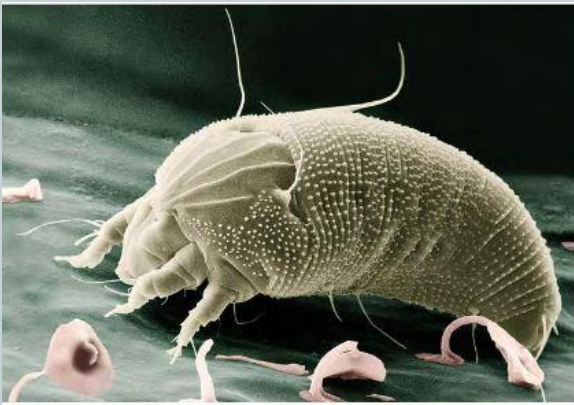


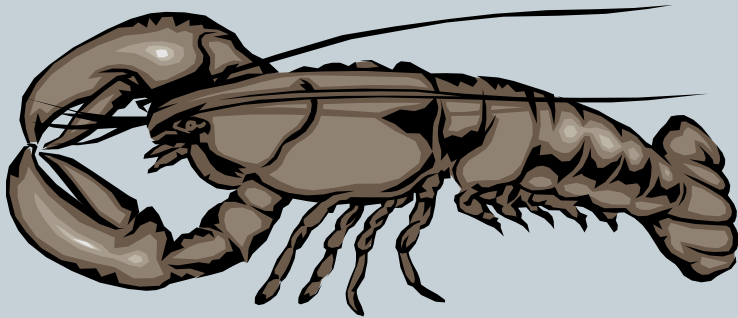
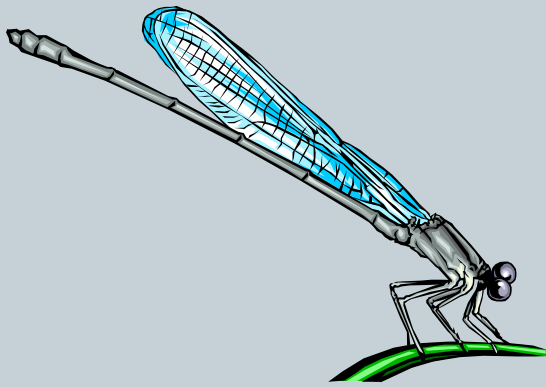
MITE PESTS OF WOODY PLANTS



IDENTIFICATION, BIOLOGY, IMPORTANCE, AND MANAGEMENT



MITES ARE ARTHROPODS

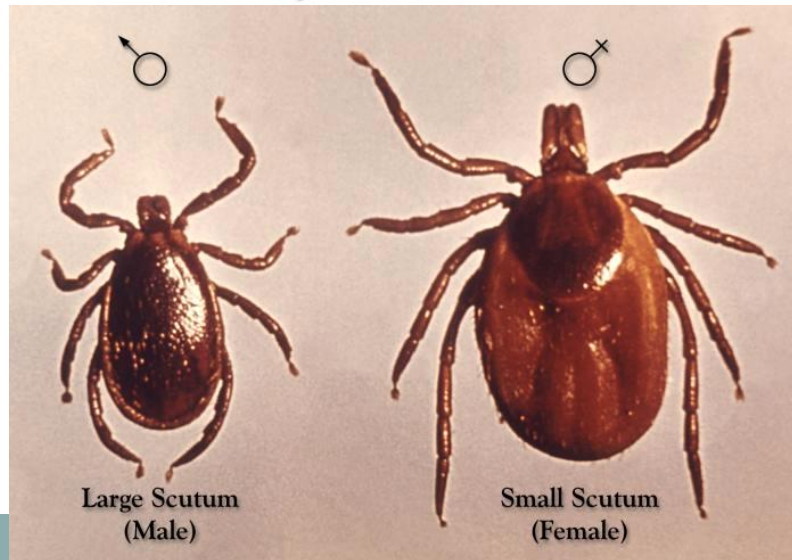


CLASSES OF ARTHROPODS



- **Crustacea**-crayfish, lobsters, “sowbugs”
- **Arachnida**-spiders, mites, ticks
- **Diplopoda**-millipedes or “thousand leggers”
- **Chilopoda**-centipedes
- **Hexapoda (Insecta)**-insects

