Differential Gene Expression Profile between Resistant and Susceptible Tomato Genotypes in Response to Tomato-Potato Psyllid (*Bactericera cockerelli*) Infestation
Poster Number: 287

Friday, August 03, 2018
01:15 PM - 02:00 PM
Washington Hilton - International Ballroom East/Center

The tomato-potato psyllid (TPP), *Bactericera cockerelli*, vectors the phloem-limited bacteria *Candidatus Liberibacter solanacearum* (Lso), the causative agent of economically important plant diseases in Solanaceae species including the tomato vein-greening and potato zebra chip. The TPP has the ability to produce a three-pronged damage to its host plant. The TPP punctures the vascular bundles, secretes toxic saliva into the host, and vectors the disease-causing Lso bacterium. In response, the host plant deploys multiple layers of defense against the invading pest-pathogen complex. The objective of this study was to identify differentially expressed genes associated with host plant resistance reaction and to determine the role of Lso in the plant-insect interaction. Insect-resistant (*Solanum habrochaites* RIL) and susceptible (*S. lycopersicum* cv CastleMart) genotypes were mock-inoculated or infested with Lso positive TPP-Lso(+), negative TPP-Lso(-) insects. After 48-hrs, plant tissue was collected for RNAseq analysis. Differentially expressed genes (DEG, log2FC ≥ 2 and P-value ≤ 0.05) were identified between insect treatments and genotypes. Thirteen genes were uniquely up-regulated in the insect-resistant plants, but downregulated in susceptible plants when infested with Lso(-) psyllids. However, only one gene was up-regulated in resistant plants and down-regulated in susceptible plants when plants were infested with Lso(+) psyllids. In the other hand, a total of 20 genes were uniquely down-regulated in resistant genotype while up-regulated in susceptible plants independently of Lso. Orthologues of these genes were mapped to determine putative molecular function and biological processes associated with plant defensive signaling. DEG included transcripts associated with catalytic activity (46%), binding activity (33%), transporter activity (12%), receptor activity (3%), antioxidant activity (2%), signal transducer activity (2%), and structural molecular activity (2%). Moreover, plant-defensive hormone salicylic acid (SA) is up-regulated in both resistant and susceptible plants when infested with TPP-Lso(+), but only in resistant plants when infested with TPP-Lso(-) insects. Taken together, these results suggest that different resistance and susceptibility factors are involved in regulating plant responses to TPP. Furthermore, Lso may play an indirect role by either enhancing or eliciting additional plant resistance responses against the psyllid.

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