

Christmas Tree Insects

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Early detection and accurate identification of insect pests is the key to prevention of serious damage and loss in Christmas tree plantations. Growers should be knowledgeable about the more common, injurious insects and mites - their recognition, host plants, damage, seasonal development, and habits. Chapter 10, Insects, in the "Christmas Tree Production Manual" is a helpful reference (Virginia Cooperative Extension Publication 420-075). The "Christmas Tree Pest Manual," Michigan State University publication E-2676, contains full-color illustrations to aid in identification as well as biological and chemical information.

Effective control depends on the timely and thorough application of recommended control measures. Control measures applied improperly or not in accordance with label directions are ineffective and a waste of time, materials, and labor, and may constitute a misuse of pesticides. Use pesticides only if pests are present or are predicted to be present from a standard or systematic sample survey.

Amounts of pesticide to use in preparing sprays or applying treatment are specified in this control guide. Even so, they should be determined from the label on the container of the pesticide at the time of application. Be sure to read **ALL** of the directions and precautions on the label before and at the time of application of each treatment. Use **ONLY** the recommended amounts of the formulation. For many insecticides listed, other formulations are available and registered for use: Carbaryl (Sevin) - 50 WP, 80S, 4F, and Sevimol; Dursban-2E and 50WP (Lorsban is the trade name for chlorpyrifos marketed for agricultural crops); Orthene - 9.4% EC and 15.6% EC; diazinon-4E and 50WP; Malathion-50% EC and 25WP; Dipel-3.2% WP, 6L, and 8L; Thuricide-32 LV, HP, and HPC. Formulation often depends on type of application as well as company marketing policy. Dusts are not recommended, since they are readily washed off by rain. WP residues are not as persistent as emulsifiable concentrates; although addition of a sticker often improves residual activity. Insecticides marked ** are restricted-use pesticides.

Major Insects and Mites Infesting Christmas Trees

Insects and mites vary in their host preferences and their severity on different hosts. The following list of pests associated with each type of tree is an aid in identifying potentially damaging species. The pests are listed in order of importance and occurrence generally. Most insects and the spruce mite tend to be localized on scattered trees rather than uniformly distributed through plantations.

Balsam Fir	white pine aphid	sawflies	pine webworm
balsam woolly adelgid	pine bark adelgid	eriophyid mites	aphids
aphids	sawflies	spruce mite	spittlebug
balsam twig aphid	bagworm	Red Pine	woolly pine scale
Blue (and Sitka) Spruce	pine needle scale	pine tip moth	Virginia Pine
spruce mite	pine webworm	sawflies	Virginia pine sawfly
white pine weevil	eriophyid mites	pine root collar weevil	pine tip moth
sawflies	Fraser Fir	pales weevil	pales weevil
aphids	balsam woolly adelgid	eastern pine weevil	pine webworm
cooley spruce gall adelgid	aphids	white pine aphid	White Fir
Douglas-Fir	spruce mite	Scotch Pine	aphids
spruce mite	eriophyid mites	pine tip moth	White Spruce
white pine weevil	balsam twig aphid	pine needle scale	spruce mite
cooley spruce gall adelgid	Norway Spruce	pine tortoise scale	white pine weevil
Eastern White Pine	white pine weevil	pine bark adelgid	sawflies
white pine weevil	eastern spruce gall adelgid	sawflies	aphids
pales weevil	aphids	pales weevil	
eastern pine weevil	pine needle scale	eastern pine weevil	

Fraser Fir Scouting Schedule for Insects and Mites

Scouting and Control Notes

(Specific chemical recommendations are in the following sections.)

Bagworm: *Scouting:* January: Look for overwintering bags. *Cultural Control:* Pick off and destroy bags in the fall and winter. Bags can be destroyed by dropping them in a can of kerosene or burying them at least 6" deep. *Chemical Control:* It is important to treat in mid-June when the larvae are small and susceptible to insecticides. Larger larvae with bags are not easily controlled. See the most recent Virginia Pest Management Guide for insecticides labeled for control of bagworms. *Biological Control:* Spraying with *Bacillus thuringiensis* (Bt, Dipel, Thuricide, etc.) in early to mid-June should give satisfactory control.

Spruce Spider Mite: *Scouting:* Start scouting in mid-April and continue scouting once a month until the first heavy frost. Walk through the plantation in a Z or W pattern. Pick a tree at random once every 50 feet. Check the shoot for mites or mite damage; you may need a 10X hand lens to see the mites. You should be examining at least 15 shoots per acre. Carry a sheet of paper with two columns marked to record the total number of shoots sampled and the total number of shoots with mites. The presence of damage alone is not enough; record it as positive if you find the mites or mite eggs. Based on research in North Carolina that is applicable to Virginia, the economic threshold is based on the size of the tree. On trees less than waist high, treat if the percentage of shoots with mites exceeds 40%. On trees waist high to year before sale, treat if the percentage of shoots with mites exceeds 20%. On trees at the year of sale, treat if the percentage of shoots with mites exceeds 10%. Use these guidelines for determining when to come back and sample again. If no mites or eggs are observed then return in 6-8 weeks. If less than 10% of the shoots have mites or eggs return in 4-5 weeks. If more than 10% of the shoots have mites or eggs return in 2 weeks. If there are more than 10 days of hot, dry weather check the trees sooner. *Cultural Control:* Avoid having bare earth under trees as this will reduce the number of predators on the tree and increase the number of Spruce Spider Mites. *Mechanical Control:* None known. *Chemical Control:* See Fact Sheet 444-235 for more detail.

