

Monarch Oviposition and Larval Survival on Nine Native Milkweed Species

RFR-A1727

Victoria Pocius, graduate student
Department of Ecology, Evolution,
and Organismal Biology
Richard Hellmich, research entomologist
USDA-ARS, Department of Entomology
Diane Debinski, professor, Ecology
Montana State University

Introduction

The Iowa Monarch Conservation Consortium was established in March 2015. Adding milkweeds to agricultural landscapes is one of many Consortium goals. In order to further monarch butterfly conservation efforts, scientists need more information about milkweed phenology and persistence on the landscape, and how monarchs are using these plants because milkweeds are now absent from most agricultural fields. This study was conducted over multiple years to examine both oviposition preference and larval survival on nine milkweed species endemic to Iowa. These data will be used as a baseline for informing monarch habitat conservation and restoration efforts across the Midwest. These are results from third season observations. Two studies using the same nine milkweed species in laboratory experiments were recently published. In greenhouse experiments, early instar survival and growth on the nine milkweed species were evaluated.

Materials and Methods

Milkweed plots were established at 11 Iowa State University Research and Demonstration Farms in June 2015. Each of nine milkweed species was randomly assigned to a 1m² plot within one row. Each block was separated by 1m. Five milkweeds of the same species were placed within each 1m² plot. The milkweed

species included common, *Asclepias syriaca*; swamp, *A. incarnata*; butterfly, *A. tuberosa*; whorled, *A. verticillata*; showy, *A. speciose*; poke, *A. exaltata*; Sullivant's, *A. sullivanti*; tall green, *A. hirtella*; and bluevine, *Cynanchum laeve*. Milkweeds that did not survive the winter were replaced at the start of the 2016 and 2017 monitoring seasons. Once per week, each plant was examined for the presence of monarch eggs and larvae by carefully inspecting each leaf. When a larva or egg was found, the milkweed species and plant position within the plot were recorded. This protocol was modified from the Monarch Larva Monitoring Project.

Results and Discussion

Monarch eggs and larvae were observed throughout the summer, but most findings were recorded in July and August during the second breeding generation. Monarch eggs and larvae were found on all nine milkweed species, indicating that all the milkweeds were suitable monarch hosts. The highest number of average eggs/plant was recorded from July 30–August 5, 2017 (Figure 1). *A. incarnata* had the highest average number of eggs (0.06/plant per week) when all monitoring data were pooled (Figure 2). *A. incarnata* also had the highest average number of larvae (.91/plant) when all monitoring data were pooled. This represents 22 percent of all findings, *A. syriaca* represented 20 percent of all findings (data not shown). Swamp and Common milkweed grew well at all locations.

Conclusions

All nine milkweed species included in the demonstration plots are suitable host plants for monarch butterflies. Peak egg laying in 2017 occurred during the first week of August, roughly the same time as the 2015 peak, and three weeks earlier than the peak in 2016. *A. incarnata* had the highest number of eggs on average across all sites. *A. incarnata* was the species with the highest number of larvae on average at all sites, although all species were used for egg laying and as larval host plants.

Acknowledgements

This research was supported through grants from the Iowa Native Plant Society, The

Center for Global and Regional Environmental Research, and Prairie Biotic Research, Inc., as well as the Iowa Monarch Conservation Consortium. The authors would like to thank Nick Howell for greenhouse assistance; Chris Beedle, Nick Howell, Steve Jonas, Dallas Maxwell, Warren Pierson, Ken Pecinovsky, Matt Schnabel, Myron Rees, Terry Tuttle, and Lyle Rossiter for milkweed plot planting and maintenance assistance; Randy Breach, Cory Haggard, Jackie Appelhans, and Nancy Shryock for plot monitoring assistance.

