Improving phosphate acquisition in white clover by transgenic expression of *MtPAP1* and *MtPHY1*

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Phosphate, a key substrate in biological activities, is one of the least available macronutrients restricting crop production in many ecosystems since the majority of the soil phosphorus is immobilized and not ready for plant uptake. This issue, plus the problem of eutrophication resulting from phosphate pollution in certain areas, makes it particularly important to develop crops with the ability of utilizing soil organic phosphate as phosphorus resource. Two genes, a purple acid phosphatase (*MtPAP1*) and a phytase (*MtPHY1*) were isolated from *Medicago truncatula* and cloned into a binary vector, pCAMBIA3301, under the control of the constitutive CaMV35S and the root-specific MtPT1 promoters. Transgenic expression of the genes in Arabidopsis resulted in improved utilization of organic phosphorus in the rhizosphere. These gene constructs were used for *Agrobacterium*-mediated cotyledon transformation of white clover (*Trifolium repens* L.), which is one of the most nutritious and widely distributed forage legumes worldwide. Totally, more than 30 transgenic plants were produced and about half of them showed expression of the MtPAP1 and MtPHY1 genes. The individual plants with high expression levels of the transgenes are being used for further analyses regarding phosphate acquisition from soil.