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# The role of sources of sulphur on yield attributes and yield of different sesame (*Sesamum indicum* L.) cultivars

**PK Tijare, SS Ilhe and VR Pusdekar**

**Abstract**
The experimental research was run on the field during summer season of 2019-20 at Post Graduate Institute Research Farm, MPKV, Rahuri, Ahmednagar (MS), to investigate the role of sources of sulphur on different yield attributes and yield of sesame (*Sesamum indicum* L.) cultivars. The FRBD was used to lay out the experiment with three replications. There are total 12 combinations of treatments which comprised of 4 sesame cultivars (AKT-101, JLT-408, PT-1 & JLT-7) and 3 sources of sulphur (Bensulf, Elemental Sulphur & Single Super Phosphate). In respect of sesame cultivar, AKT-101 cultivar recorded significantly maximum dry matter accumulation plant$^{-1}$and highest number of capsule plant$^{-1}$, seed weight plant$^{-1}$, straw weight plant$^{-1}$, seed and straw yield and harvest index of sesame as compared with all other treatments. Among the sources of sulphur, SSP recorded significantly maximum dry matter accumulation plant$^{-1}$ and highest number of capsule plant$^{-1}$, seed weight plant$^{-1}$, straw weight plant$^{-1}$, seed and straw yield and harvest index of sesame compared to all other treatments. Among the sesame cultivar, AKT-101 found significantly superior for yield attributes and yield of sesame and among the sulphur sources, application of SSP proved significantly superior for yield attributes and yield of sesame.

**Keywords:** Growth, sulphur, elemental sulphur, single super phosphate

## Introduction

The sesame word is introduced from Latin word "sesamum" and also taken from Greek word "sesamon" meaning seed or fruit of the sesame plant. Its flowers are white and purple in colour. It is a tropical annual herb. It has several names such as til, sesame, benniseed, sisim, hawari, and gingelly and also called as "Queen of oilseeds". Seed of sesame is a source of food and oil. It is rich in oil content, some varieties contains more than 50 % oil as compared to soybean which having 20 % oil. Because of sesamin, sesamolin, and sesamol, the high level of natural antioxidants, it is one of the most stable vegetable oil. It has long shelf life.

The application of different sulphur fertilizers improves seed yield, straw yield, net returns as well as oil content of sesame (Ramakrishna, 2013) [4]. There is inadequate information on the choice of sulphur fertilizers for sesame, this study was undertaken to know the suitability of various sulphur sources and the response of summer sesame (*Sesamum indicum* L.) to different sulphur sources for sesame grown in Maharashtra.

## Material and Methods

An experimental research was demonstrated in the field during Summer season of 2019-20 at Post Graduate Institute Research Farm, MPKV, Rahuri, with 12 treatment combinations comprised of 4 sesame cultivars (AKT-101, JLT-408, PT-1 & JLT-7) and 3 sources of sulphur (Bensulf, Elemental Sulphur & Single Super Phosphate) i.e., $T_1$ (AKT-101+Bensulf), $T_2$ (AKT-101+Elemental Sulfur), $T_3$ (AKT-101+SSP), $T_4$ (JLT 408+Bensulf), $T_5$ (JLT 408+Elemental Sulfur), $T_6$ (JLT 408+SSP), $T_7$ (PT 1+Bensulf), $T_8$ (PT 1+Elemental Sulfur), $T_9$ (PT 1+SSP), $T_{10}$ (JLT 7+Bensulf), $T_{11}$ (JLT 7+Elemental Sulfur), $T_{12}$ (JLT 7+SSP) in Factorial RBD with replicated thrice.

The field of research plot was uniform in depth up to 60 cm and uniformly leveled having vertisol soil order. The initial soil fertility of developmental plot was low in available nitrogen 186.22 kg ha$^{-1}$, medium in available phosphorus 27.56 kg ha$^{-1}$ and high in available potassium 478.62 kg ha$^{-1}$. Dibbling method is used for sowing the seeds. 2-3 seeds were dibbled hill$^{-1}$ at 30 cm x15 cm spacing. The sowing was done on 16/03/2019 and harvested on 18/06/2019. 15 days before sowing the FYM was applied @ 5 t ha$^{-1}$. The nitrogen was applied @ 50 kg ha$^{-1}$, out of that 25 kg N ha$^{-1}$ was applied at the time of sowin and remaining 25 kg N ha$^{-1}$ was applied 30 DAS. The sulphur dose was applied fully from various sulphur sources i.e., Bensulf, elemental sulphur and SSP at 25 kg S ha$^{-1}$. As per treatment combinations it is incorporated in the respective plots 15 days before sowing.

