Agriculture for Sustainable Development 1(1):49-51, 2013/Article *ISSN 2347-5358 (Print)*

Agriculture for Sustainable Development

http://www.sustainableagriculture.in

YIELD AND NUTRIENT UPTAKE OF MUNGBEAN [*VIGNA RADIATA* (L.) WILCZEK] INFLUENCED BY PHOSPHORUS AND SULPHUR

J. P. PRAJAPATI, R. P. SINGH, SANTOSH KUMAR*, I. K. KUSHWAHA AND P. K. YADAV[1]

Department of Agricultural Chemistry and Soil Science, Udai Pratap Autonomous College, Varanasi, Utter Pradesh-221 002, India

Received: 04.08.2013 **Revised accepted: 13.09.2013**

ABSTRACT

The field experiment was conducted at research farm Department of Agricultural Chemistry and Soil Science, Udai Pratap Autonomous College, Varanasi during 2010 to study effect of Phosphorus and Sulphur on growth and yield of mungbean (*Vigna radiata* L.). Present investigation was laid out in randomized block design with thrice replication. Sulphur and phosphorus significantly influenced on the growth and yield attributes of mungbean. The results revealed that the significant higher yield and nutrient uptake were obtained with application of treatment T_5- N, K, P, S (20, 30, 40, 40 kg/ha).

Keywords:
Sulphur,phosphorus, nutrient uptake, Yield

INTRODUCTION

Pulses in India have long been considered as the poor man's only source of protein. Pulses are grown on 22-23 million hectares of area with an annual production of 13-15 million tonnes. Nutrient management is one of the most important factors that greatly affect the growth and yield of mungbean. Phosphorus is an essential both as a part of several key plant structure compound and as catalysis in the conversion of key biochemical reaction in plant. Phosphorus is a vital component of ATP, the "energy unit" of plants. Phosphorus is also involved in controlling key enzyme reactions and in the regulation of metabolic pathways (Theodorou and Plaxton, 1993). In general, sulphur is essential for synthesis of vitamins (biotine and thiamine), Sulphur containing amino acids (cystine, cysteine and methionine) and promotes nodulation in legumes. Sulphur is the key nutrient for improving productivity of legume crop (Patel and Patel, 1994). According to Pandey and Singh (2001) reported that highest grain and straw yield of mungbean was obtained by application of sulphur. Generally, a soil with less than 22 kg/ha of available sulphur is said to be deficient in sulphur. 'S' deficiency have been reported over 70 countries worldwide, of which India is one (Balasubramanian *et al.*, 1990). The decreasing per capita availability of pulse of the country has been serious concern. To make up this short fall it is necessary to boost up the pulse production in country. Therefore, proper nutrient management is absolutely essential to enhance the yield of mungbean.

MATERIALS AND METHODS

Field experiment was conducted during *kharif* season2010 at research plots of the Department of Agricultural Chemistry and Soil Science, Udai Pratap Autonomous College, Varanasi. The soil of experimental field was silt loam in texture having pH 7.6, EC 0.29 dS/m, organic carbon 3.7 g/kg, available phosphorous and sulphur 12.50 and 14.28 kg/ha, respectively. The treatment details T_0- Control, T_1- N, K (20, 30 kg/ha), T_2- N, K, P, S (20, 30, 20, 20 kg/ha), T_3- N, K,P, S (20, 30, 40, 20 kg/ha), T_4- N, K, P, S (20, 30, 20, 40 kg/ha) and T_5- N, K, P, S (20, 30, 40, 40 kg/ha). During the experiment mungbean cultivar K 851 was sown. Recommended doses of nitrogen (20 kg/ha) and potassium (30 kg/ha) were applied as basal application at the time of sowing. However, full dose of phosphorus and sulphur as per treatment were applied as basal application at the time of sowing. Data recorded in respect to different observations were analysed as per standard statistical procedure.

RESULTS AND DISCUSSION

Effect on yield attributes and yield

Various treatments were influenced significantly on yield attributes and yield in comparison to control (Table-1). Maximum pods per plant (53.90) were recorded with T_5- N, K, P, S (20, 30, 40, 40 kg/ha) which was at par with treatment T_4 and T_3 at 90 days after sowing which was significantly superior over other treatments. 40 kg/ha application of sulphur and phosphorus significantly increased growth parameter like plant height and branches could attributed to the role of phosphorus in growth by

Department of Agronomy, Institutes of Agricultural Sciences, BHU, Varanasi-221 005, **Corresponding author Email:* *santoshagro.nd@gmail.com* ,[1]Department of Soil Science and Agricultural Chemistry, Bihar Agricultural University, Sabour

promoting extensive root development nodulation (Kaisher *et al.*, 2010). Application of phosphorus and sulphur provided maximum grain yield (15.20 q/ha) and stover yield (19.80 q/ha) with the treatment T_5- N, K, P, S (20, 30, 40, 40 kg/ha) which was at par with treatment T_4- N, K, P, S (20, 30, 20, 40 kg/ha) and T_3- N, K, P, S (20, 30, 40, 20 kg/ha) which was significantly superior over other treatments. The marked response in yield due phosphorus and sulphur application may be more production of plant biomass, nodule number and weight and Chlorophyll content in leaf exhibited significant positive correlation with grain and stover yield. These finding are in conformity with the result of Singh and Singh (2004), Deshbhratar *et al.* (2010) and Meena *et al*, (2013).

