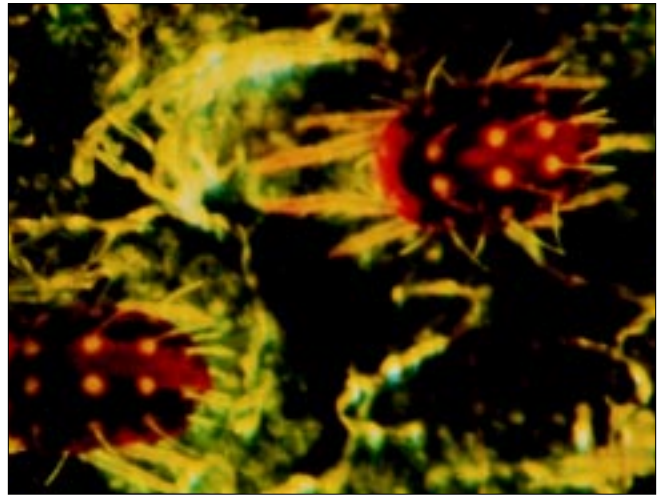


## European Red Mite

*Panonychus ulmi*

by Diane G. Alston and Michael E. Reding



European red mite adult females.

Michigan State University

### Do You Know?

- ◆ European red mite infestations are sporadic in Utah orchards, but injury can be severe when populations are high.
- ◆ Adult and immature mites feed on leaves causing white stippling, bronzing, and defoliation.
- ◆ Tree vigor and fruit color, size, and production can be reduced.
- ◆ If the mite is present, the most effective control is a delayed dormant oil spray applied as overwintering eggs begin to hatch.
- ◆ If active mite stages persist following bloom, early summer treatment is recommended based on presence-absence sampling.

The European red mite is native to Europe and was first introduced into the Pacific Northwest in the early 1900s. Since then, it has spread and become established throughout the United States and Canada.

Mites are tiny arthropods, measuring less than  $\frac{1}{60}$  inch, that are closely related to ticks and spiders. The European red mite belongs to a group of plant-feeding mites, called spider mites, which includes the twospotted and McDaniel spider mites. However, unlike its cousins, the European red mite does not spin copious amounts of webbing.

European red mite also has a more limited host range than the twospotted and McDaniel spider mites. It attacks many crops and ornamentals but is limited to perennial trees and shrubs. Infestations of European red mite are somewhat sporadic in Utah orchards; however, infestations can be severe and cause substantial crop and tree injury. Unlike twospotted and McDaniel spider mites, the European red mite overwinters on tree limbs in the egg stage. Therefore, its management is considerably different from that of webspinning spider mites.

Flare-ups of European red mites are often associated with improper pest management and pesticide applica-

tion practices. The red mite has a long history of developing resistance to miticides, but that is usually not a problem in orchards with a low or soft pesticide program. In Utah, European red mite populations tend to peak during early summer if a delayed dormant oil spray was missed or if there is poor control in the orchard. Populations then subside somewhat during the hottest mid-summer months, but they may peak again in late summer to early fall if biological control agents are not established to suppress them. There can be from five to eight overlapping generations per year.



European red mite eggs overwintering on a tree limb.

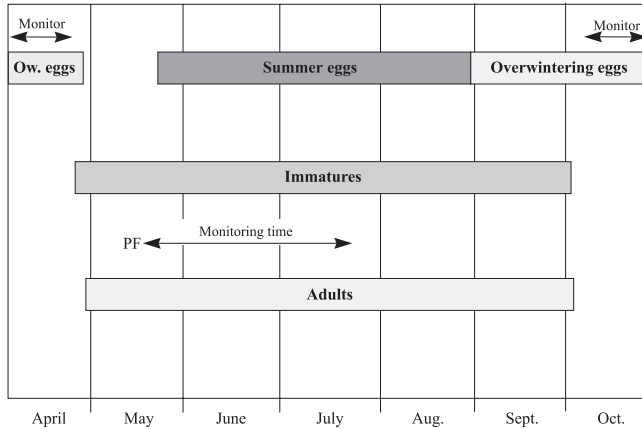
### Hosts

European red mite is a pest of pome and stone fruits, nuts, berries, and some ornamental trees and shrubs. Apple and pear cultivars vary in their susceptibility to mite injury. The highest red mite populations are typically seen on Red Delicious and Rome apples. Although spider mite injury to pear is more commonly caused by the

twospotted or McDaniel spider mite, when injury from red mite does occur, it is usually more severe on pear than apple.

<b>pear</b>	<b>peach</b>	<b>cherry</b>
<b>apple</b>	plum	prune
cane and bramble berries		
some ornamental trees and shrubs		

### European Red Mite Life History



The long arrow represents times when immatures and adults should be monitored (PF = petal fall). Overwintering eggs can be monitored from late fall through early spring (short arrows).

