



Keep Your Woods Healthy

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Help your woods resist pest outbreaks

In your backyard woods, insects and microorganisms abound, both in number of individuals and number of species. Native insects and microorganisms are key components in many ecological processes, such as nutrient recycling, decomposition, plant succession, natural pest control, and wildlife habitat. A woods devoid of insects and microorganisms would not be healthy; in fact, it would be nonfunctional!

A healthy woods is a functioning ecosystem with young, mature, and dead trees. Key qualities of a healthy woods are high diversity, resiliency to stresses, and sustainable benefits (for example: recreation, wildlife habitat, clean water, and timber).

Preventive measures

Epidemics of native forest insects and pathogens occur as part of natural fluctuations in ecosystems. During these epidemics, tree mortality and growth reduction may be localized or widespread. Some forest management practices may cause more frequent and more severe outbreaks. Such practices include planting a single species, planting a species beyond its natural range, delaying harvest beyond tree maturity, excluding fire, and harvesting only the biggest and best trees. To promote a healthy woods and to prevent pest outbreaks, take steps to ensure diversity and vigor in your backyard woods.

Increasing species diversity

Woods with a mix of tree species are often less susceptible to pest outbreaks than woods with a single species. As tree diversity increases, the diversity of all the associated organisms also increases, which leads to a more complex and stable environment. Therefore, do not retain just one or two tree species and remove the other species when selecting your preferred trees. If your woods has only a few tree species, you can add diversity by planting appropriate species that are currently lacking or by using harvesting techniques that will encourage more species to establish naturally.

Increasing age diversity

A diversity of tree ages reduces the risk of pest outbreaks. By having trees of various ages—young, juvenile, and mature—along with species diversity, the entire woods is less likely to be favorable to pests. As with species diversity, age diversity also increases the complexity and stability of the ecosystem. A natural balance of organisms is more likely to develop as age diversity increases. For example, potential pests of young trees could be regulated by parasites and predators already well established on older trees. Age diversity can be increased by the timing and location of harvests.

Increasing stand vigor

A healthy woods is less susceptible to pest outbreaks and is more resilient if an outbreak does occur. The vigor of your woods is related directly to tree density. When trees are overcrowded, competition for light, water, and nutrients results in lower growth rates for all the trees. These stressed trees are more likely to be attacked by pests, which can lead to pest outbreaks. A vigorous backyard woods with rapidly growing trees is resilient to stresses (drought, flooding, defoliation, and air pollution) and it can withstand these stresses longer and with less impact than one with less vigorous trees. (See the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for more information.)



This vigorous woods is not overcrowded and has good regeneration.

Identifying a tree health problem

Often the first visual clues of a tree health problem are symptoms like red needles, yellowing leaves, or wilting foliage. These problems may arise from a multitude of causal agents including insects, pathogens, other organisms, tree disorders, soil factors, weather events, pollution, and herbicide injury. The pattern of these symptoms on individual trees should be noted; for example, only old needles, only top of tree, only one side, or only inside the crown. Also, any pattern throughout your woods is important for identification. Are the affected trees randomly scattered, or in a group that is expanding? Are the affected trees in valleys or on ridge tops, or on the edge of a stand? Is only a certain size or age or species of tree affected?

Closer examination of the affected trees may reveal signs of the causal agent, such as the insect, fruiting body of the pathogen, a characteristic-shaped canker on a stem, insect tunnels under the bark, or a pattern of missing or discolored leaf tissue. Signs of the causal agent may be found on a different part of the tree than where the symptoms appeared. For example, red needles in the crown may be due to bark beetle attack on the lower trunk. Collection of these signs is invaluable in determining the causal agent; however, not all forest health problems will have readily identifiable causal agents; for example, herbicide injury, air pollution, girdling roots, root disease, and soil compaction. Other problems will have multiple signs from secondary insects and pathogens, and the actual causal agent may be missed. Some problems are the result of multiple factors. For example, oak decline is the result of a number of tree stresses (drought, root damage, gypsy moth defoliation, and early frosts) that weaken the tree. Then secondary insects (two-lined chestnut borer), or pathogens (*armillaria* root rot), or both may invade these weakened trees. Usually the dieback and decline progress slowly over several years.

Once you observe the symptoms and signs, consult reference materials to see if you can identify the causal agent. Forest insect and disease guidebooks and fact sheets may be available from your local library, county extension office, or State forestry office. Also, many web sites provide substantial information on forest pests. You may wish to contact the local Cooperative Extension Office for educational assistance and to inquire if a listing of qualified consulting foresters or arborists is available for your area. Otherwise, consult your phone book under "Arborists" or "Tree Service."

Introduced pests are a major threat to the health of your backyard woods. Introduced pathogens, such as chestnut

blight, Dutch elm disease, white pine blister rust, and butternut canker, have dramatically and permanently altered forested ecosystems in the United States. Many introduced insects are impacting U.S. forests, including the gypsy moth, beech scale, hemlock woolly adelgid, Asian longhorned beetle, smaller European elm bark beetle, introduced basswood thrips, larch sawfly, and European pine shoot moth.



The gypsy moth caterpillar (*Lymantria dispar*) has distinctive rows of red and blue spots along its back.



Large silken webs are symptoms of the fall webworm (*Hyphantria cunea*). Though the defoliation may look severe, trees do not sustain significant growth loss, since the defoliation is late in the growing season.

