APIMONDIA SCANDINAVIA 2025
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PP-012 [Bee Health]

Considerations when sampling honey bee *Apis mellifera* colonies for volatile organic compounds (VOCs) associated with honey bee disease and environmental contamination

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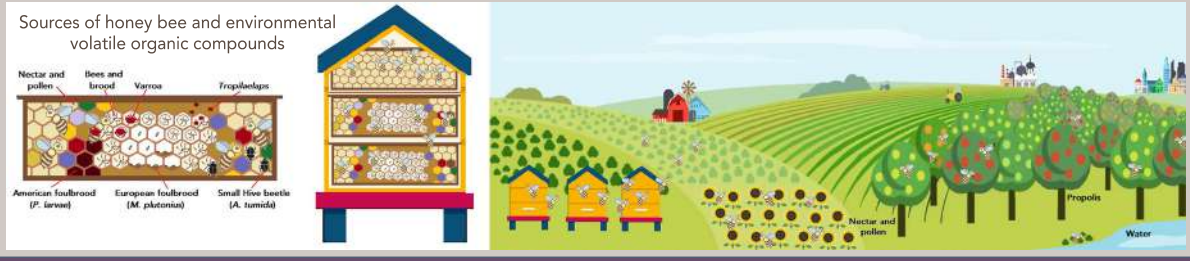
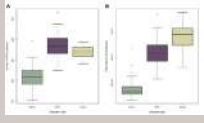
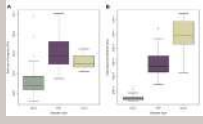
Introduction.

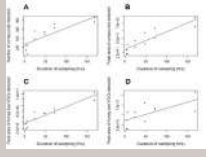


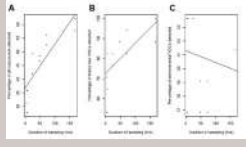
Method.

Results.









Discussion.

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PP-012 [Bee Health]

Considerations when sampling honeybee (Apis mellifera) colonies for volatile organic compounds (VOCs) associated with honeybee diseases, pests and environmental contamination

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Honeybee disease and pests cause significant colony losses globally each year. It has long been established that odour and pheromones in the form of volatile and semi volatile organic compounds play an important role in honeybee colonies. Due to their wide-ranging foraging activity honeybees also collect VOCs from the local environment in the form of nectar, propolis, water and electrostatic particles that attach to their bodies. Samplers collect VOCs indiscriminately, and therefore analysis yields valuable data related to both VOCs associated with honeybee and the local environment. Honeybee diseases and pests also produce VOCs and their early detection could be used for diagnosis and treatment, potentially improving colony survival. Relatively few field-based studies have taken place that use VOC sampling and analysis as a means of early detection of diseases and pests in honeybee colonies or for the detection of local environmental contamination. The VOC profiles of honeybee colonies were sampled using a variety of samplers (PSP, MonoTraps and Tenax TD) positioned at different location within colonies and for different time periods. GCxGC TOFMS was used to determine the most effective position in hive, sampler and duration of sampling to detect VOCs associated with disease, pests or environmental contamination.

The locations of samplers had no statistically significant impact on the quantity or peak area of VOCs detected. The number and peak area of VOCs detected for honeybee VOCs increased with duration of sampling but decreased for environmental VOCs. The peak area of honeybee and environmental VOCs detected varied with the type of sampler used. MonoTraps consistently detected the smallest peak areas. PSPs and Tenax TD were comparable for detecting honeybee VOCs and Tenax TD detecting the largest peak areas for environmental VOCs. These results have demonstrated which type of sampler, duration and location in hives have the lowest burden on colonies and beekeeper to effectively detect specific VOCs. Further research will identify honeybee disease and pest biomarkers to facilitate early detection at sub- clinical or low levels thereby improving treatment outcomes and to also ascertain the level and distribution of environmental contamination, potentially influencing resource distribution for decontamination.