



Tips on Scouting Spring Ornamental Crops Pest and Disease ID

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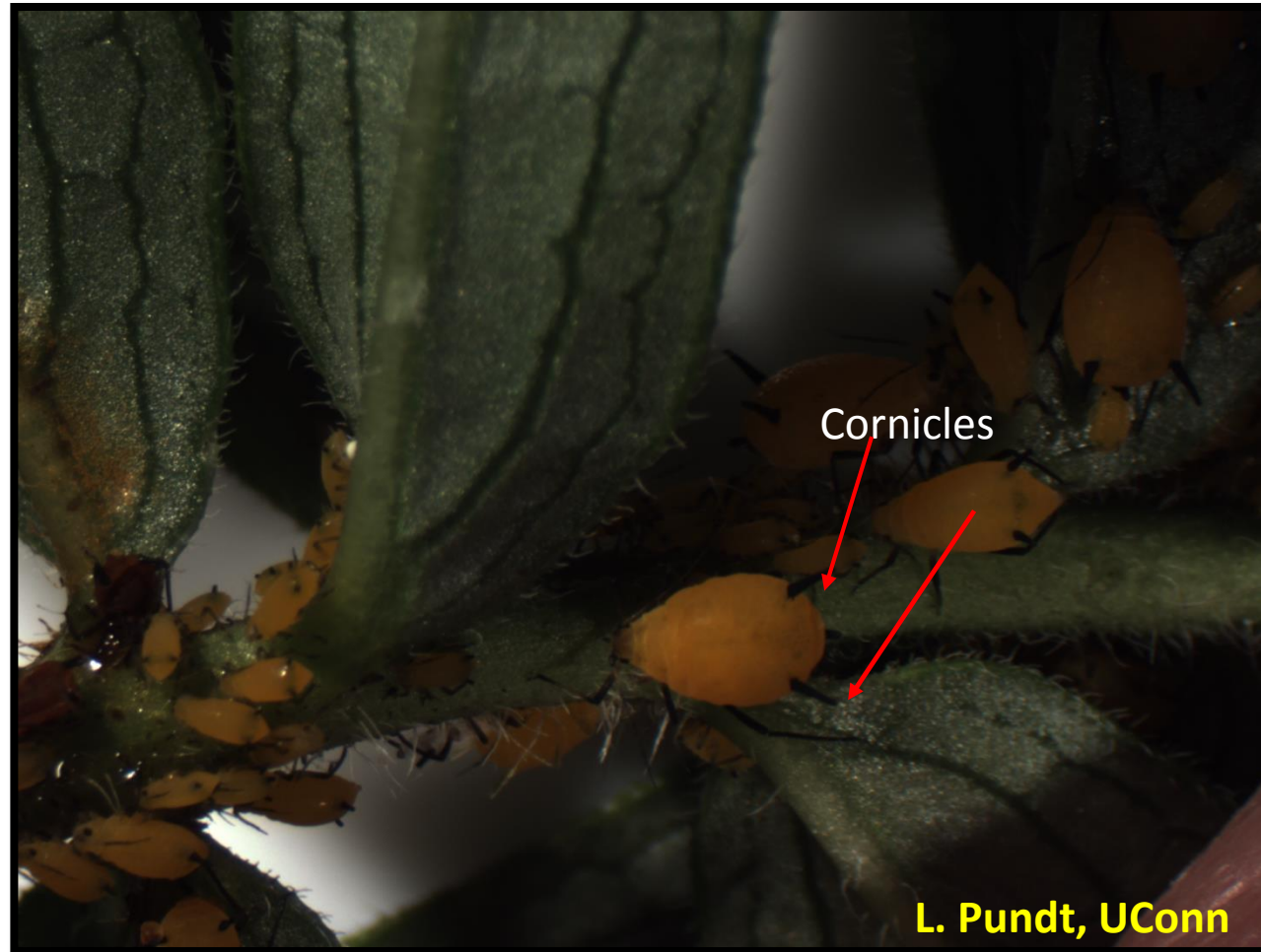
EXTENSION

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Scouting for Aphids

- Yellow sticky cards will only trap winged adults.
- Wide host range. Look for wingless aphids on the young tender growth. Some key hosts include: ageratum, calibrachoa, celosia, dahlia, fuchsia, geranium, gerbera daisy, impatiens, *Ipomoea*, marigold, nasturtium, pansy, ornamental pepper, primula, salvia, snapdragon, verbena, zinnia....
- White, cast skins, shiny honeydew, sooty mold and the presence of ants are signs of aphids.
- When releasing host specific parasitic wasps, identification to species is needed.