Balsam Twig Aphid: *Scouting:* Start in early April to determine the amount of damage present. Walk through the field in a Z or W pattern. Scouting for Balsam Twig Aphid can be done at the same time as the Spruce Spider Mite scouting. *Threshold for Christmas Tree Growers:* Treat only if the trees are within 2 years of harvest. If more than 10% of the trees have at least one damaged twig then consider treating. The amount of damage an individual grower/buyer will tolerate is variable as some buyers consider a small amount of twig damage good because the upturned needles give the tree a silvery appearance. This may take a number of seasons of working with buyers to perfect how much damage you can leave and still not reduce your price. *Mechanical Control:* None known. *Cultural Control:* Maintain the trees in good growing condition and trees should continue to vigorously grow even with populations of Balsam Twig Aphid present. *Chemical Control:* Treat between mid-April and bud break. If you wait until after bud break, it is too late for control this season and you should postpone treatment until next year. See Fact Sheet 444-228 for more detail.

Balsam Woolly Adelgid (BWA): *Scouting:* The best time to scout is in July as the adelgids are covered with a white cottony wax and are easily observed. In the winter they are much smaller and lack the woolly covering making them much harder to see. Look also for the trees that are flattening out on the top or have a crooked leader; this is early damage from the BWA. Walk through the field in a Z or W pattern. *Threshold for Christmas Tree Growers:* Treat the entire block if an infestation is found. *Mechanical Control:* If only one or two infested trees are found, wrap the infested trees in a tarp and cut down and remove. You will still need to spot spray the surrounding trees. *Cultural Control:* Avoid excess use of nitrogen fertilizer. *Chemical Control:* See Fact Sheet 444-233 for more detail.

White Grubs: *General Comment:* White grubs are seldom a problem on plantations where a grass strip is maintained between the trees. Scouting should be performed in areas where new trees are to be planted or where yellowing or slow growth occurs on established trees. *Scouting:* Check especially in areas where trees are yellowing or not growing. Look also in areas with poor grass growth or where polecats or foxes are digging up grubs. In June lift up 1-foot-square sections of sod, five sites per 2 acres. *Threshold for Christmas Tree Growers:* Treat if you find on average more than 1 grub per hole and you have damage. *Mechanical Control:* None known. *Cultural Control:* Maintain as much grass growing between the trees as possible as the white grubs prefer to feed on grass roots and only move to tree roots when nothing else is available. *Chemical Control:* Treat with Diazinon or Oftanol in the same manner you would treat a lawn.

Table 7.6 - Fraser Fir Scouting Schedule for Insects and Mites¹

Virginia Tech IPM Program - Prepared by Eric R. Day

Pest Problem	Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Bagworm	Scouting		Scout										
	Treatment												
Spruce Spider	Scouting				Scout	(Scout)	(Scout)	(Scout)	(Scout)	(Scout)	(Scout)		
	Treatment												
Balsam Twig	Scouting				Scout	Scout							
	Treatment												
White Grubs	Scouting						Scout						
	Treatment												
Balsam Woolly Adelgid	Scouting							Scout					
	Treatment							Treat					

¹Modified in part from Fraser Fir IPM by Dr. Jill Sidebotton, N.C. Cooperative Extension

Spruce Scouting Schedule for Insects and Mites

Scouting and Control Notes

(Specific chemical recommendations are in the following sections.)

Bagworm: *Scouting:* January: Look for overwintering bags. *Cultural Control:* Pick off and destroy bags in the fall and winter. Bags can be destroyed by dropping them in a can of kerosene or burying them at least 6” deep. *Chemical Control:* It is important to treat in mid- June when the larvae are small and susceptible to insecticides. Larger larvae with bags are not easily controlled. *Biological Control:* Spraying with *Bacillus thuringiensis* (*Bt*, Dipel, Thuricide, etc.) in early to mid- June should give satisfactory control.

White Pine Weevil (WPW): *Scouting:* Look for resinous bleeding in late March or early April to find when adult females are feeding and laying eggs. Check trees also in June to determine which tops are actively infested with WPW. Check for a final time in fall to determine the percent of trees that are infested. *Threshold for Christmas Tree Farms and Forestry Plantations:* If fall surveys indicate that more than 5% of the trees were infested with WPW the previous season, plan on treating the whole plantation or block. *Mechanical Control:* Prune out and destroy infested tops in late June. Make sure stems are cut below where weevils are feeding. Tops must be cut before the weevils make exit holes and leave. *Cultural Control:* Remove all old unattended stands of white pine and Norway spruce that may be harboring populations of WPW. *Chemical Control:* Treat the terminal leader with a registered insecticide before the buds open. Do not treat the lateral shoots as they are not the infestation point. Apply the insecticide no later than late March or early April. For valuable specimen trees it may be necessary to treat each year. *Remarks:* Repeated terminal dieback caused by WPW can give trees an asymmetrical crooked appearance that is aesthetically pleasing to many people. Often the nice old gnarly pine tree has been given its appearance by repeated attacks by WPW.

