

Franklin-Simpson H.S.
Magen Roberts: Agriculture

Course: Greenhouse	Unit Title: Unit 10: Pesky Bugs and Plants	# Days: 11
IEP:	504:	# Students:

Purpose of Unit: Preface

Imagine giving up a nice sunny warm Saturday of fun for a full day of work. The good news is the money earned from working hard can be used to buy something that you have wanted or for something fun. The bad news is that for every \$100.00 earned, you will get to keep only \$80.00 for your labor. A 20% loss, such as this, is the toll pests can have on profits from crop production.

One of the biggest obstacles to a successful harvest is the impacts of plant pests. These pests include a variety of plants or animals that cause negative impacts on crops used for human purposes. Weeds, nematodes, insects, and animals are common pests that cost plant producers billions of dollars each year in yield loss, quality docking, and treatments for control. These organisms are trying to survive no differently than humans, but when the pests interfere with plants grown for profit; they become a target for eradication.

The following lesson will explore common pests, determine appropriate pest management practices, and investigate common pests potentially effecting plants chosen for the Grower's Handbook projects.

One area of agribusiness strongly associated with pest management is agricultural service. Agricultural service companies market specific knowledge and skills to help grow and manage plants for producers. Essentially, the producer is paying for someone's time and talent to help with producing the crop.

For pest management there are several ways to provide help to plant producers. Some service companies specialize in chemical application and have specialized equipment to target certain kinds of pests or certain crops. An example of this service would be aerial spraying by helicopter or crop duster planes. For typical crop producers it is more cost effective to hire chemical application rather than own expensive equipment that would be used periodically.

Agricultural service in the area of pest management presents many different types of Supervised Agricultural Experience (SAE) programs. These SAE programs may be placement opportunities while students work for an established company or start their own pest management business for neighborhood yards and local farms. Some of the pest management practices require training and certification, but the pay off may be a lifelong career that students will enjoy.

For more information regarding opportunities related to Supervised Agricultural Experience, view the webpage at the following URL:

http://www.ffa.org/index.cfm?method=c_programs.SAE.

Standards and Benchmarks Addressed

AFNR Career Cluster – Plant Systems Career Pathway Content Standards

Lesson 9.1 will address parts of the following performance elements:

PS.02. Performance Element: Prepare a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

National Science Education Standards

Unifying Concepts and Processes: As a result of activities in grades K-12, all students should develop understanding and abilities aligned with the following concepts and processes:

- **Systems, order, and organization**
- **Evolution and equilibrium**
- **Form and function**

Life Science – Content Standard C: As a result of their activities in grades 9-12, all students should develop understanding of

- **Biological evolution**

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- Interdependence of organisms
- Behavior of organisms

Principles and Standards for School Mathematics

Number and Operations Measurement

Instructional programs from pre-kindergarten through grade 12 should enable all students to compute fluently and make reasonable estimates. Instructional programs from pre-kindergarten through grade 12 should enable all students to:

- understand measurable attributes of objects and the units, systems, and processes of measurement
- apply appropriate techniques, tools, and formulas to determine measurements

Data Analysis and Probability

Instructional programs from pre-kindergarten through grade 12 should enable all students to:

- develop and evaluate inferences and predictions that are based on data
- understand and apply basic concepts of probability

Connections

Instructional programs from pre-kindergarten through grade 12 should enable all students to recognize and apply mathematics in contexts outside of mathematics.

Standards for the English Language Arts

Standard 7

Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g. print and non-print texts, artifacts, and people) to communicate their discoveries in ways that suit their purpose and audience.

Standard 8

Students use a variety of technological and informational resources (e.g. libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

Standard 12

Students use spoken, written and visual language to accomplish their own purposes (e.g. for learning, enjoyment, persuasion, and the exchange of information).

Objectives Covered in Unit:

- Identify how pests affect crop quality.
- Identify anatomical features of pests that help determine what type of pests are responsible for crop predation.
- Identify specific symptoms of damage caused by pests.

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- Create an Integrated Pest Management plan and discuss ways to implement such a plan.
- Determine pest populations based upon using a statistical estimation method.
- Identify harmful insects and list the crops the insects prefer.
- Create a pictorial model of the life cycle of pests.
- Compare and contrast pest eradication and pest control methods.

Additional Information:

1. Pests have negative effects on plant growth, such as yield and quality.
2. Plant pests include several organisms including insects, mollusks, nematodes, vertebrates, and weeds.
3. Proper detection of symptoms can determine plant pest threats.
4. Biological, chemical, and mechanical methods as well as cultural practices are options for eradication or deterring pests.
5. An Integrated Pest Management plan assures that the management of pests is economically and environmentally sound.
6. Life cycles of plant pests must be considered prior to employing proper control measures.

Critical Thinking and Application Extensions

Explanation

1. Students will create models of the different life cycles of pests to describe the similarities and differences.

Perspective

2. Students will debate the economical and environmental risks and benefits of different pest control methods from both an agronomist and an environmentalist viewpoint.

