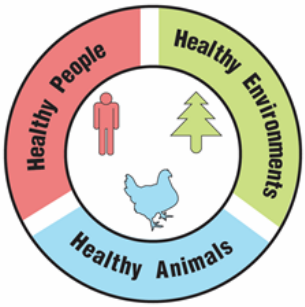
A Mosquito-Friendly Yard?

Activity Guide



Overview:

Participants will learn how to safely manage mosquito populations in outdoor spaces by interrupting the mosquito life cycle, attracting mosquito predators, and protecting themselves from mosquito bites. They will identify steps they can take in their own outdoor spaces and make an action plan. This activity can be used on its own, but we recommend using it along with a bird-, bat-, or pollinator-friendly DIY activity designed to attract mosquito predators.

Time Needed:

30-45 minutes

Audience:

This activity is recommended for ages 10-adult and for groups of up to 30. It can be adapted for different sized groups and ages.

Objectives: Participants will…

- Review the mosquito life cycle and mosquito habitat.
- Discuss ways to reduce mosquito bites by reducing mosquito populations and protecting themselves.
- Apply their knowledge to an example scenario.
- Examine their own outdoor spaces and personal behaviors.
- Plan to take action.
- Recognize the connected nature of the health and well-being of humans, animals and the environment.

Materials:

- ***Mosquito Life Cycle*** handout - https://www.cdc.gov/mosquitoes/pdfs/AedesLifeCycle-P.pdf
  Also available in Spanish - https://www.cdc.gov/mosquitoes/pdfs/AedesLifeCycle_ESP-P.pdf
- ***A Mosquito-Friendly Yard?*** diagram
- ***3 Ways to Reduce Mosquito Bites in Your Yard*** handout
- Markers
- ***My Mosquito Action Plan*** worksheet

 This activity was developed with support from the National Institutes of Health under Award Number R25GM132758. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Preparation:

- Print copies of the ***Mosquito Life Cycle*** 2-page handout (1 for each pair or small group).
- Print copies of the ***A Mosquito-Friendly Yard?*** diagram (1 for each pair or small group). If you'd like to reuse these, laminate or place into a clear plastic page protector and have participants use dry erase or washable markers.
- Print copies of the ***3 Ways to Reduce Mosquito Bites in Your Yard*** handout (1 for each participant).
- Print copies of the ***My Mosquito Action Plan*** worksheet (1 for each participant)

Optional assessment opportunity:

The ***One Health as a Tool for Informal Assessment*** activity can be easily integrated into this activity to provide an informal assessment opportunity. Check out the "One Health Connection" boxes throughout for related discussion prompts.

Description of Activity and Suggested Procedure:

1. Explain to participants that they will learn about ways to reduce mosquito populations in outdoor spaces at their home, and how to protect themselves from mosquitoes. Ask participants if and what they do to protect themselves from mosquitoes. Ask them why we might want to reduce mosquito populations and protect ourselves from mosquito bites. The optional "One Health as a Tool for Informal Assessment" activity (see above) can be used to assess participants' prior knowledge about mosquitoes.

2. Explain that many types of mosquitoes can carry diseases. West Nile Virus is the most common mosquito-borne disease in the United States affecting humans. Dogs and other animals can contract heartworm if bitten by an infected mosquito. Different types of mosquitoes in different places can carry different diseases. Some types of mosquitoes don't spread diseases at all and are simply annoying (these are called "nuisance mosquitoes"). It's hard to tell what type of mosquito we are encountering and whether it carries a disease, so it is important to protect ourselves from mosquito bites. For more information about mosquito-borne disease in the US, visit this CDC webpage.

One Health Connection:
What are some ways that mosquitoes might be related to human health? Animal health? A healthy environment?

