Forest Insects

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In addition to the major pests of forest trees, there are many kinds of insects that live in forests without occurring in damaging numbers. However, a few may develop occasionally into serious local infestations. Since both major and occasional pests tend to be cyclic and often scattered, ongoing surveys and monitoring by trained foresters are an essential part of forest pest management. Early detection of pests is essential to prevention of economic losses due to serious outbreaks.

Sound forest management practices are basic to effective integrated pest management. Proper site selection, stand density control, stand and tree vigor, and proper sanitation are among the most important. Under poor management and inadequate protection practices, salvage operations may be the only recourse. Pesticide applications may be utilized for prevention of potential insect population buildup and suppression of outbreaks that threaten the vigor as well as survival of trees. However, use of pesticides is not recommended without knowledge of pest status. Use pesticides only if pests are present or are predicted to be present from a standard or systematic sample survey. They should be used in settings where compatible with management and of limited risk to the environment.

Technical assistance is available from the Virginia Department of Forestry and the U.S. Forest Service, as well as the Virginia Cooperative Extension Service. State and federal forestry agencies may provide control services on a cost-sharing basis as well as survey and detection programs in cooperation with public and private forest land owners. Control programs for new, introduced, or as yet not established pests such as the gypsy moth are conducted by the Bureau of Plant Protection and Pesticide Regulation of the Virginia Department of Agriculture and Consumer Services with the Cooperation of the Animal and Plant Health Inspection Service, the USDA, the US Forest Service, the Virginia Department of Forestry, and Virginia Cooperative Extension.

Internet resources on forest insect pests:

http://www.ento.vt.edu

http://www.idlab.ento.vt.edu/IDLab/Fact/Fact1.html

http://www.idlab.ento.vt.edu/IDLab/Fact/Fact2.html

http://fhpr8.srs.fs.fed.us/idotis/insects.html

Table 7.1 - Insects and Insecticides

Special Note: Some of the following chemicals may be restricted to conifers only or tree nurseries only; read the label and use only as directed.

Insect Host	Recommended Control	Remarks
Adelgids Balsam woolly adelgid	Carbaryl Chlorpyrifos Dormant oil Esfenvalerate Imidacloprid Permethrin	Scout regularly for adelgid or trees loosing apical dominance; remove infested trees if practical. Spray bark and foliage to runoff. treat in June or when found May- October. If infested plants are few and scattered, rogue and burn, and spray trees in a 20 foot diameter circle around rogued trees. When removing infested trees, wrap trees in tarp so no adelgids fall off as the tree is removed.
Hemlock woolly adelgid (eastern and Carolina hemlock)	Dormant oil Imidacloprid Thiamethoxam	For soil applications of the systemic, amount applied is based on diameter of trunk at breast height. Applications should take place at bud break. Do not use on trees with less than 50% foliage. For dormant oil use 1% rate during the spring months and 2% during the fall or winter. For foliar applications, spray foliage and twigs to run off in early spring (March - April) or late fall (Oct. - Nov.).
Aphids (various hardwoods)	Azinphosmethyl Carbaryl Esfenvalerate Imidacloprid Malathion Permethrin	Thorough coverage of foliage for leaf-feeding aphids or twigs and branches for bark-feeding aphids. Treat when aphids are first seen. May occur throughout the season.

Table 7.1 - Insects and Insecticides (cont.)