Spruce Spider Mite: *Scouting:* Start scouting in mid-April and continue scouting once a month until the first heavy frost. Walk through the plantation in a Z or W pattern. Pick a tree at random once every 50 feet. Check the shoot for mites or mite damage; you may need a 10X hand lens to see the mites. You should be examining at least 15 shoots per acre. Carry a sheet of paper with two columns marked to record the total number of shoots sampled and the total number of shoots with mites. The presence of damage alone is not enough; record it as positive if you find the mites or mite eggs. Based on research in North Carolina that is applicable to Virginia, the economic threshold is based on the size of the tree. On trees less than waist high, treat if the percentage of shoots with mites exceeds 40%. On trees waist high to year before sale treat if the percentage of shoots with mites exceeds 20%. On trees at the year of sale, treat if the percentage of shoots with mites exceeds 10%. Use these guidelines for determining when to come back and sample again. If no mites or eggs are observed then return in 6-8 weeks. If less than 10% of the shoots have mites or eggs return in 4-5 weeks. If more than 10% of the shoots have mites or eggs return in 2 weeks. If there are more than 10 days of hot, dry weather check the trees sooner. *Cultural Control:* Avoid having bare earth under trees as this will reduce the number of predators on the tree and increase the number of Spruce Spider Mites. *Mechanical Control:* None known. *Chemical Control:* See Fact Sheet 444-235 for more detail.

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Cooley Spruce Gall Adelgid and Eastern Spruce Gall Adelgid: *Scouting:* Start scouting in April and look for small tufts of cotton like material at the base of buds. Look again in August and September to determine when the galls have opened up. *Threshold for Christmas Tree Farms:* Treat when 5% of the trees have ten or more galls; spot spraying may work with smaller infestations. *Cultural Control:* Avoid planting Douglas fir within 500 yards of Norway Spruce. *Mechanical Control:* None known. *Chemical Control:* Treat with dormant oil in February or March. In severe cases treat with an insecticide in August or September just as the galls turn from brown to green and small openings are created for the adelgids to exit. Treatments can also be applied in April but this is trickier as it needs to be done when the small adelgid is feeding at the base of the needle just before the gall is formed. The adelgids will be covered with a small tuft of wax.

Table 7.7 - Spruce Scouting Schedule for Insects and Mites

Virginia Tech IPM Program - Prepared by Eric R. Day

Pest Problem	Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Bagworm	Scouting	Scout											
	Treatment			Pick				Spray					Pick
Cooley Spruce Gall Adelgid and Eastern Spruce Gall Adelgid	Scouting		Scout	Scout									
	Treatment		Treat	Treat									
White Pine Weevil	Scouting			Scout									
	Treatment			Spray		Prune	Prune						
Spruce Spider Mite	Scouting				Scout	(Scout)	(Scout)	(Scout)	(Scout)	(Scout)	(Scout)		
	Treatment					Spray				Spray			

Scotch Pine Scouting Schedule for Insects and Mites

Scouting and Control Notes

(Specific chemical recommendations are in the following sections.)

Bagworm: *Scouting:* January: Look for overwintering bags. *Cultural Control:* Pick off and destroy bags in the fall and winter. Bags can be destroyed by dropping them in a can of kerosene or burying them at least 6" deep. *Chemical Control:* It is important to treat in mid- June when the larvae are small and susceptible to insecticides. Larger larvae with bags are not easily controlled. See the most recent Virginia Pest Management Guide for insecticides labeled for control of bagworms. *Biological Control:* Spraying with *Bacillus thuringiensis* (Bt, Dipel, Thuricide, etc.) in early to mid-June should give satisfactory control.

Pine Tortoise Scale: *Scouting:* Look for darkened patches or branches on the side or top of the tree. Check the twigs and needles for the presence of the scale insects. High populations will cause browned dead shoots. The presence of honeydew (clear sticky droplets) will also indicate scales, but may also be from aphids, so it is important to identify the source. Ants, bees and wasps will feed on the honeydew and their activity may lead you to a scale infestation. *Threshold for Christmas Tree Farms and Forestry Plantations:* No known threshold but the presence **coupled** with objectionable damage will warrant treatment. Many trees will support low non-damaging populations. The pine needle scale is heavily fed upon by predators and parasites which control it most years. *Mechanical Control:* Remove infested branches or trees and burn. Works best if the infestation is localized. *Cultural Control:* If chronic problems with this scale are not resolved by chemical or mechanical control it is best to switch to non-susceptible hosts such as spruces, firs, hemlock, or white pine. *Chemical Control:* February or March - Treat with dormant oil. June - For severe cases two sprays 10-14 days apart are recommended during crawler emergence early in June. *Remarks:* Check wind break trees for infestation as scales may spread from these trees as new seedlings are set nearby.

Nantucket Pine Tip Moth: *Scouting:* March - Look for small copper-colored moths flying from trees when you shake the branches or walk by the tree. At the same time assess the tree for damage from last year. *Cultural control:* July - For light infestations, simply shear off the damaged tips containing the insects. Ground beetles, ants and other scavengers should consume the tip moths once on the ground. *Chemical Control:* Late April - Treat with a residual insecticide such as dimethoate; cover all lateral branches and the leader. Additional spray dates: Late-June and Late-August - Treat again with dimethoate if damage is heavy. **See Fact Sheet 444-238 for more details.**

