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Authors

Stelinski, Lukasz L.
Mann, Rajinder S.
Ali, Jared G.
[et al.](#)

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5.2

Induced release of a plant-defense volatile ‘deceptively’ attracts insect vectors to plants infected with a bacterial pathogen

Stelinski, L.L.¹, Mann, R.S.¹, Ali, J.G.¹, Hermann, S.L.¹, Tiwari, S.¹, Pelz-Stelinski, K.S.¹, and Alborn, H.T.²

¹University of Florida, Entomology and Nematology Department, Citrus Research and Education Center, 700 Experiment Station Road, Lake Alfred, FL, 33850, USA

²Center for Medical, Agricultural, and Veterinary Entomology, Agricultural Research Service, U.S. Department of Agriculture, Gainesville, FL 32608, USA

In this investigation, we experimentally demonstrated specific mechanisms through which a bacterial plant pathogen induces plant responses that modify behavior of its insect vector. *Candidatus Liberibacter asiaticus*, a fastidious, phloem-limited bacterium responsible for causing huanglongbing disease of citrus, induced release of a specific volatile chemical, methyl salicylate, which increased attractiveness of infected plants to its insect vector, Asian citrus psyllid (*Diaphorina citri*), and caused vectors to initially prefer infected plants. However, the insect vectors subsequently dispersed to non-infected plants as their preferred location of prolonged settling because of likely sub-optimal nutritional content of infected plants. The duration of initial feeding on infected plants was sufficiently long for the vectors to acquire the pathogen before they dispersed to non-infected plants, suggesting that the bacterial pathogen manipulates behavior of its insect vector to promote its own proliferation. The behavior of psyllids in response to infected versus non-infected plants was not influenced by whether or not they were carriers of the pathogen and was similar under both light and dark conditions. Feeding on citrus by *D. citri* adults also induced the release of methyl salicylate, suggesting that it may be a cue revealing location of conspecifics on host plants. Collectively, our results suggest that host selection behavior of *D. citri* may be modified by bacterial infection of plants, which alters release of specific headspace volatiles and plant nutritional contents. Furthermore, we show in a laboratory setting that this apparent pathogen-mediated manipulation of vector behavior may facilitate pathogen spread.

References

Mann, R.S., J.G. Ali, S.L. Hermann, S. Tiwari, K.S. Pelz-Stelinski, H.T. Alborn, and L.L. Stelinski. 2012. Induced release of a plant defense volatile ‘deceptively’ attracts insect vectors to plants infected with a bacterial pathogen. *PLoS Pathogens*. 8(3): e1002610.