

ABSTRACT BOOK



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Early detection of the pinewood nematode based on volatile organic compounds (VOCs)

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Early detection of plant pests is critical for preventing large-scale outbreaks, yet conventional techniques such as morphological identification and molecular validation are often time-consuming, labour-intensive, and reliant on advanced expertise. For the quarantine pest *Bursaphelenchus xylophilus* (the pinewood nematode), the causal agent of pine wilt disease, a positive identification can range from 3 to 15 days. Emitted volatile organic compounds (VOCs) are now being analyzed as biomarkers for the early-stage detection of plant pests. In the present work, we analyzed VOCs emitted by in vitro monoxenic cultures of the pinewood nematode, feeding on *Botrytis cinerea* fungal mats, to profile nematode specific volatiles. Several compounds were identified through thermal desorption coupled to gas chromatography - mass spectrometry (TD-GC/MS) as linked to pinewood nematode population growth. The main emitted VOCs were 2-methyl-4-heptanone and 2-methyl-4-heptanol, potential aggregation pheromones. Analytical platforms such as TD-GC/MS enable sensitive, non-destructive characterization of volatiles from these types of samples, while emerging sensor-based technologies (e-noses, portable VOC detectors) present opportunities for field-deployable surveillance. The application of volatile profiling not only facilitates early diagnosis but also enhances understanding host - pathogen dynamics, potentially informing integrated management strategies. This preliminary work underscores the potential of VOC-based biomarkers as a rapid, reliable, and scalable tool for monitoring pinewood nematode infection, paving the way toward more sustainable protection of forest ecosystems.

Keywords: *Bursaphelenchus xylophilus*, Gas chromatography, Pine Wilt Disease, Volatiles.