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BOOK OF ABSTRACTS



Mating behavior and vibrational communication of the meadow spittlebug *Philaenus spumarius*

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Highlights

- Intra-specific communication in *P. spumarius* is mediated by substrate-borne signals
- Males use a call and fly strategy to enlarge their search of mates

Introduction

Xylella fastidiosa is a xylem-limited bacterium that causes economically important diseases, including Pierce's disease of grapevine (Janse and Obradovic, 2010). In southern Italy, the *X. fastidiosa* subsp *pauca* strain is associated with the quick decline syndrome of olive (QDSO). The meadow spittlebug *Philaenus spumarius* has been identified as a vector of *X. fastidiosa* in southern Italy (Cornara et al., 2016). Our aim is to provide essential information on the reproductive behaviour of *P. spumarius* which could be basic to develop, in the future, more environmentally friendly control practices. Mate recognition and localisation in 'Auchenorrhyncha' are mediated via vibrational signals transmitted through the substrate (Virant-Doberlet and Čokl, 2004). We investigated the vibrational communication of the spittlebug to determine the role of substrate-borne vibrational signals in intra-specific communication and pair formation of this species.

Material and methods

Nymphs of *P. spumarius* were collected in April 2017 from fields in Valenzano (Apulia, Southern Italy) and then transported to a climatic chamber at the Fondazione Edmund Mach (Trentino, Northern Italy). All nymphs were reared in Plexiglas cages at 25±1°C, 65±5 % relative humidity, and 16:8 (L:D) photoperiod. The cages contained plants of *Trifolium repens* and *Convolvulus arvensis*. Rearing cages were checked every day and adult males and females were removed from the nymphal culture on the day of eclosion and kept separated by gender and age to obtain virgin individuals. To describe the mating behaviour, single males and pairs were isolated on potted *Agropyrum repens* plants included in a Plexiglas box and recorded with laser vibrometer (Ometron VQ-500-D-V). Trials were performed using (i) individuals and (ii) pairs of one male and one female. To study the daily pattern of male calling activity, the trials were performed at: early morning (08:00–10:00 h), late morning (10:00–12:00 h), afternoon (13:00–15:00 h), early evening (15:00–17:00 h) and late evening (17:00–19:00 h). The emission of vibrational signals and the behavior of the insects were observed for a maximum of 30 minutes.

Results and discussion

21.4 % of *P. spumarius* virgin males emitted calling signals spontaneously within 10-30 minutes of being placed on a plant. The male activity is not influenced by photoperiod, being the percentage



of calling males not different across the day periods. In the absence of a female response, males either remained stationary or jumped off the plant thus showing a typical call & fly behaviour. When a male arrived at a short distance from the female, long and rapid pulse trains were emitted, characterised by a temporal pattern different from the calling signal. Virgin females did not respond to male signals until they reached sexual maturity; however, they were never observed to emit vibrational signals. The non-receptive female rejected the male by displaying a distressed behaviour (i.e. quick wing fluttering) or jumping off the plant. Further researches are needed to understand the processes that lead to pair formation in *P. spumarius*. As already demonstrated in the case of the leafhopper *Scaphoideus titanus* (Eriksson et al., 2012), vibrational signals can be used to disrupt the mating behaviour of hoppers, however, the polyphagy of *P. spumarius* would suggest a scarce applicability against this species. Rather, it would be interesting to find attractive/repelling signals to be used as lure & kill/push & pull stimuli.

References

- Cornara D et al. 2016. Transmission of *Xylella fastidiosa* by naturally infected *Philaenus spumarius* (Hemiptera, Aphrophoridae) to different host plants. *Journal of Applied Entomology*.
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