Essential Questions

1. What constitutes a pest?
2. What types of pests exist?
3. How are plant pests controlled?
4. What is Integrated Pest Management?
5. Why is observation critical to detection of pests?
6. How can pest management have negative effects on the environment?
7. What are the important decisions a producer must consider when deciding upon the method or methods of pest control that are best to use?
8. What can knowledge about the lifecycle of a pest contribute to the control of a pest?

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9. How does the type of pest determine the type of plant damage?
10. What is the trade-offs for chemical pest control versus biological control and cultural practices?
11. How does gathering a sample of a population determine a population of a larger area?
12. Why is the use of sampling crucial in controlling plant pests?

Daily Lesson Guide

Time: 11 days

The teacher should refer to the Teacher Resources section for specific information on teaching this lesson, in particular, **Lesson 9.1 Teacher Notes, Plant Glossary, Lesson 9.1 Materials List**, and other support materials.

Day 1:

- The teacher will present **Concepts, Performance Objectives, Key Terms, and Essential Questions** in order to provide a lesson overview.
- The teacher will provide students **Presentation Notes** pages to be used throughout the presentation to record notes and reflections. These pages are to be added to the *Agriscience Notebook*.
- The teacher will present PowerPoint® **Plant Pests**.
- Students will take notes using the *Presentation Notes* pages provided by the teacher.
- The teacher will provide students with a copy of **Project 9.1.1 Cause and Infect** and will explain the procedures and expectations.
- Students will work in pairs to begin *Project 9.1.1 Cause and Infect*.

Day 2 – 3:

- Students will complete *Project 9.1.1 Cause and Infect* and prepare for a brief summary of their poster to the class.
- The teacher will conduct “Me-You-Us” E-Moment® to share students’ findings for *Project 9.1.1 Cause and Infect*.
- The teacher will grade student work using **Project 9.1.1 Evaluation Rubric**.

Day 4:

- The teacher will provide students a copy of **Problem 9.1.2 Crop Scene Investigation**.
- Students will work individually to complete Part 1 of *Problem 9.1.2 Crop Scene Investigation*.
- The teacher will check the completeness of students’ work for Part 1 of *Problem 9.1.2 Crop Scene Investigation*.
- **NOTE:** The teacher will remind students to work on *Problem 9.1.2 Crop Scene Investigation* during any spare classroom time and as homework as they will make presentations of their work on Day 10 of the lesson.

Day 5:

- The teacher will provide students a copy of **Activity 9.1.3 Predicting Populations**.
- Students will work in pairs to complete *Activity 9.1.3 Predicting Populations* and submit work for grading.

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Day 6 – 7:

- The teacher will provide students *Presentation Notes* pages to be used throughout the presentation to record notes and reflections.
- The teacher will present PowerPoint® **All about Bugs**.
- Students will take notes using the *Presentation Notes* pages provided by the teacher.
- The teacher will provide students a copy of **Activity 9.1.4 A Bug's Life**.
- Students will work individually to complete *Project 9.1.4 A Bug's Life* and present to the class.

Day 8 – 9:

- The teacher will provide students *Presentation Notes* pages to be used throughout the PowerPoint® to record notes and reflections.
- The teacher will present PowerPoint® **Integrated Pest Management**.
- Students will take notes using the *Presentation Notes* pages provided by the teacher.
- Students will complete the remainder of *Problem 9.1.2 Crop Scene Investigation*.

Day 10 – 11:

- Students will make their presentations from *Problem 9.1.2 Crop Scene Investigation*.
- The teacher will score student work using **Problem 9.1.2 Evaluation Rubric**.
- The teacher will provide students with **Lesson 9.1 Check for Understanding**.
- Students will complete *Lesson 9.1 Check for Understanding* and submit for grading.
- The teacher will use **Lesson 9.1 Check for Understanding Key** to grade the assessment.

Instructional Resources

PowerPoint® Presentations

Plant Pests

All about Bugs

Integrated Pest Management

Student Support Documents

Presentation Notes

Project 9.1.1 Cause and Infect

Problem 9.1.2 Crop Scene Investigation

Activity 9.1.3 Predicting Populations

Activity 9.1.4 A Bug's Life

Teacher Resources

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Lesson 9.1 Teacher Notes

Lesson 9.1 Materials List

Lesson 9.1 Check for Understanding

Answer Keys and Assessment Rubrics

Project 9.1.1 Evaluation Rubric

Problem 9.1.2 Evaluation Rubric

Lesson 9.1 Check for Understanding Key

Reference Sources

Herren, R. V. (2004). *The science of agriculture: A biological approach* (2nd ed.). Albany, NY: Delmar.

Herren, R. V., & Donahue, R. L. (2000). *Delmar's agriscience dictionary with searchable CD-ROM*. Albany, NY: Delmar.

Lee, J. (2003). *Introduction to plant and soil science and technology*. Danville, IL: Interstate Publishers, Inc.

Parker, R. (2010). *Plant and soil science: Fundamentals and applications*. Clifton Park, NY: Delmar.

Reiley, H. E., & Shry, C. L. (2007). *Introduction to horticulture* (7th ed.). Clifton Park, NY: Delmar.