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Short Communications

Influence of planting pattern and sulphur on mungbean (*Vigna radiata*) and sesame (*Sesamum indicum*) intercropping under semi-arid region of Rajasthan

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ABSTRACT

The study was carried out during *kharif* season of 2009 to study the effect of different intercropping systems and sulphur levels on mungbean [*Vigna radiata* (L.) Wilczek] and sesame (*Sesamum indicum* L.). Among the different row ratios, sole planting of both the crops gave significantly maximum seed yield and uptake of nutrients. The highest productivity in terms of mungbean equivalent yield (1.21 t/ha) was obtained under sole mungbean, which remained on par with mungbean + sesame grown in 4:1 ratio. Mungbean + sesame grown in 4:1 ratio also gave significantly highest land equivalent ratio. Application of increasing levels of sulphur up to 30 kg S/ha recorded significantly highest seed yield of mungbean. However, significant improvement in seed yield of sesame, total uptake of nitrogen and sulphur by mungbean and sesame, protein content in seed of mungbean, oil content in seed of sesame, mungbean equivalent yield and land equivalent ratio were observed up to 45 kg S/ha.

Key words : Intercropping, Mungbean, Planting pattern, Sesame, Sulphur

Mungbean and sesame are the most important pulse and oilseed crops grown in semi-arid areas of Rajasthan. At present these crops are facing competition with high productive crops like coarse cereals and millets. Short supply of pulses and oilseeds has forced our country to import pulses and edible oil. Under these circumstances intercropping of pulses and oilseeds may be a feasible and viable option to augment per unit area productivity of these crops through temporal intensification which could be comparable with other higher productive crops (Meena *et al*., 2008). These crops require higher amount of sulphur as compare to cereals especially in low S soils of semi-arid region of Rajasthan (Tandon, 1986), for augmenting the productivity and quality of both the components. Keeping this in view, present investigation was undertaken to find out the effect of different intercropping ratios and sulphur levels on yield and quality of mungbean and sesame.

A field experiment was conducted during *kharif* season of 2009-10 at agronomy farm of S.K.N. College of Agriculture, Jobner, Jaipur, comprising 20 treatments combinations of 5 intercropping systems *viz.*, sole mungbean 'RMG-268' sole sesame 'RT-127', mungbean + sesame in 2:1 row ratio, mungbean + sesame in 3:1 row ratio and mungbean + sesame in 4:1 row ratio and 4 sulphur levels *viz*., 0, 15, 30 and 45 kg S/ha. Treatments were tested in randomized block design with three replications. The soil of experimental plots was loamy sand in texture, alkaline in reaction (pH 8.2), low in organic carbon (0.16%), available nitrogen (132.5 kg/ha), available phosphorus (16.0 kg P_2O_5/ha), available SO_4^{-2}-S (8.16 ppm) and medium in potassium (142.2 kg K_2O/ha) content. The experimental crops were sown on 22 July 2009 in lines 30 cm apart, keeping intrarow spacing of 10 cm for sole as well as in intercropping systems. Under intercropping, third, fourth and fifth row of mungbean were replaced by one row of sesame in 2:1, 3:1 and 4:1 row proportions, respectively. A common recommended dose of nitrogen and phosphorus (20 kg N and 40 kg P_2O_5/ha) was uniformly applied to all the plots through urea and DAP, respectively at the time of sowing and sulphur through gypsum was incorporated in the soil before sowing in respective plots as per treatments. Observations on yields of mungbean and sesame were recorded from area of net plots harvested. The mungbean equivalent yield was calculated by converting the seed yield of sesame into mungbean yield on the basis of existing market prices of the crops. The yield further used for computation of land equivalent ratio (LER) as suggested by Willey (1979). Data was statistically

***Short note**

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analysed by the procedure described by Panse and Sukhantme (1978).

The present findings pertaining to seed yield, harvest index, mungbean equivalent yield and land equivalent ratio of mungbean and sesame as influenced significantly by different intercropping systems are presented in table 1. Sole planting of both the crops recorded significantly higher seed yield as compared to other intercropping systems. Among the intercropping systems, mungbean + sesame grown in 4:1 row proportion and 2:1 row proportion recorded significantly maximum seed yield of mungbean and sesame, respectively. The reduction in seed yield of both the crops in all intercropping systems over sole crops was primarily due to low plant population. Reduction in yield of main crop (mungbean) might also be due to competition between the component crops for sharing of nutrients, light and water by intercrop. These results are in close conformity with those of Tripathi *et al.* (2005). However, yield of sesame on unit area basis was higher due to better yield attributes under intercropping systems as compared to sole sesame. Meena *et al.*, 2008, also reported increased seed yield per unit area from mixed stand of sesame and clusterbean as compared to their pure stands.

