

the pest problem? Are holes or webbing so obnoxious that a high degree of control is needed?

A late season defoliator may be annoying, but it does little harm to a plant that is essentially shutting down for the season. But, if this annoys the person who owns the plant, then appropriate suppressive measures must be applied at the proper time.

An early season defoliator may result in foliar devastation, but new leaves will form and mid-to-late-season appearance will approach that of undamaged plants.

Continued defoliation each year may be harmful to the plant and results in a second onslaught of problems at some later date.

## DORMANT PERIOD

The winter is an ideal time to control insects that survive from season to season in the egg stage or

an immature form. These insects can be smothered by dormant oil sprays. Dormant, or superior oils, exclude oxygen from the insect while not harming most plants.

Some thin-barked trees are sensitive to oil and should not be sprayed; including birch, beech, hickory, and walnut. Oils will not control eggs laid in large masses that are protected by layers of hair, wax, or other material.

## Scales

Most scale insects are effectively controlled by a combination of dormant oil sprays and application of insecticide during the crawler stage later in the year.

**Armored Scales**—This class of scales includes oyster shell scale, cottony maple scale, obscure scale on oak, pine needle scale, euonymus scale, white peach scale, San Jose scale, European elm

scale, camellia scale and juniper scale. These insects may have more than one generation or overlapping generations, depending upon the region of the country.

**Lecanium Scales**—Control of these unarmored scales is more difficult than armored scales. Dormant oil spraying is considered secondary to control of the crawler stage later in the year with materials such as Orthene® (acephate), Turcam® (bendiocarb), Diazinon®, malathion, and dimethoate. This group of scales includes Fletcher scale, European Lecanium, magnolia scale, tulip tree scale, globous scale on prunus species, and wax scale on euonymus.

## Eggs, single or single layer

Eggs deposited individually or in single layers are effectively suppressed with superior oils. In-

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## A New Generation

# LANDSCAPE

sects in this category are fall canker worm, aphids, spider mites, and eriophyid mites (causing ash flower gall, maple bladder gall, pear leaf blister, and arbovitae tip dwarf).

## Eggs in masses

Control of insects in this category is difficult with superior oils. Control later in the year of the larval stage is more effective. Insects in this category include

spring canker worm, gypsy moth, eastern tent caterpillar, and tussock moth.

## Woody Galls

Immature forms of these insects are located near the base of needles and not in the galls during winter. Thorough coverage by superior oil gives a degree of control. Applications of Sevin®, malathion or Dursban® just prior to bud break may aid in control. Insects in this category include Eastern Gall, Cooley Gall, Horned Oak Gall, Oak Flower Gall and other galls. When using oils, watch for needle color shift to prevent over-application or sensitivity.

## Bark Dwellers

Pine bark aphids, woolly aphids, and mealy bugs overwinter on the bark of woody stems. Pine bark aphids are found mainly on white pine and woolly aphids on apple and pear. Mealy bugs are common on taxus. High pressure sprays with superior oil will help reduce severe populations, but additional insecticides are needed later for best results.

## SPRING

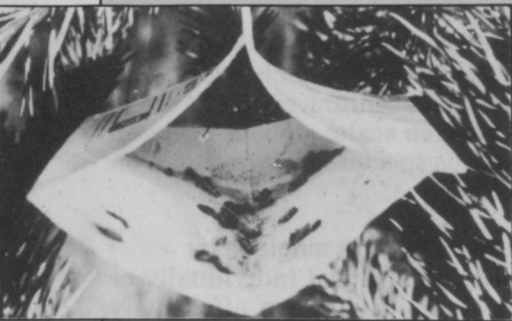
Tender succulent foliage provides an ideal food source for certain insects that hatch with the first warm weather of spring. These spring feeders, when present in large numbers, can cause severe defoliation in a matter of days.

The young stages are often unnoticed because of minimal feeding. With warmer spring weather, they begin feeding ravenously on young, tender foliage. At this stage it is almost impossible to obtain control because the mass of insects requires such a large volume of pesticide. Often, one cannot treat plants fast enough to obtain control.

