

Controlling Pests of Trees and Shrubs

Guide for Home Gardeners

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CONTROL MEASURES given in this folder are recommended as a guide to the home gardener for controlling the more common pests of trees and shrubs. Many of these pests can cause serious plant injury in a short period of time. Therefore, it is suggested that periodic inspection of plantings be an integral part of any grounds maintenance program. Replacement of woody plants is a costly and sometimes impossible operation. Learn to recognize and direct control measures against the pest before serious plant injury occurs.

Insect control does not always rely upon the use of chemicals; certain insects may be controlled by biological insecticides such as *Bacillus thuringiensis* or physical measures. Such non-chemical control procedures are suggested where known and should be employed when possible. However, if you use a chemical for pest control remember to properly identify the pest problem, select an appropriate remedial chemical and handle and apply the chemical according to instructions on the label.

Even though "all purpose" spray mixtures may be used on a time schedule to prevent insect attack, periodic inspection and corrective treatment is preferred. "All purpose" sprays are more costly, may destroy beneficial organisms and will not control all insects. Best results are achieved with specific, well timed controls. The timing of physical or chemical control measures is given for a certain time during the year to control a particular stage of the pest. Failure to comply with these suggestions will often lead to disappointing results.

Pesticides are sold as wettable powder or as emulsifiable concentrate formulations. Both types are designed to be diluted in a given amount of water and applied as sprays. Generally, emulsion type insecticides will give longer lasting residues than wettable powder formulations. Furthermore, it is recommended that emulsions be used in sprayers that lack agitation

since there will be less problems with their remaining in suspension.

RATES OF APPLICATION

Following are the chemicals and their rates of application recommended for controlling the various pests in this folder. Be accurate in your dilution rates; too much chemical may cause plant injury; too little chemical will result in poor pest control.

CHEMICAL	AMOUNT OF WATER	
	3 gals.	100 gals.
<i>Bacillus thuringiensis</i> (Thuricide, Dipel, Biotrol)	4 tbsp.	2 qts.
Diazinon 50% wettable powder	3 tbsp.	1 lb.
48% emulsion	1 tbsp.	1 pt.
Dormant Oil emulsion*	1½ cups	2 gals.
Kelthane 18.5% wettable powder	6 tbsp.	2 lbs.
18.5% emulsion	2 tbsp.	1 qt.
Lindane 25% wettable powder	3 tbsp.	1 lb.
20% emulsion	4.5 tsp.	1½ pts.
Liquid Lime Sulfur suspension†	2.5 pts.	11 gals.
Malathion 25% wettable powder	1 cup	4 lbs.
57% emulsion	2 tbsp.	1 qt.
Methoxychlor 50% wettable powder	6 tbsp.	2 lbs.
25% emulsion	3 tbsp.	2 qts.
Sevin 50% wettable powder	6 tbsp.	2 lbs.
4 flowable	2 tbsp.	1 qt.
Tedion 25% wettable powder	3 tbsp.	1 lb.
10% emulsion	2 tbsp.	1 qt.

*Apply according to manufacturers' directions in spring before plant growth begins when temperature is above 45° F. and danger of freezing nights has passed.

†Discolor stone, paint and brick; therefore, use with caution around buildings.