Aphids



Look for cornicles (“tailpipes”) at the end of the abdomen.

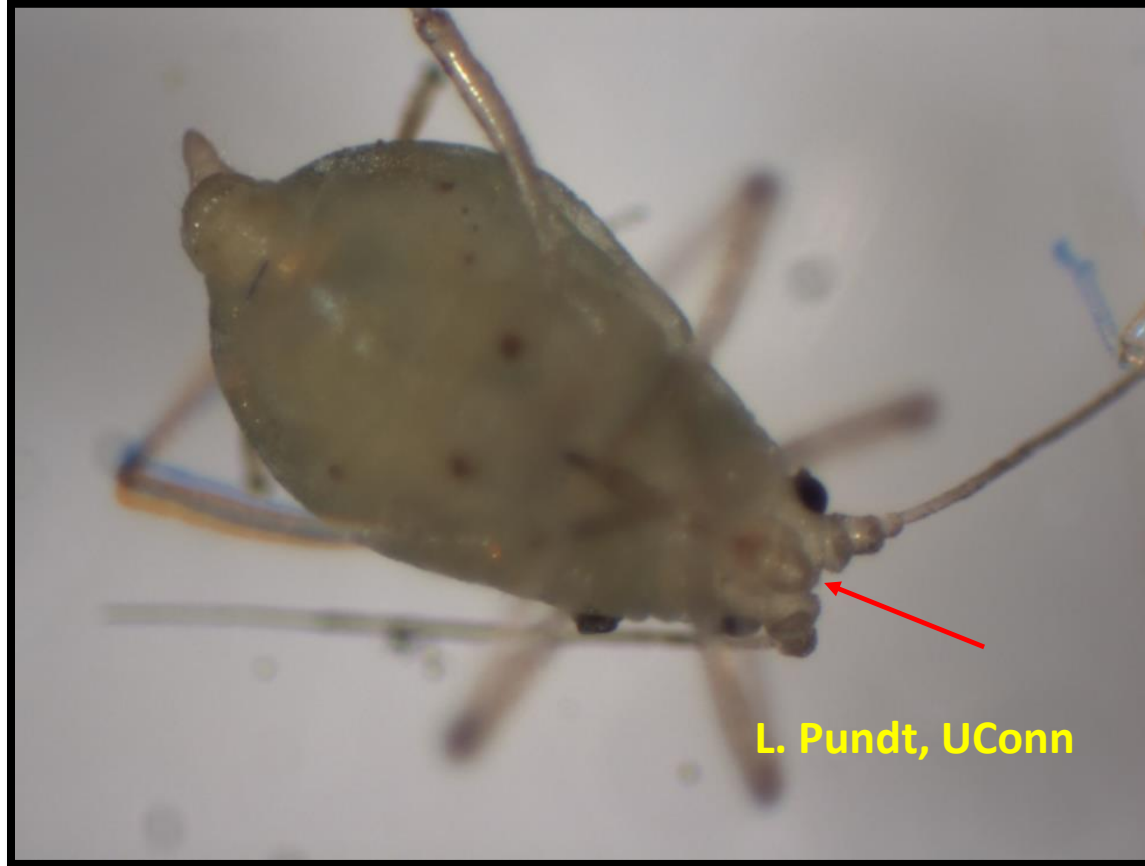
Aphids



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Look for aphids on young tender growth. White shed skins may also be present.

Green Peach Aphid



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Look for a pronounced indentation between the base of the antennae, with protusions that aim toward each other.

Foxglove Aphids



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Foxglove aphids may cause more leaf distortion than other aphids.

Foxglove Aphids



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Foxglove aphids and their shed skins on underside of leaf.