ARACHNIDS



ARACHNIDS

Spiders, Mites, Ticks



- Two body regions
- Four pairs of legs
- No antennae
- Ticks usually smaller than spiders
- Mites usually smaller than ticks



INTRODUCTION

- Pest Identification
- Pest Biology
- Economic impact
- Pest Management

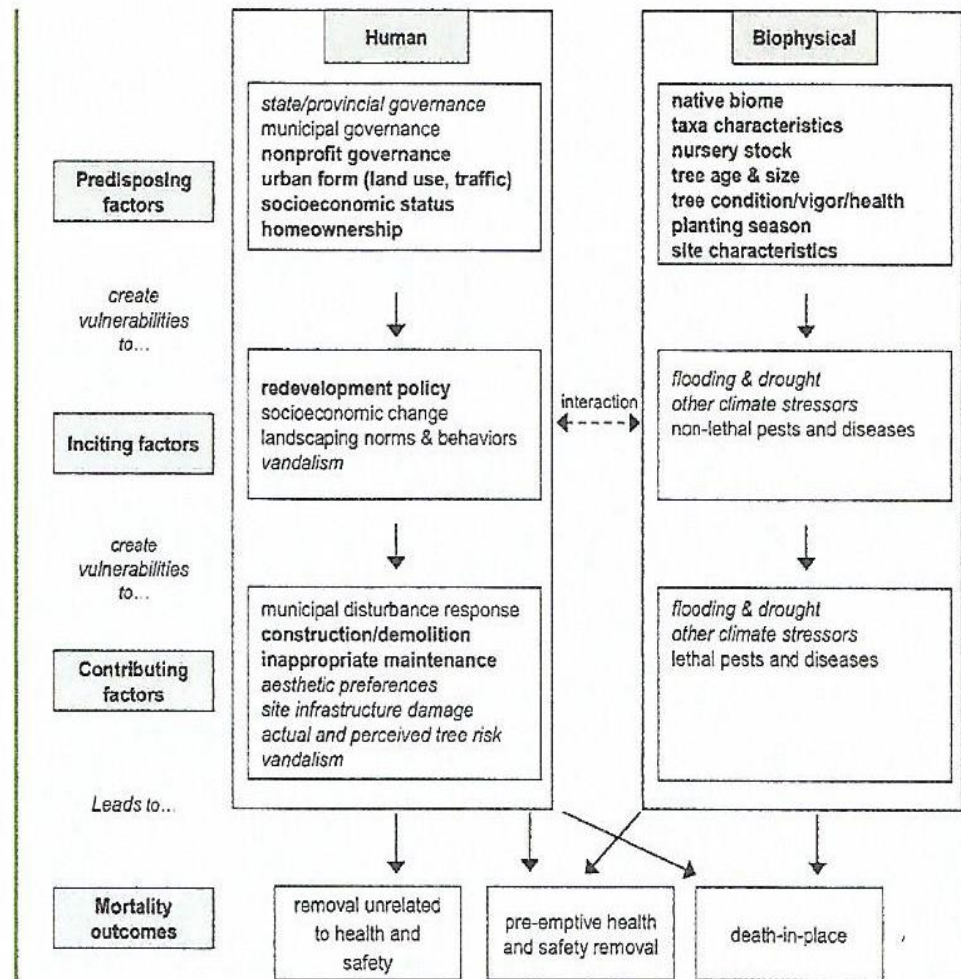


Box I. The Urban Tree Mortality Framework: Predisposing, Inciting, and Contributing Factors

The urban tree mortality framework identifies predisposing, inciting, and contributing factors.

- **Predisposing factors:** the normal human and site-related conditions that a tree is exposed to in its environment.
- **Inciting factors:** short-term stressors that impact tree vigor.
- **Contributing factors:** the mechanisms that ultimately lead to tree death.

