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Chemical chracterization of the volatile infestation-fingerprint of peaches by *Ceratitis capitata, Bactrocera zonata* and *B. dorsalis* and conversion into a detection tool (e-Nose)

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Infestation by true fruit flies (TFF) at early stages is difficult to detect. Destructive inspection is needed for a large proportion of the inspected commodity to detect infested fruits. Therefore, there is a need for the development of rapid, reliable, and cost-effective screening methods for the detection of infestation especially due to restrictions on the trade of products by Phytosanitary legislation. In this study, the aim was to determine infestation-specific volatile compounds-indicators emitted by peaches (Prunus persica var. nucipersica) at different developmental stages by TFF, namely *Ceratitis capitata* (Wiedemann), Bactrocera dorsalis (Hendel) and B. zonata (Saunders) (Diptera: Tephritidae), to develop a rapid, reliable and cost-effective method aiming to reduce the time required for a reliable inspection and to avoid the unnecessary destructive sampling. For the collection of the volatile organic compounds (VOCs) from healthy and TFF-infested peaches the dynamic headspace sampling technique was used. VOCs were analyzed by Gas Chromatography-Mass spectrometry (GC/MS). The specific volatile profiles were further used as a training, validation and prediction set for an e-Nose system. Results showed that specific VOCs are TFF species specific for peaches. Ethyl octanoate was the main ester and γ-decalactone the main lactone. Their levels increased along with the progress of maturation and infestation. Hexanol and methyl heptanoate were only present in B. dorsalis infested peaches. Methyl hexadecanoate was found only in C. capitata infested peaches. Hexyl isovalerate, hexyl hexanoate and 2E-hexenyl hexanoate in B. zonata infested peaches. Different statistical models were developed from the results of e-Nose on detection of infestation by TFF. Models are quite promising in applying this technology toward non-destructive screening methods for detection of tephritid infestation, especially for import and export inspections.

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