Establishing Monarch Butterfly Habitat On Golf Courses

It´s a slow process that requires patience, but planting milkweed food sources for monarch butterflies on golf courses can help reverse the decline of these important pollinators.

BY JOHN DANIELS

The monarch butterfly is an iconic species — one that is easily recognizable by adults and children alike. They are beautiful creatures that embody our connection with nature. To many, they symbolize rebirth, transformation, endurance, and hope. Monarchs provide a unique educational tool, pollinate wildflowers and other desirable plants, and are an indicator of ecosystem health. They are also quite valuable to the public, $4.78 billion to $6.64 billion according to one study. Unfortunately, the monarch butterfly population has declined significantly in recent years. In the Midwest alone, researchers estimate the population decreased by 81 percent from 1999 to 2010 (Pleasants and Oberhauser, 2012).

The monarch butterfly is completely dependent on milkweed for survival. Adult female butterflies lay their eggs exclusively on the underside of milkweed leaves. Once the eggs hatch, the young caterpillars feed on the egg before eventually feeding on the milkweed leaves. It is during this period that the caterpillars ingest a toxin present within the milkweed. The toxin that is accumulated during early feeding stages remains even after metamorphosis and helps protect adult butterflies from potential predators.

Eradication of milkweed in commercial agriculture fields, along roadways, and in urban landscapes is a major concern and one of the primary reasons for the decline in the monarch butterfly population (Thogmartin et al., 2017). Golf courses can play an important role in providing necessary habitat for monarch butterflies and other important pollinators to offset

Adult monarch butterflies rely on native nectar sources for food and energy during their long annual migration. (Source: Audubon International)

Monarch caterpillars feed exclusively on milkweed leaves, making this plant integral to the long-term viability of the monarch butterfly. (Source: Audubon International)

Using plugs of milkweed is the preferred planting method for formal gardens where keeping plants in place is desired.

some of the habitat that is being lost elsewhere. This is especially true in densely populated urban settings, where golf courses often represent the largest green spaces.

It is a long journey from the oyamel fir forests in southern Mexico, where most monarchs overwinter, all the way to their final destination in Canada. Three to four generations of monarchs are needed to make the 3,000-mile annual trek. Ample milkweed and nectar sources along the migration path are critical to a successful journey. Promoting the establishment of milkweed on golf courses throughout the migration path that transects North America will help to ensure this beautiful species rebounds and thrives for many years to come.

SELECTING APPROPRIATE MILKWEED SPECIES

More than 70 milkweed species are native throughout the United States and Canada, but less than half of these have been documented as

Adding milkweed and other wildflowers into existing naturalized areas is a great way to boost monarch habitat. Slight adjustments to the mowing program can help milkweed thrive.

suitable monarch larval hosts (Borders and Lee-Mäder, 2014). When trying to create monarch habitat, selecting region-specific milkweed species that can withstand environmental stresses and be used by monarch larvae is key. Otherwise, monarch butterflies may deposit their eggs on a milkweed species that cannot be consumed by the caterpillars, causing them to starve and eventually die. Milkweed genera that should be avoided include *Apocynum*, *Cynachum*, *Funastrum*, and *Matelea*. The one exception to this is sand vine (*C. leave*), which can be fed on by monarch larvae (Bartholomew and Yeargan, 2001).

Besides not providing an edible food source, certain milkweed species can disrupt the natural monarch migration cycle. Tropical milkweed (*Asclepias curassavica*), while popular in formal gardens with its showy inflorescence, can be a detriment to monarchs. This non-native plant blooms late in the year, encouraging monarchs to delay migration, and increases transmission and virulence of the protozoan parasite *Ophryocystis elektroscirrha* (Bartel et al., 2011). Although tropical milkweed can be easily found in many garden stores, it should not be used in southern locales where it doesn't die back if the goal is to promote monarch butterflies.

Not all milkweeds are created equal. Researchers at the University of Kentucky found monarchs preferred taller milkweed species with broad leaves, like the swamp milkweed (*Asclepias incarnata*), common milkweed (*Asclepias syriaca*), and showy milkweed (*Asclepias speciosa*) (Baker and Potter, 2018a). Another factor that should be considered when deciding what types of milkweed to plant is whether they spread by tillering. Those that do not spread rapidly may be best suited for formal gardens, whereas those that spread quickly could be better for prairie settings.

"Milkweeds: A Conservation Practitioner's Guide" from the Xerces Society provides a list of appropriate milkweed species, based on ecoregion, that are deemed suitable hosts for monarch butterflies. Alternatively, the website monarchmilkweedhabitat.com provides an interactive map that lists native milkweed species for each state based on information from the USDA Plants Database.

SEEDING VS. PLUGGING

There are basically two options when it comes to planting milkweed: seeding and plugging. Successful establishment can be achieved by both techniques and each offers unique advantages.

