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Insects and Related Pests of Trees, Shrubs, and Lawns

by

Everett Spackman



**Cooperative Extension Service
Department of Plant Sciences
College of Agriculture**

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Insects and Related Pests of Trees, Shrubs, and Lawns

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Insects and Related Pests of Trees, Shrubs and Lawns

INTRODUCTION

Almost every ornamental tree, shrub, or flower growing in Wyoming is subject to attack by insects or mites and may need protection. Some trees and shrubs require a number of years to become established for adding beauty to the home grounds. Damage to their growth and appearance must be held to a minimum whenever possible, especially because replacement is costly and sometimes impossible.

The many insects and mites of ornamentals have different habits, are active at different times of the growing season, cause different types of injury, and may require a specific host for their development. Successful insect and mite control depends upon recognizing common pests and understanding their habits so that, when necessary, a recommended and timely control measure can be initiated before serious damage occurs.

Proper cultural and management practices are important for avoiding or reducing pest damage to ornamental plants. Consider these measures in management: proper and adequate watering, careful pruning, necessary fertilizing, and careful selection for plants that are adapted to your area. Plant troubles resulting from malnutrition; winter injury; drought and heat injury; and smoke, gas and mechanical injury are often mistaken for damage from insects, mites, or diseases. All such factors should be considered when diagnosing a problem in the absence of an insect or mite specimen.

The University of Wyoming's Department of Plant Sciences, and the Wyoming Cooperative Extension Service (county university extension agents and the extension entomologist) will gladly assist, insofar as possible, in diagnosing insect or mite problems and with recommendations for their control.

The pests of trees and shrubs described in this publication are grouped according to their mouthparts and feeding habits, and the type of damage they inflict on the plants. Groups included are the sucking insects and mites, which feed on various plant juices by piercing the plant tissue; leaf/fruit eating insects, which have chewing mouthparts; those insects and mites that cause various odd-shaped formations on plants known as galls; pests attacking trunks and branches; and lawn insects and other pests. The mouthparts of some insects do not always indicate the kind of damage they inflict on the plant, such as with gall makers, bores, and leafminers.

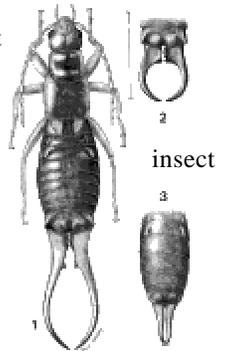
GENERAL PLANT FEEDERS

European Earwig

Forficula auricularia (Linnaeus)

The European earwig adult is a reddish-brown color and is about 3/4 of an inch long. Unlike most insects, it has a pair of "forceps" on the rear end. The eggs are laid in small batches in a chamber 2-3 inches below the soil surface. The young usually mature in one season and most have one generation per year. Earwigs are primarily scavengers on dead insects and rotted plant material; some feed on living plants and often invade the home and vegetable garden. The name "earwig" comes from a European superstition that the would enter the ear of a sleeping person and bore into the brain. Earwigs are active at night and during the day find shelter beneath boards, stones, sidewalks, or trash.

CONTROL: The earwig is an outdoor insect. Control can usually be accomplished by applications of an insecticide. Removing the cover under which they are hiding may enhance such measures.



Grasshoppers

(photo by Eric Williams)

Grasshoppers are a problem every year in many parts of Wyoming. Unless they are controlled, damage to ornamentals and the vegetable garden can be great in some seasons.

Grasshoppers lay eggs in the soil during July, August, and September. Their preferred egg laying areas are roadsides, weed patches, ditch banks, and fencerows. The eggs over winter and hatch in late May and June. There is one generation each year. Drought conditions often reduce natural vegetation and force the hoppers from weed-infested areas into lawns and home gardens.



CONTROL. Control measures are most successful when insecticide applications are made, while the hoppers are small, to infested areas along the edge of the yard, ditch banks, or roadsides. Consider the following measures:

1. Mow any surrounding area that will develop tall weeds or other plants to help develop a barrier. It may be on one side or more of your property. Keep the area mowed short all season. Mow as widely as possible, at least 15 feet.
2. Watch for young grasshoppers (nymphs). They will start to hatch any time from early May to early June.
3. When nymphs hatch and are about 1/4 inch long, start an insecticide barrier. Develop the barrier further by treating with an insecticide 10-15 feet into the tall vegetation. Baits may be considered if the foliage is short and sparse.
4. Check grasshopper kill 2 - 3 days after treating.
5. Keep watch over the barrier. When additional nymphs are seen, reapply the insecticide. The wider the barrier, the better protection you will have from grasshoppers as they become larger, hungrier, and grow wings. They are more difficult to kill as adults than as small nymphs.
6. Consider organizing a community control program.

Millipedes

(Photo Credit - <http://www.nmpest.com/images/Millapiad.JPG>)

Millipedes, like centipedes, are normally outdoor creatures. They are not carnivorous, but feed upon decaying vegetable matter in damp soil and on decaying wood. They often eat the tender roots of plants and green leaves touching the ground. A few are pests of cultivated crops. Millipedes are slow-crawling creatures with rounded, many-jointed bodies. They have two pairs of very short legs on each body segment except for the first three, which have only one pair each. If touched when crawling, they curl up.

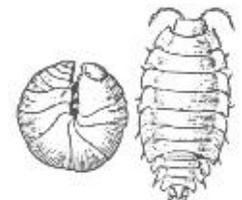


At certain times millipedes become restless and leave the soil and crawl into houses. Millipedes are most troublesome during the fall of the year, when they may crawl into crevices and cellars, up foundation walls, through small openings, and into the home. They may also crawl up walls and drop from ceilings. More often they are confined to the basement and the floors of rooms situated over unexcavated soil. The fall migrations are possibly connected with a natural urge to seek hibernation quarters. Heavy rains may raise the water level in the soil, forcing the millipedes out of their natural abode, and sending them in search of shelter elsewhere. Millipedes shun the sun, and are most abundant on the shaded side of a house. Millipedes will crawl during the evening and hide during the day in the soil, beneath stones and boards, or other darkened damp places. A dry environment will kill millipedes. Millipedes do not bite people, will not harm house furnishings, and do not eat sound wood. Usually those few millipedes that invade a building can be removed without the use of an insecticide.

CONTROL: Clean up debris near the foundation to eliminate breeding areas and, if necessary, treat the foundation and vicinity with a long-lasting insecticide spray. When found inside the home simply pick them up or sweep them into a dust pan, and toss them outside.

Sowbugs and Pillbugs

Sowbugs and pillbugs are found throughout Wyoming, and feed primarily on decaying or green plants. They sometimes wander indoors, where they do no damage. Such an invasion usually signifies a heavy population of these pests in the immediate area outside the home. They often get into damp basements and crawl spaces.



Sowbugs and pillbugs are crustaceans and are more like shrimp and crayfish than insects. They have a high moisture requirement, and are inhabitants of dark, damp places such as under trash, grass clippings, boards, and rocks. They are relatively slow-moving creatures.

Sowbugs are flat, oval, or slightly elongated, up to 1 1/2 inch in length, grayish (slate-gray) in color, and are wingless. Their body segments are easily visible. The sowbug has two tail-like appendages and cannot roll into a tight ball like a pillbug. Pillbugs are similar except they lack appendages, and can roll up into a tight ball at the least disturbance. From this action the nickname "pillbug" is derived.

CONTROL: Controls can be at least partially accomplished by removal of hiding places, moist areas, and food materials. Areas around buildings may also be thoroughly treated. A vacuum cleaner is quite effective.

PESTS OF TREES, SHRUBS, AND FLOWERS

Sucking Insects and Mites

Aphids

(*Aphidius* parasite parasitizes pea aphid) Photo by Jack Kelly Clark.

Aphids are the most common insects the gardener finds on decorative plants. Some species feed on foliage and flowers, others on twigs and branches, and some even on roots. Aphid mouthparts are designed for piercing the plant and sucking the sap. Most aphids damage host plants by robbing them of plant sap, by toxic action of their salivary secretions injected during feeding, and by serving as vectors of viruses, which can cause many plant diseases. Aphid feeding may cause reduced vigor in the plant, leaves may become curled, distorted, and discolored, or cause galls on leaves, stems, and roots.



Aphids excrete a sweet, sticky liquid known as "honeydew." When infestations are heavy, honeydew will often completely coat leaves, sidewalks, cars, and other objects, giving them a sticky and varnished appearance. Insects such as ants and flies are attracted to the honeydew. An unsightly, sooty mold often develops on the honeydew, which makes plants unattractive.

Aphids are slow-moving, soft-bodied, pear-shaped insects that vary in length from about 1/16 to 1/4 inch. Their color may be black, brown, yellow, red, gray, or green. The aphid's legs and antennae are usually long and fragile. The nymphs, or young aphids, are smaller than adults and are always wingless. Adults may be winged or wingless depending upon environmental conditions.

CONTROL: Aphids have many natural enemies that play an important part in keeping their numbers under control. Various ladybird beetles, lacewing flies, and syrphid larvae often destroy whole colonies. However, because aphid populations can increase so rapidly under favorable conditions, chemical control may be necessary to protect plants. Before applying an insecticide spray, try washing aphids off with a forcible stream of water.

Boxelder Bugs

(photo credit; Jeff Hahn, Extension Entomologist, University of Minnesota)

Leptocoris trivittatus (Say)

When weather turns cold in the fall, adult boxelder bugs and large nymphs cluster and seek suitable hibernation quarters for the winter. During the time of migration, the bugs occasionally become annoying household pests as they crawl or fly about. Boxelder bugs are plant feeders, and therefore do not feed on structures, household furnishings, or food products. When hibernating indoors, the bugs may stain curtains, papers, and similar objects with fecal spots.



Boxelder bugs pass the winter in the adult stage in protected places such as houses and other buildings, stonewalls, tree holes, and large accumulations of debris. On warm winter days they appear on sunny sheltered places, particularly on white or light-painted surfaces. In spring, when buds open, the bugs leave their winter quarters and seek host trees, preferably boxelder or ash, on which to feed and lay eggs. The bugs do little damage to trees. In warm climates there appear to be two generations a year.

Full-grown boxelder bugs are about 1/2 inch long and resemble common squash bugs. The reddish body is marked with broad, shaded areas of brown on the lower surface. The thorax has three longitudinal red lines, one down the center and one on each side. There are also red markings on the front wings. Other parts of the body are dark brown. Young boxelder bugs are bright red. These insects are true bugs with sucking mouthparts.

Boxelder bugs can be a nuisance wherever its host, the boxelder tree, is established. It has also been observed as an occasional feeder on ash and maple. The boxelder bug has gained its notoriety as a house pest by invading homes during warm days in fall, winter, and spring.

CONTROL: Boxelder bugs can be cleaned up indoors with a vacuum cleaner. One should consider eliminating hiding places such as dead leaves, boards, and general debris close to the house. To "bug proof" the house, repair screens and caulk cracks around the doors and windows. Consider spraying outside in the spring with an insecticide when susceptible young nymphs are exposed. Treatment during late summer to early fall will prevent an invasion from the host to the house. Apply the spray directly

on the bugs and on the area where they are observed. Control is much more difficult after they have begun to migrate to their hibernation quarters. Sprays should be directed at the bugs when they are congregated.

Cottony Maple Scale

(photo credit, University of Florida)

Pulvinaria innumerabilis (Pathvon)

Maple trees may be weakened by periodic epidemic infestations of this scale. Many other trees and shrubs such as willow, poplar, boxelder, honey locust, hackberry, and elm are also attacked. Infestation is evidenced by the presence of white cottony masses on the undersides of small branches. Leaves may yellow, become sooty with mold, and some times drop off prematurely. Viewed closely, each brown scale with its white egg mass somewhat resembles a kernel of partially popped corn, about 1/4 inch across.

