

Tropical Milkweed and Florida

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During a study Brower et al. (2018) used cardenolide fingerprinting on monarch butterflies located in north-central Florida to originate where individuals migrated from. The authors' study took place during the winter migration, and they noted that some monarchs fingerprinted showed that the larvae consumed *Asclepias curassavica* or tropical milkweed. At the time of the study the authors theorized that these individuals originated from South Florida since local commercial nurseries around the study site did not have widely available tropical milkweed for sale. Based on the findings made by Brower et al. (2018), this would indicate that some monarch butterflies from South Florida do in fact migrate northward.

However, due to the overall negative fitness (reduced migratory success, increased *Ophryocystis elektroscirrha* (OE) infection rates, altered physiology) for monarchs that consume tropical milkweed, they are less likely to travel the long-distance to Mexico for overwintering (Satterfield et al. 2015; Majewska et al. 2019; Davis et al. 2020; Davis et al. 2021; Clement et al. 2020). Brower et al. (2018) caution that the commercialization of tropical milkweed disrupts migratory behavior because there is an increase of the tropical milkweed use and a decrease of sandhill habitats. In addition, Brower et al. (2018) shows that there was a mixture of migratory monarchs based on their cardenolide fingerprinting, a technique that can identify what species of milkweeds an individual monarch consumed as a larva. Some monarchs had cardenolide fingerprinting for *Asclepias syriaca* which can only be found north of South Carolina.

Dockx et al. (2004) studied migratory pathways into Cuba using stable isotopes as samples were collected each November between 1993 – 1997. The authors found that monarchs do migrate to Cuba, although they may not be migrating back to North America and could either become residents in Cuba or migrate to other areas in the Caribbean. In addition, there were more migratory monarchs in Cuba than resident monarchs.

Other studies (Knight 1998, Walker 1980) suggest that migratory monarchs can be found in Florida in October through November but cannot be found between March and April, which would be consistent with the possibility of monarchs migrating through the Caribbean.

Overall, migratory monarchs in Cuba had longer wing lengths compared to resident monarchs however, there were more variable sizes among resident monarchs in November while resident monarchs had fewer variable sizes in March (Dockx 2007).



Monarch caterpillar



This shows evidence that there is a mixture of migratory monarchs with Cuban resident monarchs. A similar mixture was theorized by Knight (1998) for migratory and resident monarchs in Miami. With an increased population of tropical milkweed in Florida, the monarch migratory pathway to Cuba and other parts of the Caribbean are restricted from their monarchs' natural migratory behaviors (Majewska et al. 2019a).

The dangers of having monarch populations mixed with individuals from South Florida in Northern Florida poses a greater risk for migratory monarchs in the eastern population. While Florida has an abundance of monarchs with the parasite OE (Altizer et al. 2000), some individuals are migrating (Brower et al. 2018). Eastern monarchs that migrate southward and enter Florida are at risk of being contaminated with OE as they encounter monarchs from Florida. Those individuals that originated north of Florida may continue their migration path towards Mexico but also transport OE spores they encountered. Moreover, studies (Dockx et al. 2004, Dockx 2007, Dockx 2012) have shown that there are migrating monarchs that reach Cuba and other parts of the Caribbean.

The more interactions monarchs have with tropical milkweed and OE, the higher risk of infection occurrence for not only the eastern migratory population but also the Caribbean migratory pathway.

While Brower et al. (2018) studied monarchs in north central Florida, Vander Zanden et al. (2018) reviewed monarch migration in South Florida. The authors developed Figure 1. that demonstrates migratory and resident monarch population mixing in south Florida using stable isotope data. The stable isotope data showed that there was a likelihood of the migratory monarchs originating from the Midwest and southwest regions (Vander Zanden et al. 2018). Because this study shows a great mix of monarchs in South Florida, it's possible that some migratory monarchs overwinter there.

Another possibility is that with warming temperatures South Florida could be hosting monarchs that become reproductively active instead of overwintering, adding to the resident population. Vander Zanden et al. (2018) also suggested that the resident



Monarch caterpillar

population of monarchs in Florida is not sustainable without the influx of migratory monarchs with low OE spore loads.