Pine Needle Scale: *Scouting:* Look for the white scales in the fall and winter and note which rows or blocks need treatment. In early May and early July wrap electrical tape, sticky side up, around twigs with high populations of scale. Treat one week after the first reddish-purple crawler is found. This will usually be about mid-May and mid- to late July. *Threshold for Christmas Tree Farms and Forestry Plantations:* Treat only if stunted growth, yellowing, or unsightly populations of scales are present. *Cultural Control:* Promote vigorous growth, as scales tend to cause more damage in poorly growing trees. *Chemical Control:* Apply a 2% dormant oil in late March when temperatures are above 45°F. The dormant oil may remove the waxy bloom on the needles and give the trees a dull appearance but this is temporary and will be hidden by the summer's flush of growth. It would be advisable to avoid dormant oils on the year of harvest. Dormant oil is also sold as superior oil or horticultural oil. Malathion or diazinon can be applied one week after the first crawler is found on the tape or in mid-May and late July. Carbaryl (Sevin®) or dimethoate can be used just as the eggs start to hatch, which is indicated as the date the first crawler is found on the tape. It is thought that applications timed for the summer generation are the most effective. *Remarks:* Crawlers are blown about by wind and carried inadvertently by birds. Adult scales do not have wings and this is the only way pine needle scales are moved about.

Sawflies: *Scouting and Thresholds for All Sawflies:* Check the upper sections of pine tree for colonies of sawflies on the tips of lateral branches or on the leader. Spot treat where you find them or treat the whole block if more than 5% of the trees are infested. *Mechanical Control:* Cut off and destroy infested branches. Dip sawflies in kerosene or bury 6" deep. *Cultural Control:* Avoid susceptible hosts; replant with spruce or white pine, which are less frequently attacked by sawflies. *Chemical Control:* Spot spray as you find colonies feeding. One method is to carry a small sprayer on the mower and stop and spray as you find the sawflies. Be sure to avoid having the tractor exhaust discharging on a nearby tree as you spray as it may burn a spot. If a whole block needs treatment, a mist blower or back-pack sprayer will work well.

Pine Spittle Bug: *Scouting and Thresholds for Pine Spittlebug:* In May through early July look for spittle masses on shoots and trunk and for dead and yellow twigs. From mid- June look for oval-shaped adults which will not have a spittle mass. Check trees of all ages in May and June. A small number of spittle masses indicate low population and little threat. If there are a large number of masses check the plantation again in the fall for dead shoots. If dead shoots are present in the fall plan to treat the next season. *Cultural Control:* Maintain trees in the best possible growing condition. Avoid planting the wrong tree in the wrong spot. Consult guides or enlist help from your local county forester on which trees are best suited for your farm or site. Vigorously growing trees rarely suffer damage from spittlebugs. Plant trees that are resistant to Diplodia tip blight. Two- and three-needle pines, such as Austrian pine, tend to have more problems with Diplodia. *Chemical Control:* Control spittlebugs by spraying for the adults about mid- July. To determine the best timing check spittle masses once a week starting in late June. When 95% are empty, usually in mid- July, treat with a registered insecticide. Treat the entire plantation. *Remarks:* Consult the fact sheet if you suspect you have the Saratoga spittlebug, although most growers will have the pine spittle bug.

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Table 7.8 - Scotch Pine Scouting Schedule for Insects and Mites

Virginia Tech IPM Program - Prepared by Eric R. Day

Pest Problem	Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Bagworm	Scouting	Scout											
	Treatment		Pick				Spray					Pick	
Pine Tortoise Scale	Scouting		Scout										
	Treatment		Oil	Oil			Spray						
Nantucket Pine Tip Moth	Scouting			Scout									
	Treatment				Spray		(Spray)	Shear	(Spray)				
Pine Needle Scale	Scouting				Scout								
	Treatment					Spray							
Sawflies	Scouting					Scout	Scout	Scout					
	Treatment					Treat	Treat	Treat					
Pine Spittle Bugs	Scouting					Scout	Scout						
	Treatment							Spray					

White Pine Scouting Schedule for Insects and Mites

Scouting and Control Notes

(Specific chemical recommendations are in the following sections.)

Bagworm: *Scouting:* January: Look for overwintering bags. *Cultural Control:* Pick off and destroy bags in the fall and winter. Bags can be destroyed by dropping them in a can of kerosene or burying them at least 6" deep. *Chemical Control:* It is important to treat in mid- June when the larvae are small and susceptible to insecticides. Larger larvae with bags are not easily controlled. See the most recent Virginia Pest Management Guide for insecticides labeled for control of bagworms. *Biological Control:* Spraying with *Bacillus thuringiensis* (Bt, Dipel, Thuricide, etc.) in early to mid- June should give satisfactory control.

Pales Weevil: *Scouting:* In January count the number of stumps and determine if digging the stumps or spraying the stumps is the method of control. The other time to scout is in late summer and early fall on trees that are ready to be harvested. Check for resin covered wounds on small twigs and dead "flagged" twigs. These are places where weevils are feeding. *Mechanical Control:* Dig and remove new stumps where the tree was cut down less than one year ago, "first year stumps". *Cultural Control:* Let Christmas tree land lay fallow for one or two years before replanting and don't interplant new trees near stumps. *Chemical Control:* Purchase treated seedlings only; this will protect seedlings from pales weevil damage and more importantly will protect young trees from being infected with procerum root disease by the weevils. If you are interplanting seedlings next to stumps treat the stumps in February or March with Asana. These two pesticides can be mixed with diesel fuel or kerosene to increase their penetration into the bark. **See Fact Sheet 444-229 for more information.**

