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Short Communication

Response of fodder sorghum (Sorghum bicolor L.) to levels of sulphur in alluvial soil

DIPTI SINGH* AND SANDEEP SINGH

Department of Agricultural Chemistry and Soil Science, Raja Balwant Singh College, Bichpuri, Agra (U.P.) 283 105

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Sorghum (Sorghum bicolor L.) is not only staple food but it is also required to fulfill fodder requirement in order to make animal husbandry sector more viable. There is a great need to maintain well balanced and regular supply of more nutritious feed and fodder to the animals in the state. Sulphur is required by forage crops for their growth and development (Singh, 2021). It is a constituent of amino acids like methionine, cysteine and cystine . It is required for the synthesis of chlorophyll. There are instances where application of N, P and K fertilizers failed to give optimum yield until the deficiency of sulphur was corrected. Therefore, an attempt was made to study the response of fodder sorghum to sulphur in alluvial soil of Agra region. A field experiment was conducted during Kharif season of 2016 at farmer field of Panwari village, Agra. The experimental soil was sandy loam in texture having pH 7.9,organic carbon 3.1 g kg^{-1} available N 155 kg ha^{-1} available P 9.0 kg ha^{-1} and available S 14.5 kg ha^{-1}. The treatments comprised of five levels of S (0, 10, 20, 30 and 40 kg ha^{-1}) through elemental S, were tested in randomized block design with four replications. The sorghum crop variety M.P. Chari was sown in first week of July using 50 kg seed ha^{-1}. Recommended dose of NPK fertilizers (100:60:40 kg ha^{-1}) through urea, diammonium phosphate and muriate of potash was applied before sowing. At harvest, green foliage yield was recorded. Dry matter was recorded after drying in oven at 70^{0} C temperatures. Plant samples were digested in diacid (HNO_3: $HClO_4$) mixture and P and S in the digest were determined by adopting standard procedures (Jackson, 1973). Nitrogen was determined by Kjeldahl method. The nutrient uptake by the crop was calculated by multiplying per cent content with yield.

The result (Table 1) indicated that the increase in green fodder of sorghum over control (9.25 t ha^{-1}) was to the extent of 3.25 t ha^{-1} due to application of 30 kg S ha^{-1} while that of dry matter yield (3.17 t ha^{-1}) was 1.03 t ha^{-1} over control (2.68 t ha^{-1}) However, significant increase in yield were recorded with 20 kg S ha^{-1}. There was no significant difference between 20 and 30 kg S ha^{-1} in respect of yields. Further increase in S level (40 kg S ha^{-1}) above 30 kg S ha^{-1} had an adverse effect in increasing the yield of sorghum. Such response of sulphur was recorded by Singh and Singh (2020). Increase in yields due to S application may be ascribed to the overall improvement in plant organs associated with faster and uniform vegetative growth of the crop (Singh *et al.* 2020)

Table 1: Effect of sulphur levels on yield quality and uptake of nutrients in fodder sorghum

Sulphur (kg ha^{-1})	Yield (t ha^{-1})		Protein Content (%)	Nutrient uptake (kg ha^{-1})			Protein Yield (kg ha^{-1})
	Grain fodder	Dry matter		Nitrogen	Phosphorous	Sulphur	
0	9.25	2.68	9.3	40.2	3.8	3.0	249.2
10	10.25	3.01	10.0	48.2	4.2	3.6	301.0
20	12.40	3.58	10.6	58.0	5.2	4.3	379.5
30	12.60	3.71	11.5	66.4	5.7	5.7	426.6
40	10.75	3.21	11.6	60.0	5.6	6.0	372.4
CD (P=0.05)	0.45	0.15	0.55	6.5	0.60	0.29	35.6

**KVK. R. B. S. College, Awagarh Etah*

Protein content of sorghum increased significantly with sulphur application over control (Table 1). The magnitude of increase in protein content due to sulphur levels varied from 9.3 to 11.6 per cent. This increase in protein content with S application could be due to the fact that S is an integral part of S containing amino acids (Singh et al 2016). Corresponding application of sulphur also had significantly beneficial effect of protein yield of sorghum over control. Protein yield increased from 249.2 kg ha^{-1} at control to 426.6 kg ha^{-1} with 30 kg S ha^{-1} which may be attributed to higher dry matter yield as well as increased protein content. Similar results were reported by Singh *et al.* (2020).

Nitrogen uptake by sorghum crop increased significantly with increasing levels of S and the maximum value of N uptake (66.4 kg ha^{-1}) was recorded with 30 kg S ha^{-1} and lowest in control (40.2 kg ha^{-1}). This increase in N uptake with increasing levels of S may be attributed to favorable effect of S on N content coupled with dry matter yield. Similar results were reported by Singh and Singh (2020). Phosphorus uptake by sorghum crop increased significantly with S application and maximum value of P uptake was recorded with 30 kg S ha^{-1} (5.7 kg ha^{-1}). This increased in P uptake is apparently the result of favorable effect of S on P absorption coupled with greater dry matter production of sorghum. Singh *et al.* (2016) and Yadav and Singh (2021) also reported similar results. Data (Table 1) revealed that the application of 40 kg S ha^{-1} reported significantly highest uptake (6.0 kg ha^{-1}) of sulphur by the sorghum crop over other treatments. This might be attributed to increased sulphur availability from applied sulphur with a concomitant increase in S content and dry matter yield The results corroborate with the funding of Singh *et al.*(2020).

It may be concluded from the results that a significantly beneficial effect on sorghum could be achieved by the application of sulphur in the light textured soils of Agra region, Uttar Pradesh.

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