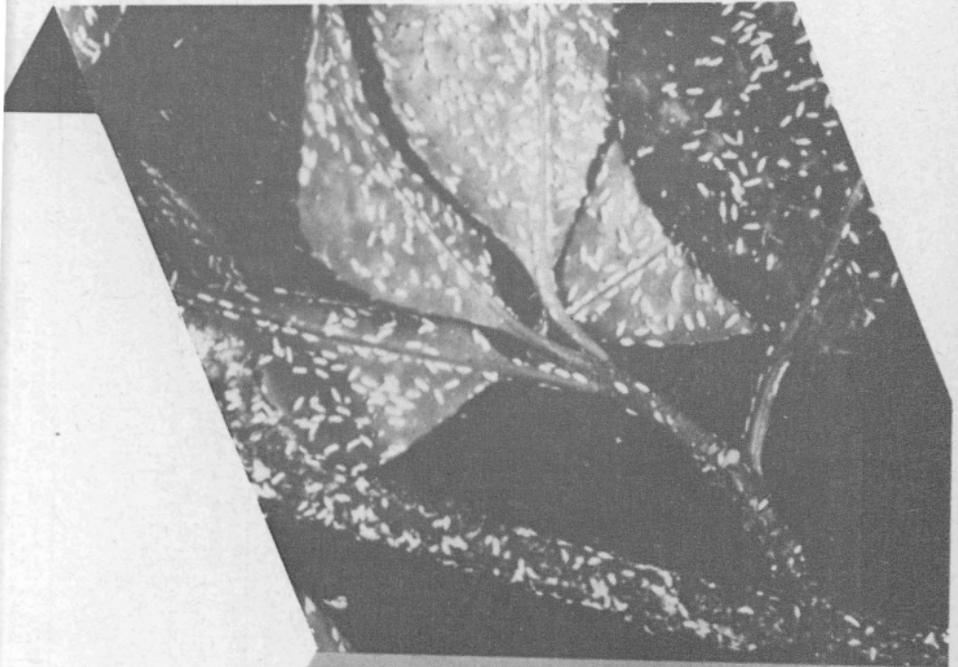


TEXAS GUIDE FOR
Controlling Insects
ON ORNAMENTAL PLANTS



EUONYMUS SCALE ON
EUONYMUS LEAVES



BAGWORMS ON ARBORVITAE

ORNAMENTAL PLANTS frequently are attacked by various species of insects and in many instances the uses of insecticides are the only means of control. In other cases, cultural practices, such as proper pruning, fertilizing and watering, play important roles in preventing or suppressing insect infestation.

GENERAL-PURPOSE SPRAYS AND DUST MIXTURES

General-purpose sprays and dusts containing several insecticides which will control both chewing and sucking insects are available for use on ornamental and flower plants around the home. Some of the insecticide mixtures contain a fungicide for the control of certain diseases. Follow directions listed on the label in applying the chemicals.

HANDLING AND STORING INSECTICIDES

All insecticides are poisonous and should be handled with care. If insecticides come in contact with the skin, remove the residue immediately by washing with soap and water.

Insecticides should be stored in a safe place out of reach of small children and irresponsible persons. Keep the materials in their original, properly labeled containers, away from human food or animal feed stuff and where there is no fire hazard.

INSECTICIDES AND THEIR USES

Many of the new organic insecticides act as both stomach and contact poisons; in addition, some exert a fumigant action. Several of the older type insecticides kill insects, acting as either contact or stomach poisons.

FORMULATIONS

Most insecticides are available in three forms: dusts, wettable powders and emulsion concentrates.

Dusts are made by mixing the ground insecticides with a "filler or carrier," such as talc, clay, gypsum, Fuller's earth and others. Dusts are applied directly to plants and cannot be used as a spray.

Wettable powder sprays are made by mixing insecticidal materials, manufactured in the form of powder, with water.

Emulsion concentrate sprays are made by mixing insecticidal materials, manufactured into a liquid emusifiable concentrate, with water. **Emulsifiers** serve to keep ingredients well mixed within a spray

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and help to spread and stick the insecticides to foliage, fruits and stems of plants.

