ICE2024 XXVII International Congress of Entomology
New Discoveries through Consilience
Dates : August 25[sun] - 30[fri], 2024
Venue : Kyoto, Japan [Kyoto International Conference Center]

Presentation information

Symposium

14. Pest Management

[14-5] Insect vectors of plant pathogens: the biology of epidemics and development of public policy

Mon. Aug 26, 2024 9:45 AM - 11:45 AM Annex Hall2

Chair: Andres Antolinez (Cornell University), Monique Rivera (Cornell University)

11:15 AM - 11:30 AM

[14-5-06] Intruding into a conversation: harnessing vibrational communication for interfering with *Xylella fastidiosa* transmission

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The introduction of the vector-borne bacterium *Xylella fastidiosa* in Southern Italy caused unprecedented ecosystem perturbation, economic losses, and social turmoil. Long-term sustainable approaches to contain the bacterium spread by controlling the bacterial vector *Philaenus spumarius* are urgently needed. Manipulation of insect vectors' communication with the surroundings during crucial steps of their life cycle could represent an efficient and environmentally safe alternative option to more impactful management strategies. Insects' communication is multimodal, and mainly based on chemical signals, i.e. semiochemicals, and physical signals, i.e. visual stimuli and air-borne and substrate borne vibrations. Currently, behavioral manipulation strategies are mostly based on semiochemicals and visual cues; substrate-borne vibrations, a widespread form of communications among different insect *taxa*, has received little attention. Mating behavior is the best-studied function of vibrational communication, although several other functions have been described, as attraction, alarm, defense, cooperation, and adult/progeny communication. Intruding into insects' vibrational communication might translate into significant alterations of insect vectors behaviors crucial to the insect-plant-bacterium interaction. Therefore, we conducted behavioral tests aimed at characterizing the impact of the playback of intra-specific and incidental substrate-borne vibrations on the dynamics of *X. fastidiosa* transmission by *P. spumarius*. For the intra-specific vibrations, we evaluated all the wide spittlebug vibrational repertoire, i.e. male and female courtship signals, male-male interaction signal, and female rejection signal, besides a narrow-band noise ranging in the frequency span of spittlebug signals (150-1200 Hz) and covering all

the harmonics. For incidental vibrations, we characterized the substrate-borne signals produced during the interaction between spittlebug adults and erratic spiders' species collected in Apulian olive orchards; vibrations associated with spiders foraging and causing freezing and jumping responses by spittlebugs were used for the behavioral trials. First, combing Ethovision-assisted choice-tests and Electrical Penetration Graph (EPG)-assisted probing behavioral observations, we characterized whether intra-specific and predator-associated vibrations transmitted on periwinkle plants via LRA (linear resonant actuators) affect the host selection and the probing patterns conducive to acquisition and inoculation of the fastidious bacterium. Thereafter, we evaluated the influence of the playback of vibrations on the *X. fastidiosa* acquisition from infected periwinkle plants, and the inoculation to healthy plants. Here we discuss the results of the behavioral and transmission trials, besides further research lines aimed at testing the feasibility of harnessing spittlebug vibrations as attractant for natural enemies.