

# Early detection of fruit infested with *Bactrocera tryoni*

Flore Mas, Lee-Anne Manning, Maryam Alavi, Terry Osborne, Olivia Reynolds and Andrew Kralicek

Postharvest Biology and Technology, Volume 175, May 2021, 111496

---

## Abstract

Fruit worldwide are prone to insect damage, particularly from the Tephritidae fruit flies. The Queensland fruit fly (“QFF”, *Bactrocera tryoni*) is one of the worst economic pests in the Pacific. Females oviposit in a wide variety of fruit and larvae develop inside the flesh with minimal external visual damage early upon infestation. The export of infested fruit into pest-free zones is one of the main pathways of pest incursion. The ability to detect infested fruit early can prevent an incursion, reduce the risk of spread and advise upon fruit quality. With the aim of detecting early QFF infestation, we investigated whether volatile organic compounds (VOCs) could be used as biomarkers. Five types of fruit were exposed to QFF and volatiles were collected at days 1 and 5 after infestation. After chemical analysis and compound identification, classification models were employed to identify volatile predictors. There were no common volatile biomarkers for all QFF infested fruit, but a combination of fruit-specific volatile biomarkers could reach up to 100 % detection of infestation at specific times. Infestations of papaya and tomato were detectable from day 1 with high accuracy (90 and 100 % respectively). Infestations of nectarine and fig were detectable from day 5 with 80 and 90 % accuracy. Early infestation of capsicum with QFF could not be reliably detected based on our models. The strong interaction between time and infestation for all fruit types requires the selection of a suite of fruit-specific volatile biomarkers for the future development of an odorant-based sensor for detection of QFF infestation.