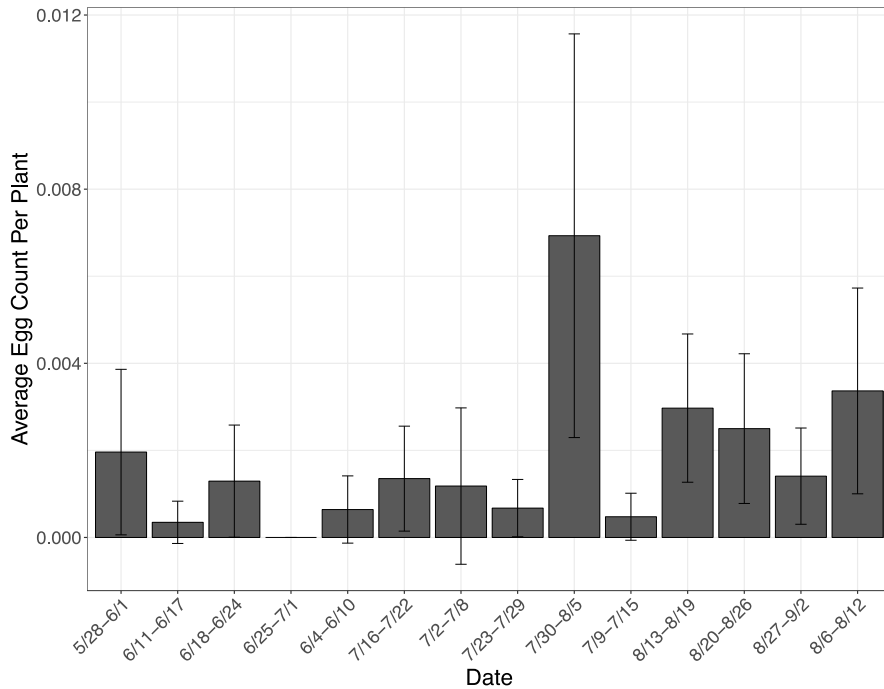


Figure 1. Average number of eggs laid/plant per week in 2017. All ISU farm sites and species were pooled.

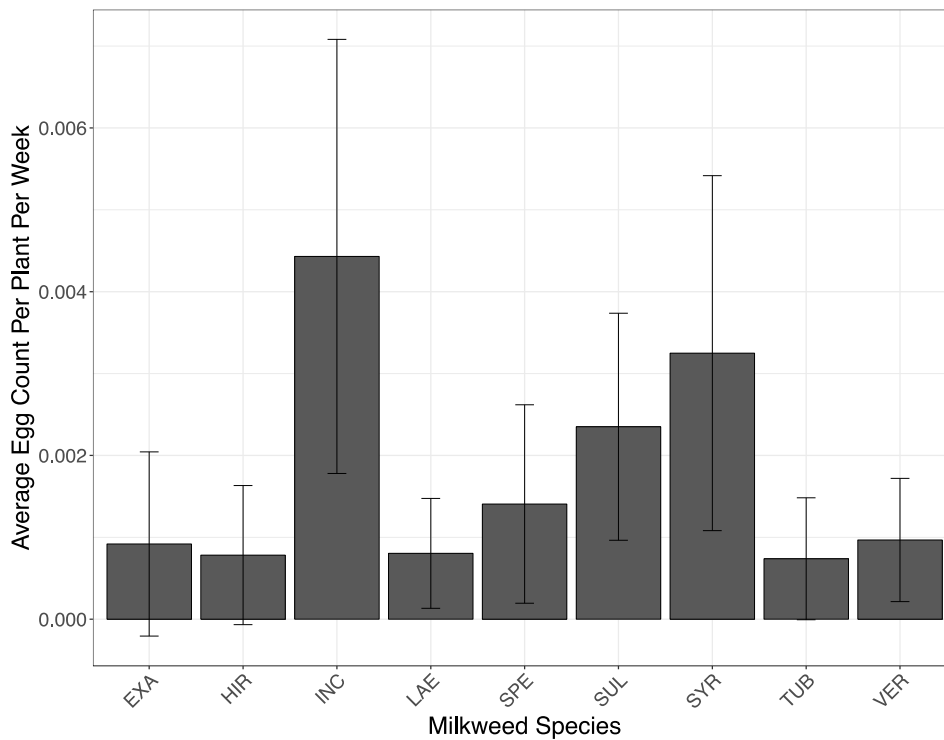


Figure 2. Average number of eggs/plant per week by species during the 2017 breeding season. All ISU farm sites were pooled.

LAE = *C. laeve*, bluevine; EXA = *A. exultata*, poke; HIR = *A. hirtella*, tall green; INC = *A. incarnata*, swamp; SPE = *A. speciose*, showy; SUL = *A. sullivantii*, sullivant’s; SYR = *A. syriaca*, common; TUB = *A. tuberosa*, butterfly; VER = *A. verticillata*, whorled.