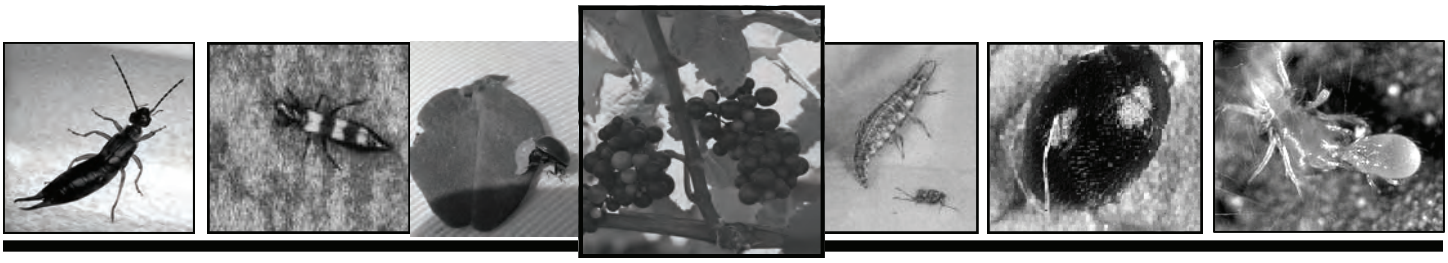
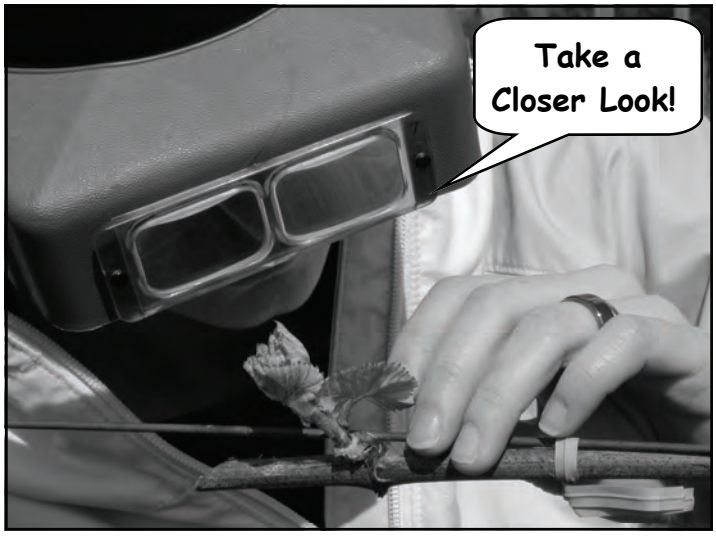


Who's Who in the Vineyard??

An OSU Extension Newsletter about Vineyard Arthropods **October 2007**

Predators Contribute to Pest Reduction



Preserving arthropod predator abundance and diversity in grape vineyards may reduce pest populations such as mites, thrips, and leafhoppers; and subsequent losses in yield. Since natural enemy species vary in their impact on pest populations, it is crucial to identify which of the natural enemies are effective at reducing pest abundance. Our research has demonstrated the value of identification of the predators contributing to pest reduction. In addition, it highlights the need to understand the contributions of individual predators to biological control. This information will help better conserve the 'right diversity' in vineyards and benefit these beneficials.

The three year project (07-09) has been funded partially by Western Region Integrated Pest Management grant (WRIPM) and OR Wine Board. The research and extension project seeks to improve Integrated Pest Management strategies for eriophyid mites, spider mites, and powdery mildew diseases in vineyards and hops by enhancing our understanding of how sulfur applications for powdery mildew control influence suppression of biological control of mites.

In 2007, we have been identifying the diversity and abundance of natural enemies associated with mite, aphid, and thrips pests with the use of a beat sheet (Fig. 1) and visual examination of buds, shoots, and leaves. We are also investigating the seasonal phenology of the predatory and pest mite population dynamics in relation to the number and timing of sulfur applications through a season.

Several natural enemies regulate populations of mites in undisturbed ecosystems. In vineyards, it is thought that mites typically are "secondary pests" that cause economic damage only after natural enemies are removed by pesticides or cultural practices.

Biological control of spider mites in hops and grapevines has focused largely on the release of predatory mites. This IPM approach has not been adopted widely because it is perceived as incompatible with the practices used to suppress other pests (i.e., powdery mildew). In addition, biological control is perceived as unreliable and expensive. Recent research reports a complex of natural enemies broader than phytoseiid mites that act to regulate spider mites on perennial crops and that conservation biological control can reduce chemical controls for mites on hops and grapevines. For this reason we believe that conserving and enhancing natural enemy presence is key in the vineyards.

It is important that we have a more complete understanding of mites and natural enemy population dynamics and the factors affecting outbreaks of these pests.

What are the Earwigs Doing?

Earwigs are largely known as nuisance pests. It has been falsely labeled to burrow into the ears of humans and therein lay their eggs. Earwigs probably have crawled into the human ear; even if they were only looking for a humid crevice in which to hide, such behavior provides a memorable basis for the name. They have a somewhat foul odor, pincers on their tail end, and scuttle about looking for foodstuff. It is native throughout Europe, western Asia, and northern Africa. The earwig rarely flies and is not inclined to travel very extensively by walking. Earwigs are most active at night.

