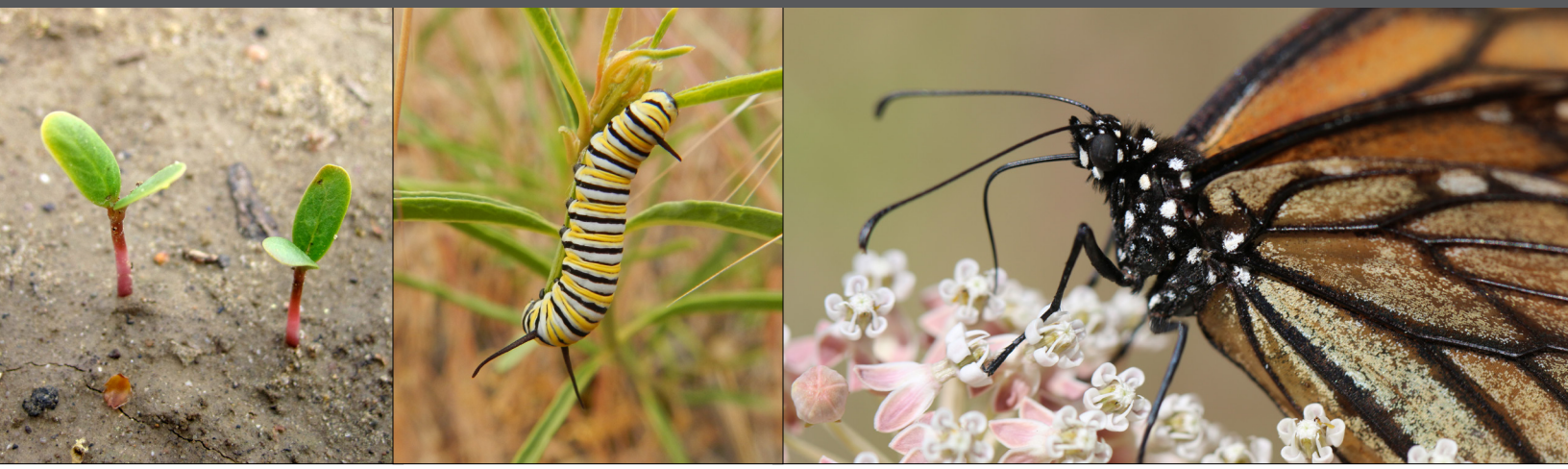
NATIVE MILKWEED PLANTING AND ESTABLISHMENT IN THE WESTERN UNITED STATES



Whether to grow milkweed from seed (l), transplants, or rhizomes may depend on the species and the location. Milkweeds are a necessary plant to support monarch caterpillars (c), and provide a rich nectar source for adult monarchs (r) and many other flower-visiting insects. (Photos: L – John Anderson, Hedgerow Farms, Inc.; C, R – Xerces Society / Stephanie McKnight.)

Native Milkweed Planting and Establishment in the Western U.S.

Monarch butterflies are an iconic species in the U.S. The Western monarch population, which generally breeds west of the Rocky Mountains and overwinters along the California coast, has declined 99.9% since the 1980s.

Monarch caterpillars need to feed on milkweeds (*Asclepias* spp.), therefore planting native milkweed is a critical component of supporting monarchs and helping their numbers recover. However, native milkweeds can be difficult to establish in the West. The Xerces Society has partnered with local native plant nurseries and USDA-Natural Resources Conservation Service Plant Materials Centers to find best practices for successfully establishing narrow-leaved and showy milkweed (*A. fascicularis* and *A. speciosa*) in habitat plantings, because these species are widespread in the west and are commercially available. While these efforts are ongoing, this factsheet contains our best information to date on getting these two milkweed species to flourish.

Where should you plant milkweed?

