OVEREXPRESSION OF MAIZE AND SORGHUM PHOSPHORUS-STARVATION TOLERANCE 1 GENES ENHANCE VEGETATIVE GROWTH AND ROOT SURFACE AREA IN TRANSGENIC TOBACCO

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Low phosphorus (P) availability in the soil is a major constraint for crop production, especially in tropical regions. *Phosphorus-Starvation Tolerance 1* gene (*OsPstol1*) encodes a protein kinase that enhances root surface area, P acquisition and grain yield under P deficiency in rice. *OsPstol1* homologs were identified in sorghum and maize by association and QTL mapping. In order to validate the function of these genes we overexpressed them in tobacco and evaluated their 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 the pMCG1005 vector with *Bar* 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. Integration of *Bar* and *Pstol1* genes in tobacco genome was confirmed by PCR with specific primers. Several events presented one copy of the transgene, and those that also showed medium and high transgene expression were selected for generation of homozygous transgenic lines. The homozygous transgenic plants were grown for ~60 days in ½ MS medium with low and high P under controlled conditions. The *Pstol1* transgenic plants presented higher vegetative growth and root surface area under controlled conditions with low and high P when compared with plants transformed with pMCG1005 (empty vector). Our results indicated that *Pstol1* homologs have a similar role as Os*Pstol1* gene in rice plants and have potential to enhance P acquisition and yield in different species.

Keywords: *P efficiency, root, transformation, overexpression, transgenic*