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Insect Host	Recommended Control	Remarks
Aphids (cont.) (various conifers)	Azinphosmethyl Carbaryl Esfenvalerate Imidacloprid Malathion Permethrin	Aphids rarely harm forest trees; heavily infested seedlings can be sprayed. Thorough coverage of new shoots, twigs and branches. Treat when first seen. May occur throughout season. Provado: apply at 4.0-8.0 oz/A
Bark Beetles Ips engraver beetles Southern pine beetle Turpentine beetle (pines)	Bifenthrin Carbaryl Permethrin	Bark beetle impact can be prevented or reduced by growing trees at lower densities, thinning during rotation, and in general keeping the basel area at about 80 square feet. In forest stands, salvage timber with a buffer strip of uninfested trees at the active head(s) of the infestation as soon as possible. This is called “cut and remove.” You can also cut and spray to remove the beetles in the trees or spray trees with insecticide before they are attacked for temporary protection. Where spraying is justified, thoroughly soak bark with spray. Do not allow spray to get into bodies of water or run off into waterways. Turpentine beetle infestations can be treated without felling by spraying the lower boles of infested and adjacent uninfested trees.
Borers	Permethrin	This chemical is registered for preconstruction lumber and logs against wood destroying insects.
Cankerworms (many hardwoods)	*Bacillus thuringiensis (B.t.)* Carbaryl Diflubenzuron Tebufenozide	Apply treatment when egg hatch is complete and larvae are young, usually in early to mid- May. For all but *B.t.*, do not allow spray or run off to get into bodies of water or streams. See label for aerial application dosage rates. Sticky banding of the trunk in the fall for fall canker-worm can be used to prevent wingless females from climbing the trees and mating with males. They also can be used to monitor activity.
Defoliators Caterpillars, beetles, etc.	*Bacillus thuringiensis (B.t.)* Carbaryl Diflubenzuron Tebufenozide	There are many other insects that occasionally defoliate Virginia forests. The impact of defolia- tion depends primarily on host condition, time of year, and degree of foliage loss. Tree growth and vigor are reduced most by heavy defoliation early in the year. Trees that are in good health at the time of defoliation will survive. Trees already under stress at that time of defoliation will loose vigor and sometimes die from the effects of secondary agents and adverse environmental conditions.
Emerald Ash Borer (Ash)	**Systemic insecticides** Acephate Bidrin Emamectin benzoate Imidacloprid **Contact insecticides** Bifenthrin Carbaryl Cyfluthrin Permethrin	Systemics (Imidacloprid, acephate, bidrin, or emamectin benzoate) need to be applied in April or May when active uptake from the roots is occuring. Contact insecticides used for branch and trunk sprays need to be applied in early May and early June. Systemics must be applied **before** the trees show signs of infestation. Imidacloprid should be drenched and emamectin benzoate must be applied by direct tree injection by an arborist. After cutting trees, do not move wood out of area. Destroy, chip, or leave wood on site.
Fall Webworm (many hardwoods)	*Bacillus thuringiensis (B.t.)* Carbaryl Diflubenzuron Tebufenozide	Rarely has significant impact on forest trees; high density populations rarely persist for more than two seasons. Stressed trees can be protected against defoliation impact by spraying the first webworm generation in mid to late June. Treat first generation in mid to late June, and if necessary, the second generation in mid to late August.

Table 7.1 - Insects and Insecticides (cont.)

