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Effect of Organic and Inorganic Sources of Nitrogen on Yield, Yield Attributes and Quality in Soybean-Maize Cropping System

Key words : Farmyard manure, Poultry manure,Recommended dose of fertilizer, Vermicompost

Soybean (*Glycine max* (L.)) is gaining importance as a remunerative crop in black soils of Northern Telangana zone in Andhra pradesh of India. Integrated use of organic manures in combination with recommended dose of nutrients through inorganic fertilizers, not only maintain higher productivity but also provide greater stability in crop production without deteriorating the quality of soil.The recommendations for nutrient applications were made based on response of individual crops rather than cropping system as a whole. Use of an appropriate combination of inorganic fertilizers and organic manures could conserve nutrients, those nutrients may be supplied to the current crop in succession. The research results from different parts of the country indicated that there was increase in yield, net returns and benefit:cost ratio in soybean and soybean based cropping systems due to conjuctive use of organic and inorganic fertilizers. The soil properties were also improved favoring higher productivity. Keeping in view the significance of organic manures in maintaining the soil health and soybean as a remunerative crop to cotton in black soils, a study was proposed on the effect of integrated use of organic sources of nitrogen with the inorganic fertilizers on yield and yield attributes in soybean–maize cropping system.

The experiment was carried out at Regional Agricultural Research Station (ANGRAU), Jagtial during *Kharif* and *rabi* seasons of 2002-03 and 2003-04. The soil was red sandy loam in texture, medium in organic carbon (0.5%), low in available N (119.82 kg/ha), high in available P_2O_5 (48.06 kg/ha), rich in available K_2O (242.20 kg/ha) with neutral in reaction (pH 7.38) and non saline (EC=0.101 dS/m). All the cultural practices were followed as per the schedule. The experiment was laid out in a Randomized Block Design comprising 8 treatments where in 50% and 25% recommended dose of nitrogen was supplied through different organic manures and replicated thrice. In case of RDF, nitrogen was applied in two splits in the from of urea while entire doses of P and K were applied as basal in the form of single super phosphate and murate of potash, respectively. Soil samples were collected before sowing and after harvest of crop. After harvesting of soybean crop, seed samples were analyzed for oil content, protein content and oil was estimated for acid values with standard procedures

Pods /plant: The number of pods / plant is an important parameter which governs the yield of the crop. The no. of pods /plant was recorded at 60DAS. The highest number (70 pods/plant) was recorded in T7 treatment at 60DAS (Table 1). Increased no. of pods/plant were noticed with the application of vermicompost @ 4.76q/ha to supply 25% RDFN.This could be contributed for higher crop DMP and nutrient uptake by crop. These findings are in line with the findings of Nayak et al., (2000).

Thousand seed weight: Seed weight is an important attribute, which has a direct influence on the yield. The highest thousand seed weight was registered in T7 treatment (Table 1). Increased nutrient uptake and assimilation by crop plants at the reproductive stage enhanced the thousand seed weight. The results are in conformity with the findings of Pannerselvam (1997) and Sammuria and Nepalia (1998).

Seed yield: The soybean seed yield was recorded in all the plants after harvest. The seed yield for different treatments ranged between 8.22 to 12.9 q/ha. Among the treatments T7 registered the highest seed yield of 12.9 q/ha. It was 56.93 % increase over the control. The next best treatment was T8, which recorded a seed yield of 9.68 q/ha.the lowest yield of 8.22 q/ha was recorded in control (Table1). Parameters such as plant height, DMP, accompanied by an increase in nutrient uptake in various treatments resulted in better yield attribute and increased seed yield. The higher seed yield recorded in T7 treatment might be due to better crop growth, yield parameters and consequently the seed yield. The results are in agreement with the reports of Jat and Gaur (2000).

Oil Content: The oil content in soybean seed was not influenced significantly due to different sources of nitrogen treatments. The mean oil content of soybean seed was 19.38 percent. It ranged from

Table 1. Effect of treatments on yield, yield attributes of soybean in Soybean-Maize cropping System.