Treatment options

When you expect that pest epidemics may cause significant damage to your woods (based on your objectives), action to protect your backyard woods is warranted. Once you have identified the causal agent, then you can consider treatment options. Silvicultural (from "silviculture"—the science and art of producing and tending a woods) and biological treatments tend to be longer-term solutions and modify conditions that allowed the pest population to reach outbreak proportions, though the treatments may take months or years to effectively reduce the pest population. Physical and chemical treatments reduce pest numbers quickly, but do not modify the factors that led to the outbreak, thus pest populations are likely to rebound.

Silvicultural treatments

Silviculture is best used in the preventive measures described earlier. In outbreak situations, timely removal and destruction of infested trees can greatly reduce a pest population and keep other trees from being attacked. The remaining trees are more vigorous and less susceptible to further outbreaks.



This pine plantation was thinned to increase growth of the selected trees and was pruned to increase the future timber value. Plantations need intensive management to prevent severe pest problems that can occur due to the lack of species and age diversity.

Biological treatments

Biological treatments use the natural enemies (predators, parasites, and pathogens) that control pest populations. In your backyard woods, it is important to conserve and enhance these natural enemies, so the natural balance is not disrupted. Therefore, limit the use of broad-spectrum pesticides (insecticides, fungicides, and herbicides), promote a diverse flora (to provide a wide range of



This parasitic wasp is a natural enemy of the introduced pine sawfly. It is laying an egg inside the cocoon of the sawfly, and the wasp larva will kill the developing sawfly.



The red-bellied woodpecker (*Centurus carolinus*) is feeding on woodborers under the bark.

natural enemies and nectar sources for parasites), and ensure nesting sites for insect-feeding birds. Introduced species often become pests because they do not have natural enemies in their new environment. Importation and colonization of natural enemies from the native range of the pest has provided effective control, especially for many insect pests. Projects to introduce new biological control agents are conducted by Federal and State regulatory agencies. Once established, these natural enemies reproduce and disperse throughout the range of the introduced pest.

Physical treatments

Physical methods can be effective, particularly on the small scale of your backyard woods. For insects, various traps, barriers, and mass collecting have been successful. Insect traps generally use an attractant (a chemical scent, bait, light, or color) to lure the insect into the trap.



A Lindgren funnel trap is baited for mountain pine beetle (*Dendroctonus ponderosae*). The attractant is synthetic sex pheromone specific to this bark beetle species.



Pruning the lower branches of white pines in zones with high incidence of white pine blister rust (*Cronartium ribicola*) can reduce damage from this introduced pathogen.

With enough traps, the pest population can be significantly reduced. Barriers on the trunks of trees can be effective for some caterpillars that migrate daily from the ground to the canopy to feed. Removal of insects by hand can be effective. For example when only a few host trees are present, gypsy moth can be controlled by placing a burlap band around the trunk of the host trees, then daily collecting and destroying the caterpillars that congregate under the burlap. For pathogens, removing and destroying the diseased tissue can be successful. For example, pruning the infected lower branches of white pines can reduce damage by white pine blister rust. Also, cutting barriers through root systems between infected and uninfected trees can stop the spread of oak wilt and Dutch elm disease.

Chemical treatments

Pesticides can be useful in protecting valued trees from damage during pest outbreaks. There are many ways to apply pesticides—from root injections to aerial sprays. With any pesticide, follow the label directions and apply it only for the pests for which it is registered. Pesticides that specifically target the pest should be favored over broad-spectrum pesticides that may impact nontarget organisms. Also formulations and application methods that have minimal impacts on other organisms should be used. Opportunities to participate in cooperative treatment projects with other backyard woods owners and government agencies should be sought. For example, the Cooperative Gypsy Moth Suppression Project assists in monitoring local populations, and aerially applying selective insecticides only to areas that are likely to be defoliated. You will pay much less per acre for the cooperative treatment than if you contract the treatment on your own.



Aerial application of a biological insecticide is used to control gypsy moth defoliation during a Cooperative Suppression Project.

A Cooperative Project of:



www.fnr.purdue.edu/inwood/ifwoa%20home.htm



www.arborday.org/backyardwoods



www.agriculture.purdue.edu/fnr/Extension/forestry.htm



USDA Forest Service
NORTHEASTERN AREA
State and Private Forestry
www.na.fs.fed.us



www.in.gov/dnr/forestry



National Association of
Conservation Districts

In the Forest

Forest pest management on private and public forests protects their economic, ecological, and social values. Through proper forest management practices, many potential pest problems are avoided. Forest health is promoted through practices that allow forests to recover quickly from natural or human-caused stresses and that provide for ecosystem stability. When serious pest problems are discovered, suitable treatments are applied to reduce the pest populations with minimal impacts on nontarget organisms. Through this holistic, ecological approach to forest management, the long-term productivity and health of the forested ecosystem is sustained.



Pesticide Precautionary Statement:

Pesticides used improperly can be injurious to humans, animals, and plants. Follow label directions and heed all precautions on the label. Store all pesticides in original containers and out of reach of children. Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. After handling a pesticide, do not eat, drink, or smoke until you have washed. Dispose of empty pesticide containers properly.

NOTE: Registrations of pesticides are under constant review by the Federal Environmental Protection Agency. Consult your local county agricultural agent or State extension agent about restrictions and registered uses of particular pesticides.