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SHORT COMMUNICATION

Effect of Sources and Levels of Sulphur on Groundnut

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Abstract

Field experiments were conducted for two consecutive *rabi* seasons of 2010-11 and 2011-12 at Agricultural Research Station, Seethampeta, AP, to evaluate the effect of sources and levels of sulphur on sandy clay loam soil with test variety K6. Sulphur application significantly influenced the growth, yield attributing characters, yield and oil content over control regardless of the sources and levels of sulphur. Addition of sulphur at 45 kg/ha through gypsum recorded highest plant height, number of filled pods per plant, 100 pod weight, 100 kernel weight, pod yield, haulm yield and oil content of the kernels. Application of gypsum at 45 kg/ha has increased the pod yield to the tune of 52.2% and 50.3%. Oil content in the kernels was found to be 7.5% and 8.8% during 2010 and 2011 respectively over control.

Keywords: Groundnut, *rabi*, sulphur, yield attributes, gypsum, kernel weight, oil content.

Introduction

Groundnut is one of the most important oil seed crops of India occupying two third areas under oil seeds. Average yields of groundnut are very low in north coastal districts of Andhra Pradesh in general and tribal areas in particular. Besides primary nutrients calcium and sulphur also plays an important role in enhancing production and productivity of groundnut. Sulphur is very crucial for the formation of sulphur containing amino acids and oil synthesis. Development of modern agricultural technology has attracted the attention of scientists on sulphur nutrition owing to cultivation of high yielding varieties, adoption of intensive cropping systems particularly involving oil seeds and pulses, use of high analysis fertilizers and decreased usage of organic manures (Jaggi, 2004). There were reports of response of groundnut to sulphur application (Krishnamoorthy, 1989). There are large numbers of sulphur sources available in the country and their efficiency in crops like groundnut needs to be evaluated. Keeping this in view, the present investigation was planned to find out the response of groundnut to sources and levels of sulphur.

Materials and methods

Study area: Field experiments were conducted for two consecutive *rabi* seasons of 2010-11 and 2011-12 at Agricultural Research Station, Seethampeta, Andhra Pradesh, India.

Experimental design: Soil was sandy clay loam having pH 6.8, organic carbon around 0.65%, available nitrogen at 245 kg/ha, available P_2O_5 at 25.8 kg/ha and K_2O at 295 kg/ha. The treatments consisted of three sources of sulphur (elemental sulphur, sulphur bentonite and gypsum) at three levels (15, 30 and 45 kg/ha). The experiment was laid out in a Randomized block design with three replications. The test variety K6 was sown during second week of July at 30 X 10 cm spacing. Full dose of N, P and K i.e., 60-50-40 kg/ha was applied basally at the time of sowing to all the plots. Sulphur was applied as per treatments one month before sowing to facilitate oxidation.

Parameters: Data on different growth parameters, yield attributes and yield were recorded from randomly selected ten tagged plants from net plot. The percentage of oil content in seed was determined by solvent extraction method in Soxhlet apparatus with petroleum ether as solvent (AOAC, 1980).

Statistical analysis: Data were analyzed using ANOVA and the significance was tested by Fisher's least significance difference (p= 0.05).

Results and discussion

During both the years of study, different levels and sources of sulphur markedly influenced the growth, yield contributing characters, yield and oil content of groundnut (Table 1 and 2). Application of sulphur significantly increased the plant height. Addition of sulphur at 45 kg/ha through gypsum recorded the highest plant height. However, it was at par to application of sulphur at 30 or 45 kg/ha through elemental sulphur and sulphur bentonite. There was no noticeable difference in growth between different sources of sulphur. The increase in growth might be ascribed to better root formation due to sulphur, which in turn activated higher absorption of N, P, K and sulphur from soil and improved metabolic activity inside the plant (Kalaiyarasan *et al.,* 2003).

Table 1. Effect of sources and levels of sulphur on plant height and yield attributes of groundnut.

Treatment	Plant height (cm)		No. of filled pods/plant		100 pod Wt. (g)		100 kernel Wt. (g)	
	2010	2011	2010	2011	2010	2011	2010	2011
T1-15 kg S through elemental sulphur	63.11	64.26	16.45	15.68	74.35	75.92	35.35	36.78
T2-30 kg S through elemental sulphur	66.60	68.08	16.77	16.14	75.73	76.47	38.32	38.27
T3-45 kg S through elemental sulphur	68.85	69.35	17.93	17.83	75.74	77.19	39.04	39.54
T4-15 kg S through sulphur bentonite	63.73	64.29	16.91	14.78	74.72	76.86	36.13	37.00
T5-30 kg S through sulphur bentonite	65.87	66.75	17.49	15.65	76.68	77.57	39.27	38.12
T6- 45 kg S through sulphur bentonite	68.11	67.93	17.74	16.89	77.37	78.13	39.63	38.93
T7-15 kg S through gypsum	64.78	65.50	18.00	17.42	77.03	78.20	37.39	38.74
T8-30 kg S through gypsum	68.90	69.07	18.27	18.67	77.72	79.42	39.37	39.09
T9- 45 kg S through gypsum	70.66	71.45	18.03	19.33	79.08	80.77	40.05	40.78
T10-Control (No S application)	61.12	60.74	13.20	12.94	70.09	71.15	32.03	33.91
SEM +	1.65	1.83	0.47	0.74	1.62	1.31	0.71	0.77
CD @ 5%	4.91	5.43	1.27	1.49	4.78	3.69	2.14	2.23

Table 2. Effect of sources and levels of sulphur on yield, shelling and oil outturn of groundnut.

