

Operation Monarch: Developing Protocols for Monarch Butterfly Conservation Plantings in Golf Course Naturalized Roughs, Parks, and other Urbanized Areas

Adam Baker, Daniel McNamara, Carl Redmond, Gregg Munshaw and Daniel Potter
University of Kentucky

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Objectives:

- 1) Evaluate methodology for establishing native milkweed (common, swamp, and butterfly) in golf course naturalized roughs
- 2) Document effectiveness of golf course milkweed plantings, with or without wildflower strips, for attracting and sustaining monarchs and other pollinators
- 3) Support and promote golf courses for monarch butterfly conservation through outreach education, webinars, conferences, trade journal articles, and media releases

This research project establishes a new conservation initiative, Operation Monarch Butterfly for Golf Courses [OMBGC]. It evaluates protocols for establishing monarch butterfly habitat and food resources in golf course naturalized roughs, and promotes the program's implementation and visibility through extension education and outreach. Populations of this charismatic beloved butterfly, renowned for its long-distance migration, are threatened by loss of wild milkweeds (*Aclepias* species) which are its only larval hosts. Monarchs require stands of native milkweeds for caterpillar development, accompanied by wildflowers to provide nectar for the butterflies during egg-laying and to sustain them along their migration routes. Milkweeds have been decimated by urbanization and by herbicide use in fields of genetically-modified herbicide-resistant crops. Increasing monarch butterfly populations through domestic/international actions and public-private partnerships is one of the three overarching goals of the 2015 National Strategy to Promote the Health of Honey Bees and Other Pollinators.

This is an opportunity for the Golf Industry to provide leadership in helping to reverse monarch decline by establishing milkweeds and nectar plants in naturalized roughs. Stands of milkweed and nectar plants adjacent to cart paths and tees, accompanied by interpretative signage, offer opportunities for conservation education while providing interest during play. Such areas can be mowed annually, in late autumn, after the monarch migrations. OMBGC complements and extends other golf-related environmental initiatives including the Audubon Cooperative Sanctuary Program, and Operation Pollinator for Golf Courses.

For Objective 1, we are evaluating establishment methods for three native milkweeds, common (*Asclepias syriaca*), swamp (*A. incarnata*), and butterfly (*A. tuberosa*), all of which are commercially available and suitable for naturalized golf course settings. Treatments include three preparation methods 1) vertical mower 2) fraze mower, and 3) scalp (with herbicides applied in spring as needed); and two seeding methods 1) drill 2) hand sown. Plots were prepared and seeded in November 2016 and will be evaluated in 2017 and 2018.

For Objective 2, we cooperated with superintendents in autumn 2016 to establish two larger plots in naturalized roughs of each of three golf courses. The planting schemes being compared include 1) common milkweed, 2) common milkweed strip-cropped with native wildflowers, 3) a 50:50 mix of swamp/butterfly milkweed, 4) swamp/butterfly milkweed mix strip-cropped with

native wildflowers, and 5) a commercial monarch conservation seed mix containing swamp and butterfly milkweeds plus native wildflowers, with six replicates of each planting scheme. Plots were prepared by scalping to weaken existing vegetation, scarifying with a vertical mower, raking out debris, and hand seeding. For the milkweed plots strip-cropped with nectar plants, the wildflower strips border the milkweeds on the side most visible from play.

Beginning in spring 2017 we will compare effectiveness of the planting schemes by evaluating the number, height, and developmental stage of the milkweed plants monthly for two growing seasons. Usage by monarchs will be assessed by examining a subset of plants in each plot for eggs and larvae biweekly from 10 June through 10 October in each year. We will also document usage by non-monarch butterflies and bees monthly during the first and second growing seasons. Butterflies will be counted and identified on the wing during timed walk-arounds of each plot. Bees will be surveyed using 50-bee collections from milkweed flowers and from the accompanying wildflowers. Effectiveness of the golf course plantings for attracting and sustaining monarchs will be compared to Monarch Waystations (small gardens with milkweed and nectar plants), some 11,000 of which have been planted at schools, businesses, parks, zoos, nature centers, and by backyard gardeners. Our hope is to demonstrate that golf courses can also play a valuable role in conservation of monarch butterflies and other pollinators.

Outreach education is an important component of this project. We will publish articles in Golf Course Management, USGA Green Section Record, and horticultural trade journals to disseminate the findings. We will publicize OMBGC to national environmental conservation and advocacy organizations (e.g., monarchwatch.org; monarchjointventure.org, wildones.org), facilitate the certification of participating golf courses as Monarch Waystations and work with industry sponsors to develop educational materials for courses committing to OMBGC.

References:

National Strategy to Promote the Health of Honey Bees and Other Pollinators.
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