

Productivity of rice bean as affected by chemical fertilizer and poultry manure

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ABSTRACT

Two sets of experiments were conducted, one at lateritic soil zone and another one at the alluvial soil zone of West Bengal, India during 1998-2000. The result of experiment at the lateritic zone revealed that maximum (1.47 t/ha) seed yield of rice bean was recorded when crop received 20 kg nitrogen, 80 kg P₂O₅ and 40 kg K₂O/ha. From the experiment conducted at the alluvial zone it revealed that rice bean yielded more (1.26 t/ha) than that of blackgram (1.02 t/ha). At the same time maximum seed yield of both ricebean (1.51 t/ha) and blackgram (1.14 t/ha) was recorded when the crop received 50% recommended doses of nutrient applied through chemical fertilizer along with another 50% recommended doses through poultry manure. This was closely followed by that of 100% recommended doses of nutrient through chemical fertilizer (1.15 and 1.39 t/ha in blackgram and ricebean, respectively).

Key Words : Productivity, ricebean, chemical fertilizer, poultry manure

Ricebean variety K-1 is a photosensitive crop. It flowers in December and pod matures in February. It has synchronous habit of pod maturity and has superior in protein content (24.0%) as compared to other kharif pulses like cowpea (23.0), green gram (23.5%), blackgram (25.6%) etc. (Mukherjee and Sarkar, 1991). It has a great promise as a kharif food legume (Nanda *et al.*, 2000). Exploring ricebean as a pulse crop can meet the growing demand for food legume in the country. Poultry manure and phosphorus play an important role in enhancing productivity of ricebean. The present experiment was undertaken to study the effect of poultry manure and phosphorus on the seed yield of rice bean crop.

MATERIALS AND METHODS

Two sets of experiments were conducted. One was at the Red and Lateritic soil zone of West Bengal. The texture of the soil is gravely rocks, pH 5.3, total nitrogen content 0.04%, available phosphorus 13 kg P₂O₅ /ha and available potassium was 246 kg K₂O/ha.

In this experiment inorganic sources of nitrogen (0 and 20 kg/ha), phosphorus (0 and 80 kg P₂O₅/ha) and potassium (0 and 40 kg K₂O/ha) were applied in two different doses.

Eight treatment combinations were arranged in factorial randomised block design with three replications. The crop was sown on 10.3.1998 and 10.3.1999 and harvested on 31.08.98 and 31.08.99.

Another experiment was conducted at the alluvial soil region of West Bengal where soil was sandy loam, pH 6.8, total nitrogen 0.064%, available phosphorus 15.44 kg P₂O₅/ha and available potassium was 104 kg K₂O/ha. The experiment was arranged in split plot design where two crops (C₁ = Blackgram and C₂ = Ricebean) were in the main plot and five manurial doses (F₁ = 100% Recommended doses as chemical fertilizer (RDF), F₂ = 75% RDF + 25% RD as poultry manure (PM), F₃ = 50% RDF + 50% RD as poultry manure and F₅ = 100% RD as PM) were in the sub plot treatments. The crop was sown on 22 July 1999 and 2000 and harvested on 22 October, 1999 and 2000 (for blkgram) and 10 November, 1999 and 2000 (for ricebean crop).

RESULTS AND DISCUSSION

Effect of N, P and K fertilization

Seed yield of rice bean increased due to addition of nitrogen, phosphorus and potassium. The increment of yield due to application of nitrogen and phosphorus was

Table 1. Effect of application of inorganic fertilizer (NPK) on the seed production of rice bean (Mean of 1998 and 1999)

Main effect N, P ₂ O ₅ & K ₂ O (kg/ha)	Seed yield in t/ha	Interaction effect of NPK (kg/ha)	Seed yield (t/ha)			
N ₀	1.07	N ₀ P ₀ K ₀	0.51			
N ₂₀	1.52	N ₀ P ₀ K ₄₀	0.77			
P ₀	1.03	N ₀ P ₈₀ K ₀	0.94			
P ₈₀	1.56	N ₀ P ₈₀ K ₄₀	1.01			
K ₀	1.15	N ₂₀ P ₀ K ₀	0.74			
K ₄₀	1.44	N ₂₀ P ₀ K ₄₀	1.08			
		N ₂₀ P ₈₀ K ₀	1.27			
		N ₂₀ P ₈₀ K ₄₀	1.47			
Effect of	N	P	K	NK	PK	NPK
SEm±	0.058	0.058	0.058	0.083	0.083	0.119
CD (P=0.05)	0.178	0.178	0.178	NS	NS	NS

Table 2. Integrated nutrient management on the seed production of ricebean and blackgram in the alluvial soil zone of West Bengal (Mean of 1999 and 2000)

Fertilizer management	Yield (t/ha)		
	C ₁ = Blackgram	C ₂ = Ricebean	Mean
F ₁ = 100% RDF	1.15	1.39	1.27
F ₂ = 75% RDF + 25% RD as PM	0.97	1.13	1.05
F ₃ = 50% RDF + 50% RD as PM	1.14	1.51	1.33
F ₄ = 25% RDF + 75% RD a PM	1.04	1.27	1.16
F ₅ = 100% RD as PM	0.77	0.99	0.88
Mean	1.02	1.26	1.14
	Crops (C)	Fert. Management (F)	C x F
SEm±	0.015	0.024	0.033
CD (P=0.05)	0.093	0.071	NS

around 50% in both the cases whereas that of potassium was only 25%. The treatment differences due to interactions were not significant. The maximum yield was obtained (1.47 t/ha) when the crop received 20 kg nitrogen 80 kg P₂O₅ and 40 kg K₂O/ha (Table 1). Mukherjee *et al.* (2004) also reported the similar trend of result.

Effect of organic and inorganic manuring

Yield of ricebean (1.26 t/ha) was all the time higher than that of blackgram (1.02 t/ha) irrespective of manurial treatment. Maximum grain yield of ricebean (1.51 t/ha) and blackgram crop (1.14 t/ha) was recorded when the crops received 50% recommended doses of fertilizer (RDF) along with 50% RD as poultry manure (Table 2). This was followed by that of 100% RDF (1.15 and 1.39 t/ha in blackgram and ricebean crops, respectively). Lowest yield in both the crops was recorded when the crops received 100% recommended doses in the form of poultry manure (0.77 and 0.99 t/ha in blackgram and

ricebean crops respectively). Mukherjee (2004) also reported the similar trend of result.

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