Treatment	Pod yield (Kg/ha)		Haulm yield (Kg/ha)		Shelling (%)		Oil content (%)	
	2010	2011	2010	2011	2010	2011	2010	2011
T1-15 kg S through elemental sulphur	895	880	1521	1610	64.82	65.17	48.50	48.57
T2-30 kg S through elemental sulphur	997	991	1619	1691	66.37	66.79	48.63	48.97
T3-45 kg S through elemental sulphur	1045	1026	1710	1758	68.90	68.42	49.23	49.57
T4-15 kg S through sulphur bentonite	886	878	1574	1567	65.03	65.23	48.07	47.50
T5-30 kg S through sulphur bentonite	982	948	1650	1677	67.05	67.37	48.57	48.60
T6- 45 kg S through sulphur bentonite	1038	1011	1736	1791	67.29	67.74	49.20	49.07
T7-15 kg S through gypsum	1005	986	1673	1638	67.37	67.61	48.97	48.77
T8-30 kg S through gypsum	1132	1102	1786	1792	68.11	68.45	49.53	49.67
T9- 45 kg S through gypsum	1215	1204	1822	1874	68.65	69.09	50.17	49.93
T10-Control (No S application)	798	801	1477	1509	63.37	62.70	46.65	45.89
SEM +	25.25	22.90	54.88	57.24	0.54	0.71	0.28	0.32
CD @ 5%	75	68	163	170	1.59	2.11	0.82	0.94

Sulphur application significantly influenced all the yield attributing characters regardless of the sources and levels of sulphur application over control. Application of sulphur at 15 kg or more/ha conspicuously augmented all the yield contributing characters. Addition of sulphur at 45 kg/ha through gypsum recorded highest number of filled pods per plant and which was on par with the remaining sources of sulphur at same level of application. Both 100 pod weight and 100 kernel weight also improved significantly with the application of sulphur at 45 kg/ha through gypsum. Pod yield increased significantly with sulphur application at 15 kg or more/ha irrespective of sources over control. Application of gypsum at 45 kg/ha resulted in highest pod yield compared to all other sources and levels of sulphur application. Application of gypsum at 45 kg/ha has increased the pod yield to the tune of 52.2%, 50.3% during 2010 and 2011 respectively over control. Supply of sulphur through gypsum showed an edge over other sources. Haulm yield was also found similar to that of pod yield. Improvement in yield might have resulted from favorable influence of sulphur on growth and efficient partitioning and translocation of metabolites to reproductive structures.

Favorable effect of sulphur application was noticed on shelling percent also where supply of sulphur at 15 kg or more/ha improved shelling percent. Similar results of higher growth, yield attributes pod yield and shelling out turn were also reported by Chitkala and Reddy (1991) and Kalaiyarasan *et al.* (2003).

Sulphur application improved the oil content of the kernel significantly. Addition of sulphur at 45 kg/ha through gypsum registered highest oil content, however it was found at par to application of sulphur at 30 kg/ha through gypsum, application of sulphur at 45 kg/ha through elemental sulphur and sulphur bentonite. Application of gypsum at 45 kg/ha has increased the percent oil content in the kernels by 7.5 and 8.8% during 2010 and 2011 over control. Improvement in oil content with sulphur application might be due to involvement of sulphur directly in oil synthesis. Higher yield and oil content with increased application of sulphur also attributed protein and enzyme synthesis as it is a constituent of sulphur containing amino acids namely methonine, cysteine and cystine (Kumar *et al.,* 2011).

Conclusion

Sulphur application significantly influenced the growth, yield attributing characters and yield over control regardless of the sources and levels of sulphur application. Addition of sulphur at 45 kg/ha through gypsum recorded the highest plant height, number of filled pods per plant, 100 pod weight ,100 kernel weight, pod yield, haulm yield and oil content of the kernels.

References

1. AOAC. 1980. Official methods of analysis, 13th ed. Association of official Oil Analytical chemists. Washington D.C. pp.376-384.
2. Chitkala, T.D. and Reddy, M.G.R. 1991. Effect of sulphur on growth, yield and oil outturn in groundnut. *Ind. J. Agron*. 36(2): 265-266.
3. Jaggi, R.C. 2004. Effect of sulphur levels and sources on composition and yield of onion. *Ind. J. Agric. Sci*. 74(4): 219-220.
4. Kalaiyarasan, C., Vaiyapuri, V. and Chandrasekharan, M.V.S. 2003. Effect of sulphur sources and levels on the nutrient uptake, crop quality and sulphur use efficiency in groundnut. *Ann. Agric. Res. New Series*. 24(3): 478-480.
5. Krishnamoorthy, S.K. 1989. Sulphur fertilization for yield and quality of crops. Proc. Nat. Seminar on Sulphur in Agriculture, held at UAS, Bangalore. pp.22-25.
6. Kumar, S., Tewari, S.K. and Singh, S.S. 2011. Effect of sources and levels of sulphur on growth yield and quality of sunflower. *Ind. J. Agron*. 56(3): 242-246.