

Whatcha Got There?

Lesson 2

“What’s that?” This is usually the first sentence uttered when an organism is found in an unexpected or unwanted place. Properly identifying the organism is the first step in a successful integrated pest management (IPM) plan, and understanding its biology is the second step. This lesson allows students the opportunity to scout for pests and signs of injury in the greenhouse, properly identify the organisms they find, and learn about the pest’s biology.

Suggested Level(s):

9-12 Grade

Subject(s):

Environment & Ecology; Science & Technology; Reading, Writing, Speaking & Listening

Standards:

Environment & Ecology

4.5 Integrated Pest Management

Science & Technology

3.3 Biological Sciences

3.7 Technological Devices

Reading, Writing, Speaking & Listening

1.8 Research

Skills:

Discussing, Identifying, Researching

Technology Connection:

Internet Resources, Digital Camera

Materials:

Paper

Pencil

Hand lens (10x or greater)

Ruler

Digital camera

Specimen collecting supplies*

Time Consideration:

Average 1-4 class periods for scouting and proper identification

Objective(s):

Students will...

- compare and contrast “pest” and “beneficial” organisms
- discuss and recognize injury on greenhouse plants caused by pests
- locate and identify organisms within the greenhouse
- research the organism’s biology and behavior
- determine if the organisms present are considered beneficial, pests, or neither.

Assessment Opportunities:

Either individually or with a partner, have students create a “cheat sheet” of the pests and diseases they found in the greenhouse.

Suggested items for the cheat sheet:

- Picture (include life cycle stages if possible)
- Name (common and scientific)
- Description of organism
- Biology of organism (life cycle, behavior, etc.)
- Description of signs/symptoms of organism/disease
- Plant host(s) of the organism or disease

Cheat sheets can then be laminated and used for other greenhouse lessons.

Alternative Option: Have each student or pair of students design a 4x6 note card for each pest and/or disease discovered with all pertinent information, life cycle, and picture. Laminate the note cards, and place them in a card file in the greenhouse for future reference/management.

Background:

Just because an insect or other organism is found in the greenhouse doesn’t mean it’s there to cause problems. The first step of an IPM plan is to properly identify the organism. Once the organism is properly identified, its biology, life cycle and behavior can be studied. Then decisions can be made about whether management is needed and what methods might be used. Some organisms found in the greenhouse may not be pests at all. They may be considered beneficial to have around because they are natural enemies of pest species found in the greenhouse. Using natural predators, parasitoids, and pathogens to manage pest species,

called biological control or biocontrol, is one IPM method. For example, several species of Ladybird beetles are predators of mealybugs, whiteflies, and aphids. Several species of parasitoid wasps kill whiteflies directly by developing inside the body of the host. Parasites, such as entomopathogenic nematodes, and pathogens, such as entomopathogenic fungi, can infect and kill insect pests. When managing a pest problem within a greenhouse, it is important to choose methods that will not harm beneficial organisms already helping to keep pest populations under control.

While there are many pests that can be found in a greenhouse, some are more common than others. Fungus gnats and shore flies can be found in the soil feeding on rotting plant material and algae. Larval feeding can result in wilting of the plant and slowed plant growth. Aphids, mealybugs, mites, thrips, whiteflies, and soft scales are pests that feed on plant sap and juices with their piecing-sucking mouthparts. Yellow, wilted and/or curled leaves, and stunted plant growth are results of their feeding. Caterpillars, snails, slugs, and leafminers chew plant material. Fungi, viruses, bacteria, and other plant pathogens attack different parts of the plant and can cause a variety of symptoms such as wilt, blight, root rot and leaf spots. Different pest species can cause similar signs and symptoms in plants. Proper identification of the pest and learning about its biology, life cycle and behavior can help determine which IPM tactics may be most effective.

Getting Ready:

1. For this lesson, students will be working in pairs. Depending on the greenhouse size and the number of students, determine if student pairs will be assigned to a section(s) of the greenhouse or if everyone will cover the entire greenhouse.
2. Make sure there are enough supplies for each pair. *If you decide you are going to have students collect samples of pests or examples of damage, before you enter the greenhouse, instruct them how to properly collect without harming the plants.

Doing the Activity:

1. As a class, define “beneficial organism” and discuss how those organisms are different from “pests.”
2. As a class, brainstorm possible signs of pests (including diseases) and/or pest damage that may be seen on/around plants in the greenhouse. If certain organisms are mentioned, include a physical description. Also discuss where to look for pests and damage (plant stem, under leaves, etc.).
 - Examples of things to look for or observe: honeydew on leaves, white cottony masses on leaves, holes, brown, black or yellow spots/areas on leaves/stems, cast skins from insects molting, webbing on leaves/flowers, slime trail on leaves, chewed leaves, etc.
 - Compare these signs/symptoms to what healthy plants look like.
3.  Working in pairs, have students take paper, pencil, hand lens, ruler, digital camera, and collecting supplies (if applicable) into the greenhouse. Before walking around, students should note the date, time, and temperature of the greenhouse on their paper. As they walk around, students should make notes and take pictures of organisms and/or damage they see. Detailed notes should be written down and either paired with the appropriate digital picture or students may draw their own picture of what is seen. Students should collect samples if they were instructed to do so. Questions to ask and record information on include but aren't limited to:
 - On what plant did you see the pest/damage?
 - Where on the plant did you see the pest/damage (soil, under leaf, top of leaf, etc.)?
 - What does the organism/damage look like? Include picture and written physical description.
 - If it was an organism (not a disease), how many were there?

4. 🐞 After the students have finished looking through the plants of the greenhouse and making their notes, have them use identification books, the Internet, and other resources to properly identify what organisms they found in the greenhouse and learn about their biology and behavior. Be sure to include information on the organism's life cycle if applicable. Determine if the organism is beneficial or if it's a pest. If damage was found but no organisms, have students research what may have caused the damage (may be an organism, may be something else such as lack of water, soil pH, etc). Were there any diseases present in the greenhouse?

5. Have each student or pair of students report to the class what they found in the greenhouse. Any information on pests and beneficial organisms found will be used with Lessons 3 and 4.

Enrichment Activities:

1. Ask local county extension agents to come and assist with and support the identifying of pest species. They can also provide advice on different monitoring and management options, which may help with Lessons 3 and 4.

Reading Connection:

Ball Identification Guide to Greenhouse Pests and Beneficials by Stanton Gill and John Sanderson

- Hardcover: 244 pages
- Publisher: Ball Publishing (Feb. 1998)
- ISBN-10: 1883052173
- ISBN-13: 978-1883052171

Ball Field Guide to Diseases of Greenhouse Ornamentals by Margery Daughtrey and A. R. Chase

- Paperback: 224 pages
- Publisher: Ball Publishing; illustrated edition (Jan. 1992)
- ISBN-10: 0962679631
- ISBN-13: 978-0962679636