INSECT RESISTANCE

Integrating IPM into insect resistance management (IRM) theory for improved resistance management and pest suppression

DESCRIPTION

The high-dose/refuge strategy is effective at delaying the evolution of resistance to transgenic crops for some pests, but is inadequate for pests that have many generations per year. Rapid resistance evolution has led to calls for a return to the concepts of Integrated Pest Management (IPM) in which methodologies from IPM are integrated into the high-dose/refuge strategy as part of a holistic approach to pest and resistance management. The objective of this project is to develop a theoretical framework to generate and test hypotheses concerning management of resistance evolution using strategies that consider integration of pest and natural enemy biologies, crop spatial and temporal heterogeneity, insecticide applications, and interactions among these processes.

HOW THIS IS DIFFERENT THAN RELATED RESEARCH

Our models will differ from previous efforts by simultaneously considering spatial and temporal variation in resistance evolution in a meta-population model that also considers dispersal, density-dependent population dynamics, types of refuge, crop rotations, insecticide applications, and biocontrol strategies. In addition, our model will be novel by simultaneously considering pest population dynamics/densities and IRM to identify novel resistance management methodologies that may extend product durability and improve pest suppression.

MEMBER BENEFITS

● Metapopulation model that is verified against previous IRM studies.

● Predictions for strategies that incorporate IPM tactics into IRM programs to maintain susceptible pest populations.

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