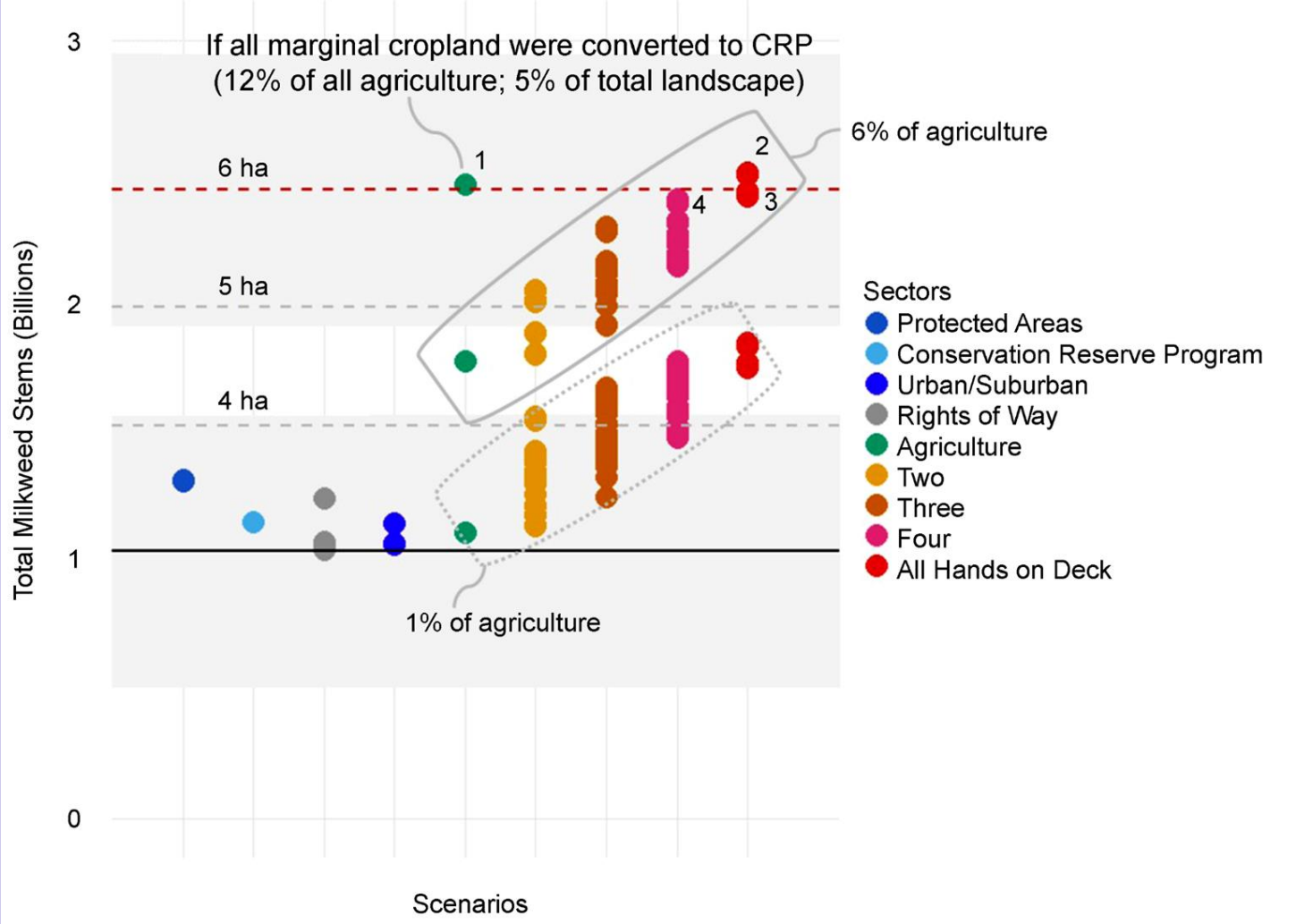
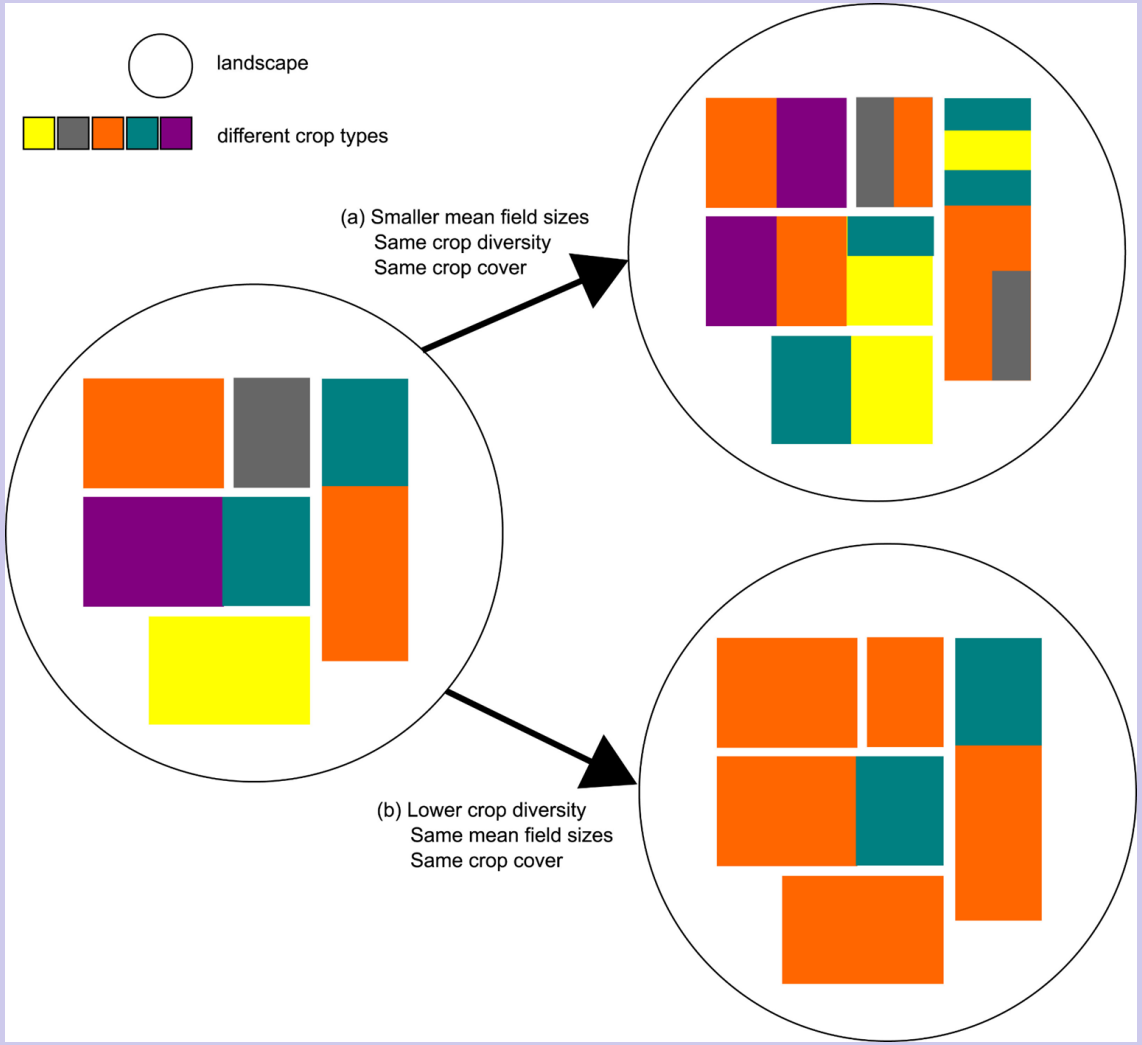
Agriculture & Monarchs: Recent Research Summary

