Insect Galls on Trees and Shrubs

Galls are abnormal growths or swellings of plant tissue caused by the attack of a living organism. Insects, mites, nematodes, bacteria, fungi, and viruses produce these plant deformities. Galls also can form as a result of mechanical injury. This publication deals only with tree and shrub galls caused by insects and mites.

There are hundreds of unique galls caused by insects and mites. They are formed on a variety of plants and in a broad range of sizes, shapes, colors, and textures. Galls may be found on leaves, stems, twigs, branches, trunks, and roots (Table 1). Some galls are common and abundant and easily noticed. Others are rare or less conspicuous.

Insects or mites that cause galls to form are called gallmakers. Galls grow in response to either feeding by the gallmaker or as a result of egg laying on or within the plant tissues.

Galls grow to surround the tiny insects and mites that form them, providing some protection from adverse weather, predators, and parasites. In addition, the gall is a ready source of food for the gallmaker, rich in protein and carbohydrates.

The insect or mite develops and grows inside the gall during the summer and emerges as an adult either in the summer or the following spring. Each species of gallmaker causes its own distinctive gall that is different in appearance from galls caused by other species.

The nature of gall formation was not discovered until recent times, even though galls have been written about since the days of the Roman Empire. Galls are now believed to be caused by powerful plant-growth-regulating chemicals or other stimuli produced by the gallmaker. It is well known that galls form as a result of cell multiplication in meristematic (growing) tissue. Gall formation cannot take place after a leaf or stem has stopped growing.

Damage

Most insect galls do not seriously affect the health and vigor of healthy, well-established trees and shrubs. Occasionally, a heavy gall infestation causes severe leaf or stem deformation and premature leaf drop. However, these annoyances usually do not cause long-term damage to the tree. Leaf galls may be especially aesthetically displeasing but they do not directly kill the plant. Twig galls may cause stem dieback that could bring about the demise of small trees. Galls discovered during inspection of trees that are declining or dying are usually not the cause of the problem.

Uses for Galls

Folk remedies from earlier times frequently included galls. Also, because the formation of galls was not understood, they were thought to be supernatural and possessed with future-telling powers. Dyes and inks have been obtained from galls over the past several centuries. In more recent times, galls have been used in the production of tannic acid. In certain instances, galls have been used as sources of food, probably because of their high starch and sugar content.

Insect Gall Classification

In general, there are two types of galls: open and closed. Open galls are produced by insects with piercing, sucking mouthparts—aphids, psyllids, and scales as well as mites. These galls have an opening through which the gallmakers escape. Gallmaker reproduction occurs within the open galls.

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Closed galls are made by insects with chewing mouthparts—larvae of beetles, flies, wasps, and moths. None of these insects reproduce within the galls. Because these gallmakers have chewing mouthparts, they are able to chew an opening to the outside upon completion of development.

Gall Communities

Galls may contain complex communities of many different organisms in addition to the one that caused the gall to form.

There may be parasitoids in the larva or pupa of the insect that caused the gall and the primary parasite may in turn have hyperparasites. Some mites, wasps, flies, beetles, and even small caterpillars may colonize developed galls, living as lodgers and eating the food provided by the gall. It is never safe to assume that the first insect to emerge from a gall is the one that caused the formation of the gall.

Control of Galls

Because most galls do not seriously affect trees, controls are not usually necessary. Also, galls cannot be "cured" after they have formed and spraying the galls does not make them go away.

Preventive treatments must be applied before the galls form and properly timed to coincide with the development of the plant and the attack by the gallmaker. Although treatment may be effective, it is usually not practical. The appropriate time to treat will vary considerably from year to year and from place to place, making good control more a matter of luck than skill. Specific preventive treatments are outlined in Table 1.

Contact insecticides and miticides can prevent galls by killing the adult stage of the gallmaker. Systemic insecticides, both foliar and soil applied, theoretically should provide good gall control. However, these products will not cure galls that have already formed, and their ability to prevent gall formation also depends on accurate timing. The insecticides and miticides labeled for gall control are listed in Table 2.

Table !. Descriptions of common galls and gallmakers.

Host	Gall	Gallmaker/description/location/control
Ash	Ash flower gall	Mite. Globose, swollen, distorted flower pedicles. Green at first, then brown. Variable size. Use dormant treatment or spray when first flowers appear in spring
Cottonwood	Leaf-petiole gall	Aphid. Also known as basal leaf gall and poplar stem gall. Smooth, spherical gall, 6 to 12 mm in diameter. At junction of leaf blade and petiole; transverse slit.
	Poplar petiole gall	Aphid. Also known as poplar leaf stem gall. Similar to leaf-petiole gall except on petiole near middle.
Grape	Grape phylloxera	Aphid. Small, irregular, wart-like gall, 2 to 3 mm in diameter. Upper and lower leaf surface. Destroy wild grapes in the area. Commercial grape cultivars are grafted onto resistant root-stocks, minimizing impact.
Hackberry	Hackberry nipple gall	Psyllid. Nipple-shaped, 4.5 mm in diameter. Lower leaf surface. Spray when leaves are about 2.5 cm in length
	Hackberry flask gall	Psyllid. Conical, flask-shaped leaf gall. Slightly ribbed, 3.5 mm in diameter.
	Spiny hackberry gall	Midge. Conical, spine-shaped, 4 mm in height. Upper leaf surface.
	Witches'-broom	Mite. Cluster of twigs on stem terminal. Use dormant spray prior to bud break.

