

THE MONARCH BUTTERFLY AND GARDEN HABITAT GUIDE

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Creating a monarch butterfly garden habitat is enjoyable and helps the iconic monarch survive and thrive. It's also a fun multi-generational family project. The first part of this guide is about the monarch butterfly and the second part is how to create and maintain a monarch garden habitat.

MONARCH BUTTERFLY FOUR LIFE CYCLE STAGES

The four life cycle stages are egg, caterpillar, chrysalis and adult. Here is a general timeline, although it depends on weather, time of year and sunlight level. The colder the temperature or lower the level of sunlight, the longer the process.

Egg - This stage is 4 - 7 days. A monarch female lays an egg generally on the underside of the milkweed leaf, one egg per leaf. Sometimes the female will lay one or more eggs on a leaf, bottom or topside or on a plant stalk or flower bud, all depending on how much healthy milkweed leaves there are on the plant.

The egg is about the size of a speck of dust and is a light cream color. The caterpillar's head turns black as it grows so you'll know the caterpillar is ready to emerge when the egg becomes a dark color.

The caterpillar is so tiny it's barely visible. It emerges headfirst and often eats the egg as its first meal.

Caterpillar - This stage is about 10-14 days. It becomes a colorful yellow, black, and white striped caterpillar after about its first 24 hours out of the egg. It doubles in size every day from devouring milkweed. The caterpillar increases in mass about 2,000 times its birth weight while a caterpillar. The caterpillar grows by molting its skin. Each caterpillar stage is called an "instar." The first instar is the newborn caterpillar. The fifth instar, the largest, is the one that reveals a chrysalis.

It starts making its chrysalis while still a caterpillar. Inside, “imaginal discs” will become the various parts of the adult, like the organs and wings. That’s TRUE METAMORPHOSIS! The fifth instar stops eating and crawls off its milkweed up to 30 feet away to find a safe hiding place to make its chrysalis.

Make sure in your garden you have places the caterpillar can crawl to make its chrysalis. And have some near the milkweed so the caterpillar doesn’t have to go far, making it visible to predators like lizards and birds. The caterpillar likes things like wood fences, boxes, bushes, piles of wood, underneath patio furniture...be creative and build or put something together. Caterpillars will crawl up the side of a house or tree if there’s nothing to stop it from moving forward.

Once the caterpillar finds where it wants to reveal its chrysalis, it spins a silk pad and hangs quietly from it upside down by its “prolegs,” its temporary legs, in a “J” shape for less than 24 hours. More changes are happening internally in the “J” shape. More metamorphosis!

Eventually the caterpillar will straighten out, losing its “J”. The skin will split, move up toward the silk pad and fall off, revealing a beautiful jade green chrysalis. This happens in a few short minutes and includes violent rotating as it forces the black cremaster attached to its end into the silk pad, defying gravity. The first signs of the ensuing change is the minimal shaking of its antenna. Then the body starts undulating which causes the skin to split and move. If you watch for these first subtle signs you will be able to watch the whole process.

Eventually, the undulating becomes a violent turning and twisting of the chrysalis for a few minutes, which includes the flinging off the old caterpillar skin, until the chrysalis slowly stops moving and the shell hardens. It’s a fascinating process to see and you may find some online videos to watch if you aren’t able to watch it in real time.

Chrysalis - This stage is generally 10-14 days, but it depends on climate conditions. The imaginal discs continue to mature and organs, wings, proboscis, feet, all parts of the adult grow.

The revealed pupa is fragile. As previously described, the clear chrysalis case forms that gradually hardens, golden embellishments appear, and the pupa becomes still.

Adult - The adult stage is 2 - 6 weeks. The adult emerges from the chrysalis with only the briefest of warnings. A leg punctures through the chrysalis creates an opening and it emerges headfirst. Then it holds on as hard as it can to the chrysalis with its head up. The wings are very soft at birth. It takes an hour or more for them to harden.

DO NOT DISTURB OR TOUCH THE BUTTERFLY WHEN IT FIRST EMERGES FROM THE CHRYSALIS. IF ITS WINGS DO NOT HARDEN NORMALLY IT WILL DIE BECAUSE IT MUST BE ABLE TO FLY TO FIND FOOD.

Hemolymph, a dark red liquid protein moves from the adult's stomach into the wings as the monarch adult gently moves its new wings gently back and forth. The hemolymph causes the wings to expand. Eventually it will exit the body and drop to the ground forming a red mark.

Sometimes the adult will sit quietly still for awhile, testing the new world, including maybe the earth's sunlight, temperature, wind, gravity, sounds, etc. When it's ready the adult will take off to start its new life, find a mate and begin the cycle again.

Some adults have been reported living longer than a 2 - 6-week life span. Some monarch gardeners swear they have the same monarch adult visit their garden daily, sometimes for more than 2 months over the summer. Just like a friend that returns. These gardeners have lots of flowering nectar plants available for food for these returning visitors.

