

EFFICIENT UTILIZATION OF PHOSPHORUS AND FARMYARD MANURE (FYM) ON PRODUCTIVITY OF SOYBEAN - WHEAT CROPPING SEQUENCE UNDER RAINFED CONDITIONS OF VINDHYAN PLATEAU

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ABSTRACT

Field experiment was conducted during Kharif and Rabi seasons of 1996-97 and 1997-98 at JNKVV, Regional Agriculture Research Station, Sagar (M.P.). Results revealed that higher level of phosphorus (@60 kg P₂O₅/ha) with FYM (@4 tonnes/ha) produced highest seed yield of Soybean during both the years (21.35 and 21.52 q/ha, respectively). As regard wheat production, the residual effect of phosphorus and FYM was prominent during 1996-97, even 4 tonnes FYM/ha without phosphorus also gave wheat yield at par to treatment consisted 60 kg P₂O₅/ha + 4 tonnes FYM/ha. On the basis of mean yield of various treatments 60 kg P₂O₅/ha + 4 tonnes FYM/ha produces highest grain yield (24.22 q/ha) followed by 30 kg P₂O₅ + 4 tonnes FYM/ha (22.91 q/ha), 60 kg P₂O₅/ha + 0 kg P₂O₅ FYM/ha (22.80 q/ha) and 0 kg P₂O₅/ha + 4 tonnes FYM the (22.66 q/ha) as compared to control.

Direct effect of phosphorus also influenced grain production of wheat significantly during both the years and produced grain yield of 20.53 and 27.89 q/ha respectively.

Keywords: Farm yard manure (FYM), Phosphorus, Soybean-wheat, Vindhyan plateau.

INTRODUCTION

Intensive agriculture under the present strategy demands judicious crop and soil management practices to maintain higher production potential. In such system the fertilizer effects must be considered well, as the response to fertilizer applications varies with different crops. Depending upon ecological, edaphic and biotic conditions of the Vindhyan plateau, Soybean-Wheat is by and large the most dominant and stable sequence of the region. The average production of food grains in Vindhyan plateau is 284.35 kg/ha, which is low in comparison to other states. Therefore, new cropping systems for diversification of existing cropping patterns towards more balanced cropping system have become important to increase agricultural production combined with poverty alleviation, meet the ever increasing demand for cereals, pulses and oil seeds etc.

Therefore, the experiment entitled "Efficient utilization of phosphorus and farmyard manure on productivity of soybean-wheat cropping sequence under rainfed conditions of Sagar region" was

conducted due to unbalanced ecology. Studies have shown that the inclusion of legumes in cropping systems improves nitrogen status of soil and helps in increasing the yield of succeeding cereal crops (Balyann, 1990). Studies also revealed that farm yard manure increase the absorptive power of the soil for cations and anions particularly phosphates and nitrate (Dhar, 1953).

MATERIAL AND METHODS

Field experiment was conducted in a split plot design with three replications during 1996-97 and 1997-98 at JNKVV Regional Agricultural Research Station, Sagar (M.P.).

The main plot treatment consisted of phosphorus levels (@ 0, 30 and 60 kg P₂O₅/ha) and farm yard manure (@ 0 and 4 tonnes/ha) and sub plot treatment consisted of phosphorus levels (@ 0, 30 and 60 kg P₂O₅/ha) for wheat on fixed plot technique. Soybean variety JS 335 was sown during Kharif season and recently released wheat variety namely JWS 17 was sown during Rabi season. Nitrogen and potash was given as per

recommendations. The soil type was medium black having 7.4 pH value with an average of 234 kg available N, 8.4 kg available P_2O_5 and 624 kg available K_2O /ha. Pre-sowing irrigation was given after the harvest of soybean for field preparation. FYM was given as per treatment and mixed with soil upto root zone. Rainfall during 1996-97 and 1997-98 was 1021 mm and 938 mm respectively.

RESULTS AND DISCUSSION

Soybean

During 1996-97 (Kharif season) effect of phosphorus and FYM was found significant upto higher level of phosphorus and FYM (@60 kg P_2O_5 /ha + 4 tonnes FYM/ha). Higher level of phosphorus

and FYM gave maximum seed yield (21.35 q/ha) of soybean, which was significantly superior over rest of the treatment, except treatment consisting 60 kg P_2O_5 /ha + 0 tonnes FYM/ha. Similar findings were given in pulses by Dhane *et al.*, (1996).

