

## **Yield and phosphorus efficiency of some lowland rice varieties at different levels of soil-available phosphorus**

### **ABSTRACT**

A field experiment was conducted on an Aeric Haplaquept soil to study the effect of phosphorus (P) deficiency in soil on the P nutrition and yield of five modern varieties of rice, viz., Purbachi, BR1, BR3, BR14, and BR29, popular with the rice farmers of Bangladesh. Soil-available P in the different plots of the experimental field varied widely, from 2.8 to 16.4 ppm. This plot to plot variation in soil-available P content resulted from differences in the total amounts (0 to 480 kg ha<sup>-1</sup>) of P the plots had received over a period of 8 years in a long-term P fertilizer trial conducted previously in the same field. Phosphorus deficiency in soil drastically reduced the grain yield of all the rice varieties. In severely P deficient plots, where soil-available P was around 3 ppm, the yield was less than 1 ton ha<sup>-1</sup> while in plots containing an adequate P level, i.e., >6 ppm, the yield was more than 4 t ha<sup>-1</sup>. Rice yield increased linearly with an increase in soil P content up to 6 ppm, and the highest grain yield for any variety, obtained at 6-7 ppm of soil-available P leveled off at this point. Soil P deficiency not only decreased rice yield severely but also decreased P content in straw and grain drastically. However, differences among rice varieties were noted in P nutrition, particularly at low soil P levels. The rice varieties differed markedly also in respect of internal P efficiency. The BR29 showed the highest internal P efficiency both at low and high soil P levels. In all the rice varieties, internal P efficiency decreased with an increase in soil P levels.

**Keyword:** Phosphorus; Rice; Soil fertility; Yield response