HOST GUIDE TO COMMON PESTS

APPLE aphids bagworm cottony maple scale eastern tent caterpillar fall webworm lecanium scales mites oystershell scale rose chafer San Jose' scale	oystershell scale San Jose' scale	cottony maple scale fall webworm lecanium scales mites rose chafer San Jose' scale	LINDEN aphids bagworm cankerworms cottony maple scale fall webworm oystershell scale San Jose' scale	OAK aphids cankerworms cottony maple scale eastern tent caterpillar fall webworm leafhoppers lecanium scales mites oak galls	SPRUCE bagworm mites pine needle scale spruce gall aphids
BIRCH aphids birch leaf miner bronze birch borer fall webworm lecanium scales	BIRCH aphids birch leaf miner bronze birch borer fall webworm lecanium scales	EUONYMUS euonymus scale	LOCUST cottony maple scale leafhoppers and plant bugs mites	PINE aphids bagworm mites pine needle scale pine sawflies	TAXUS (YEW) Fletcher scale taxus meslybug taxus weevil
ARBORETVITAE bagworm Fletcher scale juniper scale mites taxus weevil	BOXELDER aphid boxelder bug fall webworm	FLOWERING FRUITS aphids eastern tent caterpillar fall webworm lecanium scales mites rose chafer San Jose' scale	MAPLE aphids bagworm boxelder bug cankerworms cottony maple scale lecanium scales mistle galls mites oystershell scale	PRIVET lilac borer mites	VIBURNUM aphids oystershell scale
ASH bagworm boxelder bug cottony maple scale fall webworm lecanium scales lilac borer	COTONEASTOR mites San Jose' scale	JUNIPER bagworm Fletcher scale juniper scale mites		PYRACANTHA mites San Jose' scale oystershell scale	WILLOW aphids cottony maple scale fall webworm leaf beetles lecanium scales lilac borer
ELM aphids bagworm cankerworms	DOUGLAS-FIR Cooley spruce gall aphid mites	LILAC lilac borer oystershell scale San Jose' scale			

INSECT CONTROL GUIDE

PEST	INJURY AND PLANTS ATTACKED	WHEN TO TAKE ACTION	WHAT TO DO
APHIDS	Soft-bodied gray, green, red or black insects about 1/4 inch long. Suck juices from leaves and new growth of many deciduous trees and shrubs as well as several conifers. Liberate large amounts of sticky honeydew, which eventually turns black.	<i>Dormant</i> — During April before plant growth begins for controlling overwintering eggs. <i>or</i> <i>Spring or Summer</i> — From May through August to control active forms.	Spray Dormant Oil to twigs and branches. Spray Malathion or Diazinon to foliage.
BAGWORMS	Caterpillars within bags up to 2 inches long rapidly devour foliage of many evergreens (especially arborvitae) and several deciduous trees.	When caterpillars first noticed — usually during mid-June.	Pick bags from trees and destroy them or apply a spray of Malathion or Sevin or Diazinon to foliage.
BIRCH LEAF MINER	Flattened, white, legless larvae feed between upper and lower leaf surfaces, causing leaves to blister and turn brown.	When eggs have hatched but before leaf mines exceed 3/8 inch — usually during mid-May.	Spray Malathion or Diazinon or Sevin to the foliage.
BOXELDER BUG	Black and red bugs about 1/4 inch long feed on seed pods and leaves of boxelder, maple and ash, but cause little injury. Chiefly a nuisance pest because it invades dwellings for overwintering.	When insects congregate in May and June or in the fall.	Spray Malathion or Diazinon or Sevin to the foliage or building foundations where the insects cluster.
BRONZE BIRCH BORER	White, legless larvae tunnel beneath bark, girdling branches, causing them to die. Die-back of branches begins in the top, but all woody portions may be attacked.	About June 7 followed by a second spray in 10 to 14 days.	Cut out dead branches before June 1 and destroy them. Apply a lindane spray to the bark of branches and trunk.

