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Effect of Phosphorus sources on seed production of rice bean (*Vigna umbellata*) cultivars in red lateritic zones of West Bengal

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ABSTRACT

A field experiment was conducted during August to November, 2002 and 2003 at Farmer's Field near Raghunathpur, West Bengal to study the effect of Phosphorus sources on seed production of rice bean cultivars in red lateritic zones of West Bengal. The cultivars differed for number of pods/m^2, number of seeds/pod, seed yield and seed husk ratio. RBL-35 performed better with a seed yield of 6.37 q/ha. Application of SSP as Phosphorus source gave significantly higher seed yield, number of pods/m^2, number of seeds/pod and pod length over DAP. The interaction effect was found not significant.

Rice bean is normally categorized as an important forage crop not only in the eastern region but also in other parts of the country mainly to meet the fodder requirement during the scarcity period. However, rice bean has great promise as a *kharif* pulse. Besides its high production potentiality the crop has been proved to be superior in quality as compared to other *kharif* pulses like cowpea, green gram and black gram with respect to protein content and disease pest resistance and the synchronous habit of pod maturity (Nanda *et al.,* 2000). It has wide range of soil and climatic adaptability and shown high seed yield potentiality under marginal growing condition (Chandel *et al.,* 1978). Rice bean as a legume crop responds very well to phosphorus application (Mukherjee and Sarkar, 1991; Bhattacharya *et al.,* 1996). But, its yield potentiality differs with cultivars and agro-climatic conditions. In view of this fact, an attempt has been made to study the seed production potential of different rice bean cultivars with phosphorus sources under marginal soil situation of red lateritic zones of West Bengal.

MATERIALS AND METHODS

The experiment was conducted under marginal land situation during August to November, 2003 at Farmer's Field near Raghunathpur, Purulia, West Bengal. The soil of the experimental field was gravely rocky having acidic in reaction (p^H – 5.4) with very poor fertility status containing 0.048% total N, 19.4 kg available P_2O_5/ha and 32 kg available K_2O/ha. The experimental field was laid out in a factorial randomized block design with three replications and eight treatments combination in the plot size of 5m X 3m. The treatments were four cultivars of rice bean *viz.*, LRB–224, RBL–35, LRB–

234 and LRB–197 and two phosphorus sources *viz.*, single super phosphate (SSP) and di ammonium phosphate (DAP) at 80 kg P_2O_5/ha. The cultivars were sown on 20 August at a spacing of 40 cm X 20 cm and harvested on 23 November, 2002 and 2003. 40 Kg K_2O/ha as muriate of Potash (MOP) was applied as basal dose. Equal amount of N added through DAP was also applied as Urea to only SSP treated plots as basal dose. The weeding and thinning operations were done at 15 and 30 days after sowing. Other cultural practices and plant protection measures were taken equally in all plots as and when required. The crop was harvested at full pod maturity stage. At harvest, the biometric observations on pod length and number of seeds/pod were recorded from randomly selected 10 samples along with the number of pods/m^2. The test weight, husk and seed yield were taken from each plot after perfect sun drying.

RESULTS AND DISCUSSION

Effect of Cultivars

The observations reveal that the cultivars differed for number of pods/m^2, number of seeds/pod, seed yield and seed husk ratio. The highest number of pods/m^2 was recorded from RBL–35 (295.80) followed by LRB–234 (253.39) where as LRB–197 recorded the lowest number of pods/m^2. The varietal difference with respect to number of seeds/pod was recorded to be significant. RBL–35 recorded the maximum number of seeds/pod (7.78) although it was at par with LRB–234 (7.75). The cultivars under study did not differ with respect to test weight (Table – 1). However, the highest test weight was found in variety LRB–234 (64.88 g). The yield difference among the varieties was significant. RBL–35 was high yielder (6.37 q/ha) under the prevalent condition. On the other hand, LRB–197 gave the lowest seed yield among all the cultivars under study (3.66 q/ha). The work of Mukherjee *et al.*, (1998) supports the above finding. The highest value of seed husk ratio was also recorded from the cultivar RBL–35, closely followed by LRB–234.

Effect of sources of Phosphorus

So far as sources of phosphorus is concerned, it can be stated that the application of SSP as source of phosphetic fertilizer gave significantly higher seed yield, number of pods/m^2, number of seed/pod and pod length over the application of DAP as P source. This might be due to the fact that the sulphur present in SSP fertilizer would help rice bean crop to nodulate better and in turn better crop growth and higher seed yield was observed. These results are in agreement with the findings of Arya and Singh (1996).

Interaction effect

The interaction between the cultivars and sources of Phosphetic fertilizer was found to be not significant with respect to seed yield and yield attributes in the present study.

So, from the above discussion it can be inferred that RBL–35 cultivar performed better under red latiritic soils of West Bengal when applied with 80 kg P_2O_5/ha as SSP and can be grown as a potential pulse crop in *kharif* season.

Table 1 Effect of sources of phosphatic fertilizer on seed yield and yield attributes of rice bean cultivars (Mean of 2002 and 2003)

Treatment	No. of pods /m^2	Pod length (cm)	No. of seeds/ pod	Test weight (g)	Seed yield (q/ha)	Seed husk ratio
Variety						
LRB-224	226.62	8.23	7.48	64.73	5.06	2.49
RBL-35	295.80	8.63	7.78	64.10	6.37	2.87
LRB- 234	253.39	8.30	7.75	64.88	5.58	2.65
LRB -197	137.71	8.12	6.90	60.07	3.66	2.13
S.Em (±)	3.39	0.13	0.12	1.32	0.14	0.10
CD (P=0.05)	10.29	NS	0.36	NS	0.42	0.30
Sources of P						
80 kg P_2O_5 /ha as DAP	217.62	8.15	7.33	63.98	4.85	2.48
80 kg P_2O_5 / ha as SSP	239.14	8.49	7.63	63.91	5.48	2.58
S.Em (±)	2.40	0.09	0.09	0.93	0.10	0.07
CD (P=0.05)	7.28	0.28	0.26	NS	0.29	NS

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