Predisposing and inciting factors work against the tree, setting the stage for the contributing factors to cause mortality (after Manion 1981). In the framework below, factors in each box are ordered from larger scales at the top (e.g., regional, municipal) to smaller scales (e.g., parcel, planting site). Factors found to be statistically significant in the studies reviewed are bolded, while those that were qualitatively important are italicized. (Hilbert et al. 2019)



Plant Stress – Pre-Disposing Factors – Plant Pests

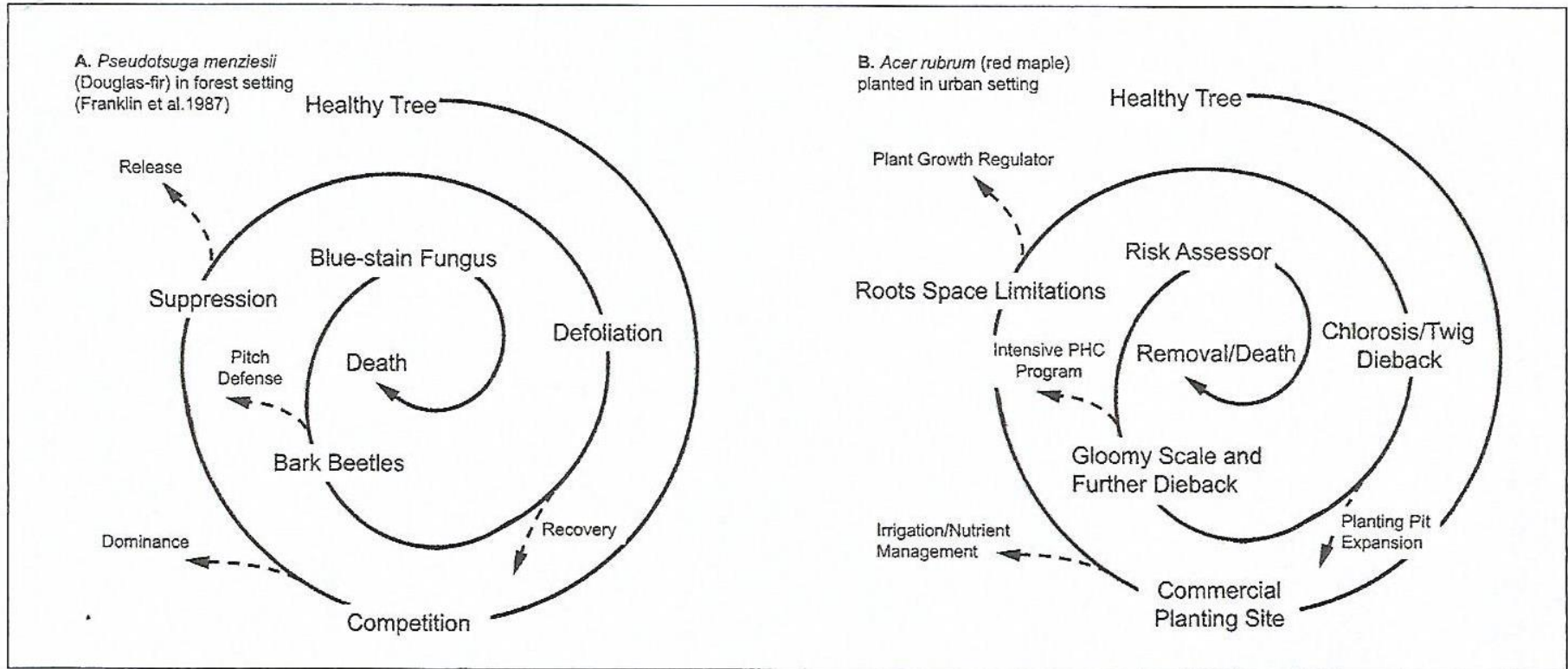
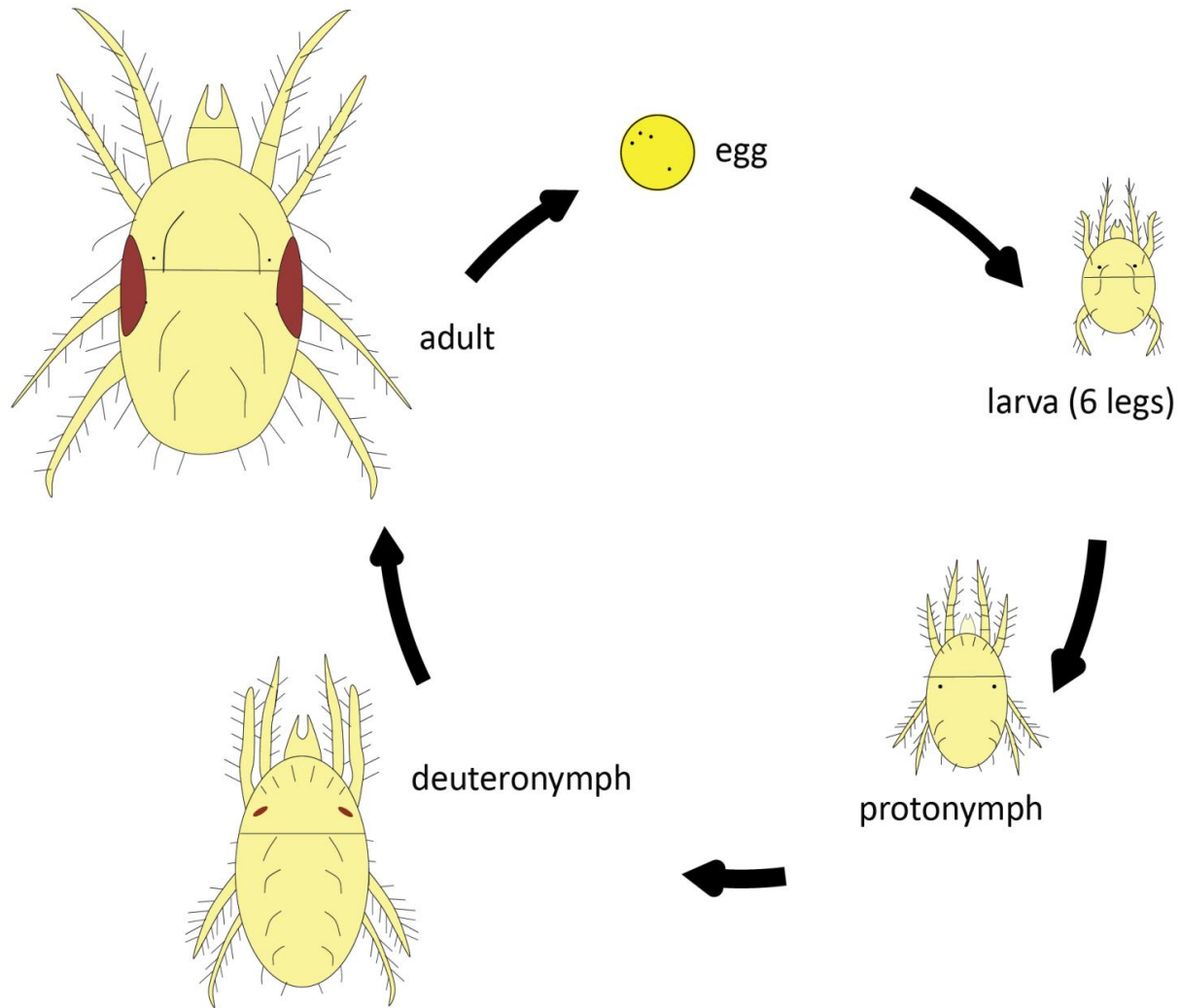


Figure 1. Tree mortality spirals depicting (A) an example tree in a natural forest (adapted from Franklin et al. 1987) and (B) an example planted urban tree (Hilbert et al. 2019).

