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Effect of different combinations of gypsum and LFA on use efficiency of sulphur and economics in sunflower

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ABSTRACT
A field experiment was conducted during 2004-05 at Keevalur village, Nagapattinam district to study at effect of different combinations of gypsum and lignite fly ash on use efficiency of sulphur in sunflower. The result revealed that the application 50 per cent gypsum and 50 per cent of LFA combinedly to supply of 45 kg S ha^{-1} significantly influenced the response ratio, agronomic efficiency, physiological efficiency and translocation efficiency. Application 45 kg S of ha^{-1} recorded significantly higher total income, net return and benefit cost ratio.

Key words : Sunflower, Sulphur use efficiency, Benefit cost ratio.

INTRODUCTION

Sulphur is called as the fourth nutrient after N,P,K and particularly in oilseed crop, it is considered as a key nutrient. Oilseeds have the highest requirement of sulphur per unit yield amongst the field crops. Sulphor play a multiple role in the formation of oil compounds. The deficiency of S is being reported from more than 70 countries all over world including India. Intensive cropping with high yielding varieties as a great endeavour for boosting food production and shift into the use of S free high analysis fertilizers along with depletion of S from soil because of non-replenishment, are some of the important reasons for increasing S deficiency in the country.

MATERIALS AND METHODS

A field experiment was conducted during 2003-2004 at Keevalur village Nagapattinam district, Tamil Nadu with sunflower cv. Cargill as a test crop. The experiment soil was clay loam with a pH of 6.92, EC 0.59 d Sm^{-1} and CEC 19.28 c mol (p^+) kg^{-1}. The available nitrogen, phosphorus and potassium contents were 220, 19, 250 kg ha^{-1} respectively. The available sulphur content was 6.9 mg kg^{-1}. The exchangeable calcium, magnesium, potassium and sodium content were 8.3, 6.9, 3.0 and 0.8 cmol (p^+) kg^{-1} respectively. The treatments consisted of application of gypsum and LFA alone or in different combinations. The treatments were T_0 – control, T_1- 100 per cent recommended does of S as gypsum, T_2 – 75 per cent R.D. of S as gypsum + 25 per cent R.D. of S as LFA, T_3-50 per cent R.D. of S as gypsum + 50 per cent R.D. of S as LFA. T_4-25 per cent R.D. of S as gypsum + 75 per cent R.D of S as LFA, T_5-100 per cent R.D of S as LFA. The recommended dose of S to sunflower is 45 kg ha^{-1}. The experiment was laid out in randomized block design replicated four times. The recommended does of fertilizer viz., 40:20:20 Kg. N: P_2O_5 : K_2O ha^{-1} was applied uniformly to all the plots.

RESULTS AND DISCUSSION

Sulphur use efficiency

There was a significant influence in the response ratio due to the application of S through gypsum and LFA in different combinations.

Table 1 : Effect of Gypsum and Lignite Fly Ash of Sulphur on Indices of Sulphur Use Efficiency.

Treatments	Response Ratio	Agronomic Efficiency	Physiological Efficiency	Translocation Efficiency
T_0-Control	-	-	-	50.55
T_1-100% S as gypsum	10.26	43.33	179.00	50.79
T_2-75% S as gypsum + 25% S as LFA	14.04	47.11	181.60	51.46
T_3 – 50% S as gypsum + 50% S as LFA	18.50	51.55	181.65	52.07
T_4 – 25% S as gypsum + 75% S as LFA	13.20	42.26	180.00	51.58
T_5 – 100% S as LFA	13.20	42.26	175.40	50.31
SED	0.19	0.39	0.69	0.23
C_D (p=0.05)	0.39	0.79	1.39	0.47

Table 2 : Economic Analysis

Treatments	Cost of cultivation (Rs. ha^{-1})	Gross Income (Rs. ha^{-1})	Net Income (Rs. ha^{-1})	Return $Rupee^{-1}$ Invested
T_0-Control	12685.41	22320	9634.59	1.75
T_1-100% S as gypsum	13831.29	29250	15418.71	2.11
T_2 - 75% S as gypsum + 25% S as LFA	13738.25	31800	18061.75	2.31
T_3 – 50% S as gypsum + 50% S as LFA	13644.79	34800	21155.21	2.75
T_4 – 25% S as gypsum + 75% S as LFA	13551.35	31230	17678.65	2.30
T_5 – 100% S as LFA	13457.91	28530	15072.09	2.11

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Among the different treatments tried, the maximum response ratio was recorded with application of 50 per cent R.D of S as gypsum + 25 per cent R.D of S as LFA recording the response ratio of 14.04 (Poonkodi, 1999).

The application of S through gypsum and LFA in different combinations significantly influenced the agronomic efficiency. Among the different treatments, the application of 50 per cent R.D of S as gypsum + 50 percent R.D of S as LFA (T_3) recorded the maximum agronomic efficiency of 51.55. It was followed by T_2 (75 per cent R.D of S as LFA) and T_4 (25 per cent R.D of as gypsum + 75 per cent R.D of S as LFA) Similar trend of results were followed for the physiological efficiency and translocation efficiency (Poomurugesan, 2003).

Economics

Application of 50 per cent R.D of S as gypsum and 50 per cent R.D of S as LFA recorded the maximum net income of Rs. 1155 ha^{-1} return rupee invested of 2.71. This was closely followed by the 75 per cent R.D of S as gypsum and 25 per cent R.D of S as LFA, (T2) and T_4 (75 per cent R.D of S as LFA and 25 per cent R.D of S as gypsum and they were on par with each other. Control registered the leased net income and return $rupee^{-1}$ invested. (Dubey *et al.,* 1994), (BikRam Singh, *et al.,* 2000).

It may be concluded from the present investigation that application of gypsum @ 140.6 and LFA @ 2.25 t ha^{-1} to supply the 45 kg S ha^{-1} recorded the highest sulphur use efficiency and benefit cost ratio.

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