## Foliage Feeders

*Eastern Tent Caterpillar*—Early development of the destructive stage takes place at bud break on wild cherry, apples, and crabapples. Webbing indicates problem

## Pheromone traps are indicators, not total controls



**Pheromone traps** make an insect look for you instead of you looking for it.

The American homeowner often goes to great lengths to avoid getting professional help. Back yards across the country have a blue cast at night from millions of insect electrocutors hung on posts or tree limbs. What would a barbecue be without the crackling sound of insects flying into electrocutors?

Another method of 'stumping the pros' is collecting bags and bags of bugs in traps hung from little L-shaped posts stuck in the lawn. During the Japanese beetle summer invasion, homeowners empty the bags in their traps every night. But, what have they gained?

The trap is the result of research on pheromones, natural odors which can now be produced synthetically. Pheromones are specific to insects, i.e. what attracts a Jap beetle won't attract a tussock moth. Pheromones

are used to confuse mating as well as to attract certain insects. "Gypsy moths have been tracked following a pheromone scent for up to 100 yards," says USDA Forest Service Researcher Dr. Lonnie Sower.

"Trapping-out, or using the pheromone to attract pests to a lethal trap, generally has a cost efficiency problem...because the compounds are expensive to produce. Male insects can also become habituated to the synthetic compound and no longer react to it," says Sower.

The advantages of pheromone traps are; they are species specific so non-target insects are not harmed, they let you know exactly when a certain insect is present so that control measures can be implemented or withheld, and research indicates pheromones are harmless to humans.

Control is possible with pheromones says Sower, but cost is related to the actual cost of pest damage. Up to 80 percent control was achieved in forest studies with aerial application of pheromones for tussock moth.

Still, their main use is for monitoring insect populations so pesticides can be used if needed at the right time. □

# What's your professional I.Q.?

Grab a pen and take this quick quiz of your professional knowledge.

**1.** You're faced with a variety of insect problems in the same location. Sod webworms are attacking turf. Beetles are destroying flower beds. And tent caterpillars are defoliating trees. What should you do?

- Use three pest-specific insecticides, making sure to clean your spray tank between applications;
- Spray a pesticide specifically formulated for tent caterpillars and hope it controls the other insects, too;
- Apply a broad-spectrum insecticide that's labeled to control these and more than 210 other problem pests.

**2.** A wooded lot is being attacked by elm leaf beetles. But this area is also home for several species of birds and other wildlife. What's your best course of action?

- Use a highly toxic chemical, but exercise caution when spraying;
- Refrain from spraying and hope the defoliation is minimal;
- Spray a selective insecticide that's highly toxic to target pests, yet registered for insect control on pests, poultry and even game birds.

**3.** During hot summer weather, your employees don't like to wear bulky safety equipment while applying insecticides. What can you do?

- Demand that they wear respirators and other protective gear, even if it is uncomfortable;
- Allow them to apply highly toxic chemicals without these safeguards;
- Use an effective insecticide that can be applied without special protective clothing.

**4.** It's late summer, and fall webworms have become a serious problem. But in the area you're spraying are some sensitive flowers and shrubs. How would you handle this situation?

- Use an insecticide labeled for use on trees, hoping that any run-off does not injure the flowers and shrubs;
- Take time to cover the flowers and shrubs with plastic sheeting, then proceed with your spraying;
- Apply an insecticide that's broadly registered and phytotoxic to only three types of plants (Boston ivy, Virginia creeper and Maidenhair fern).

**5.** It's the peak of the insect season and you have to protect a wide variety of trees, turf, shrubs, ornamentals and flowers from damage. But how can you control insects on all these plants?

- Use several different insecticides, each formulated for specific plants;
- Treat everything with a tree and shrub spray, hoping that this product does an adequate job on turf, flowers and other plants;

**6.** You're scheduled to spray for Japanese beetles today, but there's a problem. A church gathering will be held near the spray site. What can you do to minimize offensive odor?

- Proceed with the spraying and hope the odor of your insecticide dissipates before the church function begins;
- Postpone your application until later in the week and run the risk of further insect damage;
- Use an insecticide that's virtually odorless, but also highly effective against Japanese beetles and other damaging pests.

**7.** As a grounds maintenance professional, you have access to a number of different insecticides. But what criteria should you use in selecting these products?

