An individual-based modeling approach to assess trap cropping management of *Helicoverpa zea* in tomato field in Martinique.

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Abstract. Farmers in the tropics are faced with crop protection issues such as adverse impacts of pesticides on human health and on the environment, particularly in intensive agrosystems in French overseas islands, or food insecurity and low income due to pest-induced crop losses, particularly in low-input traditional systems in Sub-Saharan Africa. A Cirad-funded « Omega3 » project tackles these problems by studying the effects of the planned introduction of plant species diversity (PSD) in tropical agrosystems, as a potential alternative to conventional practices based on pesticide use. One of the several study cases the project focused on is the management of the tomato fruit worm *Helicoverpa zea* in tomato field in the French West Indies (Martinique), relying on stimulant pest diversion PSD-based process. Sweet corn is proposed .as a trap crop to control the populations and damages of *H. zea* at the tomato field scale. To understand system functioning and improve *H. zea* management, a spatially-explicit individual-based model is under development. The model includes three interacting modules that describe (i) phenology of tomato and corn plants and dynamic of their attractive stages for *H. zea* (ii) *H. zea* development, both using thermal units, and (iii) movement and oviposition behavior *of H. zea*. The model runs at the field scale over one tomato cropping cycle and is approximated at a daily time-step. More widely, we aim to use this model as a generic tool to improve our understanding of system functioning by assessing general infestation patterns in response to the plant characteristics (e.g., relative attractiveness of the commercial vs. trap crops), the spatio-temporal deployment of commercial and trap crops (i.e., spatio-temporal planting design of the crops), and the insect behavioural traits (e.g., movement, oviposition,…). The modeling approach is presented and discussed.