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Conference Details

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Conference Title: Joint North Central & Southwestern Branch Meeting of the Entomological Society of America

Communication Title: Tradeoffs between pest and pollinator management occur at the local and landscape-scale

ABSTRACT

Pesticide use is a global phenomenon which threatens the biodiversity and ecosystem function of pollinators. In the Upper Midwest, pesticides are used to reduce pest pressures and enhance yields. However, some pesticides can also harm honey bees and wild bee pollinators. Thus, a tradeoff may occur in pollinator dependent farms, where the use of pesticides could reduce wild and honey bee pollinator populations. The aim of this research was to study changes in bee pollinator populations due to pesticide use in pollinator dependent farms of the Upper Midwest, with the goal of determining how pesticides could be safely used to control pests while conserving wild bee pollinators. This research was conducted in 2017 and 2018 across farms in Michigan, Ohio, Indiana, and Illinois. At each farm, we measured the levels of insecticide concentrations in crop flowers, pest numbers, and made observation of bee pollinators foraging on crop flowers. We then cataloged the use of pesticides around each farm to determine if landscape-level pesticide use in the Upper Midwest could mediate bee pollinators foraging at crop flowers. Our research suggests that farms with higher numbers of pests also have more wild bee pollinators, indicating that a tradeoff exists between pest and pollinator management. Flowers from which bees foraged were also found to contain toxic levels of insecticides, indicating that pollinators are exposed to pesticides which are applied to control pests. When we evaluated the landscape around farms, we found that fungicide use, and synergisms between landscape-scale fungicide use and local-level toxicity of flowers increased honey bee foraging on toxic flowers while reducing the use of toxic flowers by wild bees. This suggests that local and landscape-level pesticide use may be reducing wild bee populations on farms in the Upper Midwest, and promoting exposure of honey bee pollinators to toxic chemicals in crop flowers. More broadly, these results indicate the need for reform of pesticide management practices in the Upper Midwest to enhance the health and populations of all pollinators.

COMMUNICATION OUTCOMES

This research stems from a \$3.6 million grant from the United State Department of Agriculture which funds research into the environmental, ecological, and socioeconomic effects of pesticide use. The research spans 5-years and engages a team of 16 scientists from Michigan State University, the Ohio State University, Purdue, the University of New Hampshire, and Clark University. The Szendrei Lab focuses on the ecology and management of arthropods that occur in vegetable production systems and has broad interests in pollinator and pest management. My role in the Szendrei Lab is to combine data collected from across these universities to evaluate the response of bee pollinators to pesticide use in the Upper Midwest. Prior to my joining the Szendrei laboratory in 2019, researchers from MSU, Purdue, and OSU collected these data, allowing me to move the project forward by performing my analysis. The impact of my analysis will be to guide the future management of pests and pollinators in the Upper Midwest. However, pesticide use is a widespread phenomenon, indicating that the results of my study could be widely applicable to cropping systems which rely on pollinators worldwide.

The Joint North Central & Southwestern Branch Meeting of the Entomological Society of America is the ideal setting to communicate the results of my research. At this meeting, my locally relevant research will reach scientists from across the Upper Midwest, allowing for the dissemination of my results to many local stakeholders who can shape pest management policy. Moreover, since this is a joint meeting with the Southwestern Branch, I will be able to communicate the results of my project to researchers outside of my region. Therefore, by attending this meeting, my oral presentation will likely impact a wide group of researchers from across the US. By networking with these researchers from both branches, I will be able to elevate my status as a researcher in the field of pollinator management. Presenting my research and receiving feedback from my peers will allow me to develop as a scientist, improve my analysis, and become more suitable for academic positions. By attending this meeting, I will also be exposed to presentations from a broad array of research within the field of Entomology. This will allow me to advance my career by making me a more well-rounded and knowledgeable scientist. Overall, as I prepare this research for publication, attending this meeting will help provide critical feedback which will guide this project to a successful conclusion.