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Modeling the Effect of Diversity in Host Plant-Herbivore-Predator Interactions

Predator and plant diversity can control Potato leafhopper (PLH) pest damage to the host-plant Alfalfa. New models of systems of differential equations were constructed using age structures, Allee effect, the Shannon diversity Index and other modeling approaches. Recent data and results on enemies and diversity hypotheses in field experiments were used to determine parameter ranges and validate the models. Parameters were adjusted to predict outcomes for scenarios not covered by field experiments and to examine their roles. This work provides a frame work for designing cost-effective and environmentally safe strategies to minimize alfalfa damage, and utilize enemies hypothesis and polyculture diversity.