2016 Organic, Fresh Market Tomato Production
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Woodland, CA

Russet and Spider Mites on Tomatoes

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What are mites?

Not insects, but also members of the Phylum Arthropoda “jointed feet”

- One or more pairs of jointed appendages
- Segmented body
- Hardened exoskeleton

Mites are members of the Class Arachnida – includes spiders, scorpions, ticks, etc.

Insects are members of the Class Insecta

How do mites differ from insects?

Mites

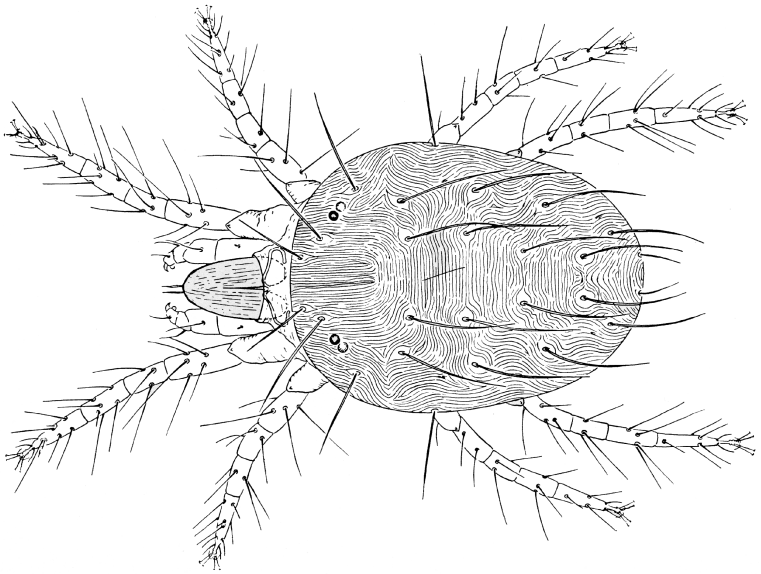
- Two body regions
- Lack antennae
- Lack wings
- Body segments fused

Insects

- Three body regions
- Antennae present in adults
- Most have wings as adults
- 3-segmented thorax & multi-segmented abdomen

Families of mites

Tetranychidae – spider mites

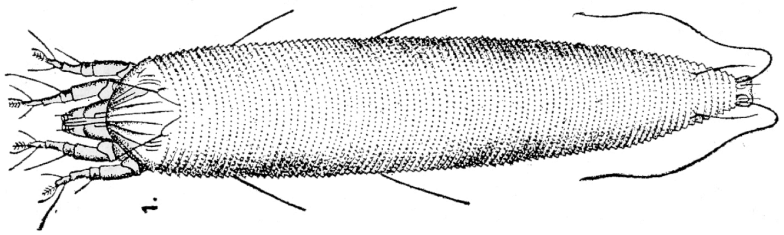


- Plant feeders
- ~0.6 mm long
- Oval abdomen
- Feed by puncturing leaf tissue with needle-like chelicerae; pharyngeal pump sucks up cell contents