Foxglove Aphid



Shiny light yellowish green aphid with dark green patches at the base of the cornicles, and black markings on legs & antennae.

Potato Aphids



The potato aphid is pink or green, with a darker stripe down its back. Antennae are longer than their bodies, with long, black tipped cylindrical cornicles.

Scouting for Beetles

- **During weekly plant inspections, look for chewed leaves, or pinholes from flea beetle feeding.**
- **Beetles are a large group of insects characterized by hardened forewings.**
- **Both adults and larvae have chewing mouthparts that can cause damage to a wide range of plants.**
- **Most are a problem in outdoor production yards.**

Beetles



Small, regular holes in leaves due to golden tortoise beetle feeding on *Ipomoea*. Look for this damage on members of the Morning Glory family.

Golden Tortoise Beetle



**Brilliant gold tortoise beetles are also known as “goldbugs”.
Their wing covers (elytra) and prothorax hide their head and appendages.**

Scouting for Broad Mites

- **Look for characteristic damage (leaf edges curling downward, bronzing on underside of leaves, distorted flowers and buds).**
- **Some key hosts include African violet, ageratum, begonia, dahlia, geranium, gerbera daisy, English ivy, marigold, New Guinea impatiens, garden impatiens, salvia, snapdragon, verbena, vegetative petunia, wishbone flower, zinnia, etc.**
- **Microscopic examination is helpful to observe the underside of leaves for broad mites and their eggs.**

Broad Mite Damage



Outer leaf edges turn downward. Broad mite's toxic saliva causes twisted, hardened, distorted tip growth on this salvia.

Broad Mite Damage



Leaf edges turn downward and leaves are elongated on this New Guinea impatiens. Terminal buds may be killed.

