1. Stem borer larvae infesting sugarcane stalks on Reunion Island

2. *The egg parasitoid* Trichogramma chilonis (*Hymenoptera: Trichogrammatidae*) *moving on a* Chilo saccahriphagus *egg batch*

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Towards biological control of the sugarcane stemborer on Reunion Island: the case of augmentative releases of *Trichogramma*

Sugarcane is an economically important crop in many tropical countries. However, stemboring insects attacking this crop strongly impede productivity, particularly in southern Africa and countries bordering the Indian Ocean. The spotted stemborer, Chilo sacchariphagus (Lepidoptera: Crambidae), is responsible for significant crop losses due to internal damage in the stalk caused by its larvae. Such feeding causes direct losses in terms of cane tonnage prior to harvesting (up to 40t/ha) and indirect losses during processing (reduced recoverable sugar and sucrose quality). Recent stemborer outbreaks have been reported on Mauritius and Reunion islands. On Reunion island, this phenomenon is linked to the development of new highyield sugarcane varieties (such as variety R579; yield of 150t/ha compared to 100 to 120t/ha for the other varieties) that are more susceptible to the borer. While chemical treatments are difficult to apply and can be ineffective since the targeted insects are usually inside the stalk, biological control presents an interesting and environmentally friendly solution. Over 3 years, a project co-funded by the European Union and the General Council of La Réunion allowed the establishment of a biological control program on Réunion, in close collaboration with Inra, Cirad and FDGDON. On this island, there is an existing complex of parasitoids to control the borer, among them Trichogramma spp. (Hymenoptera: Trichogrammatidae), a group of wellknown and effective egg parasitoids that are commonly used in biological control programs worlwide. A field inventory of these parasitoids showed the presence of only one species on Réunion, Trichogramma chilonis, and the natural density of this parasitoid was too low for effective pest control.

Our objective was to carry out augmentative releases of *T. chilonis* in the cane fields at the beginning of the crop cycle, corresponding to the most active oviposition period of the borer. To choose the wasps offering the best abilities for both biological control and mass rearing, the biological characteristics of three *T. chilonis* strains were compared in the laboratory. A population originating from Saint-Benoît (hot and humid climate) appeared to offer the best potential as a biological control agent. This strain was therefore chosen for mass production and field experiments. Three years of field releases (2002-2004) led to significantly lower percentages of bored internodes in the treated plots (those with *Trichogramma* releases) than in the control plots. This increased sugar cane production by 15 to 36 tons of cane per hectare (i.e. +571 to 1423 \in /ha).

The best results were obtained in the plots where the host density was the highest, a situation usually associated with the hot and humid areas of La Réunion. Such results from small plots allowed us to be very optimistic about the generalized use of biological control using *Trichogramma* by the surgarcane farmers. To ensure profitability and reliability of this biological control process, it is now necessary to refine the release strategy of *T. chilonis* (periods and doses), in addition to continuing to select more effective *Trichogramma* populations. The research and development partnership that prevailed during this project should lead to future successes in these endeavours.

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