On the five plants of sesame, the different biometric observations were recorded which were selected randomly from each net plot. Near the selected plants, pegs were fixed by tying with tags for easy demarcation. For recording observations at all the periodical intervals these tagged plants were used at 30, 60, 90, 120 DAS and at harvest.

## Result and Discussion

### Yield attributes

Among all the varieties, cv. AKT 101 recorded significantly maximum dry matter accumulation plant$^{-1}$ at 60, 90 DAS and at harvest. Whereas the significantly minimum dry matter accumulation plant$^{-1}$ was observed with cv. JLT 7 at 60, 90 DAS and at harvest and it was at par with JLT 408 at 60 DAS. This might be due to varietal character to convert maximum photosynthetes in the dry matter. The same findings were shown by Gade *et al*., (2017) [1]. Among the sulphur sources numerically maximum dry matter accumulation plant$^{-1}$ at 30, 60, 90 DAS and at harvest was recorded with SSP. Similarly numerically minimum dry matter accumulation plant$^{-1}$ was recorded with elemental sulphur at 30, 60, 90 DAS and at harvest. Similar results are in accordance with Wadile *et al*., (2005) [6], Ramakrishna (2017) [5] and Yadav (2018) [7].

The significantly highest count of capsules plant$^{-1}$ at harvest was observed with cv. AKT 101 due to less flower drop and more fruit setting. Whereas the significantly minimum number of capsules plant$^{-1}$ at harvest was observed with cv. JLT 7. Similar results were reported by Jiotode *et al*., (2013) [2] and Gade *et al*., (2017) [1]. The application of different sulphur sources showed significant effect on count of capsules plant$^{-1}$. Among the sulphur sources the maximum number of capsules plant$^{-1}$ at harvest was recorded with SSP and it was at par with bensulf. The application of different sulphur sources increased number of primary and secondary branches plant$^{-1}$ which ultimately increased the count of capsules plant$^{-1}$ at harvest. Whereas significantly minimum number of capsules plant$^{-1}$ was recorded by elemental sulphur. These results are in confirmation with the findings of Krishnaiah (2009) [3] and Ramakrishna (2013) [4].

The significantly highest test weight and maximum seed weight capsule$^{-1}$ was reported with cv. AKT 101 and it was at par with cv. PT 1. Whereas the significantly minimum test weight and seed weight capsule$^{-1}$ was observed with cv. JLT 7. Similar findings were investigated by Gade *et al*., (2017) [1]. Among the different sulphur sources the highest test weight and maximum seed weight capsule$^{-1}$ was recorded with SSP followed by elemental sulphur. The application of SSP increased the count of capsules per plant$^{-1}$ which ultimately increased the seed weight capsule$^{-1}$ at harvest, whereas minimum test weight (Weight of 1000 seeds) and seed weight capsule$^{-1}$ was recorded with bensulf.

The significantly highest seed weight plant$^{-1}$ and straw weight plant$^{-1}$ was recorded by cv. AKT 101 which is significantly superior over on the rest of sesame cultivars. It was due to more number of branches plant$^{-1}$ that helped in production of more number of matured or productive capsules ultimately the total biomass that resulted in higher straw yield. Whereas the significantly minimum seed weight plant$^{-1}$ was reported with cv. JLT 7 and the significantly minimum straw weight plant$^{-1}$ was observed with cv. JLT 408. Same findings were found by Jiotode *et al*., (2013) [2] and Gade *et al*., (2017) [1]. Among the sulphur sources the maximum seed weight plant$^{-1}$ and straw weight plant$^{-1}$ at harvest was recorded with SSP and it was at par with bensulf, whereas significantly minimum seed weight plant$^{-1}$ and straw weight plant$^{-1}$ was recorded with elemental sulphur at harvest. The application of sulphur sources increases primary and secondary branches and ultimately increased the capsule number plant$^{-1}$ which resulted in the increased seed weight plant$^{-1}$. These findings are in conformity with Wadile *et al*., (2005) [6], Krishnaiah (2009) [3] and Ramakrishna (2017) [5].