INSECTICIDES

Lead arsenate acts as a stomach poison and is non-injurious to foliage of most ornamental plants if used properly.

Nicotine Sulfate is an oily liquid containing 40 percent actual nicotine. Both dusts and sprays are available for killing many sucking insects. They are more effective when used at high temperatures. Nicotine should not be handled inside buildings because it is dangerous to breathe the fumes.

Dusting Sulfur is finely ground sulfur used primarily for controlling spider mites.

Wettable Sulfur is powdered sulfur with a wetting agent added and can be mixed in water and used as a spray.

Liquid Lime-sulfur is a mixture of calcium lime, sulfur and water, and frequently is used to control scale insects.

Miscible Oils contain an emulsifier dissolved in oil and when mixed with water make creamy-white mixtures for dormant and summer sprays. Dormant oil sprays should be used during the winter. **Caution:** Summer oil sprays may burn foliage of some plants if applied when temperatures are high.

Rotenone is the active ingredient of extracts from derris, cube and timbo plants. It is available in liquid and powder forms and is relatively non-poisonous to humans.

Aldrin is formulated as dust, wettable powder and emulsion concentrate. It is poisonous to animals.

Aramite, a mixture of sulfites, has a long residual effect. It is available as a dust, wettable powder and emulsion concentrate. It should not be mixed with Bordeaux or other sprays containing lime.

Chlordane has a long residual effect and its toxicity to animals is similar to that of DDT. It is available as a dust, wettable powder and emulsion concentrate.

DDT is marketed as a dust, wettable powder and emulsion concentrate. It acts more slowly than many insecticides, but it has a long residual effect.

Dieldrin has a long residual effect but is considered toxic to animals and should be handled with care. It is formulated as a dust, wettable powder and emulsion concentrate.

Lindane is the pure gamma isomer of benzene hexachloride (BHC) but has considerably less odor than BHC. It is marketed as a dust, wettable powder and emulsion concentrate and is less toxic to animals than many of the newer insecticides.

Malathion is an organic phosphorous compound but is not as toxic to animals as parathion. It is available as a dust, wettable powder and emulsion concentrate and shows promise for controlling several insects.

Toxaphene is toxic to animals but is safe when used according to directions. It is available as a dust, wettable powder and emulsion concentrate.

DILUTION CHART FOR MIXING SPRAYS

Insecticides	Amounts Needed to Make Spray of:		
	100 Gallons	5 Gallons	1 Gallon
Aldrin, 25% Emulsion Concentrate	1½ pt.	1 oz.	1 tsp.
Aldrin, 25% Wettable Powder	1¾ lb.	1½ oz.	2 tsp.
Aramite, 25% Emulsion Concentrate	1 qt.	1½ oz.	2 tsp.
Aramite, 15% Wettable Powder	3 lb.	2 oz.	1 Tbl.
Chlordane, 40% Emulsion Concentrate	1 qt.	1½ oz.	2 tsp.
Chlordane, 40% Wettable Powder	2 lb.	1½ oz.	2 tsp.
DDT, 25% Emulsion Concentrate	2 qt.	3 oz.	4 tsp.
DDT, 50% Wettable Powder	2 lb.	1½ oz.	2 tsp.
Dieldrin, 20% Emulsion Concentrate	1 pt.	1 oz.	1 tsp.
Dieldrin, 25% Wettable Powder	1 lb.	1 oz.	1 tsp.
Emulsifier (Soap) Use with Nicotine Sulphate	4 lb.	2 oz.	1 in. cu.
Lead Arsenate	3 lb.	2½ oz.	2 Tbl.
Lime Sulfur, Dormant Spray	9 gal.	3 pt.	1½ cups
Lindane, 25% Emulsion Concentrate	1 pt.	1 oz.	2 tsp.
Lindane, 25% Wettable Powder	1 lb.	1 oz.	2 tsp.
Malathion, 50% Emulsion Concentrate	1 pt.	1 oz.	2 tsp.
Malathion, 25% Wettable Powder	2 lb.	1½ oz.	2 Tbl.
Miscible Oils (3½%, for Dormant Spray)	3½ gal.	1½ pt.	9 Tbl.
Miscible Oils (1½%, for Summer Spray)	1½ gal.	½ pt.	3 Tbl.
Nicotine Sulphate	1 pt.	1 oz.	1 tsp.
Toxaphene, 60% Emulsion Concentrate	3 pt.	2½ oz.	1 Tbl.
Toxaphene, 40% Wettable Powder	5 lb.	4 oz.	2 Tbl.
Wettable Sulfur (325 mesh)	7 lb.	1/3 lb.	3 Tbl.

