PREDATOR DIVERSITY IMPACTS HERBIVORE ABUNDANCE AND BEHAVIOR WITH CASCADING EFFECTS ON THE PREVALENCE OF A VECTOR-BORNE PLANT PATHOGEN

Elizabeth Y. Long

Dr. Deborah Finke, Dissertation Supervisor

ABSTRACT

As predator diversity declines there may be consequences for critical ecosystem processes such as disease dynamics, and/or valuable ecosystem services like natural pest suppression. In this study, I examine the impact of declining predator diversity on 1) the strength and spatial stability of suppression of a generalist sap-feeding insect, the bird cherry-oat aphid *Rhopalosiphum padi*, residing in wheat (*Triticum aestivum*) habitats, and 2) the mechanism contributing to any observed predator diversity effects on aphid suppression. Furthermore, I evaluate 3) any cascading impacts of predator diversity loss on the prevalence of a plant pathogen, cereal yellow dwarf virus, which is vectored from plant to plant exclusively by aphids. By manipulating predator species richness and identity in experimental mesocosms in the laboratory, greenhouse and field settings, I found that increasing predator diversity had no impact on the prevalence of the CYDV pathogen in wheat; however, predator diversity did enhance the overall strength and spatial stability of vector suppression across the habitat. The presence of a predator assemblage, regardless of diversity, significantly reduced the proportion of virus-infected plants, and this was likely due to predator-induced changes in vector behavior, whereby vectors moved more and spent less time feeding, resulting in reductions in pathogen transmission. These results suggest that conserving predator diversity in natural and managed ecosystems may enhance the magnitude and spatial consistency of herbivore suppression, and potentially diminish the prevalence of some vector-borne plant pathogens.