

## Insights into Insect Vectors: Liberibacter Interactions

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**Abstract :** The citrus greening disease, also known as Huanglongbing, caused by the phloem-limited bacterium *Candidatus Liberibacter asiaticus* (CLas) has resulted in tremendous losses and the death of millions of citrus trees worldwide. CLas is transmitted by the Asian citrus psyllid (ACP) *Diaphorina citri*. The closely-related bacterium *Candidatus Liberibacter solanacearum* (CLso), which is associated with vegetative disorders in carrots and the zebra chips disease in potatoes, is transmitted by other psyllid species including *Bactericera trigonica* in carrots and *B. ckockerelli* in potatoes. Chemical sprays are currently the prevailing method for managing these diseases for limiting psyllid populations; however, they are limited in their effectiveness. A promising approach to prevent the transmission of these pathogens is to interfere with the vector-pathogen interactions, but our understanding of these processes is very limited. CLas induces changes in the nuclear architecture in the midgut of ACP and activates programmed cell death (apoptosis) in this organ. Strikingly, CLso displayed an opposite effect in the gut of *B. trigonica*, showing limited apoptosis, but widespread necrosis. Electron and fluorescent microscopy further showed that CLas induced the formation of Endoplasmic reticulum (ER) inclusion- and replication-like bodies, in which it increases and multiplies. ER involvement in bacterial replication is hypothesized to be the first stage of an immune response leading to the apoptotic and necrotic responses. ER exploitation and the subsequent events that lead to these cellular and stress responses might activate a cascade of molecular responses ending up with apoptosis and necrosis. Understanding the molecular interactions that underlay the necrotic/apoptotic responses to the bacteria will increase our knowledge of ACP-CLas, and BT-CLso interactions, and will set the foundation for developing novel, and efficient strategies to disturb these interactions and inhibit the transmission.

**Keywords :** Liberibacter, psyllid, transmission, apoptosis, necrosis

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