Eggs hatch in late June or July; the crawlers migrate principally to the undersides of the leaves where they suck out juices. In the fall the partially-grown scales migrate back to twigs where they over winter. Adults suck sap from twigs and branches before laying white egg masses in late spring.

The cottony maple scale is a large scale attached to the underside of branches. In the spring, when the female is depositing eggs, the egg sacks of the scale resemble strings of popcorn. The female, when not depositing eggs, is a less conspicuous pale to dark brown color, and is bare, convex to oval in shape, has a more or less distinct median ridge, and is about 4-6 millimeters long. The males are flat and winged and are much smaller than the females.

The cottony maple scale is an important pest of shade trees and shrubs throughout the United States. Its favorite host is soft maple, but a large number of other deciduous trees are also attacked, including other species of maple, boxelder, dogwood, honey locust, hackberry, elm, apple, Virginia creeper, linden, mulberry, rose, sumac, lilac, willow, poplar, and plum. Damage to heavily infested plants may be severe due to feeding by the scale on twigs and underside of leaves. The foliage turns a sickly yellow and the vigor of the tree is reduced. Branches are sometimes killed. Honeydew dripping from infested trees on sidewalks, automobiles, etc. is often a nuisance. Honeydew promotes the growth of a black, sooty mold that gives the tree a blackened appearance on the leaves, twigs, and branches.



Cottony maple scale over winters as an immature, flat, inconspicuous fertilized female on the bark of host twigs and branches. The female is pale to dark brown, bare, convex to oval in shape, has a more or less distinct median ridge and is about 4-6 millimeters long. They are most conspicuous during the summer when large, white, cottony egg sacks extend from the rear. Male scales reach maturity in the summer and emerge as tiny, winged individuals that mate with immature females. Males die within a day or two of their appearance as they have nonfunctional mouthparts and cannot feed.

Eggs are laid from June to July in cotton-like masses under the female. These masses are several times the size of the scale. Hatching occurs in late June and July. Nymphs crawl under the surfaces of leaves and feed on the principal veins. They become mature in August and September, and mate. Fertilized females then crawl back to twigs where they overwinter. Development is resumed in early spring and females become mature in May.

European Elm Scale

(photo credit, University of Minnesota)

Gossyparia spuria (Modeer)

European elm scale is common in Wyoming wherever American elms are grown. It has also been seen on Siberian elms in the state. When abundant, it is a serious and destructive pest. Found in the United States for about 75 years, it is most injurious to city plantings.

European elm scales are easily seen on the bark of elm trees during early summer when scales reach maturity. The scales are oval, not over 1/16 of an inch long, reddish purple, and are surrounded by a fringe of white, waxy secretion. They are commonly found on the undersides of limbs and branches. When crushed with the finger, they leave a reddish stain.



Scales attack lower branches of trees first, and if not controlled will infest the entire tree. Scales damage trees by sucking sap from the leaves and tender branches. Elms suffering from European elm scale have a dark, sooty colored bark caused by a fungus that grows on the sticky honeydew that the scales secrete.

Infested elm trees display a yellowing of the leaves on lower branches during July. Later in the season, heavily infested branches may become yellowish-brown. When scales are extremely abundant, the foliage turns gray-green and wilts.

European elm scales have a single generation each year. Insects pass the winter as half-grown scales embedded in masses of cottony wax, which are located in cracks and crevices of the bark. In spring they move out and begin feeding along lower sides of branches and larger limbs.

Upon maturing, females mate with either wingless or winged males, attach themselves permanently to the host plant, and begin laying eggs. In late June, crawlers appear from under mature female scales and migrate to leaves, where they remain throughout the summer. Old females produce new crawlers for about a month before dying. In fall, before leaves drop, the half-grown scales return to the branches and larger limbs to spend the winter.

CONTROL: Apply an insecticide when crawlers are out and repeat in 10 days.

Honeysuckle Aphid

(photo credit, Kansas State University)

Hyadaphis tataricae (Aiz)

The honeysuckle “witches’ broom” aphid was first found in the United States in northern Illinois in 1980. More recently it has spread to Michigan, Ohio, Indiana, Wisconsin, Iowa, Minnesota, Nebraska, and Wyoming.

The host plant for this aphid is the honeysuckle. Injury caused by the aphid usually occurs on new leaves. It feeds by sucking plant juice, which results in stunted, tiny, folded leaf and stem growth. Elongation of the shoot is slowed and a "witches' broom" is created. The aphids are found on the upper side of the leaves that are folded longitudinally to enclose the insect. Several hundred aphids may thrive on a single plant.



When feeding begins in early season, very little natural growth occurs on that stem. As the season progresses, the stunted, distorted growth of infested stems appears more dense and compact, assuming a typical witches' broom appearance. Only a few tips may be involved, or all tips on the plant may show the damage. Stunted leaves of infested terminals turn brown earlier in the fall than normal foliage, and there may be abnormal fall flowering on infested stems. In the winter, broomed terminals are easily observed and quite unsightly. Several successive years of infestation may lead to severe stunting or even death of plants.

The honeysuckle aphid overwinters in the egg stage on the terminals. Eggs are usually protected by folded leaves, and hatch as the buds begin to swell in early spring. Young aphids move to developing buds to feed. They usually feed on the upper leaf surface, causing the leaves to fold upward. Like most aphids, honeysuckle aphids reproduce through most of the year without mating. Unmated females produce young by live birth. In this fashion they can complete each generation in seven to 14 days, with several generations occurring each season. In September, males and females mate, producing overwintering eggs. Adult aphids are quite small. Their color varies from cream to pale green.

CONTROL:

1. Remove and burn infested terminals.
2. Treat with insecticide in spring when leaves begin to form.
3. Chemical treatment is suggested throughout the summer to kill new and migrating aphids from infested plants. Most insecticides labeled for aphid control on trees and shrubs will yield aphid control when applied to the foliage before damage is apparent.
4. Some kinds (cultivars) of honeysuckle are resistant to severe attack. Another option in control would be to consider planting resistant cultivars. The susceptibility of the many cultivars is not fully known at this time.

Leafhoppers

There is hardly a tree or shrub that is immune from the attacks of one or more species of leafhoppers. Injury is characterized by white stippling of the leaves followed by yellowing and eventually browning. They are quite slender and generally small, rarely exceeding 1/4 inch in length. Immature forms resemble the adults and can easily be spotted by their peculiar habit of running sideways. Coloration varies but green seems to predominate, making both the nymphs and adults difficult to see.



CONTROL: Treat infested foliage with a thorough application of an insecticide. Sometimes a forceful jet of water to the effected foliage will give control.

Lecanium Scale

(photo credit, Dave Leatherman)

Parthenolecanium spp.

Lecanium scale infects a wide variety of hosts including green ash, elm, roses, caragana, fruit trees, and some evergreens. Scales damage trees and shrubs by sucking sap from the leaves and twigs. When numerous, they may be responsible for stunting and die-back of branches and foliage. The honeydew that the scale excretes causes another problem. Accumulation of the material on underlying foliage provides an excellent site for prolific growth of unsightly black sooty mold. Honeydew also may drip onto parked cars beneath infested trees, causing a sticky residue.



Lecanium scale is easily seen on the twigs of its host. The full-grown scale is shiny, reddish-brown and convex, about 1/8 to 1/4 inch in diameter. Its smooth, hemispherical look resembles a very small turtle.

Lecanium scale overwinters as an immature (crawler) scale on branches of the host plant and matures in early summer. In late June and early July the female lays large numbers of white eggs beneath her body. The eggs hatch into tiny, light tan crawlers from late July to early August. Egg hatch may last for several days, depending on the temperatures. The crawlers migrate to the underside of leaves and some to twigs where they feed until late summer. The crawlers then move back onto twigs and complete their development the following spring and summer. There is one generation per year. Scales move from host to host in a variety of ways; dispersal is probably most often accomplished on wind currents or by crawlers hitch-hiking on birds and mammals.

CONTROL: Chemical control measures are applied when scales are in the crawler stage and not during the adult stage. The shells of mature scales prevent insecticides from being effective. Determine when eggs hatch by examining the mature scale in early July. This can be done by flipping the scale over. Make this examination each week until you observe crawlers. Use a magnifying glass to see the very small mite-like crawlers. After you have determined that the majority of eggs have hatched, make an application of an insecticide. It may be necessary to make a second treatment 10 days later with some products.

Oystershell Scale

(photo credit, F. B. Peairs)

Lepidosaphes ulmi (Linnaeus)

Oystershell scales are easily detected with the naked eye. They derive their name from a hard, waxy protective covering secreted by their bodies. The scale, covering the insect as a shield, resembles a miniature oyster shell. It is brownish-gray with concentric bands, broadly rounded at one end, and about 1/8 inch long and 1/16 inch wide.



Oystershell scale infests many kinds of shade trees, shrubs, and perennial plants. It is probably the insect pest most destructive to lilacs and ash in Wyoming. Other host plants include ash, poplar, willow, elm, maple, and cotoneaster.

Scales often are so abundant on lilac bushes, ash trees, and cotoneaster shrubs that they form a complete crust on the bark. This insect punctures the bark with its mouthparts and sucks plant juices. Badly infested branches weaken and die. These tiny scale insects can kill whole lilac bushes and ash and willow trees.

Each female lays 50 to 60 oval, off-white eggs under the old scale before dying. The winter is passed in the egg stage. Overwintering eggs usually hatch in mid to late June into yellowish-white, mite-like crawlers. Barely visible to the naked eye, they crawl over the host plant for a few hours, insert their thread-like stylets into the bark, and begin sucking sap. After feeding starts, they grow rapidly and secrete a wax-like material that forms the scales. Females remain under the scales for the rest of their lives. One generation a year is produced in Wyoming.

CONTROL: First consider pruning much of the infested plant material. Treat with an insecticide at the time the eggs are hatching (June 10-30) and the crawlers are moving out from under the parent scale towards new growth. This is a brief period before the insect has produced a protective covering. Repeat the treatment in 10-14 days.

Pine Needle Scale

(photo credit, University of Minnesota)

Chionaspis pinefoliae (Fitch)

Pine needle scales infest pine, spruce, and fir. Spruce is especially hit hard in Wyoming. This pest seldom kills the tree. It causes needles to fall and trees to become weakened and discolored, and to appear unhealthy. Injury comes when thousands of scales suck great amounts of sap from the needles.

Both male and female pine needle scales have white, elongated scales. Their shapes vary with the shape and width of the needles on which the insects occur. Female scales may be from 1/8 inch to 1/16 inch long; they vary from pear-shaped on spruce needles to linear-shaped on pine needles. Males are always straight-sided and measure only 1/25 inch long.

Before dying, each female lays 20 to 30 very small, purple-red eggs under the old scale. Winter is passed in the egg stage. Overwintering eggs usually hatch in June, depending upon weather and locality. Eggs hatch into dark-red, mite-like crawlers that creep over the needles for a short time. Young scales (crawlers) soon insert their stylets into the needles and remain in the same location.



Scales seem to prefer the undersides of needles on the lower parts and within the protected portions of the tree. In such locations they can occur in large numbers and may not be noticed.

CONTROL: To determine the best time to apply a control measure, examine infested trees for crawlers every three or four days during June. Scrape some scales onto a white piece of paper or remove one of the scales with a needle. With a magnifying glass examine whether the eggs have hatched. If you find they are hatching, apply a recommended insecticide.

Control often is difficult largely because of failure to obtain thorough coverage. If application is made after insects are shielded with their waxy, protective covering, control is difficult also. Since crawlers move around on the tree, apply the spray to all parts of the trunk, twigs, and needles.

Treat with an insecticide when crawlers are out and then repeat the application in 10-14 days.