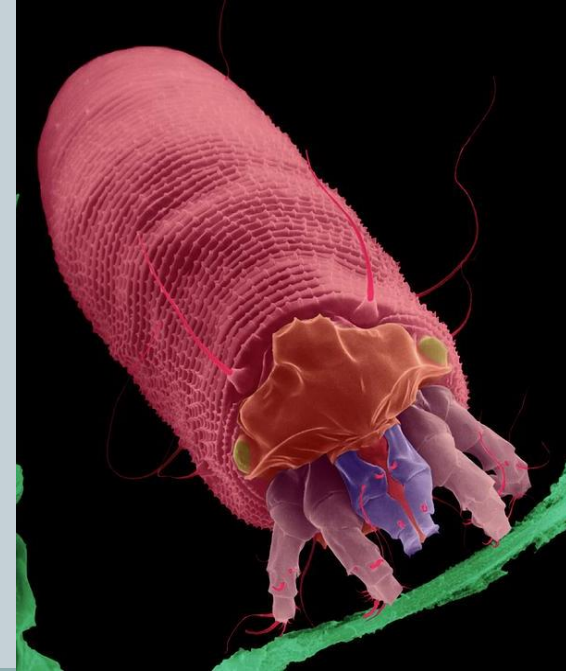
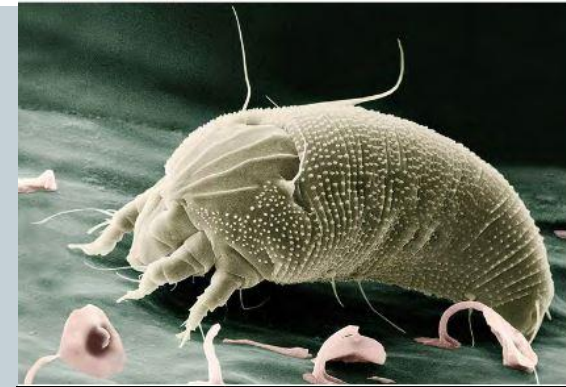
Life Cycle of Mites



Eriophyid Mites



- Genus *Eriophyes* spp.
- Less than 1 mm. long
- White, yellow, or orange and spindle-shaped with four short legs
- Several generations per year
- Overwinter in bark crevices and under bud scales



Eriophyid Mites



- Feed on leaf surfaces of deciduous and evergreen trees and shrubs including including maples, ash, walnut , cherry, and elm
- May cause leaf galls on maple, leaf blisters on pear or damage buds of yew and flowers of ash



Damage Caused by Eriophyid Mites

- Leaves and needles are olive-tan
- Form leaf galls and blisters (**maple bladder gall mite**)
- Form fuzzy growth (**erinium**) on underside of leaf (**erinium gall mites**)
- Ash flowers may “blast” (**ash flower gall mite**)



Maple Bladder Gall Mite



- **Indicator plants**
- *Salix caprea* with yellow catkins
- *Acer rubrum* beginning to blossom
- *Gleditsia triacanthos* buds beginning to show green
- **50-100 DD₅₀**



Hemlock and Spruce Eriophyid Mites

- **Active at 50-100 DD₅₀**
- **Indicator plants**
 - *Cornus mas* in full bloom
 - *Acer rubrum* with red buds
 - *A. saccharinum* at bud break
 - *Amelanchier* blossom buds show
 - *Magnolia x soulangiana* at pink bud
- **Spruce eriophyid mite damage will resemble spruce spider mite damage**



Monitoring for Eriophyid Mites



- Look for off-color foliage
- Look for mites with a 10X to 20X hand lens
- Heavy populations will produce elongate, white shed skins



Management of Eriophyid Mites



- Dormant oil application to kill overwintering stages
- For galls, spray immediately at bud break
- Leaf feeders can be sprayed when detected



