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RESPONSE OF ORGANIC NUTRIENT SOURCES AND SULPHUR LEVELS ON YIELD ATTRIBUTES AND YIELD OF SOYBEAN (*GLYCINE MAX* L. MIRRELL)

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KEYWORDS

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ABSTRACT

A field experiment was conducted during the *kharif season* 2013-14 at the Crop Research Farm, Department of Agronomy Allahabad School of Agriculture, SHIATS, Allahabad (U.P.) to evaluate the response of organic nutrient sources and sulphur levels on growth and yield of soybean. The experiment was laid out in randomized block design with three replications. The treatment consisted of three sources of solid organic nutrient sources (Vermicompost, Farmyard manure and Poultry manure) and four levels of sulphur (0 kg ha^{-1}, 30 kg ha^{-1} sulphur, 40 kg ha-1 and 50 kg ha^{-1} respectively). The experimental results revealed that Farmyard manure + 40 kg ha^{-1} sulphur recorded grain yield (2112.89 kg ha^{-1}), haulm yield (3776.03 kg ha^{-1}), pod $plant^{-1}$ (38.66), seed index (6.49) and grain pod^{-1} (2.66). Among the organic sources and sulphur levels Farmyard manure + 40 kg ha^{-1} sulphur is best in all yield attributes characters and yield of soyabean.

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INTRODUCTION

Soybean (*Glycine max* L. Merrill) is an important oilseed crop and food grain legume. India is the second largest producer of Soybean after U.S.A. Soybean known as the "Wonder crop". It is an excellent source of protein (44%), Cholesterol free oil (20%) and carbohydrate (Gahukar *et al.*, 1997). It is a triple beneficiary crop, a unique food, a valuable feed and an industrial raw material with considerable potential (Chavan, *et al.*, 2014) The management of manures within a crop rotation can have large effects on yields and crop quality (Stein-Bachinger and Werner,1997). The non-judicious and unbalanced use of fertilizers leads to environmental pollution (Yadav et al., 2005). At present soil health as well as productivity of crop affected by nutrient imbalance and quality and productivity of crop decreases day by day due to using of chemical fertilizer to supply plant nutrient. Another aspect that of chemical fertilizer affect the physical, chemical and biological properties of soil. On the other hand when increased doses of chemical fertilizers are used to increase crop production it cause the environmental pollution and toxicity to soil as it kill the beneficial microorganism. It is also proved that plant remove more nutrient from the soil in modern intensive cultivation and hence needs constant replenishment. Under such condition organic manure offer good alternative technology to replenish the required crop nutrients (Chandra *et. al.*2005). So at present organic farming is one of the most important practice to maintain long lives soil fertility. One of the important aspects in organic farming is the soil fertility/nutrient management of crops/cropping systems to optimize crop productivity. Organic amendments helps in improving the soil physical and biological environment besides supplying nutrients for crop growth (Darwish *et al.*, 1995). The management of manures within a crop rotation can have large effects on yields and crop quality (Stein-Bachinger and Werner, 1997). Organic farming plays greater role in maintaining soil health and reducing the risk of soil erosion when compared to chemical farming (Reganold and Palmer, 1995). There is need to refining and standardized package of practice for important crop under organic farming system. Sulphur is an essential macronutrient in plant growth and development. It is increasingly being recognized as the fourth major plant nutrient after nitrogen, phosphorus and potassium. Among the fertilizer elements sulphur requirement of oilseed crops is quite high as compared to other crops (Das and Das, 1994). Sulphur deficiencies in crops have increasingly occurred due to less to no addition of S to soil because of increased use of S-free fertilizers, greater S removal from soil by crops with enhanced yield and under more intensive cropping systems (Scherer, 2001). The objective of this paper is to evaluate the effect of integrated nutrient management, organic nutrient sources and sulphur levels on yield attributes and yield of soyabean.

MATERIALS AND METHODS

The soil of the experimental field was shallow in depth (30 cm) having 0.34% organic carbon, 225 kg ha^{-1} available nitrogen 13.50 kg ha^{-1} available P_2O_5, 257.00

Table 1: Effect of organic nutrient sources and sulphur levels on yield attributes and yields of soybean