CANKERWORMS	Infectious about 1 inch long consume the leaves of elm, maple, linden, oak, and many others during May and June.	During early May when larvae begin to feed.	Apply a spray of Bacillus thuringiensis or Sevin or Malathion to the foliage.
COTTONY MAPLE SCALE	White, cottony scales about 1/4 inch long on the twigs and small stems and cause leaves to yellow and drop prematurely. Tree vigor is reduced and individual branches may be killed.	Downward—Before plant growth begins in the spring to control overwintering scales, or Summer—During late June or early July to control immature scales.	Spray Time Sulfur to the back of all branches and trunk. Seyn Sevin or Malathion to all plant parts.
EASTERN TENT CATERPILLAR	Hair caterpillars up to 1 1/2 inches long with a light stripe along their backs form nests in branch crotches starting in May. Larvae on small trees or branches of large trees are completely chewed off by the caterpillars.	During the spring when the weather is cloudy and cool and the trees are small usually during mid-May.	Remove nests and destroy them.
KUONYMUS SCALE	Brown, oval females and white, elongated males infest the stems and leaves of many deciduous trees and shrubs of eastern region. Leaves turn yellow, then drop prematurely, eventually the entire plant dies.	Downward—Before plant growth begins in spring to control overwintering scales, or Summer—In late May or early June to control immature scales. Repeat again in 10 days.	Apply a spray of Bacillus thuringiensis or Malathion or Dactinon to the twigs and the foliage. Seyn Dactinon Oil applied to upper and lower leaf surfaces and stems. Malathion or Dactinon to stems and upper and lower leaf surfaces.
FALL WEBWORM	During August or September the foliage of one limb or entire tree or shrub may be stripped and washed to gullies to form a tent. Mature larvae are 1 1/2 inch long, pale green in color and have numerous whitish hairs.	If webs are not too numerous, prune out and destroy them as soon as they are discovered. If webs are numerous apply a spray, generally during early August.	Apply a spray of Bacillus thuringiensis or Malathion or Dactinon to webs and all foliage.
FLETCHER SCALE	Brown, oval, hemispherical scales 1/4 inch long suck the juices from the twigs of trees, shrubs and raspberries. Heavy infestation cause needles to yellow and drop; branches or entire plants may be killed.	Downward—Before plant growth begins in spring to control overwintering scales, or Summer—in late June and repeat in 10 days.	Seyn Dactinon Oil with pressure to all plant parts. Seyn Malathion or Sevin or Dactinon with pressure to the foliage.
JUNIPER SCALE	Greyish-white scales 1/200 inch in diameter with a yellow center suck juices from the foliage and twigs. Plants turn yellow and branches or entire trees die.	Downward—Before plant growth begins in spring or Summer—in mid-May. This spray should be repeated in 10 days if immature scales continue to emerge over an extended period of time.	Seyn Time Sulfur to all plant parts. Seyn Malathion or Sevin or Dactinon to all plant parts.
LEAFHOPPERS AND PLANT BUGS	These green to dark brown insects about 1/4 inch long suck juices from a variety of trees and shrubs. Their damage is most apparent on locust which may drop all of its foliage during seed to late summer.	Late June or early July or when large numbers of insects are noted on the foliage.	Seyn Sevin or Malathion or Dactinon to the foliage.
LECANUM SCALES	Melanoglyca larvae, iron-backed insects 1/4 to 3/8 inches long infest woody portions of many plants. Suck juices from buds reducing their vigor and causing leaves to yellow and with. Branches of mature trees or entire immature trees may be killed. Scales excrete dark droplets of clear sticky substance, which adhere to plant parts and other objects it falls upon, which eventually turns black.	Downward—before plant growth begins in spring to control overwintering scales, or Summer—in late June and repeat in 10 days.	Seyn Dactinon Oil to all woody parts. Seyn Malathion or Sevin or Dactinon to all plant parts.
LILAC BOBER	Circomphalid larvae with brown heads about 1 inch in length bore into the main stem of lilac, ash, and privet causing leaves to with and shoots to break off. Older, rough-barked stems are most susceptible to attack.	Cut and burn heavily infested shoots before the end of April. Apply spray at 3-week intervals beginning the first week in May.	Apply a lindane spray to woody parts, particularly the larger rough-barked stems.
MAPLE BLADDER GALL	Green, red, or black bladder-shaped galls on the upper leaf surfaces of silver and red maples are caused by microscopic mites. While galls may be numerous, they cause little injury to the tree.	When leaves have dropped in the fall or during April before plant growth begins.	Seyn Sevin or Malathion or Liquid Lime Sulfur to all twigs and branches.
OAK GALLS	Growth on leaves or smaller branches are produced by the attack of a number of small wasps. These galls may be round, hemispherical, honey or irregular in appearance. Each usually produces a characteristic gall which can usually be found within it. While galls may be numerous they seldom cause injury to the tree.	Summer—late June, or when galls are first noted.	Pick or prune out galls after they form if they are not too numerous.