Life stages - egg, larva, protonymph, deutonymph and adult; many nymphal molts

Families of mites

Eriophyidae – rust, blister and gall mites

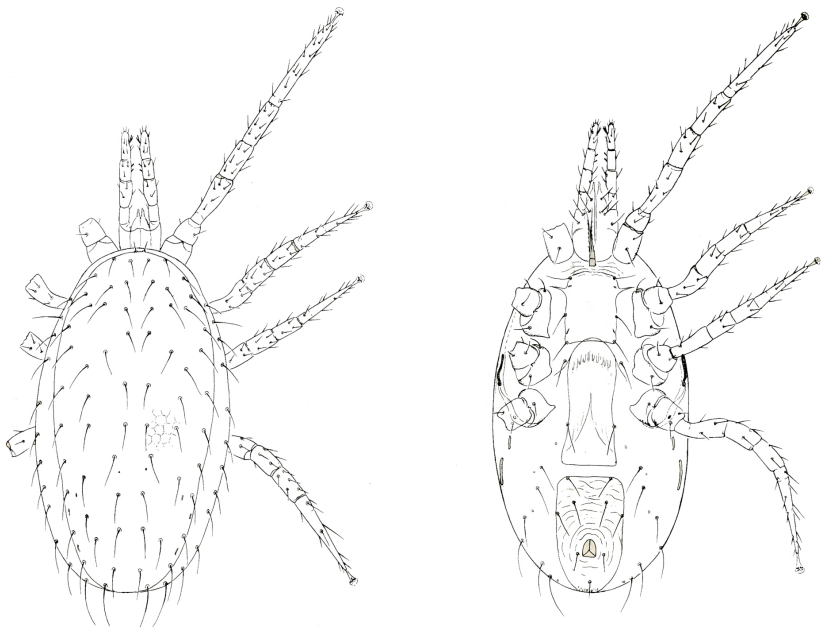


- Second to Tetranychidae as plant feeders
- < 0.25 mm long
- Body annulate and long
- Two pairs of legs
- A few are vectors of plant viruses

Life stages – egg, 2 nymphal stages and adult

Families of mites

Phytoseiidae – predatory mites

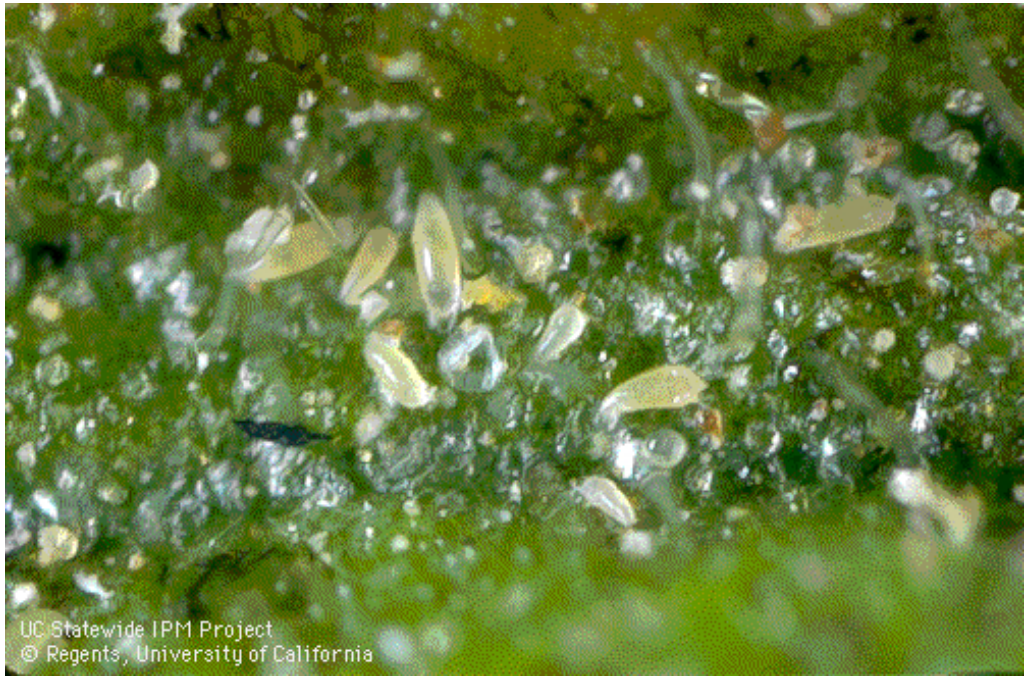


- Most important predators on spider mites
- May also feed on pollen, honeydew, and fungi depending on species
- ~1 mm long
- Usually shiny
- Moves quickly

Life stages – egg, larva, protonymph, deutonymph and adult; larva does not feed

Tomato Russet Mite - Eriophyidae

Aculops lycopersici



- Worldwide pest of tomatoes
- First described in Australia in 1937
- Adult females are most abundant when damage symptoms appear
- 0.1 – 0.2 mm long and 0.05 mm wide

Tomato Russet Mite

Damage

- Presence of mites are rarely noticed until the plants are damaged
- Feed on leaves, stems, and flowers
- Symptoms (bronzing) usually start near the ground
- Most mites found on leaves above those that are drying

