

# Forest Insect Pests and Diseases

## Forest insect pests

The forest is home to an abundant diversity of organisms, including insects. The study of forest insects is called **forest entomology**. Many insects play important roles in a forest ecosystem by serving as food for wildlife, pollinating plants and even preying on forest pests. Some insects, however, cause tremendous damage to a forest. They reduce the growth rate of trees, transmit disease, and weaken trees so they are more susceptible to attack by other insects or diseases or even kill trees. Many forest insect pests were introduced from other countries and have become invasive species, primarily because they have no natural predators.



forest damaged by gypsy moths

One way to classify insect pests is by the damage they cause. Each insect species has a preferred part of the tree on which it feeds. Some insects eat leaves; others suck juice from the leaves and still others bore through the bark and wood of the tree.

**Defoliators** eat a tree's leaves or needles. Heavy infestations of these insects can strip the leaves from entire stands of trees. Without leaves or needles, trees cannot make the sugar they need to grow. Most deciduous trees can survive one year of defoliation, although their growth rate will slow. Several years of defoliation generally will kill them. Evergreen trees can be killed by just one year of defoliation. The gypsy moth is an example of a defoliator.



defoliation caused by gypsy moths



skeletonized birch leaf

**Skeletonizers** eat all of the leaf except the veins. These insects dig between the upper and lower leaf surfaces or eat all but the upper surface, leaving only a thin layer of cells. Because a skeletonized leaf can still photosynthesize at a reduced level, these insects cause less damage than do complete leaf eaters. The birch leafminer is an example of a skeletonizer.

**Sapsuckers** are insects that draw sap and plant juices from trees using their hollow, straw-like mouth parts. They feed on needles, leaves, shoots or stems. Leaves feed upon will have a crinkled appearance and generally are smaller. Although this feeding does not kill the tree, it does reduce the ability of the damaged tree to make sugars. In heavy infestations, sapsucking insects can kill the tree. The hemlock woolly adelgid is an example of a sapsucker.



hemlock woolly adelgid

**Bark borers** are insect pests that feed on the cambium and inner bark of a tree, disrupting the transport of water and nutrients. Many bark borers attack only trees weakened from disease or drought. Trees attacked by bark borers have small holes in the bark where adult beetles have exited. Some bark borers also carry tree diseases. The Asian longhorned beetle and emerald ash borer are examples of bark borers.



exit hole of adult emerald ash borer



exit holes of adult Asian longhorned beetle

## Forest Diseases

**Forest pathology** is the study of tree diseases. Diseases that affect trees cause damage that ranges from mild to very severe. Forest pathologists classify tree diseases by what causes them. They look at the disease signs and symptoms. Some of the most serious tree diseases are caused by fungi. Fungi attack various parts of the tree, including the leaves, branches, trunk and roots. Fungal diseases are grouped by the part of the plant that is infected, or the type of infection it causes. Two examples are vascular wilt disease and canker disease.



Dutch elm disease

Dutch elm disease is an example of a fungus that causes vascular wilt disease. This disease clogs vessels in trees preventing water and nutrients from reaching the leaves and sugars from reaching the roots and other parts of the tree.



vascular wilt disease



chestnut blight

Chestnut blight is an example of a fungus that causes a canker disease. The chestnut blight grows on the bark of the trees and eats away the bark creating an orange canker. These cankers prevent the movement of water, nutrients and sugars at the affected areas. The blight eventually eats a ring all of the way around the tree, girdling the tree and the tree eventually dies.



orange canker

# Management of Forest Insect Pests and Diseases

How can forest managers control harmful insects and diseases? Foresters concentrate their efforts on two areas, suppression and prevention. :

## **Suppression**

Suppression controls existing insect populations and disease outbreaks using a variety of methods including biological, chemical, sanitation and mechanical controls.

- ❖ Biological controls can be used to reduce insect pest populations. These controls include the introduction of natural predators, competitors or diseases. Introduced predators attack the unwanted insects. Biological controls can be “specific” to the pest, destroying that insect without harming others.
- ❖ Chemicals called insecticides can provide a quick response to insect infestations. Some insecticides function almost as a disease causing the insect pest to become sick and die. Other insecticides send signals that confuse insects so that they will not reproduce or cause the insects to gather in chemical traps. For diseases, chemicals are sometimes used to give individual trees resistance to a disease. All chemicals are regulated carefully and must be used properly to avoid damaging other forest organisms.
- ❖ Sanitation is the process of harvesting insect-infested or diseased trees. Loggers remove the trees from the forest and sell the wood to a mill, where it is made into products. Sanitation is aimed at removing the insects or diseases from an area, so that they can’t spread to surrounding healthy trees.
- ❖ Mechanical procedures for controlling insects and diseases include cutting down, chipping, peeling or burning affected trees to destroy insect habitats and sources of disease. Wood produced by these methods is seldom used commercially.



chemical control



cutting down affected trees

## **Prevention**

Prevention is aimed at avoiding insect and disease outbreaks. Foresters are thinking ahead about the types of potential insect and disease problems a forest may have. Methods of prevention include regulatory and silviculture controls.

- ❖ Regulatory controls include laws that prohibit the transport and entry of insect pests or diseases. Quarantines prohibit the movement of affected material into an area. Containment policies are also used to prevent movement of insects or affected material out of an area.



- ❖ Silvicultural controls are aimed at optimizing a forest’s growing conditions so that it will not be susceptible to insect pests or tree diseases in the first place. Healthy trees are less attractive to some pests and to recover more quickly if pest or disease damage occurs.



healthy forest

## Tree Insect Summary

<b>Tree Damage</b>	<b>Harmful Insects</b>	<b>Envirothon Tree Species Most Affected</b>	<b>Land of Origin</b>
<b>Defoliators</b>	gypsy moth	red oak, paper birch	Europe & Asia
<b>Skeltonizer</b>	birch leafminer	paper birch	Europe
<b>Sapsucker</b>	hemlock woolly adelgid	Eastern hemlock	Japan
<b>Barkborers</b>	Asian longhorned beetle	Norway maple, white ash, paper birch, American elm	China
	emerald ash borer	white ash	Asia

## Tree Disease Summary

<b>Tree Disease</b>	<b>Harmful Fungi</b>	<b>Envirothon Tree Species Most Affected</b>	<b>Land of Origin</b>
<b>Vascular Wilt</b>	Dutch elm disease	American elm	Asia
<b>Canker</b>	chestnut blight	American chestnut	China