https://doi.org/10.29321/MAJ.10.A02244

Madras Agric. J. 73 (3) : 151—154 March, 1986

EFFECT OF SULPHUR FERTILISATION ON NUTRIENT CONTENT DRY MATTER PRODUCTION AND YIELD OF GROUNDNUT*

KAMALA THIRUMALAISAMY[1], R. SATHASIVAM[2] and NATARAJARATNAM[3]

An experiment was conducted to study the effect of sulphur fertilisation on nutrition and yield of groundnut. The results indicated that the basal application of sulphur in the from of sulphur dust (22 kg/ha) increased the dry matter and pod yield significantly. Higher HI and higher contribution by pod to the total dry matter production indicated the greater efficiency in translocation of assimilates from source to sink. The increase in pod yield was mostly due to the increase in dry matter production ($r=0.896^{**}$) rather than the HI ($r=0.805^{**}$) Sulphur application had increased the carbohydrate, protein and oil contents in kernel. The 100-kernel weight and shelling percentage were also high in sulphur dust treated plants.

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop. More than 60 per cent of the crop is cultivated under rain-fed conditions. Yield per hectare has been almost static suggesting that increase in production can be achieved more by intensive than by extensive cultivation. Sulphur is the fourth major nutrient of plants. It is essential for oil synthesis and a constituent of amino acids like methionine, cystine and cysteine. The sulphur content of many legumes exceeds that of phosphorus. Of late sulphur deficiency is increasingly felt because of large scale use of sulphur free fertilizers. Groundnut often suffers from sulphur deficiency because of its higher sulphur requirement. Beneficial effects of sulphur fertilisation had been reported in many crops (Hara and Sonoda, 1981). Hava (1964) and Dalal *et al.*, (1963) made attempts to study the effects of sulphur on groundnut and reported beneficial results. Besides increasing the pod yield and oil content, sulphur also found to improve the gynophore strength. The present investigation aims to find out more information on the effect of sulphur on nutritional status. dry matter production and distribution and pod yield in groundnut CV. TMV. 7 a bunch type.

MATERIALS AND METHODS

The experiment was conducted during *Kharif* under rainfed conditions. The soil type was sandy clay loam containing 20-40 ppm sulphur. Sulphur was applied in different forms viz., gypsum, potassium sulphate, sulphur dust, magnesium sulphate and ammonium sulphate. The different forms of sulphur were applied basally on

*Oil seed Experiment Station, TNAU, Tindivanam

Table 1. Effect of sulphur nutrition on dry matter distribution in TMV 7 groundnut at 100 DAS.

S. No.	Treatments	Leaf %	Stems %	Pod %	TDMP g/plant
1.	Gypsum 220 kg/ha	18	30	52	51.2
2.	Potassium sulphate 121 kg/ha	18	42	40	50.3
3.	Sulphur dust 22 kg/ha	10	30	60	55.6
4.	Magnesium sulphate 171 kg/ha	19	39	42	49.6
5.	Ammonium sulphate 92 kg/ha	16	34	48	49.4
6.	Urea 20 kg/ha	20	42	38	49.0
7.	Control [NPK alone]	20	48	32	46.3

Table 2 Effect of sulphur nutrition on yield attributes in TMV 7 groundnut

S. No.	Treatment	Pod yield kg/ha	Percent increase over control	HI %	Shelling percentage	100 kernel weight [g]
1.	Gypsum 220 kg/ha	1584	14.7	38.6	74.2	41.5
2.	Potassium sulphate 121 kg/ha	1483	5.9	28.8	72.0	40.2
3.	Sulphur dust 22 kg/ha	1711	23.9	45.7	76.2	42.5
4.	Magnesium sulphate 171 kg/ha	1574	13.9	28.4	67.7	39.5
5.	Ammonium sulphate 92 kg/ha	1403	5.9	33.8	70.5	41.8
6.	Urea 20 kg/ha	1444	5.5	25.6	67.5	39.2
7.	Control [NPK alone]	1381	—	20.8	65.0	38.0
	CD [P=0.05] 59.2					

equal sulphur basis. The control plot was given NPK (19:10;60) alone so as to get the required amount of sulphur in the treatments. In the sulphur treatment plots the quantities of N and K basal applications were so adjusted that the total N and K applied worked out to 19:10:60 as in control. Top dressing of gypsum on the 45 day was given to all the treatments including control. Total hydrolysable Carbohydrate (Somogyi, 1952), total Protein (Lowry *et al.*, 1951) and oil content (AOAC, 1960) in mature kernels were estimated. Five plants were taken on 100 DAS for

Table 3 Effect of sulphur nutrition on nutritional status in TMV 7 groundnut kernel on 80 DAS

S. No.	Treatments	Carbo-hydrate %	Protein %	Oil content %
1.	Gypsum 220 kg/ha	23.8	36.5	50.0
2.	Potassium sulphate 121. kg/ha	23.0	35.6	49.2
3	Sulphur dust 22 kg/ha	24.6	38.8	51.0
4	Magnesium sulphate 171 kg/ha	22.0	37.7	48.2
5.	Ammonium sulphate 92 kg/ha	22.0	38.0	48.0
6.	Urea 20 kg/ha	29.0	28.0	46.9
7.	Control (NPK alone)	19.0	26.0	46.0

dry matter estimation. The crop was harvested at 105 days after sowing.