For most parts of the west, planting native milkweed is recommended as a key strategy for helping monarchs. However, we recommend against planting milkweed in areas where it did not occur historically, including near monarch overwintering sites, to avoid disrupting monarchs' natural behavior. These 'no milkweed' zones include along the California coast within 5 miles of monarch overwintering grounds north of Santa Barbara, and within 1 mile of overwintering grounds south of Santa Barbara. It also includes high elevation forests (~above 9,000 feet). If you live near overwintering sites, consider planting early spring, late-fall, and winter-blooming nectar plants instead of milkweed, as nectar is critical for fueling monarchs during their migration, breeding and overwintering.

A few other factors should be considered when selecting specific site locations for milkweed planting. Both species discussed in this document are drought-tolerant after they are well established, but prefer ample soil moisture, and are often found growing in drainage areas or along riparian areas. Both species also seem to tolerate periodic flooding, flourish in disturbed

areas, and dislike competition from other plant species. Although both are tolerant of a variety of soil types, from sandy-loam to clay-loam, showy milkweed (*A. speciosa*) is more tolerant of alkaline soils than narrow leaf milkweed (*A. fascicularis*).

You do not need a large, dense stand of milkweed to create meaningful monarch habitat; even small patches can provide important resources for monarchs. In fact, there is some evidence that monarchs prefer to lay eggs in small- to medium-sized milkweed patches (i.e. less than 8,500 ft2) compared to large milkweed patches (Pitman et al 2018). When adding milkweed to habitat, we recommend varying the size and density of the milkweed patches.

In general, milkweeds are adapted to full sun. However, recent research has also found that monarchs prefer to lay eggs on narrow-leaved milkweed plants that were shaded, compared to narrow-leaved milkweed plants that were unshaded (Schultz & Crone et al., unpublished data). Planting some milkweed plants in light shade when possible may be beneficial to monarchs. Both narrow-leaved and showy milkweed can tolerate some shade.

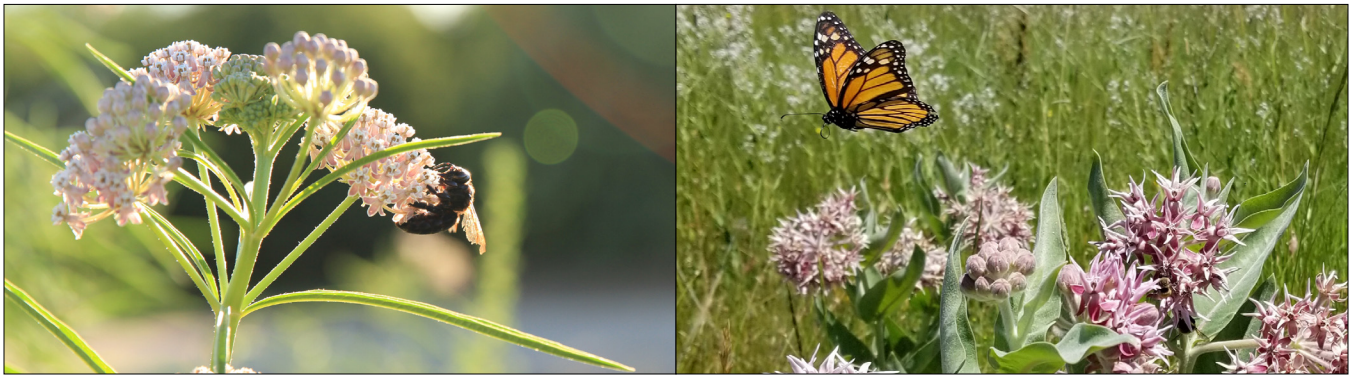
The Problem With Tropical Milkweed

Tropical milkweed (*Asclepias curassavica*) does not die back in winter, especially in warmer climates like southern California. This creates two problems. First, it allows pathogens such as the widespread protozoan parasite *Ophryocystis elektroscirrha* (OE) to build up to very high levels, which is then transmitted to butterflies visiting the plants. Research finds that OE rates are much higher in areas with tropical milkweed and can harm or even kill monarchs. Second, because the tropical milkweed doesn't die back, it can cause monarchs to disrupt their migration or break diapause too early should they come into contact with living plants during late fall or winter months. Replace existing tropical milkweed with native milkweed and/or nectar plants if feasible; at a minimum, cut it back in the fall (Oct/Nov) and repeatedly throughout the winter to mimic the phenology of native milkweed and break the buildup of OE.