White Pine Weevil (WPW): *Scouting:* Look for resinous bleeding in late March or early April to find when adult females are feeding and laying eggs. Check trees also in June to determine which tops are actively infested with WPW. Check for a final time in fall to determine the percent of trees that are infested. *Threshold for Christmas Tree Farms and Forestry Plantations:* If fall surveys indicate that more than 5% of the trees were infested with WPW the previous season plan on treating the whole plantation or block. *Mechanical Control:* Prune out and destroy infested tops in late June. Make sure stems are cut below where weevils are feeding. Tops must be cut before the weevils make exit holes and leave. *Cultural Control:* Remove all old unattended stands of white pine and Norway spruce that may be harboring populations of WPW. *Chemical Control:* Treat the terminal leader with a registered insecticide before the buds open. Do not treat the lateral shoots as they are not the infestation point. Apply the insecticide no later than late March or early April. For valuable specimen trees it may be necessary to treat each year. Consult the latest Virginia Pest Management Guide for current labeled insecticides. *Remarks:* Repeated terminal dieback caused by WPW can give trees an asymmetrical crooked appearance that is aesthetically pleasing to many people.

Often the nice old gnarly pine tree has been given its appearance by repeated attacks by WPW.

Pine Bark Adelgid: *Scouting:* Check for the white cottony wax on the trunk and twigs. Look for abnormal abundant bud formation that gives the top of the tree a bushy broom like appearance. A profusion of twigs on the top of the tree is sometimes called witch's brooming. *Threshold for Christmas Tree Farms and Forestry Plantations:* This is rarely a pest and it is uncommon to have damage. If adelgids are present and more than 5% of tops are witch's broomed consider treating with an insecticide or oil. *Cultural Control:* Avoid applying excess nitrogen as this has been shown to increase populations of sucking insects on pines. Switch to a different species of tree other than white pine. *Mechanical Control:* None known. *Chemical Control:* Apply dormant oil at a 2% rate in March; this may temporarily slightly discolor the foliage but this will be covered by the summer flush of growth. Applications of a registered insecticide in May can be made instead for good control. *Remarks:* Try to educate your buyers that this is a mostly harmless pest that is found everywhere including yard trees.

Needle Sheath Mite *Scouting:* Check trees in March by checking 10 needle bundles on 10 trees randomly selected in each block. Pull open the needles and look with a 10X hand lens at the base for small pale mites. In addition to the mites you will probably see yellowing and stippling, particularly on the south side of the tree. It takes practice to observe the mites and if you are not sure of what you are finding a sub-sample of 10 needle bundles may be submitted to the Insect Identification Laboratory through your county extension agent. *Threshold for Christmas Tree Farms and Forestry Plantations:* If damage and mites are present it is advised to treat. *Cultural Control:* Switch to a different species of tree other than white pine. *Mechanical Control:* None known. *Chemical Control:* Treat with carbaryl (Sevin®) or dormant oil in March or April.

Pine Needle Scale: *Scouting:* Look for the white scales in the fall and winter and note which rows or blocks need treatment. In early May and early July wrap electrical tape, sticky side up, around twigs with high populations of scale. Treat one week after the first reddish-purple crawler is found. This will usually be about mid-May and mid- to late July. *Threshold for Christmas Tree Farms and Forestry Plantations:* Treat only if stunted growth, yellowing, or unsightly populations of scales are present. *Cultural Control:* Promote vigorous growth, as scales tend to cause more damage in poorly growing trees. *Chemical Control:* Apply a 2% dormant oil in late March when temperatures are above 45°F. The dormant oil may remove the waxy bloom on the needles and give the trees a dull appearance but this is temporary and will be hidden by the summer's flush of growth. It would be advisable to avoid dormant oils on the year of harvest. Dormant oil is also sold as superior oil or horticultural oil. After the first crawler is found on the tape or in mid- May and late July, an insecticide can be applied. It is thought that applications timed for the summer generation are the most effective. *Remarks:* Crawlers are blown about by wind and carried inadvertently by birds. Adult scales do not have wings and these are found on the tape.

Pine Spittle Bug: *Scouting and Thresholds for Pine Spittlebug:* In May through early July look for spittle masses on shoots and trunk and for dead and yellow twigs. From mid- June look for oval shaped adults which will not have a spittle mass. Check trees of all ages in May and June. A small number of spittle masses indicate low population and little threat. If there are a large number of masses check the plantation again in the fall for dead shoots. If dead shoots are present in the fall, plan to treat the next season. *Cultural Control:* Maintain trees in the best possible growing condition. Avoid planting the wrong tree in the wrong spot. Consult guides or enlist help from your local county forester on which trees are best suited for your farm or site. Vigorous growing trees rarely suffer damage from spittlebugs. Plant trees that are resistant to Diplodia tip blight. Two- and three-needle pines, such as Austrian pine, tend to have more problems with Diplodia. *Chemical Control:* Control spittlebugs by spraying for the adults about mid- July. To determine the best timing, check spittle masses once a week starting in late June. When 95% are empty, usually in mid- July, treat with a registered insecticide. Treat the entire plantation. *Remarks:* Submit a sample to the insect ID lab if you suspect you have the Saratoga spittlebug, although most growers will have the pine spittle bug.

White Pine Aphid: *Scouting and Thresholds for Christmas trees:* Check for sooty mold and yellowing in October to determine which areas of the planting have this aphid as it tends to occur in clumps and field edges. This aphid is more common on the upper sections of the tree. Fall scouting is important for finding populations on trees about to be harvested to insure that aphids will not emerge on trees that are brought indoors. In May and June again scout for the aphids and mark trees for spot spraying or spray entire blocks if more than 5% of the trees are infected. *Cultural control:* Avoid applying excess nitrogen as this has been shown to increase populations of sucking insects on pines. *Mechanical Control:* None known. *Chemical Control:* Treat with insecticidal soap or a registered insecticide in May or whenever you find the aphids. *Remarks:* This is the aphid that customers complain about when they find small black insects crawling on the tree and decorations.