Tomato Russet Mite

Damage

- Leaves dry after becoming bronzed
- Flowers abort
- If not controlled, plants will die

- Damage is similar, but usually less severe on related solanaceous crops

Tomato Russet Mite

Biology

- Russet mites begin to infest tomatoes shortly after transplanting from alternate hosts (including older crop plants that have been infested)
- Dispersed locally by wind
- Generation time is 6 to 7 days under optimal conditions
- 80^{o}F and dry (30% humidity or less)

Tomato Russet Mite

Biology

- A 1981-84 survey of Sacramento Valley tomato fields documented 57% to 69% with some level of russet mite damage
- More early and mid season plantings had russet mites (68% and 70%) than later plantings (56%)
- Average plant stage at which symptoms were first observed was when first mature green fruit or pink fruit were seen

Zalom, FG, J Kitzmiller, LT Wilson and P Gutierrez. 1986. Observations of tomato russet mite damage symptoms in relation to tomato plant development. J. Econ. Entomology. 79: 940-942.

Tomato Russet Mite

Host plants

All are in Solanaceae and Convolvulaceae

Crop hosts include:

- Tomato
- Pepper
- Tobacco
- Tomatillo
- Potato
- Sweet potato

Tomato Russet Mite

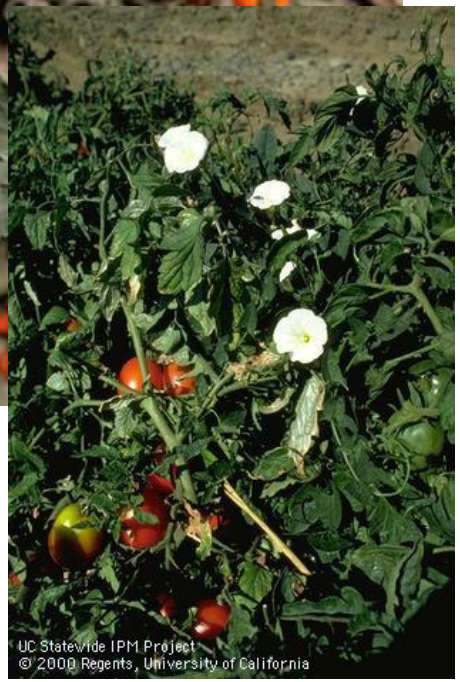
Host plants

All are in Solanaceae and Convolvulaceae

Weed hosts include:

- Morning glory
- Bindweed
- Downy thornapple
- Jimsonweed
- Petunia
- Aubergine
- Black nightshade
- Jerusalem cherry
- Hairy nightshade

Black nightshade



Bindweed

Tomato Russet Mite

Management

- Start monitoring when first fruit begin to turn pink
- Monitor on lower leaves and stems for bronzing symptoms
- Check green leaves immediately above these leaves for presence of mites – use a 14X - 20X hand lens at minimum
- Remove alternate crop hosts when possible
- Remove alternate weed hosts
- Remove overwintering weed hosts such as morning glory and bindweed

Tomato Russet Mite

When russet mites are confirmed

- Treat with sulfur dust or wettable sulfur
- Check with your certifier regarding the suitability of the specific product
- Thorough coverage is required, especially areas that show any symptoms
- Do not apply when temperatures are in excess of 90°F
- Do not apply with an oil, or if any oil was recently applied

Webspinning Spider Mites

Tetranychus spp.

- Spider mites spin silk threads that anchor them and their eggs to the plant
- Silk protects them from some of their enemies and even from pesticide applications

Two spotted spider mite (*Tetranychus urticae*) and carmine spider mite (*Tetranychus cinnabarinus*) are most common

Webspinning Spider Mites

Tetranychus spp.

