Sensitivity Analysis of Caprio´s Deterministic Model for Simulating Pest Resistance Evolution

Maia AHN[1*], Dourado-Neto D[2]

1. Embrapa Meio Ambiente, Jaguariúna, Brazil
2. Esalq/Universidade de São Paulo, Piracicaba, Brazil

Caprio´s deterministic mathematical model was developed to simulate evolution of pest resistance to *Bacillus thuringiensis* toxins expressed by transgenic crops, process driven by genetic, biological and operational inter related factors. The model outputs are point estimates of the resistance allele frequency (Rfreq) along pest generations and the number of generations (Nger) until Rfreq exceed a critical frequency (Rfreq*).

We investigated the sensitivity of the model outputs to variations in the input parameters initial frequency of the resistance allele (InitialFreq) and functional dominance of resistance (FDRes). Six pest generations were chosen for Rfreq sensitivity analysis: the first generation, the generation in which RFreq* is achieved, and four intermediate generations. Non linear regression models were adjusted to describe the effect of InitialFreq on Nger.

The results show that the sensitivity of RFreq estimates to variations in both InitialFreq and FDRes change along pest generations. The influence of InitialFreq on Nger follows a negative exponential pattern. For FDRes, the same pattern is observed. For the scenarios considered, the model outputs are more sensitive to Rfreq than to FDRes. We discuss the importance of such information in the context of model uncertainty analysis.