

Cross-kingdoms Interactions: Symbiotic bacteria- insect- plant virus-plant

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The whitefly *Bemisia tabaci* is a polyphagous insect pest that transmits over 100 plant viruses, of which *Tomato yellow leaf curl virus* (TYLCV) (*Geminiviridae*: begomovirus) is the most devastating to tomato crops worldwide. TYLCV is exclusively transmitted by *B. tabaci* in a persistent circulative manner. Previous research in our lab demonstrated that the insect facultative endosymbiont *Hamiltonella* is implicated in the transmission of TYLCV. *B. tabaci* individuals free of this bacteria are less efficient vectors for TYLCV. Our recent results indicate that *Rickettsia*, another secondary endosymbiont of *B. tabaci*, may also influence TYLCV-*B. tabaci* interactions. Unlike most of the known secondary endosymbionts in *B. tabaci*, which are confined to a specialized organ called bacteriome, *Rickettsia* occupies most of the body cavity of the insect, including organs implicated in the virus transmission. We used Fluorescence in-situ hybridization (FISH) and qPCR to investigate the influence of *Rickettsia* on TYLCV transmission. TYLCV transmission results by *B. tabaci* *Rickettsia*-infected and uninfected iso-female strains showed higher abilities of the infected population to transmit the virus. Furthermore, the virus was acquired more efficiently by *Rickettsia*-infected whiteflies compared to uninfected ones. TYLCV Transmission experiments conducted with *B. tabaci* populations derived from two different *B. tabaci* species found in Israel that differ in genetic background, bacterial endosymbionts composition and resistance to insecticides, indicated that infection with *Rickettsia* improves transmission abilities, regardless of the other factors. Future research will focus on further investigating *Rickettsia*-TYLCV interactions within *B. tabaci* and the implications of these interactions on virus retention and transmission in the whitefly. These studies will assist in the identification of key factors related to virus transmission that could be employed in the prevention of the transmission.