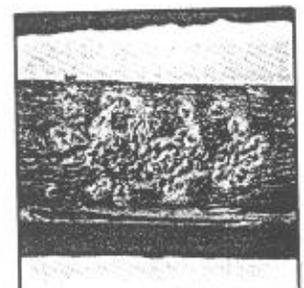
Putnam Scale

Diaspidiotus ancyles (Putnam)

The Putnam scale is a pest of deciduous trees, especially cottonwood (poplar). Ash, locust, and maple are also favored hosts. It is not a common pest in Wyoming. This scale can be found on large cottonwoods in Laramie by the experienced eye.

Putnam scale is an armored scale. Females are grayish circular, and convex. They measure 1 to 1 1/2 millimeter (1/17 inch) in diameter. The male scale is slightly smaller. Scales are found on the bark on larger limbs and small twigs. Sometimes infestations can be so heavy that they give the bark a crusty appearance.

The exact emergence dates of the immature (crawlers) stage are not known, although they are probably active in July. There appears to be just one generation. They overwinter in the



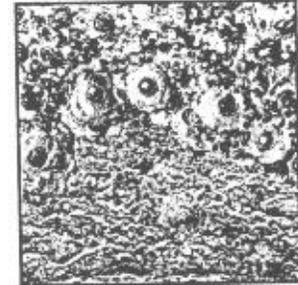
immature stage and complete their growth the next spring in May and early June. Eggs are laid over a period of several weeks in early summer. This scale may very well be a strong factor in killing small twigs and branches on heavily infested trees. Light infestations are difficult to detect.

CONTROL: Putnam scale is most easily controlled in the crawler stage. Consider making at least two treatments with insecticide sprays at two-week intervals.

San Jose Scale

Quadraspidiotus penticosus (Comstock)

San Jose scale appears as a small, gray, disk-shaped speck on the bark of a tree. The female scales are flat, circular, and somewhat larger than a pinhead (1-2 millimeter) in diameter. They have a slightly raised, dark or yellow central area or nipple that can be seen with a magnifying glass. Immature scales are small, nearly black, and have a black nipple surrounded by a grayish ring. Male scales are oblong or oval, and nearly twice as long as wide. Frequently the bark is reddened around each scale.



San Jose scale infests a wide variety of deciduous shade trees, shrubs, and fruit trees. They have been found in Wyoming on willow and crabapple. These infestations were discovered in Laramie and Torrington, respectively.

Some other important tree hosts are elm, ash, poplar, linden, willow, and mountain ash. The feeding of both the immature and adult scales, which insert their needle-like mouthparts into the tissue and suck the plant juice, causes injury. Infestations of scale on the bark contribute to an overall decline in tree vigor, growth, and productivity. In addition, feeding on fruit induces red to purple discoloration around feeding sites and decreases fruit quality. Fruit infestations usually result in small, deformed fruit.

San Jose scale spends the winter as a partially grown scale fastened to the bark of trees. They begin feeding and mature to adults in May or early June when apple trees are in full bloom. Males emerge from their scale shell and mate with females, which retain their protective covering. After mating, the females give birth to living young. Young crawlers move around on the trees for a few hours and then settle down and insert their slender, thread-like mouthparts through the bark and begin sucking plant juice. They soon secrete a waxy substance, completely covering their bodies and forming the shell. There may be more than one generation a year in Wyoming.

CONTROL: To determine the best time to apply chemical control measures on apple trees, examine the infested tree for crawlers every three or four days after bloom. Crawlers are yellow, mobile forms that resemble mites. When crawlers are detected, apply enough spray to thoroughly cover all parts of the tree. Repeat the treatment in 10-14 days. Do not treat apple trees during bloom.

Scurfy Scale

(photo credit, W.S. Cranshaw)

Chionaspis furfura (Fitch)

This grayish-white, pear shaped, 1/8 inch long scale is usually found on the bark of its host plant. The plants most commonly attacked are cottonwood, willow, apple, pear, mountain ash, dogwood, black raspberry, currants, and other deciduous trees and bush plants. Withdrawal of sap by an infestation of this scale reduces the vitality of the plant, kills branches and limbs, and sometimes, if the plant is young, deforms it.

Mature female scales are about 1/8 inch long and mature males are only 1/16 inch long.



This insect passes the winter as purplish-red eggs beneath the scale of the dead females. Eggs hatch in mid May. Females complete their growth, lay their eggs, and die in August or September. Males die soon after mating. There is one generation a year in Wyoming.

CONTROL: Treat with an insecticide when eggs hatch and the crawlers are out. Repeat the application in 10 to 14 days.

Spider Mites

(photo credit, U.C. Davis)

Spider mites attack a wide variety of plants. There are a number of distinct mite species; but because all are very similar in appearance, habits, injury, and control, they may be treated as a group.

Mites are quite small, and are barely visible to the naked eye. They vary in color from light yellow to pink, red, green, or brown. The eggs are straw-colored and are usually laid on the undersides of leaves. Most mites overwinter as adult females in plant refuse near a host plant. In the spring they migrate to the leaves of host plants where eggs are laid. Spider mites thrive in hot, dry weather and usually become most abundant during July and August. They injure host plants by sucking juices from the leaves. Spider mites live largely on the undersides of leaves and in other protected places. Plants badly infested with spider mites turn yellow and take on a sickly appearance.

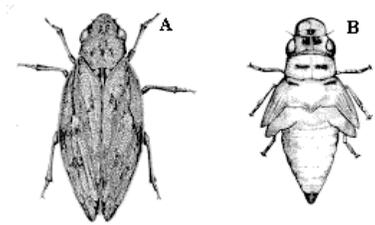


CONTROL: Apply treatment as soon as first signs of mite damage appear. The best way to check for mites is to hold a sheet of white paper under a branch and tap the branch sharply with a stick. If mites are present they will fall, and can then be seen crawling over the paper.

Chemical controls consist of spraying from July to August. Trees should be thoroughly covered and the spraying repeated at 10-day intervals if necessary. A forceful spray of cold water repeated several times will dislodge the mites and help control them on ornamental trees.

Spittlebugs

Spittlebugs have often been found on juniper in Wyoming. The nymphal or immature stages are spent in frothy masses of spittle on their host plant. The nymphs feed by sucking juices from plants. Spittle is excreted by the nymphs and whipped into froth by contraction of the abdomen. The froth serves as a means of protection from desiccation and predators. They overwinter as eggs, which hatch during May and complete their growth in July. Adults are brownish, jumping insects about 3/8 inch long.



Spittlebug. A, Adult. B, Nymph.

CONTROL. Pruning off twigs containing spittle can control light infestations.

Spruce Bud Scale

(photo credit, University of Minnesota)

Physokermes piceae (Shrank)

Spruce bud scale has recently been found in parts of Wyoming. It is dependent on spruce and pine as host plants. Spruce bud scale produces honeydew on which black fungus grows. Mature scales are 1/8 inch across, round, gall-like or similar to a bud of the host, reddish brown, and situated in clusters of three to five at the base twigs. The close resemblance to spruce buds makes them difficult to detect. It can become quite numerous on lower branches.

The insects overwinter as immatures in clusters on the underside of spruce needles. They remain dormant until spring when they become active and migrate from one branch to another. Soon after the spring activity they settle on the needles. Later in the spring they migrate to the twigs. Females settle in the woody bark at the base of smaller twigs.



Growth is slow at this stage and tendril-like wax filaments are secreted around the margin of the scale. After about two weeks they molt for the last time and all appendages are lost; a mere globular sac remains in May. Egg laying begins in June. Large quantities of honeydew are produced. The trees often become infected with sooty mold, which gives the branches a blackish appearance.

As the eggs are deposited the female shrinks until the body organs become obliterated. Thus, the female remains as a hollow sphere divided internally into two cells that are closely packed with eggs. The average number of eggs per female is about 220.

Eggs hatch after about a month or probably late July. The young then emerge from the dead female capsule to the needles where they settle. There is one generation each year. The old dead female shells are generally found at the base of the twigs in groups of from two to as many as eight.

They are chestnut brown in color and resemble buds. They are attached to the bark and often remain there for several years.

Thrips

Although very small in size, thrips may cause quite a bit of damage if they are abundant. They are not a common problem in Wyoming. Most thrips are about 1/16 inch in length. Color varies from light yellow to nearly black. They have four long and narrow wings, and have a fringe of hair on the borders giving the appearance of small feathers. Most of the economically important species lay their eggs in plant tissue. Both the young and the adults feed by rasping leaf surfaces and sucking up exuding juices. Injury causes distortion of plant parts in many instances, especially where thrips feed in the buds. Infestation of flower buds often results in malformed and spotted flowers.



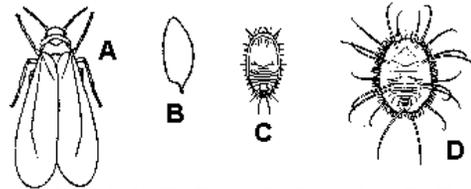
CONTROL: Often it is not necessary to control thrips. An application of an insecticide will give control.

Whiteflies

Adult whiteflies are 1/10 – 1/16 inch in size. Wings and body are covered with a white, powdery wax giving a milk white appearance. They have four broad, delicate wings that are held roof-like over the body when at rest. Whiteflies have sucking mouthparts. They feed by inserting their mouthparts into plant tissue and sucking sap from the plant. They also excrete honeydew that often makes plants unsightly.

Eggs are very small, oval, and attached to the plant by a stalk. Immature whiteflies, or nymphs, are attached to the underside of leaves. Newly hatched nymphs (crawlers) are flat, nearly transparent, and only mobile for a short time. Crawlers soon settle down and insert their beaks and begin to feed. In about three to four weeks and after four immature stages and a pupal stage, they become adults. Feeding by heavy populations of whiteflies may stunt the plant.

Fig. 177: Greenhouse Whitefly



A, Adult. B, Egg. C, Crawler. D, Pupa.

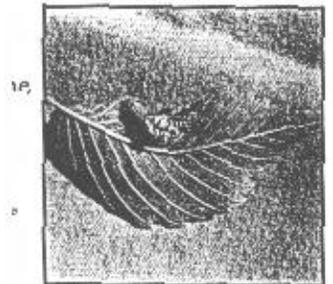
CONTROL: When a whitefly infestation begins, do not neglect it. Either destroy the plant(s) or treat to prevent spreading. Yellow cards or boards hung every few feet among plants in the greenhouse with sticky material such as "Tack Trap®" or Tanglefoot® applied over the surface are quite effective in keeping whitefly populations to a tolerable level. Traps work when the whitefly, which seems to be attracted to yellow, becomes stuck when it lands on the board. Heavy motor oil (SAE90) may also be used as a source of sticky material to spread over the yellow surface.

Whiteflies are difficult to control. A few repeat treatments of an insecticide may be necessary at five to seven day intervals.

Woolly Elm Aphid

(Eriosoma americanum)

The woolly elm aphid causes a tolling or Curling of one side and sometimes both sides of the leaf. The feeding by the aphid stimulates leaf curl. The aphid overwinters as eggs, which are deposited in the fall by females in bark crevices. As the aphids develop they secrete powdery white wax-like strands of material and large amounts of honeydew are excreted. Because of this the aphids have a woolly or dusty gray appearance. In the spring, female nymphs hatched from the eggs move onto the elm foliage. During summer, winged and wingless aphids are produced. The winged aphids are able to move to additional leaves.



CONTROL: Heavy infestations of this aphid may cause an unsightly appearance and the honeydew produced may be objectionable. The injury from the aphid is rarely serious. They can be controlled by a complete application of a recommended insecticide.

Chewing Insects

Aspen Leafminer

(*Phyllocnistis populiella* (Chambers))

Most of the aspen leaves in western Wyoming's natural forests seem to be infested with the aspen leafminer. Aspen leafminer larvae mine the upper and lower surfaces of leaves. Heavy infestations may result in discoloration followed by desiccation and early leaf drop. Inquiries are received from homeowners who are concerned about the unsightly effects on aspen trees used as ornamentals or shade trees.