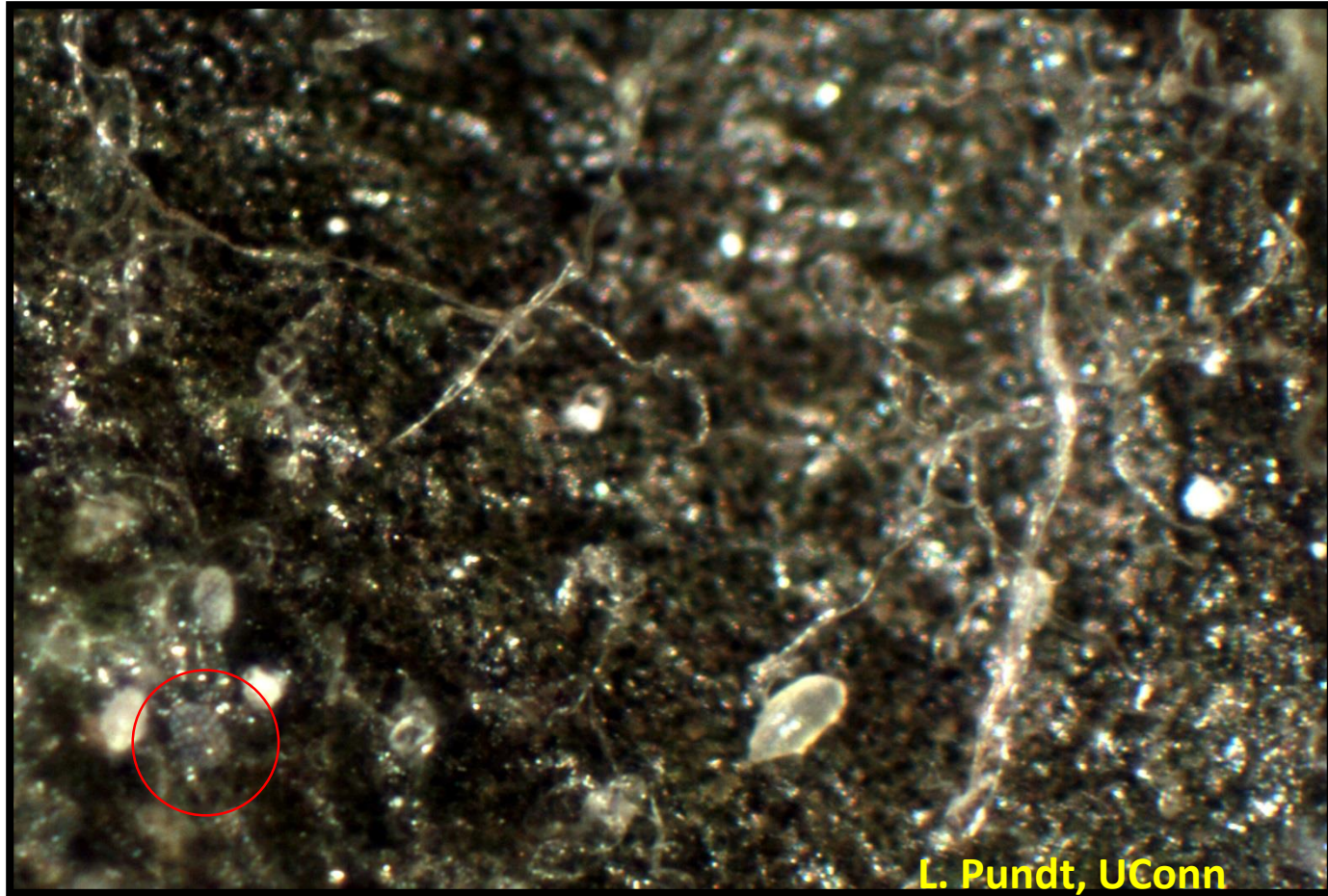
Broad Mite Damage



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Hardened, distorted and twisted growth on gerbera daisy infested with broad mites.

Broad Mites



Use a dissecting microscope to look for the very small, broad mites.
Note: the elliptical, translucent, colorless egg is covered with whitish bumps (within circle).

Scouting for Caterpillars

- **Inspect plants routinely for signs of feeding damage and the presence of fecal pellets (caterpillar frass or droppings).**
- **Begin plant inspections when adults (butterflies and moths) are flying.**
- **When scouting, check plants closest to greenhouse openings where adults may enter, especially areas closest to vegetable fields or weedy areas.**

Caterpillars



Caterpillar feeding causes irregular holes in leaves. Look for fecal droppings to distinguish from slug damage.

Tobacco Budworm



Tobacco budworms attack the flower buds of petunias, calibrachoa, and geraniums, especially in garden beds. Damaged buds fail to open.

Scouting for Fungus Gnats

- **Use yellow sticky cards (horizontal placement is best) or vertical placement near growing media to attract winged adults**
- **Use potato chunks or slices to monitor for larvae. Check after two days.**
- **Look for larval feeding damage on young seedlings, especially in propagation houses.**
- **Fungus gnats have a wide host range. Plants with succulent stems such as begonia, geranium, and coleus are especially susceptible to injury.**
- **Younger plants are more prone to damage than older plants.**

Fungus Gnat Adult



**Delicate winged adult fungus gnat on
Catharanthus.**

Fungus Gnat Adult



Adult fungus gnats are mosquito-like in body shape, with long legs, a clear pair of wings, & long beaded antennae. Look for distinct Y pattern on the wings.

Fungus Gnat Larva



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Fungus gnat larval feeding damage to young roots of *Catharanthus roseus*.

Fungus Gnats



Fungus gnat larvae feeding on leaves touching media surface which could be confused with slug damage (but there are no slime trails).

Scouting for Mealybugs

- **Look for white flecks or cottony residues along leaf midribs, on leaf or stem axils, and underside of leaves.**
- **Some key hosts include begonia, cacti, coleus, croton, dracaena, English ivy, English primrose, fuchsia, gardenia, jasmine, hibiscus, mandevilla, orchids, succulents, etc.**
- **Shiny honeydew, black sooty mold fungus and the presence of ants are signs of mealybugs.**

Mealybugs



Mealybugs feeding on coleus, where the leaf petioles meet the stem. They can also be found on the underside of leaves, especially along the leaf mid-vein.