OTYSPERHELL SCALE	Grey-brown, oval-shaped scales about 1/4 inch long completely encrust branches and twigs of blue, ash, white, apple, viburnum, and many other trees and shrubs. Trees are stunted, foliage is yellowish and branches or entire trees die.	Downward—Before plant growth begins in spring, or Summer—Apply in late May and repeat in 2 weeks to control immature scales.	Seyn Dactinon Oil to all woody parts. Seyn Malathion or Sevin or Dactinon to leaves, twigs, and trunk.
FINE NEEDLE SCALE	White, elongated scales about 1/4 inch long suck juices from needles of Scotch, red, Austrian, and white pines as well as white and blue spruces. Trees are stunted, needles turn yellow and drop prematurely. If successful, this insect may kill entire trees.	Downward—Apply in April before plant growth begins, or Summer—Apply when blue is in full bloom (late May) and repeat again in late July.	Seyn Liquid Lime Sulfur complete coverage of all needles. Seyn Malathion or Sevin or Dactinon to needles and branches.
FINE SAWFLIES	Larvae about 1/4 inch long (gray-green) with black stripes or white with ones of black spots) feed in clusters and completely strip the alder needles from Scotch, red, Austrian, spruce, and larch pines. When disturbed, larvae raise back their heads.	During early May when larvae hatch from overwintering eggs.	Malathion or Sevin or Methoxychlor. Spray to entire foliage.
ROSE CHAFER	During June, ten beetles 1/4 inch long with spiny red legs are particularly damaging to rose, peony, iris and other floribundous plants. Rosemary adults also feed on the foliage of elm, apple, cherry, virginia creeper, and others.	Control of the immature grub stage is usually unimportant, but adults are easily controlled during early June.	Seyn Sevin or Methoxychlor to the foliage when adults congregate.
SAN JOSE SCALE	Grey-black scales 1/18 inch in diameter with a black central stripe around the center and trunk of apple, flowering cherry, hawthorn, cotoneaster, quince, dogwood, elm, ash, and many others. Scales suck large amounts of juices, reducing plant vigor, often killing branches or the entire tree.	Downward—During April before plant growth begins. Summer—in late June and again in 10 days; repeat in early August and again 10 days later to control immature scales.	Seyn Dactinon Oil or Liquid Lime Sulfur to all woody parts. Sevin or Malathion or Dactinon. Spray to all plant parts.
SPIDER MITES	Several different mites feed on the leaves of elm, oak, linden, ash, flowering crab, pyracantha, pine, arbutus, juniper, spruce, and many others. Mites pierce tissues and suck juices, giving leaves or needles a stippled or leathery appearance and causing them to drop prematurely. Mites can be detected by frankly tearing a portion of the foliage over a white piece of paper; mites will appear as tiny moving specks.	Downward—During April before plant growth begins, or Spring through Fall—To control active adults.	Seyn Dactinon Oil to all plant portions. (Caution—oil will remove lacins from blue spruce.) Kerbane or Tordon. Spray to all leaf surfaces.
SPRUCE GALL, AVIDS	Microscopic gnats in leaves overwings which consume the tips of Colorado blue, Englemann, and white spruces, or pineyale galls at the bases of twigs of Norway, red, white, and black spruces are caused by the feeding of two different aphids. Galls defigure trees, but do not kill them.	During late June after galls have formed, or During April before plant growth begins.	Pick off and destroy aphids if they are not too numerous. Lindane or liquid lime sulfur—To all twigs and branches.
TAXUS MEALYBUG	All varieties of yew, especially the more compact forms, are subject to attack by this white, fluffy, clammy insect that sucks juices from the branches and trunk. Infested plants accumulate abundant brown needles and become blackened with honeydew.	Downward—During April before plant growth begins, or Early Summer—in late May or early June before insects produce protective cottony material.	Seyn Lindane or Liquid Lime Sulfur to all twigs and branches. Seyn Dactinon Oil to both of all branches and trunk.
TAXUS WEEVIL	White, legless grubs about 1/4 inch long feed on the small roots of yew, rhododendron, andromeda, arbutus, hemlock, and many other herbaceous plants, causing seed growth to yellow and reducing new growth. Black adult weevils about 2/3 inch long bore holes in the soil during the day and feed at night by chewing needles in needles particularly those closest to the soil.	During late June and again in early July after all adults have emerged from the soil.	Seyn Sevin with pressure to the plant and the soil beneath it.
WILLOW LEAF BEETLES	Mottled blue or black beetles about 1/4 inch long chew holes in the leaves. Larvae, black slug-like creatures 1/4 inch long, skeletonize leaves by chewing off upper tissues.	During early May to control adults or later in early summer to control larvae.	Seyn Sevin to all leaf surfaces.