Spider Mites

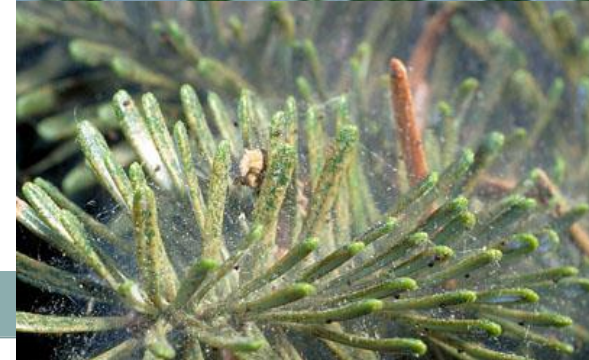
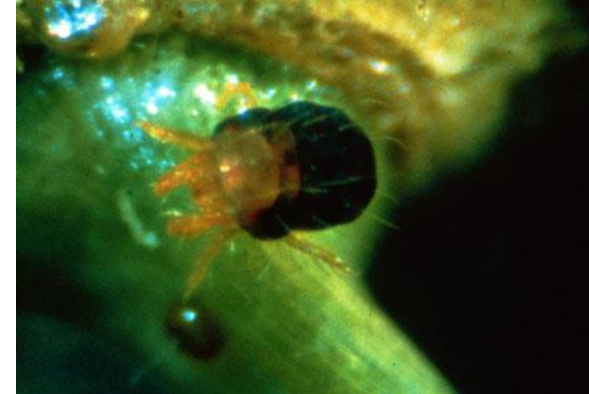
- Populations build rapidly with multiple generations
- **Signs**
 - Fine silk webbing
 - Old cast skins
- **Symptoms**
 - Yellowing-bronzing of foliage
 - Wilting and loss of plant vitality
 - Dieback and death



Cool Season Spruce Spider Mite



- 1/2 mm. long
- Immatures are yellowish green
- Adults are grayish black
- Eggs are oval and reddish-brown and overwinter on bark and needles



Cool Season Spruce Spider Mite

- **Active at 100 -200 DD50**
- **Spring indicator plants**
 - *Amelanchier* beginning to bloom
 - *Acer saccharum* beginning to bloom
 - *A. saccharinum* leaf blades 1/2"
 - *A. platanoides* blooming
- **Fall indicator plants**
 - *A. saccharum* beginning fall color
 - *Cornus alternifolia* beginning fall color
 - *Crataegus phaenopyrum* fruit ripening



Hosts of Spruce Spider Mite



- **Prefer spruce, pine, hemlock, and arborvitae**
- Common on cedar, yew, larch, dawn redwood, fir, and Douglas-fir
- Several generations per year
- **Present at 50-100DD₅₀**



Warm Season Spider Mites



- **Two-spotted spider mite**
- **European red mite**
- **Honeylocust mite**



Two-Spotted Spider Mite



- **Major pest of many plants**
- Oval and 1/2 mm. long
- Greenish-yellow with black spots on each side of body
- Eggs are white to yellow
- Overwintering females are reddish-orange and overwinter in bark cracks
- **Active at 900-100 DD₅₀ with multiple generations**