Presented by: Jake Koenig

Restoring Monarch Butterfly Habitat in the Midwestern US: 'All Hands on Deck'. (Thogmartin et al., 2017)



More Milkweed in Farmlands Containing Small, Annual Crop Fields and Many Hedgerows. (Martin, et al., 2021)



Asclepias Dynamics on US Rangelands: Implications for Conservation of Monarch Butterflies and Other Insects. (Spaeth Jr. et al. 2022)

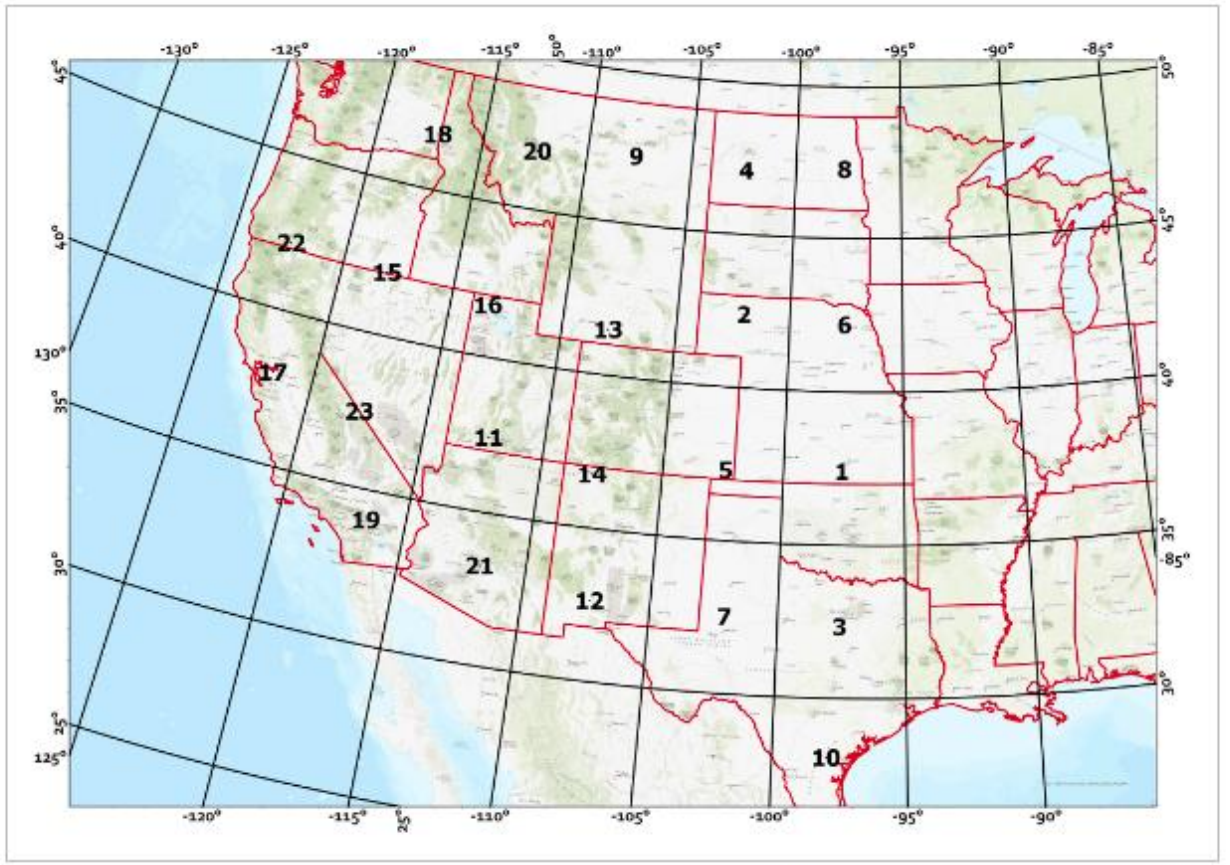
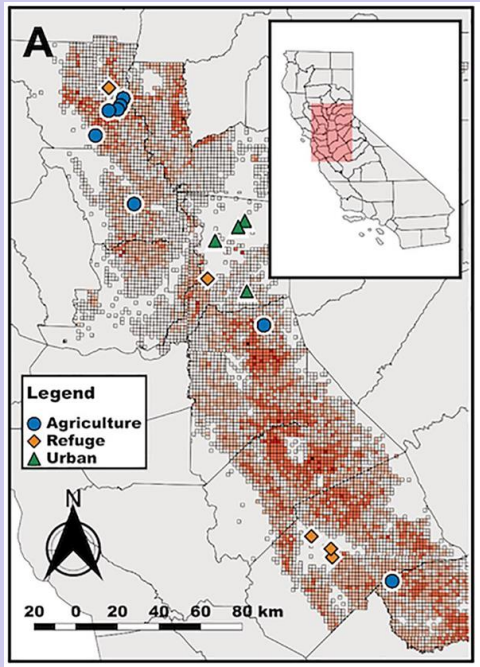
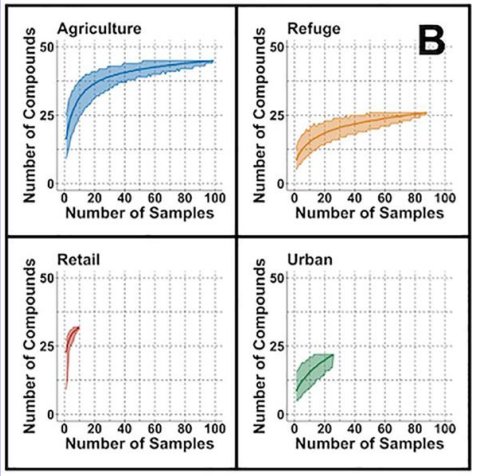


