

eDNA metabarcoding of avocado flowers: ‘Hass’ it got potential to survey arthropods in food production systems?

Joshua Kestel¹, Phil Bateman¹, David Field², Nicole White¹, Rosemarie Lines³, and Paul Nevill⁴

¹Curtin University - Perth Bentley Campus

²Edith Cowan University

³Western Australia Department of Primary Industries and Regional Development

⁴Curtin University Bentley Campus

December 20, 2022

Abstract

In the face of global biodiversity declines, surveys of beneficial and antagonistic arthropod diversity as well as the ecological services that they provide are increasingly important in both natural and agro-ecosystems. Conventional survey methods used to monitor these communities often require extensive taxonomic expertise and are time-intensive, potentially limiting their application in industries such as agriculture, where arthropods often play a critical role in productivity (e.g. pollinators, pests and predators). Environmental DNA (eDNA) metabarcoding of a novel substrate, crop flowers, may offer an accurate and high throughput alternative to aid in the detection managed and unmanaged arthropod taxa (e.g. flower-visiting insects and potential pollinators). Here, we compared the arthropod communities detected with eDNA metabarcoding of flowers, from an agricultural species (*Persea americana* - ‘Hass’ avocado), with two conventional survey techniques; Digital Video Recording (DVR) devices and pan traps. In total, 80 eDNA flower samples, 96 hours of DVRs and 48 pan trap samples were collected. Across the three methods, 49 arthropod families were identified, of which 12 were unique to the eDNA dataset. Alpha diversity levels did not differ across the three survey methods although taxonomic composition varied significantly, with only 12% of arthropod families found to be common across all three methods. This study demonstrates that eDNA metabarcoding of flowers to detect visiting arthropods, although in a developmental stage, can complement traditional survey methods and increase the diversity of taxa detected with implications for both natural and agro-ecosystems.

Hosted file

003b_Manuscript.docx available at <https://authorea.com/users/568014/articles/614055-edna-metabarcoding-of-avocado-flowers-hass-it-got-potential-to-survey-arthropods-in-food-production-systems>