

## Model Selection and Permanence in a Stochastic Integrated Pest Management Model

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### **Abstract**

We present a model for integrated pest management with stochastic and mixture model components to create further flexibility in modeling the impacts of random environmental changes on an integrated pest management system. In particular, we first determine the conditions under which solutions of our deterministic mixture model are permanent. We then analyze the stochastic model to find the optimal value of the mixing parameter that minimizes the variance in the efficacy of the pesticide. Additionally we perform a sensitivity analysis to show that the corresponding pesticide efficacy determined by this optimization technique is indeed robust. Through numerical simulations we show that permanence can be preserved in our stochastic model. Our study of stochastic version of the model indicates that our results on the deterministic model provide informative conclusions about the behavior of the stochastic model.