Mealybugs



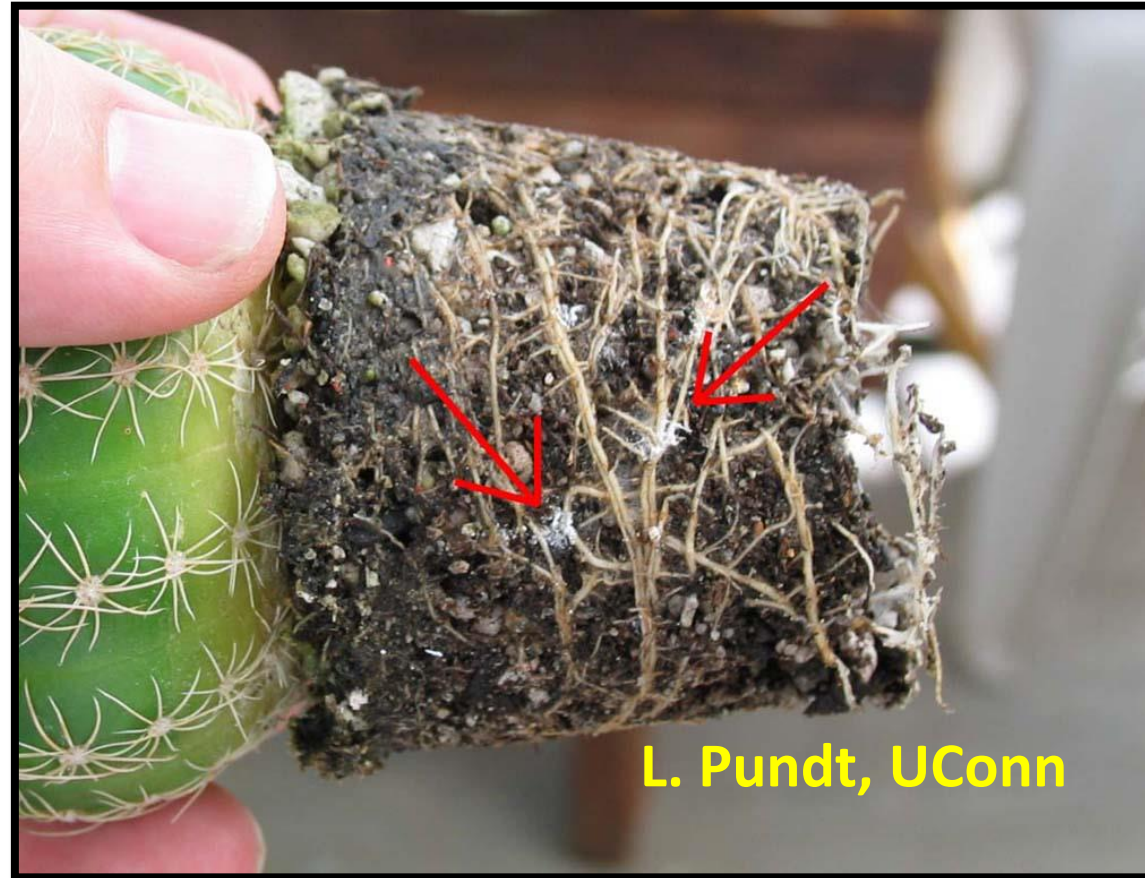
Citrus mealybug females lay their eggs within a cottony mass.

Long-tailed mealybugs



The long-tailed mealybug has wax thread "tails" that are as long as or longer than the body.

Root Feeding Mealybugs



Root feeding mealybugs are covered with a fine, powdery, wax-like material and can be found on the outer edges of the root ball.

Shore Flies



Robust shore fly adults resting on leaf. They are a nuisance pest.



Manage algae, which the shore flies feed upon.

Scouting for Spider Mites

- Visual inspection is needed as the wingless mites will not be found on sticky cards.
- Wide host range. Ageratum, angelonia, campanula, celosia, dahlia, geraniums (ivy), gerbera daisy, garden impatiens, hibiscus, *Ipomoea*, mandevilla, marigold, New Guinea impatiens, primrose, pansy, vinca vine, salvia, scalevola, verbenas, viola....
- Look on underside of leaves, along the leaf vein.
- Scout plants in hot, dry areas of a greenhouse, hanging baskets and those plants that are not irrigated by overhead watering.
(Overhead watering helps wash mites off the leaves.)