## Life History

### Egg—Overwintering Stage

- ◆ **Size, color, and shape:**  $\frac{1}{160}$  inch in diameter, dark red, and oval with small ridges running top to bottom and a slender tassel or stalk
- ◆ **Where:** overwintering eggs are found on rough bark at the bases of buds and spurs, on small limbs and twigs, and in limb crevices and forks; summer eggs are found along leaf veins predominantly on the undersides of leaves and sometimes on fruit if populations are high
- ◆ **When:** overwintering eggs are deposited during August and September and hatch the following spring between tight cluster and bloom; summer eggs hatch throughout the summer

### Immature—Damaging Stage

There are three forms of immatures—larva, protonymph, and deutonymph—with a molt between each stage. A molt is where the cuticle or “skin” is shed. Each molt is preceded by a resting period during which the immature mite stops feeding and the body appears silvery as the old “skin” is shed.

#### Larva

- ◆ **Size, color, and shape:** slightly larger than the egg, orange red, and has three pairs of legs

- ◆ Moves to young leaves and begins feeding, usually on the undersides

#### Protonymph and Deutonymph

- ◆ **Size, color, and shape:** gradually larger, red, and have four pairs of legs; greenish red just after molting, turning bright red as feeding resumes
- ◆ Sex is distinguished at the deutonymphal stage as females grow larger and more oval than males
- ◆ Feed on the undersides of leaves

### Adult—Damaging Stage

- ◆ **Size, color, and shape:** female is about  $\frac{1}{72}$  inch long, brick red, and oval shaped with white hairs on her back and white spots at the base of the hairs; male is  $\frac{1}{80}$  inch long, red tinged with yellow, and more slender and tapered near the hind end
- ◆ **Where:** feeds mainly on the undersides of leaves; moves to upper leaf surfaces when populations are crowded
- ◆ **When:** first appears around petal fall and mates immediately
- ◆ Female begins laying eggs after two days; lives up to 20 days and lays an average of 30 to 35 eggs
- ◆ One generation can be completed in 10 to 25 days, depending on the temperature; typically there are five to eight overlapping generations per year
- ◆ Adults will “balloon” in order to disperse when densities are high by crawling to a high point, rearing up on their hind legs, and catching a wind current to balloon on a silken thread

## Host Injury

Mites feed by piercing leaf tissue with their mouth parts and sucking out the cellular contents. Fruit trees and cultivars differ in their susceptibility to mite damage. Pear is most sensitive to mite feeding, then stone fruit. Apple is the most tolerant. The effects of mite feeding on trees accumulate over time.

#### Pear

- ◆ Feeding causes leaves to lighten and become mottled or stippled.
- ◆ Heavy feeding can cause severe injury, such as necrosis, leaf burn, and defoliation.
- ◆ Leaf burn can even occur after mites have been controlled if high temperatures follow feeding damage.
- ◆ Severe damage and defoliation can cause a reduction in fruit size and return crop load.
- ◆ Red strains of pear cultivars are more tolerant to mite injury than green strains; Bartlett and Comice are more tolerant to leaf burn and defoliation than D’Anjou and Bosc.

## Apple

- ◆ Red Delicious usually has higher red mite populations, but Golden Delicious is more susceptible to damage.
- ◆ Feeding causes white stippling on leaves that can eventually turn brown, called bronzing.
- ◆ High populations can cause defoliation.
- ◆ The following year's crop may be reduced in both fruit size and amount of fruit.
- ◆ Eggs may be deposited on the calyx end of fruit, causing downgrading and processing problems.

## Stone Fruits

- ◆ Injury is intermediate compared to pear and apple.
- ◆ Light infestations cause leaf speckling.
- ◆ Heavy infestations can cause the following: bronze and pale leaves; undersized and poor quality fruit; reduced tree vigor; and decreased yield the year after significant June and July infestations because fewer fruit buds are formed.
- ◆ Extremely heavy infestations can cause leaf drop.

## Timing Control

Because mites may be feeding on trees from the pre-bloom stage through fall, it is important to continually monitor for mites. Mites can build up at different times and in different blocks or years. Therefore, make sure to not only consider the mite density at one point in time, but to also monitor densities over a period of time and use this information to assist with control decisions.

## Delayed Dormant

The most effective and easiest time to control the European red mite on all types of fruit trees is during the delayed dormant period (half-inch green to tight cluster) before overwintering eggs on the limbs begin to hatch.

- ◆ Carefully scout orchards from late fall through early spring for the tiny ( $1/160$  inch in diameter), bright red eggs on small limbs and twigs near buds and spurs.
- ◆ Scouting for overwintering eggs is especially important if European red mite was detected the previous season.
- ◆ Large numbers of overwintering eggs may look like paprika sprinkled on tree limbs.
- ◆ Reddish stains on the fingers after handling infested limbs, or leaves later in the season, indicate European red mite.

