Behavioral differences in host-finding among two maize disease vectors: *Dalbulus maidis* (Cicadellidae) and *Peregrinus maidis* (Delphacidae)

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Among the main maize diseases in Argentina there are those that are caused by maize-stunting pathogens transmitted in a persistent propagative way by the leafhopper *Dalbulus maidis* and the planthoppers *Delphacodes kuscheli* and *Peregrinus maidis*.

Dalbulus maidis (DeLong) is considered a serious maize pest throughout most of Latin America, primarily by serving as a vector of Corn Stunt Spiroplasma (CSS), Maize Rayado Fino Virus (MRFV) and Maize Bushy Stunt Micoplasm (MBSM). It is a specialist herbivore feeding only on plants of the genus *Zea*, maize (*Zea mays* L.) and its wild relatives, the teosintes (*Zea* spp.). In Argentina it is present in the NW and NE (Carloni *et al.* 2013).

Although *Delphacodes kuscheli* is the main vector of Mal de Rio Cuarto Virus (MRCV), the most prejudicial stunting pathogen in Argentina, it has been demonstrated experimentally that *Peregrinus maidis* (Ashmead), a planthopper present in central, NE and NW Argentina, could also transmit MRCV (Virla *et al.* 2004), besides being a known vector of several other diseases. *Peregrinus maidis* is a more polyphagous insect, although most frequently associated with maize, it has been found on *Sorghum* spp., *Panicum* spp., other grasses, and even *Citrus* (Tesón & Remes Lenicov 1989).

Behavioural differences in host-finding among different maize germplasms have not been studied, and may contribute to the pest status of stunting pathogens vectors. In this study, we compared the preferences of a specialist leafhopper, *D. maidis* (Hemiptera: Cicadellidae), and a more generalist planthopper, *P. maidis* (Delphacidae), on a suite of three maize cultivars, a temperate and a tropical germoplasm and a landrace. Moreover, we analysed the volatile organic compounds (VOCs) emitted constitutively by the maize plants that could act as non-contact cues determining host-finding.

Materials and methods

Two corn hybrids, P1780YR (temperate) versus P30B39HR (tropical) and a landrace known as sweet white maize (SWM) were employed. Maize plants were planted in pots with commercial soil and left in greenhouse conditions until analysis. Insects were obtained from a colony reared in PROIMI.

Olfactometer Bioassays: The attractiveness of volatile compounds from V2 maize plants from the three evaluated germplasms on *D. maidis* and *P. maidis* females was evaluated in olfactory dual choice tests using a stationary phase olfactometer, with the odor sources placed in opposite directions. The system consisted of a central choice chamber and two opposite side arms connected to glass cages with the odor source plants. The first choice of each female was

recorded when it trespassed about an inch towards the odor source in the olfactometer arm. Statistical differences in choices made by the females where determined with Chi-square goodness-of-fit test (χ^2).

Volatile Collection and Chemical Analysis: Headspace samples were taken by enclosing intact V2 plants into a 2L glass recipient. Charcoal-filtered air was pushed into the recipient with an aquarium air pump and then pulled by a suction pump at a constant rate of 0.5 L per min. Air leaving the recipient through an outlet passed through a volatile collection trap (30 mg HayeSep Q) where volatiles were collected. After a sampling period of 6 h (between 10:00 and 16:00 h), the volatile collection traps were eluted with 150 µl of dichloromethane containing 5 ng of dodecane as internal standard. Samples were analysed by GC/MS.

Results

Adults of *Dalbulus maidis* preferred seedlings with temperate genetic background (75%) instead of tropical background (χ^2 = 10.000, P = 0.002). *Dalbulus maidis* was slightly more attracted, but not significantly, towards SWM (60.8%) over tropical maize (χ^2 = 2.174, P = 0.140), and did not discriminate between white and temperate maize (χ^2 = 0.364, P = 0.546).

On the other hand, *Peregrinus maidis* chose seedlings with tropical genetic background (71.4%) over temperate maize (χ^2 = 7.714, P = 0.005); and significantly chose SWM (69.5%) over temperate (χ^2 = 7.043, P = 0.008). *Peregrinus maidis* did not discriminate between SWM and tropical maize (χ^2 = 0.857, P = 0.355).

All three types of corn differed both qualitatively and quantitatively in their constitutive volatile compounds. Temperate corn was correlated with a greater abundance of monoterpenes, whereas SWM was positively correlated with aromatic compounds and tropical maize lacked monoterpenes, homoterpenes and salycilates. These results suggest that both *D. maidis* and *P. maidis* could select their host plants based on the emitted VOCs, even though having opposed behavioral responses.

References

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