SEEDING

Seeding is the most cost-effective option and the most logical choice when establishing milkweed over large areas. Naturalized areas, which are becoming a common feature on golf courses, are typically established from seed. While many golf courses have traditionally planted grass species in

Controlled burns during the off-season are a terrific way to reduce weed pressure and stimulate native wildflowers.

Planting milkweed in clusters along the perimeters of naturalized areas will help to attract monarch butterflies.

these areas as a way to enhance aesthetics while reducing inputs, a growing number of facilities are looking to establish more diverse naturalized areas that provide habitat for pollinators and a variety of other species. Often, milkweed seed can be purchased as part of a wildflower mix that includes other nectar species. Once the seed mix is established, the naturalized areas require minimal inputs. However, it can take some time to achieve the desired look. It is also important to keep in mind that the population of the stand will be dynamic, varying from year to year depending on environmental conditions. For example, during a wet spring certain plants may flourish while others may be curtailed.

There are numerous sources available for milkweed seed, some of which are free of charge to golf courses. Monarchs in the Rough, a program led by Audubon International and the Environmental Defense Fund, with financial support from the National Fish and Wildlife Foundation and the USGA, is providing regionally appropriate milkweed seed to 500 golf courses throughout the migration path. Golf courses that are eligible for free seed include those in Illinois, Indiana, Ohio, Michigan, Pennsylvania, Wisconsin, and all states west of the Mississippi River. Each course is given enough seed to establish one acre of monarch habitat, along with signage to highlight the program benefits.

Other pollinator programs, such as #MonarchChallenge and Operation Pollinator, also offer complimentary wildflower seed mix for golf courses. You'll just want to confirm that the mix you are provided includes some milkweed.

Milkweed seed can also be purchased from a variety of vendors. For a list of local growers, search the Xerces Society Milkweed Seed Finder. You can search for a specific milkweed species or see a list of growers in a given state. Given the wide distribution of many milkweed species, selecting locally sourced material is suggested to minimize potential issues with different ecotypes.

PLUGGING

Planting small plugs of milkweed is another option for establishing monarch butterfly habitat. This technique is advantageous for planting formal gardens when controlling where each plant grows is desired. This is also an effective method for introducing milkweed into an existing naturalized area, where seedlings could have difficulty competing with more mature plants and grasses. However, planting plugs of milkweed over large areas can prove very time consuming and uneconomical. Plugs will also likely

Establishing milkweed on golf courses doesn't require large expanses of land. In fact, numerous small clusters of milkweeds positioned throughout a property are better for attracting monarchs.

require more attention with regard to watering in the weeks following planting until root systems develop.

Plugs of milkweed can be secured through programs like Monarch Watch. Golf courses can purchase milkweed in flats from this program, similar to how tomato plants are grown, or apply for free plant material as part of a habitat restoration program. To qualify for free milkweed plants, two acres of habitat is needed. Golf courses are eligible to apply for the program.

Alternatively, a golf course could easily create its own flats of milkweed by sowing seeds into small containers or flats. This a perfect project for facilities that have their own greenhouse. Establish plants during late winter and transplant in the spring once air temperatures consistently reach 65 to 75 degrees Fahrenheit. This method is a great way to give milkweed a head start over weed competition. Generally, milkweed plants will be ready for transplanting four to eight weeks after seeding.

TIPS FOR SEEDING

Seeding should occur during late fall or early winter. The cold, moist weather of winter will actually help break the dormancy of the milkweed seed. This is a critical step for successful germination. Once temperatures warm in the spring, the seed will begin to germinate.

If plantings occur outside the fall through early winter period, the seeds should be stratified to increase the germination rate. To stratify seeds, place them in a sealed bag with moist sand and leave them in the refrigerator. The length of time needed has been shown to vary depending on milkweed species and ecotype (Luna and Dumroese, 2013). According to the "Monarchs in the Rough Resource Guide for Golf Course Superintendents," a period of four to six weeks is recommended as a general rule. Shaking the bag of seed and sand for a minute can help break any remaining seed coat.

Intensive soil preparation is not necessary when planting milkweed. However, ensuring good seed-to-soil contact will yield the best results. The deeper the disturbance to the existing soil, the more weed seed you will expose, so the best approach is usually to scalp down an area and avoid turning over the soil. For areas with dense plant coverage, such as turfgrass areas, chemical treatment with a nonselective herbicide is beneficial prior to planting milkweed.

In addition to milkweed plants, it is important that other nectar sources are available for adult monarch butterflies.

The method of seeding should be determined by the size of the area. Small areas can be sown by hand or by using a mechanical device such as a handheld spreader, walk-behind broadcast spreader, or drop seeder. For large plantings that encompass multiple acres, using a seed drill that can be calibrated to provide a specific number of seeds per unit area is recommended. No-till drills that are specifically designed for handling native grass and wildflower seeds can be rented from the Natural Resources Conservation Service (NRCS) in most counties for a reasonable fee. The other option is using a seeder designed for turfgrass seed — but be prepared for occasional clogging.