- Eggs are tiny, spherical, pale-white, and are laid on the undersides of leaves
- Nymphs look similar to the adults, but are smaller
- Adults are oval and have eight legs
- Color is variable depending on species and food host

Webspinning Spider Mites

Damage

- Suck the sap of plant tissues
- Infestations are most serious in hot and dry conditions
- Usually feed on leaves, but at high densities will also feed on fruit
- Can kill plant under extreme conditions

Webspinning Spider Mites

Damage

- Symptoms may resemble a nutrient deficiency or plant disease
- Inspect the underside of affected leaves for presence of mites
  - Twospotted spider mite has a very broad host range encompassing virtually all plants except conifers

Webspinning Spider Mites

Biology

- More numerous in hot, dry weather; optimum development at 60.8^{o}F to 98.6^{o}F
- Lifecycle may take 10 to 30 days between these temperatures
- A female may lay over 100 eggs during her lifetime
- Wind plays an important role in the dispersal of spider mites (ballooning)
- Populations can build very quickly

Webspinning Spider Mites

Management

Avoid situations that favor spider mite presence and development -

- Presence of other highly infested crops or weeds in the near vicinity – remove highly infested plants in and around tomatoes
- Avoid planting new tomatoes next to an already infested field (tomato or other crops)
- Water stress favors mites – provide sufficient irrigation

Webspinning Spider Mites

Management

Monitoring -

- Inspect your field regularly; distribution of mites is very patchy at the beginning of an infestation
- Randomly select 20 tomato plants per area and access presence of feeding damage caused by the mites on 3 leaflets/plant
- Assess presence of natural enemies

Webspinning Spider Mites

Management

Natural enemies include -

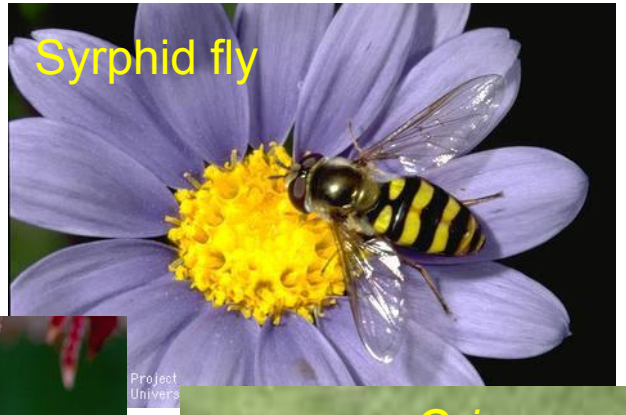
- Predatory thrips
- Lacewings
- Minute pirate bugs (*Orius* spp)
- Ladybird beetles
- Rove beetles (Staphilinidae)
- Flower flies

Webspinning Spider Mites

Management

Conserve natural enemies -

Naturally occurring predators are in many cases capable of controlling the two-spotted spider mite



Webspinning Spider Mites

Management

Predator mite releases - Phytoseiidae

Obligate predators – only feed on spider mites

- *Phytoseiulus persimilis*
- Will not persist in the crop without presence of spider mites
- Release rates depend on mite densities at time of release – generally trying to establish a predator-prey ration of 1:10; good distribution over infested areas is important

Webspinning Spider Mites

Management

Predator mite releases - Phytoseiidae

Obligate predators – only feed on spider mites

- *Phytoseiulus persimilis*

Webspinning Spider Mites

Management

Predator mite releases - Phytoseiidae

Type III predators – will feed on spider mites, small insects such as thrips and whiteflies, and even pollen

- *Amblyseius californicus*, *Amblyseius cucumeris*, *Amblyseius andersoni*, and others
- Early releases to allow establishment is possible
- Suitable release rates and timings vary

Webspinning Spider Mites

Management

Predator mite releases - Phytoseiidae

Type III predators – will feed on spider mites, small insects such as thrips and whiteflies, and even pollen

Sachet for releasing predators


Amblyseius predators

Webspinning Spider Mites

When spider mites are damaging

Treat to reduce populations – always make certain to get good underleaf coverage

- Horticultural oil or insecticidal soap
  - Check with your certifier regarding the suitability of the specific product
  - Test a plant to make certain the product does not damage it
  - Do not use on water-stressed plants or when temperatures are above 90^{o}F

Webspinning Spider Mites

When spider mites are damaging

Treat to reduce populations – always make certain to get good underleaf coverage

- Plant extracts and oils
- Neem and neem oil
- Water – use a strong jet of water to knock off mites and destroy their webs

A good time for predator mite release is after a spray when their populations are lower.

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