

Instructional Scenario

Something's Wrong in the Garden



Course/Duty Area: Introduction to Plant Science/Using Basic Scientific Principles in Integrated Pest Management

Scenario:

Riverside Community Garden is a half-acre plot in the heart of a small Southwest Virginia town. It was established five years ago by a local nonprofit to provide fresh vegetables to families who do not have space to grow their own food. The garden is divided into twelve raised beds and two in-ground plots, and it grows tomatoes, peppers, squash, beans, lettuce, kale, and herbs from late April through October.

This spring, the garden's volunteer coordinator, Mr. Dale Owens, is worried. Several plots are showing signs of trouble, and he can't figure out exactly what is going on. He has reached out to the local high school agriculture program for help. Your class has been invited to visit the garden, investigate the problems, and put together a pest management plan that the volunteer gardeners can use.

Mr. Owens has documented the following observations before your visit:

- Tomato leaves on the south side of the garden are turning yellow, with brown spots that seem to spread from leaf to leaf.
- Something has been digging up the bean seedlings overnight on the west side of the garden. Tracks and droppings have been found nearby.
- The squash plants have sticky residue on the undersides of leaves and the plants look stunted.
- A fast-growing vine with broad leaves is taking over one of the in-ground plots and shading out the kale.
- A small number of milkweed plants growing along the garden border have caterpillars feeding on them.

Mr. Owens wants solutions that are safe for volunteers (including children who sometimes help on weekends), safe for the environment, and as low-cost as possible. He is also required by the nonprofit's guidelines to document any chemical products used in the garden.

Big Question:

How would you diagnose the problems at Riverside Community Garden and build a safe, practical integrated pest management (IPM) plan to protect the crops?

Focused Questions:

Identifying What's Attacking the Plants:

- Look at Mr. Owens' observations. Which problem do you think involves an invertebrate pest? What clues point you in that direction?
- Which observation is most likely caused by a vertebrate pest? What are the signs that tell you it is a mammal rather than an insect?
- What is the difference between a biotic (infectious) and an abiotic (noninfectious) cause of plant damage? Looking at the tomato leaf problem, which type do you think it is, and why?
- The fast-growing vine shading the kale is competing with the garden crops. Is that vine a weed? What makes a plant a weed, and why is it important to know whether a weed is native, non-native, or invasive?

- The caterpillars on the milkweed at the garden border are feeding on the plants. Before recommending any control, what question should you ask about those caterpillars?
- What are the basic differences between the life cycles of insects that undergo complete metamorphosis vs. those that undergo incomplete metamorphosis, and why does this matter when deciding how and when to treat a pest?

Building an IPM Plan:

- What does *integrated* mean in integrated pest management? Why is using multiple methods better than relying on chemicals alone?
- For the vertebrate pest digging up the bean seedlings, list one mechanical, one cultural, and one non-chemical management option Mr. Owens could try.
- What is a *monitoring threshold* (also called an *action threshold*)? How would you use this idea to help Mr. Owens decide when a pest problem is serious enough to act on?
- Mr. Owens wants to keep records of any pest problems and treatments in the garden. Why is recordkeeping an important part of an IPM program?
- Critical Thinking: The sticky residue and stunted squash plants suggest a sucking insect pest. If Mr. Owens introduces ladybugs to the garden to help control the problem, what type of IPM method is he using? What are the benefits and risks of that approach?

Reading a Pesticide Label:

- What information should you find on any pesticide label before using the product? Name at least four pieces of information.
- What are the three signal words found on pesticide labels? What does each word tell you about the product's level of hazard?
- Mr. Owens finds an old, unlabeled spray bottle in the garden shed. What should he do with it, and why?
- If a volunteer accidentally splashes a pesticide in their eyes while working at Riverside Garden, what information on the label tells you what to do first?
- Mr. Owens needs to document any chemicals used at the garden. What specific label information should he record in the garden log?

Choosing and Applying Pesticides Correctly:

- What is the difference between a general-use pesticide and a restricted-use pesticide? Which type would Mr. Owens most likely be able to use at a community garden without a pesticide applicator's license?
- Mr. Owens is considering a granular pesticide and a ready-to-use liquid spray for the same problem. What are the advantages and disadvantages of each formulation for use in a community garden setting?

Critical Thinking: Mr. Owens wants to treat the tomato disease problem. He finds two products at the local farm supply store that both list the same disease on the label, but one is labeled for use on food crops and one is not. What does *labeled for use* mean, and why does it matter legally and for food safety?

Student Project or Outcome:

Working individually or in pairs, students will produce a complete Pest Management Report for Riverside Community Garden. The report should be written clearly enough that a volunteer with no farming background

can read it and understand what to do.

The Pest Management Report must include the following elements:

- A Pest Diagnosis Chart – a simple table or list that matches each of Mr. Owens’ five observations to:
 - The most likely type of pest or problem (invertebrate, vertebrate, weed, biotic disease, or abiotic disorder)
 - A brief explanation of why you identified it that way
 - Whether it is beneficial, harmless, or harmful to the garden
- An IPM Action Plan – for at least three of the five problems, recommend a management strategy that includes:
 - At least one non-chemical control option
 - A description of when and how to monitor the problem before deciding to act
 - If a pesticide is recommended: the type of formulation, whether it is general-use or restricted-use, and the personal protective equipment (PPE) required
- A Pesticide Label Summary – using a real or teacher-provided sample pesticide label, identify and explain:
 - Product name, active ingredient, and U.S. Environmental Protection Agency (EPA) registration number
 - Signal word and what it means
 - Directions for use relevant to the garden
 - First aid and emergency contact information
 - Storage and disposal requirements
- A Safety Note to Volunteers – one short paragraph (4–6 sentences) written for a general audience explaining how to use pesticides safely and responsibly, including PPE, label compliance, and documentation
- (Optional / Extension) A written recommendation to Mr. Owens about whether any of the five problems require no action at all, and a scientific justification for that recommendation

Project-Based Assessment:

Students will present their Pest Management Reports to the class in a brief oral presentation (3–5 minutes), simulating a report to Mr. Owens and the garden’s volunteer board. Presentations should walk through the pest diagnosis, highlight the selected IPM strategies, and explain pesticide label findings in plain language.

Suggested assessment criteria:

- Accuracy of pest identification and classification
- Quality and practicality of the IPM Action Plan
- Correct interpretation of the pesticide label
- Appropriate pesticide selection and safety recommendations
- Clarity of the Safety Note to Volunteers and oral presentation

Teacher Resources:

- Virginia Cooperative Extension – Integrated Pest Management resources, pest identification guides, and vegetable gardening publications: ext.vt.edu

- Virginia Department of Agriculture and Consumer Services (VDACS) – Pesticide regulation and licensing information: vdacs.virginia.gov
- Virginia Tech Pesticide Programs – Label interpretation, applicator training, and regulatory guidance: vtp.ento.vt.edu
- EPA Pesticide Label Information – Sample labels and label reading guides: epa.gov/pesticide-labels
- National Pesticide Information Center (NPIC) – First aid and safety resources: npic.orst.edu
- National FFA Organization – Nursery/Landscape and Floriculture CDE materials include pest identification components: ffa.org/participate/cdes/nursery-landscape
- Sample pesticide labels (teacher-provided) – Recommend selecting a commonly available garden insecticide (e.g., neem oil or Spinosad) and a fungicide labeled for vegetable use for the label interpretation activity

Scenario submitted by Lawrence Cox, Holston High School, Washington County Public Schools