ACTIVITY BACKGROUND

Aphid Pets

If you garden, someday you're bound to meet up with aphids, or "plant lice." The piercing mouths of these soft-bodied, pale green, gray, white, or tan insects suck sap from a variety of plants. They're attracted to the undersides of leaves, stems, and flower buds, particularly of young, rapidly growing plants. The activity **Aphid Pets** encourages students to take advantage of the appearance of aphids by exploring these fascinating creatures.

Aphids are often found on the undersides of leaves.

Prolific Creatures

Aphids have complex life cycles and overwhelming reproductive rates. As each generation is born, sometimes as often as every seven to ten days, the next generation is already growing inside the newborns! With a good microscope, you can actually see aphids growing within aphids. Newborn aphids are normally wingless and similar to adults. When conditions become overcrowded, however, winged aphids, which can fly to another plant, are born.

Females of one species of aphid give birth to at least ten female offspring every week. These offspring, in turn, do the

same in another week. It's been estimated that if all offspring were to survive, one female could trigger the production of a quadrillion offspring per season! Disease, weather, limited resources, and predation prevent this from happening; but with reproductive rates like these, it's no wonder we need to be vigilant with these visitors.

Lions and Ladies and Cows, Oh My!

Like the rest of us, aphids are an integral strand in the great web of life. While aphids are munching away on plants, they are also an important part of other insects' diets. The voracious larvae of the lacewing fly, for instance, devour leaves and consume any aphids in their path. It's no wonder they are known as "aphid lions"! Ladybugs are also avid aphid consumers, as are certain tiny wasps that parasitize unsuspecting aphids.

Some hungry ants actually herd aphids. The ants "milk" aphids by stroking their bodies with their antennae, causing the aphids to release drops of sweet honeydew, a nutritious food source. Sometimes ants will carry these aphid "cows" underground where the aphids can feed on plant roots right in the ant colony nest.

An Ounce of Prevention

Just as we can resist disease when we're in good condition, healthy plants are most likely to resist an aphid attack. If they have been stressed by lack of water or by under- or overfertilizing, plants are more susceptible to aphids. They can become weakened, yellow, and misshapen, and may eventually die. This may be due, in part, to one of the many viruses that aphids transmit.

Some of the suggested means of getting rid of aphids, once they've appeared, include hand crushing, water or soap spray, and homemade repellents. For a large infestation, thorough hand crushing can be not only time consuming but also devastating to plants. Although a hard water spray will knock many aphids from plants, hardy individuals can crawl or fly back to plants. Soapy sprays, however, kill aphids on contact. See directions on pages 61 and 62 of *GrowLab: A Complete Guide to Gardening in the Classroom* for application of soapy sprays.

Some gardeners prefer homemade insect controls using recipes such as the following:

- 3 cloves garlic, chopped
- 1 onion, chopped
- 1 tablespoon cayenne powder
- 1 teaspoon soap flakes
- 1 quart warm water

Blend ingredients, and let sit covered overnight. Spray leaves with a mister. Rinse leaves with warm water the next day.

Aphid Pets

Overview: Students take advantage of the presence of aphids by exploring these fascinating insects.

Although this activity focuses on aphids, you can use a similar format for exploring other garden insects.

Time:
Groundwork: 30 to 40 minutes
Exploration: variable
Making Connections: ongoing

Materials:
- variable (aphids!, hand lenses, GrowLab plants, pots, etc.)
- "Problem Solving for Growing Minds" reproducible, page 283
- "Observation Journal", page 286

Background: Page 208 and page 222

If you're getting bugged by aphids,
Don't despair and do not fret.
Though you may be losing plants,
You're gaining aphid pets!

—Fourth-grade teacher, Mississippi

Laying the Groundwork

Objective: To observe and raise questions about aphids.

1. If your vigilant plant detectives notice what appear to be "pests" in the GrowLab, have them observe the visitors closely with hand lenses. As a class, make a list of the things students can observe about the visitors. *What do they look like? Where are they most abundant? How do they seem to move around?* Refer to pages 60 and 61 in *GrowLab: A Complete Guide to Gardening in the Classroom,* to identify the insects.

