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Wireworms under the Sword of Damocles: Attraction to Maize Root Volatiles

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Abstract : Volatiles Organic Compound (VOCs) are one of the many features of defense used by plants in their eternal fight against pests. Their main role is to attract the natural enemies of the herbivores. But on another hand, they can be used by the same herbivores to locate plants while foraging. In an attempt to fill a gap of knowledge in a complex web of interactions, we focused on wireworms (Coleoptera:Elateridae). Wireworms whose larvae feed on roots are one of the most spread pests of valuable crops such as maize and potatoes, causing important economical damage. Little is known about the root compounds that are playing a role in the attraction of the larvae. In order to know more about these compounds, we compared four different maize varieties (Zea mays mays) that are known to have different levels of attraction, from weak to strong, for wireworms in fields. We tested the attraction of larvae in laboratory conditions in dual-choice olfactometer assays where they were offered all possible combinations of the four maize varieties. Contemporary, we collected the VOCs of each variety during 24h using a push-and-pull system. The collected samples were then analyzed by gas chromatography coupled with a mass spectrometer (GC-MS) to identify their molecular profiles. The choice of the larvae was dependent on the offered combination and some varieties were preferred to others. Differences were also observed in terms of quantitative and qualitative emissions of volatile profiles between the maize varieties. Our aim is to develop traps based on VOCs from maize roots to open a new frontier in wireworms management.

Keywords : integrated pest management, maize roots, plant defense, volatile organic compounds, wireworms
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