

8th International Symposium on Fruit Flies of Economic Importance (ISFFEI 2010), Valencia, Spain ,  
26th September - 1st October 2010

### **Tritrophic interaction in the complexes of fruit flies damaging fruit and vegetable crops in Reunion island**

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The study of tri-trophic interactions is a vast field of basic ecological studies which are also of paramount importance for the development of environment-friendly methods of pest management. Within the Diptera, the Tephritidae family represents an interesting model for such studies because of the variable host-specificity of species in this group, and the important role that some natural enemies may play in the regulation of their populations. Furthermore, the great economic importance of many species in this family offers a large array of applications to research results.

La Réunion, a French island situated in the south-west of the Indian Ocean, is a favourable area for studying such interactions, because of the number of tephritid species present in the island, and the great variability of its climatic conditions. On fruit crops, a complex of three polyphagous species of tephritids cause considerable damage: the Mediterranean fruit fly, *Ceratitis capitata*, the Natal fruit fly, *Ceratitis rosa*, and the Peach fruit fly, *Bactrocera zonata*. In addition, another complex of Dacini is harmful to cucurbit crops: the Melon fly, *Bactrocera cucurbitae*, the Ethiopian cucurbit fly, *Dacus ciliatus*, and the Indian Ocean cucurbit fly, *Dacus demmerezi*. Conversely, on Solanaceous crops such as tomato, the Tomato fruit fly *Neoceratitis cyanescens*, is the only species of economic importance. Over the last twenty years, many field studies allowed us to specify the host-range and relative importance of the different species on cultivated crops. Of particular interest are some host preferences observed in the field in some otherwise very polyphagous species, such as *C. capitata*. Detailed studies (lab, wind tunnel and field cages) were also devoted to the host location behaviour of stenophagous species, taking as a model the tomato fruit fly, *N. cyanescens*. Other behavioural studies also highlighted the preferences of the different species for particular host-plants during foraging or egg-laying behaviour. More recently, studies were focused on the quality of various host or non-host fruits for the pre-imaginal development of the different species, and its influence on their fitness.

Though some indigenous parasitoids of the Mediterranean fruit fly have been recorded in the island, most of the natural regulation by parasitoids is due to exotic species imported through classical biological control programmes. This is particularly the case with two species imported from Hawaii, in collaboration with USDA Hawaii and the University of Hawaii: *Psytalia fletcheri*, a larvo-pupal parasitoid of the Melon fly, and, more recently, *Fopius arisanus*, an egg-pupal parasitoid of some *Bactrocera* spp. Following the acclimatization of these two species, field studies allowed us to evaluate their host range, favourite habitats, and impact on host species populations. In addition, laboratory, field-cage and wind tunnel studies improved our knowledge of the stimuli involved in host habitat and host selection behaviours.

Results of these studies are summarized and discussed in relation to the current state of knowledge of insect-plant and host-parasitoid interactions in tephritids, and to their possible applications in pest management.

Key words: Tephritidae, tri-trophic interactions, insect-plant relationship, host-parasitoid relationship, La Réunion