Poster

# P stress-induced changes in plant root exudation facilitate P mobilization from stable mineral forms

Santoro V., Schiavon M., Said Pullicino D., Martin M., Celi L.
DISAFA, Università degli Studi di Torino, Largo Paolo Braccini 2, 10095 - Grugliasco (TO)

Phosphorus (P) is one of the essential elements that plants require to develop and function. Much of the P in agricultural soils is not bioavailable after application due to reactions as soil adsorption, precipitation and coprecipitation, making P one of the most immobile, inaccessible, and unavailable among all nutrient elements. In addition, 20 to 80% of the total soil P is present as organic P, which can undergo the same interactions with soil colloids as Pi, leading to the retention of a potentially important source of P for plant nutrition. Plants have evolved many strategies to cope with P deficiency, aimed at increasing P acquisition in the soil and optimizing P internal use. Recent studies have indicated a role for strigolactones (SLs) as molecules able to trigger morphological, physiological and biochemical responses in response to P deficiency conditions. In this study, we evaluated the ability of wild-type (WT) and SL-depleted (SL-) tomato plants grown under variable P availability conditions to mine P allowing for nutrient uptake and utilization. We performed a hydroponic experiment in which P was provided as Pi, soluble myo-inositol hexaphosphate (myoInsP6) and as the coprecipitated form of these two P compounds. We measured the plant biomass, P, N, C and Fe content, and root enzymatic activity. Root exudates were characterized for DOC content and degree of aromaticity, and proton and organic acid (OA) anion exudation. When P was provided to as the coprecipitated form of myoInsP6, both genotypes were scarcely able to use it, possibly due to the inhibition of phytases already reported for myoInsP6 adsorbed on the surface of Fe oxides, even if their activity was greatly stimulated. A similar but less pronounced inability to take up P was observed with coprecipitated Pi. Both genotypes were instead able to acquire P from soluble myoInsP6, and SL- plants exhibited unregulated P acquisition capacity under all P treatments, confirming the central role of SLs in P acquisition. The comparable decrease of the solution pH in the presence of soluble myoInsP6 indicated that the type of provided P can prevail over SL control in the establishment of this specific response. Finally, OA exudation was higher in WT than in SL- plants and was triggered by the absence of P rather that its scarce availability.
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