Galls

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A gall is any abnormal growth of plant tissue caused by a reaction of the plant to secretions by an organism within the plant tissue. Most people are familiar with these plant deformities. What is not often realised is that galls are produced by such diverse organisms as wasps, flies, beetles, psyllids, coccids, moths, nematodes and mites as well as bacteria and fungi. They occur on leaves, stems, buds and roots. The shape and colour is usually characteristic of the insect and host plant involved, however there are some species in which males and females cause quite different shaped galls to occur.

Little is known of the actual mechanisms of gall formation but it is though that plants are stimulated to produce these shapes either by the initial attack of the insect laying eggs or by the insect larvae feeding.

There are hundreds of different species of gall-forming insects and their identification is difficult especially as often the insect that finally emerges from the gall is a parasite of the insect that originally caused the gall.

Description

Galls are very common on eucalypts and range from being quite small to being very large and grotesque. They are often brightly coloured red or yellow and green. There are many different types of galls and gall-insects:

Coccid galls: The insects causing these galls are closely related to scale insects. The galls are hard and woody and are often found in clusters. Those caused by female coccids are usually very large whilst those caused by males are small. The galls may be oval, elongated or round and many have several horn-shaped projections. The tiny adult males are winged but the female coccids remain in the galls all their lives.

Fly galls: These are usually pimple-like galls on leaves but they may also occur on buds and stems. There are over a hundred species of minute flies that cause galls on eucalypts. The galls may be woody or spongy and are often pale green or reddish. Some contain only one maggot (fly larva), others contain many.

Psyllid galls: These are pimple or bubble galls caused by tiny psyllids. The galls may be large or spongy or small and hard depending on the species of psyllid involved.

Moth galls: Little is known of the insects that cause these galls. Often the empty pupal cases can be seen sticking out of emergence holes in the galls.

Wasp galls: Minute wasps lay eggs in plant tissue causing these galls to develop. Each gall contains a number of small maggot-like larvae. The galls are often brightly coloured red and green and come in many shapes and sizes.

Beetle galls: Several species of weevils and jewel beetles cause galls on stems and shoot tips. The larvae inside the galls are small, fleshy and white in colour.

Bacterial and fungal galls: These are caused by bacterial and fungi attacking roots and stems. Crown gall is a particularly widespread and debilitating disease which severely weakens plants. It is known all over the world and attacks over 600 species of plants including several native species.

Nematode galls: Nematodes are microscopic, thread-like worms. There are many different species, some of which cause galls on eucalypts. These nematodes are usually associated with tiny *Fergusonina* flies in a symbiotic relationship, that is a relationship where the organisms involved (the flies and the nematodes) live in close association with each other.

The nematodes live inside the tiny flies and their larvae are deposited in the leaf as the flies lay their eggs. The nematodes (and fly larvae) feed within the resulting gall. When mature the nematodes enter the bodies of the female fly larvae so when the flies hatch they contain the nematodes. The flies then mate and lay eggs in eucalypt leaves and the cycle is repeated.

Mite galls: Mites are not insects but are tiny, 8-legged, sap-sucking animals. Some species cause galls on eucalypt leaves - these are known as blister mites since the galls they cause resemble small blisters on the leaves.

Some of the more commonly found galls on eucalypts are described in Table 1.

Biology

The biology of the gall-forming insects is not well known. The egg, larval and often pupal stages of the insects involved are spent inside the gall, which provides shelter and food. Many galls contain only a single insect but some contain several, each within a separate cell or chamber.

Damage

In general, galls are relatively minor pests on eucalypts and cause little damage. Although they are not killed by galls, trees are often rendered unsightly - especially if the galls are very numerous and occur on the leaves.

Control

Chemical:
Control with chemicals is very difficult as gall insects are well protected inside the galls. Even systemic insecticides are ineffective.
Once emergence holes are seen in the gall, the insects have gone and it is too late to attempt control. Practices such as fertilising, which increase the health and vigour of the tree, reduce the effect of the galls.

Natural:
Parasitic wasps are the main factor in natural control of all types of gall insects. They lay their eggs in the galls and these hatch and feed on the gall insect, thereby killing it.
The most effective method of control is removal and burning of the galls when they first appear but this is not practical in plantations.

Summary

When to look: All year

Where to look: Look on leaves, stems and buds and roots

What to look for: Look for misshapen or distorted growths of various shapes and sizes (see descriptions).

Table 1: Different types of galls commonly found on eucalypts and their position on the tree

Description of Gall	Insect Responsible	Position of Gall
Tiny, round, pimple like, numerous, may be red, brown or green	Wasps	Leaves
Large, round, red or green	Wasps	Leaves
Pale, green, hard, cone-shaped, numerous	Wasps	Leaves
Hard, woody, oval or elongated, with or without "horns", may be large or small	Coccids	Stems & Leaves
Tiny pimples along midrib	Flies	Leaves
Large, soft, spongy, bubble-like	Psyllids	Leaves
Hard, pendulous, may be distorted growth of stems or tips	Beetles	Leaves, Tips and Stems
Flat, rough, pale blister-like	Blister mites	Leaves
Large, soft, spongy, pale green or reddish	Flies/ Nematodes	Leaves

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