Spider Mites



Stippling or light flecking on the leaves, as a result of spider mites feeding.

Spider Mites



Look on the underside of the leaves, along the leaf veins for the spider mites.

Spider Mites



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As spider mite populations reach high levels, webbing may be seen.

Spider Mites



Leaf yellowing, resembling a nutrient deficiency, may also occur.

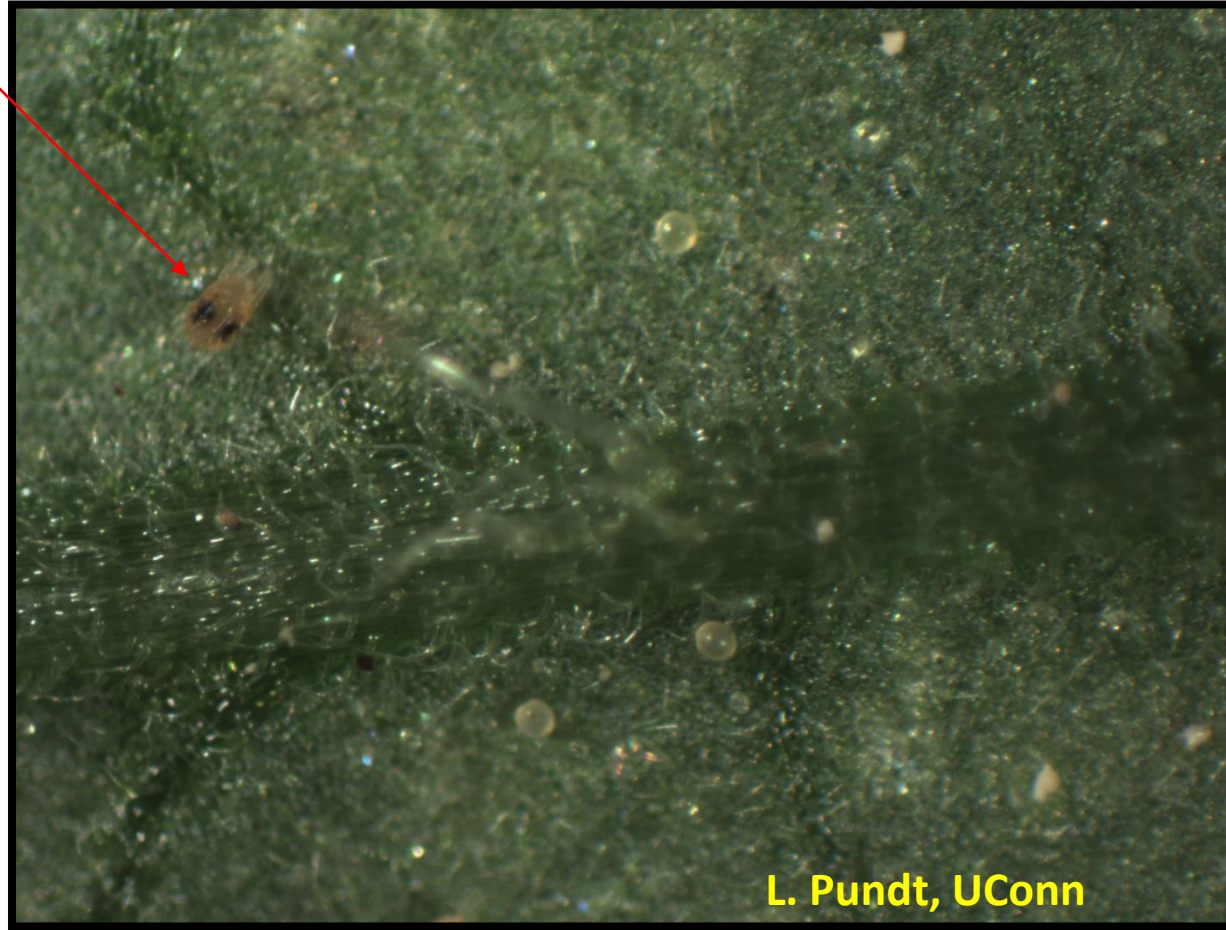
Spider Mites



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Look on the underside of the leaves for the spider mites.