Treatments	Pods Plant^{-1} 60 DAS *	1000 Seed Weight (g) *	Seed Yield (q/ha) *	% Increase Over Control	Specific Gravity *
T1: Control (0:0:0)	52	124.65	8.22	-	0.87
T2: RDF (40:50:40) Kg/ha of N-P_2O_5-K_2O	60	138.28	9.22	12.16	0.86
T3: 50% RDFN through inorganic fertilizers+ 50% RDFN through FYM	64	140.86	8.78	6.81	0.86
T4: 50% RDFN through inorganic fertilizers+ 50% RDFN through VC	68	143.56	9.14	11.19	0.87
T5: 50% RDFN through inorganic fertilizers+ 50% RDFN through PM	66	141.96	8.97	9.12	0.86
T6: 75% RDFN through inorganic fertilizers + 25% RDFN through FYM	68	148.56	9.58	16.54	0.86
T7: 75% RDFN through inorganic fertilizers + 25% RDFN throughVC	72	155.39	12.9	56.93	0.87
T8: 75% RDFN through inorganic fertilizers + 25% RDFN through PM	68	152.53	9.68	7.76	0.87
SE (d)	0.12	1.31	0.56		0.001
CD (p=0.05)	NS	3.78	1.91		NS

* Mean of two years

19.01 to 19.64 percent (Table 2). Oil biosynthesis is a complex process governed by the population of gene. Hence it is always difficult to modulate its content in soybean through nutrient management practices. Results are in support of Kausale et al., (2007).

Acid Value: The mean acid value of soybean oil was 0.67mg per 100g of oil (Table2). Highest acid value registered with control. Acid value decreased with treatments that received INM practices rather than control and RDF. Least acid value (0.64 mg per 100 g of oil) was registered with T7 treatment followed by T8 treatment. This might be due to inverse relation between Nitrogen, Phosphorous availability with acid value of soybean oil. Similar observations were reported by Kadam et al, (2007).

Protein Content: The mean protein content of soybean seed was 38.3 percent (Table 2) and was ranged from 35.9 to 40.5.There was significant difference between treatments. Treatments which received nutrient through organic manures such FYM, VC, PM have registered higher amount of protein, compared to control and RDF.Application of vermicompost has shown significant influence on protein content compared to all other sources. It has given 11.3% higher protein content over control. This suggests that soybean grown with integrated nutrient management practices is rich with respect to protein content. Among all treatments, highest mean amount of protein (40.5) was registered with T7, while lowest mean amount of protein (35.9) was recorded with control.

Table 2. Effect of treatments on Quality parameters of soybean.

Treatments	Protein content (%) *	% Increase Over Control	Oil content (%) *	Acid value (mg /100g oil) *
T1: Control (0:0:0)	35.9	-	19.43	0.73
T2: RDF (40:50:40) Kg/ha of N-P_2O_5-K_2O	36.6	1.91	19.22	0.71
T3: 50% RDFN through inorganic fertilizers+ 50% RDFN through FYM	38.1	5.7	19.43	0.69
T4: 50% RDFN through inorganic fertilizers+ 50% RDFN through VC	38.8	7.4	19.54	0.66
T5: 50% RDFN through inorganic fertilizers+ 50% RDFN through PM	38.6	6.9	19.64	0.68
T6: 75% RDFN through inorganic fertilizers + 25% RDFN through FYM	39.0	7.9	19.01	0.66
T7: 75% RDFN through inorganic fertilizers + 25% RDFN throughVC	40.5	11.3	19.27	0.64
T8: 75% RDFN through inorganic fertilizers + 25% RDFN through PM	39.2	8.4	19.55	0.65
General Mean	38.3		19.38	0.67
SE (d)	0.07		0.01	0.01
CD (p=0.05)	0.22		NS	NS

***** Mean of two years

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