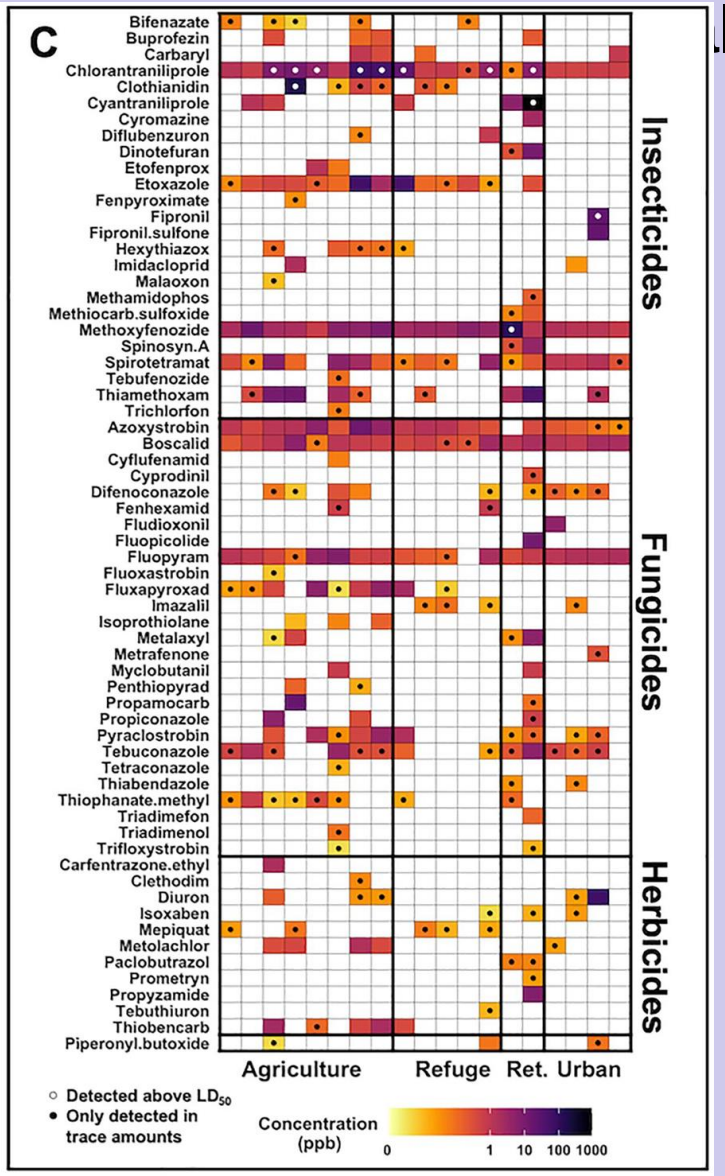
Fig. 5 Open in figure viewer | PowerPoint

Latitude–longitude cell ranking based on *Asclepias* density and hectares. For example, the highest ranking cell (1) occupies N35-40 lat, and W-95-100 long.