RESULTS AND DISCUSSION

Data on dry matter production showed that the sulphur dust treatment had recorded the maximum of 55 68g plant followed by the gypsum treatment with 51.2 g/plant. Increased dry matter production was obtained in soyabean (Dhillon and Dev, 1980) and in rice (Sachdev *et al.*, 1982) due to sulphur application. Higher percentage contribution by pod to total dry matter over and above that of leaf and stem indicated the efficiency in translocation of assimilates from source to sink. Higher harvest index recorded in the sulphur dust and gypsum treatments also indicated the greater efficiency in translocation.

Application of various forms of sulphur increased the pod yield between 5.9 and 23.9 per cent when compared to control. Sulphur dust recorded the highest pod yield followed by gypsum treatment. The yield increase was significantly superior than control and other treatments. The increase in pod yield was mostly due to increase in dry matter production ($r=0.896^{**}$) rather than HI ($r=0.805^{**}$). Duncan *et al.*, (1978) stressed the importance of dry matter production in low productivity environments for increasing yield in groundnut Increase in carbohydrate, protein and oil contents in kernel was observed by application of sulphur dust. The 100-kernel weight and shelling percentage was also more in sulphur dust treated plants. Aulakh

et al, (1977) obtained increased pod yield up to 15 percent due to sulphur application in groundnut. Gypsum was the superior source of sulphur for increasing dry matter, seed size, and oil content in *Brassica* sp. (Pathak and Tripathi, 1979). Application of sulphur brought out increased yield and other quality attributes.

The results indicate that adequate availability of sulphur to groundnut at an early stage of crop growth helps in the active growth and metabolism which ultimately lead to an increase in the yield potential. It is evident from the present study that sulphur has a major role in regulating the physiological and metabolic system in the plants.

REFERENCES

AOAC. 1960. Oils, fats and wastes. Official methods of analysis. Washington. 358-78.

AULAKH, M.S., N. S. PASRICHA,and G. DEV. 1977. Response of different crops to sulphur fertilisation in Punjab. Fertilizer News 22 [9] : 32-36.

DALAL, J. L., J. S. KANWAR and J. S. SAINI. 1963. Investigations on soil sulphur. II. Gypsum as a fertilizer for groundnut in the Punjab. Indian J. Agric. Sci. 33 [3] : 199-204.

DHILLON, N. S. and G. DEV, 1980. Studies on sulphur nutrition of soyabean *(Glycine max* L.) from three sulphate sources. J. Indian Soc. Soil Sci. 28[3]. 361-65.

DUNCAN,W. G., D. E. McCLOUD, R. L. McGRAW, and K. J. BOOTE, 1978. pyhsiological aspects of peanut yield improvement. Crop Sci. 18: 1015-1020.

HARA, T., and y. SONODA. 1981. The role of macronutrients in cabbage-head formation. II. Contribution to Cabbage head formation of calcium, magnesium or sulphur supplied at different growth stages. Soil Sci. Plant Nutrition. 27 (1) : 45-54.

HAVA, K. 1964. The effects of calcium and sulphur on yields of groundnut grown on a virgin granite-derived soil. Rhod. J. Agric. Res. 2: 79-83.

LOWRY, O. H., N. J. ROSEBROUGH, L. A. FARR and R J. RANDALL. 1951. Protein measurement with folin phenol reagent. J. Biol. chem. 193: 265-75.

PATHAK, R. K., and R D. TRIPATHI. 1979. Effect of nitrogen and sulphur on yield and quality of rai *(Brassica Juncea* (L) Czern & Coss) var. Varuna. Indian J. Agri. chem. 12 (2) : 151-57.

SACHDEV, M.S., R. B. MITTAL and P. SACHDEV. 1982. Utilisation of sulphur by rice from gypsum and its balance sheet in soil using ^{35}S. J. Nuclear Agri. Biol. 11 (1) : 11-14.

SOMOGYI, M. 1952. Note on sugar determination. J. Biol. chem. 200 : 145-54