2 pints (pt.) = 1 quart (qt.)
 4 quarts = 1 gallon (gal.)
 1 gallon = 128 fluid ounces (oz.)

16 fluid ounces = 1 pint
 1 fluid ounce = 2 tablespoons (Tbl.)
 3 teaspoons (tsp.) = 1 Tbl.

LEAF-EATING INSECTS

Insects	Description and Type of Damage	Treatment (listed alphabetically) (See dilution chart for mixing sprays.)	Remarks	
Ants	Many species, 1/12 to 1/2 in. long, varying in color. Feed upon seeds, leaves, fruits, bark of trees and upon honeydew from aphids and scales. Leaf-cutting ants cut leaf parts from plants and store in dens.	Dusts: A. 5 or 10% Chlordane B. 2% Dieldrin Fumigant-Carbon Disulfide Leaf-cutting Ants Fumigant-Methyl Bromide	Apply treatment to ant dens. For detailed information on applying fumigants, see Extension Service Leaflets Nos. 128 and 185.	
Blister Beetles	Adults eat foliage and will cause blisters on skin of man if bodies are crushed on it. Several species, black or grayish colored, or black with narrow yellowish or gray stripes. Tip of body is exposed beyond tip of wing covers.	Dusts: A. 5% DDT	Sprays: A. DDT	Apply insecticide when beetles appear. Valuable plants may be covered with mosquito netting.
Bagworms	Larvae feed on foliage after hatching in late spring or early summer. Young worm spins silken sac and attaches bits of leaves as it feeds. The worm carries bag wherever it goes. Full grown worm has bag 1 1/2 to 2 1/2 in. long. Wingless female crawls out and dies after laying eggs inside bag.	Dusts: A. 10% Toxaphene B. 4% Malathion	Sprays: A. Lead Arsenate B. Toxaphene C. Malathion	Apply insecticides early while worms are small. No chemical control when worms are full grown. Hand pick and burn bags, because the winter is passed in egg stage within bag.
Caterpillars Eating Foliage: Webworms Tent Caterpillars Walnut & Pecan Caterpillars	Generally feed by eating leaves. May feed in concentrated areas. Some web together several branches and feed within, or build "web-tent" in crotches of limbs, or feed together in large groups without making web. Caterpillars vary from 1 to 2 in. long. Also vary in color, but usually striped, multi-colored and hairy.		Sprays: A. DDT B. Lead Arsenate C. Toxaphene	If webbing of branches are present, small scale infestations may be destroyed by cutting out and burning. "Web-tents" in crotches of limbs may be destroyed mechanically. There are 1 to 3 generations per year. Some pass winter as eggs, in clusters on limbs; other hibernate as pupa in the ground.
Grasshoppers and Crickets	Several species of grasshoppers and crickets are general feeders upon plants. Crickets often migrate into homes and other buildings during mid- and late-summer and fall.	Dusts: A. 2 1/2% Aldrin B. 10% Chlordane C. 2 1/2% Dieldrin D. 3% Lindane E. 20% Toxaphene	Sprays: A. Aldrin B. Chlordane C. Dieldrin D. Lindane E. Toxaphene	Infestations of grasshoppers and crickets should be eliminated; if not, they lay eggs in ground which cause large populations the following year.
Other Leaf-eating Insects: May Beetles, Climbing Cutworms, Armyworms, Leaf Beetles, Pine Shoot Moth, Leaf Rollers and others.	Damage varies but generally caused by worms or beetles eating leaves of many plants.	Dusts: A. 5-10% Chlordane B. 5 or 10% DDT C. 2 1/2% Dieldrin D. 3% Lindane E. 10% Toxaphene	Sprays: A. Chlordane B. DDT C. Dieldrin D. Lead Arsenate E. Lindane F. Toxaphene	Apply insecticides early to prevent damage. Young worms are easier to kill than older worms.

