

Phosphorus Deficiency Tolerance Mechanisms of Selected Sri Lankan Rice Varieties

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Phosphorus (P)-deficiency in soil is one of the major problems in rice (*Oryza sativa* L.) cultivation. Modern improved high-yielding rice varieties are highly responsive to P and rely on high input of P fertilizer. Genetic variation is responsible for the differences in tolerance to P-deficiency. The gene, PSTOL1 is known to improve P-deficiency tolerance in rice, particularly in upland conditions. It has been found that some of the Sri Lankan rice varieties carry the PSTOL1 gene. However, the effect of PSTOL1 gene on improving P nutrition of Sri Lankan rice varieties with (+) and without (–) PSTOL1 background under lowland conditions is not known. Therefore, this study was conducted to examine the P nutrition of selected PSTOL1 (+) and (–) Sri Lankan rice varieties to take-up and use P under low-P soil conditions. Study included eight local (Bg94-1, Bg300, Bg304, Bg358, At402, Bw400, Bg450 and Bw272-6B) and two international standard varieties (Kasalath and Nipponbare with PSTOL1 (+) and (–) backgrounds, respectively). Results revealed similar P-use efficiency and root diameter among the varieties at low-P condition. Shoot P content, shoot dry weight, photosynthetic rate, and total root length of the plants were higher in PSTOL1 (+) varieties (Bg94-1, Bg300, Kasalath, Bg304) and PSTOL1 (–) rice varieties (Bw400 and Bw272-6B) at low-P condition. Moreover, when comparing varieties, Bg94-1, Bg300 and Bw400 well performed at low-P condition. The results conclude that the PSTOL1 gene may not be a major contributor to take up and/or use P efficiently at low-P lowland soil conditions of tested Sri Lankan rice varieties.

Keywords: Adaptations, PSTOL1

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