At Zoo Miami, the Conservation and Research department implemented a project to remove the invasive tropical milkweed from Zoo grounds and the surrounding critically imperiled pine rockland ecosystem. Efforts to remove all tropical milkweed from the zoo began in 2021 and continues as new individuals grow from the seed bank in the soil. We have observed tropical milkweed within the pine rockland (Figure 2.) where the species competes with several of our native milkweeds including *A. viridis*, *A. tuberosa*, *A. verticillate*. While it is true that species of hymenoptera (wasps and bees) often do better at pollinating milkweeds, it doesn't take away the competition between the native and non-native milkweeds. Because monarchs prefer to oviposit on tropical milkweed (Malcolm 1986), our native milkweeds lack the interaction with monarch butterflies.

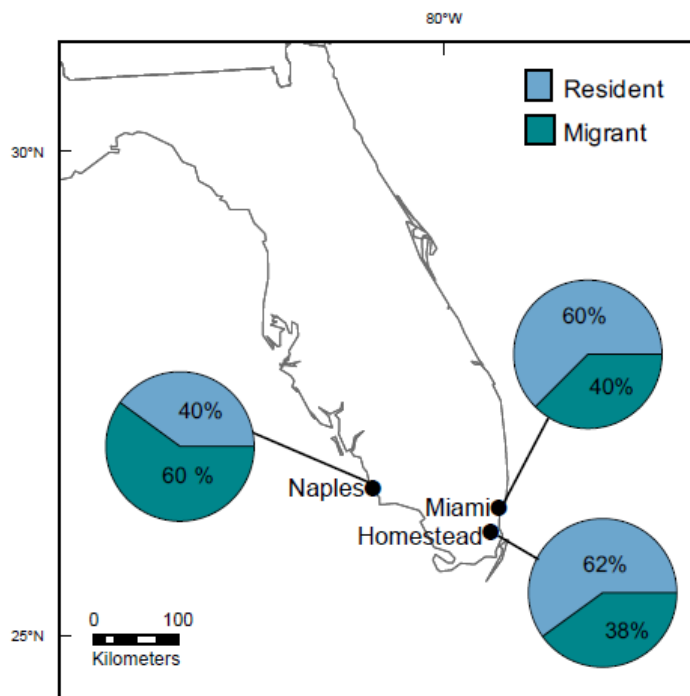


Figure 1. Vander Zanden 2018.



Figure 2. Tropical milkweed growing in the critically endangered Pine Rockland habitat.

In December 2024, Zoo Miami partnered with Fairchild Tropical Botanical Garden to submit a proposal to the Florida Invasive Species Council (FISC) to list *Asclepias curassavica* as a category II invasive species. While FISC does not have the regulatory authority to ban tropical milkweed, the listing could help make recommendations for its removal from landscapes across Florida. On March 3rd, 2025, FISC decided to support the listing of *A. curassavica* as a category II invasive. FISC describes category II as “invasive plants [that] have increased in abundance or frequency but have not yet altered Florida plant communities or ecological function to the extent shown by Category I species.” Based on this definition, tropical milkweed has shown that it has negative impacts on monarch populations in Florida and have increased in abundance to the concerning level.

However, the presence of tropical milkweed in forest/habitat settings have not yet altered the native habitat to the level of a category I listing. Importantly, designation of ecological risk does not require demonstrated displacement of native milkweeds if other documented mechanisms—such as parasite amplification and behavioral disruption—

pose population-level risks. There is evidence of tropical milkweed escaping urban gardens (Figure 2.) which has caused a disruption to native milkweeds. In systems such as South Florida pine rocklands—where multiple native *Asclepias* species are already imperiled—competitive interference does not need to result in complete exclusion to be ecologically significant. Even reduced monarch visitation or altered reproductive dynamics can further disadvantage rare native milkweeds. In the absence of tropical milkweed, monarchs will utilize native milkweeds (Figure 3.). This photo comes from a pine rockland fragment in Miami Dade County where there are more native milkweeds available. At Zoo Miami, monarchs have been observed on tropical milkweed (prior to full removal) but never on the native milkweed species in the pine rockland.



