

Abstract

Fruit Fly Chemical Communication with Gut Bacteria [†]

Nazma Akter Tithi 

School of Natural Sciences, Macquarie University, Sydney, NSW 2109, Australia; nazma.akter@hdr.mq.edu.au

[†] Presented at the 3rd International Electronic Conference on Applied Sciences, 1–15 December 2022; Available online: <https://asec2022.sciforum.net/>.

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 microbiota may attract host flies. To this end, we isolated culturable bacterial species, mostly belonging to the family Enterobacteriaceae, from the midgut of the 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 odours 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 the highest attraction identified a number of chemicals that elicit olfactory responses to adult Qflies. 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 potential repellents for fruit fly pest management.

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



Citation: Tithi, N.A. Fruit Fly Chemical Communication with Gut Bacteria. *Eng. Proc.* **2023**, *31*, 85. <https://doi.org/10.3390/ASEC2022-13801>

Academic Editor: Roger Narayan

Published: 2 December 2022



Copyright: © 2022 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/ASEC2022-13801/s1>.

Funding: This research was funded by International Macquarie University Research Excellence Scholarship (iMQRES).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data available upon request.

Acknowledgments: I acknowledge the support of Phil Taylor, Joanne Jamie, Ian Jamie and Flore Mas throughout the project.

Conflicts of Interest: The author declares no conflict of interest.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.