Earwigs have been noted to cause damage in wine grapes. They have been noted to feed on vine leaves soon after budburst resulting in a tattered leaf appearance, flowers, buds and fruits, live insects (e.g., aphids, lepidopteran larvae such as corn borers), mites, insect and mite eggs, including other earwigs. Because earwigs are also carnivorous they may be a potentially useful predator, but little is reported in the literature. Earwigs also eat pollen, fungi, and lichens. They are known to be a problem in harvested fruit whereby they become 'matter other than grapes'.

The life cycle of the earwig depends on temperature and can range between 9 to 15 weeks. Adults lay 20 to 80 white oval eggs in burrows in the topsoil. These eggs hatch two to three weeks later. There are six nymphal stages between moults.

Enemies of the earwig include: frogs, birds, ground beetles (family: Carabidae), rove beetles (family: Staphylinidae), parasitic flies (family: Tachnidae) and fungi

Oregon State University, Prepared by Amy J. Dreves and Vaughn Walton

Phytoseiids are Predominant in Valley!

Several beneficials were found in the vineyards during the past season. One of these includes:

Typhlodromus pyri (Phytoseiidae family) This Phytoseiid mite is currently the most predominant and effective mite predator in the Willamette Valley vineyards! Previous research states that they can regulate pest mite populations well below injury thresholds of less than five pest mites per leaf. They are most effective in cooler weather during spring and fall and less effective in the summer months.

Eggs are laid and these develop into a six legged larva, eight-legged protonymph then deutonymph stages, and finally the adult. This predatory mite is pear-shaped, white and translucent before they feed. They begin to emerge from overwintering sites deep in bark crevices at the beginning of bud break. They are very tolerant to cold Oregon winters. It is difficult to see this mite with a trained eye.

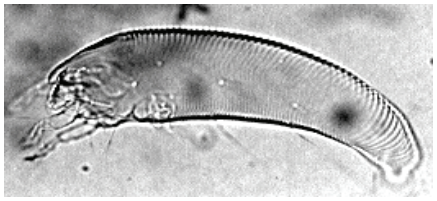
Typically, adults and immature stages search all parts of the vines for prey and also feed on alternative food such as pollen, fungal spores, thrips, and scale crawlers. When feeding, its abdomen may appear yellowish. *T. pyri* is very active and can consume up to 350 mite prey in a lifespan of about 75 days. They are strongly attracted by chemicals produced either by infested plants or by the prey mite species itself. Female *T. pyri* may lay up to 70 eggs each and have several generations per season. Populations, therefore, can build rapidly in response to pest mite populations. They do not disperse quickly, but air currents can passively distribute them. If harmful pesticides are used, they may take several growing seasons to reestablish. We believe that the large numbers of *T. pyri* found are a stronger indication of its importance in the vineyard.

Whirligig mites (Acari: Anystidae). These red, fast-moving predatory mites are important predators on plant-feeding mites. They feed on a wide variety of small insects (e.g., aphids, thrips, leafhoppers), mites, and many other arthropods. In early spring, the juveniles often hunt on the tops of bud spur, where pest mites are crawling around budbreak.

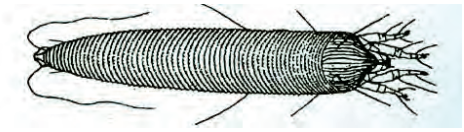
Some plants that have been documented in research to harbor Phytoseiid predatory mites and large motile predators, necessary for overwintering:
White oak (*Quercus garryana*)
Black currant (*Ribes nigrum*)
Caneberry (*Rubus spp.*)
Honeysuckle (*Lonicera xylosteum*)
Apple (*Malus domestica*)
Ash (*Fraxinus excelsior*)
Dogwood (*Cornus sanguinea*)
Hazelnut (*Corylus avellana*)
Horse chestnut (*Aesculus hippocas-*

Stay tuned for more stories about the arthropod team in your vineyard including**: ladybugs, minute pirate bugs, spiders, lacewings, mirids, parasitic wasps, Stethorus and the predatory 6-spotted thrips!**

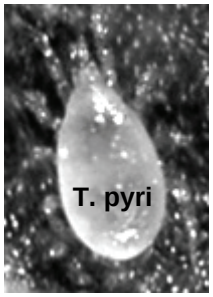
The 'Mitey' Beasts: Grape Leaf Rust Mite and Bud Mite



Grape Leaf Rust Mites (*Calepitrimerus vitis*)
- Microscopic (.2 mm); overwinters under trunk bark
- Light yellow in color
- Feeds on outer bud scales, shoots and vine leaves
- Triangular-shaped; more robust front end of body



Bud Mites (*Colomerus vitis*)
- Microscopic (.2 mm)
- Creamy-white in color
- Feeds on primordial tissue in buds
- More elongated & cigar-shaped than rust mites



NOTE: As grapes ripen, sugar levels rise and acidity is lowered. The sugar level in the grapes will ultimately determine the alcohol level. Sugar levels are measured by 1° Brix. 1 Bric equals 1% sugar, which after fermentation equals about .6% alcohol. Grapes contain polyphenols. Polyphenols are compounds that make up the aromas and flavors in wine. They are naturally present in the grape skins and are fully mature when the seeds are brown and when the pulp isn't clinging to the seeds. As sugar levels increase, grapes split, ***pest problems*** may increase including the **leafhoppers, wasps, ladybird beetles, earwigs** and **ants.**

Oregon State University, Prepared by Amy J. Dreves and Vaughn Walton