



MONARCH JOINT VENTURE

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

www.monarchjointventure.org

The Monarch Joint Venture is a partnership of federal and state agencies, non-governmental organizations, and academic programs that are working together to protect the monarch migration across the lower 48 United States.

MISSION

Recognizing that North American monarch (*Danaus plexippus*) conservation is a responsibility of Mexico, Canada and the U.S., as identified in the North American Monarch Conservation Plan, this Joint Venture will coordinate efforts throughout the U.S. to conserve and protect monarch populations and their migratory phenomena by developing and implementing science-based habitat conservation and restoration measures in collaboration with multiple stakeholders.

Our mission will be achieved by coordinating and facilitating partnerships and communications in the U.S. and North America to deliver a combination of habitat conservation, education, and research and monitoring.

VISION

The vision of this Joint Venture is abundant monarch populations to sustain the monarch migratory phenomena into perpetuity, and more broadly to promote monarchs as a flagship species whose conservation will sustain habitats for pollinators and other plants and animals.

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Potential risks of growing exotic (non-native) milkweeds for monarchs

Each fall, monarchs in eastern and western North America migrate to overwintering sites, where they form clusters in trees and stay in a semi-dormant state until the spring. However, some monarchs skip the traditional long-distance migration. In parts of the southern U.S. and California, the year-round persistence of tropical milkweed allows monarchs to breed throughout the winter. These year-round tropical milkweed patches foster greater transmission of the protozoan *Ophryocystis elektroscirrha* (OE), increasing the likelihood that monarchs become infected with the debilitating parasite. Therefore, we recommend that tropical milkweed (*Asclepias curassavica*) should be cut back in the winter and fall months in the southern U.S. and California, and should be gradually replaced with native milkweeds as they become available.

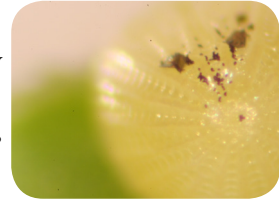
Tropical milkweed

Tropical milkweed (*Asclepias curassavica*) has a natural range that extends as far north as Mexico, but this plant is not native to the United States or Canada. Tropical milkweed is attractive and easy to grow, so it tends to be the most widely available milkweed at commercial nurseries. Because tropical milkweed historically occurred in the New World tropics, it is adapted to grow year-round in mild climates, whereas most native North American milkweeds die back seasonally and are absent during the winter months. When tropical milkweed is planted in the coastal southern U.S. and California, these plants continue to flower and produce new leaves throughout the fall and winter, except during rare freeze events.



What is OE?

Ophryocystis elektroscirrha (OE) is a debilitating protozoan parasite that infects monarchs. Infected adult monarchs harbor thousands or millions of microscopic OE spores on the outside of their bodies. When dormant spores are scattered onto eggs or milkweed leaves by infected adults, monarch larvae consume the spores, and these parasites then replicate inside the larvae and pupae. Monarchs with severe OE infections can fail to emerge successfully from their pupal stage, either because they become stuck or they are too weak to fully expand their wings. Monarchs with mild OE infections can appear normal but live shorter lives and cannot fly as well as healthy monarchs. Although recent research shows that tropical milkweed can lower OE replication within infected monarchs (due to high levels of cardenolide toxins), this might not benefit the monarch population. In fact, this could actually promote disease spread by allowing moderately infected monarchs that otherwise would have died quickly following eclosion to live longer and spread more parasite spores.



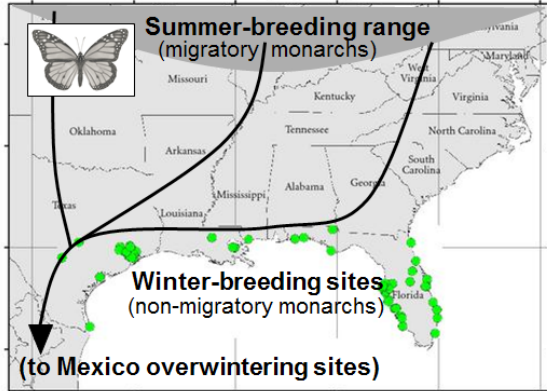
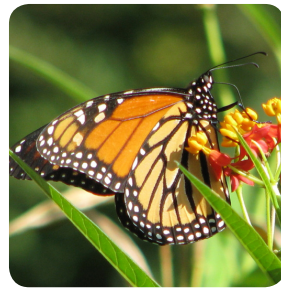
PROJECT
MONARCH
HEALTH

Project Monarch Health - www.monarchparasites.org

Project Monarch Health is a citizen science program focused on understanding the monarch parasite, OE. Learn more about this program and how to get involved by visiting the project website.

