An individual based model to optimize natural enemies deployment in augmentative biological control.

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POSTER

AN INDIVIDUAL BASED MODEL TO OPTIMIZE NATURAL ENEMIES DEPLOYMENT IN AUGMENTATIVE BIOLOGICAL CONTROL

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ABSTRACT

Augmentative biological control is a crop protection method that relies on the repeated introduction of natural enemies to fight agricultural crop pests. The question of the amount, distribution and frequency of natural enemies introductions to best suppress the pests is a central issue. Mathematical results were obtained with hybrid population dynamics models. They indicate that the optimal deployment strategy of natural enemies strongly relies on the presence [4] and sign of density dependence among the natural enemies population [5, 6, 1], and is also affected by the spatial structure of the environment [3]. To evaluate these theoretical predictions in a more realistic, stochastic and spatially explicit setting, a stochastic individual based model has been built on the multi-agent programmable modeling environment Netlogo [7]. Extensive simulatory experiments were performed to assess the effects of density dependent processes as well as spatial structure and stochasticity on augmentative biological control performance and variability. In addition to being used to optimise biological control agents introductions, the model has also been designed to ease the communication with a non-specialist audience regarding the effects of complex population dynamics processes on augmentative biological control efficacy and optimal natural enemies deployment strategies. This objective ressembles that of the Webidemics model in plant epidemics control [2].

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