3. Divide participants into pairs. Pass out the ***Mosquito Life Cycle*** handout and have participants review the mosquito life cycle using the handout. Note that all mosquito life stages before adult (egg, larva, pupa) are aquatic – they live in water.
    - **Optional**: Review the mosquito life cycle with a video, such as this one from HHMI BioInteractive (recommended for high school and adult participants) or Next Generation Science (recommended for younger participants).
    - **Adaption for younger participants**: Review the mosquito life cycle as a whole group, instead of in pairs. If time permits, review the life cycle by playing mosquito life cycle "rock-paper-scissors" (example instructions) with the stages of the mosquito life cycle – egg, larva, pupa, adult.

4. Explain that an easy way to control mosquitoes around homes is to remove their habitat – standing water. The mosquito life cycle can be interrupted at the egg or larval stage by removing or regularly emptying, cleaning, and refilling all standing water at least once a week. This will limit egg and larval mosquitoes. Ask participants for examples of sources of standing water that might be found in a yard. Answers may include things like bird baths, buckets, trash cans, or puddles. Having examples of items available as props may be useful, especially for **younger participants**; for example, you might experiment with how easy or hard it is to remove water from different items such as a bucket or a tire.

One Health Connection:
Are mosquitoes "bad"?
What roles might mosquitoes play in the environment?
Fun fact: The Blunt-Leaf Orchid, native to the Rocky Mountain and Northern regions of the US, is pollinated by mosquitoes and moths.

5. Explain that another way to control mosquitoes is to attract predators of mosquitoes to your yard. Mosquito predators include bats, dragonflies and damselflies, and some small insect-eating birds, such as bluebirds. Ask participants for examples of things that might attract bats, beneficial insects, or birds to a yard.
    - **Note:** Participants may ask how reducing mosquito populations will affect mosquito predators. While many animals prey on mosquitoes, none depend entirely on mosquitoes for food. If mosquito populations decrease, these mosquito predators will eat other species instead.

6. Give each pair the ***Mosquito-Friendly Yard?*** diagram and 2 copies of the 3 Ways to Reduce Mosquito Bites in Your Yard handout.
    - **Note:** The ***Mosquito-Friendly Yard?*** diagram may not resemble the outdoor spaces that your participants have where they live (for example, in urban areas). The yard diagram is an example that includes many common locations for standing water (mosquito habitat) and things to attract predators. If the ***Mosquito-Friendly Yard?*** diagram is not relevant for your group, you may choose to add another image of an outdoor space such as a photograph, an image from the internet, or have participants draw an image to use. We recommend using your other outdoor space

image after using the ***Mosquito-Friendly Yard?*** diagram or introducing your other image during Step 8 (Action Plan).

7. Ask participants to work with their partner to identify things that might attract mosquitoes to the yard in the diagram. Have participants mark these things with an "X". Ask participants to also identify things in the yard diagram that might help reduce mosquito populations. Have them circle these things.

    - **Note:** the goal of this activity is to apply the knowledge about mosquito habitat, life cycle, and predators to an example scenario. Participants do not need to identify every possible answer. **The lists below are not comprehensive, but merely examples.**

    One Health Connection: Where else in your community might there be mosquito habitat? What might affect mosquito populations there?

    - Things that attract mosquitoes **might include**:
        - Bird bath
        - Wading pool
        - Buckets/toys
        - Pooling water (tire, grill cover, plant saucers, gutters/drainpipes)
    - Things that reduce mosquito populations **might include**:
        - Bird bath (attracts predators)
        - Mealworm bird feeder (attracts predators (insect-eating birds))
        - Bluebird box (attracts predators)
        - Tightly covering rain barrels
        - Having screens on doors and windows
        - Turning off outdoor lighting at night (attracts predators)
        - Pollinator-friendly flowers (attracts predators)

    Optional: If you have access to an outdoor space such as a garden or schoolyard, you may want to do this activity using that space instead of or after doing the activity with the yard diagram. Have participants walk around the outdoor space and look for things that might attract mosquitoes or help reduce mosquito populations. Instead of marking them on the yard diagram, make a list or draw your own picture of the outdoor space. (Note that this may require additional time for the activity.)