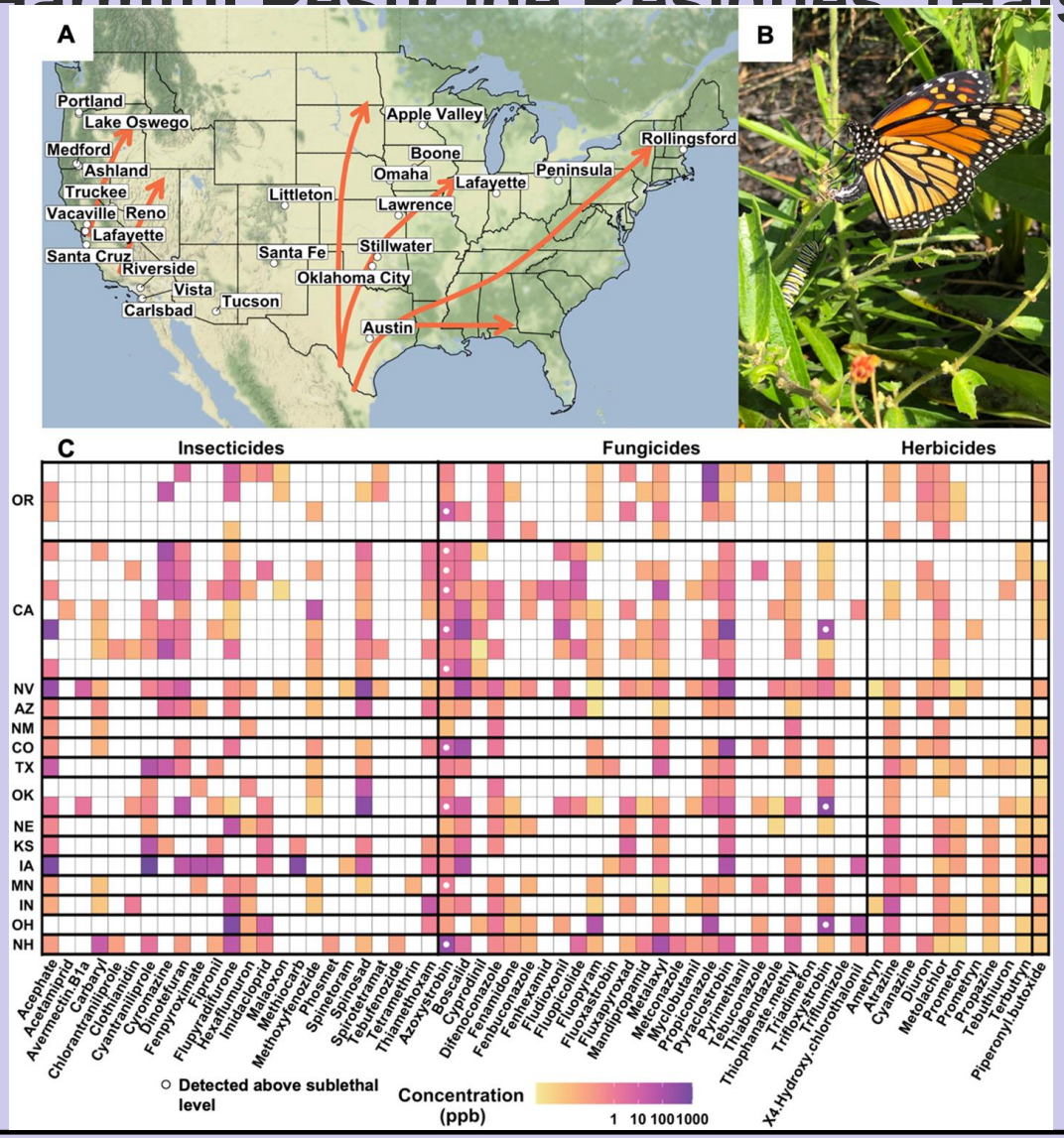
Pesticide Contamination of Milkweeds Across the Agricultural, Urban, and Open Spaces of [illegible]lsch et al., 2020)