- Use agricultural insecticides, since these chemicals are formulated for large-volume users;
- Opt for home and garden products, since many of the pests you encounter are also found in residential areas;
- Choose a compound that was developed and labeled for use by grounds maintenance professionals.

**8.** Due to a warm, wet winter, infestations of several insect species are expected to be severe. How can you control all these pests and inventory costs, too?

- Stock several pest-specific insecticides;
- Wait until an outbreak occurs to order your insecticide;
- Make sure you have a broad-spectrum insecticide on hand to handle most of your pest problems.

As a grounds maintenance professional, many factors affect your choice of pesticides. Broad-spectrum insect control. Environmental protection. Your workers' safety. Phytotoxicity of pesticides to various plants. The offensive odor of many chemicals. Versatility of the products you buy. How an insecticide answers your specific needs. And the high cost of inventory.

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# LANDSCAPE



Four life stages of the black vine weevil (left to right); egg, larva, pupa, adult.

areas. Apply Orthene®, Bt, Sevin®, malathion, methoxychlor, Dylox®, or dymet for control. One generation per year.

**Forest Tent Caterpillar**—Similar to eastern tent caterpillar but forms a silken mat on trunks and branches instead of webs. Same control as eastern tent caterpillar.

**Spring Canker Worm**—Eggs are deposited in the spring. Crawler has two prolegs, as compared with three prolegs of fall canker worm. Apply Bt, Sevin®, methoxychlor, Orthene®, or dymet. One generation per year.

**Fall Canker Worm**—Eggs deposited the previous fall. Three prolegs. Control same as spring canker worm.

**Gypsy Moth**—Voracious feeder on many plants, especially oak. Heavy population in Northeast with scattered outbreaks elsewhere. White egg masses on trees and buildings during winter provide clue to presence. Apply Sevin®, Bt, methoxychlor, or Orthene® over large area. One generation per year.

**Tussock Moth**—General feeders of trees and shrubs. White



Bronze birch borer and D-shaped emergence hole.



Cottony maple scales are found most easily before trees leaf out.

tufts of hair are common marking. Western tussock moth is a problem in mountain states. White marked may have several generations per year. Most materials listed for foliage feeders are effective.

**Yellow-Necked Caterpillar**—Yellow and black striped caterpillar with prominent yellow spot just behind head. Feed in groups and raise head and tip of abdomen when disturbed. Apply Sevin® or Orthene®. One generation.

**Juniper Web Worm**—Reddish-brown caterpillar overwinters in

frass on branches. May cause severe damage before recognized. Penetrating sprays of Orthene®, Diazinon®, Sevin®, or dymet early in the spring or early fall needed for control. One generation.

**Green Stripe Maple Worm**—Limited insect on maple in river bottoms, but a major defoliator when present. Two generations, the second is most damaging. Apply Sevin®, Orthene®, methoxychlor, dymet.

**Elm Leaf Beetle**—Larvae feed on the lower leaf surface causing

them to die and drop prematurely. More than one generation. Apply Sevin®, methoxychlor, dymet, and Orthene® for control.

### Sawflies and Leaf Miners

**European**—Eggs are deposited in needles in late fall. Look for symptoms on needles to determine potential problem. Use Orthene®, methoxychlor, Sevin® in early stages. Other conifer sawflies develop during the summer.

**Birch Leaf Miner**—Small black fly-like wasp present when leaves are half grown, signifies time to apply a corrective control. Use Sevin®, Diazinon®, Orthene®, or dimethoate.

**Arbovitae Leaf Miner**—Small green caterpillar with black head that overwinters in mined leaves. Look for holes in terminal tissue. Adults are small moths. One generation. Direct sprays in spring of Orthene®.

**Locust Leaf Miner**—Many plants skeletonized by adults. Mining occurs on black locust. Two generations. Limited materials for control. Lindane and Dibrom® are listed.

**Other Sawflies**—Skeletonized foliage or consumed foliage. Need to watch for damage as insects are sporadic. Most materials listed will give good control.

### Sucking Insects

**Aphids**—Often present on new growth. Use malathion, Diazinon®, dymet, Orthene®, and Turcam®. Orthene and Turcam have longer residual but new generations build quickly. Need to watch closely.