Figure 4. is a series of maps regarding the relationship between OE and tropical milkweed. Photos A and B show the locations of tropical milkweed and OE compared to Southern California locations in photos C and D. The long-term presence of tropical milkweed has led to resident monarch populations most likely from well-intentioned butterfly enthusiasts.

Monarchs that were captive raised on tropical milkweed had an infection rate of 33%, however even uninfected monarchs that were released acquired an OE parasite load by 81% and the number of spores increased over time (Majewska et al. 2019b). The abundance of tropical milkweed fosters a population sink (Clement et al. 2020), which also promotes the association with resident monarch populations (Satterfield et al. 2016). Not only does tropical milkweed create resident populations with a high abundance of OE but monarch larvae that have been raised on tropical milkweed has had altered physiology (Davis et al. 2020), preferred ovipositing (Clement et al. 2020; Malcolm 1986), and the presence of tropical milkweed breaks their diapause (Majewska et al. 2019a).



Asclepias tuberosa – butterfly weed

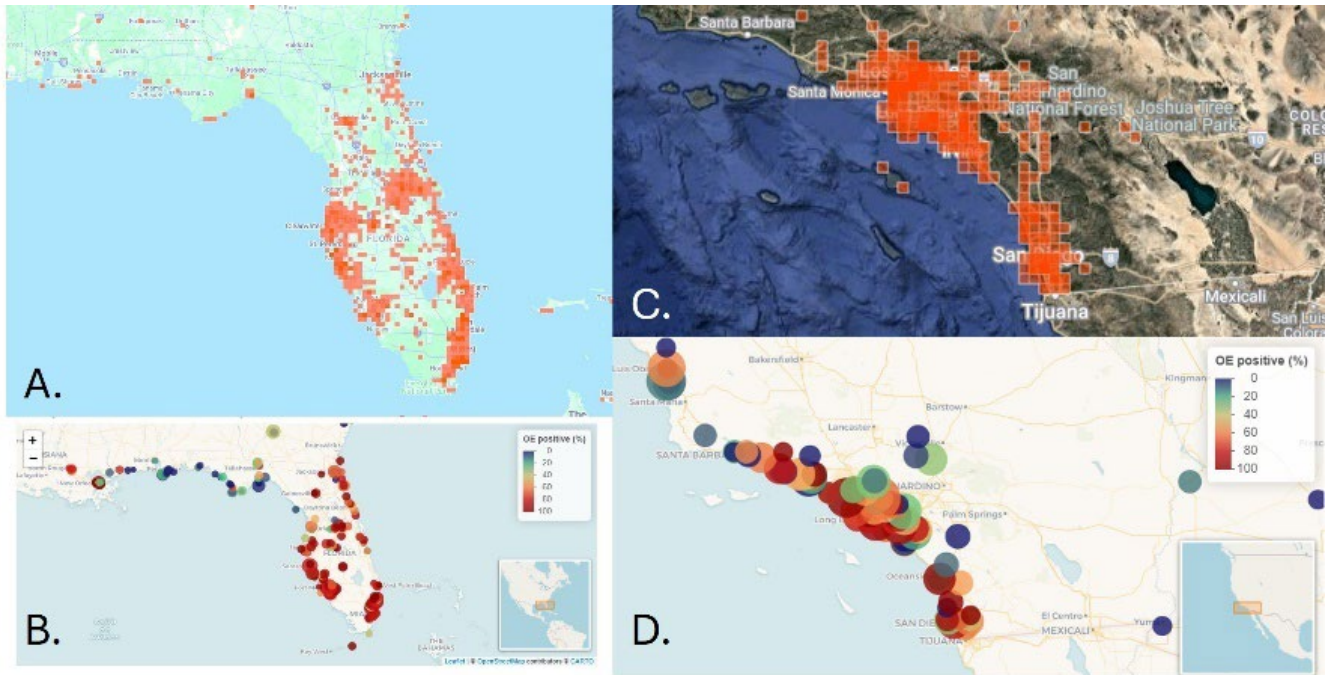


Figure 4. A) Tropical milkweed locations in Florida via iNaturalist. B) OE parasite density locations in Florida from Project Monarch Health. C) Tropical milkweed locations in Southern California via iNaturalist. D) OE parasite locations in Southern California via Project Monarch Health. Accessed 2/20/2025

Climate change has changed the way monarchs migrate and may suggest that more groups are becoming residents instead. In some regions of the monarch's range in the United States, there was a population increase but could be reflected from migratory to resident monarchs (Crossley et al. 2022).

