

Overexpression and characterization of rice *Phosphorus-Starvation Tolerance 1* gene and its sorghum and maize homologs in transgenic tobacco

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Low phosphorus (P) availability in soil is a major constraint for crop production in tropical regions. Rice *Phosphorus-Starvation Tolerance 1* gene (*OsPstol1*) encodes a protein kinase involved in processes that enhance root surface, P acquisition and grain yield under P deficiency. *OsPstol1* homologs were identified in sorghum and maize by association and QTL mapping, respectively. To validate the function of these genes we overexpressed them in tobacco and evaluated the phenotypes under P deficiency. Rice *OsPstol1* (control) and its maize (*ZmPstol3.06*, *ZmPstol8.02* and *ZmPstol8.05_1*) and sorghum (*Sb07g002840*, *Sb03g031690* and *Sb03g006765*) homologs were cloned downstream of ubiquitin promoter in pMCG1005 vector, using *Bar* gene as a selective marker. Tobacco *Petit havana* plants were genetically transformed via *Agrobacterium tumefaciens* EHA101 strain and regenerated from selected callus in shooting and rooting medium. Fragments of the *Bar* gene (~400 bp) and *Pstol1* gene (~700 bp) were amplified by PCR confirming integration of respective genes in the transformed plants. Several plants presented one copy of the transgene, and those that also showed overexpression of the transgene were selected for evaluation under low P conditions. Overexpression of *Pstol1* genes significantly enhanced vegetative plant growth and root surface area on low P, indicating that these genes act in a similar manner to *osPstol1* gene in rice plants. These transgenic tobacco plants are going to be analyzed for P acquisition efficiency and grain yield under low P conditions.

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