SUCKING INSECTS

Insects	Description and Type of Damage	Treatment (listed alphabetically) (See dilution chart for mixing sprays.)	Remarks	
Thrips	Minute bugs, 1/40 to 1/10 inch long. Several species, vary from yellow to dark brown or nearly black. Very slender bodies and fringed wings. Their feeding causes tops of leaves to wither, curl up and die and failure of buds to open normally.	Dusts: A. 5% DDT B. 2 1/2% Dieldrin C. 1% Lindane D. 10% Toxaphene	Sprays: A. DDT B. Dieldrin C. Lindane D. Toxaphene	Injured buds and flowers of plants should be removed and burned. Reinfestation of thrips are common on flowering plants. Repeated applications of insecticides often are necessary.
Aphids or Plant Lice	Soft-bodied, sucking insects, 1/8 to 1/5 in. long. Causes leaves to curl. Varying colors: yellow, green, bluish-green, reddish-brown and nearly black.	Dusts: A. 1% Lindane B. 4% Malathion C. 2% Nicotine	Sprays: A. Lindane B. Malathion C. Nicotine	Lice infestations attract large numbers of flies to trees and shrubs to feed upon honeydew. Increased dosages of nicotine dusts and sprays may burn tender plants.
Lace Bugs	Tiny, mottled, brownish to black and gray insects about 1/8 in. long with lace-like wings. Suck sap from underside of leaves causing leaves to become gray or brownish spotted.	Dusts: A. 10% DDT B. 2% Lindane C. 4% Malathion D. 2% Nicotine	Sprays: A. DDT B. Lindane C. Malathion D. Nicotine	Underside of leaves discolored by a black and brown varnish-like excrement. Repeat applications of nicotine necessary to control this pest.
Spider Mites	Small, about 1/60 inch, yellowish or reddish animal which sucks juices from undersides of leaves. Causes pale blotches on upper and lower surfaces of foliage. Webbing often present. Plants gradually lose vigor and die.	Dusts: A. 3% Aramite B. 4% Malathion C. Dusting Sulfur	Sprays: A. Aramite B. Malathion C. Wettable Sulfur	These chemicals are not effective against egg; therefore, a second application 7 days later is needed.
Scales: San Jose, Oyster Shell Pine-needle Obscure Euonymus Soft Brown Mealy Bugs et al.	Suck sap. Small, covered with shell or armor. Most of them lay eggs that hatch into active crawlers. Infestation build up primarily during growing season. Inconspicuous; usually go unnoticed until plant is severely damaged.		Sprays: A. Dormant Oil B. Lime-sulfur C. Malathion D. Nicotine Sulfate - soap	Scales spread from plant to plant in crawler stage on birds, insects and other animals, and by wind. Nicotine sulfate-soap sprays will not eliminate scales but is effective against crawlers.
Whiteflies	Adults small, white, fly-like insects.			

Whiteflies	Adults small, snow-white, four-winged flies, nymphs small, oval, flat, palegreen or yellow; less than 1/30 in. long. Suck sap from plants causing them to wilt, turn yellow and die.	Sprays: A. DDT B. Lindane C. Malathion D. Nicotine Sulfate	Repeated applications at weekly intervals may be necessary to eliminate the flies.
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BARK AND WOOD BORING INSECTS