EQUIPMENT

There are many types and sizes of sprayers suitable for spraying ornamental shrubs and trees. The type of equipment you select will depend on the magnitude of your spray operation and your preference. **Hose-on Sprayer.** Simple to operate, these small sprayers are designed to be attached to a garden hose. They require no spray tank but operate by metering out a desired amount of chemical into a stream of water under household pressure. Problems encountered in some types of these sprayers have been poor spray distribution, clogging of nozzles and non-mixing of the insecticide with the water.

Trombone Sprayer. Spray mixture can be prepared in any size container and applied by inserting the intake apparatus into it and moving the slide in a trombone-like motion. A uniform spray concentration can be obtained since the insecticide is mixed in a known quantity of water. However, the insecticide mixture should be periodically agitated when using wettable powder formulations.

Compressed Air Sprayer. Air is pumped into the tank and forces the spray out when the nozzle is opened. Compressed air sprayers with 3- to 5-gallon capacity have wide adaptability for spraying small plantings. It is advisable to shake the sprayer periodically when using wettable powder insecticides to keep them in suspension.

Knapsack Sprayer. Carried on the back this sprayer operates by hand pumping a piston which supplies the spray pressure. The capacity of these sprayers is 3- to 5-gallons and allows for considerable movement in treating plants widely spaced from each other.

For treating large trees, high-pressure power sprayers are necessary. Should it be necessary to treat large trees, you should consult a commercial spray operator.

GENERAL WARNINGS

All pesticides are poisonous in some degree to warm-blooded mammals. They should be handled cautiously to prevent poisoning pets, livestock, chil-

dren, or the user. When using any chemical, observe the following safe-use procedures:

1. Always read the label before using any chemical. Note warnings and cautions each time before opening the container.

2. Keep chemicals out of the reach of children, pets, and irresponsible people. Pesticides should be stored in their original container outside the home in a locked cabinet or shed.

3. Avoid inhaling pesticide sprays or dusts and, as directed on the label, wear protective clothing and mask. A handkerchief fitted to the face and long-sleeved shirts and gloves will help prevent excessive inhalation and contact with the material.

4. Do not spill sprays or dusts on the skin or clothing. If they are spilled, wash yourself immediately with soap and water and launder your clothing before wearing it again.

5. Dispose of empty pesticide containers in trash or by burning or burying them. When burning them, avoid inhaling the smoke.

6. Use separate equipment for applying hormone-type herbicides and separate equipment for applying pesticides in order to avoid accidental injury to susceptible plants.

7. Do not apply an insecticide listed in this folder to vegetables, fruits, livestock, or garden soils unless the label or up-to-date Michigan State University Co-operative Extension Service literature says you can safely do so.

8. Dispose of excess spray mixtures correctly by dumping into a sanitary land fill dump. If such a dump is not available, dig a hole at least 18" deep, pour in the excess spray and cover with soil. **DO NOT DUMP EXCESS SPRAY MATERIAL INTO SEWERS OR DRAINS OR DISPOSE OF THEM IN SOIL TO BE USED FOR GROWING EDIBLE PLANTS.**

Effort has been made to suggest only those chemicals which will adequately control the target pest with maximum safety to the user and other wildlife. Proper handling and application of these pesticides will further minimize undesirable side effects.

