

Abstract

Fruit Fly Chemical Communication with Gut Bacteria [†]

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Abstract: Relationships between tephritids and microorganisms have been a focus of entomological research particularly due to the potential use of microbial emissions in pest control. Symbiotic interactions between fruit flies and their associated gut bacteria have been well-studied, however, the composition of volatile chemicals from these gut bacterial emissions and their role as mediators of fruit fly behaviour is still underexplored. Here we hypothesise that the volatile emissions from fruit flies gut microbionts may attract host flies. To this end, we isolated culturable bacterial species, mostly belonging to the family Enterobacteriaceae, from the midgut of wild adult *Bactrocera tryoni*, one of the most damaging horticultural pests in Australia. In a screening trap assay with more than 80 isolates, both male and female adult *B. tryoni* were attracted to the odors emitted by most cultured isolates and a few significantly deterred adult male and female flies. Gas Chromatography-Mass Spectroscopy analyses revealed a number of microbial volatile organic chemicals (mVOCs) in the headspace of liquid cultures of isolated bacteria, including ketones, carboxylic acids, alcohols and esters. Electrophysiological assays of selected isolates with highest attraction identified a number of chemicals that elicit olfactory responses to adult flies. Behavioural assay determined the attraction potential of a few chemicals among these mVOCs. This is an important step in understanding fruit fly-bacteria chemical relationships and its potential to develop attractants and potentially repellents for fruit fly pest management.

Keywords: bacteria; microbial volatile organic compounds; tephritidae; attraction; insect-microbe interaction

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