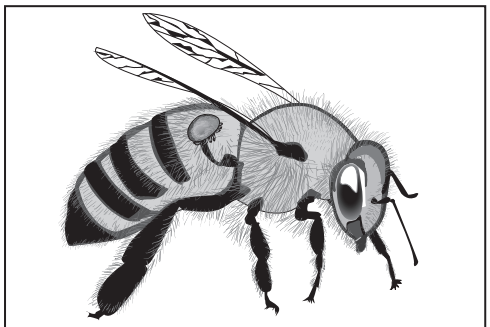
Invasive Species Fact Sheet

Varroa Mite

Background – Invasive species are organisms that are moved by nature, people, or animals into an ecosystem where they have not been previously found. Some of these organisms are spread naturally or accidentally by people, while others are spread intentionally, without understanding the harm they might cause. Although most of the organisms brought into our state cause no harm, a few are able to thrive in California to the detriment of native ecosystems, recreation, agriculture, including specialty crops, infrastructure, and public or animal health. These invasive species include plants and animals, insects and other arthropods, and pathogens.



Honey bee with Varroa mite on abdomen

Description: The Varroa mite is a tiny parasite that feeds on honey bees by poking a hole in their body and sucking the body fluid. This can make the honey bee weak and more likely to become sick. Varroa mites look like tiny, reddish colored crabs with eight legs. Although Varroa mites are small compared to humans, compared to a honey bee they are relatively large. For humans, it would be the same as having a tick the size of a dinner plate on your back.

Habitat: Varroa mites are from Asia. The mites have now spread throughout the United States and every continent except for Australia. While the Asian honey bees have some natural resistance to the mite, other honey bees, including those in the United States, are easily infected by Varroa mites. Varroa mites live on the body of adult honey bees as well as on the larvae of honey bees in the bee hive. A Varroa mite lives about 50 days and they cannot survive for more than a few days without a honey bee host. The mites hide in between the parts of a bee's body, which makes it difficult for the bee to remove.

How they spread: Mites transfer from one bee to the next when bees are in close contact with each other, such as in a hive. Mites can also spread when hives of honey bees are moved to different areas. Varroa mites likely made their way from Asia to Europe and the United States when beekeepers accidentally moved infected hives or queen bees.

Why it is a problem: Too many Varroa mites in a honey bee hive can kill all the bees in the hive, and many bees have already died. This is a major problem for beekeepers in the U.S. When honey bee larvae are infected, they often develop with deformed wings, legs, and bodies. When Varroa mites infect adult honey bees, they cause bees to become confused as they fly. They often get lost and can't find their way back to their hive. This can weaken the hive. Bee colonies that are not treated for Varroa mites usually die within one to three years. If honey bees continue to die, crops that depend on pollinators will go down, causing food prices to go up and farmers and farm workers to lose jobs.

How it affects California specialty crops: Many of the affected crops are California specialty crops. Specialty crops are fruits and vegetables, tree nuts, dried fruits, and horticulture and nursery crops (including floriculture). Many of the fruits, nuts, and vegetables eaten in the United States are grown right here in California. Besides producing honey, honey bees are needed to pollinate about one third of the plants that we eat. This includes California crops like: strawberries, cherries, berries, melons, kiwifruit, pears, sunflowers, cucumbers, and many more. Crops like almonds would completely disappear because they depend on bees.

Methods for control: Bee keepers can check their hives for mites by using the "sugar shake method," which does not harm the bees. To do this, bee keepers use a large screen-topped jar that allows the mites to fall out but keeps the bees in. Approximately 200 to 400 bees are removed from the hive and placed in the jar at one time. (A quarter cup of bees is equal to about 200 bees.) Two tablespoons of powdered sugar are placed into the jar with the bees and the screen lid is attached before gently shaking the jar to coat bees with the powdered sugar. After letting the jar sit for a couple of minutes, the jar can be tipped upside down over a white plastic container to shake the mites out through the screen. Bees are returned to the hive where other bees clean the sugar off their bodies and they return to normal. The mites taken from the jar are counted to determine what percentage of the hive is infected. If there were 100 bees in the sample and five mites were found, there are probably 5 to 10 mites per 100 bees. More mites than this can harm a bee colony and the colony should be treated for mites.