**Table 1. European Red Mite Presence-absence Sampling Method Look-up Table\***

Number of leaves out of 10 with at least one mite present*	Apple and Pear Estimated number of European red mites per leaf on apple and pear	Cherry and Peach Estimated number of European red mites per leaf on cherry and peach
1	0.1	0.1
2	0.3	0.3
3	0.5	0.7
4	0.8	1.1
5	1.2	1.7
6	1.8	2.4
7	2.5	3.5
8	3.5	5.3
9	5.7	8.7
10	—	—

\*Note: For each tree sampled, determine the number of leaves out of 10 with at least one mite present.

## Post Bloom

- ◆ Immatures and adults should be monitored following petal fall to determine if early summer miticide treatments are necessary. Keep in mind that there may be a lag time in buildup of predator populations.
- ◆ A reliable and easy-to-use sampling method for all spider mites is the presence-absence, or binomial, method. This method requires the scout to determine only the proportion of infested leaves and does not require a count of individual mite numbers. Refer to the bulletin on "Web Spinning Spider Mites" for a complete description of how to sample.
- ◆ Use the European red mite look-up table (see Table 1) to estimate the number of mites per leaf.
- ◆ Use the "Spider and Predatory Mite Sampling Form" found in the "Web Spinning Spider Mites" bulletin to record the number of infested leaves during sampling.

# Management

## Delayed Dormant

If overwintering eggs are present, applying a delayed-dormant oil spray (half-inch green to tight cluster) each year is the most important management tactic for the European red mite. Eggs are most vulnerable to control just before hatching. If a delayed dormant spray is missed, later sprays may be required to keep European red mite populations below damaging levels. This may result in the destruction of beneficial mites and insects and the outbreak of secondary pests, such as twospotted and McDaniel spider mites. Although a delayed dormant spray may not provide season-long control, it can prevent early summer buildup of the mite.

*Recommended chemicals:*

- ◆ Superior type oil + an organophosphate\*, if targeting additional overwintering insects such as aphids, scale or leafrollers
- ◆ Superior type oil alone, if only targeting European red mite

Note: \*EC or liquid formulations are recommended for use with oil.

## Post Bloom

If European red mites are present later in the season, the grower will need to make a decision about whether to use a miticide or rely on natural predators for control. Use the treatment thresholds for web spinning spider mites as a guideline (see “Web Spinning Spider Mites” bulletin), but have a higher tolerance for European red mite because its populations do not build as rapidly during the hot summer months as do populations of webspinning mites.

## Biological Control

The major predators of European red mite are: the green lacewing, *Chrysopa spp.*; the brown lacewing, *Hemerobius spp.*; minute pirate bugs, *Orius tristicolor*; campyloomma bug, *Campyloomma verbasci*; and a predatory mite, *Zetzellia mali*.

The more common predator, western predatory mite (*Typhlodromus occidentalis*), will feed to some extent on immature stages, but it prefers twospotted and McDaniel spider mites over European red mite. The small black lady beetle, *Stethorus picipes*, can be a good predator of European red mite, but it is most often found in orchards not treated with insecticides and in those with substantial apple rust mite densities.

Relying on predators for natural biological control of European red mite is not as consistent or strong as is the use of *T. occidentalis* for webspinning mites. Therefore, the presence of predators in orchards should be considered in any management decision, but be aware that biological control of European red mite is not as likely. In addition, post-bloom miticide applications could dramatically upset the biological control of webspinning mites by eliminating the predatory mites. Refer to the “Web Spinning Spider Mites” bulletin for more details.

## Chemical Control

If European red mite reaches economically damaging levels early in the summer, using a miticide before predators begin moving into trees is preferable to waiting until mid- to late summer when predators are more abundant. Mid-summer miticide applications can upset the biological control of webspinning spider mites and insects.

There are few effective miticide choices for fruit trees because of the loss of some products and because mites have developed resistance to most types of miticides and insecticides used in orchards. If summer applications are required for control of European red mite, the following materials are recommended:

- ◆ abamectin (Agri-Mek)—apple and pear only
- ◆ clofentezine (Apollo)
- ◆ hexythiazox (Savey)—pear only
- ◆ fenbutatin-oxide (Vendex)
- ◆ insecticidal soap
- ◆ summer-weight oil

Use lower label rates if predators are present. To avoid selecting for resistance, rotate different types of miticides. Once a miticide is applied, mite densities should be monitored one week later. A second application may be required in 7 to 10 days following the first application if a large number of eggs and hatching larvae are present. Avoid applying a miticide on the same schedule as codling moth sprays, which would mean sprays that are 14 to 21 days apart. This schedule could result in eliminating predators while allowing mites to build back up between sprays creating a need for 3 to 4 sprays to maintain control throughout the season.

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