A significant effect of different intercropping systems on mungbean equivalent yield was observed (Table 1). Sole planting of mungbean being on par with 4:1 row ratio gave significantly highest mungbean equivalent yield (MEY) as compared to sole sesame, 2:1 and 3:1 row ratios. The higher equivalent yield of mungbean under sole planting might be due to higher production per unit area of mungbean along with higher prices of produce. But the highest land equivalent ratio (LER) was found under 4:1 row ratio as compared to 2:1, 3:1 row ratios and sole crops (Table 1). The higher LER under intercropping might be due to biological efficiency of system in terms of yield per unit area.

Intercropping systems differed in total uptake of nitrogen and sulphur, protein content in seed of mungbean and oil content in seed of sesame (Table 1). Sole mungbean, being on par with 4:1 row ratio, gave significantly highest total uptake of nitrogen, sulphur and protein content in seed as compared to 2:1 and 3:1 row ratios. Among intercropping systems, 4:1 and 3:1 row ratios were remained on par in protein content in seed of mungbean. Sole sesame also gave significantly highest total uptake of nitrogen and sulphur. Perceptible change in oil content of sesame was not observed due to intercropping systems. The higher total nitrogen and sulphur uptake under sole crops as compared to their intercropping systems was primarily due to increased seed yield under sole mungbean and sesame as compared to yield obtained under intercropping. Meena *et al.*, 2008 also reported significantly higher uptake of total nitrogen by sole clusterbean and sesame.

Application of graded levels of sulphur from 0 to 45 kg S/ha significantly influenced the seed yield, total uptake of nitrogen and sulphur, protein content in seed of mungbean and oil content in seed of sesame over control (Table 1).

Table 1. Effect of different intercropping systems and levels of sulphur on mungbean and sesame

Treatment	Mungbean					Sesame					MEY	LER
	Seed yield (t/ha)	Harvest index (%)	Total uptake of N (kg/ha)	Total uptake of S (kg/ha)	Protein content (%)	Seed yield (t/ha)	Harvest index	Total uptake of N (kg/ha)	Total uptake of S (kg/ha)	Oil content (%)	(t/ha)	
Intercropping systems												
M sole	1.207	32.95	79.34	8.02	24.70	-	-	-	-	-	1.21	1.00
S sole	-	-	-	-	-	0.724	21.65	42.43	3.66	44.50	0.69	1.00
M+S (2: 1)	0.708	32.11	43.82	4.36	22.42	0.318	23.27	20.14	1.82	46.45	1.01	1.02
M+S (3: 1)	0.842	32.83	53.45	5.29	23.48	0.241	22.65	15.23	1.29	45.95	1.07	1.02
M+S (4: 1)	0.971	33.36	61.24	6.03	23.61	0.193	22.35	12.35	1.00	45.79	1.16	1.07
SEm±	0.022	0.79	1.70	0.19	0.37	0.006	0.66	0.93	0.06	0.73	0.02	0.02
CD (P=0.05)	0.064	NS	4.90	8.02	1.06	0.018	NS	2.70	0.19	NS	0.06	0.05
Sulphur (Kg S/ha)												
0	0.799	31.88	47.32	4.37	21.63	0.304	20.70	15.47	1.28	41.45	0.87	0.95
15	0.898	32.63	55.90	5.51	22.97	0.356	21.54	21.15	1.83	44.55	0.99	1.02
30	0.986	33.24	63.85	6.50	24.27	0.396	22.56	25.29	2.19	47.21	1.09	1.07
45	1.046	33.48	70.77	7.31	25.36	0.419	22.90	28.24	2.48	49.48	1.16	1.11
SEm±	0.022	0.79	1.70	0.19	0.37	0.006	0.66	0.93	0.06	0.73	0.02	0.01
CD (P=0.05)	0.064	NS	4.90	0.54	1.06	0.018	NS	2.70	0.19	2.12	0.05	0.04

NS – Non significant

The significantly highest seed yield of mungbean was obtained with increased application of sulphur up to 30 kg S/ha over control. However, seed yield of sesame, total uptake of nitrogen and sulphur by mungbean and sesame, protein content in seed of mungbean and oil content in seed of sesame were recorded significantly higher with increased application of sulphur up to 45 kg S/ha. The increase in yield under sulphur fertilization is obvious from the fact that application of sulphur improved overall nutritional environment of the rhizosphere as well as in the plant system, which in turn enhanced the plant metabolism and photosynthetic activity resulting into better growth and development of plants and ultimately the yields. Similar results were also reported by Ghosh and Joseph, 2008. Mungbean equivalent yield and land equivalent ratio were significantly increased up to 45 kg S/ha (Table 1). The increase in mungbean equivalent yield and land equivalent ratio with increased sulphur supply could be explained on the basis of highly beneficial effect of sulphur application on the yield contributing characters as well as yields of both the component corps.

To describe the mungbean equivalent yield (y) as a function of main effect of sulphur, multiple regression equation [$Y = 872.1+9.073(X)-0.06(X^2)$] was developed. Based on this equation a level of 72.2 kg S/ha was found to be optimum with mungbean equivalent yield of 1214.4 kg/ha and a response of 342.4 kg/ha.

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