeds per capsule, seed weight per plant, test weight, seed yield and stover yield were significantly influenced by sulphur levels. It is evident from Table 1 that an application of sulphur @ 40 kg ha$^{-1}$ recorded significantly higher number of capsules per plant (38.59), length of capsule (2.27cm), number of seeds per capsule (56.83), seed weight per plant (3.92 g), test weight (2.91 g), seed yield (804 kg ha$^{-1}$) and stover yield (1146 kg ha$^{-1}$) over control while sulphur @ 20 kg ha$^{-1}$ was at par in case of number of capsules per plant, length of capsules, number of seeds per capsule. This trend might be attributed due to sulphur besides improving vegetative growth, also activate of certain vitamins and co-enzymes. These bio-activities of sulphur might have played important role in

**Table 1: Effect of potash and sulphur on yield and yield attributes of sesamum**

| Treatments | No. of capsules per plant | Length of capsule (cm) | Number of seeds per capsules | Seed weight per plant (g) | Test weight (g) | Seed yield (kg ha$^{-1}$) | Stover yield (kg ha$^{-1}$) |
|---|---|---|---|---|---|---|---|
| **Potash levels (K)** | | | | | | | |
| $K_0$ = Control | 34.26 | 2.08 | 50.83 | 3.14 | 2.46 | 628 | 958 |
| $K_1$ = 25 Kg ha$^{-1}$ | 37.25 | 2.18 | 54.74 | 3.67 | 2.81 | 764 | 1102 |
| $K_2$ = 50 Kg ha$^{-1}$ | 39.17 | 2.30 | 57.13 | 3.94 | 2.96 | 813 | 1165 |
| S.E.. ± | 0.87 | 0.05 | 1.24 | 0.09 | 0.08 | 18.12 | 27.52 |
| C. D. (P= 0.05) | 2.54 | 0.16 | 3.61 | 0.27 | 0.22 | 52.89 | 80.32 |
| **Sulphur levels (S)** | | | | | | | |
| $S_0$ = Control | 34.42 | 2.07 | 51.39 | 3.15 | 2.53 | 644 | 973 |
| $S_1$ = 20 kg S ha$^{-1}$ | 37.67 | 2.21 | 54.47 | 3.69 | 2.78 | 756 | 1105 |
| $S_2$ = 40 kg ha$^{-1}$ | 38.59 | 2.27 | 56.83 | 3.92 | 2.91 | 804 | 1146 |
| S.E. ± | 0.87 | 0.05 | 1.24 | 0.09 | 0.08 | 18.12 | 27.52 |
| C. D. (P= 0.05) | 2.54 | 0.16 | 3.61 | 0.27 | 0.22 | 52.89 | 80.32 |
| **Interaction** | | | | | | | |
| K X S | Sig. | NS | NS | Sig. | Sig. | Sig. | Sig. |
| C. V. % | 8.18 | 8.57 | 7.89 | 8.98 | 9.45 | 8.54 | 8.87 |

**Table 2: Effect of potash and sulphur on oil and protein content, nutrient uptake by seed, and economics**

| Treatments | Oil content (%) | Protein content (%) | Nutrient uptake by seed | | | | Net returns (Rs. ha$^{-1}$) | Benefit : Cost ratio |
|---|---|---|---|---|---|---|---|---|
| | | | N | P | K | S | | |
| **Potash levels (K)** | | | | | | | | |
| $K_0$ = Control | 40.34 | 21.91 | 22.25 | 4.88 | 4.81 | 6.25 | 18133 | 2.05 |
| $K_1$ = 25 Kg ha$^{-1}$ | 43.08 | 24.58 | 30.30 | 6.56 | 6.29 | 8.17 | 25469 | 2.46 |
| $K_2$ = 50 Kg ha$^{-1}$ | 44.89 | 27.82 | 36.40 | 7.59 | 7.29 | 9.39 | 27937 | 2.58 |
| S.E. ± | 0.93 | 0.69 | 1.15 | 0.21 | 0.20 | 0.24 | - | - |
| C. D. (P= 0.05) | 2.72 | 2.01 | 3.35 | 0.61 | 0.57 | 0.69 | - | - |
| **Sulphur levels (S)** | | | | | | | | |
| $S_0$ = Control | 39.62 | 22.19 | 23.28 | 5.17 | 4.98 | 6.38 | 19024 | 2.10 |
| $S_1$ = 20 kg S ha$^{-1}$ | 43.23 | 24.08 | 29.13 | 6.35 | 6.21 | 8.08 | 25036 | 2.44 |
| $S_2$ = 40 kg ha$^{-1}$ | 45.46 | 28.04 | 36.54 | 7.51 | 7.19 | 9.35 | 27478 | 2.56 |
| S.E. ± | 0.93 | 0.69 | 1.15 | 0.21 | 0.20 | 0.24 | - | - |
| C. D. (P= 0.05) | 2.72 | 2.01 | 3.35 | 0.61 | 0.57 | 0.69 | - | - |
| **Interaction** | | | | | | | | |
| K X S | NS | NS | NS | NS | Sig. | Sig. | - | - |
| C. V. % | 7.54 | 9.63 | 13.39 | 11.12 | 11.02 | 12.26 | - | - |

improving yield attributes like number of capsules per plant, length of capsule and number of seeds per capsule and there by ultimately increase in seed and stover yield. These findings confirmed with the report of Vaiyapuri *et al.* (2004) and Raja *et al.* (2007).