What species of milkweed should you plant?

We recommend planting native milkweeds only. There are about 44 species of milkweed in the western U.S., all of which are perennial and go dormant in the winter. Two of these species, showy milkweed and narrow-leaved milkweed, are widely available from plant suppliers and are suitable for planting in much of the arid west. Many other species, including woollypod milkweed (*A. eriocarpa*), California milkweed (*A. californica*), heartleaf milkweed (*A. cordifolia*), spider milkweed (*A. asperula*), broadleaf milkweed (*A. latifolia*) and wooly milkweed (*A. vestita*) are are also good host plants for western monarchs but currently have limited commercial availability. Planting multiple species of native milkweed where appropriate can be beneficial to monarchs because each species has a different phenology. Early-emerging milkweed species such as heartleaf milkweed and california milkweed may be especially beneficial to monarchs leaving their coastal overwintering grounds, and therefore important to plant in California in areas where they historically occurred.

To select the best milkweed species for your geographic location and specific site conditions, please refer to our milkweed guides (see resources). Locally sourced seed is usually preferable and should be used when possible. We strongly recommend against planting nonnative milkweeds, especially tropical milkweed (*A. curassavica*); see Box 1 for more information.



Narrow-leaved milkweed (l) and showy milkweed (r) are two native species of milkweed that are widely available from plant suppliers and are suitable for planting in much of the western U.S.
(Photos: L – Xerces Society / Cameron Newell; R – Xerces Society / Stephanie McKnight.)

Establishing milkweed: the importance of site preparation and management

Site preparation and follow-up management to remove weeds and competing plants are key to milkweed establishment , especially when planting from seed. Although milkweed can be quite vigorous once established, it can grow slowly at first and be easily outcompeted. Also, many milkweed species don't germinate or emerge until spring, sometimes late spring, and may be outcompeted by other earlier-germinating species. Site preparation methods include solarization, burning, grazing, frequent mowing, herbicide use or a combination of two or more of these methods. After planting or seeding, mowing in late winter or early spring before milkweed has germinated or emerged is one simple and effective technique for reducing weed competition.

The Xerces Society has researched organic site preparation techniques and published detailed information about site preparation available at xerces.org/publications/guidelines/organic-site-preparation-for-wildflower-establishment

Establishing milkweed from seed

If irrigation is not available, planting from seed is generally the best option, but site preparation must be very thorough. Because of the risk for showy and narrow-leaf milkweeds to be outcompeted in a seed mix, we recommend seeding patches of milkweed alone or with other nonaggressive species. Solarizing the soil or using an alternative, thorough site-preparation method for a minimum of one year prior to planting is highly recommended. Seed should be sown in the fall, once the rains start, at a seeding rate of approximately 25 pure live seed/ft2. After spreading seeds onto a prepared site, incorporate them into the soil immediately using a rake, light harrow, ring-roller, or gentle over-head irrigation. Narrow-leaved milkweed in particular seems to do well from seed when planted in the fall in a well-prepared location. People who have used seed often report that it can take two years to germinate.

Establishing milkweed from transplants

In general, habitat established from transplants is more successful and easier to maintain than projects sown with seeds, and is the recommended method when irrigation is available. Milkweed transplants tend to do best when planted in the fall before going dormant (e.g., October). Thoroughly water the transplants immediately after planting and continue to provide irrigation as needed, especially during the dry season for the first 1-3 years until the plants are established. Most milkweed species are fairly drought-tolerant, so even during the establishment phase, irrigating every 7–14 days during the dry season is usually sufficient, although both showy and narrow-leaved milkweed can easily tolerate more frequent irrigation or wetter conditions. Smaller transplants, such as plugs, may need more frequent irrigation initially than larger transplants, such as 1 gallon containers. For milkweeds, as with most native plants, irrigation requirements are minimal after they become established. Using a top-mulch around transplants will help conserve moisture and reduce weed competition.