It is not uncommon for a mechanical seeder to clog while planting a wildflower mix. Unlike turfgrass mixes, which most golf course superintendents are familiar with, wildflower mixes range in seed size and shape. Plants with large seeds, like Indian Blanket (*Gaillardia pulchella*), and those with feathery seeds, such as Goldenrod (*Solidago* spp.), can get stuck in seeders traditionally used for planting turfgrass.

Adding graphite to the seed mix can help alleviate such issues. Graphite is a dry lubricant that reduces friction of seeds and planter components alike. It also prevents static buildup, which can cause certain seeds to stick to one another. It doesn't take much graphite to achieve the desired result, around half a cup of graphite per load of seed is usually sufficient. Simply sprinkle it

on top of the seed mix after it is placed in the seed box.

An alternative option is to incorporate some sand or finely graded fertilizer with the wildflower mix. The weight of the material will help push seeds through the planter tubes, and, in the case of fertilizer, provide some nutrients to help stimulate growth after germination. A 2:1 sand-to-seed ratio by volume is a reasonable rate. Make sure to use dry sand as any moisture will only encourage clogging. If a fertilizer is used, a slow-release organic product would be a good option.

TIPS FOR PLUGGING

Holes for plug plants can be dug with a basic hand trowel or small auger. To increase efficiency, dig all the holes at once in advance of planting. Milkweed plantings should be in small clusters of three to five individual milkweed plants. This will allow employees to more readily distinguish the milkweed from other look-alike plants they may want to remove. Monarch butterflies are also better able to locate clusters of plants compared to individual plants that are spread out. For the best results, position the clusters of milkweeds along the perimeters of naturalized areas so that the monarchs can easily find them and are able to avoid potential predators that may be more prevalent in dense cover.

Planting plugs should occur as soon as possible during spring once the threat of frost has passed. Young milkweed plants will be susceptible to drought stress and will likely require supplemental irrigation every couple of days during the first four weeks after planting. Adding a little starter fertilizer is not required but can aid in development.

MANAGEMENT

Avoid using herbicides that could injure milkweed and other nectar sources, especially during the initial establishment year. Once the plants have matured, they will be able to better compete with other plants. Instead of relying upon chemical treatments to control weeds, use mowing or controlled burns to keep unwanted plants at bay.

The timing of mowing is crucial not only to limit damage to recently established plants, but also to promote the spread and development of new milkweed. Contrary to popular belief, an early summer mowing has been shown to improve regrowth of milkweed and sustain a more continuously suitable habitat for monarch egg laying and larval development compared to an unmown control (Fisher et al., 2015). A second mowing or controlled burn later in the year after the monarchs have departed on their southern migration is also recommended. The exact timing of this will vary depending on region and weather. Websites like monarchwatch.org can help you track the migration progress. As a general rule, the later that mowing occurs in the fall the better. Also, avoid mowing or burning all vegetation during the same period. Instead, remove only half of the vegetation one year and the other half the next as this will ensure some vegetation remains for those pollinators and other animals that do not migrate and depend on the habitat for survival.

Insecticide applications should be avoided where milkweed is growing. Systemic insecticides could be taken up by the plants and ultimately kill monarch caterpillars and other beneficial pollinators. However, the use of insecticides to protect turf areas from troublesome pests like the Japanese beetle is advised. Japanese beetles have been shown to cause extensive damage to common milkweed flowers (Baker and Potter, 2018b). Therefore, anything you can do to limit infestations

Before transplanting milkweed plugs, cut down any existing vegetation and apply a nonselective herbicide to prevent competition from other plants.

would increase the chance of milkweed seeding and ultimately improving monarch habitat.

SETTING REALISTIC EXPECTATIONS

Planting a milkweed wildflower mix is not an overly challenging task for golf course superintendents. They can easily acquire appropriate plant material and generally already have the necessary tools for planting. What is often most difficult is setting reasonable expectations for success. Golf course superintendents are used to planting turfgrass seed and seeing evidence of germination in a matter of a few days. Such instant gratification does not occur when dealing with milkweed and many other wildflowers.

Transforming an existing site into a picturesque landscape of blooming wildflowers is going to be a slow process that requires patience. It is not uncommon for things to look somewhat ugly during the course of the first year. Milkweed plants will be puny, and keeping the area free from weeds will require diligent hand work. Over the course of the first three years, the overall look of the area should dramatically improve and maintenance efforts will be simplified. Don't let the temporary inconvenience deter you from the attractive and healthy landscape that can be achieved. Monarch butterflies and other pollinators are counting on you.

Thanks to Marcus Gray at Audubon International for providing valuable information and feedback on this article.

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