**Spider Mites**—Common on evergreens. Need to watch for off-color foliage. Spruce spider mite may be a problem at this time. As weather warms, two spotted spider mite becomes common. Apply Kelthane®, malathion, Vendex®, or dymet.

**Plant Bugs and Leaf Hoppers**—Common on honey locust as new growth unfolds. Sevin®, dymet, Diazinon®.

**Lace Bugs**—Found on hackber-

ry, oak, mountain ash, sycamore, elm, and azalea. Wings appear lace-like with many veins. Can cause considerable leaf browning. Several generations. When severe, use malathion, Sevin®, Turcam®, dymet, or methoxychlor.

### Borers

**Clear Wing**—Early season emergent holes. Use pheromone traps to detect activity. Protect new wood with Dursban® or lindane.

**Bronze Birch Borer**—Severely damages white birch. Plant vigor is a factor, but protection possible with Turcam® or lindane. Timely application needed.

**Flat Head and Round Head**—Enter wounded or weakened plant tissue. Little to no control once tissue is invaded. Plant vigor is major deterrent.

### Scale

**Crawlers**—The early crawler stages of euonymus, oyster shell, oak kermes, golden oak and pine needle scale can be active at this time. Watch plants carefully for activity. Apply Orthene®, Sevin®, Diazinon®, or malathion. Multiple generations.

### Shoot and Tip Moths

**Pine Tip and Mugo Pine Tip**—Several species of shoot and tip moths need to be treated at this time. Timing important. Several

materials suggested, including Sevin®, Orthene®, dymet, lindane, Turcam®, and dimethoate.

### SUMMER INSECTS

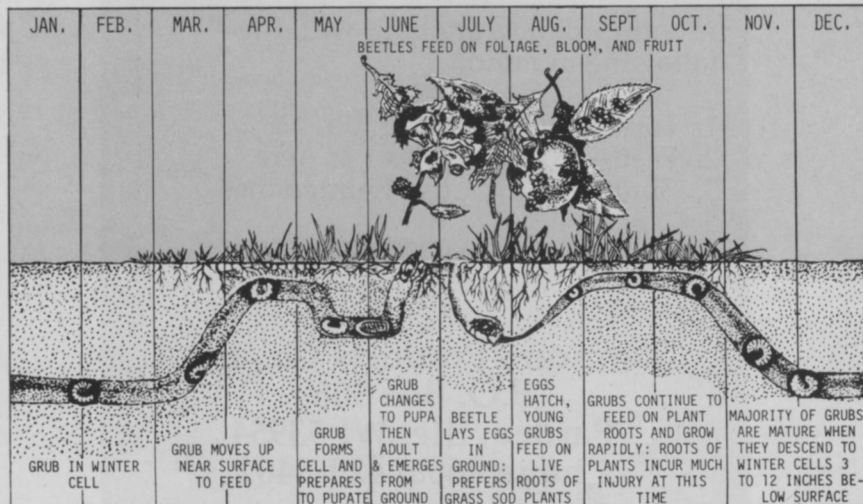
These insects feed on mature or near mature foliage. Injury at this time may reduce the amount of sugar or carbohydrates the plant can store for bud development and winter survival in colder areas of the country. Weakened plants are more susceptible to various stresses.

### Foliage Feeders

**Bag Worms**—Most common on narrow-leaf evergreens, but found on many other plants when population levels rise. Reasonable control can be obtained with Sevin®, Diazinon®, Orthene®, malathion, methoxychlor, and Turcam® when insects are small. Dursban® and Orthene® are more effective against mature insects.

**Japanese Beetles**—Early to mid-summer favors the first emergence of this colorful but destructive flying beetle. Favored hosts are prunus, apple, rose, elm, and many other plants need to be protected with Sevin®, Turcam®, methoxychlor or Diazinon®. Long residual is important.

**Black Vine Weevil**—Leaf notching on taxus, azalea, rhodo-



Japanese beetle life cycle shows control with soil insecticides has the best chance of working in late April through October.