For Additional Information:

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This is one in a series of fact sheets composed by the California Foundation for Agriculture in the Classroom (CFAITC). For additional educational materials: CFAITC, 2300 River Plaza Drive, Sacramento, CA 95833-3293 (916) 561-5625 (800) 700-AITC Fax: (916) 561-5697
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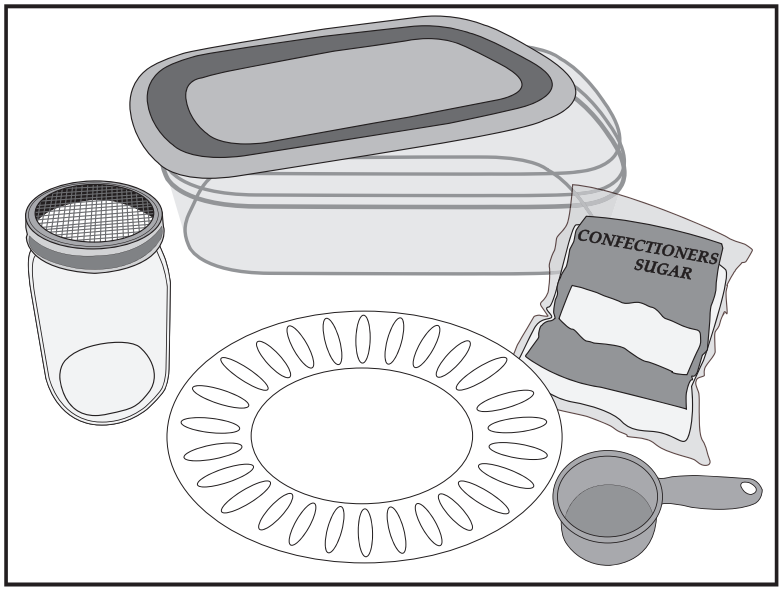
Varroa Mite Activity Sheet

Sugar Shaking



The sugar shake activity is similar to a method that beekeepers use to check their honey bee hives for mite infestation.

Fantastic Facts

1. What is the Varroa mite?
2. What impact could the Varroa mite have on the supply of fruits, vegetables, and nuts?
3. What happens to adult honey bees that are infected by mites?
4. What happens to honey bee larvae that are infected by mites?
5. Approximately what percentage of the food crops we eat must be pollinated by honey bees?
6. How does the Varroa mite spread?

1) A mite that attacks honey bees 2) Cause the decline of honey bee populations needed to pollinate many crops, thereby decreasing crop production 3) They may get lost and won't find way back to hive, weakened immune systems 4) Deformed wings and legs 5) Approximately 33% 6) From close contact with other bees

Lesson Ideas

- Create a comic strip showing the lifecycle of a Varroa mite in the bee hive.
- Write a story about the travels of a Varroa mite.
- Have a local entomologist visit your class to discuss the Varroa mite and bee health.
- Work in teams to create Varroa mites out of paper plates and duct tape. Compete with other teams to see who can remove the mite the fastest without using hands. Create other rules as a class using your knowledge of how a Varroa mite infects a bee and what bees may do to get rid of them.

Lesson Plan: Sugar Shake Simulation

Introduction: In order to keep honey bee populations healthy, bee keepers must regularly check their bee hives for mites. This will allow the bee keepers to estimate the level of mite infestation and whether or not they need to treat the hive in order to kill the mites and save the honey bees.

Materials: beans to represent honey bees, brown cake decorating sprinkles to represent Varroa mites, canning jars, canning jar ring lids, screen purchased from the hardware or dollar store that has holes large enough for brown cake decorating sprinkles to pass through but small enough so that the beans will not pass through, powdered sugar or flour, and a table cloth

Procedure:

1. Read the fact sheet and discuss the Fantastic Fact Questions and answers as a class.
2. Tell students that they will act as bee keepers who are checking their honey bee hives for Varroa mites. Organize students into groups of two or three and instruct them to assemble their jars with screens, lids, and 100 beans.
3. Move around the room, giving each group a varying number of brown sprinkles. For example, one group might receive 5 sprinkles, while another group receives 23 sprinkles.
4. Model the steps for the sugar shake method explained on the front page in the "Methods for Control" section. Instruct students to follow the same procedure with their jars in order to determine what percentage of their hive is infected with mites. Discuss experimental error and ask students what they could do to reduce experimental error in this procedure.
5. Students should explain what their next steps should be to protect their hives from Varroa mites and how to prevent them from spreading to other areas.

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