

Vibrations to manipulate pest behaviours: new frontiers in pest control

Problem

Many insect pests do not (or partially) rely on odours for finding a mate, so pheromones and other chemical stimuli are ineffective for their management.

Solution

Vibrational signals (VS) play a crucial role in the mating of these species and can provide effective and sustainable control strategies to manipulate pest behaviours.

Benefits

The use of VS for pest control reduce pest populations, are safe (for humans and ecosystems) and are well-accepted by consumers.

Practical recommendation

- VS can be used to manipulate pest behaviours such as landing on the plant, mating, and feeding (Picture 1). Moreover, VS do not harm beneficial insects as they are tailored to a specific pest.
- VS mating disruption is a feasible control against grapevine leafhoppers, given that trellis systems are excellent for transmitting vibrations.
- VS can be applied within any crop by installing poles and wires connected to the VS exciter and a solar panel as an energy source (Picture 2).
- Novel VS pest control strategies for citrus groves are under development at CIHEAM Bari. VS are transmitted to plants by wires to reduce mating and settling of the whitefly pest *Alerocanthus spiniferus*.
- A VS trap is under development for monitoring the stinkbug *Halyomorpha halys* within economically important fruit groves (i.e., apple, pear and nut orchards). The device only needs to be placed in strategic spots in the field and will soon be available on the market.
- VS devices can be set up in the orchard either *de novo* or by adjusting the system according to farmers' needs.
- Vibrational devices will soon be integrated into the farmers' toolbox for pest control, providing sustainable control techniques compatible with other organic approaches (i.e., biocontrol agents). Indeed, farmers should stay tuned and keep in contact with VS pest control providers.

Applicability box

Theme

Crop production, environment and society

Context

Global, Mediterranean basin

Application time

During the cropping season but may depend on the species and scenario

Required time

From six months to one year

Period of impact

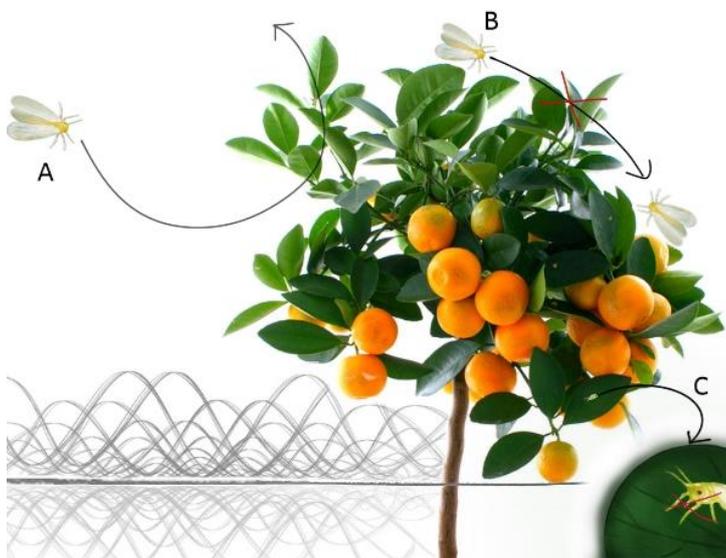
Less than one year

Equipment

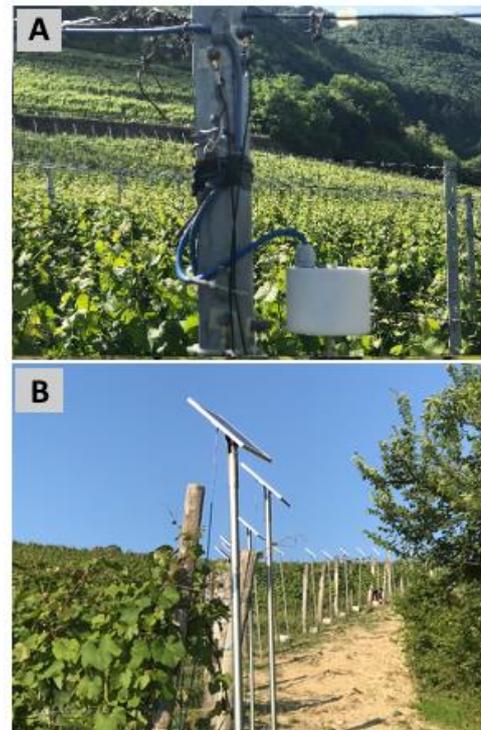
Vibrational devices (i.e., piezo-buzzers, metal wires, exciters, trellis systems, etc.)

Best in

Cropping systems ravaged by pests communicating by means of vibrations (i.e., hemipterans but not exclusively)



Picture 1: Vibrational approaches for pest management. A) VS to reduce pest landing and permanence on the plant; B) vibrational mating disruption; C) vibrational disruption of feeding behaviours. Credit: Sabina Avosani, CIHEAM Bari.



Picture 2: A) Device transmitting VS along the vibrational vineyard set in northern Italy to control grapevine leafhoppers; B) Solar panels providing energy to the vibrational devices. Credit: Fondazione Edmund Mach and Biogard® (Italy).

Further information

Further reading

- Polajnar, J., Eriksson, A., Lucchi, A., Anfora, G., Virant-Doberlet, M. and Mazzoni, V. (2015). Manipulating behaviour with substrate-borne vibrations – potential for insect pest control. *Pest. Manag. Sci.*, 71: 15-23. <https://doi.org/10.1002/ps.3848>

Weblinks

- Check the [Organic Farm Knowledge](#) platform for more practical recommendations.
- [Vibrational mating disruption](#) for grape leafhoppers control. AGRO electronics.

About this practice abstract and CIHEAM Bari

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