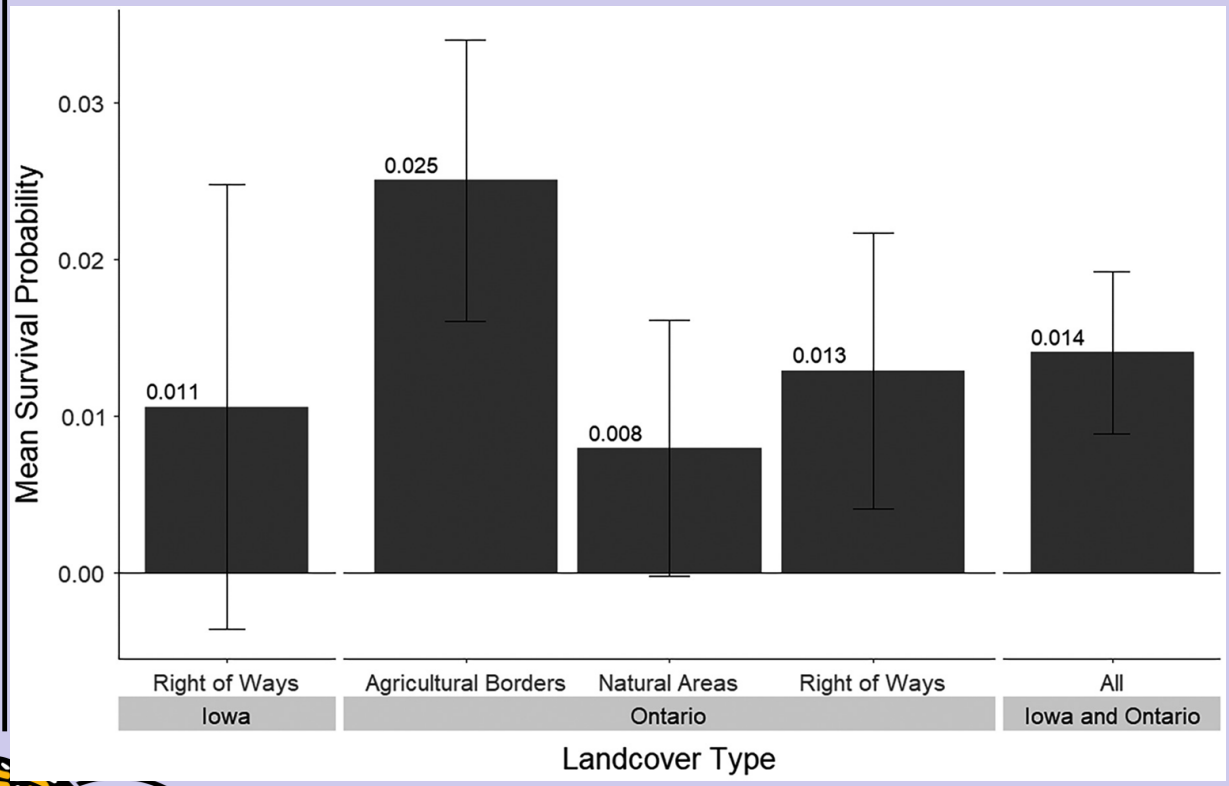


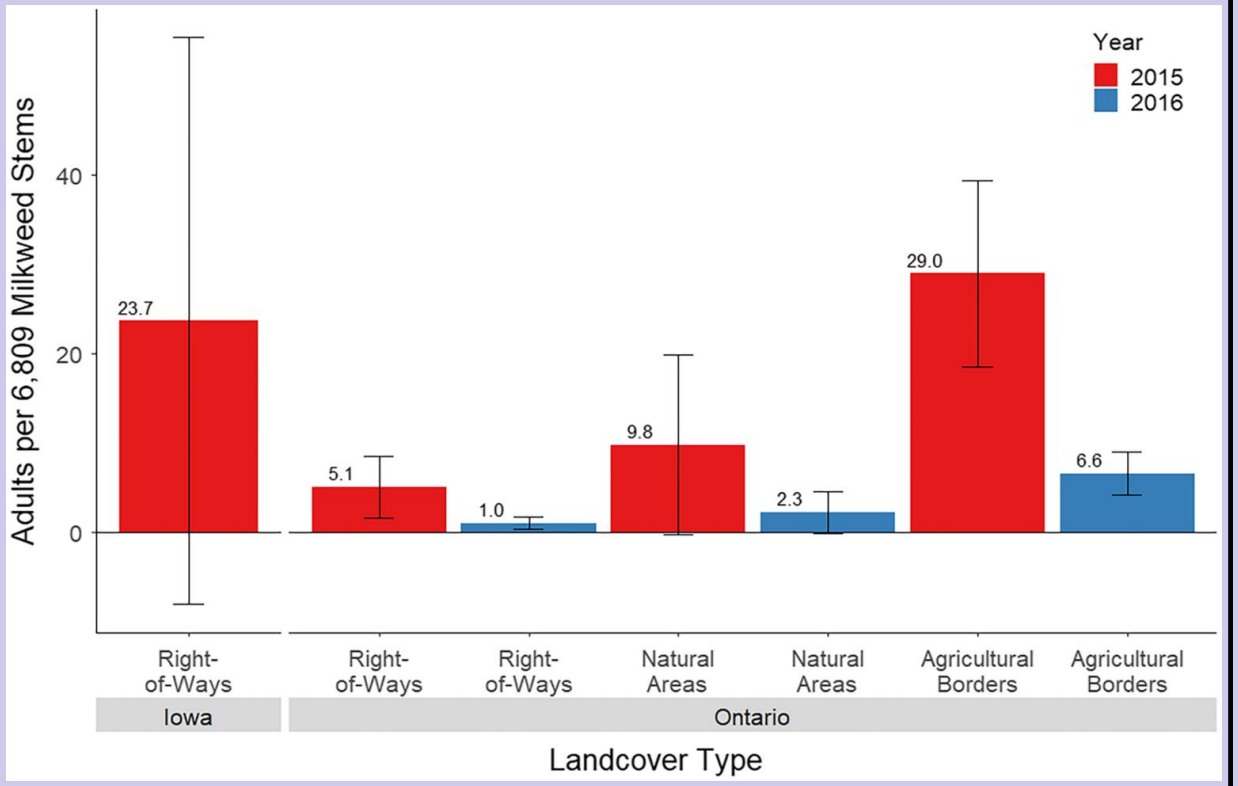


Milkweed Plants Bought at Nurseries May Expose Monarch Caterpillars to Harmful Pesticide Residues (Halsch et al., 2022)