The very tiny aspen leafminer overwinters as an adult moth. It lays eggs on newly emerged leaves in the spring. Larvae feed only on the single epidermal cell layer on upper and lower leaf surfaces. Serpentine mines made by larvae cause the leaves to take on a silvery appearance.

CONTROL: Control may not be necessary, but may be achieved by treating the foliage with a spray.

Blister Beetle

(Photo credit: Bastiaan (Bart) Drees, Extension Entomology, Texas A&M University)

This discussion concerns the blister beetle group rather than any specific species. Only adults feed on foliage, but are often ravenous and may stunt or kill plants by devouring most of the foliage. Blister beetles contain a substance known as cantharidin, which may blister human skin when they are handled.



Damage is done principally to shrubs, but flowering plants are also attacked and damaged. Blister beetles appear during the summer. The population will emerge in high numbers over a short period and cause leaf damage, often before they are noticed.

The color varies depending on species. They may be black, brownish, gray, or shiny metallic blue to green. Their general shape is shown by the accompanying illustration. The sizes of various species range from less than 1/2 inch to over 1 inch long. Usually the width is about 1/4 that of the length. They are strong fliers, and may descend on a garden or field and cause considerable damage in a very short time. Adults have chewing mouthparts, two pairs of wings, and may fly or walk when moving from place to place.

Most females lay their eggs in clusters within holes they make in the soil. The eggs are yellow, cylindrical, and elongated.

Newly hatched larvae are very active and strong-jawed. They burrow through the soil until they find an egg mass of a grasshopper upon which to feed and complete their development.

Yellowish-orange colored pupae are often found in the partially destroyed or destroyed grasshopper egg mass on which they have developed.

CONTROL: Apply a spray as soon as beetles are noticed.

Codling Moth

Codling moth, a pest of apples, has been included in this publication because the apple tree is used as an ornamental in many parts of Wyoming. Also, if the apples are to be harvested control measures are suggested.



Codling moth is the most important pest of apples in Wyoming. It feeds on apples, pears, and crab apples. The larva eats its way into the center of the apple and feeds on the seeds and core. Later it tunnels back out and leaves the fruit. It most often enters fruit through the calyx end. Sometimes it enters where two fruits touch, or where a leaf touches a fruit.

Female codling moths lay their eggs singly on the foliage or fruit. Eggs are pearly white and oval in shape. A newly hatched larva is semi-transparent, white with a shiny black head, and is about 1/16 inch long. When mature, it is pinkish-white with a

brown head and about 3/4 inch long. Full-grown larvae spin a silken cocoon under bark or other suitable shelter. The pupa is about 1/2 inch long and varies in color from yellow to brown, depending on age.

Adult moths vary in size with a wing expanse of 3/4 inch or less. Wings are brownish-gray with dark bands. Near the tip of each forewing there is a brown spot containing two irregular coppery-colored lines.

Codling moths overwinter as mature larvae in waterproof cocoons under bark or in the ground at the base of the tree. In May or June they change into light brown pupae. This stage may last four to six weeks.



Moths of the spring brood reach a peak of activity during June in most localities. Temperatures influence the extent of egg-laying and development of first-generation larvae (worms), and are important in determining seasonal codling moth activity. However, larval injury depends mostly upon the initial infestation. Large populations of overwintering larvae increase the chances for early fruit damage.

Eggs of the first generation usually take 12 to 14 days to hatch because of cool weather. First-generation larvae enter the fruit over a period of five to six weeks. The pupal period lasts from ten days to two weeks. First generation moths appear by midsummer and may be present until cool weather.

Second-generation eggs hatch after six to seven days. Second-generation caterpillars appear in mid-to-late summer, depending on locality, and attack the fruit for about six weeks. Second-generation caterpillars leave the fruit and go into winter quarters during August and September.

CONTROL: Apply a spray about seven to ten days after the petals fall, repeat three or four applications every 10 to 14 days.

Cottonwood Blotch Leafminer

(Zeugophora scutellaria)

The cottonwood blotch leafminer is quite common on cottonwood in Wyoming. During the adult stage the small beetles feed on the underside of leaves, causing a slight skeletonizing. The larvae mine the leaves. First symptoms of the miner attack are small, blistered, translucent spots made on the leaves by the small larvae when they begin to feed. As the miners enlarge, the epidermal tissue dies, resulting in brownish to black dead-looking areas. Heavy infestation may cause early leaf drop. The adult is about 1/8 inch long. The head, prothorax, and legs are yellow; the abdomen is black; and wing covers are yellow.



Adults emerge in June and July to lay eggs on leaves. Then the larvae feed within the mines, causing irregular and often quite large blotches. They feed for about a month, constantly enlarging their irregular mines until a large portion of the leaf is damaged. When larvae mature they drop to the ground and pupate. They overwinter, within cells in the upper layers of soil beneath trees. There is one generation per year.

CONTROL: Usually control is not necessary. The insect can be controlled with chemical sprays if applied thoroughly when the first tiny blister (mines) appears.

Cottonwood Leaf Beetle

The cottonwood leaf beetle may severely damage cottonwood, poplar, and willow trees. Larvae completely destroy all the leaves except for the fine network of veins; often large areas of leaves are completely defoliated. The adult is 7 to 9 millimeters long, metallic dark purple or blackish with broad lateral orange markings on the back, and has yellowish outer wings usually with seven purplish spots on each one. There are many variations in the color pattern of adults.

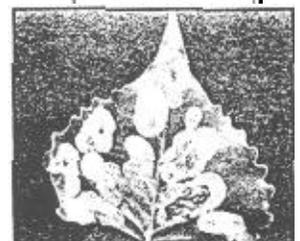


CONTROL: Treat tree leaves by spraying an insecticide when the damage is first noticed.

Cottonwood Tentiform Leafminer

(Phyllenorycter nipigon)

Cottonwood tentiform leafminers cause mines in the leaves. There have been heavy infestations in Fort Laramie, Casper, Evanston, and Laramie. Often a single leaf will have up to 15-17 mines. Each mine



contains one larva. Adult moths emerge from their over wintering site at about the time Leafminer damage the leaves are fully developed.

The adult is a very tiny moth, about 3/16 of an inch (3-4 millimeters) in length, and gray in color. The adult lays its eggs on the underside of the leaf. Mines, when first started in between the smaller veins, are round, translucent, small blister-like oblong spots up to 15 millimeters long and 8 millimeters wide. As the larvae feed and grow, the mine becomes wide. They are convex on the upper side of the leaf and the lower surface has a slight fold outward, giving the mine a tent-like appearance. During early August pupation takes place, and then during mid to late August the adults emerge from the leaf mine. Adults seem to be quite active in flight and can often be seen above the ground beneath the host tree.

CONTROL: Treat trees by spraying an insecticide on the leaves when the adults are active in the spring. Spraying before the tissue dies can also treat new mines.

Elm Leaf Beetle

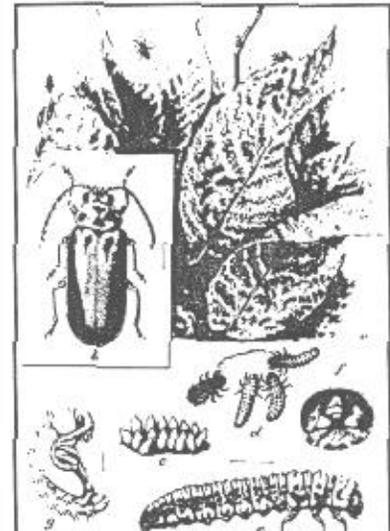
Pyrrhalta luteola

Elm leaf beetles are one of the most destructive pests of Siberian elm in Wyoming. Although all species of elm are subject to attack, the beetles prefer Siberian elm. Both beetles and larvae feed on the underside of leaves. The foliage of entire trees is often skeletonized.

The adult, or beetle, is about 1/4 inch long, yellowish to olive green, with dark green to black stripes along the margin of each wing cover. The antennae are long and yellow. In the spring adults come out of hibernation, fly to nearby trees, and begin chewing holes in new developing leaves. Female beetles deposit clusters of elongated, yellow eggs on the underside of the leaf during late May and early June. Eggs hatch in about a week and the larvae feed for approximately three to four weeks. Young larvae appear nearly black; when full-grown they are approximately 1/2 inch long and dull yellow with two black stripes down the back. They then crawl down the tree in search of a place to pupate. Some will pupate under the rough bark on the trees, on the soil, and in grass at the base of trees.

Pupation lasts from one to two weeks. The entire life cycle from egg to adult may last from 30 to 45 days, with two generations per year in Wyoming. The second generation usually occurs in August to early September.

Beetles start seeking hibernation quarters in late August continuing until cold weather sets in.



CONTROL: Control measures should be applied in the spring when beetles first appear on trees. One thorough and properly timed spray application may give protection throughout the season. If neighboring trees are not treated, it may be necessary to repeat treatment and observe the tree for damage from the second-generation.

Apply a Spray for the first generation in late May to early June, or treat for the second-generation larvae when they start to show in early August. This, of course, will depend on the weather.

Forest Tent Caterpillar

Malacosoma disstria (Hubner)

The forest tent caterpillar is a common defoliator of elm, ash, cottonwood, and fruit trees in Wyoming. When the forest tent caterpillar is a problem, it occurs early in the season of leaf development. The adult is light buff-brown and has a wingspread of 1 - 1 1/4 inches. Mature larvae are bluish in color with keyhole-shaped white spots on the back. The larvae commonly hatch when leaf buds burst. Caterpillars may cluster on the leaves in their early larval stages. As larvae develop, they become more widely dispersed in surrounding foliage. Even though they are known as forest tent caterpillars, they do not construct tents. As they approach maturity they tend to wander individually over the tree in search of a place to pupate after lowering themselves to the ground. The cocoon is pale yellow, and is spun in folds of leaves, in bark crevices, on shrubs, or other vegetation. Adults appear from late June to July. Eggs are laid in bands of 100 to 350 eggs encircling twigs.



CONTROL: Once the caterpillars have hatched, the simplest way to control them is to remove and destroy the larvae before they spread. When tent caterpillars are numerous or hard to reach, chemical control is suggested. When the larvae are still feeding actively in groups, an application of an insecticide on the infested trees should provide adequate protection.

Garden Slug

Slugs cause problems throughout the United States. They damage plantings in ornamental and vegetable gardens, and greenhouses.

These pests are frequently abundant in gardens, causing damage by attacks on seedlings, flowers, shrubs, and vegetables. In greenhouses, Slugs attack the young seedlings and the more succulent parts of plants. Common slugs found in gardens are small, soft-bodied, grayish or mottled, slimy creatures averaging about 3/4 inch in length, but rarely more than 1 1/2 inches.



Slugs feed on molds, decaying organic matter, and on foliage of plants. They need a large amount of moisture to survive, and prefer darkness. Mainly nocturnal, they come out of their hiding places to feed in the evening or on dark days. Favorite hiding places are under old decaying boards and logs, in rock piles, and beneath any damp refuse such as leaves and materials under plants.

Slugs leave a silver-colored, slimy trail wherever they travel. These trails can be seen on foundation walls, basement floors, walks, and plant leaves.

CONTROL. Eliminating preferred hiding places controls slugs. Remove rotting boards and debris left on the ground. Keep the crawl space under the house free of trash. In greenhouses, many slugs will hide under rotting boards, flowerpots, and debris beneath benches.

Most garden supply centers have slug and snail baits that should be applied according to directions on the package label. Apply the bait to the soil surfaces around plants. Do not apply bait to edible plant parts. Treated slugs become paralyzed and usually die when exposed to the sun. However, on cool, moist days some may recover, necessitating repeated application of the pesticide.

