

## Lesson B2–3

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# Identifying Diseases and Pests of Forest Trees

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**Unit B.** Plant Wildlife Management

**Problem Area 2.** Tree Growth and Development

**Lesson 3.** Identifying Diseases and Pests of Forest Trees

### **New Mexico Content Standard:**

**Pathway Strand:** Natural Resources and Environmental Systems

**Standard:** V: Practice responsible conduct to protect natural resources.

**Benchmark:** V-C: Recognize insect types and available controls to prevent insect infestations.

**Performance Standard:** 1. Identify and classify insects. 2. Identify insect damage signs. 3. Describe how to report observance of insect infestations.

**Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

1. Describe the major categories of insect pests of forest trees.
2. Describe the major categories of disease problems of forest trees.
3. Describe management techniques for controlling insect and disease pests in forest trees.

**List of Resources.** The following resources may be useful in teaching this lesson:

Camp, William G. and Thomas B. Daugherty. *Managing Our Natural Resources*, 4<sup>th</sup> Edition. Albany, New York: Delmar, 2002. (Chapter 20)

Rolfe, Gary L., John M. Edgington, I. Irving Holland, and Gayle C. Fortenberry. *Forests and Forestry* (6<sup>th</sup> Edition). Upper Saddle River, New Jersey, Prentice Hall Interstate, 2003. (Chapter 2)

## List of Equipment, Tools, Supplies, and Facilities

Writing surface  
Overhead projector  
Transparencies from attached masters  
Copies of student lab sheets  
Insect specimens  
disease damaged trees

**Terms.** The following terms are presented in this lesson (shown in bold italics):

Bark borers  
Biological controls  
Chemical controls  
Defoliators  
Management controls  
Parasite  
Pathogen  
Root feeders  
Sap suckers  
Tip feeders  
Wood borers

**Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

*Collect specimens of insect and disease damage on trees to show the students. If unable to collect suitable specimens, contact your local state forester. Allow the students to observe the damage. Ask the students how these pest cause damage to the tree. Refer to information presented in earlier lessons such as how nutrients are transported through the tree. Relate that information to how insect damage can hamper the transport of this material. Lead discussion to first objective of the lesson.*

# Summary of Content and Teaching Strategies

**Objective 1:** Describe the major categories of insect pests of forest trees.

**Anticipated Problem:** What are the major categories of insect pests of forest trees?

- I. One of, if not the most deadly, pests of forest trees are insects. Some insects are pests to all kinds of trees, while other only affect certain species. Insects can cause damage to trees in a variety of ways.
  - A. Bark borers—As the name suggests, **bark borers** are insects that attack trees by tunneling underneath the bark. The soft cambium and newly produced wood and bark cells are destroyed. This effectively girdles the tree cutting off the supply of nutrients. In addition, the damage caused by bark borers often provides an entry point for diseases and other pests to attack the tree. One of the most common insects of this type is the Southern Pine Bark Beetle.
  - B. **Defoliators**—This type of insect causes damage to the tree by feeding on the leaves or needles of the plant. In most cases, insect larvae, instead of the adults, do damage.
  - C. **Wood borers**—Insects in this category eat their way through the sapwood and heartwood of the tree. This damage causes the wood to weaken. The most well known insect in this category is the termite.
  - D. Tip feeders—Insects that attack young twigs, stems, or buds are known as **tip feeders**. These insects attack the most tender parts of the tree.
  - E. **Sap suckers**—These insects are equipped with penetrating mouthparts that allow them to feed on tree sap. These insects rarely cause the tree to die, however, trees are weakened and growth is slowed. Common examples of sap suckers are aphids and scales.
  - F. Root feeders—**Root feeders** are insects in the soil around the tree that feed on the tree's roots. These insects cause the most damage to tree seedlings. Examples of this category are white grubs and wireworms.

*There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in understanding the major categories of insect pests of forest trees. Chapter 20 in Managing Our Natural Resources is recommended.*

**Objective 2:** Describe the major categories of disease problems of forest trees.

**Anticipated Problem:** What are the major categories of disease problems of forest trees?

- II. Diseases are most often caused by parasites. A **parasite** is an organism that relies on other organism for their food. These parasite organisms can be classified into five major categories: fungi, bacteria, nematodes, viruses, and mistletoes.
  - A. Of the five major categories of parasite organisms listed above, fungi are the cause of the most important diseases that affect forest trees. Whereas, fungi reproduce and spread by

tiny spores, they can multiply very quickly. Fungus diseases can attack any part of the tree. Stem diseases are generally considered the most dangerous as far as causing death to the tree. Leaf and root diseases generally do not kill the tree, just weaken the plant and slow down its growth. Examples of a stem diseases are Dutch elm disease, chestnut blight, fusiform rust, and various types of heart rot.