It's easy to identify the adult's sex, particularly when the wings are open and flat. The adult male has a black spot on each of its two hind wings; the female does not. The male is larger than the female. The female's black wing veins are thicker than the male's wing veins.

TWO MAJOR MONARCH BUTTERFLY PREDATORS

In recent years the following two predators have become more common and monarch gardeners are on the lookout for them. There is no current remedy for either of them as no pesticides may be used in a butterfly or pollinator garden.

Tachinid Fly

The tachinid fly (*Lespesia Archippivora*) is a tiny, red-eyed fly that lays its eggs on an unsuspecting caterpillar, generally on the upper back behind its head so the caterpillar can't turn around and push the fly or fly eggs off. The fly eggs hatch and the larva or larvae crawl into the caterpillar where they feed on its non-vital internal parts. The caterpillar acts and eats normally until the larvae eat the vital parts, killing the caterpillar hanging in its "J" shape or pupa in its chrysalis.

Another telltale sign of fly infestation is one or more white "strings" hanging from the dead caterpillar or chrysalis. Using the string, which the larva made, it climbs

down on it and drops to the ground. The number of strings tells you how many

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larvae were in the caterpillar. Each larva then burrows into the ground to continue its life cycle, which is like the monarch's four stage life cycle. It next forms a chrysalis from which it will emerge from the ground as an adult.

Tachinid flies are considered beneficial insects and are used by farmers in their fields for other kinds of caterpillars on their plants, for example, destructive caterpillars on their cucumber crop. The flies can be easily purchased online. That may be why the numbers of tachinid flies in monarch garden habitats have increased greatly in recent years.

The tachinid fly likes nectar flowers and maybe the sticky sweet "honeydew" oleander aphids make from ingesting sap from milkweed stalks and then exuding it, another good reason to keep down the number of aphids in your garden.

If the percentage of tachinid fly infested monarchs becomes too high in your garden, an alternative is to raise some or all your monarchs in butterfly cages for the rest of the monarch season. Mesh butterfly cages are inexpensive and can be purchased online.

You can place milkweed plants in the larger cages and smaller milkweeds or plant tubes with milkweed stalks in the smaller cages. Or you can build your own cage, wood works fine. There is information about how to use the cages online.

If you use a butterfly cage, bring in only eggs and/or the first instar. The first instar is too small for a tachinid fly to attack. It's not known for sure if the second instar is big enough for the fly to lay its eggs on. So, it's a risk to take in even the second instar and certainly not bigger instars.

Continually check your cage to make sure no tachinid flies are in it or else having a cage is useless for preventing the tachinid fly. Do this for sure if you have milkweed pots in your cage in case there are some tachinid fly pupae in their chrysalis stage in the pot soil, soon to emerge.

If you have tachinid flies you may inadvertently raise them as they go through their life cycle, something you, of course, are not trying to do. There is currently no fly prevention or destruction, again, no pesticides, herbicides or any other garden poisons can be used in or near a pollinator garden. An idea I've had is, if you can, place a mug or cup with a small amount of soapy water under a hanging caterpillar in a "J" shape or chrysalis in case it's tachinid fly infested, to catch any larvae that can drop from their white string to the ground.

In nature, the survival rate of monarchs is only about 5%. You will not have a 100% survival rate but your success rate by having a monarch garden habitat will exceed 5%. You will be doing important work for the monarch butterfly's survival.

Ophryocystis Elektroscurrha (OE)

Ophryocystis Elektroscurrha (OE), a protozoan parasite, is a harmful monarch predator. OE spores get on an infected monarch's body and the female can rub them onto the milkweed leaf as she lays an egg. The unsuspecting caterpillar eats a spore or spores and is infected. The caterpillar acts normally so you don't know the caterpillar is infected.

The tiny spores can show up visually in the chrysalis several days before it is due to eclose (emerge). Monarchs with OE that eclose can be weak, underweight, smaller than normal and/or may have flight difficulty. In extreme cases the wings are deformed, the adult is stuck in the chrysalis and cannot survive. A high percentage of San Diego County monarchs have a mild case of OE.

Current research shows that non-native milkweed that lives year-round, unlike native milkweed that becomes dormant in winter, has an increased amount of OE spores on them as compared with the amount on native milkweed because of the native milkweed's dormancy. And non-native milkweed is causing extra monarch generations that don't exist with native milkweed. Before non-native milkweed was introduced, historically there were no year-round resident monarchs.

Planting native milkweed is important. The importance is not just for its winter dormancy. Native plants, including native nectar plants, are compatible with fauna, drought tolerant, fine with native soil, and have fewer pests. They also provide a balance with nature.

