

Dr Jennifer Morrow

Hawkesbury Institute for the Environment

Western Sydney University, Sydney, Australia

***Wolbachia* and tephritid fruit flies**

ABSTRACT

Wolbachia is an intracellular, maternally inherited bacterium that is common in insects. However, in some tephritid fruit flies, the incidence is much lower than generally expected. While species of *Rhagoletis* are well-known hosts, key pests such as *Ceratitidis capitata*, *Bactrocera dorsalis* and *Bactrocera tryoni* do not have pervasive *Wolbachia* associations in natural populations. Therefore, *Wolbachia* may constitute an interesting candidate for biological control. Interestingly, we detected two co-occurring *Wolbachia* strains at low prevalence in seven Australian *Bactrocera* and *Dacus* species. However, we can now attribute these strains to concealed parasitisation by a strepsipteran parasite, *Dipterophagus daci*, within the flies' abdomen. Our research demonstrates that there is surprisingly no *Wolbachia* naturally inherited by Australian tephritids. Furthermore, we found that *Wolbachia* microinjected into *B. tryoni* is lost from its new host after a few generations and, therefore, Australian tephritids may have some resistance to this bacterium.

Wolbachia strains can be used in incompatible insect technique (IIT), a method analogous to the sterile insect technique (SIT) but applies *Wolbachia*-induced cytoplasmic incompatibility (CI) to cause crossing sterility in field insects. Several strains native to *Rhagoletis cerasi* cause CI, but information about their phenotypes, interactions, relatedness and evolution is incomplete. We have genome-sequenced four of its *Wolbachia* strains which provide resources to expand knowledge and their potential uses in other fruit fly species including Medfly, olive fly and Qfly.



j.morrow@westernsydney.edu.au



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"I entered the world of fruit flies by researching the molecular biology of Australian fruit flies at the Fruit Fly Research Centre of the University of Sydney with Marianne Frommer. In 2015 I completed my PhD at WSU, supervised by Markus Riegler, Marianne and Deb Shearman, expanding on my previous research interest in sex determination of *Bactrocera* species and incorporating studies of *Wolbachia*, its potential application to pest management and its interaction with *Bactrocera* species. I have continued my research at WSU, studying microbial associates and viral pathogens of fruit flies and other insects through genomics and transcriptomics approaches."