During 1997-98 (Kharif season) similar trend was also found. Higher level of phosphorus + FYM (@ 60 kg P_2O_5 /ha) of soybean and was found significantly superior over rest of the treatments, except treatment consisting 60 kg P_2O_5 /ha + 0 tonnes FYM/ha. On the basis of two years average 60 kg P_2O_5 /ha + 4 tonnes FYM/ha gave maximum seed yield (21.44 q/ha). Although, treatment consisting 30 kg P_2O_5 /ha + 4 tonnes FYM/ha gave (21.50 q/ha) soybean seed yield and was found

Table -1 : Seed yield of soybean (q/ha) as affected by P_2O_5 and FYM

Treatment	Seed yield (q/ha) 1996-97	1997-98	Average yield (q/ha)
Main Plot treatment			
P_2O_5 (kg/ha) FYM (t/ha)			
P_2O_5 and FYM	19.00	18.87	18.94
0 kg P_2O_5 + 4 tonnes FYM	19.66	19.84	19.75
30 kg P_2O_5 + 0 tonnes FYM	20.17	20.27	20.22
30 kg P_2O_5 + 4 tonnes FYM	20.50	20.51	20.50
60 kg P_2O_5 + 0 tonnes FYM	21.28	21.32	21.33
60 kg P_2O_5 + 4 tonnes FYM	21.35	21.52	21.44
CD at 5%	0.44	0.56	

Table - 2 : Grain yield (q/ha) of wheat as influenced by direct and residual effect of P_2O_5 and FYM

Treatment	Seed yield (q/ha) 1996-97	1997-98	Average yield (q/ha)
Main Plot treatment			
P_2O_5 (kg/ha) FYM (t/ha)			
0 kg P_2O_5 + 0 tonnes FYM	18.26	21.31	19.77
0 kg P_2O_5 + 4 tonnes FYM	19.64	25.68	22.66
30 kg P_2O_5 + 0 tonnes FYM	18.95	23.65	21.30
30 kg P_2O_5 + 4 tonnes FYM	19.42	26.40	22.91
60 kg P_2O_5 + 0 tonnes FYM	18.67	26.93	22.80
60 kg P_2O_5 + 4 tonnes FYM	19.75	28.69	24.22
CD at 5%	0.51	1.19	-
Sub plot treatment			
Phosphorus (kg/ha)			
0	17.62	23.90	20.76
30	19.18	24.54	21.86
60	20.53	27.89	24.21
C.D. at 5%	0.58	1.55	-

comparable to higher level of P_2O_5 and FYM (@ 60 kg P_2O_5 /ha + 4 tonnes FYM/ha). These results were in agreement with those of Gupta *et al.*, (1993).

Wheat

During 1996-97 (Rabi season) residual effect of phosphorus and FYM was also found significant. Treatments consisting of 60 kg P_2O_5 /ha + 4 tonnes FYM/ha, 0 kg P_2O_5 /ha + 4 tonnes FYM/ha and 30 kg P_2O_5 /ha + 4 tonnes FYM/ha were given significantly higher grain yield (19.75, 19.64 and 19.42 q/ha) respectively of wheat than rest of the treatments.

Residual effect of main plot treatment and direct effect of sub plot treatment i.e. 60 kg P_2O_5 /ha was found significantly superior than lower doses. Residual effect of main plot treatment and direct

effect of higher level of phosphorus produced significantly higher grain yield (20.53 q/ha) than lower doses during 1996-97. But during 1997-98 (Rabi season) residual effect of phosphorus and FYM was found significantly than control.

Treatment consisting of 60 kg P_2O_5 /ha + 4 tonnes FYM/ha produced maximum grain yield (28.69 q/ha) and was found significantly superior than lower doses. Higher level of phosphorus produced significantly higher grain yield (27.89 q/ha) than lower levels. The results are in conformity with those of Yodhida (1976).

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REFERENCES

1. Balyan, J.S. Effect of proceedings crop on growth, N concentration and uptake in wheat. *Annals of agricultural research* **11(1)**: 109-112 (1990)
2. Dhane, S.S., Dodake, S.B. and Jadhav, S.N. Evaluation of vermicompost in groundnut production, Maharashtra, India. *Int. Arachis, News*, **16**, 52-53 (1996)
3. Gupta, A. and Govindakrishnan, P.M. Potato in multiple cropping system (In) *Advances in Horticulture*, **7**, Chadha, K.L. and Grewal, J.S. (Eds), 143-156. Malhotra Publishing House, New Deli (1993)
4. Singh, R.P., Das, S.K., Bhaskar Rao, U.M. and Narayana Reddy, M. Towards sustainable dry land agricultural practices: Central Research Institute for dry land agriculture, Hyderabad, 106 (1990)
5. Yodhida, S. Effect of farmyard manure on the nutrition of soybean. *Japanese J. Crop Sci.*, 17-24 (1976)