### Yield

The maximum seed yield was produced by cultivar AKT 101, which was significantly higher over rest of the cultivars followed by cv. PT 1. This was due to less flower drop, more capsule setting and more number of branches plant$^{-1}$ that helped in production of more number of matured or productive capsules and significantly maximum straw yield over the rest of sesame cultivars. This was might be due to more lateral branches, number of leaves and capsules contributed towards increase in straw yield. However, the significantly lower sesame seed yield and straw yield was observed with cultivar JLT 7. Similar results were concluded by Jiotode *et al*., (2013) [2] and Gade *et al*., (2017) [1]. The significantly highest seed yield and straw yield was produced when sulphur applied through SSP which was at par with bensulf, whereas significantly minimum seed yield and straw yield were reported with elemental sulphur. The application of sulphur sources enhanced the growth of primary and secondary branches and increased the number of capsules plant-1 which resulted in the increased seed yield and straw yield. Similar results were recorded by Wadile *et al*., (2005) [6], Krishnaiah (2009) [3], Ramakrishna (2013) [4] and Yadav (2018) [7].

The significantly highest biological yield and harvest index was recorded with cv. AKT 101 over the rest of sesame cultivars, followed by cv. PT 1. This was due to maximum seed yield and straw yield. Whereas the significantly minimum biological yield and harvest index was reported by cv. JLT 7. Same result was concluded by Jiotode *et al*., (2013) [2] and Gade *et al*., (2017) [1]. Among the sulphur sources the maximum biological yield and harvest index was recorded with SSP which was at par with bensulf. This was due to more number of branches and straw yield. Whereas significantly minimum biological yield and harvest index was recorded with elemental sulphur. Same findings are in accordance with Wadile *et al*., (2005) [6] and Ramakrishna (2013) [4] and Yadav (2018) [7].

**Table 1:** Dry matter accumulation plant$^{-1}$ of sesame as influenced periodically by different treatment

| Treatment | Dry matter accumulation plant$^{-1}$ (g) | | | |
|---|---|---|---|---|
| | 30 DAS | 60 DAS | 90 DAS | At harvest |
| **A : Cultivars** | | | | |
| C1 : AKT 101 | 3.49 | 12.18 | 17.61 | 18.56 |
| C2 : JLT 408 | 3.35 | 10.24 | 15.11 | 16.07 |
| C3 : PT 1 | 3.36 | 11.42 | 16.51 | 17.41 |
| C4 : JLT 7 | 3.10 | 9.95 | 14.11 | 15.41 |
| S.E.m. (±) | 0.12 | 0.15 | 0.16 | 0.13 |
| C.D. (P= 0.05) | N.S. | 0.44 | 0.45 | 0.39 |
| **B : Source of Sulphur** | | | | |
| S1 : Bensulf | 3.28 | 11.00 | 15.76 | 16.89 |
| S2 : Elemental Sulphur | 3.25 | 10.76 | 15.68 | 16.68 |
| S3 : SSP | 3.44 | 11.07 | 16.06 | 17.01 |
| S.E.m. (±) | 0.11 | 0.13 | 0.13 | 0.12 |
| C.D. (P= 0.05) | N.S. | N.S. | N.S. | N.S. |
| GM | 3.32 | 10.95 | 15.84 | 16.86 |

