

## Yield, yield attributes and oil content of soybean as influenced by INM in soybean-maize cropping system

R. UMA REDDY\*, S.NARENDER REDDY<sup>1</sup> AND M. SURYANARAYAN REDDY<sup>2</sup>  
A.P. Water Management Project, Regional Agricultural Research Station, JAGTIAL (A.P.) INDIA

### ABSTRACT

The Field experiment was conducted to study the effect of different organic and inorganic sources of nitrogen on yield and yield attributes of soybean in soybean-maize cropping system. Higher soybean yields 13.3 q/ha and 12.50 q/ha were obtained with the application of 75% of recommended dose of nitrogen and 100% recommended dose of PK through inorganic fertilizers +25% of recommended dose of nitrogen is through vermicompost+ during *kharif* 2002-03 and 2003-04, respectively. Effective nodules and oil content was not significantly influenced by different treatments.

**Key words :** Vermicompost, Poultry manure, Farmyard manure, Soybean, INM.

### INTRODUCTION

Soybean [*Glycine max* (L.)] is gaining importance as a remunerative crop in black soils of Northern telangana zone in Andhra Pradesh of India. Use of organic manures in conjunction with inorganic fertilizers was proved to be useful in sustaining crop yields without deteriorating the quality of soil. 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 and inorganic sources of nitrogen on yield and yield attributes of soybean in soybean-maize cropping system.

### MATERIALS AND METHODS

The experiment was carried out at Department of Soil Science, Regional Agricultural Research Station, 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<sub>2</sub>O<sub>5</sub> (48.06 kg/ha), fairly rich in available K<sub>2</sub>O (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 (RBD) comprising of 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 form 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 with standard procedures.

### RESULTS AND DISCUSSION

#### Seed yield:

The results revealed that seed yield of soybean was significantly highest with the application of organic manures and inorganic fertilizers in combination, over control and RDF (Table 1). An increase of yield 0.97 q/ha was recorded in RDF over control during the year 2002-03 and 0.91 q/ha during the year 2003-04. These results are in accordance with the results of Tejada *et al.* (2005). Different organic manures which supplied 50 per cent of recommended dose of nitrogen were given an increased yield of 0.52, 0.89, 0.71 q/ha during 2002-03 and 0.91, 0.49, 0.84, 0.67 q/ha during 2003-04 with FYM, VC and PM, respectively over control, but decreased yield of 0.45, 0.08, 0.26 q/ha during 2002-03 and 0.42, 0.07, 0.24 q/ha during 2003-04 over RDF. These results are in accordance with the results of Antonio *et al.* (1988). This can be attributed as urea is rapidly transformed into ammonium by a soil enzyme, which in turn is nitrified to nitrate by bacteria. This process is fast in warm soil but is very slow at soil temperatures colder than 50° F. Nitrate cannot be retained by the soil and is prone to leaching. However, organic manures which supplied 25 per cent of recommended dose of nitrogen were given an increased yield of 1.34, 4.76, 1.44 q/ha during 2002-03 and 1.26, 4.48, 1.36 q/ha during 2003-04 with FYM, VC and PM, respectively over control, and 0.37, 3.79, 0.47 q/ha during 2002-03 and 0.35, 3.57, 0.45 q/ha during 2003-04 over

\* Author for correspondence. <sup>1</sup>Department of of Plant Physiology, Water Technology Centre, Acharya N.G. Ranga Agricultural University, Rajendra Nagar, HYDERABAD (A.P.) INDIA

<sup>2</sup> Department of Soil Science, WALAMTARI, Himayatsagar, HYDERABAD (A.P.) INDIA