Since aphids are the most common insect in the GrowLab, they're used as a springboard for this activity.

2. Ask each student to come up with one question about aphids, encouraging them to ask questions that cannot be answered by a simple yes or no. List the questions on a class chart. Questions that make viable classroom explorations include the following:

- What types and/or ages of plants do aphids prefer?
- What type of plant parts do aphids prefer?
- How fast do aphids multiply (and how do they do it)?
- What do aphids do to plants? How do they seem to do it?
- What would happen if we sprayed aphids with different "natural" insecticides?

3. Unless you're experimenting with methods for eradicating aphids, we recommend that you treat most of your infested plants as described in the background, page 223. Carefully quarantine one or a few sacrificial plants in a large jar or aquarium with a fine screen or a cheesecloth covering. Use this as your experimental chamber.

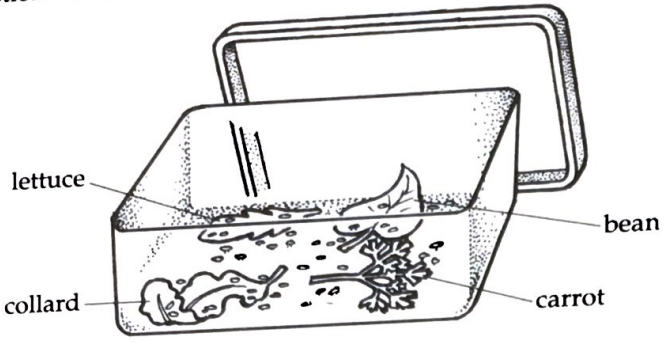
Exploration

Objective: To design and conduct simple explorations to uncover new information about garden insects.

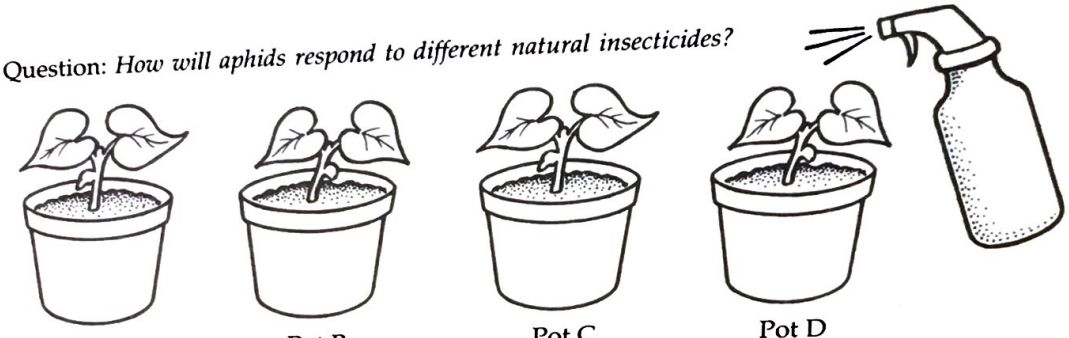
1. As a class or in small groups, choose one of your aphid questions to explore. Students may choose to supplement their investigations with library research, or interviews with local gardeners, extension agents, or garden store staff. Use the Problem Solving for Growing Minds process, page 10 and the "Observation Journal" to help guide and record explorations.

Two sample investigations follow.

Question: *What type of plant leaves do aphids prefer?*



Question: *How will aphids respond to different natural insecticides?*



Pot A (garlic spray)

Pot B (cayenne pepper spray)

Pot C (insecticidal soap spray)

Pot D (laundry soap spray)

2. Discuss findings as a class. Ask: *In general, how do aphids seem to affect plants? Do they seem to prefer specific parts, types, or ages of plants? Which ones? What sparked your interest in the question you explored? How did you decide on the best method for answering your question(s) about aphids?*

Making Connections

Possible discussion questions:

- *How did your findings compare with your predictions? What might you do differently if you were to conduct this exploration again? Why?*
- *If we had conducted these investigations in an outdoor garden, what other things might have affected our results? What other organisms*