Host	Gall	Gallmaker/description/location/control
Hickory	Hickory petiole gall	Aphid. Globular, oval. One or several petiole, 5 to 25 mm in diameter. Aphid-filled. Use horticultural oil or spray in late May.
Honeylocust	Honeylocust pod gall	Midge. Swollen, globular leaflets containing orange larvae. Treat at bud break and repeat at 10-day intervals.
Honeysuckle	Witches'-broom	Aphid. Cluster of twigs on terminals. Dwarfed, folded leaves. Cream-colored aphid. Spray a foliar systemic insecticide monthly beginning when buds show greeen. Removed affected plants; replace with a resistant variety.
Linden	Linden wart gall	Midge. Subglobular, brown leaf gall, 3 mm in diameter
	Linden twig gall	Midge. Irregular swellings on twigs and petioles, 4 to 8 mm in diameter.
Maple	Maple bladder gall	Mite. Small red or black galls. Irregularly spherical, 2.5 mm in diameter. Spray dormant oil before bud break or spray miticide when leaves are one-quarter expanded and repeat contact spray in 10 days.
	Maple erineum gall	Mite. bright red, glossy patches of tiny pustules on upper leaf surface. Spray at bud break.
	Maple spindle gall	Mite. Slender, spindle-shaped leaf gall, 5 mm in length.
	Gouty vein gall	Midge. Thickened, pouch-like swelling along leaf veins. Green or red.
Oak	Succulent oak gall	Wasp. Green succulent, globular leaf gall resembling a grape or gooseberry on pin oak. Hollow with loose kernel, 5 to 12 mm in diameter. Spray as leaves are expanding in the spring.
	Noxious oak gall	Wasp. Irregular swollen mass starting at midvein but deforming entire leaf. Green and succulent at first, later shriveling and drying. Also on twigs as irregular potato-shaped twig gall.
	Jumping bullet gall	Wasp. Also known as jumping oak gall. Globose, thin-shelled, slightly pointed leaf gall on lower leaf surface. 1 mm in diameter. Blister above. Detached galls hop like a Mexican jumping bean.
	Marginal fold gall	Midge. Folds or pockets in leaf margins.
	Oak apples	Wasp. Globular. Hard outer shell, spongy interior with central hard kernel. On leaf vein, 2 to 5 cm in diameter.
	Oak pill gall	Midge. Globose or subglobose, irregular, wrinkled leaf gall, 3 to 4 mm in diameter. Dark red. Usually on upper surface.
	Vein pocket gall	Midge. Elongated, pocket-like swelling of leaf midrib.
	Oak leaf galls	Wasps. Hundreds of types with no specific names.
	Oak bullet gall	Wasps. Globular, hard single or clustered twig galls, 8 to 16 mm in diameter.
	Gouty oak gall	Wasp. Irregular, globose, frequently clustered with twig galls, 3 cm in dimeter, up to 10 cm in length.
	Wool sower gall	Wasp. Globular, white woolly growth marked with pink, seed-like grains, 3 to 4 cm in diameter.

Host	Gall	Gallmaker/description/location/control
	Horned oak gall	Wasp. Globose twig gall; irregular, woody. Hornlike projections. Variable in size. May cause twig dieback. Prune to remove galls when green.
	Oak stem galls	Wasps. Hundreds of types with no specific names. Prune stem and twig galls while they are still green.
Rose	Mossy rose gall	Wasp. Mossy spheres along stems, 2.5 cm in diameter. Common on *R. rugosa* cultivars. Prune and destroy galls.
	Spiny rose gall	Wasp. Globular, green or red, prickly twig galls, 5 to 15 mm in diameter. Usually clustered.
Spruce	Eastern spruce gall	Aphid. Large swelling at base of new growth. Many cells. Prune out galls in midsummer. Spray after galls open in midsummer or before buds break in spring.
	Cooley spruce gall	Aphid. Pineapple-like growth on tips of new growth. Many cells. Green until late summer, then brown, up to 63 mm in length. Prune out galls in midsummer. Spray when galls open in mid-summer or before buds break in spring.
Willow	Willow cone gall	Midge. Rosette of tightly-clustered leaves resembling a pine cone, up to 2.5 cm in diameter.
	Willow blister gall	Mite. Clustered, fuzzy, grayish-white and red leaf gall on upper and lower leaf surfaces, especially on pussywillow. Leaves may become curled and distorted.

Table 2. Insecticides and miticides labeled for preventive gall treatment.

The following active ingredients are labeled for one or more common tree and shrub gallmakers found in Iowa. Carefully read and follow all label directions. Check the label to determine which insects or mites are controlled and which tree species can be treated. Proper timing of application is critical to prevent gall formation. None of these pesticides controls galls after they have formed.

azadirachtin
bifenthrin
carbaryl
cyfluthrin
dicofol
horticultural oil (dormant)
imidacloprid
insecticidal soap
malathion
permethrin
spinosad

The potential for contamination of surface and groundwater with pesticides is increased by use that does not conform to label directions. Iowa State University Extension recommends that pesticides be selected and applied in accordance with label directions. It is illegal to apply a pesticide in a manner inconsistent with its labeling. Applicators should read and follow all label directions, including use of protective clothing, mixing and handling precautions, rates and methods of application, and environmental hazard warnings.

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