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Molecular Characterisation of Silicon-Induced Resistance in Potato against Bacterial Wilt

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Abstract

Bacterial wilt caused by *Ralstonia solanacearum* attacks more than 200 crop species, among them important *Solanaceae*. The soilborne pathogen is widespread in tropical and subtropical areas and causes devastating losses. Host plant resistance as a control strategy has not been successful so far, either because germplasm resistance is not stable or/and because of high genetic diversity within the *R. solanacearum* species complex. Alternatively, integrated disease management is considered as a promising strategy to be exploited. We are studying the role of silicon (monosilicic acid) amendment in the potato (*Solanum tuberosum* L.) × *R. solanacearum* interaction as a potential element of such a strategy. We have previously shown by gene expression profiling that silicon was able to induce defense-related genes and to subsequently reduce disease incidence in tomato (*Lycopersicon esculentum* Mill).

Silicon application led to reduced disease incidence in two moderately resistant potato genotypes, but not in a susceptible one. Our main focus is now referred to the kinetic of the phenylpropanoid metabolism in both roots and stems in a time frame of 24–120 hours post inoculation. Phenylalanine ammonialyase (PAL) activity and total soluble phenols are being measured in both plant organs. Recently, in collaboration with Max-Planck Institute for Molecular Plant Physiology (Golm, Potsdam, Germany) we initiated a metabolomic approach by using gas chromatography coupled to mass spectrometry (GC-MS) in an attempt to correlate the profile of secondary metabolites (phenylpropanoid metabolism) as well as other defense-related metabolites to the resistance reaction of our pathosystem after induction through silicon application. Preliminary results showed no role of silicon in PAL activity in inoculated plants of a moderately resistant potato genotype. Additionally, we used three monoclonal antibodies against pectic polysaccharides of the cell walls (JIM7 and JIM5, recognising high and low esterification levels of homogalacturonan, respectively) and arabinogalacatan proteins to study the involvement of the cell wall in the resistance reaction. Preliminary results from these antibodies showed a relation between high esterification level and arabinogalactan proteins with the level of resistance.

Keywords: Bacterial wilt, induced resistance, potato, *Ralstonia solanacearum*

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