Chemical Science Review and Letters ISSN 2278-6783

Research Article

Effect of Potassium and Sulphur on Growth, Yield attributes and Yield of Sesame (*Sesamum indicum* L.)

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Abstract

A field experiment was conducted at Agronomy farm, S.K.N. college of Agriculture, Jobner (Rajasthan) during *kharif* 2014 on loamy sand soil. The experiment consisted 16 treatment combinations of four levels each of potassium (0, 25, 50 and 75 kg ha^{-1}) and sulphur (0, 20, 40 and 60 kg ha^{-1}). The results showed that progressive increase in level of potassium upto 50 kg K_2O ha^{-1} and sulphur 40 kg S ha^{-1} significantly increased the growth and yield attributes and yield of sesame.

Keywords: Potassium, Sulphur, Growth, Yield attributes, Yield

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Introduction

Sesame is called as 'the queen of oils' because of extra ordinary cosmetic and skin care qualities. It is grown in all seasons of the year and being a short duration crop, fit well into various cropping sequences/systems. Globally, sesame is grown on 6.57 million hectares with production of 2.94 million tonnes with productivity of 448 kg ha^{-1}. In India, it is cultivated on 17 lakh hectares and the total production of 7.48 lakh tones with productivity of 439 kg ha^{-1} [1]. Potassium plays an important role in activation of enzymes and resistance to cold, disease, water stress and other adverse conditions. Sulphur an essential 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 and best known for its role in the synthesis of proteins, oils and vitamins. Keeping this in view, the investigation was carried out to study the effect of potassium and sulphur on growth, yield attributes and yield of sesame crop.

Materials and Method

A field was conducted at the Agronomy farm, S.K.N. College of Agriculture, Jobner (Rajasthan) in a randomized block design, with four replication using sesame cv. RT-46. There were 16 treatments consisting of four levels of K (0,25,50 and 75 kg K2O/ha applied as gypsum) and four levels of S (0,20,40 and 60 kg S/ha applied as sulphate of potash) experimental soil was loamy sand in texture with high infiltration rate (22.4 cm hr^{-1}) and saturated hydraulic conductivity 10.20 cm hr^{-1}. The soil was low in organic carbon (0.21%), low available nitrogen (125.64 kg N ha^{-1}), medium in available phosphorus (18.43 kg P_2O_5 ha^{-1}) and in available potassium (178.05 kg K_2O ha^{-1}) while the soil was deficient in available sulphur (7.95 mg kg^{-1}). The soil was non saline with a reaction 8.2. All the treatments i.e. levels of sulphur after adjusting sulphur received from potassium sulphate applied through gypsum 21 days before sowing and potassium as per treatments were applied prior to sowing and incorporated manually in top 15 cm soil. The recommended dose of N and P in the form of urea and DAP were applied through broadcasting before sowing. The crop was raised with standard package of practices. The crop was harvested at maturity and plot wise fodder and grain yield recorded after sun dry as well as plant height, number of branches per plant, number of capsule per plant, number of seed per capsule and 1000 seed test weight were also recorded.

Result and Discussion

Effect of Potassium on Growth, Yield attributes and Yield

The results obtained from the present investigation are presented in **Table 1**. The yield attributing characters like as plant height, number of branches per plant, number of capsule per plant, number of seed per capsule and 1000 seed

test weight sesame significantly differed with an increase in level of potassium up to 50 kg K_2O ha^{-1}. The treatment K_{50} and K_{75} also remained statistically at par). The positive effect of potassium on growth character due to its favourable effect on growth [2] and augment of cell division and cell expansion. The treatment K_{50} being at par with the treatment K_{75}, obtained significantly maximum seed yield 818 q ha^{-1} and stalk yield 1199 q ha^{-1} over control. The per cent increase in seed yield of crop was recorded as 27.81 per cent and stalk yield 23.22 per cent higher over control with the application of potassium @ 50 kg K_2O ha^{-1} (K_{50}). The response of crop to apply K in the present study may be attributed to the fact that soil under investigation was medium in available K. Such increase in yield attributes and yield with the application of potassium may increase the availability of nitrogen through exchange phenomena [3].

Table 1 Effect of potassium and sulphur on plant height, number of capsul per plant and Number of seeds per capsule, seed and stalk yield

Treatments	Plant height (cm)	Number of capsule per plant	Number of seeds per capsule	Seed yield (kg ha^{-1})	Stalk yield (kg ha^{-1})
Potassium levels					
K_0	83.06	34.11	50.74	640	973
K_{25}	90.51	37.98	55.51	747	1110
K_{50}	97.21	41.35	59.81	818	1199
K_{75}	97.41	41.75	60.11	835	1218
SEm±	2.29	1.15	1.46	20.00	29.68
CD (P=0.05)	6.60	3.32	4.20	57.75	85.72
Sulphur levels					
S_0	83.25	34.01	50.62	626	967
S_{20}	90.45	37.82	55.45	757	1111
S_{40}	97.11	41.40	59.68	821	1197
S_{60}	97.37	41.95	60.42	836	1225
SEm±	2.29	1.15	1.46	20.00	29.68
CD (P=0.05)	6.60	3.32	4.20	57.75	85.72

Effect of Sulphur on Growth, Yield attributes and Yield

An appraisal of data on growth parameters (Table 1) revealed that sulphur fertilization significantly increased plant height at harvest of the crop. The maximum significant increase in plant height at harvest was observed with the application of 40 kg S ha^{-1} as compared to no sulphur application. The increase in plant height may be due to the beneficial effect of sulphur on the various metabolic activities [4] and also because sulphur play important role in synthesis of sulphur containing amino acids, coenzyme and increase in chlorophyll content in growing region and improving the photosynthetic activity ultimately enhancing cell division and thereby resulting higher crop growing rate [5]. The seed yield and stalk yield of sesame were also significantly influenced with the application of sulphur. The significantly highest seed yield 821 q ha^{-1} was recorded with the application of 40 kg sulphur (S_{40}) which was 20.92 % and stalk yield (1197 q ha^{-1}) which was 31.15 % higher over control (S_0). The treatment S_{40} and S_{60} also were statistically at par. The increase in the yield with the application of sulphur might be due to role of sulphur in cell division, cell elongation and setting of cell structure and sulphur might have involved in the improvement of yield related traits of the sesame crop leading to higher seed yield [6].

Conclusion

Based on the experimental results, it was concluded that better crop growth, yield attributes and yield of sesame crop can be obtained by the application of potassium @ 50 kg K_2O ha^{-1} and sulphur @ 40 kg S ha^{-1}.

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Publication History
Received 19th Jan 2017
Revised 10th Feb 2017
Accepted 11th Feb 2017
Online 28th Feb 2017