

## **Natal origins of a pest: Using Sr isotopes to identify if an exotic pest infact [or unfortunately?] has local origins**

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Understanding if an invasive pest species grew up locally has dramatic implications for the nature and size of biosecurity measures. Identifying a local breeding colony early allows for efficient and timely intervention.

Here we propose that Sr isotopes represents an excellent proxy for accessing proximal provenance (i.e. grew up locally) versus a distal provenance for an exotic invader. This is based on the premises that 1) Sr isotopes show significant geographic variability that is linked to the underlying geology, and 2) the isotopes of Sr do not fractionate significantly during biological processes.

Here we test the Australian regional variability of Sr isotopes expressed in fruit flies (Diptera: Tephritidae) reared on lemons harvested from the major fruit growing regions of Queensland, New South Wales, South Australia and Western Australia as well as from both the North and South Island of New Zealand. The Sr isotope composition of soil sampled from the base of each lemon tree is also analysed as a proxy for the local geological environment.

In addition, each fly sampled has been analysed for O and H isotopes. These isotopes are strongly fractionated during biological processes, yet are still proven useful indicators of provenance.

This study has allowed us to test the usefulness of Sr isotopes as an indicator of local versus distal provenance across Australia and between Australia and New Zealand. It has also tested the potentially improved accuracy of provenance through combined Sr, O and H isotope signatures that is needed to evaluating the origin of an invasive pest.