Yahdi, Mohammed , Cara Sulyok, Karissa Smith, and Alison Bugenis. 2014. Modeling and Sensitivity Analysis of the Role of Biodiversity to Control Pest Damage in Agroecosystems. *Letters in Biomathematics*. 1(1): 41-50.

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From the Abstract: The paper provides a mathematical framework for cost-effective and environmentally safe strategies to minimize alfalfa damage from pests in alfalfa agroecosystems with optimal biodiversity levels and to predict outcomes for scenarios not covered by field experiments. Alfalfa is the most important forage legume world-wide and is a valuable source of nutrition for farm animals. The potato leafhopper (PLH) pest damages the alfalfa plant leading to a reduction of the

productivity, a loss in nutritional value, and a decrease in milk production. The PLH pest outbreaks are also prone in monocultures. New mathematical models are shown to accurately fit results from field experiments utilizing plant diversity and enemies (pest-predator) hypotheses. The focus is on polyculture as a farming technique and the damsel bug, *Nabis*, a natural predator of the PLH. Mathematical methods include the Shannon diversity index, differential equations, scramble competition approaches, and sensitivity analysis to determine critical parameters.

Keywords: alfalfa, mathematical modeling, sensitivity analysis, steady state, Shannon diversity index, plant herbivore, predator