

MYSTERY MARAUDERS

BIO Animal Investigation
KEY Insect-Damaged Plants
Pests

OVERVIEW

After gathering evidence that plants in the activity site are being eaten, the youngsters try to identify the plant eaters.



BACKGROUND

Many animals eat plants. Large grazing animals such as sheep, cows, and deer eat large amounts of plants, frequently devouring the plants right down to the ground. Small animals such as caterpillars, grasshoppers, grubs, and beetles eat much smaller amounts of plants as individuals, but their combined impact on plants can be huge due to the tremendous numbers of the insects.

Multitudes of different kinds of insects feed on almost every kind of plant. The part of the plant that insects most frequently nibble on is the leaf. Evidence left in the wake of feeding insects is quite varied. Sometimes only twigs remain, because the insects eat entire leaves. Some insects chew small round holes in leaves, and others eat out worm-shaped channels. Some insects work from the leaf edge toward the center, while others prefer to scrape away one surface of the leaf. To the trained observer, the type of damage to the leaf or plant is a clue to the kind of animal that fed on the plant.

A **pest** is an organism that is harmful or troublesome. Insect pests damage crops or other plants that people value. Every year, crop losses due to insect damage soar into the billions of dollars. Millions more are spent on crop spraying and other insect control measures.

CHALLENGE: DISCOVER WHICH PLANTS IN THIS SITE ARE BEING ATTACKED BY INSECTS. LOCATE "SUSPECT" INSECTS THAT MIGHT BE RESPONSIBLE FOR THE DAMAGE.

MATERIALS

For each youngster or team of two:

- 1 Action Assignment Card
- 2 medium-size plastic bags*
- 2 rubber bands* to close the plastic bags
- 1 hand lens* or bug box*
- 1 sweepnet*
- OR
- 1 Shake-It Container

For the group:

- 1 sheet of Action Assignment Cards*
- extra rubber bands*
- 1 "Sweepnet" Equipment Card*
- OR
- 1 "Shake-It Container" Equipment Card*

* Available from Delta Education.

PREPARATION

Group Size. This activity works best with groups of up to sixteen youngsters. However, the activity can be used with larger groups if you have enough equipment and a large activity site.

Time. Plan on forty to fifty minutes for this activity.

Site. Select a field or vegetable garden with lots of broad-leaved plants (weeds are fine). The site should contain lots of plants that have insect-damaged leaves. Check the plants for holes in the leaves or damaged leaf edges.

Materials

1. Obtain or make sweepnets or Shake-It Containers in advance. If possible, let your youngsters help you make the nets or containers. See the "Sweepnet" and "Shake-It Container" Equipment Cards for instructions on making and using the equipment. Nets work best in areas of grassland or shrubs. The Shake-It Containers work well with



bushes, shrubs, and trees.

2. Make a copy of the Action Assignment Card for each youngster or team of two.



ACTION

1. At the activity site, tell the youngsters that it has been reported that some mysterious animals have been eating plants in the area. Show the kids a leaf with holes or chewed edges. Tell the youngsters that their assignment is to gather some leaf samples as evidence that animals are in fact eating the plants.

2. Hold up an Action Assignment Card, and explain that the card shows examples of the types of evidence the youngsters should be looking for. Give each youngster or team of two an Action Assignment Card and a plastic bag for holding leaf samples. Go over the challenge on the card. Tell the kids that they have five to ten minutes to gather evidence that animals are eating plants in this area. Send the youngsters off to hunt.

3. Call the youngsters back, and spread out the leaf samples on the data board for everyone to see. Ask the youngsters:

- Which plant seems to be the most popular food source?

- How many different kinds of plants have been eaten?
- How many different kinds of animals do you think are eating the plants? Why?

4. Challenge the youngsters to find out which animals are eating the plants. Send the group back into the site with a hand lens or bug box to look closely for suspects at the scene of the crime. Tell the kids to look for animals in the act of eating leaves or at the site of plant damage. Suggest looking in buds, on the tips of branches, on the undersides of leaves, and in curled leaves. Ask the kids to place suspects and some of the leaf samples they were found on in their plastic bags. After five minutes, call the group together to share their finds. How many suspects were rounded up?

5. There may be other culprits in the field that were not captured. Organize a shakedown operation with sweepnets or Shake-It Containers. Demonstrate the technique and send the kids out with new plastic bags to bring in the suspects for observation.

6. Call the group together to share discoveries. Ask the youngsters to close up their bags with a rubber band and to put their "bagged" suspects on the data board. Suggest putting leaves into some of the bags and looking for interactions. Do any insects go to the leaves? Eat them? Are any suspects attacking other insects (acting as predators)?



“SUSPECT” QUESTIONS



Wrap up the investigation with a brief discussion.