Insects	Description and Type of Damage	Treatment (listed alphabetically) (See dilution chart for mixing sprays.)	Remarks
Roundedheaded Borers (long-horned beetles)	Larvae (borers) make galleries beneath bark and also tunnel into heart-wood of devitalized, diseased or transplanted weakened trees. Enlargement behind head with horny plate only on upper side . They are legless; beetles (adult) vary from 1/2 to nearly 2 in. in length; feelers usually as long or longer than body.	Sprays: A. DDT (Double dosage given in dilution chart.) Repeat at monthly intervals beginning in late spring, through the growing season. Inject carbon disulphide with medicine dropper and plug hole with mud or nonabsorbent cotton. Larvae may be killed by probing burrows with ice pick or wire.	Proper tree care, tree pruning, fertilizers and sufficient moisture will help prevent borer attacks. Oily spots on trunk of trees usually indicate presence of roundheaded borers.
Flatheaded Borers	Larvae (borers) tunnel beneath bark making long, shallow, winding galleries packed with frass. Openings of burrows usually confined to south or southwest (sunny) side of tree trunk and main branches. Larvae usually 1/2 to 1 in. long, legless, with pronounced flattened enlargement behind head and bears horny plate on both upper and under sides .	DDT sprays or paints as given for roundheaded borers may help. Newly transplanted trees should be wrapped with tree wrapping paper for first year. Some larvae may be killed by cutting out the grubs with a sharp knife.	Keep trees in vigorous growing condition. Adults are sun-loving insects and are found mostly on the sunny side of trees. Females select unhealthy trees on which to lay their eggs.
Shot-hole or Bark Beetles	Both adult beetle and larva bore into trunk, branches and twigs. Adults about 1/10 in. and larvae about 1/8 in. long. Severe damage often causes wilting and yellowing of foliage. They make holes about the size of BB shots. One to 3 generations each year.	Paint or spray trees with DDT wettable powder or DDT emulsion concentrate as recommended for roundheaded borers.	Keep trees growing vigorously. Attacks of bark beetles result in death of trees, but they are rarely the primary cause.
Twig Girdlers Twig Pruners	Beetles completely or partly girdle twigs after having laid eggs in the branch above girdled area. Beetles vary from 1/8 to 3/4 in. long and have antennae longer than their bodies.	No insecticidal control	Larvae live through winter in girdled twigs. The girdled twigs contain eggs and should be removed and burned.

GENERAL

Insects	Description and Type of Damage	Treatment (listed alphabetically) (See dilution chart for mixing sprays.)	Remarks	
Snails and Slugs	Grayish to grayish-brown, legless, slimy and soft-bodied slugs, 1/2 in. to 4 in. long. Snails are made up of spirally coiled conical shells about 1 in. long.	Use commercially prepared baits.	Broadcast bait in the late evening or early morning. Prepared baits may be purchased.	
White Grubs (larvae of May Beetles)	White with brown head and 6 legs. One to 1 1/2 in. long. Grubs feed upon roots and underground tender parts of plants.	Dusts: Wettable Powders— 6 oz. 25% Aldrin; or 10 oz. 40% Chlordane; or 4 oz. 25% Dieldrin; or 5 oz. 25% Heptachlor per 1000 sq. ft.	Sprays: A. Aldrin B. Chlordane C. Dieldrin D. Heptachlor	Apply dust on lawn and sprinkle with water to soak into soil. Apply spray directly onto soil at rate of 25 gallons per 1000 sq. ft.
Pillbugs or Sowbugs	These animals are not insects but often cause damage to tender plants. Light-gray to slate-colored and about 1/2 in. long. Roll up in shape of pill when inactive.	Dusts: A. 5% Chlordane B. 5% DDT C. 2% Lindane	Use commercially prepared baits.	Apply dusts directly onto the feeding area. Baits should be broadcast in early morning or late evening. Prepared baits may be purchased.
Termites	Small trees are sometimes attacked by termites. They burrow into roots and crowns of plants. Worker termites are wingless, soft-bodied and white with dark jaws.	Dusts: A. 10% Chlordane B. 10% DDT C. 2 1/2% Dieldrin	Sprays: A. Chlordane B. DDT C. Dieldrin	Dust soil surface around plant with wettable powder and water plant to soak insecticide into soil.
Gall-forming Insects: Phylloxera Leaf Galls Stem Galls	Many kinds of galls are caused on leaves, stems and roots of trees by aphids, mites, tiny flies and wasp-like insects. Usually the galls form as insects feed and lay eggs upon buds, stems or leaves; the young usually develop inside the galls.	Sprays: A. DDT B. Nicotine Sulphate	Sprays applied when gall insects are feeding upon new leaves in the spring may help. Correct timing of spray applications determines the degree of control.	