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Effect of integrated nutrient management on quality and economics of soybean

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ABSTRACT

The quality components *viz*. Oil, oil yield, protein and protein yields were found to be superior under potassium and integrated nutrient management over rest other treatments and control. The application of 50 kg N + 75 kg P_2O_5 + 50 kg K_2O + 5 t FYM ha^{-1} was found to be superior over other treatments. The highest gross income (Rs. 36420), net monetary returns (Rs.18210) and B : C ratio (2.00) were observed with the application of 50 kg N + 75 kg P_2O_5 + 50 kg K_2O + 5 t FYM ha^{-1}. Increasing the levels of fertilizer in combination of K_2O and FYM levels enhanced the quality as well as economic of soybean.

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Key words : Integrated nutrient management, Yield, Quality soybean and economic returns, FYM

INTRODUCTION

Soybean [*Glycine max* (L) Merrill] is one of the important pulse and oilseed crops of the world. It becomes miracle crop of twentieth century and designated as "Golden Bean". It has high nutritive value and it is extensively grown verticals of India because of its wider adaptability to agro-climatic condition and high market value.

The crop soybean was introduced in sixties as supplementary oilseed crop to overcome the edible oil shortage in the country. Among all oilseed crops, soybean occupied third position in the edible oil scenario of India. It contains high quality of protein 43.2 per cent and oil 19.5 per cent. It also contains 26 per cent carbohydrates, 4 per cent minerals and 2 per cent phospholipids. (Halvankar *et.al.,*1992) It is rich source of vitamin A,B and D. Being best and cheapest source of high quality protein amongst vegetable and animal protein source. The protein from soybean is equivalent to that of milk product, eggs and meat in quality, hence it is called as "poor man's meat". In coming decades in addition to nitrogenous and phosporic fertilizer, potasisic fertilizers will be used. Nitrogen important role in early growth, green colour and vegetative growth. Phosphorus helps to improve quality of grain and to increase amount of protein in soybean. Potash plays an important role in protein formation in soybean.

MATERIALS AND METHODS

The field experiment was conducted at the Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar during rainy (*Kharif)* 2005 at Director of Farm, 'D' Block, Mahatma Phule Krishi Vidyapeeth, Rahuri. (Maharashtra) The experimental soil was Clayey in texture, contains 0.42% organic carbon, 209.52 kg N, 21.73 kg /ha available P and 313.20 kg/ha available K. The experiment consisted of 8 treatments *viz*., T_1 : Control, T_2 : 50 kg N + 75 kg P_2O_5, T_3 : 50 kg N + 75 kg P_2O_5 + 25 kg K_2O, T_4 : 50 kg N + 75 kg P_2O_5 + 50 kg k_2O, T_5 : 50 kg N + 75 kg P_2O_5 + 25 kg K_2O+ 2.5 t FYM ha^{-1}, T_6 : 50 kg N + 75 kg P_2O_5 + 25 kg K_2O + 5 t FYM ha^{-1}, T_7 : 50 kg N+75 kg P_2O_5 + 50 kg K_2O+ 2.5 t FYM ha^{-1}, T_8 :50 kg N+75 kg P_2O_5 + 50 kg K_2O+5 t FYM ha^{-1} was laid out in Randomized Block Design with 3 replications. The fertilizer dose of NPK and FYM was incorporated at the time of sowing. The seeds were inoculated with *Rhizobium* and PSB culture to all treatments before sowing. Soybean variety DS-228 (Phule Kalyani) was grown on 5th July 2005 sown at spacing of 30x10 cm. The full dose of NPK and organic manure through urea, single superphosphate, muriate of potash and FYM, respectively were applied basally as per treatment at the time of sowing. The grain and haulm were analyzed for nitrogen content by micro-Kjeldhal's method, potassium by flame photometer method and phosphorus was estimated by Vando-molybdate-yellow colour method as per A.O.A.C. (1992) and Jackson (1973), respectively. Protein content (%) was worked out by multiplying N content with 5.71 and protein yield per hectare was calculated by multiplying the protein content with per hectare grain yield of respective treatments. The oil content (%) in grains of soybean was estimated with the help of soxhelt apparatus using ether as solvent for oil extraction. Oil yield per hectare was calculated by

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multiplying oil content with grain yield of respective treatments.

RESULTS AND DISCUSSION

The findings of the present study have been discussed under following heads:

Nutrient content and quality parameter:

There was a significant effect of integrated nutrient management on N,P and K content of both grain and haulm (Table 1). The N, P and K content increased with increase the fertilizer and FYM levels. The application of 50 kg N + 75 kg P_2O_5 + 50 kg K_2O + 5 t FYM ha^{-1} registered the maximum nitrogen concentration in grain (7.07%) and haulm (0.62%), phosphorus concentration in grain (0.66%) and haulm (0.30%) and potassium concentration in grain (0.96%) and haulm (2.96%), respectively. Lowest nitrogen, phosphorus and potassium concentration was recorded in control plot. Nitrogen, phosphorous and potassium content at flowering and harvesting stages were significantly enhanced due to increase levels of fertilizer. Similar, results were also reported by Patel and Chandravanshi (1996). Protein and oil content were well with in the desirable limits in all the treatments and there were no significant difference among integrated nutrient management treatment (Table 1), although it improved with integrated nutrient management the highest protein yield and oil yield of soybean was recorded under 50 kg N+75 kg P_2O_5 + 50 kg K_2O + 5 t FYM ha^{-1}. Protein and oil yield of soybean significantly increased by the combination of inorganic fertilizer along with FYM. Similar results were also reported by Sharma and Dixit (1987)