8. Pass out the ***My Mosquito Action Plan*** worksheet. Each participant should consider their own outdoor space but encourage participants to brainstorm ideas with their partner. Using the action plan, ask participants to identify and check off any actions that they are already taking. Then, ask them to identify 3 goals of actions they can take in the future.

One Health Connection:
Besides reducing mosquito populations and risk of mosquito-borne disease, what other effects might these actions have on human, animal, and environment health?

   - **Optional:** If you considered mosquito habitat in another outdoor space such as a garden or schoolyard in Step 7, create an action plan for that space.
   - **Younger participants** may benefit from working with an adult.

9. **Wrap up:** Allow participants to share their action plans with the group.
   - **Adaptation for large groups:** Have participants share and discuss their action plans in small groups, to allow for deeper conversation.

Note for facilitators: Participants may have questions about the use of insecticides to control mosquito populations. The easiest way to control mosquitoes, especially at our homes, is to eliminate their habitat and protect yourself from bites by following the techniques described in this activity. Removing mosquito habitat in your yard is easy, effective, and free. If participants do wish to use insecticides, they should look for products that target mosquitoes specifically (avoid broad-spectrum insecticides), read the labels and follow all instructions, and consider hiring an experienced mosquito-control professional. Use of some insecticides may be harmful to the health of humans, other animals (including beneficial insects such as pollinators), and the environment. Use of insecticides will not eliminate mosquito populations; combining multiple approaches is best for effective mosquito control.

Looking for more?

We recommend pairing this activity with a DIY activity to attract a mosquito predator!

Some ideas include:

- **Make seed balls/bombs** with native, pollinator-friendly plants. Find native plants and resources local to you here: https://www.audubon.org/native-plants
- **Build a bat house**. Find tips and a construction guide here: https://www.batcon.org/about-bats/bat-gardens-houses/
- **Make a mealworm bird feeder**, such as this bluebird feeder: https://www.birdsandblooms.com/backyard-projects/diy-bird-feeder/diy-bird-feeder-attracting-bluebirds/

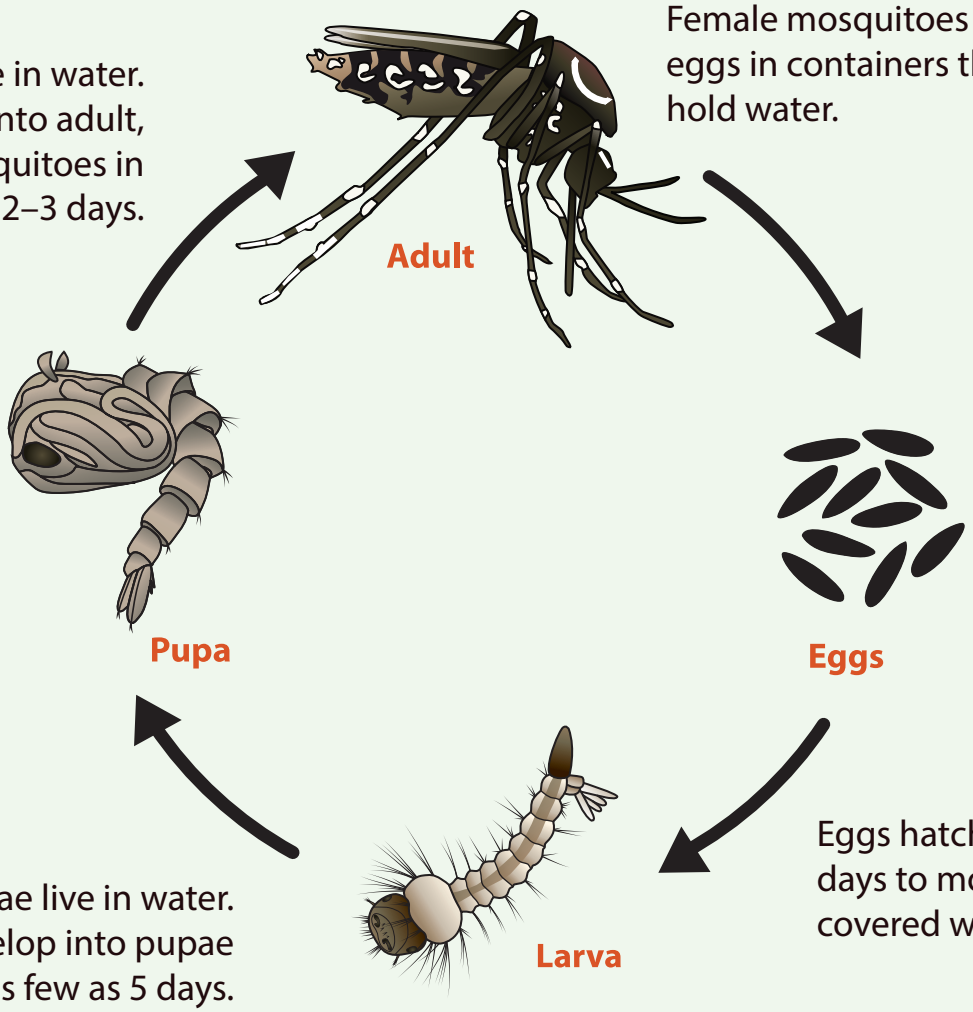
For more information on mosquitoes visit these websites:

- About Mosquitoes in the United States (CDC)
- Mosquito Control at Home (CDC)
- Success in Mosquito Control: An Integrated Approach (US EPA)
- Mosquitoes (Cornell University)

Mosquito Life Cycle

Aedes aegypti and *Ae. albopictus*

It takes about 7–10 days for an egg to develop into an adult mosquito.



For more information
www.cdc.gov/mosquitoes/about/life-cycles/aedes

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

CS330074A June 29, 2022

Life stages of *Ae. aegypti* and *Ae. albopictus* mosquitoes

Eggs

- Adult, female mosquitoes lay eggs on the inner walls of containers with water above the waterline.
- Eggs stick to container walls like glue. They can survive drying out for up to 8 months. Mosquito eggs can even survive a winter in the southern United States.
- Mosquitoes only need a small amount of water to lay eggs. Bowls, cups, fountains, tires, barrels, vases, and any other container storing water make a great "nursery."

Larva

- Larvae live in the water. They hatch from mosquito eggs. This happens when water (from rain or a sprinkler) covers the eggs.
- Larvae can be seen in the water. They are very active and are often called "wigglers."

Pupa

- Pupae live in the water. An adult mosquito emerges from the pupa and flies away.

Adult

- Adult female mosquitoes bite people and animals. Mosquitoes need blood to produce eggs.
- After feeding, female mosquitoes look for water sources to lay eggs.
- *Ae. aegypti* and *Ae. albopictus* don't fly long distances. In its lifetime, a mosquito will only fly within a few blocks.
- *Ae. aegypti* mosquitoes prefer to live near and bite people.
- Because *Ae. albopictus* bite people and animals, they can live in or near homes.
- Mosquitoes live indoors and outdoors.

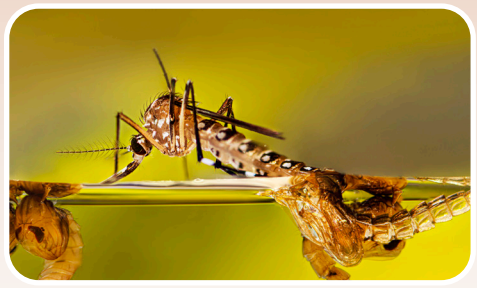
For more information on diseases spread by mosquitoes:

- www.cdc.gov/chikungunya
- www.cdc.gov/dengue
- www.cdc.gov/Zika

Eggs look like black dirt.

Larvae live in the water.

A pupa living in the water.



An adult mosquito emerges from a pupa.