Because slugs are nocturnal, apply bait late in the afternoon or at night. Apply it when the ground is moist or wet, as the pests are more active on the soil surface then. If possible, do not use the bait just before rain because effectiveness may be reduced.

Slugs may feed intermittently rather than every day. For these reasons, distribute fresh bait at intervals of seven to ten days.

Leafcutter Bees

Damage caused by leafcutter bees frequently attracts attention because of the circular areas cut from the leaves. Rose foliage is often used for this purpose, although the leaves of honeysuckle and ash are also cut. These pieces of leaves are used in forming a thimble-like cup or cell for the young. Cells or nests are made in pruned or broken ends of branches, in pithy stems, or in other spaces of desired size. As the larva hollow out the pith of living plants, the injured portion is killed. Leafcutter bees are of medium size, usually black, brown, metallic green, or bluish.

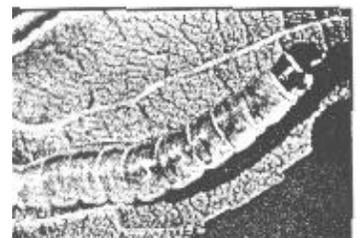


Cutting of leaves is usually not extensive enough to cause serious injury to plants.

CONTROL: No insecticide is registered for this use.

Leafrollers

Fruit tree leafrollers have many hosts including fruit and shade trees such as apple, ash, cotoneaster, elm, oak, maple, Russian olive, and cottonwood. There are various kinds of leafrollers that may be found on trees and shrubs. The adult is brown to orange-red and has a wingspread of 18-25 millimeters. The forewings are mottled with golden scales. Full-grown larvae are light green and about 20-25 millimeters long.



Adults are present from June to August, depending on geographical location. Eggs are deposited in small, round or convex masses containing about 100 to 150 eggs each, usually on twigs or small branches. Winter is spent in the egg stage and hatching occurs in early spring. Young larvae feed on opening buds, blossoms, young fruit, and unfolding leaves that they web together with silk. Later, several leaves may be webbed together forming a nest in which the larvae live and from which they move out to feed. Pupation occurs in flimsy cocoons spun inside the nest or on the branches. There is one generation per year.

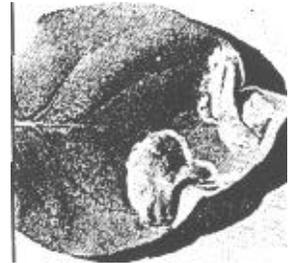
CONTROL: Leafrollers usually cause damage early in the summer. If control measures are necessary, make a thorough application of a recommended insecticide. A second application may be required in a week or ten days.

Lilac Leafminer

Caloptelia syringella (Fabricius)

Lilac leafminer has become a serious threat to lilac plantings in many communities throughout Wyoming. The minute larvae enter the leaf and feed upon the soft tissue. Lilac leafminers are small caterpillars that feed between the surfaces of the lilac leaves. The presence of the caterpillars can easily be recognized because of the damage they cause. The blotch mines and the leaf-tips that roll down soon turn brown, giving the shrub a burned appearance.

Larvae first appear as tiny, greenish worms. When full grown they are pale yellowish, translucent, and 1/3 inch long. The adult (or moth) has a dark brown body with a wingspan of about 2/5 inch. Forewings are brownish and marked with six irregular transverse patches of yellow, and the hind wings are grayish brown.



The lilac leafminer is widespread over Wyoming, causing severe damage to lilacs. It may also cause damage to ash and privet. Larval feeding between the upper and lower surfaces of the leaf causes the blotch mines, and later causes leaves to roll and turn brown. Heavy infestations may cause nearly every leaf to turn brown.

Lilac leafminer overwinters in the pupal stage in the trash below the shrub. In spring it transforms to the adult stage, which is active at night. Eggs are laid in small masses on the lower surface of leaves. Upon hatching, young larvae enter the leaf tissue and feed between the upper and lower epidermis for about four weeks. They then leave the mines and curl leaf tips. There may be from one to six larvae per mine. Pupation usually takes place on the ground. There are two generations each year. First generation damage shows up during June; the second occurs during late July and early August.

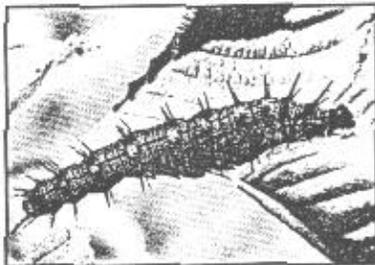
CONTROL: Because this insect spends a large portion of its life as a leafminer, insecticides are only effective when applied on the foliage as moths emerge and start to lay eggs, or just as mines first show. Foliage should be examined frequently. Effective control of young larvae can be achieved by spraying every seven to ten days in late June to early August.

Special consideration should be given to the second generation of the lilac leafminer as it usually causes more damage than the first. The second generation usually appears in late July to early August.

Mourning-cloak Butterfly (Spiny elm caterpillar)

Nymphalis antiopa (Linnaeus)

Larvae of the mourning-cloak butterfly feed on elm, willow, cottonwood, and hack-berry. Full-grown larvae, about 2 inches long, are purplish-black with a scattering of red dots



down the middle of the back. The head is covered with tubercles and the body is covered with many large, branching spines. The butterfly is black-bodied and has a wing spread of 2 1/4 to 3 1/4 inches. The upper wing surface is dark reddish-brown except for a broad creamy yellow border with a row of blue spots.

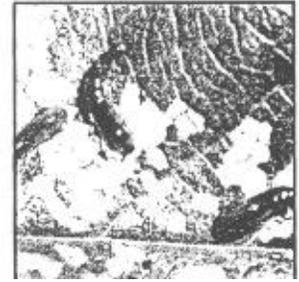


Adults overwinter and are one of the first butterflies to appear in early spring to deposit egg clusters around small twigs. The larvae cause defoliation on a few trees but are not widespread. Larvae feed until mid-July then pupate and emerge as adults. They lay eggs, hatch, and then overwinter as an adult.

CONTROL: Foliage of the favored host trees should be examined frequently during June and July. The larvae are usually easy to control with an application of a recommended insecticide on the foliage of the infested tree.

Pearslug (Sawflies)

The tadpole-shaped, slug like larvae of the pearslug are pests of cotoneaster, cherry, pear, plum, and apple. The adult sawfly lays eggs. When they hatch the young larvae begin feeding on the upper surface of the leaves, skeletonizing them. Full-grown larvae are about 1/2 inch long and the body is covered with a shiny, olive-green, slime-like material that gives them the slug-like appearance. Heavily infested trees or shrubs appear as if they are scorched and may be severely injured. Full-grown larvae drop to the ground and form cells in the soil in which they pupate. The adult sawfly, a black shiny insect with transparent wings, may be observed on the leaves during June and July. There may be a second generation.



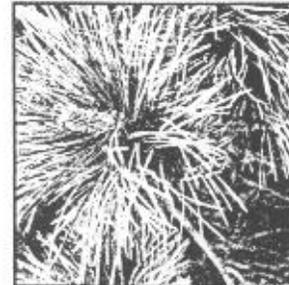
CONTROL: Pearslugs are easy to control with an insecticide application, including insecticidal soaps.

Ponderosa Needleminer

Coleotechnites ponderosa (Hodges and Stevens)

Ponderosa needleminer has been found on ponderosa pine in parts of Wyoming. The causes damage to the foliage and detracts from the tree's appearance.

Adult miners are moths with a wingspan of about 13 millimeters (1/2 inch). Moths mottled with black and white scales, giving them a generally gray appearance. Larvae are dark reddish brown with black heads, and measure about 8-10 millimeters. Pupae are dark brown. Eggs are laid singly or in clusters of up to 10 or 12 usually in mined-out needles.



insect

are
Mature
long.
old,

The host for the insect is ponderosa pine. The insect has caused severe damage to ponderosa pine in parts of Colorado. Infestations found so far in Wyoming are not widespread.

Ponderosa needleminer has one generation per year. Moths lay their eggs in August and September. Eggs hatch and the larvae overwinter. Tiny larvae or caterpillars enter near the needle tips and feed inside the pine needles, hollowing them out. Thus, they are called needleminers. Each larva completes its development in a single needle and pupates about mid-July. Mined needles may drop prematurely.

CONTROL: Control may not be necessary because the larvae usually feed on old needles providing little nutrition to the tree. However, several years of heavy needleminer feeding does result in visible tree decline. Highly valued trees can be protected against ponderosa needleminer by spraying with an insecticide. Timing is always important in treating for insects and this problem is no exception. Treat when eggs hatch, about mid-September.

Spring and Fall Cankerworms

Palcaerila vernata (Peck), *Alsophila pomataria* (Harris)

Spring and fall cankerworms are named for the time of year the adults (moths) appear. Usually their natural enemies hold these insects in check. Spring and fall cankerworms cause the same type of damage by skeletonizing the leaves. They feed on the softer tissue and leave the main veins and some membrane intact. Larvae start to feed during late spring and finish feeding in June. In the spring, cankerworm adults emerge and lay eggs. Larvae hatch and start to feed. They finish in late June when they drop to the ground and enter the soil, remaining inactive until the following spring. Besides the three pair of true legs just behind the head, there is a pair of "prolegs" on the sixth abdominal segment and another on the last segment. Fall cankerworm larvae differ in that they have the pair of prolegs on the sixth abdominal segment and the second pair on the fifth abdominal segment. The fall cankerworm overwinters in the egg stage. They hatch in early spring and finish feeding usually in June. They drop to the ground and enter the soil to pupate. Adults emerge in late fall, mate, lay eggs, and die.

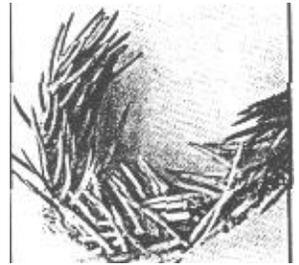


CONTROL: Control is usually not necessary. Because the females are wingless and emerge from the soil, a sticky band (six inches wide) placed at breast height on the tree trunk in early September and again in early spring will prevent the female from crawling into the tree to lay eggs.

Spruce Needleminer

Endothenia albolineana (Kearfott)

Spruce needleminer larvae mine needles of most ornamental varieties of spruce in Wyoming. Groups of dead, mined needles, which have a small hole near each needle base, are found webbed together on the twigs. Each larva is capable of eating the entire contents of needles leaving only the outer layers. Larvae mature and leave the needles and construct nests of fresh and dead needles in which they overwinter. Nests are usually found near the base of large branches in the thickest growth. When infesting small trees they are usually on the lower branches next to the trunk.



Needle loss weakens the tree, and nests give the tree an unsightly appearance. Continued heavy attack along with other factors could eventually kill the tree.

Adults of the spruce needleminer are small moths. They are grayish-brown with a wingspan of about 1/2 inch. The female lays two to eight pale yellow eggs along the side of the needle. Eggs hatch in about 10 days. Larvae enter the base of the needle and feed towards the tip. As the larvae grow they eat the entire needle contents. Larvae will feed on about 10 needles. Full-grown larvae are green with a brown head and are about 1/4 inch in length. Larvae are active until frost, when they construct a cocoon inside the nest and overwinter. They usually pupate in late May to early June. Adults emerge in about two weeks.

CONTROL: In the spring before the buds break, the nests can be washed away with a strong stream of water from a garden hose. Gather the washed-off debris and burn. This will help to reduce the infestation. Insecticides will control the larvae if applied with a pressurized hand pump. Thoroughly spray the trees to the drip stage in early July after the eggs have hatched. Consider a second application in August if larvae are found at that time.

Western Spruce Budworm

(photo credits, USDA Forest Service)

Choristoneura occidentalis (Freeman)

Spruce budworm is causing a considerable amount of damage to host trees in western Wyoming. It also causes some damage to those host trees grown as ornamentals around homes and in shelterbelts. Preferred hosts for the insect are spruce and fir.