**Table 1 : Soybean seed and Haulm yield influenced by INM in soybean-maize cropping system during 2002-03 and 2003-04**

Treatments	Yield (qha <sup>-1</sup> )			
	Seed		Haulm	
	2002-03	2003-04	2002-03	2003-04
Control (0:0:0)	8.54	8.02	19.85	18.65
RDF (40:50:40) Kg/ha	9.51	8.93	21.21	19.93
50% * RDN+50% **FYM (40.40 q/ha)	9.06	8.51	20.58	19.34
50% * RDN +50% **VC (9.42 q/ha)	9.43	8.86	20.86	19.60
50% * RDN+50% **PM (4.92 q/ha)	9.25	8.69	20.76	19.51
75% *RDN+25% **FYM (20.20 q/ha)	9.88	9.28	21.40	20.11
75% *RDN+25% **VC (4.76 q/ha)	13.3	12.50	24.63	23.15
75% * RDN+25% **PM (2.45 q/ha)	9.98	9.38	21.83	20.52
S.E. ±	0.55	0.61	0.73	0.69
C.D. (P=0.05)	1.67	2.19	2.21	2.42
CV (%)	10.94	8.34	6.66	7.20

\* % Of recommended dose of nitrogen +100% recommended dose of PK through inorganic fertilizers.

\*\* % recommended dose of nitrogen through organic source.

RDF. Thus when 75% nitrogen is supplied through RDF and 25% nitrogen is through organic manures, they gave substantially highest yields over control and RDF, rather than 100% nitrogen through RDF. Among the manures the effect of application of 75% of recommended dose of nitrogen and 100% recommended dose of PK through inorganic fertilizers + 25% recommended dose of nitrogen

is through vermicompost, on seed yield was substantial and significant with an increase of 4.76 q/ha during 2002-03 and 4.48 q/ha during 2003-04 over control, and 3.79 q/ha during 2002-03 and 3.57 q/ha during 2003-04 over RDF, respectively. Similar increase of haulm yield was observed with the application of 75% of recommended dose of nitrogen through inorganic fertilizers + 25% recommended dose of nitrogen is through vermicompost. It was observed that time of sowing play significant role in yields of soybean, and it was understood that optimum time of sowing for soybean is up to first week of July and same was revealed from the experiment that, good yields were harvested during the year 2002-03 compared to 2003-04 as the crop which was sown during third week of June during 2002-03 compared to crop sown during second week of July during the year 2003-04. The yield response obtained with different manures suggested that, 75% recommended dose of nitrogen is supplied through inorganic fertilizers and 25% nitrogen is through organic manures that too with Vermicompost will be beneficial to realize higher crop yields under these agro climatic conditions.

#### **Oil content and yield attributes:**

Oil content (%) did not vary significantly with the manurial application (Table 2). In different treatments it was varied from 8.54 to 13.3% and 8.02 to 12.50 % during 2002-03 and 2003-04, respectively. However, it was high with the treatments which received conjunctive application of organic and organic source of nitrogen. The number of pods plant<sup>-1</sup> is an important parameter which governs the yield of the crop (Suryaprabha and Senthively, 2007). At 60 DAS, the highest number 72 and 68 pods plant<sup>-1</sup>

**Table 2 : Soybean oil content and yield attributes influenced by INM in soybean-maize cropping system during 2002-03 and 2003-04**

Treatments	Oil Content (%)		Yield attributes			
			Pods/plant 60 DAS		Effective nodules /plant	
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Control (0:0:0)	18.6	20.27	52	48	33	38
RDF(40:50:40)Kg/ha	18.4	20.05	60	56	42	47
50% * RDN+50% **FYM (40.40 q/ha)	18.6	20.27	64	58	41	46
50% * RDN+50% **VC (9.42 q/ha)	18.7	20.38	68	64	44	49
50% * RDN+50% **PM (4.92 q/ha)	18.8	20.49	66	62	44	49
75% *RDN+25% **FYM (20.20 q/ha)	18.2	19.83	68	64	48	53
75% *RDN+25% **VC (4.76 q/ha)	18.4	20.15	72	68	48	53
75% * RDN+25% **PM (2.45 q/ha)	18.7	20.40	68	64	48	53
S. E. ±	0.01	0.01	0.12	0.12	0.22	0.22
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS
CV (%)	10.07	8.63	7.24	6.34	5.83	4.91

\* % Of recommended dose of nitrogen +100% recommended dose of PK through inorganic fertilizers.

