

# Modelling Movement and Stage-Specific Habitat Preferences of a Polyphagous Insect Pest

Claudia P. Ferreira<sup>\*1</sup>

<sup>1</sup>Department of Biodiversity and Biostatistics, UNESP, Botucatu, SP, Brazil

## Abstract

The feeding preferences of *Diabrotica speciosa* (Coleoptera: Chrysomelidae) generate a parent-offspring conflict, as selecting the optimal host for offspring development can negatively affect adult survival and fecundity. Understanding this conflict is essential for developing effective pest-management strategies. We investigated the foraging behavior of *D. speciosa* using an individual-based model in two scenarios. In an intercropping scenario, we simulated parent-offspring conflict with adults exploiting two crops (corn and soybean) providing distinct nutritional advantages for each life stage. Three adult dispersal strategies were compared under continuous oviposition: simple diffusion, attraction to a fixed host, and alternating between hosts with a foraging period  $\tau$  per crop. Two behavioral principles were explored: “mother knows best” (adults foraging on corn during oviposition) and “optimal bad motherhood” (adults foraging on soybean to maximize their own fitness), including pre-oviposition effects. In a landscape scenario, population dynamics were simulated across four crop plots with temporal changes. Results indicated that crop-alternating dispersal near an optimal  $\tau$  maximized population performance, and the “mother knows best” strategy supported higher population growth than “optimal bad motherhood.” Landscape heterogeneity, fallow periods, and reduced soybean monocultures lowered insect density. Our findings suggest that alternating crop foraging enhances population fitness, while spatial and temporal crop management can effectively mitigate *D. speciosa* infestations [1].

## References

- [1] Adriano G Garcia, Wesley AC Godoy, Fernando L C onsoli, and Claudia P Ferreira. Modelling movement and stage-specific habitat preferences of a polyphagous insect pest. *Movement Ecology*, 8(1):13, 2020.

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\*claudia.pio@unesp.br