

# Modeling the Biocontrol of an invasive plant.

A. Mathieu<sup>a</sup>, F. Chiroleu<sup>a</sup>, S. Quilici<sup>a</sup>, O. Flores<sup>a</sup>, and Y. Dumont<sup>b</sup>

<sup>a</sup>CIRAD -Umr PVBMT, Réunion Island, France,

<sup>b</sup> CIRAD -Umr AMAP, Montpellier, France

*Keywords: Modeling, invasive plant, plant-insect interactions, biocontrol*

The giant bramble, *Rubus alceifolius* Poir. (*Rosaceae*) is one of the most invasive plants in la Réunion. In the last decades, mechanical and chemical control have been used to limit its spreading. However, la Réunion being one of the hot spots of endemism in the world, the use of chemical products is limited. Moreover, parts of the island are completely inaccessible. Thus, control is really limited. That is why biological control agents have been considered, like *Cibdela janthina* Klug (*Argidae*).

This sawfly is native from Sumatra and can cause severe damages to *Rubus alceifolius*. After some preliminary studies between 2001 and 2007, *Cibdela* has been released in 2008 in the South-East part of la Réunion. Since then the *Cibdela* population has spread through the island. The first objective has been reached: *Rubus alceifolius* has completely disappeared in some places (in particular at low altitudes), while in other places an equilibrium between *Rubus* and *Cibdela* has apparently been reached. Altogether, some unexpected situations appeared, and that is why new biological and ecological investigations have begun two years ago. In this context, mathematical modeling can be a useful tool to formalize all extensive knowledges about *Rubus-Cibdela* interactions and to estimate the long term behavior of the bramble, when attacked by the sawfly, at different altitudes.

The aim of this talk is to present some preliminary studies about the modeling of these interactions. We will also present some theoretical results and illustrate our talk with various simulations.

[1] I. A. W. Macdonald, C. Thebaud, W. A. Strahm and D. Strasberg, Effects of Alien Plant Invasions on Native Vegetation Remnants on La Reunion (Mascarene-Islands, Indian-Ocean). *Environmental Conservation* 18 (1): 51-61, 1991.

[2] A. Mathieu, S. Quilici, Development and Life History Traits of *Cibdela janthina* (Hymenoptera: Argidae) Larval Stage, in progress.