Two Spotted Spider Mites



Two dark spots on either side of abdomen and round eggs are characteristic of two spotted spider mites.

Scouting for thrips

- **Yellow sticky cards are needed to detect early infestations of adults.**
- **Wide host range. Ageratum, begonia, calendula, calibrachoa (especially yellow flowered), celosia, dahlia, dianthus, gazania, gerbera daisy, garden impatiens, geranium (especially ivy), marigold, New Guinea impatiens, pansy, petunia, ornamental pepper, portulaca, salvia, snapdragon, verbena, vinca, and zinnia.**
- **Many weed hosts, especially those with yellow flowers.**
- **Look for thrips and their damage (white scarring, distorted growth, small fecal spots).**
- **Tap foliage over a sheet of white paper to see the small thrips.**

Thrips



Thrips feeding damage (white scarring and distorted flower petals) to gerbera daisy flowers. One can blow gently on the flower to agitate and better see the pollen feeding thrips.

Thrips



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Distorted growth and white scarring from thrips feeding on gerbera daisy leaves.

Thrips



**White scarring and small black fecal spots from thrips feeding on verbena flower.
Gently blow into flower to see the thrips.**

Thrips



White scarring on garden impatiens from thrips feeding.

Adult thrips



Scouting for Greenhouse Whiteflies

- **Winged adults will be found on yellow sticky cards.**
- **Wide host range. More problematic if stock or “pet plants” are overwintered.**
- **Look on underside of leaves for eggs, immature nymphs, pupae and adults on coleus, dahlia, fuchsia, geranium, gerbera daisy, heliotrope, lavender, primrose, salvia, verbena, and zinnia...**

Greenhouse Whiteflies



Greenhouse whitefly adults laying eggs on the underside of a *Brugmansia* leaf.

Greenhouse Whitefly Adult



Close-up of greenhouse whitefly adult.
Wings lay flat over the body, not tent-like as in sweet potato whitefly.

Greenhouse Whitefly Pupa



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Close-up of greenhouse whitefly pupa.
(White, with straight elevated sides and a fringe of wax filaments).

Scouting for Slugs

- **Slugs feed on a wide range of plants, especially where there is abundant moisture.**
- **Look for holes in leaves and stems, and shiny mucous-like slime trails.**
- **Slugs hide during the day and emerge at night to feed.**
- **Inspect areas under containers and damp areas in greenhouse.**

Slug Damage



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Shiny, mucous-like slime trails.

Slug Damage



Ragged holes in leaves, with no fecal droppings (which would indicate caterpillars).

Slugs



Look under containers and in damp areas for slugs.

Diseases

Bacterial Blight on Geranium



Small, water-soaked spots, less than 1/8 inch in diameter, may be within a v-shaped wedge.

Scouting for Black Root Rot

- Above ground symptoms include stunting, chlorosis or yellowing and plant dieback.
- Key hosts include: calibrachoa, pansy, viola and vinca (*Catharanthus*). Petunia, verbena, geranium, diascia, fuchsia and snapdragon can also become infected
- Infected plants in a plug tray will often be uneven in height. Roots and lower stems may be shriveled, dark brown to black in color and under-developed.
- May be confused with slow growth due to lack of nutrients or cold growing conditions.