Young larvae damage the trees during the spring by feeding on buds and new shoots. Only new foliage is eaten. As shoot growth starts from the buds, needles may be found webbed together by larva. Heavy infestations of larvae may destroy practically all-new needle growth.



Moths emerge from the pupal cases late in July or early August.

Females lay eggs on the needles in masses of 25 to 40. Each female will lay approximately 150 eggs. Eggs hatch in about 10 days. Larvae do not feed, but seek hiding places on trees. They spin silken shelters where they spend the winter. In spring the larvae first feed within needles and bore into expanding buds. As new shoots open, larvae spin loose webs between needles and feed on new foliage. The pupal stage usually is formed in the webbed foliage. Larvae become full grown in 30-40 days after attacking the buds. There is one generation per year.



Adult moths are about 12 millimeters long and have a wingspread of about 25 millimeters. They are gray-brown or orange-brown with bands and usually with a conspicuous white dot on the margin of the wing. Eggs are oval, light green, about 1.2 millimeters long and are deposited on the underside of the needles overlapping (shingled). Upon hatching, larvae are green with brown heads. Larvae have six stages of growth. In their next stage larvae have black heads, collars, and an orange-brown or cinnamon-brown body. Older larvae (fifth stage) have reddish brown heads marked with black triangles, a black collar, and an olive-brown body marked with small whitish spots. Full-grown larvae are about 30

millimeters long, with tan or light chestnut-brown heads and collars with large ivory colored areas superimposed on an olive-brown body.

Pupae are 12-16 millimeters long, broad at the hind end but tapering rapidly toward the tail, and are reddish brown.

CONTROL: Treat the infested tree in the spring when larvae first appear, before damage becomes noticeable from a distance. Wet the foliage thoroughly and repeat treatment in seven to ten days. Apply treatment when temperature is above 55 F.

Gall Producers

Ash Flower-Gall Mite

Enophyes fraxiniflora

Male or staminate flowers of some ash trees become distorted and enlarged, and unsightly masses form on twigs when infested with a minute gall-forming mite. These galls become blackened and remain on trees throughout the winter. This pest does not kill trees.



CONTROL: Ash trees have Gall injury either male or female flowers. Planting only ash trees with female flowers will avoid the problem. Male blossoms appear before leaf buds open and mites infest them. It is possible that applying a full-strength, dormant spray on male blossoms before leaf buds open would kill mites before they have a chance to feed. Apply the spray as soon as the tree is in bloom.

Chokecherry Gall Midge

Contarinia virginianiae

Chokecherry gall midge feeds on the fruit of choke cherry. Infested fruit are enlarged, compared to normal fruit. Injury to chokecherry fruit is caused by the maggot stage of the gall midge. It penetrates the fruit causing the seed to abort. The fruit becomes enlarged to twice its normal size, and is hollow. Each infested fruit, called a gall, may have several larvae within.

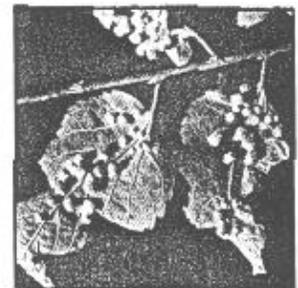
Chokecherry gall midge adult is a small fly-like insect. Adults emerge each spring from soil when the chokecherry is in bloom. After mating, females lay eggs in the flowers. Eggs hatch in a few days and the yellowish-orange maggot enters the developing fruit. Several maggots feeding within the same fruit cause it to become enlarged and somewhat pear-shaped. Developing seed is usually destroyed. Feeding continues until late July when mature larvae abandon galled fruit through a crescent-shaped opening, drop to the ground, and pupate in the soil. Shortly thereafter, desiccated fruit usually falls to the ground.

CONTROL: There is no insecticide registered for the control of the chokecherry midge gall. Research conducted in Canada resulted in its control if insecticides were applied at peak petal drop.

Hackberry Nipple Gall Psyllid

Pachypsylla ceticismamma (Riley)

The hackberry nipple gall is probably noticed before one observes the gall-maker, which is an insect known as a psyllid. Typical gall growth on the underside of leaves is shown in the accompanying illustration. Adults are dark-colored, have the appearance of miniature cicadas, and are about 1/5 to 1/8 inch long.



Hackberry is the host for this insect in Wyoming. The pest causes the nipple-shaped gall on the bottom side of the leaf. Most hackberry trees can tolerate a great number of galls with no apparent injury. Whenever there are a large number of galls on a single leaf, it becomes distorted and discolored.

These insects, sometimes called jumping plant lice, overwinter in the bark of trees, in trash, in buildings, and in other protected places. In spring, just as hackberry leaf buds swell, the adults emerge from their hibernation and are often observed in great numbers flying around or crawling on terminal twigs. As leaf buds open and leaves unfold, females deposit their eggs on the under surface of leaves. After eggs hatch, young nymphs feed by sucking sap from leaves. This irritation results in the formation of a gall made from leaf tissue enclosing the insect. Nymphs live inside galls throughout the summer and emerge as adults during mid to late August. There is only one generation per year.

CONTROL: Control of gall insects is difficult. To control with an insecticide, it is necessary to treat when adults are active in the spring. Once the gall has started its development the recommended insecticides are no longer effective. Hackberry tree leaves, when about half grown, can be sprayed in late May to early June. Make two applications at 10-14 day intervals.

Honey Locust Pod Gall Midge

Dasineura gleditscheae

Pod-shaped galls, 1/4 inch in diameter, are produced by this midge on terminal leaflets. Thornless varieties of locust such as moraine are particularly susceptible. Gall-covered leaflets may dry up and be shed prematurely, especially when they have been attacked several times. Trees are rarely ruined by an infestation, but unsightliness is another matter and may be dealt with as the situation requires.

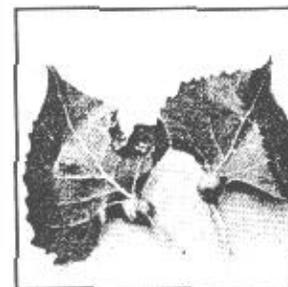
Adult midges appear in May at about the time locusts start growth. These midges are about 1/8 inch long. Males are black and females have a red abdomen. Tiny kidney-shaped eggs are inserted singly or in clusters among leaflets. Larvae hatch in one or two days and start feeding. Larval feeding on inner surfaces of a leaflet stops its development, but the outer surface grows normally. This produces the pod from which the insect gets its common name. When feeding is completed the adults emerge. There are two or three generations each year.

CONTROL: Honey locust pod gall midge rarely kills established trees. The problem is one of unsightliness. Infested branch tips can be pruned and burned. Usually chemical control is not necessary. Insecticide sprays, when applied, can be easily synchronized to adult emergence by observing when numbers of midges (tiny flies) are swarming around branch tips on warm, sunny days. Repeat applications of an insecticide will be required for control of the successive pod gall midge generations.

Leaf Stem Gall Aphid

The leaf stem gall is caused by an aphid and is common on cottonwood. This is an oval gall on the petiole (leaf stem) near the leaf base. Close inspection of the gall reveals a slit in the side of the gall through which aphids emerge when mature.

CONTROL: Apply a spray when the leaves are forming in spring and repeat in 10-14 days.



Maple Bladder Gall Mite

Vasates quadripedes



The presence of the maple bladder gall mite can easily be determined on a mature leaf. Its damage manifests itself as a small, hollow, spherical gall on the upper surface of the foliage. Galls may be described as bladder-like, about 3 millimeters in diameter, and occurring on the upper surface of leaves. When first formed, galls may be pink or green but later become red, or dark red to almost black. They may deform leaves and perhaps are most serious on young trees. They cause no appreciable damage to trees except to reduce ornamental value. Very small, elongated white to pinkish mites winter in bark crevices or bud scales. In spring, about May when buds break, the mites migrate to swelling buds to start feeding on developing leaves. Mites feed on the lower leaf surface of developing leaves by means of their piercing mouthparts. Feeding causes the galls to develop on the upper surface. As galls enlarge, a cavity forms within the opening to the lower leaf surface.

Mites continue to feed and reproduce inside until fall when they migrate to the bark.

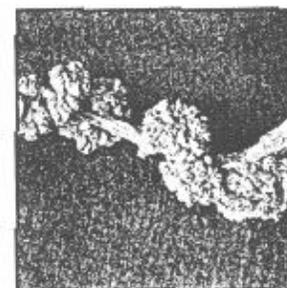
CONTROL: Damage to the host is usually negligible and control measures are not recommended. High mite populations on small trees can cause injury to the extent that premature leaf fall will occur. In tests the insecticide carbaryl (Sevin) has shown to be more effective against erophyid mites than the commonly used miticides. Apply spray treatment about the time the leaves are one-half expanded and repeat in 10-14 days.

Poplar Bud-gall Mite

Eriophes parapopuli (Keifer)

A severe problem on cottonwood in Wyoming, the poplar bud-gall mite is very small. Magnification is required to see it. This is not true of the gall formation the mite causes. These can easily be seen after trees have been infested for a few months.

Tiny mites attack leaf buds as they are opening in spring, sucking the plant juices and stopping further leaf and twig development from the infested bud. The mites' activity causes a swelling that has the appearance of a wart or cauliflower-like gall. New galls are green, pliable to the fingernail, and hairy. They change to a reddish color later in summer. Galls remain soft for more than one year, or as long as mites are living in them. They may become 1 inch in diameter. Abandoned galls are dry, brown or grayish, and hard or woody. Old,



abandoned galls remain on the tree. New galls are formed each year by migration of mites to new, unfolding buds.

Mites feed on exterior surfaces of galls and in pockets or folds within the galls. Growth of galls, instead of normal buds and leaves, causes trees to be deformed. It is not known how many generations there are each year, perhaps eight or more.

CONTROL: Control is difficult because the mite lives within folds of the gall most of its life. Movement of mites from one tree to another appears to be slow. Because of the slow speed, often pruning the galls out of a young tree can be effective in slowing down the spread. Prune in winter or early spring before buds start to open.

If the infestation is out of hand or the tree is too large to consider pruning, then consider spraying the tree when the buds start to open.

Poplar Vagabond Aphid

Mordvilkoja vagabunda (Walsh)

Gall formation caused by the poplar gall aphid is probably the easiest way to identify it. The gall is found on cottonwood trees. When fully developed, galls can be 3-3 ½ inches in diameter and are yellow-green in color when aphids are active in pocket galls. Galls occur either singly or in clusters of three to five at stem tips.



The most distinctive characteristic of mature galls is the development of extensive convulsions at the periphery, forming elevated ridges. Young galls are red and resemble a small rose. They become yellow-green as they mature, then turn dark brown after the aphid abandons them usually late July to early August. The winter interior of the gall contains large, open chambers. Aphids overwinter on the host in the egg stage. In the fall, eggs are deposited in pockets of galls on trees from previous infestations, and occasionally in bark crevices near galls. Eggs start hatching when leaf development has started in the spring. New nymphs move from the hatching sites to developing tips.

The aphid goes through a few generations within the closed pocket gall. Some galls have been found to contain as many as 1,600 individuals. Galls occur commonly in the top 1/3 of the tree. Adults leave galls of the primary host in late July to early August through holes in gall ridges. These migrate to a secondary host. It is believed there are two to three generations on secondary hosts, and then migration takes the aphids back to a primary host tree to deposit eggs in or near galls of the previous infestation. Galls remain attached to branches when leaves are shed. Winter is a good time to make some quick observations on whether the insect is in a given tree or vicinity. Like most aphids, the biology of this aphid is very complex. The life history has been simplified in this example.

CONTROL: For chemical control, spray trees with a systemic pesticide as early as possible after leaf development begins. For nonchemical control where small trees are involved, it is suggested that the galls be pruned where possible.

