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INFLUENCE OF DIFFERENT SULPHUR SOURCES ON GROWTH AND YIELD OF SESAME (*SESAMUM INDICUM*)

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Abstract

Field investigation was carried out during March to June 2016 and July to October 2016 at the Experimental Farm, Annamalai University, Tamil Nadu, India to study the influence of different sulphur sources on the growth and yield of sesame. The experiment comprised of nine treatments with various sulphur sources of Ammonium sulphate, Single super phosphate, Gypsum and Elemental sulphur. The experiment was laid out in randomized block design with three replications and statistically analyzed to find out the best performing treatments. Among the various treatments, the treatment T_6 (RDF + 40 kg Sulphur ha^{-1} through Ammonium Sulphate) exerted significant influence on growth attributes, yield attributes and yield.

Key word:

Introduction

Sesame (*Sesamum indicum*) is one of the important oil seed crops in India next to groundnut and mustard. Sesamum is called as "Queen oilseed crops" by virtue of its excellent quality. It is having the highest oil content (51%) and dietary energy of 6355 k cal kg^{-1} (Sanjay Kumar and Goel, 1994). The seed serve as rich source of protein (20-28%), sugar (14-16%) and minerals (5-7 %) (Kuldipsingh and Gupta, 1973). Sesame oil is one of the most stable vegetable oils, because of the high level of natural antioxidants (sesamin, sesamolin, and sesamol) (Bhardwaj *et al*., 2013). Oil from the seed is used in cooking, as salad oils and margarine, and contains about 47 percent oleic and 39 percent linoleic acid. Due to the presence of potent antioxidants, sesame seeds are called as 'the seeds of immortality'. Sesame cake or meal obtained as a by-product of the oil milling industry is rich in protein, vitamin (Niacine) and minerals, has good effective carbohydrates and contains water-soluble antioxidants (sesaminol glucosides) that provide added shelf-life to many products. This flour, also called sesame meal, is an excellent high protein feed for poultry and livestock. The productivity of sesame is very low as compared to other oilseed crops. In world, sesame is grown in area of 11.25 million hectares with production of 6235.53 thousand tones and productivity of 576.3 kg ha^{-1}. The world's largest exporter of sesame seeds was India and Japan the largest importer.

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Materials and methods

The experiment was conducted at Department of Agronomy, Annamalai University, Annamalai Nagar. The experiment was laid out in Randomized block design with 9 treatments 1) control (RDF), 2) 20 kg of sulphur ha^{-1} through Ammonium sulphate, 3) 20 kg of sulphur ha^{-1} through Single Super Phosphate, 4) 20 kg sulphur ha^{-1} through Gypsum, 5) 20 kg Sulphur ha^{-1} through Elemental Sulphur, 6) 40 kg sulphur ha^{-1} through Ammonium sulphate, 7) 40 kg sulphur ha^{-1} through Single super phosphate, 8) 40 kg sulphur ha^{-1} through Gypsum, 9) 40 kg sulphur ha^{-1} through Elemental sulphur with three replication. The plot size was 5m×4m and seeds of varieties TMV3 were sown with a spacing of 30×30 cm. The yield and quality attributes which were observed during the experiment includes, plant height at harvest (cm), number of capsules $plant^{-1}$, number of seed $plant^{-1}$, 1000 seed weight(g), seed yield (ha^{-1}), oil content (%) and protein content (%).

Results and discussion

Growth attributes

Statistically analysed results showed that the effect of different sources and levels of sulphur application significantly influenced all experiment traits except 1000 seed weight. Among the different sources of sulphur, the highest plant height (89.62cm), DMP (3311.63 kg ha^{-1}) and LAI (3.82) was noticed with application of Ammonium sulphate @ 40 kg ha^{-1} which was followed by single super phosphate @ 40 kg ha^{-1} (86.95cm). Application of sulphur significantly increases the growth parameters. These findings are in accordance with the earlier reports of Devakumar and Gajendra Giri (1998) and Tiwari *et al*. (2000). This might be due to the improved photosynthetic activity of the plant which ultimately enhanced the cell division and increased the crop growth rate. This was evidenced through the studies of Intodia and Tomar (1997) and Raja *et al*. (2007).

Table 1: Effect of sulphur sources on growth attributes of sesame (pooled data for two seasons)

Treatments	Plant ht (cm)	LAI	DMP (kg ha^{-1})
T_1	68.37	1.93	2670.06
T_2	80.18	2.98	2990.43
T_3	77.21	2.56	2910.22
T_4	71.55	2.19	2750.29
T_5	74.67	2.45	2830.37
T_6	89.62	3.82	3311.63
T_7	86.95	3.66	3230.98
T_8	83.03	3.21	3071.01
T_9	85.75	3.54	3152.12
S.Ed	1.31	0.09	40
C.D (p=0.05)	2.62	0.18	80

Yield attributes

Sulphur sources significantly influenced the yield components and yield of sesame crop. Among the different sources of sulphur Ammonium sulphur @ 40 kg ha^{-1} obtained maximum number of capsule plant^{-1} (75.24), total number of seeds capsule^{-1} (48.63), 1000 seed weight

Table 2: Effect of sulphur sources on yield attributes of sesame (pooled data for two seasons)

Treatments	No. of capsule plant^{-1}	No. of seed capsule^{-1}	1000 seed weight(g)
T_1	52.19	37.12	3.62
T_2	63.53	43.11	3.68
T_3	60.47	41.43	3.74
T_4	55.23	38.76	3.70
T_5	58.21	40.14	3.72
T_6	**75.24**	**48.63**	**3.76**
T_7	72.16	47.28	3.64
T_8	66.48	44.45	3.73
T_9	69.66	46.09	3.71
S.Ed	1.47	0.65	0.52
C.D (P=0.05)	2.94	1.31	N.S

NS* - non significant

(3.76 g). Sulphur is known to play a vital role in the formation of amino acids. It had favourable effect on yield attributes due to proper partitioning of photosynthates from source to sink. These findings were earlier reported by Syed Shuja Hussain *et al*. (2011) and Muhammad Mehran Anjum (2016).

Yield

Sulphur sources significantly influenced the yield components and yield of sesame crop. Among the different sources of sulphur Ammonium sulphur @ 40 kg ha^{-1} obtained maximum number of seed yield (996.82 kg ha^{-1}) and stalk yield (2634.72 kg ha^{-1}). Application of S through ammonium sulphate improved the availability of most of the nutrients and created more favourable environment in the soil for other elements to be in the available form which ultimately resulted in increased seed and stalk yield. Similar findings were reported by Rao *et al*. (1990), Mishra (1996), Kapila Shekwat and Shivay (2008), Kamran Mirzashahi *et al*. (2010) and Muhammad Mehran Anjum (2016).

Table 3: Effect of sulphur sources on yield of sesame (pooled data for two seasons)

Treatments	Seed yield (kg ha^{-1})	Stalk yield (kg ha^{-1})
T_1	752.55	2153.62
T_2	879.73	2398.05
T_3	846.26	2331.81
T_4	789.12	2219.43
T_5	821.68	2279.54
T_6	996.82	2634.72
T_7	965.91	2574.99
T_8	912.89	2460.12
T_9	943.56	2520.00
S.Ed	14.21	29.83
C.D (P=0.05)	28.43	59.67

Conculsion

The application of 40 kg sulphur ha^{-1} through ammonium sulphate along with recommended dose of fertilizer improved the availability of most of the nutrients and created more favourable environment in the soil for other elements to be in the available form which ultimately resulted in increased the growth, yield and yield components of sesame.

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