Establishing milkweed from rhizomes

Although their commercial availability is limited, rhizomes may be the most reliable way to establish some species of milkweed, especially showy milkweed. Rhizomes can be harvested in the fall or winter from existing plants that are dormant. Mature showy milkweed rhizomes are generally very large and can be divided into sections and planted individually. Sections should be a minimum of ½" in diameter and 4" long, with at least one viable node per rhizome. They can be planted immediately, or stored for up to a month in buckets of water or in a cool location before planting. They can also be stored for up to 6 months in a refrigerator or freezer in plastic bags of damp peat moss (Topping et al, 2019). Rhizomes can be planted at any depth from just below the surface (~2 inches) to 6 inches deep, and should be planted in the fall or early winter (before the ground freezes in cooler regions). Plants from rhizomes that are deep-planted are slower to reach the surface, but could require less supplemental irrigation, as soil moisture is usually higher at greater depths. While most non-irrigated plantings of showy milkweed rhizomes in the West have not been successful to date, areas receiving only occasional irrigation (3-4 times per year) have established very well.

The efficacy of using rhizomes for other milkweed species is not well-researched, but to date, we have had some success with outplanting woollypod milkweed (*Asclepias eriocarpa*) from rhizomes. Initial trials with establishing narrow-leaved milkweed from rhizomes directly into restoration sites have not been successful, but others have

reported success establishing narrow-leaved milkweed from rhizomes by following a slightly different process. Rhizomes can be harvested in the spring, when the plants break dormancy and then planted into gallon containers or a planting bed. The plants that grow from the rhizomes, can then be transplanted into restoration sites in the fall (Tom Landis, personal communication).

Future work

We are currently working with partners on additional milkweed trials, including trials with rhizomes of other species, and tests to see if irrigation is required when rhizomes are planted more than 6 inches deep. We are also beginning propagation and establishment trials for less common milkweed species, especially early-emerging species such as California milkweed (*Asclepias californica*). Look for updates to this document as we learn more about milkweed establishment.

Additional resources

Xerces' Milkweed Seed Finder lists nurseries that sell native milkweed seeds and plugs:
xerces.org/milkweed-seed-finder

For regional milkweed guides, which include distribution maps see:
xerces.org/milkweed/milkweed-guides

Western Monarch Milkweed Mapper:
monarchmilkweedmapper.org

For more in-depth information on milkweeds, propagating seed, and using them in restoration projects:
xerces.org/milkweeds-a-conservation-practitioners-guide/

For suggestions for nectar plants to include in your monarch habitat, see Xerces' monarch plant lists:
xerces.org/publications/plant-lists/monarch-butterfly-nectar-plant-lists-for-conservation-plantings

For information on site preparation:
xerces.org/publications/guidelines/organic-site-preparation-for-wildflower-establishment

For more information about the biology and management of western monarchs:
xerces.org/publications/guidelines/managing-for-monarchs-in-west

For information on adding monarch habitat to farmland in California's Central Valley:
xerces.org/publications/guidelines/quick-guide-to-monarch-habitat-on-farms-in-californias-central-valley

For recommendations on sourcing pesticide free plant materials:
xerces.org/pesticides/bee-safe-nursery-plants

For information on known monarch overwintering sites in California:
westernmonarchcount.org/find-an-overwintering-site-near-you/

Acknowledgments

We are grateful for partnerships and discussions with the USDA-NRCS Plant Materials Centers in Lockeford, CA, and Aberdeen, ID, and expertise provided by Patrick Reynolds and Tom Landis for helping us learn more about milkweed establishment. Funding for this guide was provided by the Wildlife Conservation Society Climate Adaptation Fund and by a contribution agreement with the USDA-NRCS National Technology Support Centers.

References

Pitman, G. M., D. T. T. Flockhart, and D. R. Norris. 2018/1. Patterns and causes of oviposition in monarch butterflies: Implications for milkweed restoration. Biological conservation 217:54–65.

Topping, M. L., R. K. Dumroese, and J. R. Pinto. 2019. Successfully storing milkweed taproots for habitat restoration. Native Plants Journal. 20: 48-58. 20:48–58.