

Class Arachnida, Order Acari: Mites

Adapted from <http://ipm.ucanr.edu/PMG/GARDEN/PLANTS/INVERT/gallblistermites.html>, UC Davis

| Family | Common Family Name | Host/Functional Group | Species |
|---------------|--------------------|---------------------------------|--|
| Phytoseiidae | predatory mites | predators | <i>Phytoseiulus persimilis</i> <i>Neoseiulus</i> (= <i>Amblyseius</i>) <i>californicus</i> , <i>fallacis</i> |
| Tarsonemidae | tarsonemid mites | greenhouse | broad mite |
| Tarsonemidae | tarsonemid mites | greenhouse | cyclamen mite |
| Tetranychidae | spider mites | boxwood | boxwood mite |
| Tetranychidae | spider mites | turf | clover mite |
| Tetranychidae | spider mites | citrus, numerous trees | European red mite |
| Tetranychidae | spider mites | spruce, arborvitae, Douglas-fir | spruce spider mite |
| Tetranychidae | spider mites | herbaceous plants, trees | twospotted spider mite |
| Tetranychidae | spider mites | honeylocust | honeylocust spider mite |
| Eriophyidae | eriphyid mites | hemlock | hemlock rust mite |
| Eriophyidae | eriphyid mites | privet | privet rust mite |
| Eriophyidae | eriphyid mites | maple | maple velvet erineum gall mite |
| Eriophyidae | eriphyid mites | maple | maple spindle gall mite |

Eriophyid Mites

The eriophyid mites are a large group of very small, four-legged, slow-moving, "worm-like" mites. Only a few species are barely discernible with the unaided eye. Their minute size (0.1-0.3 mm in length) has undoubtedly long protected them from discovery and description. Many species are yet to be found and identified. Eriophyids reproduce rapidly and may increase to great populations, especially the rust mites. They are highly specialized plant feeders.

Life History:

In general, the eriophyids, upon hatching from eggs, pass through two instars (stages) to become adult. The females (protogynes) resemble the males. Some species, especially those infesting deciduous hosts, have a second type of female, the deutogyne, which is the overwintering stage. In some species, the deutogyne also move out and aestivate (rest) in hot periods before overwintering. All known eriophyids are plant parasites. There are no records of alternative hosts or convincing evidence of parthenogenesis. Males do not mate with females, but rather fertilization occurs from the contact of females with sperm sacks laid down on the host by males. Up to 80 eggs per female (3 to 4 per day) may be laid over a month or so. No eggs are known to overwinter. Dispersal of these slow-moving mites is by wind, water, birds, insects, or humans. Commerce with plants is probably the major agent in introducing mite species into distant, previously uninfested areas. In the Midwestern states, eriophyid mites have been collected in sampling devices at 200 feet and greater elevations

above the ground. Any unknown plant abnormality should be checked for the presence of eriophyid mites. A 10X or stronger hand lens is necessary for field determination. The mites are most common in mid- to late summer. Some knowledge of plant leaf characteristics helps because certain trees and shrubs produce resins on the leaves and at a distance can look as if russeted by a vagrant rust eriophyid mite species. Samples for identification can either be collected on the infested parts (into paper envelopes or wax paper; tight plastic bags allow the samples to mold making identification impossible) or into a vial containing a sorbitol syrup (a mixture of 1/3 sugar, 1/3 water, and 1/3 isopropyl alcohol with a few crystals of iodine as a preservative).

Management:

Control is not recommended for many species. Information on fruit pests can be found in specific schedules for fruit pest management. Because of the great number of poorly known species, general control recommendations are not possible.

Types of eriophyid mites:

The eriophyid mites are often divided into several groups.

Russeting (Rust):

Feeding produces a brownish discoloration of the epidermis. Heavy fine stippling induces a blemishing or staining of leaf surfaces and fruit. May result in a great loss of water. "Silvering" and "bronzing" are similar descriptive terms.

Gall formers:

A number of eriophyids produce galls and other plant abnormalities by injecting growth regulators into the host tissues. Thus, the modified leaf provides shelter as well as food. There are many types of galls (bladder, pouch, finger, nail, bead, etc.), but they all have an exit hole at the bottom (usually undersurface of the leaf). Most galls are on the leaves but some are on flowers, petioles, green stems, and even roots. (Silver, sugar, and red maple, cherry, elm, basswood, poison ivy, ash.)

Erinea:

The feeding of certain eriophyids induces the production of hairy patches, single erineae, plural erineum) on the surfaces of leaves and petioles. Feeding within the thick hairs offer the mites find both anchorage and protection. Some erineae on the undersurface are domed up and distort the upper leaf surface. (Sugar, red and silver maple; Boxelder, Beech, butternut.)

Damage caused by eriophyid mites

Leaf-edge rolling:

Some eriophyid feeding produces a rolling of the leaf margin, again providing a shelter within which the mites can feed and reproduce.

Witches-brooming:

A number of organisms, plant or animal, cause the tips of branches to develop broom-like bunches of twigs. Some eriophyids also cause witches-brooming--usually the result of shortening of internodal growth with resultant clustering of buds. (White birch, hackberry.) Retarded maturation: The red berry mite enters blackberry flowers and feeds near the bases of immature berries, causing them or individual berry sections ("drupes") to remain red instead of turning black at maturity.

Blistering and tissue breakdown:

Eriophyids, with their small mouthparts, feed on individual plant cells and do not usually deeply penetrate plant tissues. The pear leaf blister mite is an exception. Its feeding on the undersurfaces of young leaves in loosening buds results in raised blisters that later in the summer dry out, leaving dead areas on the expanded leaf blades.

Bud destruction:

Some eriophyid species cause a blasting of the buds. The pear leaf blister mite may kill the buds of pear trees in the spring. The feeding causes the interior embryonic parts of buds to swell producing the symptom known as "big bud." The buds die after the mites leave the cavities.

Partial damage results in distorted new growth that looks like possible herbicide injury (taxus bud mite). (Pear, Taxus.)

Organ malformations:

Sometimes the mite feeding kills only part of the bud tissues, which dry out--exposing the mites to desiccation. The remaining living plant tissue continues to grow producing "monsters"-- grotesque distortions of fruits, foliage, etc.

Virus-like symptoms:

Symptoms resembling virus infections are at times caused by eriophyids. The mite-injected growth regulators may cause the entire physiology of the host plant to be disturbed (failure of fruit bud formation, loss of vigor, early death) or scattered symptoms (chlorotic foliar flecking, concentric ring blotch) suggestive of a virus disease.

Virus transmission:

Some eriophyids can produce symptoms in plants other than those related to their injected growth regulators. These symptoms are caused by viruses vectored by and transmitted to the host by the feeding mites. The small size of the eriophyid mites enables them to enter buds and other protected places, thus making it difficult to tell whether symptoms are due to mite-injected toxins or to mite-injected viruses. Wheat streak mosaic, fig mosaic, and others are examples of this.

Bacteria transmission:

Walnut blight is a bacterial (*Xanthomonas*) disease of walnut. The walnut erinose mite has been implicated as a dispersal agent of the bacterium.

Webbing:

Webbing is a sign of the mite rather than a host symptom. Some eriophyids can produce webbing, although the great majority do not produce webbing, which is characteristic of the spider mites (Tetranychidae).