Warmer weather also shifts the arrival of monarchs in Mexico to later in the year (Altizer et al. 2011). Temperatures in the Trans-Mexican Volcanic Belt are expected to rise 2° to 3° C by 2050 (Villers-Ruiz et al. 2013), which can have an impact on monarch butterflies who migrate there. As areas are warming, there may be a lesser need for the process of migration to occur. Additionally, we may see tropical milkweed survive longer periods in areas where temperatures are increasing, furthering the complex problems associated with the non-native species.

Monarchs have a lower fitness if they were raised on tropical milkweed that was exposed to elevated temperatures (Faldyn et al. 2018). There was also an increase in the production of cardenolides in tropical milkweed as temperatures increased,



Queen caterpillar



Top: Queen caterpillar. Bottom: Queen butterfly.

As stated previously, monarch populations mix with migratory and resident individuals in Florida and also serve as a migratory pathway for Cuba as well as other parts of the Caribbean. The exclusion of Florida from studies like these have allowed research questions to be left unanswered. However, the absence of specific documented displacement should not be read as evidence of *no ecological impact*. Many invasive plant effects are subtle, context dependent, and under-studied in peer-reviewed publications, especially for non-native plants that only recently gained regulatory attention.

which had negative impacts to monarch fitness (Faldyn et al. 2018).

Monarchs losing their migration is concerning, however, it is not unique to migratory species. Similar to other songbirds, the American redstart has had migratory and breeding ranges shift due to climate change (Dossman et al. 2023). While, climate change has influenced monarch population dynamics (Thogmartin et al. 2017), it still poses a risk to overall migratory populations, we may see more resident populations or even new migratory pathways for monarch butterflies. Monarch butterflies are remigrating from Mexico later in the year which does not correlate to the regrowth of native milkweeds (Howard et al. 2022). This study indicates that it takes monarchs longer to recolonize their range in the United States. Florida or parts of Florida have been excluded from many research papers for various reasons (Majewska et al. 2022; Satterfield et al. 2015; Thogmartin et al. 2017). The assumption of resident monarchs has limited much-needed research for this region.



Figure 3. Monarch larva on *A. tuberosa* (butterfly weed) in Miami Dade County pine rockland fragment.