Spruce Gall Aphid

Spruce gall aphid can cause problems anywhere spruce is grown as an ornamental. The insect is not really an aphid, but rather aphid-like with an incredibly complicated life cycle.

Spruce gall aphid requires both spruce and Douglas fir to complete its normal life cycle. However, it can reproduce continuous generations on spruce or Douglas fir. Injury to spruce is caused by formation of a pineapple or cone shaped gall at the tip of new spring growth. The gall consists of a swelling of tissue at tips. It turns purplish as it reaches full size, up to 2 1/2 inches long. In August galls dry out, turn brown, and kill the twig. Old galls may remain on the tree for two or three years. Damage is mainly the unsightly appearance; however, heavy infestations can slow the growth of the tree.



On Douglas fir the insect appears as a woolly mass on needles, but galls are not produced. Feeding causes light-colored spots on needles and occasional premature needle drop.

It can survive on spruce, Douglas fir, or a combination of the two. It takes two years to complete a normal life cycle on spruce and then Douglas fir. As stated earlier, the normal life cycle is complicated. The information given here has been simplified.

The insect overwinters as a nymph on spruce at the base of needles. In spring, females mature and lay eggs. These hatch and the nymphs move to new growth where they feed at the base of new needles and cause characteristic gall to form. Nymphs emerge from galls in early August and molt to winged adults. These fly to Douglas fir or another spruce. The "aphid" appears as a wooly aphid on Douglas fir needles; no galls are produced on this tree.

CONTROL:

1. Prune off as many galls as possible on new growth.
2. Do not plant Douglas fir and spruce near each other.
3. Spray spruce just as buds are starting to open or when the galls have opened in summer to kill emerging winged forms.
4. Systemic -type insecticides injected into the soil under the ends of the branches (drip line) at the time buds are swelling have been successful.

Borers

Ash Bark Beetle

(photo credit, James Solomon, USDA Forest Service)

The ash bark beetle has caused damage to green ash in parts of Wyoming. Increased activity of the beetle has also been observed in some neighboring states. The beetle has been responsible for killing branches of trees and, in some cases, tree mortality.

The insect damages trees by tunneling beneath the bark in the cambium. Dieback of branches results from tunnels encircling limbs, which cuts off the life support system for that portion of the tree. The tunnel is nearly invisible to the human eye. A row of holes encircling the branch may be seen, but is often not noticed until the limb dies past the damage. One may mistakenly believe the cause of death to be winter injury. Wilting branches during midsummer is the best way to detect an infestation.



Adult beetles overwinter on the bark of the host tree. Adults become active in May to June. After mating, females fly up to branches and begin tunneling. Eggs are laid along the tunnel. It is at this time that wilting begins. Eggs hatch and larvae continue tunneling. Larvae mature and adult beetles appear in August. They remain active until fall when they burrow into bark near the base of the tree. They hollow out little shelters known as hibernation chambers. This is where they spend the winter, emerging the following spring to repeat the cycle. There is one generation per year.

CONTROL: The best way to control the beetle is by pruning when beetles begin making new tunnels in spring and early summer.

Ash/Lilac Borer

Podosia syringiae (Lugger) (photo credit, James Solomon, USDA Forest Service)

This borer is a pest of lilac, ash, and occasionally privet and mountain ash. Plants affected appear unhealthy with wilting or dying shoots. The surest symptom is the presence of borer holes in rough, canker like areas on older stem bases, often near graft scars. Dark, moist sawdust oozing from these holes indicates active feeding.

Ash borer has been causing damage to green ash in Wyoming. It may also attack lilac. The larval stage of this insect causes plant damage on the lower trunk and crown area.

Adult ash borer, a wasp-like moth, has narrow, transparent hind wings, a slender abdomen, and very long, yellow and black hind legs. Body color varies from yellow to brown-black. Newly hatched larvae are white with an amber-colored head, and mature larvae are about 1 inch long, creamy white, with a shiny brown head.



The insect pupates just underneath bark. When adults emerge, pupal skin is drawn partially out of the emergence hole. Adult emergence may begin in mid-April and continue through May. After mating, the adult females fly about locating host plants. Eggs are laid in cracks in bark from May to June, depending on the location and weather. Eggs hatch in about a week, and small larvae tunnel through the bark to begin feeding on cambium and later "mine" into the sapwood. Larvae become at least half grown by winter and resume feeding the following spring. Entrances of larvae are marked by frass -- a mixture of fine boring dust, oozing sap, and body wastes. Injuries often make ugly scars. During summer, larvae continue to feed and extend their tunnels first horizontally into sapwood, then upward until they bore close to the bark. Affected lilac canes will usually wilt and die. Ash trees will show unhealthy appearance and development of areas around larval wound sites.

Completed tunnels are about the width of a pencil. Larvae overwinter in the heartwood. Prior to pupating the following spring, they construct an emergence hole in the bark. The pupa uses its backward projecting spines to wriggle forward and push partially out of the exit hole. When the moth emerges, the pupal skin is left in the exit hole.

CONTROL: The best control measure is to prevent borers from successfully attacking trees or shrubs. A residual insecticide treatment to trunks and lower branches during periods of egg laying, May and June, is effective.

Practices improving tree vigor may reduce borer survival or enable trees to withstand attack. These practices include irrigation, fertilization, reducing competition from other plants, and pruning to remove weakened branches.

Horntails

(photo credit, Edward H. Holsten, USDA Forest Service)

Horntails invade only dead or weakened trees. They are called horntails because of a horn-like tail at the end of their abdomen. They will not attack healthy trees; however, they will attack dead areas of a living tree. Preferred hosts are American elm, Siberian elm, and boxelder. Females are attracted to injured trees or trees weakened by fire.



During early summer, the adult wasps emerge from circular holes that have the appearance of a .22 caliber bullet hole.

Adult horntails are sturdy, wasp-like insects from 1 1/2 to 2 1/4 inches in length. They are usually black or metallic blue and often have markings of yellow, red, or brown. Horntails have four clear wings. Females have a sturdy horn-like ovipositor (for egg laying), but the male abdomen ends in a small, sharp point. The insect will not bite or sting.

CONTROL: Horntails are difficult to control once they are beneath the bark. There is no magic formula that can be applied to the soil or tree to kill woodborers. Preventing the borer from infesting the tree is best. Weakened trees are especially susceptible. Trees in vigorous condition are less subject to attack. Prune infested, dead, or dying branches. Clean and paint all wounds. Treatment is seldom, if ever, justified.

Locust Borer

(photo credit, Robert L. Anderson, USDA Forest Service)

Megacyllene robiniae (Forster)

Black locust trees become stunted, disfigured, or broken over due to tunnelings of whitish borers. Symptoms include swollen trunk areas with sear-red, gnarled bark, broken limbs, wet bark areas in fall and spring, and summer accumulations of sawdust along the base of the trunk.

Borers pupate in late summer; black beetles 3/4 to 1 inch long with zigzag golden yellow markings emerge in early September to lay eggs in bark crevices. Small larvae soon hatch and bore into inner bark to overwinter.



CONTROL: Locust borers are difficult to control once they are beneath the bark. There is no magic formula that can be applied to the soil or tree to kill woodborers. Preventing borers from infesting trees is best. Weakened trees are especially susceptible. Trees in vigorous condition are less subject to attack. Prune infested, dead, or dying branches. Clean and paint all wounds.

Apply insecticide treatment early in August and repeat in three weeks.

Pine Bark Beetle

(photo credit, USDA Forest Service)

Dendroctonus ponderosa (Hopk)

Mountain pine beetle is one of the most destructive forest insects affecting Wyoming lodgepole and ponderosa pine. The first evidence of attack is pitch tubes on the tree trunk, marking places where beetles have entered. Pitch tubes are dark red to cream-colored masses of resin mixed with bark and wood borings. After trees have been attacked, the color starts to fade a month to a year afterwards, depending on the season and weather. Needles change from green to yellowish-green and finally rusty brown before dropping off.



Adult beetles attack by boring through the bark to the cambium area, then tunneling upward along the inner bark. Females lay eggs in these galleries that are roughly 12-30 inches long. After hatching, larvae feed on the inner bark in individual channels, which extend generally at right angles to the egg galleries. When fully developed, pupation takes place at the end of the larval gallery. Adults eventually emerge and fly to attack new trees and start a new generation. Adults are cylindrical, stout bodied insects, from 1/8 to 3/8 inches long, and usually reddish-brown to black.

CONTROL: Trees that are hosts of the pine bark beetle can be protected by a timely and thorough application of a recommended insecticide prior to the egg laying period.

Poplar Borer

Saperda cackarata (Say)

Adults are long-horned, 1 1/4 inch beetles with tiny black and yellowish spots on their gray bodies. They feed on the bark of young twigs, and the female deposits eggs in crevices in the bark. After hatching, larvae burrow into the bark and spend their first year working just beneath it. During the second year they tunnel further into trees and attain a length of about 2 inches. It may take three years to complete the life cycle.



Tunnel openings show a wet sawdust-like mass and often sap will ooze from wound openings. Trees or larger limbs may be weakened at the point of attack so much that they become subject to wind damage.

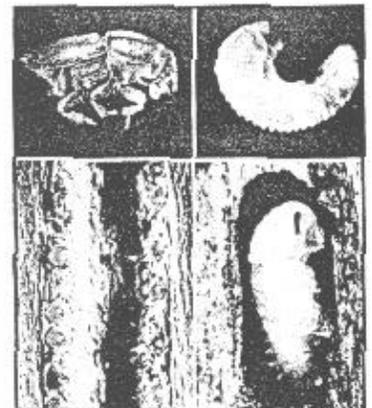
CONTROL: Poplarborers are difficult to control once they are beneath the bark. There is no magic formula that can be applied to the soil or tree to kill woodborers. Preventing the borer from infesting the tree is best. Weakened trees are especially susceptible. Trees in vigorous condition are less subject to attack. Prune infested, dead, or dying branches. Clean and paint all wounds. Spray trunks and lower limbs thoroughly during early August and repeat in three weeks.

Smaller European Elm Bark Beetle

Smaller European elm bark beetle, which carries Dutch elm disease, is known to occur in elm in Wyoming.

The European elm bark beetle, approximately 1/8 inch long, shiny, and dark reddish brown, is the main carrier. The underside of the hindquarters of its body is concave with a noticeable projection or bottom spine. Adults of native species are also about 1/8 inch long, but they are dull brown and do not have the concave or spine characteristics.

Larvae of both pine bark and European elm bark beetle are similar -- white, footless grubs about 1/8 inch long when full grown. Beetles prefer recently cut, broken, weakened, or dying trees for laying eggs. Eggs of the European species are laid in straight galleries that follow the grain of the wood. Native species lay eggs in galleries crossing the grain.



Beetles overwinter as larvae under bark of trees or logs. In spring, larvae complete their growth, pupate, and change into adult beetles. Beetles begin to emerge about the middle

of May through holes they make in the bark. In Wyoming there is probably a second brood, which emerges in late July or early August.

Adults fly a short distance, usually not more than 500 feet, where they feed on the bark of small branches of living elms. Beetles that have emerged from diseased trees can carry fungus spores to the feeding wounds made on healthy trees, unless a through application of insecticide kills the beetles.

After feeding on healthy trees, adults seek breeding sites under the bark of dead or weakened trees and logs. They bore through the bark and into the cambium area where they lay their eggs.

CONTROL: Once the disease is established within an elm, annual trunk injection of certain fungicides is the only alternative to the destruction of the tree, although it is quite costly. Three things are important: (1) sanitation, (2) destruction of root grafts, and (3) control with insecticide.

The insecticides can be applied two ways. Either the insecticide is applied in large quantities of water with a hydraulic power sprayer, or the insecticide is applied in small quantities of water by the use of a mist blower. Insecticide applications should be made in early spring. If necessary, make a second application during early July.