**Effect on quality parameters and nutrient uptake by seed:**

It is evident from Table 2 observed that significantly highest oil content (44.89 %) and protein content (27.82 %) were recorded with the application of potash @ 50 Kg $K_2O$ ha$^{-1}$ over control. The increase in protein content was due to the soil under experiment was medium in available potash and response is restricted to 50 kg $K_2O$ ha$^{-1}$. These results are in close agreement with those reported by Dasmahapatra *et al.* (1990) and protein content Mandal and Pramanik *et al.* (1996). Similarly higher oil content was recorded with the application of sulphur @ 40 kg ha$^{-1}$ being at par with sulphur @ 20 kg ha$^{-1}$. Significantly highest protein content was recorded with the application of sulphur @ 40 kg ha$^{-1}$ over control. The increase in protein content was due to sulphur which is important constituent of some amino acid molecules and, therefore, resulted in increase in protein content. These results corroborated the findings of Yadav *et al*. (1996), and Raja *et al*. (2007).

Significantly highest uptake of N, P, K, and S by seed was recorded with the application of potash @ 50 kg ha$^{-1}$ but it was statistically at par with application of potash @ 25 kg ha$^{-1}$. The increase in nutrient uptake by the sesamum crop was appeared due to the cumulative effect of increase in yield of seed and stover as well as increase in nutrient content in seed and stover. The findings are in agreement with those reported by Basavaraj *et al*. (2000). Similarly sulphur application to sesamum greatly influenced nutrient uptake by seed. Application of sulphur @ 40 kg ha$^{-1}$ gave significantly highest N, P, K and S uptake by seed. The probable reason for higher uptake of nutrient by seed due to higher application of sulphur might have increased their concentration in soil solution, which increased the availability and uptake by plant. More over, increasing trend of seed and stover yield as well as sulphur content in seed and stover were noticed with sulphur application. The results are in conformity with the work of Yadav *et al*. (1996), and Jadav (2004) in sesamum.

**Effect on economics:**

The highest net return of Rs. 27927 ha$^{-1}$ with BCR value of 2.58 was obtained with the application of potash @ 50 Kg ha$^{-1}$ followed by application of potash @ 25 Kg ha$^{-1}$ with net return of Rs. 25469 ha$^{-1}$ and BCR value of 2.46. This was due to comparatively more increase in yield which was obtained under potash @ 50 Kg ha$^{-1}$ (813 kg ha$^{-1}$) over potash @ 25 kg ha$^{-1}$ (764 kg ha$^{-1}$). Results further reported that an appreciable increase in net realization due to various levels of sulphur. The highest net return of Rs. 27478 ha$^{-1}$ with BCR value of 2.56 was obtained with the application of sulphur @ 40 kg ha$^{-1}$ followed by application of sulphur @ 20 kg ha$^{-1}$ which realized net return of Rs.25036 ha$^{-1}$ and BCR value of 2.44. This was due to comparatively better increase in yield over other treatments.

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## LITERATURE CITED

Basavaraj, B., Shetty, R.A., Patil, S.G. and Hunshal, C.S. (2000). Nutrient content and uptake by sesamum varieties as influenced by fertilizer and population levels under summer irrigated conditions. *Karnataka J. Agric. Sci.,* **13**(1): 141-143.

Dasmahapatra, A. N., Mondal, S.S., Pradhan B.K. and Pan, P.K. (1990). Response of sesamum to potassium nutrition. *J. Potassium Res.,* **6**(3): 124-128.

Jadav, D. P. (2004). Effect of different levels of sulphur and potash on grain and oil yields of sesame. M. Sc. (Ag.) Thesis, Junagadh Agricultural University, Junagadh, Gujarat (India).

Mandal, S. S. and Pramanik, C. K. (1996). Integrated fertilizer management with potassium in soybean and sesamum under different cropping systems. *J. Potassium Res.,* **12**(3): 298-304.

Mandal, S. S., Das, S.K., Goswami, S.B. and Pradhan, B.K. (1990). Yield and yield attributes of sesamum as influenced by potassium nutrition and plant density. *Indian Agriculturist.,* **34**(2): 99-102.

Raja, A., Hattab, K.O., Gurusamy, L., Vembu, G. and Suganya, S. (2007). Sulphur application on growth and yield and quality of sesame varieties. *Internat. J. Agric. Res.,* **2**(7): 599-606.

Vaiyapuri,V., Amudha,A., Sriramachandrasekharan, M. and Imayavaramban,V. (2004). Effect of sulphur levels and organics on growth and yield of sesamum. *Advances-in-Plant-Sciences,* **17**(2): 681-685.

Yadav, N.P.S., Singh, Vinay., Mehta,V.S. and Singh,V. (1996). Effect of different levels and sources of sulphur on yield, quality and uptake of sulphur by sesamum. *J. Oilseeds Res.,* **13**: (1): 22-25.

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