\*\* % recommended dose of nitrogen through organic source.

**Table 3: Dry matter production, grain yield and harvest index of soybean in different treatments during 2002-03 and 2003-04**

Treatments	2002-03			2003-04			Mean of two years		
	TDM (Kg/ha)	Seed yield (Kg/ha)	HI	TDM (Kg/ha)	Seed yield (Kg/ha)	HI	TDM (Kg/ha)	Seed yield (Kg/ha)	HI
Control (0:0:0)	3068	854	28	2669	802	30	4403	1255	43
RDF(40:50:40)Kg/ha	3248	951	29	2825	893	32	4661	1398	45
50% *RDN+50%**FYM (40.40 q/ha)	3108	906	29	2703	851	31	4460	1332	45
50% *RDN+50%**VC (9.42 q/ha)	3178	943	30	2764	886	32	4560	1386	46
50% *RDN+50%**PM (4.92 q/ha)	3145	925	29	2736	869	32	4513	1360	45
75% *RDN+25%**FYM (20.20 q/ha)	3298	988	30	2869	928	32	4733	1452	46
75% *RDN+25%**VC (4.76 q/ha)	3589	1330	37	3122	1250	40	5150	1955	57
75% *RDN+25%**PM (2.45 q/ha)	3348	998	30	2912	938	32	4804	1467	46

\* % Of recommended dose of nitrogen +100% recommended dose of PK through inorganic fertilizers.

\*\* % recommended dose of nitrogen through organic source.

Data was not statically analyzed

were recorded during 2002-03 and 2003-04, respectively with 75% of RDN through chemical fertilizers + 25% RDN through vermicompost, which was 40% increase over control. Highest no. of pods plant<sup>-1</sup> were noticed with the conjunctive application of organic and inorganic source of Nitrogen rather than either of alone. These findings are in line with the findings of Nayak *et al.* (2000). Effective nodules *i.e.* nodules contain bacterial habitation, is an important attribute which has a direct influence on yield. The higher no. of nodules were observed in treatments which received consumptive use of organic and inorganic source of nitrogen. These nodules enabled the crop for fixing more amount of atmospheric nitrogen, which could contributed for highest yield.

#### **Total dry matter and harvest index:**

It was noticed that TDM and HI were highest in treatments which received 75% of RDN through chemical fertilizers + 25% RDN through vermicompost (Table 2). These results are in accordance with Pannerselvem (1997). Highest total mean dry matter *i.e.* 5150 kg/ha and highest mean harvest index *i.e.* 57 were produced with treatments which received 75% recommended dose of nitrogen is supplied through inorganic fertilizers and 25% nitrogen is through organic manures that too with vermicompost. This indicates that application of nutrients

through organic and inorganic sources would enable the soil for better productivity.

## REFERENCES

- Antonio, P. Mallarino and Pedro A. (1988).** Grain yield of corn, soybean and oats as affected by crop rotation and nitrogen fertilization for corn general guide for crop nutrient recommendation in Iowa. Publ. Pm- (Rev.). Iowa State Univ. Ext., Ames.
- Nayak, M.P., Vyas, M.D. and Madloi, K.S. (2000).** Efficacy of pendimethalin in soybean. *Indian J. Agron.*
- Pannerselvem, S. (1997).** Effect of organic manure, inorganic fertilizers and weed management practices on the yield and quality of soybean [*Glycine max* (L)] Ph.D. Thesis, Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore.
- Suryaprabha, A.C. and Senthivelu, M. (2007).** Nutrient uptake and yield of soybean [*Glycine max* (L.)] as influenced by clomazone – pendimethaline ready mix. *An Asian J. Soil Sci.*, **2** (1): 9-13.
- Tejada, M., Benitez, C. and Gonzalez, J.L. (2005).** Effects of application of two organic mineral fertilizers on nutrient leaching losses and wheat crop. *American Soc. Agron. J.*, **97** : 960-967.

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