Annals of Plant and Soil Research 18(3): 298-299 (2016)
Short communication

RESPONSE OF LUCERNE TO SULPHUR APPLICATION IN ALLUVIAL SOIL

HARVENDRA SINGH AND ANIL KUMAR SHARMA

RVSKVV-Zonal Agriculture Research Station, Morena (MP) – 474 001

Received: June, 2016; Revised accepted: August, 2016

Lucerne (medicago sativa) is primanily a rabi fodder crop and it is usually grown on marginal lands with poor fertility status. The low yield of lucerne is not only due to cultivation on marginal lands, but also because of inadeguate and imbalanced fertilization. Among the several constraints improper nutrifionhal management is an important impediment for increasing the productivity. After NPK, Sulphur is the fourth plant nutrient whose deficiency is widespread in India and considered as the quality- and quantity- limiting factor particularly for legmes (Upadhyay, 2013). Sulphur plays an important role in growth and developement of crops as it is a constituent of amino acids like methionine cysteine and cystine needed for the synthesis of proteins. Information of sulphur management in lucerne is lacking in Morena (M.P.). Thus the present study was undertaken to evaluate the effect of graded doses of sulphur on yield, uptake of nutrients and quality of lucerne.

Field experiment was conducted at ZARS Research farm Morena (M.P.). The climate of the study area is semi-arid with an average rain fall of about 700 mm per annum, about 80% of which is received during June to September. The soil of the experimental field was sandy loam in texture, having pH 7. 8 organic carbon 4.1g kg^{-1} and available N, P, K, and S 175, 9.2, 155 and 16.5 kg ha^{-1}, respectively. The experiment was laid out in randomized block design with four replications. The treatments included five levels of S (0, 15, 30, 45 and 60 kg S ha^{-1}). Recommended dose of N, P and K (20 kg N, 60 kg P_2O_5 and 40 kg K_2O ha^{-1}) were applied as di-ammonium phosphate and muriate of potash, respectively. Potassium and phosphorus were applied at sowing. Sulphur was applied as elemental sulphur at the time of sowing. The Lucerne seeds were sown at the rate of 15 kg ha^{-1} in the second week of October during 2013-14. Lucerne crop was irrigated as and when required. The crop was harvested at 60 days after sowing and yield data were recorded. Processed plant samples were analyzed for their nutrients by digesting the samples using di-acid mixture (HNO3: HClO4:10: 4). Phosphorus and Sulphur were determined by vanadomolybdophosphoric yellow colour method (Jackson 1973) and turbidimetric method (Chesnin and Yien 1951), respectively. Nitrogen content was determined following micro Kjeldahl method. The protein content was computed from the nitrogen content multiplied by a factor 6.25. The uptake of nutrients was then computed from their concentrations in plant samples and dry matter yield.

Table 1: Effect of sulphur levels on yield, quality and uptake of nutrients in lucerne .

Sulphur (Kg ha^{-1})	Green foliage Yield(t ha^{-1})	Dry matter yield (t ha^{-1})	Protein contain%	Uptake of nutrients (kg ha^{-1})		
				Nitrogen	Phosphors	Sulphur
0	8.33	1.79	18.8	54.3	4.7	3.5
15	9.28	2.00	19.1	61.2	5.6	4.6
30	10.00	2.15	19.3	66.6	6.4	5.3
45	9.79	2.13	19.6	66.8	6.8	5.9
60	9.00	1.95	19.7	61.2	6.4	5.5
Semi	0.15	0.04	0.012	1.05	0.051	0.025
CD(p=0.05)	0.49	0.14	0.139	3.48	0.170	0.081

Application of varying doses of sulphur had significant effect on the green foliage and dry matter yield of lucerne. The green foliage yield increased from 8.33 to 10.00 t ha^{-1} progressively with increase in the level of S from 0 to 30 kg ha^{-1}. The corresponding increase in dry matter yield was from 1.79 to 2.15 t ha^{-1}. Increase in yield under sulpur levels might be

Corresponding audhor: iaas_morena@rediffmail.com

due to improved availability of the S, which in turn enhance the plant metabolism and photosynthetic activity resulting in to better growth development and yield. These results confirm the forming of Jat etal (2013).The higher levels of S (45 and 60 kg p2o5) tended to reduce the yields over 30 kg S-1 which may be attributed to imbalanced nutrition of crops .

The protein content in lucerne crop increased significantly from 18.8 to 19.7% with increasing levels of sulphur from 0 to 60 kg S ha^{-1}. The positive response to added sulphur is assigned to low status of available sulphur of soil. This beneficial effect of S may also be due to stimulating effect of applied S in the synthesis of protein. Similar results were reported be Upadhyay (2013).

The nitrogen uptake by lucerne crop increased significantly with increased levels of S up to 30 kg ha^{-1} . The nitrogen uptake values at 0 and 30 kg S ha^{-1} were 51.3 kg ha^{-1} and 66.6 kg ha^{-1}, respectively. This increase in N uptake might be attributed to increased N content and dry matter yield. Similar results were reporded by upadhyay (2013). Application of sulphur significantly increasesd the uptake of P by crop over control. The increase in P uptake by lucerne crop due to sulphur application was from 4.7 to 6.2 kg ha^{-1} with 45 kg S ha^{-1} (table 1).The results corroborate the findings of Tripathi etal (2011). this increase in P uptake by the crop may be attributed to higher dry matter yield along with improved P content with sulpur application.The uptake of S by lucerne crop increased significantly with S application at different levels over control due to increase in yield and S concentration in plants. The sulphur uptake by the crop increased from 3.5 to 5.9 kg ha^{-1} with 45 kg S ha^{-1}. Similar results were reported by Tripathi etal (2011).

From the result, it may be concluded that the application of 30 kg S ha^{-1} may be recommended for lucerne in alluvial soils of Morena (M.P.). Application of 30 kg S ha^{-1} gave higher values of nutrient uptake, quality and yield of lucerne.

REFERENCES

Jat, S.R, Patal, B.J, Shivran, A.C., Kuri, B.R. and Jat, G. (2013). Effect of phosphorus and sulphur on growth and yield of cowpea under rainfed condition . *Annals of Plant and Soil Research***15** (2):114-117.

Upadhyay, A.K. (2013) Effect of sulphur and zinc nutrition on yield, uptake of nutrients and quality of lentil in alluvial soils. *Annals of Plant and Soil Research* **15**(2):160-163.

Jackson, M.L. (1973) *Soil Chemcal Analysis*. Prentice Hall of India Private Limited, New Delhi.

Tripathi, H.C, Pathak, R.K., Kumar, A. and Dimree, S. (2011) Effect of sulphur and zinc on yield attributes, yield and nutrient uptake in shickpea. *Annals of Plant and Soil Research* **13**(2): 134-136.

Chesnin, L. and Yien, C.H. (1951) Turbidimetric determination of available sulphate. *Soil Science Socity of America Proceedings* **15**:149-151.