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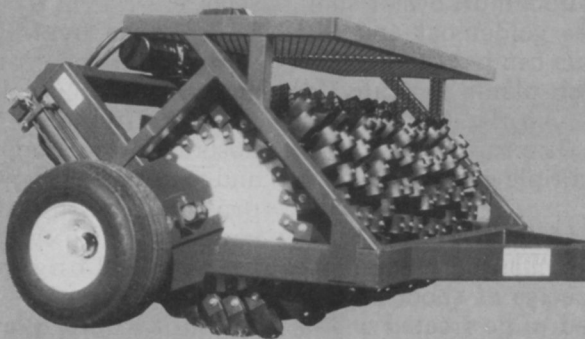
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dendron and numerous other plants in the landscape suggests weevil feeding. Black vine weevil is a night feeder. Larvae feed on roots. Control adults with Orthene®, Turcam® or lindane.

**Imported Willow Leaf Beetle**—Most willows attacked by this insect. Several generations. Apply Sevin®, Orthene®, methoxychlor. Timing is important.

## Sucking Insects

**Lace Bugs**—Off color and stipple-pattern on leaves is common with shiny black fecal residue on underside of leaf. Common on azalea, rhododendron, sycamore, and pyracantha. Use malathion, Orthene®, Sevin®, dymet, or dimethoate.

**Spider Mites**—Hot weather will favor the buildup of these insects often found on juniper and spruce. Many regular insecticides give little to no control of spider mites. Other materials must be used such as Dicofol, dymet, or Vendex.

**Aphids**—Different species are present during the growing season. Must be alert to buildup, especially on new succulent tissue. Use Orthene®, Diazinon®, or malathion.

**White Flies**—Often found on the undersides of leaves of azalea, privet and foundation plants. Black sooty mold grows on the honey dew produced by the flies. Difficult to control insect due to life cycle. Apply Orthene®, dymet, Diazinon®, dimethoate, plus others.

## Scale, Crawlers

**Cottony Maple Scale**—Cottony masses on silver maple and others. Wait for all eggs to hatch for best control. Use Orthene®, Diazinon®, Sevin®, or malathion.

**Lecanium Scale**—Wait for crawler stages to be active for control. Timing important. Use materials for scale listed above.

**Oyster Shell Scale**—Watch for branch dieback or slow leaf development.

**MID-SUMMER, EARLY FALL**  
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# LANDSCAPE

the object is to keep foliage for the fall color change, one must be aware of these late-season feeders.

Life cycles of certain insects also dictates that control measures be employed at this time for optimum results and satisfied clients.

## Scale Insects

**Magnolia Scale**—The crawler stage of this scale is active in the latter part of the growing season. Use Sevin®, Diazinon®, malathion, or Orthene® on the crawler stage.

**Pine Needle Scale**—Second generations of this insect that can

blow in or be carried by other insects and birds, or were missed by earlier treatments, can explode and nullify all previous efforts. Use Sevin®, Diazinon®, dymet or Orthene® on the crawler stage.

**Fletcher Scale**—Watch for crawler stage at this time of year on prone plants and use Sevin®, malathion®, or Orthene®.

## Adelgids

**Cooley Gall**—This adelgid leaves the gall in late summer to start as new life cycle or may return from fir trees if the alternate host of this pest is in the area. Good coverage of the new growth with Diazinon®, Sevin®, or malathion is important.

**Eastern Spruce Gall**—Similar in nature to the cooley gall, but activity is later so timing is important for the particular area.

## Leaf Feeders

**Fall Web Worms**—The second generation becomes very obvious at this time of year with extensive webbing of the foliage. Suppression can be obtained with Sevin® or methoxychlor.

**Japanese Beetle**—This destructive flying beetle keeps feeding on foliage into the fall. Weather conditions play an important role in its numbers. Control with Sevin® or methoxychlor will be dependent on local analysis.

**Mimosa Web Worm**—Webbing similar to fall web worm where leaves are pulled together. Several generations. Apply Sevin®, Orthene®, Diazinon®.

**Oak Leaf Skeletonizer**—Second generation on oak. See controls under spring section.

## Borers

**Locust Borer**—A problem on black locust. Emergence occurs in the fall and egg laying is when golden rod is in bloom. Lindane as a trunk protectant can be used where a problem exists.

**Peach Tree Borer**—Mid- to late-summer treatment may be necessary on valuable plants. Use Dursban® or lindane.

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