

Host specialisation in Tephritidae fruit flies in La Réunion : preference – performance – host phylogeny relationships

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Abstract:

Among invasive species, phytophagous insects have repeatedly become pests for agriculture. Such insects can differ widely in their degree of specialisation to their host plants. While host specialisation occurs as a natural process structuring food webs, it also represents a major factor determining the importance of insect pest potential damages. Predicting on which crops a given insect species may become a pest therefore requires (i) a good knowledge of both the realised (*i.e.*, resource used by the species in the field) and fundamental (*i.e.*, potential resource that the species is capable of using) host ranges of the insect species and (ii) a deep understanding of the processes by which insects are able to adapt to new hosts.

The Tephritidae community in La Réunion presents numerous advantages for an ideal study of the preference – performance – host phylogeny relationships. La Réunion hosts eight species of tephritids infesting crops that highly overlap in their host breadth with the other species of the community. This community includes two indigenous species and six exotic species that have different degree of specialisation. Some are generalist (*Ceratitis rosa*) and some are specialist (*Neoceratitis cyanescens*).

The aim of this PhD is to study the relation between host phylogeny, host preference of the females and larval performance of the tephritid community of La Réunion. This objective is developed through four main parts:

- (i) Phylogeny reconstruction of all host plant species of the eight tephritid species present in La Réunion.
- (ii) Study of historical records and definition of the host range in the field of each Tephritidae species and the evolution of this host range before and after the latest invasion of *Bactrocera zonata* in 2000.
- (iii) Estimation of host preference by studying behavioural and physiological responses to plant odours and volatile compounds in the laboratory.
- (iv) Finally, the results of the three tasks and performance data will be combined to define the relationships between performance, preference and phylogeny of host plants.