7-18 *Low-Management Crops and Areas: Christmas Tree Insects*

Table 7.9 - White Pine Scouting Schedule for Insects and Mites

Virginia Tech IPM Program - Prepared by Eric R. Day

Pest Problem	Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Bagworm	Scouting	Scout											
	Treatment		Pick				Spray					Pick	
Pales Weevil	Scouting	Scout	Spray						Scout	Scout			
	Treatment												
White Pine Weevil	Scouting			Scout									
	Treatment			Spray		Prune	Prune		(Spray)				
Pine Bark Adelgid	Scouting			Scout									
	Treatment			Oil		Spray	Spray						
Needle Sheath Mite	Scouting			Scout									
	Treatment			Oil or spray									
Pine Needle Scale	Scouting				Scout								
	Treatment					Spray	Spray						
Pine Spittle Bugs	Scouting					Scout	Scout			Scout			
	Treatment							Spray					
White Pine Aphid	Scouting					Scout	Scout			Scout			
	Treatment					Spray	Spray						

Table 7.10 - Recommended Control

Insect	Name	Remarks
Adelgids	Acephate (Orthene)	Treat in June or when found May-October. Spray bark and foliage to runoff. If infested trees are few and scattered, rogue and burn, and spray trees in a 20 ft diameter circle around rogued tree. When removing infested tree wrap it in a tarp so no adelgids fall off as the tree is removed from the field.
General	Acetamiprid	
	Avermectin B1	
	Bifenthrin (Brigade)	
	Canola oil	
	Chlorpyrifos (Dursban)	
	Clothianidin	
	Deltamethrin (K-orthrin)	
	Dinotefuran	

E-emulsifiable; EC-emulsifiable concentrate; WP-wettable powder; F-flowable; S-sprayable; SP sprayable powder; gal-gal-lon; pt-pint; lb-pound; tsp-teaspoon; tbsp-tablespoon;

¹**RESTRICTED-USE** insecticide.

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 honey bees. Follow precautionary instructions on labels and use protective equipment wherever specified.

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

Table 7.10 - Recommended Control (cont.)

Insect	Name	Remarks
Adelgids General (cont.)	Fluvalinate	
	Imidacloprid	
	Limonen	
	Mineral oil - includes paraffin oil	
	Oxydemeton-methyl	
	Potassium laurate	
	Pyrethrins	
	Soybean oil	
	Spirotetramat	
	Sucrose octanoate	
Tall oil fatty acids, potassium salts		
Thiamethoxam		
	Zeta-Cyermethrin	Treat in June or when found May-October. Spray bark and foliage to runoff.
	Mixtures of Bifenthrin & Imidacloprid, or Clothianidin	If infested trees are few and scattered, rogue and burn, and spray trees in a 20 ft diameter circle around rogued tree.
	Mixtures of Imidacloprid & Bifenthrin, Clothianidin, Tebuconazole, Beta-cyfluthrin, or Cyfluthrin	When removing infested tree wrap it in a tarp so no adelgids fall off as the tree is removed from the field.
	Mixtures of Potassium laurate & Sulfur, or Pyrethrins	
	Mixtures of Pyrethrins & Oil of thyme, 2-Phenylethyl propionate, or Canola oil	
	Mixtures of Thiamethoxam & Lambda-Cyhalothrin	
balsam woolly adelgid	Asana, Esfenvalerate Dinotefuran	Treat in June or when found May-October. Spray bark and foliage to runoff. If infested trees are few and scattered, rogue and burn, and spray trees in a 20 ft diameter circle around rogued tree. When removing infested tree wrap in a tarp so no adelgids fall off as the tree is removed from the field.
pine bark adelgid	Chlorpyrifos (Dursban)	Treat in May for crawlers. Strong spray streams help to penetrate cottony masses. Spray bark to runoff including twigs and small branches. Insecticidal soap is also registered for adelgids.
	Paraffin oil	Oil may remove "bloom" from needles; apply as dormant spray before buds swell.
spruce gall adelgid	Carbaryl (sevin)	Treat after galls have turned brown and opened in late August and September. Timing is more critical in spring: Treat before cottony egg masses appear at bases of buds or before new growth forms needles and bud scales have dropped, which is usually in April.
	Chlorpyrifos (Dursban)	
	Endosulfan	
	Paraffin oil	Oil may remove "bloom" from needles; do not use on blue spruce. Apply as dormant spray before buds swell.

E-emulsifiable; EC-emulsifiable concentrate; WP-wettable powder; F-flowable; S-sprayable; SP sprayable powder; gal-gallon; pt-pint; lb-pound; tsp-teaspoon; tbs-tablespoon;

¹**RESTRICTED-USE** insecticide.

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 honey bees. Follow precautionary instructions on labels and use protective equipment wherever specified.

Equivalentents: 1 lb WP per 100 gal = 1 Tablespoon per gal; 1 pt EC per 100 gal = 1 teaspoon per gal

Table 7.10 - Recommended Control (cont.)