*There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in understanding the major categories of disease problems of forest trees. Chapter 20 in Managing Our Natural Resources is recommended.*

**Objective 3:** Describe management techniques for controlling insect and disease pests in forest trees.

**Anticipated Problem:** What are some management techniques that can be employed to control insect and disease pests in forest trees?

- III. The key to a healthy forest is good forest management. In the controlling of insect and disease pests, there are several alternatives a forest manager has to choose from.
  - A. In controlling the negative effects of insects on forest trees, there are three basic types of controls. They are:
    1. **Biological controls**—Natural controls for most insect pest exist in nature. However, these natural controls are slow. Whenever foresters alter these natural controls to manage insect pests, they become **biological controls**. Every insect has a natural enemy. An example of a biological control would be the introduction of a new predator of an insect pest into the infected area. Another example is the introduction of a pathogen. A **pathogen** is any disease-causing organism. The pathogen that attacks the specific insect pest may be available and can be introduced into the insect population.
    2. **Management controls**—These controls consist of various management practices that the forester can employ. These would include the removal of infested trees and tree parts, the use of insect resistant tree varieties, maintaining proper tree populations, and prescribed burns.
    3. **Chemical controls**—The use of pesticides on forest trees is regulated by the Environmental Protection Agency (EPA). Pesticides offer a quick and effective short-term solution to insect pests; however, often other control measures need to be used for long-term forest management.
  - B. The most effective control of forest disease is good management by the forester. Many kinds of diseases can be prevented from entering a forest by dusting the stumps of cut trees with borax or creosote. By removing damaged trees from the forest, the likelihood of disease infestation is reduced. In most cases, once a tree becomes diseased, little can be done. Therefore, prevention is the answer to a healthy forest.

There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in understanding the management techniques for controlling insect and disease pests in forest trees. Chapter 20 in *Managing Our Natural Resources* is recommended.

**Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at end of chapters in the textbook may also be used in the review/summary.

**Application.** Refer to *Managing Our Natural Resources* for an additional application of this lesson.

**Evaluation.** Use the following sample test to evaluate the students' comprehension of the material covered in this lesson.

## **Answers to Sample Test:**

### **Part One: Matching**

1 = c; 2 = b; 3 = d; 4 = a; 5 = f; 6 = e

### **Part Two: Completion**

1. parasites
2. sap suckers
3. Stem
4. good forest management

### **Part Three: Short Answer**

1. See Objective 2 in this lesson.
2. Fungi, bacteria, nematodes, viruses, and mistletoes

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# Test

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## Lesson B2–3: Identifying Diseases and Pests of Forest Trees

### Part One: Matching

*Instructions.* Match the term with the correct response. Write the letter of the term by the definition.

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|----------------|----------------|-----------------|
| a. Bark borers | c. Pathogen    | e. Wood borers  |
| b. Parasite    | d. Defoliators | f. Root feeders |

- \_\_\_\_\_ 1. Any disease-causing organism.
- \_\_\_\_\_ 2. An organism that relies on another organism for their food.
- \_\_\_\_\_ 3. This type of insect causes damage to the tree by feeding on the leaves or needles of the plant.
- \_\_\_\_\_ 4. Insects that attack trees by tunneling underneath the bark
- \_\_\_\_\_ 5. Insects in the soil around the tree that feed on the tree's roots.
- \_\_\_\_\_ 6. Insects in this category eat their way through the sapwood and heartwood of the tree.

### Part Two: Completion

*Instructions.* Provide the word or words to complete the following statements.

1. Diseases are most often caused by \_\_\_\_\_.
2. Common examples of \_\_\_\_\_ are aphids and scales.
3. \_\_\_\_\_ diseases are generally considered the most dangerous as far as causing death to the tree.
4. The key to a healthy forest is \_\_\_\_\_.

### Part Three: Short Answer

*Instructions.* Provide information to answer the following questions.

1. Explain the various controls a forester can use to manage insects in forest trees.
2. List the five major categories of disease causing organisms.