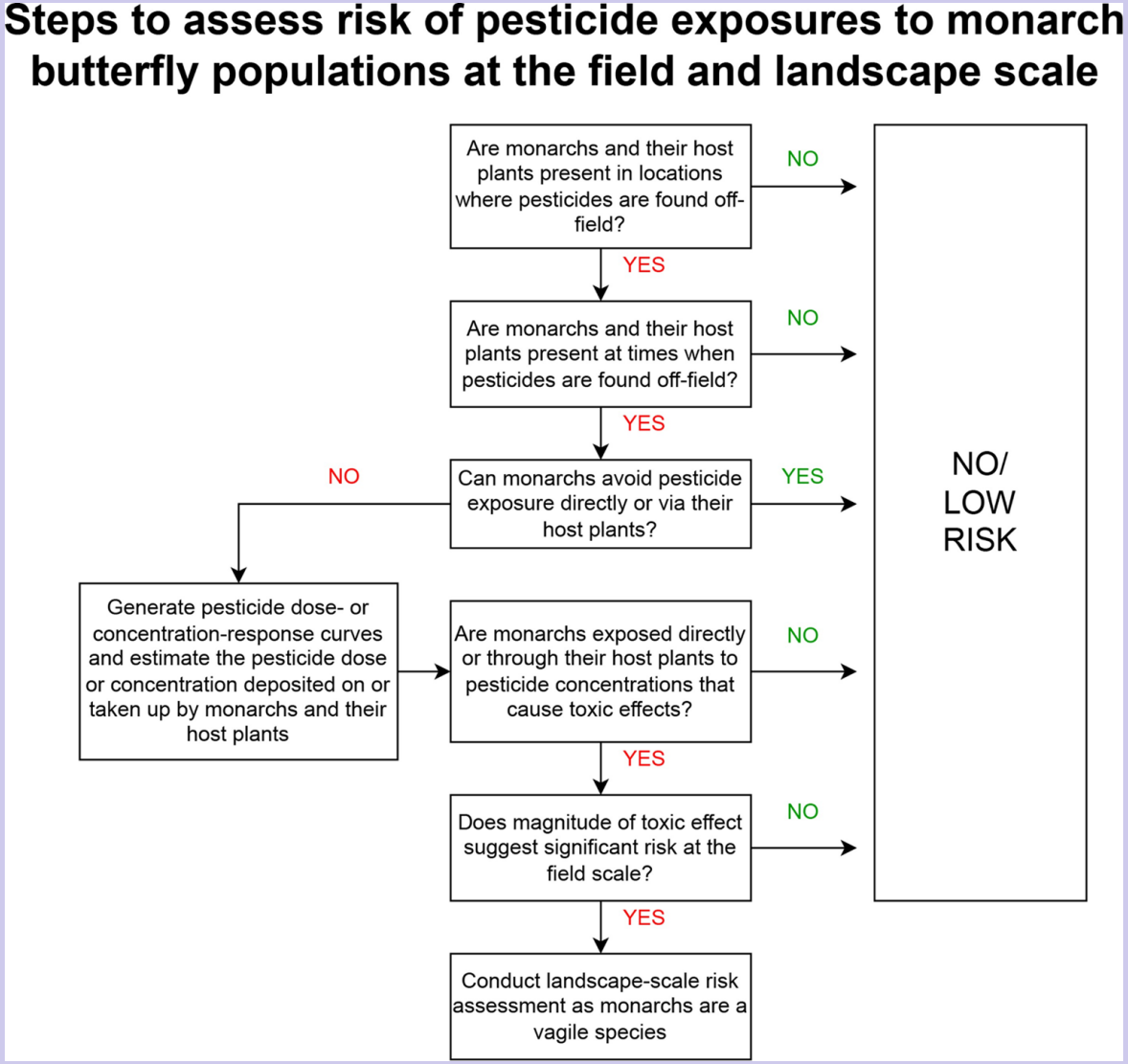


Estimating Arthropod Survival Probability from Field Counts: a Case Study with Monarch Butterflies. (Grant et al., 2020)





Monarch Butterfly Ecology, Behavior, and Vulnerabilities in North Central United States Agricultural Landscapes. (Grant et al., 2022)



MJV Resources Mentioned

MONARCH JOINT VENTURE

Partnering across the U.S. to conserve the monarch migration

www.monarchjointventure.org

Monarch Joint Venture

The Monarch Joint Venture (MJV) is a partnership of federal and state agencies, non-governmental organizations, businesses and academic programs working together to protect the monarch migration across the United States.

Our mission is to protect monarchs and their migration by collaborating with partners to deliver habitat conservation, education, and science across the United States.

Our vision is thriving monarch populations that sustain the monarch migration into perpetuity and serve as a flagship for the conservation of other plants and animals.

Contact us

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Find additional contact information on our website.

Photo credits: Wendy Caldwell
Figures: Holly Holt

Risks of Neonicotinoid Use to Pollinators

Globally, pollinator populations are decreasing; their declines endanger food production and threaten natural ecosystems (Ollerton, Winfree, & Tarrant, 2011). Many factors contribute to these declines, including habitat loss, climate change, predators and disease, poor nutrition, invasive species and chemical exposure. A relatively new class of pesticides, **neonicotinoids**, is of growing concern as a threat to pollinators.

How Neonicotinoids Work

Neonicotinoids (neonics) are commonly-used insecticides (Goulson, 2013; Simon-Delso et al., 2015) and are used in agricultural, nursery, and private settings. They can be applied to plants many ways, such as seed treatments or spraying plants or soil.