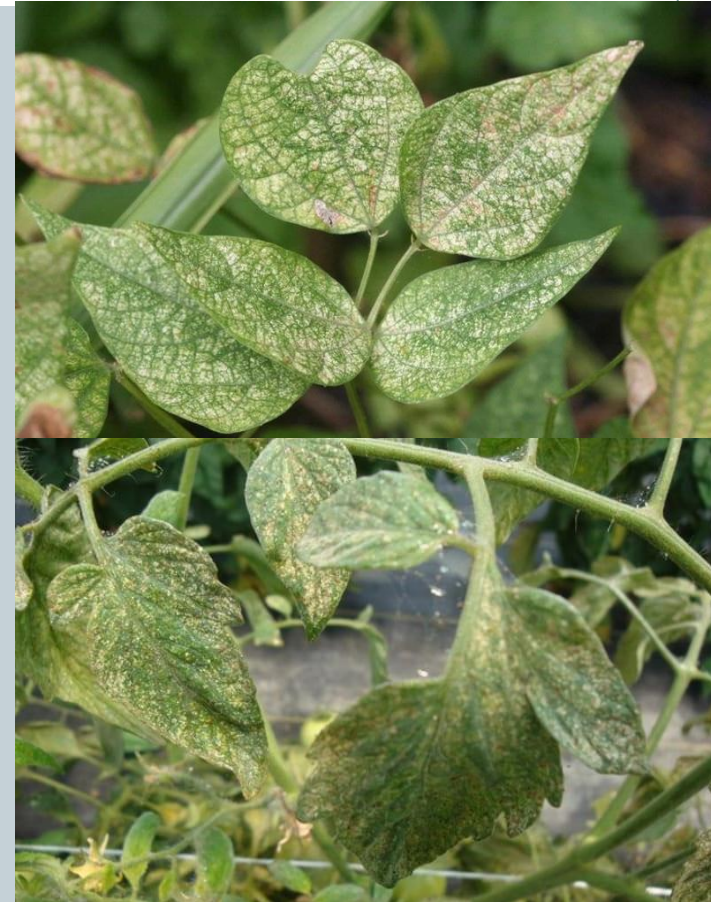
Two-Spotted Spider Mite Damage

- Feed on leaf “juices” by rupturing plant cells causing minute white to yellow stippling
- Heavy feeding causes stippling to coalesce and leaves will appear white, yellow, or brown and die



Monitoring for Spider Mites

- Look for **stippling** in hot weather
- Shake leaves over a white paper
- **Fine silk webbing and old cast skins** indicate heavy populations
- **Account for natural enemies**
 - Predaceous mites and lady beetles



Monitoring for Spider Mites



- **Early Summer Indicator Plants**

- *Daucus carota* blooming
- *Yucca filamentosa* blooming

- **Late Summer Indicator Plants**

- *Sorbus aucuparia* orange fruit
- *Solidago* with some blooming



Management of Spider Mites



- Monitor dry, hot, sunny locations **weekly**
 - Spider mites may produce a generation per week
- Use horticultural oils or soaps when populations are low to conserve natural enemies
- Use a residual miticide for heavy populations and absence of natural enemies

European Red Mite

- **Introduced and economic pest** of nut, pome and stone fruits, and some berries
- Causes leaf damage and fruit to russet



European Red Mite

- ERM can have 6 to 8 generations per year
 - Sumer generations may develop in as little as 14 days
- **Female mites** are brick red with white spots at the base and six to eight hairs on their back
- **Male mites** are more slender and lighter in color with a more pointed abdomen



European Red Mite

- Eggs are red, globular and somewhat flattened (onion shaped) with a slender stalk on the upper side
- Mites overwinter as eggs on roughened bark around the bases of buds and spurs on small branches



European Red Mite

- Egg hatch in the spring is closely correlated with bud development
-
- In summer eggs are laid on the underside of leaves
- During the summer, eggs require 7 to 14 days to hatch.



Damage Caused by European Red Mite

- Injures plant by removing cell contents, including chlorophyll
- Moderate to high numbers of mites can cause the leaves to initially turn pale
- Heavy feeding causes leaves to turn bronze, reduce tree growth, yield, and affect fruit bud formation for following year



Damage Caused by European Red Mite

- Some apple cultivars (i.e. 'Red Delicious' and 'Braeburn'), are more prone to mite buildup and injury
- **European red mites are rarely a problem on backyard apple trees**
- Predatory mites, ladybird beetles and the six-spotted thrips help to maintain mite populations at non-damaging levels