Insect	Name	Remarks
Aphids White pine aphid, spotted pine aphid, balsam twig aphid, spruce aphid	Asana, Esfenalorate	Aphids are often on scattered individual trees, not all trees. Ants active on trees indicate those infested. Treat when aphids are first seen and before colonies enlarge. May appear at any time in the growing season. Provado should be applied at 4.0-8.0 oz/A. Treat for balsam twig aphid just before bud break or about late April.
	Carbaryl (Sevin)	
	Chlorpyrifos (Dursban)	
	Cygon, Dimethoate	
	Dinotefuran	
	Gamma-cyhalothrin	
	Lambda-Cyhalothrin	
	Paraffin oil Potassium laurate	
Bagworms	Rotenone	Treat when bagworms are small in mid-June. The larger the worms, the harder they are to kill. Sevin may cause spruce mite buildup on spruces and firs. If only a few trees are infested, remove and destroy bags, July-May.
	Acephate (Orthene)	
	Asana, Esfenvalerate, S- Fenvalerate	
	Azadirachtin	
	Bacillus thuringiensis subsp. Kurstaki	
	Beta-cyfluthrin	
	Biphenthrin (Brigade, Capture)	
	Carbaryl (Sevin)	
	Chlorantraniliprole	
	Chlorpyrifos (Dursban)	
	Clarified hydrophobic neem oil	
	Cyfluthrin	
	Cygon, Dimethoate	
	Deltamethrin (K-Othrin)	
	Diazol	
	Diflubenzuron, Difuron	
	Flubendiamide	
	Fluvalinate	
	Gamma-Cyhalothrin	
	Indoxacarb	
Lambda-Cyhalothrin		
Larvin, Thiodicarb		
Malathion		

E-emulsifiable; EC-emulsifiable concentrate; WP-wettable powder; F-flowable; S-sprayable; SP sprayable powder; gal-gallon; pt-pint; lb-pound; tsp-teaspoon; tbsp-tablespoon;

¹RESTRICTED-USE insecticide.

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 honey bees. Follow precautionary instructions on labels and use protective equipment wherever specified.

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

Table 7.10 - Recommended Control (cont.)

Insect	Name	Remarks
Bagworms (cont.)	Methoxyfenozide	
	Permethrin	
	Pyrethrin	
	Spinosyn A	
	Tebufenozide	
	Zeta-Cypermethrin	
	Mixtures of Bifenthrin (Brigade, Capture) & Imidacloprid, or Clothianidin	
	Mixtures of Capsaicin & Allyl isothiocyanate	
	Mixtures of Carbaryl & Malathion	
	Mixtures of Imidacloprid & Bifenthrin, Fluvalinate, Beta-cyfluthrin, Cyfluthrin, or Clothianidin	
	Mixtures of K-Orthrin (Decamethrin) & Esbiol (S-Bioallethrin)	
	Mixtures of Permethrin & Systhane	
	Mixtures of Piperonyl butoxide & Pyrethrins	
	Mixtures of Potassium laurate & Pyrethrins, or Fats and glyceridic oils, margosa	
Mixtures of Rotenone & Cube resins		
Mixtures of Thiamethoxam & Lambda-Cyhalothrin		
Mites spruce spider mite (spruces, firs, cedar)	Acequinocyl	Treat in early May and/or mid- to late September before major buildup occurs, or when present otherwise. Multiple generations are most prolific with cool spring and fall weather. Treat with Savey before mites are present.
	Avermectin B1	
	Azadirachtin	
	Bifenazate	
	Bifenthrin (Brigade)	
	Emamectin benzoate	
	Etoxazole	
	Fenbutatin-oxide	
	Gamma-cyhalothrin	
	Lambda-Cyhalothrin	
	Malathion	
	Paraffin oil	
	Spinosyn A	
	Spiromesifen	
Mixtures of Avermectin B1 & Bifenazate		
Mixtures of Fenbutatin-oxide & Acephate (Orthene)		
E-emulsifiable; EC-emulsifiable concentrate; WP-wettable powder; F-flowable; S-sprayable; SP sprayable powder; gal-gallon; pt-pint; lb-pound; tsp-teaspoon; tbsp-tablespoon;		
¹RESTRICTED-USE insecticide.		
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 honey bees. Follow precautionary instructions on labels and use protective equipment wherever specified.		
Equivalentents: 1 lb WP per 100 gal = 1 Tablespoon per gal; 1 pt EC per 100 gal = 1 teaspoon per gal		

Table 7.10 - Recommended Control (cont.)

Insect	Name	Remarks
Mites Eriophyid mites (white pine, spruce, fir)	Avermectin B1 Carbaryl (Sevin) Fenpyroximate Lime sulfur Milbemectin (A mixture of ≥70% Milbemcin A4, & ≤30% Milbemycin A3) Mineral oil - includes paraffin oil Paraffin oil Pyrethrins Spirodiclofen Spiromesifen Sulfur	Treat in March or April, or when mites are found. They are active in cold weather, spring and fall. Oil sprays may remove needle "bloom."
Rosette bud mites (fraser fir)	Avermectin B1 Cygon, Dimethoate Fenpyroximate Lime sulfur Mineral oil - includes paraffin oil Sulfur Mixtures of Avermectin B1 & Bifenazate	Treat between the last week of May and the third week of June. Treat 3-5 foot trees when more than 10% have damaged buds.
Pine Tip Moth Nantucket pine tip moth (all 2 and 3 needled pines)	Acephate (Orthene) Asana, Esfenvalerate Azinphos-Methyl, Gusathion Bifenthrin (Brigade) Carbaryl (Sevin) Chlorpyrifos (Dursban) Cygon, Dimethoate Decemthion (Phosmet) Imidacloprid Permethrin Piperonyl butoxide & Pyrethrins Pyrethrins Spinosyn A	Thoroughly wet all needles and shoots with full coverage spray. Treat in early to late April and repeat 1-2 times at 8-week intervals. Systemic: kills larvae in needles and new shoots before they cause serious damage. Full coverage spray of shoots and needles. Contact: kills young and larvae before mining needles and entering shoots. Treat when adults are active, repeat as indicated on the label, before larvae enter shoots.
Pine Webworm	Azadirachtin	Treat for pine webworm (yellow-brown larvae) in July and August; pine false webworm (green sawfly larvae) in May and June. Apply full-coverage spray before nests become enlarged.