Table 1 : Effect of integrated nutrient management on nutrient content (%) and quality parameters of soybean

Treatments	Nitrogen		Phosphorus		Potassium		Yield (q/ha)	Oil (%) in grain	Oil yield	Protein (%)	Protein yield
	Grain	Haulm	Grain	Haulm	Grain	Haulm					
T_1 : Control	6.95	0.54	0.55	0.20	0.73	2.80	17.61	18.35	3.23	39.68	6.99
T_2 : 50 kg N+ 75 kg P_2O_5 ha^{-1}	6.98	0.55	0.57	0.22	0.80	2.82	20.93	18.42	3.86	39.85	8.34
T_3 : 50 kg N+ 75 kg P_2O_5 + 25 kg K_2O ha^{-1}	6.99	0.55	0.58	0.23	0.81	2.84	22.03	18.54	4.08	39.91	8.79
T_4 : 50 kg N+ 75 kg P_2O_5+50 kg K_2O ha^{-1}	7.01	0.57	0.59	0.24	0.88	2.85	23.10	18.63	4.30	40.02	9.24
T_5 : 50 kg N + 75 kg P_2O_5 + 25 kg K_2O + 2.5 tonne FYM ha^{-1},	7.03	0.59	0.59	0.26	0.91	2.87	24.45	18.70	4.57	40.14	9.81
T_6 : 50 kg N + 75 kg P_2O_5 + 25 kg K_2O + 5 tonne FYM ha^{-1},	7.04	0.59	0.60	0.27	0.93	2.89	26.33	18.82	4.96	40.19	10.58
T_7 : 50 kg N + 75 kg P_2O_5 + 50 kg K_2O + 2.5 tonne FYM ha^{-1},	7.06	0.60	0.65	0.29	0.95	2.93	26.50	18.93	5.02	40.31	10.68
T_8 : 50 kg N + 75 kg P_2O_5 + 50 kg K_2O + 5 tonnes FYM ha^{-1}	7.07	0.62	0.66	0.30	0.96	2.96	28.01	19.02	5.33	40.36	11.30
SE ± Mean	0.02	0.01	0.01	0.01	0.02	0.01	0.94	0.12	0.19	0.17	0.12
CD (P=0.05)	0.07	0.03	0.03	0.03	0.07	0.03	2.88	N.S	0.47	N.S	0.36

NS=Non-significant

Table 2 : Monetary economic as influenced by various integrated nutrient management treatments

Treatments	cost of cultivation (Rs ha^{-1})	Gross monetary returns (Rs ha^{-1})	Net monetary returns (Rs ha^{-1})	Benefit : cost ratio
T_1 : Control	14020	22893	11115	1.63
T_2 : 50 kg N+ 75 kg P_2O_5 ha^{-1}	16094	27639	12362	1.69
T_3 : 50 kg N+75 kg P_2O_5 +25 kg K_2O ha^{-1}	16277	28639	13570	1.76
T_4 : 50 kg N+ 75 kg P_2O_5+50 kg K_2O ha^{-1}	16460	30030	14633	1.83
T_5 : 50 kg N + 75 kg P_2O_5 + 25 kg K_2O + 2.5 t FYM ha^{-1},	17152	31785	14633	1.85
T_6 : 50 kg N + 75 kg P_2O_5 + 25 kg K_2O + 5 t FYM ha^{-1},	18027	34229	16202	1.90
T_7 : 50 kg N + 75 kg P_2O_5 + 50 kg K_2O + 2.5 t FYM ha^{-1},	17335	34450	17115	1.99
T_8 : 50 kg N + 75 kg P_2O_5 + 50 kg K_2O + 5 t FYM ha^{-1}	18210	36420	18210	2.00
SE ± Mean	-	766	494	0.03
C.D. (P=0.05)	-	2323	1499	0.09

Economics:

Use of no fertilizer was found to be uneconomical and recorded low values of gross returns, net returns and benefit : cost ratio. The gross returns, net returns and benefit : cost ratio increased progressively with increasing levels of FYM from 2.5 to 5 t/ha and K_2O levels 25 to 50 kg/ha.(Table 2) Integrated application of inorganic fertilizer and FYM resulted in better economic returns and benefit : cost ratio. Maximum gross returns of Rs ha^{-1}. 36,420, net returns of Rs ha^{-1} 18,210 and benefit : cost ratio of 2.00 were obtained with application of 50 kg N+75 kg P_2O_5 + 50 kg K_2O in conjuction of 5 t FYM/ha might be due to balanced fertilization.

REFERENCES

A.O.A.C. (1992). *Methods of analysis.* Associastion of official of agriculture chemists 15th Edn. Washington D.C.

Halvankar, G.B., Raut, V.M. and Patil, V.P. (1994). Response of soybean to nitrogen and phosphorus doses. *J. Maharashtra Agric. Univ.,* **19** (2): 198-200.

Jackson, M.L. (1973). *Soil chemical analysis.* Prentice Hall of India Pvt. Ltd, New Delhi, India.

Patel, S.R and Chandravanshi, B.R. (1996). Nitrogen and phosphorus nutrition of soybean (*Glycine max*) grown in vertisol. *Indian J. Agron.,* **41**(4):601-603.

Sharma, R.A. and Dixit, B.K. (1987). Effect of nutrient application on rainfed soybean *J. Indian Soc. Soil Sci.,* **35**(3):452-455

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