There's an important compromise if you have non-native milkweed that you, as a responsible monarch gardener are encouraged to do. It's to cut all non-native milkweed back in the fall to about six inches for over the winter to mimic native milkweed plants' winter dormancy.

You may have to do it more than once. Also, get rid of the plant debris as any OE spores may be stuck to them. But be very careful as you place the cut stalks into bags for disposal so that the OE spores don't scatter onto the other milkweed plants. Responsible monarch gardeners try hard not to spread OE.

CREATE YOUR GARDEN HABITAT IN GROUND OR CONTAINERS

Never use pesticides or herbicides on or near milkweed

1. Ground and/or containers
2. Exposure - full or partial sun
3. Shelter from wind and rain
4. Milkweed
5. Nectar plants - flat flowers like landing pads
6. Water source - wet puddling area/rocks for sunning optional
7. Maintenance plan and schedule
8. Pesticide/herbicide free zone

You need both milkweed and flowering nectar plants in your monarch garden. If you only have milkweed your adults will be looking for flowering nectar plants for food and when they don't find any, they will fly off and not return. Your monarch garden will come to an end if you have no mated female monarchs around to lay more eggs unless there are plants in your neighborhood...but you may not get to enjoy them flying around in your garden. Make sure to have flowering nectar plants that bloom at different times during the monarch gardening season, early, middle, and late so you always have blooms.

If in the ground rather than pots, plant the same plants in groups of three or more. That will help protect the caterpillar from moving around in view of predators and provide about six caterpillars with food. For food, factor 2 caterpillars for each full sized one-gallon milkweed pot. Because of the huge desire for milkweed plants by monarch gardeners in recent years, growers aren't able to let their milkweed plants grow to full size in their one-gallon pots so be aware of milkweed size when figuring out how many caterpillars per 1 gallon plant. Keep close track that you aren't running out of milkweed.

As written earlier, MILKWEED IS THE ONLY MONARCH HOST PLANT SO MAKE SURE YOU ALWAYS HAVE ENOUGH OR THE CATERPILLARS WILL STARVE. Keep a list of vendors to contact and neighbors who have a monarch garden who may have extra plants. Always call a retailer first to check for milkweed inventory as places sell out, particularly during the heart of the spring and summer.

Planting Milkweed and/or Flower Nectar Plant into the Ground

Planting native milkweed, if possible, is important. Native plants, including native nectar plants, are compatible with native fauna, drought tolerant, fine with native soil, and have fewer pests. They also provide a balance with nature.

Native milkweed like native soil. There's usually no need to amend it. Plus, they are drought tolerant/water-wise plants. With non-natives you can use potting soil or outdoor plant mix.

To transplant a milkweed or flowering nectar plant into the ground, dig a hole about double the size of the container and add some hose water in the hole bottom. Plant the plant so the crown of the root (the area where the plant and root meet) is slightly above the soil level.

Fill in the hole with soil and immediately water and keep the soil moist. All newly planted plants need water, even water-wise plants until established. Once established, cut back on water for the plant if it will benefit the plant. Use seed packet instructions for seeds. ALWAYS make sure the plant has enough water, particularly as we are in a long-term drought. LOW WATER DOESN'T MEAN NO WATER! Drooping leaves denoting dehydration.... WATER!

Containers - Plant or transplant milkweed that comes in a one-gallon pot into at least a one gallon size container, not smaller. There are some fancy one-gallon containers out there for sale. You can plant more than one plant in a large container. But don't crowd them or they will become root bound and not grow. Have a separate "nursery" area for container milkweed that have been eaten by caterpillars so that a female can't find them to lay eggs on while the leaves grow back or use mesh paint strainer bags.

Milkweed Plants and Seeds

The badge of success for a monarch butterfly garden is a milkweed plant without leaves because the caterpillar devoured them. That's the opposite of normal gardening where the goal is to have perfect leaves. You are planting a milkweed garden salad for your monarch butterfly caterpillars.

If you break apart a milkweed stalk you will see the milky white latex for which milkweed is named. This sap is toxic and helps monarch caterpillars survive because it makes

the caterpillar unpalatable to many predators. If you accidentally break open a milkweed and get any latex on your hands, immediately carefully wash them, and **never** put your hands near your eyes if there's latex on them. You can wear gardening gloves and glasses as protections when monarch garden gardening.

You can also plant milkweed plants and seeds too. Seeds can take a long time to grow but they are less expensive to buy, and they will eventually become large plants. Sometimes you can find interesting varieties that you won't find as salable plants.

SAN DIEGO COUNTY SIX NATIVE MILKWEEDS

It can be harder to find native milkweed plants, particularly in the heart of the monarch gardening season, to purchase as compared with non-native milkweed as fewer growers grow them. If you can't find native milkweed, buy non-native milkweed to start and you can plant native milkweed to join the non-native as you find it.

