LEOPOLD CENTER
FOR SUSTAINABLE AGRICULTURE

Optimizing buffers strips for improved ecosystem services

Abstract: The project objective is to enhance delivery of insect-derived ecosystem services provided by perennial buffers through a strategy of combining research and outreach.

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Existing buffer strips play a positive role but are not optimal. The best habitat would be buffers that use native flowering forbs that are attractive to beneficial insects in a mixture that provides a flower resource throughout the growing season. A higher density of highly attractive native species is better for beneficials than a high diversity of native species.

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What was done and why?

The project investigators seek to understand how perennial vegetation can improve conditions for crop production, specifically through the delivery of pest suppression and pollination ecosystem services (i.e., insect-derived ecosystem services). Plant diversity is an important factor in determining the diversity of higher trophic levels, including insects that mediate ecosystem services. Beneficial insects can mediate ecosystem services through biological control of herbivorous pests and pollination.

The goal was to determine the optimal composition of perennial plant communities for buffer strips that could enhance beneficial insect abundance and diversity. The researchers hypothesized that diversity and abundance of beneficial insects will be:

1. greatest in diverse plant communities with a continuous availability of floral resources,
2. intermediary in plant communities reduced in species richness and availability of floral resources, and
3. lowest in plant communities composed of single species.

What did we learn?

Results from the field experiments indicate that:

1. Plant communities that dominate existing buffer strips and lands designated for conservation are generally not optimal for beneficial insects;
2. Adding flowering perennial forbs improved buffer strips as habitats for beneficial insects, especially pollinators;
3. Buffer strips can be further optimized by intentionally combining native species that are highly attractive to beneficial insects at modest levels (i.e., only two very attractive plant species) such that flowering resources for pollen and nectar are available throughout the growing season;
4. Established buffers on organic farms house more beneficial insects than adjacent conventional crop fields (although the organic buffers are not consistently more or less populated than the organic croplands they border); and
5. Conservation of beneficial insects appears to be more a function of the density of key species than a general increase in the diversity of native plants species.