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Insect Host	Recommended Control	Remarks
Gypsy Moth (many hardwoods)	*Bacillus thuringiensis (B.t.)* Carbaryl Diflubenzuron Tebufenozide	Treat when most larvae are in second instars and most oak leafs are at least half expanded. Most treatments are coordinated through local-state-federal cooperative suppression programs. Defoliation impact can be reduced through preventive forest management practices, including presalvage, thinning, sanitation, and manipulation of species composition, all done at least 5 years before invasion by the moth.
Mites Spruce spider mite (conifers, especially spruces, hemlock, fraser fir in nurseries, and plantations. Seldom on pine)	Avid Clofentezine Dormant oil Etoxazole Floramite Spiromesifen	Treat in early spring and fall (usually late April and mid-September) when mites are most active; use oil as a dormant spray (make foliage oily)
Eriophyid mite (Needle Sheath Mite)	Carbaryl Chlorpyrifos Dimethoate Dormant oil	Treat as soon as detected (early spring); oils may alter foliage appearance.
Pine Tip Moth Nantucket pine tip moth (2 and 3 needle pines only)	Carbaryl Confirm Diflubenzuron Esfenvalerate Imidacloprid Imidan Permethrin Tebufenozide	Thoroughly wet all shoots and needles in the spring and repeat 1 to 2 times later in the summer. Pheromone traps are used to time male flight activity. A general rule is to treat 10 days after catching males in traps so that susceptible early instar larvae are at their first peak. The descrete generations that this rule depends on break-down with each succeeding generation, of which there are three in Virginia.
Pine Webworm (white, Scots, red pine)	*Bacillus thuringiensis (B.t.)*	Rarely contributes to seedling mortality. Spray only when webworm population density is high and seedling stocking marginal. Treat as soon as detected
Sawflies Virginia pine sawfly, introduced pine sawfly, red-headed pine sawfly	Carbaryl Esfenvalerate Imidacloprid	Treat Virginia pine sawfly in April; introduced pine sawfly on white pine in June and September; red-headed pine sawfly, June to September. Since pine sawflies tend to avoid current season's foliage, defoliation is rarely total and trees can survive repeated infestations. See label for aerial application directions.
Scale Insects Pine needle scale, pine tortoise or scale, elongate hemlock scale, etc.	Carbaryl Dormant oil Malathion Permethrin	Treat for pine needle scale mid to late May and/ mid to late July; pine tortoise scale mid June and July. For all other scale insects treat at crawler date. Scale insects rarely reach high densities or have serious impact on hardwood forests; spread of invading beech scale and associated beech bark disease can be slowed through salvage of infested trees. Spraying in not practical in the forest setting.
Tent Caterpillars Forest tent caterpillar (many hardwoods)	*Bacillus thuringiensis (B.t.)* Carbaryl Diflubenzuron Malathion Tebufenozide	Treat for forest tent caterpillar when first leaves are fully expanded. Forest tent caterpillars occasionally cause extensive hardwood forest defoliation. They do not make the web tents in the crotch of the tree branches.
Eastern tent caterpillar (wild cherry)		Eastern tent caterpillar only have minor impact and should not be treated in the forest setting.

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Insect Host	Recommended Control	Remarks
Weevils Pine reproduction weevils, Pales weevil, Eastern Pitcheating weevil. (conifers: feed on first year stumps and the base of recently dead trees as larvae. The adults may feed on live twigs.)	Esfenvalerate Imidan Permethrin	In forest plantations, wait one year to replant with seedlings if harvesting took place after June 1. Seedlings are currently treated in nursery beds prior to lifting under SLN registration; foresters and landowners can order seedlings that are already treated. In Christmas tree plantations, stump removal or stump treatment with insecticide (as described below) is recommended. Thoroughly soak stumps and ground surface 1 to 2 ft around stumps or slash prior to mid-March. Apply Imidan as 4% top dip for seedlings prior to planting. Follow label directions. **For seedlings:** Apply as a **full coverage spray** to seedlings immediately after planting. **For stumps:** Thoroughly **soak** stumps and ground surface around stumps or slash prior to mid-March. Only stumps or wood cut since previous summer needs treatment. Dilute Asana in kerosene.
White Pine Weevil (eastern white pine, Scots pine, and Norway spruce: feed in the tops of trees only.)	Permethrin	Treat when plantations show 5% or more weeviled tips. Applications must be made prior to adult egg laying, usually April 1. Treat only 1.5 to 2 ft of the main terminal shoot, not the entire tree or laterals. A full 4 gal knapsack sprayer will treat approximately 200 terminal shoots.
Wood Borers		Heavily infested trees should be salvaged for fuel wood or felled and bucked to encourage predation of borer larvae by ants; if left standing, such trees serve as breeding grounds for borers that will in fest and degrade additional trees. Spraying is im practical. Do not move infested wood out of area.

Precautions: Do not allow any insecticides as sprays, drift, or runoff to contaminate bodies of water, streams, or drainage systems. Carbaryl is highly toxic to honeybees. Follow precautionary instructions on labels and use protective equipment wherever specified.

Equivalents: 1 lb WP/100 gal = 1 Tablespoon/gal; 1 pt EC/100 gal = 1 teaspoon/gal