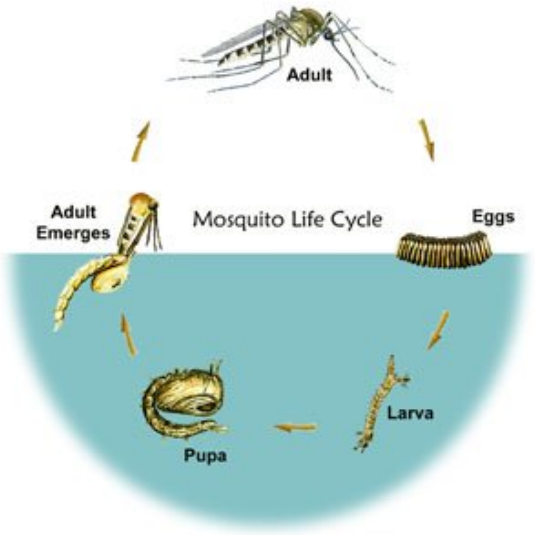
An adult mosquito bites a person.

A Mosquito-Friendly Yard?

3 Ways to Reduce Mosquito Bites in Your Yard

1. Interrupt the Mosquito Life Cycle

The mosquito life cycle takes about 8-10 days and requires standing water. Eggs are laid near standing water, and mosquito larvae and pupae live in water.



https://www.epa.gov/mosquitocontrol/mosquito-life-cycle

- **Empty**, **clean**, and **change water** in bird baths, fountains, and wading pools **weekly.**
- **Look for standing water.** Check items like buckets, toys, plastic covers, tires, plant saucers or planters. Turn over weekly, cover, or throw away these items.
- **Cover water storage containers** such as rain barrels with tightly fitting lids or fine wire mesh.
- **Keep water circulating** in ponds or pools.
- **Keep gutters and drainpipes clean** and check for clogs and pooling water.
- **Discuss concerns** with neighbors and **work together** to reduce habitat.

2. Attract Mosquito Predators

Birds, bats, fish, and other insects are known to eat mosquitos!

- Turn off **outdoor lights**, build a **bat house**, or plant native, **night-blooming plants** to attract bats.
- Provide a **water feature** such as a circulating pond to attract dragonflies and damselflies.
- Provide a **nesting box**, **mealworm feeder**, or **bird bath** to attract insect-eating birds (such as bluebirds).
- Plant **native, pollinator-friendly species**. Find native plants for your region at https://www.audubon.org/native-plants.

3. Protect Yourself

- Wear **long sleeves** and **pants** to prevent bites.
- **Avoid** being outside at the times mosquitos are most active (**dawn and dusk**)
- Choose insect repellents with **lemon eucalyptus oil (OLE)** as the active ingredient. If you do use DEET, use products with 20-30% DEET. **Read the label and follow instructions.**

Did you know?

August 20th is World Mosquito Day!

It marks the discovery that mosquitos spread malaria. Understanding that malaria is spread by mosquitos allowed people to know how to control the disease effectively.

My Mosquito Action Plan

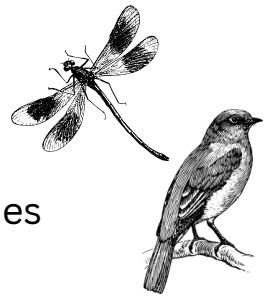
I can take steps to...

Check off any steps you are already doing.
Great job!

Interrupt the mosquito life cycle

- ☐ Empty, clean, and change water in bird baths, fountains, and wading pools weekly
- ☐ Look for standing water and dump out, cover, or throw away items catching water
- ☐ Cover water storage containers tightly
- ☐ Keep water circulating in ponds or pools
- ☐ Keep gutters and drainpipes clean
- ☐ Discuss concerns and work together with neighbors

Attract mosquito predators



- ☐ Install a bat box or bird nesting box
- ☐ Install a mealworm bird feeder
- ☐ Plant native, pollinator-friendly species
- ☐ Turn off outdoor lights at night

Protect myself

- ☐ Wear long sleeves and pants to prevent bites
- ☐ Avoid being outside at dawn and dusk
- ☐ Choose insect repellant with lemon eucalyptus oil as the active ingredient
- ☐ If using DEET, use products with 20-30% DEET

List a few actions you plan to take:

1.

2.

3.