

Tissue-specific transcriptional responses of the potato psyllid related to the horizontal and vertical transmission of the bacterial pathogen causing zebra chip disease of potato

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The potato psyllid, *Bactericera cockerelli* (Hemiptera: Triozidae), is the insect vector of the fastidious alpha-proteobacterium "*Candidatus Liberibacter solanacearum*" (Lso). This bacterial pathogen causes diseases in several solanaceous crops, including zebra chip, an economically important disease of potato in United States, Mexico, Central America, and New Zealand. Lso is transmitted in a persistent propagative manner by *B. cockerelli* where it infects and multiplies in the digestive track, reproductive organs, and salivary glands of its insect vector. Lso infection of the reproductive organs of *B. cockerelli* is hypothesized to be a pre-requisite for transovarial transmission of the pathogen to the insect offspring. It has been previously shown that Lso has a detrimental effect on the fecundity and nymphal survival rate of *B. cockerelli*. To better understand the molecular bases of these biological consequences in the insect vector due to the bacterial infection, we have conducted a tissue-specific transcriptome analysis of *B. cockerelli* organs involved in the horizontal and vertical transmission of Lso. Total RNA was extracted from pools of dissected salivary glands and ovaries from non-infected (Lso-) and infected (Lso+) insects using three biological replicates. Libraries were prepared and sequenced using poly-A enriched RNA coupled with Illumina Hi-Seq technology. Bioinformatics analyses are being conducted to identify the transcriptional changes in these insect tissues in response to the bacterial infection. Identification of responsive candidate genes from *B. cockerelli* is expected to increase our understanding of a vector-bacteria interaction that results in some detrimental effects to the insect host and might ultimately aid in the development of novel control strategies to mitigate losses caused by this economically important pathosystem.

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Developing methods to determine relative infectivity/virulence (= efficacy) of selected insect pathogenic fungi for ACP using spray exposure bioassays

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As a part of an integrated pest management program and in an attempt to manage populations of *D. citri*, a screening method has been developed to determine the efficacy of commercial entomopathogenic fungi in the Lower Rio Grande Valley. Previous programs, such as the control of sweet potato whitefly, have shown the value of mycoinsecticides in IPM programs, and many of the current commercially available mycoinsecticides are products of these programs. Nevertheless, few have been tested for efficacy against *D. citri*, therefore, this project aims to produce several candidates for field trials under conditions that are highly transferrable to field application. Protocols have been established to screen primary and secondary acquisition of adult *D. citri*, and primary acquisition by *D. citri* nymphs, in an effort to determine the impact of each acquisition method in the field. Likewise, the design and manufacturing of a Potter's spray tower and calibration of the apparatus to administer a spore deposition rate reflective of observed field application rates further increases the transferability of the collected data to field trials. Thus, in combination with climate parameters adherent to observed climate data for the Lower Rio Grande Valley, this study aims to elucidate the expected outcome of the selected mycoinsecticides in future field trials for the management of *D. citri* populations.