Year-round monarch breeding

If milkweed is present year-round, then monarchs can breed year-round. In recent years, Journey North (www.learner.org/jnorth) and Monarch Larva Monitoring Project (www.mlmp.org) volunteers have reported many monarch larval sightings during the winter in the southern U.S., ranging from coastal Texas to the Carolinas. Almost exclusively, these caterpillars are feeding on tropical milkweed – often in very high densities. In mild climates, a single garden of tropical milkweed can harbor tens or hundreds of monarch eggs and larvae with multiple monarchs per plant, during December, January, and February. Scientists have reasons to think that winter-breeding is more common now than in the past, although data needed to test this trend are limited. It is not clear whether the eggs and larvae on tropical milkweed come primarily from resident monarchs or from migratory monarchs that halt their journeys once they encounter tropical milkweed. Regardless, winter larvae feeding on tropical milkweed face multiple threats, including a higher chance of becoming infected with OE parasites.



Risks of year-round breeding

Monarchs that reproduce year-round on tropical milkweed face several challenges. Research in this area is ongoing, but recent work suggests that winter-breeding monarchs suffer higher risks of mortality and lower ability to reproduce due to:

1. **Infectious disease.** Winter larvae are more likely than migratory monarchs to become infected with the OE parasite. Citizen scientists in the program Monarch Health showed that 49% of winter-breeding monarchs were infected with this parasite, compared to 9% of migratory monarchs sampled in Mexico and 15% of migratory monarchs sampled in the northern U.S. and Canada. This effect is probably the result of monarchs using the same plants generation after generation, allowing the parasite to accumulate both in the local monarch population and on milkweed plants.
2. **Food shortages.** Because tropical milkweed plants often harbor high densities of monarch larvae during the winter, larvae sometimes eat plants to the ground and run out of food. Thus, compared to summer-breeding larvae, winter-breeding larvae face a higher risk of food limitation, leading to starvation or cannibalism.
3. **Freezing temperatures.** While winters in the southern U.S. and California are mild in most years, rare freeze events can kill tropical milkweed plants, leaving monarch larvae without food and adult monarchs with less nectar. This happened in many locations in early 2014.



Acknowledgements:

Photos

Larva on *A. curassavica* - S. Altizer
Oviposition - P. Davis
Spores on egg - J. de Roode
Deformed/Infected adult - S. Altizer
Aging milkweed - D. Satterfield
Adult on *A. curassavica* - P. Davis
Winter-breeding map - Modified from Howard, Aschen and Davis (2010)
Larvae defoliating milkweed - D. Satterfield

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What can you do?

- Plant only species of milkweed that are native to your region, whenever possible. The MJV Milkweed Information Sheet (monarchjointventure.org) provides more information on a few priority species for each region of the U.S.
- If you already have tropical milkweed in your garden, prune the milkweed stalks to about 6 inches in height during the fall and winter months to discourage monarchs from establishing winter-breeding colonies*. Cutting back the milkweed will also help to eliminate OE spores that may be present on the plant. Re-cut the milkweed every few weeks as leaves re-sprout. Tropical milkweed might pose fewer problems in the northern monarch breeding range because it dies back naturally when it freezes.

**These recommendations are not applicable in south Florida (south of Orlando), where a distinctive, non-migratory population of monarchs has long been established. However, native milkweed planting is still encouraged in this area.*

- Contribute to scientific knowledge about winter-breeding monarchs by participating in citizen science projects. **Project Monarch Health** involves volunteers in collecting parasite samples from wild monarchs (monarchparasites.org). Observers receive a report on the infection status of all monarchs they sample. Volunteers can also report observations about winter monarch sightings on **Journey North** (learner.org/jnorth), and collect detailed information on monarch use of milkweed plants in any season for the **Monarch Larva Monitoring Project** (mlmp.org).