Spruce Weevil (White Pine Weevil)

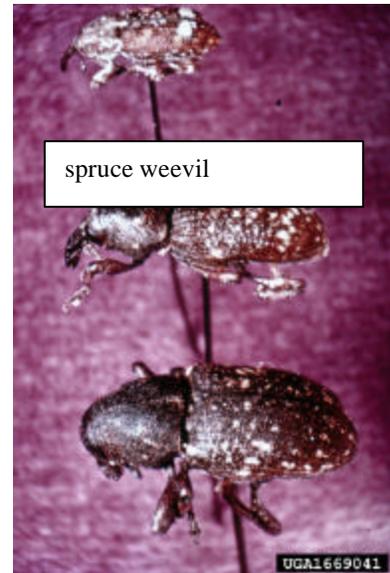
(photo credit, USDA Forest Service)

Pissodes strobi (Peck)

Weevils attack and kill the year-old leader at the top of spruce. The current year's growth dies as well. Usually the first evidence of an infestation is when new shoots begin to wilt and curl (shepherd's crook), usually in July. Needles eventually discolor, turn red, and drop by the following spring. Damage from this weevil each results in crooked stems, loss of growth, and a bushy appearance.

Adults deposit eggs into the leader during May and June. Larvae burrow downward when nearly mature, form cavities in woody tissue of the leader. Cavities can be found just under the bark, are covered with wood fibers, and are commonly called "chip cocoons." Larvae pupate in these cocoons and emerge as adults in late July August. Adults feed in the crowns of trees, and then overwinter in the litter under trees or in the crowns of the trees. In spring, during May and June, adults become active and lay eggs.

CONTROL: Because the leader is dead or will die, prune the leader and then select side branch to be the new leader. Bend the side branch up gently with a splint tied to trunk. Use some pieces of nylon hose for the ties. A preventative spray can be applied during April and a foliar treatment can be made in mid-May to control existing larvae.



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Lawn Insects and Other Turf Pests

Bluegrass Billbug

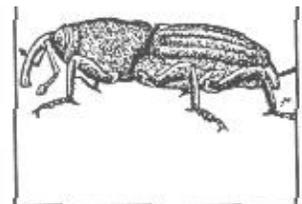
Sphenophoruspanulus Gyllenhal

Common symptoms of billbug injury are areas of turf that appear brown and do not respond to watering. Heavy infestations of bluegrass billbug can kill turfgrass.

Adult billbugs are dark gray to black "snout beetles" (weevils) about 1/3-1/2 inch in length. Billbug adults do not commonly fly, but can be found walking across sidewalks and other open areas next to lawns.

Billbug eggs are inserted into small openings cut by the adult female near the base of grass stems .

Grass blades damaged by this puncture wounding often grow shredded leaves for a short period afterwards. Eggs hatch and larvae begin by feeding within the crown area of the grass plant. Billbug larvae are white, legless grubs with brown heads. When full grown, billbug larvae are about 1/3-1/2 inch in length and may superficially resemble small white grub larvae, but they can be differentiated by absence of legs. As billbugs grow, they move to feed on roots.



Bluegrass billbug overwinters in the adult stage in protected locations in and around lawns. In late April and May weevils move to lawns and lay eggs. Eggs hatch in about two weeks. Larval development primarily occurs during June and July and most

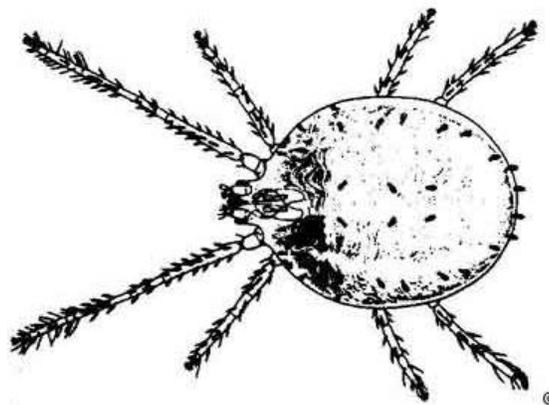
pupation has been initiated by August. Damage to turfgrass increases as grubs near full development. Heat and drought stresses that are common at these times further accentuate the effects of billbug damage to turf. Pupation occurs at the base of the plants in the sod. Adults are present throughout late summer and fall.

CONTROL: Insecticidal control of billbugs can often give poor results because grub stages are relatively protected while developing within grass stems or in the root zone. The most effective controls of bluegrass billbug include treatment during periods when adults are present and laying eggs in lawns. These adult control measures are usually timed in early to mid-May, but this will vary due to spring weather

Clover Mites

(photo credit, Colorado State University)

Clover mites are reddish brown, eight-legged creatures that are smaller than the head of a common pin. They are not insects, but are a close relative of spiders and ticks. By looking closely, or with the aid of a hand lens, you can see two gangling legs projecting beyond the mite's head. These are not feelers, but merely the front pair of legs, which are somewhat longer than the other legs.



Clover mites are most often troublesome in fall and early spring, but they may be a nuisance to homeowners during summer months if plants on which they are feeding are cup or have dried up.

Clover mites will not bite you or your pets, transmit disease, or feed on pantry supplies and household furnishings. Their tremendous numbers and the stains they leave when crushed make them a nuisance in your home.

Clover mites lay reddish-colored eggs, either singly or in masses, on host plants during late summer or early fall. Mites then develop through four stages -- larva, two nymphal stages, and adult. Each of the stages lasts from two to six days. There may be two or more generations a year. Mites may pass the winter in any stage of growth.

Mites feed on clover, grasses, and other forms of vegetation without causing a great deal of damage. Heaviest infestations usually occur in recently established residential areas. Apparently clover mites prefer new lawns and heavily fertilized old lawns.

Mites move to homes and other buildings from surrounding lawns and vegetation. They enter homes whenever they find tiny openings, usually under and around doors and windows and in foundation cracks. Mites appear to be more numerous on the warmer, sunny, and south side of homes. This is where they enter homes in largest numbers.

CONTROL: Control is based on two facts: Clover mites do not like to cross bare soil and they may be killed by miticides that leave a lasting residue. The number of clover mites crossing a bare strip of soil will be only one third the number that would cross a grassy area.

Remove grass from an 18 to 24 inch band at the base of the foundation. The strip of bare soil helps to prevent mites from entering the house. Bare soil in combination with a miticide application gives the best control. Spray the lawn, shrubbery, and bare strip within 10-20 feet of the house. Apply a heavy, drenching spray to the foundation where mites have congregated. A drench spray is essential. Since great numbers of mites may feed in protected parts of plants and down toward their bases, apply enough spray to penetrate the vegetative cover. Repeated applications at two or three week intervals may be required through summer and fall to keep mites under control. A regular lawn-spraying program during this period will reduce mite populations and later migrations into homes. It may take a day or two for the effects of spraying to become noticeable, but they will continue to kill mites for a week or two after application.

A vacuum cleaner is also a very good method of control for mites within the house. It can be used to pick up large numbers of clover mites either in the house or on the foundation in the basement.

Earthworms (Night Crawlers) (Fish worms)

Earthworms sometimes cause the soil surface of a lawn to be very lumpy and uneven. The worms cause this by pushing up castings. Earthworms, (night crawlers, fish worms) are beneficial to the soil for air, water, and organic decomposition but sometimes are not wanted. When this condition occurs, questions often are brought up on how to control earthworms or night crawlers.

CONTROL: There no longer is a product registered for their control.

Sod Webworm

(photo credits, Colorado State University)

Sod webworm moths in the caterpillar stage are destructive to bluegrass lawns in parts of Wyoming. Larvae/ caterpillars are grayish-brown to dirty white with characteristic dark circular spots scattered over the body length. They are about 3/4 inch long when mature. Larvae construct tunnels or burrows among grass crowns. Webworm moths are grayish-tan, 1/2 to 3/4 inch long with two fingerlike horns protruding from the head. Adults are generally active during the evening and have a zigzag flight. When at rest, the moths fold their wings around the body, giving a cylindrical appearance.



Nearly mature larvae overwinter in soil and resume feeding in spring (mid to late May) as



temperatures rise. Adults appear in early June. Female moths drop their eggs on the lawn as they fly over the turf at dusk. They may drop up to 200 eggs, which hatch in seven to ten days. As webworms develop you should be able to see feeding damage (notches). More mature larvae construct silk lined tunnels into thatch and begin to chew grass blades off near the base. Pupation takes place in early July and second generation adults are observed laying their eggs. Second generation larvae cause more damage than the earlier ones.

CONTROL: Brown patches and thin grass in lawns may be caused by the sod webworm. Increased bird activity shown by funnel shaped holes in a lawn is an indicator of webworm problems. Check brown patches for larvae, their excrement (green pellets), and damage to grass blades. Moth activity does not necessarily mean a webworm problem. Be sure larvae are present before applying control measures. Larvae presence in lawns can also be determined by applying a drench of detergent or pyrethrins, which will bring larvae to the surface. A soap solution can be prepared by mixing 1/4 ounce of laundry detergent or liquid soap per gallon of water. Mark off two to three sections of the lawn 3 square feet, both damaged and undamaged areas, and evenly pour (drench) 1 gallon of the solution over each section. The pyrethrins method is also effective. Mix 1 tablespoon of 1 percent to 2 percent pyrethrins (a common garden insecticide) in 1 gallon of water and apply the solution uniformly over 1 yard of lawn. The solution irritates the larvae, causing them to crawl to the surface in five to ten minutes. Generally if more than four to six larvae per 4 feet of lawn are found, treatment is advised. Follow these steps when larvae are abundant:

1. Mow the lawn first. Remove clippings.
2. If lawn is dry, water before applying chemical. This will help bring larvae closer to the surface.
3. Apply a recommended insecticide according to label directions during late afternoon or early evening. Be sure foliage is dry before applying granular insecticides. After application of granular insecticides, water lightly.
4. Delay watering for 24 - 48 hours.
5. Keep pets and children off the lawn until surface has dried.

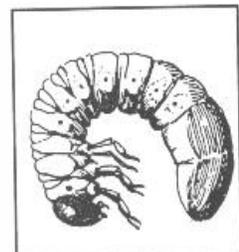
White Grubs (June Beetles) (May Beetles)

Phyllophaga spp.

Grubs are larvae of June or May beetles and are white with brown heads and six prominent legs. The hind part of the body is smooth and shiny, with dark body contents showing through the skin. Grubs have curved bodies, from 1/2 to over 1 inch in length, and are usually found curled in a c-shape. They feed on roots of grass and heavy infestations will loosen the sod so that it can be rolled back.



Adult



Winter is passed in soil in both grub and adult stages. In spring after trees have put forth leaves, adults become active and fly about during the night, mating and feeding. At the first streaks of dawn, they return to the soil where females lay their Larvae pearly white eggs from 1 to several inches below the surface. While the beetles may be moving at dusk from soil to trees for an hour or more, the return to the soil at dawn takes place very rapidly. Eggs are generally laid in grasslands, or patches of grassy weeds in cultivated fields. They hatch in two or three weeks, and young grubs feed on roots and underground parts of plants until early fall when they are about 1/2 inch long. They then work their way down in the soil, usually below the frost line.

As soil warms in spring, they work upward and, by the time plant growth is well-started, they are feeding a few inches below the surface. Feeding continues throughout the season.

The best way to tell if there are grubs in lawns is to examine the soil by cutting a 6 inch square and lifting it out to examine the root zone of the sod for the c-shaped larvae. Do this a number of times throughout the area showing injury. More than one grub per square foot indicates a need for treatment.

CONTROL: When an insecticide is applied, wet the lawn prior to treatment. This helps move the insecticide into the root zone where larvae are located. If a spray (emulsifiable) formulation is used, apply 10-25 gallons per 1,000 square feet to wash the insecticide into the soil. When the granular formulation is used, thoroughly water the lawn after treatment.