There are six main native San Diego County milkweeds. Other milkweeds for sale may be California milkweeds or out of state milkweed and labelled as "native" so be aware of this list if you are only interested in buying and planting San Diego County milkweed.

The six main S.D. County milkweeds are 1. *Asclepias Fascicularis* (Narrowleaf), 2. *Asclepias Eriocarpa* (Indian/Woolypod), 3. *Asclepias Californica* (California), 4. *Asclepias Subulata* (Desert), 5. *Asclepias Albicans* (Whitestem) and 6. *Asclepias Erosa* (Rush). The last three are desert milkweed. Narrowleaf is the most available commercial one to buy. You can also order milkweed seeds and/or plants online.

NON-NATIVE MILKWEED

Non-native milkweed comes from anywhere outside of San Diego County. A major difference between native and non-native milkweed is native milkweed goes dormant over the winter and non-native milkweed doesn't. How to handle non-native milkweed to duplicate native milkweed over the winter is addressed in the OE section of this guide. It's important you read it and follow the instructions to help your garden monarchs avoid getting OE.

The most available non-native milkweed for sale at San Diego County nurseries is *Asclepias_Curassavica*. Two of the *Curassavica* varieties are Tropical and Silky Gold. Other non-native milkweed includes Showy (*Asclepias Speciosa*), Butterfly Plant (*Asclepias Tuberosa*), Balloon Plant (*Gomphocarpus physocarpus*), Apple of Sodom/Giant (*Calotropis Gigantea*), Crownflower/Giant (*Calotropis Procera*), Swamp (*Asclepias Incarnata*), and Pine Needle (*Asclepias Lineria*).

TWO MAJOR MILKWEED PESTS, 1. Oleander Aphids, 2. Leaf Miners

1. Oleander Aphid

An oleander aphid (*Aphis Nerrii*) is a winged or wingless female. It is parthenogenic, which means it can clone itself. The most common color is yellow. It sucks sap from the milkweed stalk and exudes a sticky residue called "honeydew." The "honeydew" is prized by ants that "farm" them and as written earlier, maybe the tachinid fly so it's best to control them. If there are a few aphids, they can be maintained by picking or hosing them off. Hose off large infestations. You can hose them off as part of your regular garden habitat maintenance schedule. Make sure there are no small monarch caterpillars or eggs first. Monarch eggs, and first and second instars are tiny, so look closely.

2. Leaf Miner

Milkweed Leaf Miners (*Liriomyza Asclepiadis*) are small flies. The females lay their eggs on the underside of native and non-native milkweed leaves. The fly larvae infiltrate the leaves between the layers. The evidence they were there are often circular trails they leave as they eat and destroy the leaf. The leaf turns yellow, brown, dies, and falls off the plant. The color change can make the milkweed leaf look like it has Rust, which is caused by wet leaves. If there are not wet leaves, look at leaf miner as the source.

A simple technique to control leaf miners I created is to squash every part of a milkweed leaf using your thumb and index finger. Placing your thumb on the top of the leaf and your index finger on the bottom of the leaf, press both fingers quickly together. Make sure you don't miss any area. Press, release, press, release, slowly and repetitively.

You will be able to squash any leaf miners in the leaf. Do it on every leaf on a regular basis. If you are just starting this control method, you may have to do it on a close regular basis and then can cut back when they are under control...take fingers break, to keep the flies from returning.

Another way to help control leaf miners is to use a mesh paint strainer bag (See below). However, you must find a way to completely close off the bottom of the bag for it to work best. And you will have to occasionally remove the bag if you want monarch females to lay eggs or number five caterpillar instars that are ready to crawl off to find a hiding place to make their chrysalis to do so. That's why I find the thumb and index finger squash/release method to work best because I don't have to keep placing and removing a bag. But squashing does take a time commitment. You might want to schedule when you want the bags off and on your milkweed.

You should also pick off and toss away any milkweed leaf in the final stage of leaf miner damage, the ones yellow and brown, which sometime forming blotch designs on the leaf. Dispose them in a closed bag.

MESH PAINT STRAINER BAGS

Mesh paint strainer bags are a versatile tool to use in a monarch butterfly habitat garden. They come in one- and five-gallon sizes, two-packs, are inexpensive, and can be purchased at home improvement stores or online. The bag may be able to help protect milkweeds and monarch caterpillars and/or eggs from predators.

Another reason to use it is a mesh paint strainer bag may also be able to protect the milkweed plant from leaf miners. A bag can also protect a milkweed that is growing back after being decimated by caterpillars from having a female lay eggs on it too soon a_You might need to schedule when you have the bags off and on your milkweed and it can help keep milkweed seedlings from having a female lay eggs on plants when they are too small to support a caterpillar.

Wishing you success and fun creating and caring for your monarch butterfly garden habitat. You are helping the monarch butterfly survive and thrive! They thank you.

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