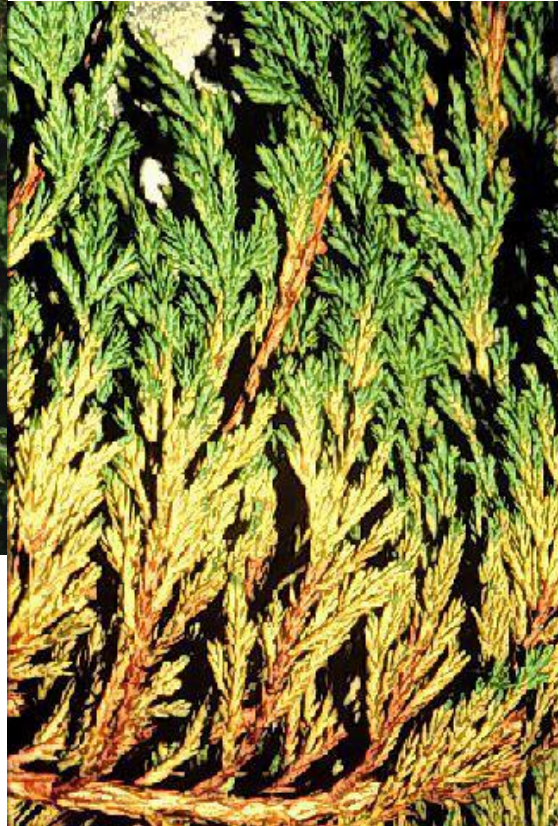


Damage Caused by European Red Mite



- **Considered a secondary pest**
- Typically builds to damaging levels after natural enemies have been depleted by insecticide applications used to control other pests
- Minimizing insecticide usage and selecting insecticides that are least toxic to beneficial organisms will help to minimize mite problems

European Red Mite Damage on Arborvitae



Monitoring for European Red Mite



- Examine 5 hardened-off leaves from each of four scaffold limbs per tree
- Commercial orchardists should examine at least 5 trees per acre
 - **Red Delicious is more susceptible**
- Using a hand lens, count all active stages of pest and predatory mites
 - **Predatory mites are more active and are tear-drop shaped**

Economic Threshold for European Red Mite



- **Economic threshold (ET)** for the mites varies with time of year
 - Miticide is recommended early in the year (until April 1) if active mites exceed an average of 5 per leaf
 - During April and May if mites exceed 10 per leaf
 - Rest of season if mite numbers exceed 15 per leaf
 -

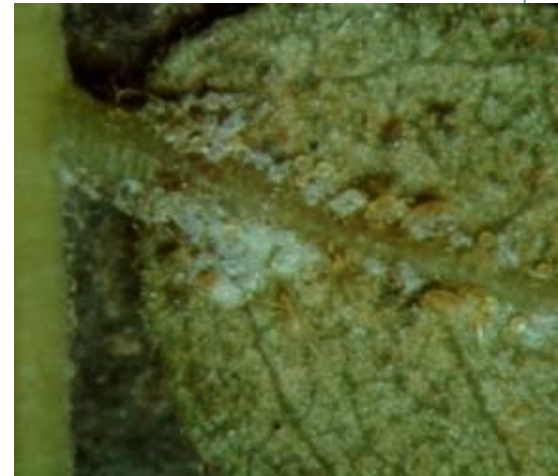
Management of the European Red Mite

- Treat overwintering mite eggs with dormant oil treatment anytime between just before bud swell until half inch green
- Summer management of mites is based on scouting and the use of miticides or summer oil treatments



Honeylocust Mite

- **Native mite, host specific to honeylocust**
- Less than 1 mm long and orange
- Overwinter as adults and congregate in bud scars and bark cracks
- Eggs laid in spring and hatch after bud break
- Adults are pale yellow to green



Monitoring for Honeylocust Mite

- In winter, look for orange mites on twigs with 10X hand lens
- Look in bud scars and bark cracks to estimate future mite populations
- Monitor stressed trees for evidence of stippling on leaflets and yellowing of foliage



Honeylocust Mite Damage



Management of Honeylocust Mite

- Use **dormant oil application** on heavy overwintering populations
- In summer use a **verdant oil application** or insecticidal soap spray to conserve natural enemies
- Use residual miticide for heavy summer populations



PHC for Plants Susceptible to Mites



- Keep plants healthy and avoid over fertilizing
- Monitor and inspect plants for infestations
- Conserve natural enemies
- Chemical management
 - Apply dormant oil and/or soap applications for low populations to conserve natural enemies
 - Apply residual miticides for heavy mite populations

END OF PRESENTATION