Treatment		pod plant^{-1}	seed pod^{-1}	seed index	grain yield kg ha^{-1}	stover yield kg ha^{-1}	Seed Yield Kg (ha^{1})
T_1	Farmyard manure + Control (0 kg ha^{-1} sulphur)	24.77	1.66	5.51	752.27	1293.26	752.27
T_2	Farmyard manure + 30 kg ha^{-1} sulphur	24.11	1.66	5.79	771.28	1326.51	771.28
T_3	Farmyard manure + 40 kg ha^{-1} sulphur	38.66	2.66	6.49	2112.89	3776.03	2112.89
T_4	Farmyard manure + 50 kg ha^{-1} sulphur	25.66	1.66	5.44	789.24	1508.40	789.24
T_5	Vermicompost + Control (0 kg ha^{-1} sulphur)	24.55	1.66	5.76	756.86	1487.06	756.86
T_6	Vermicompost + 30 kg ha^{-1} sulphur	23.11	1.55	5.89	698.52	1265.89	698.52
T_7	Vermicompost + 40 kg ha^{-1} sulphur	33.55	2.33	6.22	1629.65	2942.91	1629.65
T_8	Vermicompost + 50 kg ha^{-1} sulphur	23.77	1.66	5.35	756.74	1376.77	756.74
T_9	Poultry manure + Control (0 kg ha^{-1} sulphur)	23.99	1.66	5.22	737.55	1289.91	737.55
T_{10}	Poultry manure + 30 kg ha^{-1} sulphur	24.22	1.44	5.86	733.79	1205.47	733.79
T_{11}	Poultry manure + 40 kg ha^{-1} sulphur	25.33	1.66	5.49	769.44	1314.82	769.44
T_{12}	Poultry manure + 50 kg ha^{-1} sulphur	25.88	1.55	5.64	798.68	1451.60	798.68
	SEd (±)	1.10	0.16	0.56	116.02	196.94	116.02
	CD (p= 0.05)	2.27	0.33	NS	240.61	408.44	240.61
	CV (%)	5.07	11.09	12.04	15.08	14.30	15.08

NS – Non significant

kg ha^{-1} available K_2O, pH 7.5 and EC (0.13 dS m^{-1}). Farm is situated at 25^0 57′ N latitude, 87^0 19′ E longitude and 98 m altitude from the sea level. The treatment combinations in the experiment comprised of 3 sources of solid organic manures *viz*., Farmyard manure, Poultry manure and Vermicompost and four levels of sulphur (30 kg ha^{-1}, 40kg ha^{-1} and 50 kg ha^{-1}) with control (0 kg ha^{-1} sulphur) for sulphur. Half dose of NPK was supply by organic manure and remaining dose supply by inorganic sources (equivalency based on phosphorus). The experiment was laid out in Randomized Block Design with three replication. Twelve treatment T_1-FYM + Control (0 kg ha^{-1}sulphur), T_2- FYM + 30 kg ha^{-1} sulphur, T_3- FYM + 40 kg ha^{-1} sulphur, T_4- FYM + 50 kg ha^{-1} sulphur, T_5-Vermicompost + Control (0 kg ha^{-1} sulphur), T_6-Vermicompost + 30 kg ha^{-1} sulphur, T_7-Vermicompost + 40 kg ha^{-1} sulphur, T_8-Vermicompost + 50 kg ha^{-1} sulphur, T_9-Poultry manure + Control (0 kg ha^{-1} sulphur), T_{10}-Poultry manure + 30 kg ha^{-1} sulphur, T_{11}-Poultry manure + 40 kg ha^{-1} sulphur and T_{12}-Poultry manure + 50 kg ha^{-1} sulphur. In T_1, T_5 and T_9 are controlled for sulphur. Seed sown at the rate of 80 kg ha-1 with kera method of sowing. Variety using in trial is JS-335.

RESULTS AND DISCUSSION

Among the all sources of organic manure and levels of sulphur T_3 (FYM + 40 kg ha^{-1} sulphur) is best in all of treatment. Yield attributing characters like pod plant^{-1}, seed pod^{-1}, seed index and yield of soybean showed significantly higher in pod plant^{-1} (38.66), seed pod^{-1} (2.66) and seed index (6.49). Application of farmyard manure due to increased available macro and micro nutrient thus promoting activity of beneficial micro organism (Chaturvedi *et al*., 2010). The application of organic manures decrease bulk density, improve the soil environment including physico-chemical (such as enhanced nitrogenase activity), aeration biological condition, and micro climate of photosphere resulting in maximum penetration of rhizobium in root hairs (Yawalkar *et al*., 1996). All yield attributing characters viz., pod plant-^{1}, grains pod^{-1}, 100-seed weight (g) and seed yield pot^{-1} (g) of the experimental crop significantly influenced by different sulphur levels (Choudhary *et. al*., 2014) Maximum seed yield and stover yield highest (2112.89 kg ha^{-1}, 3776.03 kg ha^{-1} respectively) was recorded in T_3 (FYM + 40 kg ha^{-1} sulphur). Nitrogen influenced the seed yield through optimum or enhanced source-sink relationship, resulting in higher production of photosynthates and their increased translocation to reproductive parts, as nitrogen being the most important essential plant nutrient is needed for growth and development of plant and known to increase the yield of soybean (Amarnath *et al*., 1990, Edward and Daniel, 1992).

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