

PERFORMANCE OF AUGMENTORIUM AS A SANITATION TECHNIQUE AGAINST FRUIT FLIES (DIPTERA: TEPHRITIDAE) IN REUNION ISLAND

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Background. Tephritid fruit flies cause severe damage to fruit and vegetable crops in Reunion Island. Instead of the curative approach to reduce existing populations, the first step proposed for their management is sanitation. This method is based on an original technique firstly developed by USDA in Hawaii utilizing a tent-like structure called an "augmentorium" which aims to sequester adult flies emerging from infested fruit while allowing the parasitoids to escape, via a net placed at the top of the structure. This study focused on the performance and the efficiency of the augmentorium prototype recently tested in Reunion Island and particularly (i) the number of adult flies that can potentially be sequestered in an augmentorium in the field; (ii) the efficiency of the net mesh for fly sequestration and parasitoid escape; (iii) the feasibility of producing compost with infested fruit collected in the field.

Method. The potential number of flies that could be sequestered was estimated by measuring in the lab the emergence of several species of flies from infested fruit collected in the field from 2005 to 2009 in different sites of the island. Emergence of adult flies was measured for six species of flies: (i) *Bactrocera cucurbitae*, *Dacus ciliatus* and *D. demmerezi* attacking three species of Cucurbits (pumpkin: *Cucurbita maxima*; cucumber: *Cucumis sativus* and courgette: *Cucurbita pepo*); (ii) *Bactrocera zonata*, *Ceratitis rosa* and *C. capitata* attacking one species of fruit (mango: *Mangifera indica*). The sequestration of three of these fly species (*B. cucurbitae*, *B. zonata* and *C. capitata*) and the escape of two of their parasitoids (*Psytalia fletcheri* and *Fopius arisanus*) were assessed in the Cirad laboratory in Saint-Pierre in 2008. Preliminary tests on the feasibility of producing compost were then conducted in Saint-Pierre in 2009, mixing courgette and other components.

Results. Collections of infested fruits showed the following means of emerged adults per kg of fruit: 76 for mango (*B. zonata*, *C. rosa*, *C. capitata*); 217 for cucumber, 340 for pumpkin and 594 for courgette (*B. cucurbitae*, *D. ciliatus*, *D. demmerezi*). The efficiency of the mesh chosen for the prototype of augmentorium (hole area 1.96 mm²) proved to be perfectly effective in the lab with 100% of sequestration of adult flies. In the same way, 100% of the parasitoids were able to escape from the mesh if they choose to do so. In addition, we showed that a ratio of 50:30:20 of courgette, sugar cane stem and chicken litter respectively was well adapted to produce compost.

Conclusion. These results confirm the relevance and the efficiency of the augmentorium in an agroecological crop protection. As a sanitation technique against fruit flies, the augmentorium sequesters on average several hundreds of adult flies per kg of infested fruit. As a biological control method, it may contribute to increase parasitoid populations which are often low because of the previous and significant pesticide pressure. The augmentorium can also be considered as a useful tool to produce compost in the context of sustainable agriculture. The technique of sanitation using the augmentorium is now well accepted by farmers in pilot areas in Reunion Island.