1. Which captured insects do you think eat plants? What evidence do you have to support your judgment?
2. Did you observe any animals actually eating plants either in a bag or on a plant? Which animals? What kind of leaf damage did their eating cause (holes, chewed edges)?
3. If no animals were actually observed eating plants, how do you think we could find out which animals eat plants?
4. Did the shakedown uncover any animals that might help keep the plant eaters under control? (Predators such as spiders, mantids, or ladybugs.)
5. Introduce and define the term **pest**. (See the “Background” section.) Ask the group for examples of plant-eating pests (e.g. aphids, fruit flies, and termites). Ask if the youngsters think any of the plant-eating suspects they found today are pests. Why?

BRANCHING OUT



1. Are some pests associated with only certain plants? Have the kids search garden plants to find out what is causing damage to various crops.
2. Are there some plants that show no insect damage? Why might that be? Have the youngsters check leaf surfaces and the odors of undamaged plants.
3. Do animals attack parts of plants other than leaves? Suggest that the kids check fruits, limbs, bark, flowers, buds, and roots.
4. What animals come out to eat plants at night? Bring the group back at night, and do the activity with flashlights.
5. Plant-eating animals are known as “pests” when they dine on your vegetable garden. Set up a pair of similar gardens. Have the kids try to keep pests away from one garden by using natural pest-control methods (e.g. putting up screens, picking insects off by hand, using garlic spray). Let nature take its course with the other garden, and compare results.



Shake It!

SHAKE-IT CONTAINER

Equipment Card 

Side One



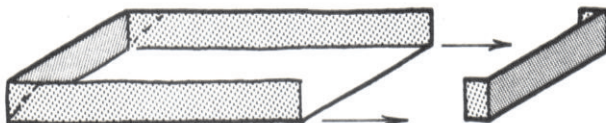
MATERIALS FOR ONE CONTAINER

- 1 small, flat box
- 1 piece of white paper (optional)
- 1 plastic bag*
- tape*

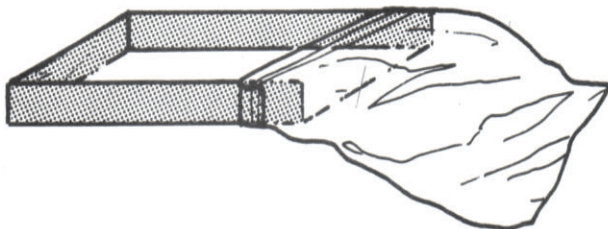
* Available from Delta Education.

CONSTRUCTION

1. Get some small, flat boxes and cut one *end* out. One-ream standard 8.5" × 11" paper boxes are perfect.



2. If the bottom of the box is smooth and light colored, fine. If not, tape some white paper on the bottom.
3. Now put the open end of the box a short distance into a plastic bag. Supermarket produce bags work well.
4. Tape the bag in place on the *bottom* and *sides* of the box. That's it.



TO USE THE SHAKE-IT CONTAINER

1. Simply hold open part of the box under some foliage and shake the *foliage* vigorously.
2. Things that fall into the box can be tipped immediately into the bag. Critters that hold on can be tapped or gently scraped into the bag with a 3" × 5" card.



3. Returning the box to the level position puts a bend in the bag, preventing captured critters from escaping. In this way, you can make many "shakes" and transfer the catches into the bag.
4. To empty the bag, take it off the box and dump the contents. To reuse, retape the bag to the box.

Shake It! VIEW CHAMBER

Equipment Card 

Side Two



MATERIALS FOR ONE CHAMBER

1 box about 30 cm × 50 cm (and at least 20 cm high)

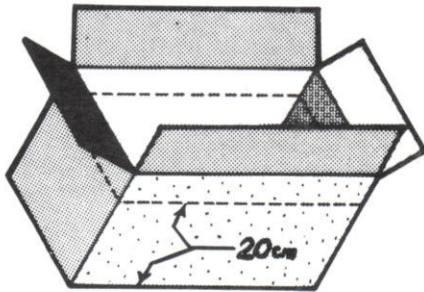
tape*

clear plastic wrap*

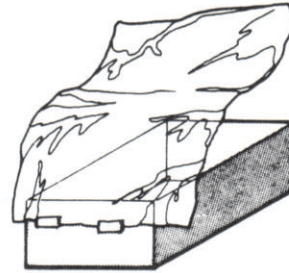
* Available from Delta Education

CONSTRUCTION

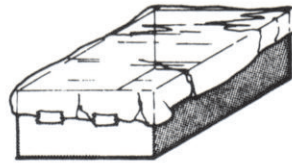
1. Get a box about 30 cm wide by 50 cm long and at least 20 cm high.
2. Cut the box off at 20 cm.



3. Tape a piece of plastic to one edge of the box.



4. Pull the plastic over the top to hold animals inside.



Mystery Marauders Action Assignment Card



It has been reported that some mysterious animals are eating the plants in this area. Your assignment is to gather some leaf samples as evidence that animals are eating the plants. Look for:

Leaves with holes.

Leaves with chewed edges.

Curled, shriveled leaves.

Surface scraping on leaves.



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