

8.8

Modulation of plant defense responses by Salicylate hydroxylase of *Candidatus Liberibacter asiaticus*

Trivedi, P. and Wang, N.

Citrus Research and Education Center, Department of Microbiology and Cell Science, University of Florida, 700 Experiment Station Road, Lake Alfred 33850, U.S.A. Corresponding author: nianwang@ufl.edu

Citrus huanglongbing (HLB) associated with the pathogen *Candidatus Liberibacter asiaticus* (Las) is a devastating disease for the US citrus industry (1, 2). To gain knowledge on the mechanism(s) by which Las evades host defense responses, we first expressed salicylate hydroxylase (*sahA*) of Las in *Escherichia coli*. Our data indicate that Las encodes a functional salicylate hydroxylase, which converts salicylic acid (SA) into catechol, a product that does not induce resistance. The *sahA* gene was highly induced *in planta* compared to psyllid vector suggesting its important role in disease progression. To determine expression level of defense related genes after Las infection, *Xanthomonas axonopodis* pv. *citri* strain A^w (Xac A^w) was used to induce *PR* gene expression. The *PR-1* gene expression in Xac A^w-challenged plants, which were previously infected with Las, was lower than Xac A^w-challenged healthy plants. Using SA biosensor strain (*Acinetobacter* sp. ADPWH_lux), 4 fold reduction in SA accumulation was observed in the Las-infected as compared to healthy plants. To understand a possible synergistic effect of the presence of Las on the citrus canker [caused by *X. citri* subsp. *citri* (Xcc)] we inoculated Xcc in Las-infected and healthy leaves of grapefruit. The population levels of Xcc were significantly higher during all the observation time points (up to 14 days) in Las-infected as compared to healthy citrus indicating that modulation of SA production and subsequent regulation of defense related genes such as *PR-1* gene could be one of the mechanisms deployed by Las to evade plant defense responses. The Las-infected plants compromised with defense responses could further succumb to the infection by other pathogens. We also conducted experiments to restore the SA level in Las infected plants using SA hydroxylase inhibitors and test their effect in controlling HLB.

References

Bové, JM. Huanglongbing: A destructive, newly-emerging, century-old disease of citrus. 2006. *Journal of Plant Pathology*, 88 (1), 7-37.

Gottwald, TR, da Graça, JV, and Bassanezi, RB. 2007. Citrus Huanglongbing: The pathogen and its impact. Online. *Plant Health Progress* doi:10.1094/PHP-2007-0906-01-RV.