In agriculture, seed treatments account for an estimated 60% of neonic use (Goulson, 2013). Neonics are highly water soluble, allowing the growing plants to absorb and transport the chemical to all plant tissues, from roots to shoots (Bonmatin et al., 2015) (Figure 1). While seed coatings are the most common application method, other methods often use a heavier amount of neonics.

Figure 1 — ~2% released as dust; ~1.5% absorbed by plant; >80% into environment; 1; 2; 3

Neonics disrupt the central nervous system of insects and other invertebrates; sufficient doses cause paralysis and death. Since small quantities of neonics are highly lethal (Goulson, 2013), their systemic movement to all tissues of treated plants offers protection against insect pests, especially during early stages of plant development. Because of differences between vertebrate and invertebrate nervous systems, neonics are much less toxic to vertebrates (Simon-Delso et al., 2015). Their low toxicity to vertebrates and systemic plant protection make neonics appealing for pest control, but they can bring unintended harm to pollinators.

Routes of Neonicotinoid Exposure

Pollinators can be exposed to neonicotinoids in multiple ways. Pollinators may consume contaminated plant products like leaves, pollen and nectar and be killed if they consume a high enough dose of the chemical. For example, when monarch caterpillars eat neonicotinoid treated milkweed plants they are often killed. Toxic dust kicked up while planting neonic-treated seeds can also kill honeybees foraging nearby (Bonmatin et al., 2015; Goulson, 2013). Since neonics are water soluble, they can also

Pollinator Habitat Help Desk

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FARMERS for MONARCHS

Farmers for Monarchs

Identifying and implementing solutions on agricultural and ranching

2022 Monarch

RESEARCH REVIEW

Prepared by

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