Effect on nutrient content and uptake

The phosphorus and sulphur concentration in seed and stover was significantly affected due to different treatments (Table-2). Result revealed that soil applied P and S increased the nitrogen content in seed and stover as compared with control (T_0). The maximum nitrogen content was recorded with treatment T_5 (2.19 %) which was found at par with treatment T_4 and T_3 which was significantly superior over other treatments. It might to be the increased in nutrient contents in both grain and stover with increases application of phosphorus and sulphur at optimum levels. Nutrient content increased due to better root system, higher dry matter production and higher availability of phosphorus and sulphur in soil (Sharma *et al.*, 2008). Nutrient depletion from the soil is a function nutrient content in plants. Various treatments were influenced significantly on nutrient uptake by the crop (Table 2). maximum nitrogen uptake by crop (33.29 kg/ha) were recorded under treatment T_5 which was at par with treatment T_4 and T_3 at 30 days after sowing which was significantly superior over other treatments. The same trends were found in respect of uptake phosphorus and sulphur by crop. It is due the higher contents in stover and grain which ultimately increases the uptake of nutrient with of application of phosphorus and sulphur. Increased nutrient content and uptake attributed to better root system, higher availability of P and S in soil and higher dry matter production. The similar results are also reported by Sasode (2008).Data on yield and nutrients uptake of crop increased as compared to control by application of phosphorus and sulphur. The best treatment was T_5- N, K, P, S (20, 30, 40, 40 kg/ ha) followed by T_4- N, K, P, S (20, 30, 20, 40 kg/ ha) and T_3- N, K, P, S (20, 30, 40, 20 kg/ ha). Judicious application of phosphorous and sulphur significantly increased in yield and nutrient uptake.

Table 1: Effects of phosphorus and sulphur on yield attributes and yield of mungbean

Treatment	Number of pods/plant			Test weight (g)	Grain yield (q/ ha)	Stover yield (q/ ha)
	30 DAS	60 DAS	90 DAS			
T_0	5.00	29.5	45.80	35.2	9.80	15.00
T_1	5.80	30.41	47.50	36.10	10.20	15.50
T_2	6.16	32.50	48.50	40.40	11.50	16.40
T_3	8.00	34.83	49.30	37.50	13.20	17.70
T_4	10.16	34.83	51.00	41.20	13.70	18.10
T_5	11.08	36.75	53.90	42.80	15.20	19.80
CD (*P*=0.05)	4.19	4.14	4.54	0.98	2.12	2.42

Table 2: Effects of phosphorus and sulphur on nutrient content and uptake of mungbean

Treatment	Grain content (%)			Stover content (%)			Uptake by grain (kg/ ha)			Uptake by stover (kg/ ha)		
	N	P	S	N	P	S	N	P	S	N	P	S
T_0	3.10	1.79	0.1	1.08	0.09	0.13	15.00	17.54	0.98	16.20	1.35	1.95
T_1	3.20	2.11	0.11	1.11	0.11	0.14	16.54	21.52	1.12	17.21	1.75	2.17
T_2	3.60	2.13	0.11	1.19	0.13	0.16	19.68	24.50	1.27	19.52	2.13	2.62
T_3	3.55	3.02	0.14	1.21	0.16	0.19	20.94	39.86	1.85	21.42	2.83	3.36
T_4	3.68	3.14	0.16	1.25	0.17	0.21	22.20	43.02	2.19	22.63	2.53	3.80
T_5	3.85	3.30	0.18	1.30	0.18	0.22	25.41	50.16	2.74	25.74	3.56	4.36
CD(*P*=0.05)	0.30	0.21	0.04	0.22	0.02	0.17	0.93	0.45	0.08	0.53	0.51	0.41

REFERENCES

Balasubramaniam, P.M., Babu, K.A. and Ragupathy, B.1990. Influence of soil parameters on the forms of sulphur in benchmark soil of Chidambaram Taluk, Tamil Nadu. In the Proceeding of the 1990 UAS-FACT seminar on sulphur, Bangalore.

Deshbhratar, P.B., Singh, P.K., Jambhulkar, A.P., Ramteke, D.S. 2010. Effect of sulphur and phosphorus on yield, quality and nutrient status of pigeon pea (*Cajanus cajan*). *Journal of Environmental Biology*. 31: 933- 937.

Kaisher, M.S., Rahman, M.A., Amin, M.H.A., Amanullah, A.S.M. 2010. Effect of sulphur and boron on the seed yield and protein content of mungbean. *Bangladesh Research Publication Journal*. 3**:** 1181-1186.

Meena, K.K., Meena, R.S. and Kumawat, S. M. 2013. Effect of sulphur and iron fertilization on yield attributes, yield and nutrientuptake of mungbean (*Vigna radiate. Indian Journal of Agricultural Sciences.* **84**(4):472-6.

Pandey, S. P. and Singh, R.S. 2001. Response of phosphorus and sulphur on yield and quality of summer moong (*Vigna radiata* L.) *Crop Research*. 22**:** 206-209.

Patel, P.C. and Patel, J.R. 1994. Effect of phosphorus and sulphur on forage yield and nutrient uptake by lucerne. *Journal of the Indian Society of Soil Science.* 41:154-156.

Sasode, D.S. 2008. Response of mungbean [*Vigna radiata* (L) Wilczek] to fertility levels and sulphursources application. *Agricultural Science Digest*. 28 (1): 18-21.

Sharma, R., Dahiya, S.S., Singh, M., Malik, R.K. and Singh,D.2008.Effectof sulphur and phosphorus inte ractions on growth and nutrient content in green gram *Haryana Agricultural University Journal of Research*. 38(1/2):41-47.

Singh ,Y.P. and Singh, R. 2004. Interaction effect of sulphur and phosphorus on growth and nutrient uptake of black gram. *Journal of the Indian Society of Soil*. 52: 266- 269.

Theodorou, M.E. and Plaxton. W.C. 1993. Metabolic adaptations of plant respiration to nutritional phosphate deprivation. *Plant Physiology.* 101: 339-344.