ENJOY WATCHING WILD MONARCHS

instead of
rearing them
indoors

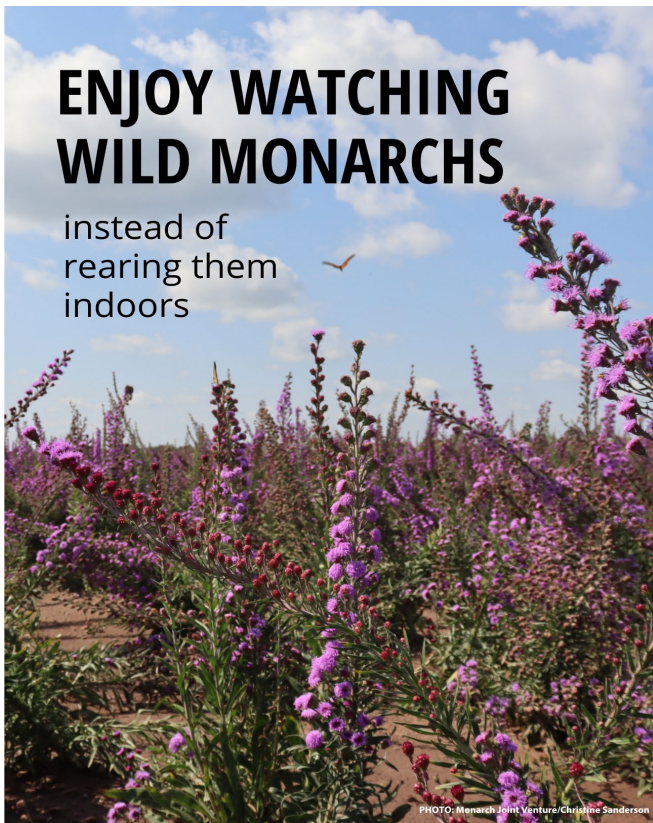


PHOTO: Monarch Joint Venture/Christine Sanderson

SAFE
SAVING ANIMALS
FROM EXTINCTION
NORTH AMERICAN
MONARCH

**PLAY IT SAFE
FOR MONARCHS**

While it is true that OE can exist on other species of milkweeds, they are not prevalent on milkweed species that naturally dieback throughout the year. In Florida, where winter dieback is inconsistent and *Asclepias curassavica* remains available year-round, the migratory culling mechanism that reduces OE prevalence elsewhere is weakened. This is not hypothetical, Florida monarchs consistently exhibit some of the highest OE prevalence recorded in North America (Altizer et al. 2000; Project Monarch Health), sustained by continuous breeding opportunities. As these native milkweed species dieback, so does OE. It will only receive more OE spores when monarchs visit that plant and deposit spores after the monarch has already visited OE positive plants. If tropical milkweed persists congruently with native milkweeds, they spread more OE spores to all milkweed and nectar plants monarchs visit. Responsible gardeners may cut back their tropical milkweed after Halloween, but many do not practice this. It's important to keep the plants completely cut to prevent monarchs from

laying eggs during a time when monarchs are meant to be migrating. If one homeowner cuts their milkweed back and their neighbor does not, it does not eliminate the issue with OE when present monarchs will choose the neighbor's garden instead. While seasonal cutting can reduce OE risk at the scale of individual gardens, invasive species assessments must consider landscape-level feasibility. Because monarchs are highly mobile, localized compliance does not prevent exposure when adjacent unmanaged plantings persist. This limits the effectiveness of voluntary mitigation as a primary management strategy.

Concerns regarding tropical milkweed are not driven by any single researcher, but rather by convergent findings across multiple independent studies examining parasite transmission, reproductive physiology, host preference, and migration energetics. The question is not whether tropical milkweed has been proven to cause monarch declines in Florida, but whether it's known ecological effects, when placed into Florida's unique climatic and migratory context, introduce avoidable risk.

Below is a list of Florida native milkweeds and their status. Our recommendation is to generate a demand for native species of milkweeds rather than tropical milkweed.

Species Name	Common Name	Commercially Available?
<i>Asclepias connivens</i>	Largeflower milkweed	No - presumed extirpated
<i>Asclepias perennis</i>	Swamp milkweed	Yes
<i>Asclepias lanceolata</i>	Fewflower milkweed	No
<i>Asclepias longifolia</i>	Longleaf milkweed	No
<i>Asclepias pedicellate</i>	Savannah milkweed	No
<i>Asclepias tuberosa</i>	Butterfly milkweed	Yes
<i>Asclepias verticillate</i>	Whorled milkweed	Yes
<i>Asclepias viridis</i>	Green antelopehorn milkweed	Yes
<i>Asclepias cinerea</i>	Carolina milkweed	No
<i>Asclepias amplexicaulis</i>	Clasping milkweed	No
<i>Asclepias curtissii</i>	Curtiss' milkweed	No – state endangered
<i>Asclepias feayi</i>	Florida milkweed	No
<i>Asclepias viridula</i>	Southern milkweed	No – state endangered
<i>Asclepias tomentosa</i>	Velvetleaf milkweed	No
<i>Asclepias humistrata</i>	Pinewoods milkweed	Yes
<i>Asclepias virdiflora</i>	Green milkweed	No
<i>Sarcostemma clausum</i>	White twine vine	Yes

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