**Table 2:** Number of capsule plant$^{-1}$, test weight, seed weight capsule$^{-1}$, seed weight plant$^{-1}$ and straw weight plant$^{-1}$ of sesame as influenced by different treatment

| Treatment | No. of capsule plant$^{-1}$ | Test weight (g) | Seed weight capsule$^{-1}$ (g) | Seed weight plant$^{-1}$ (g) | Straw weight plant$^{-1}$ (g) |
|---|---|---|---|---|---|
| **A : Cultivars** | | | | | |
| C1 : AKT 101 | 84.35 | 3.40 | 0.067 | 5.52 | 10.01 |
| C2 : JLT 408 | 70.25 | 3.23 | 0.053 | 3.75 | 8.20 |
| C3 : PT 1 | 72.15 | 3.30 | 0.066 | 4.91 | 8.36 |
| C4 : JLT 7 | 67.55 | 3.07 | 0.048 | 3.17 | 8.21 |
| S.E.m. (±) | 2.25 | 0.02 | 0.002 | 0.14 | 0.25 |
| C.D. ( P= 0.05 ) | 6.49 | 0.06 | 0.007 | 0.40 | 0.72 |
| **B : Source of Sulphur** | | | | | |
| S1 : Bensulf | 74.33 | 3.23 | 0.056 | 4.39 | 8.60 |
| S2 : Elemental Sulphur | 67.90 | 3.24 | 0.058 | 4.08 | 8.53 |
| S3 : SSP | 76.29 | 3.28 | 0.061 | 4.55 | 8.72 |
| S.E.m. (±) | 1.95 | 0.02 | 0.002 | 0.12 | 0.22 |
| C.D. ( P= 0.05 ) | 5.62 | N.S. | N.S. | 0.35 | N.S. |
| GM | 72.84 | 3.25 | 0.058 | 4.34 | 8.64 |

**Table 3:** Seed yield, straw yield, biological yield, harvest index of sesame as influenced by different treatment

| Treatment | Seed yield (kg ha$^{-1}$) | Straw yield (kg ha$^{-1}$) | Biological yield (kg ha$^{-1}$) | Harvest index (%) |
|---|---|---|---|---|
| **A : Cultivars** | | | | |
| C1 : AKT 101 | 1180.87 | 2885.26 | 4066.13 | 28.02 |
| C2 : JLT 408 | 889.14 | 2435.30 | 3324.45 | 25.18 |
| C3 : PT 1 | 1046.97 | 2605.82 | 3652.78 | 25.50 |
| C4 : JLT 7 | 779.60 | 2140.72 | 2920.63 | 24.18 |
| S.E.m. (±) | 26.80 | 38.82 | 52.13 | 0.36 |
| C.D. ( P= 0.05 ) | 77.21 | 111.84 | 150.17 | 1.06 |
| **B : Source of Sulphur** | | | | |
| S1 : Bensulf | 980.65 | 2543.65 | 3524.31 | 25.87 |
| S2 : Elemental Sulphur | 916.97 | 2394.91 | 3311.88 | 24.76 |
| S3 : SSP | 1024.29 | 2611.77 | 3636.06 | 26.53 |
| S.E.m. (±) | 23.21 | 33.62 | 45.14 | 0.31 |
| C.D. ( P= 0.05 ) | 66.67 | 96.85 | 130.07 | 0.92 |
| GM | 973.97 | 2516.77 | 3476.87 | 25.72 |

## Conclusion

Out of the various four varieties (cultivars) of sesame, cv. AKT 101 produced significantly higher yield contributing characters resulting significantly maximum dry matter accumulation plant$^{-1}$, highest number of capsule plant$^{-1}$, seed weight plant$^{-1}$, straw weight plant$^{-1}$, seed and straw yield and harvest index of sesame as compared to cv. PT 1, JLT 408 and JLT 7. Therefore, it would be recommended to adopt cv. AKT 101 for cultivation of sesame in summer under Rahuri condition.

The different sulphur sources and its application observed a significant result on yield of summer sesame. The SSP (Single super phosphate) favorably influenced yield contributing characters resulted in increased seed (1024.29 kg ha$^{-1}$), straw (2611.77 kg ha$^{-1}$) and biological yield (3636.06 kg ha$^{-1}$) which was significantly superior over bensulf and elemental sulphur. The application of SSP produced more branches there by more leaf area for more interception of radiation and efficient photosynthesis resulted in higher sesame seed yield. Based on one season trial data, cultivation of summer sesame cv. AKT 101 along with application of SSP as a sulphur source were found suitable for achieving maximum growth contributing characters of sesame.

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