E-emulsifiable; EC-emulsifiable concentrate; WP-wettable powder; F-flowable; S-sprayable; SP sprayable powder; gal-gallon; pt-pint; lb-pound; tsp-teaspoon; tbs-¹tablespoon;

¹**RESTRICTED-USE** insecticide.

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 honey bees. Follow precautionary instructions on labels and use protective equipment wherever specified.

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Table 7.10 - Recommended Control (cont.)

Insect	Name	Remarks
Sawflies redheaded pine sawfly	Asana, Esfenvalerate, S-Fenvalerate	Treat when larvae first appear, before extensive feeding occurs, May to September. Introduced pine sawfly has two generations, June and August. Redheaded pine sawflies may produce colonies at any time in the summer. BT is site labeled for ornamental pine trees.
	Azadirachtin	
	Chlorpyrifos (Dursban)	
	Malathion Spinosyn A	
introduced (European) pine sawfly	Acetamiprid	
	Asana, Esfenvalerate, S-Fenvalerate	
	Azadirachtin	
	Chlorpyrifos (Dursban)	
	Deltamethrin (K-othrin)	
	Diazinon	
	Gamma-cyhalothrin & Chlorpyrifos (Dursban)	
	Lambda-Cyhalothrin Malathion Thiamethoxam	
Scale Insects pine needle scale, pine tortoise scale, woolly pine scale	Acetamiprid	Treat for crawlers of pine needle scale in mid- to late May and/or mid- to late July; pine tortoise scale mid- to late June; and woolly pine scale late June to early July. Use as dormant spray before buds swell. Not fully effective for pine needle scale. Oil spray may remove needle "bloom."
	Aliphatic petroleum hydrocarbons	
	Azadirachtin	
	Chlorpyrifos (Dursban)	
	Diazinon	
	Dinotefuran	
	Gamma-cyhalothrin	
	Gamma-cyhalothrin & Chlorpyrifos (Dursban)	
	Lambda-Cyhalothrin	
	Lime sulfur	
	Malathion Paraffin oil Permethrin	
Spittle Bugs	Acephate (Orthene)	Treat in mid- July when 95% of spit masses are empty. A strong stream of water will often remove spittle bugs from the tree.
	Acetamiprid	
	Asana, Esfenvalerate	
	Azadirachtin	
	Beauveria bassiana	
	Beta-cyfluthrin	
	Bifenthrin (Brigade)	
	Bromchlophos, Dibrom	
	Carbaryl (Sevin)	
	Chlorantraniliprole	
	Chlorpyrifos (Dursban)	
	Clothianidin	
	Cyfluthrin	
	Deltamethrin (K-othrin)	
	Endosulfan	
Fenpropanate, Danitol		
Gamma-cyhalothrin		
Gusathion, Carfene		

E-emulsifiable; EC-emulsifiable concentrate; WP-wettable powder; F-flowable; S-sprayable; SP sprayable powder; gal-gal-lon; pt-pint; lb-pound; tsp-teaspoon; tbsp-tablespoon;

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Table 7.10 - Recommended Control (cont.)

Insect	Name	Remarks
Spittle Bugs (cont.)	Imidacloprid	
	Lambda-Cyhalothrin	
	Malathion	
	Permethrin	
	Spirotetramat	
	Tall oil fatty acids, potassium salts	
	Thiamethoxam	
	Mixtures of Pyrethrins & Piperonyl butoxide, Canola oil or Sulfur	
Weevils pitch-eating weevil	Mixtures of Imidacloprid & Cyfluthrin	
	Mixtures of Bifenthrin (Brigade, Capture) & Clothianidin, Carbaryl, Zeta-Cypermethrin, or Avermectin B1	
	Mixtures of Lambda-Cyhalothrin & Chlorpyrifos (Dursban), or Thiamethoxam	
	Mixtures of Capsaicin & Allyl isothiocyanate	
	Chlorpyrifos (Dursban)	Apply as 4% top dip for seedlings prior to planting. Follow label directions.
White pine weevil	Decemthion (Phosmet)	
	Furadan	
	Acephate (Orthene)	Apply as a full coverage spray to seedlings immediately after planting. Dilute Asana in water.
	Avermectin B1	
	Bifenthrin (Brigade)	
	Dinotefuran	Thoroughly soak stumps and ground surface 1-2 feet around stumps or slash prior to mid- March. Only stumps or wood cut since previous summer needs treatment. Dilute Asana in kerosene.
	Emamectin benzoate	Spray only the main upright leader down to the first branched whorl, prior to April 1-10. Remove and destroy infested shoots before mid- June; do not leave them on the ground.
Imidacloprid		
Oxydemeton-methy		

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RESTRICTED-USE insecticide.

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