Black Root Rot



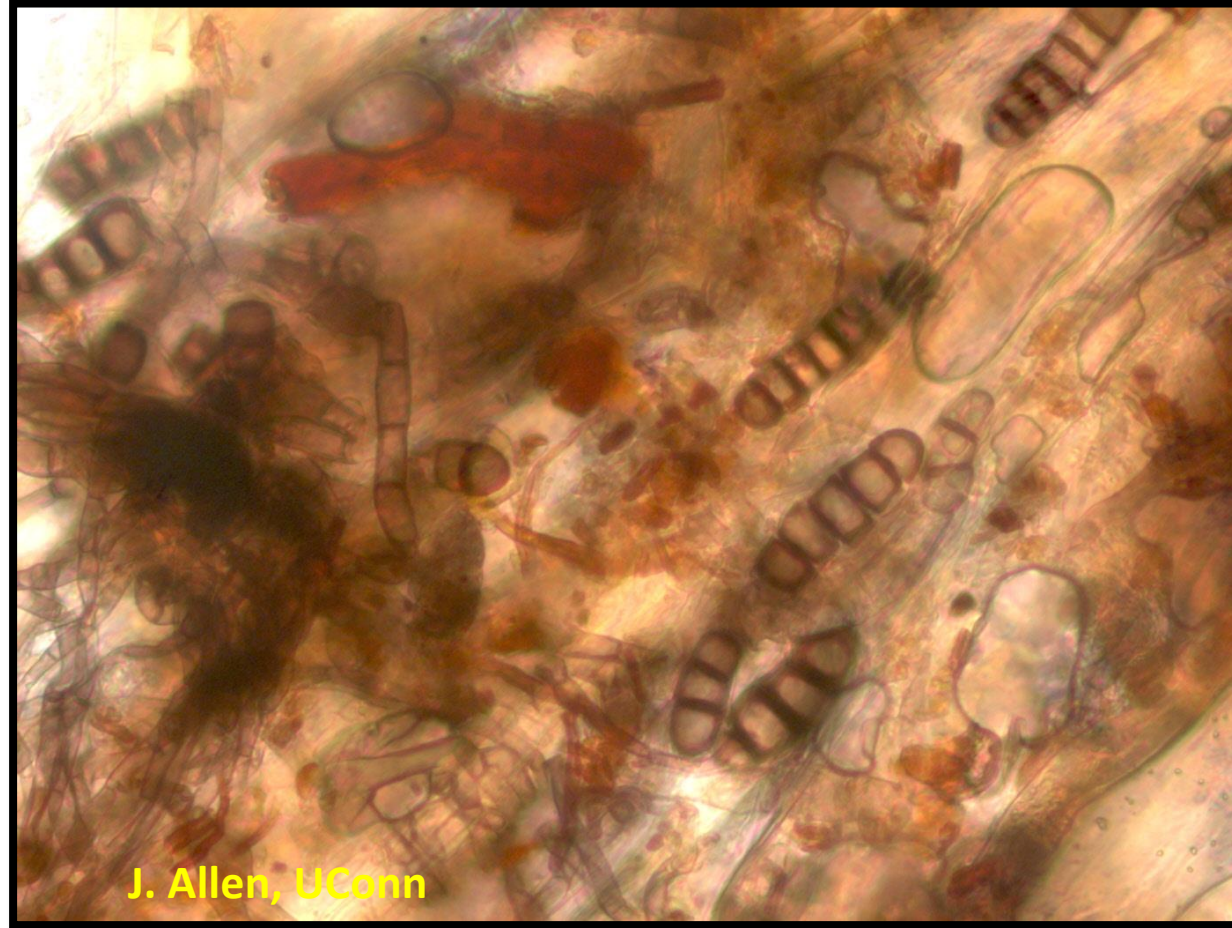
Roots and lower stems are blackened on this calibrachoa.

Black Root Rot



Wash off roots to look for black, discolored sections.

Black Root Rot



Thick walled overwintering spores (chlamydospores) resemble “tootsie-rolls” when viewed under the microscope.

Scouting for Botrytis Blight

- ***Botrytis* can cause leaf & flower spots & blights, stem cankers, damping off and cutting root rot.**
- **Wide host range. Plants may be attacked at any stage, but the new tender growth, and freshly injured tissues are most susceptible.**
- **Look for leaf blight, and gray fuzzy appearing spores on plant leaves during humid conditions.**
- **Tan stem cankers may develop on fuchsia, rosemary and other plants.**

Botrytis Blight



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Spent flowers dropping on plants below serve as an energy source for the fungus helping to encourage the development of *Botrytis* blight.

Botrytis Blight



Leaf spots may develop a zonate pattern.

Botrytis Blight



Flowers, especially white varieties, may also become infected with Botrytis Blight.

Botrytis Blight



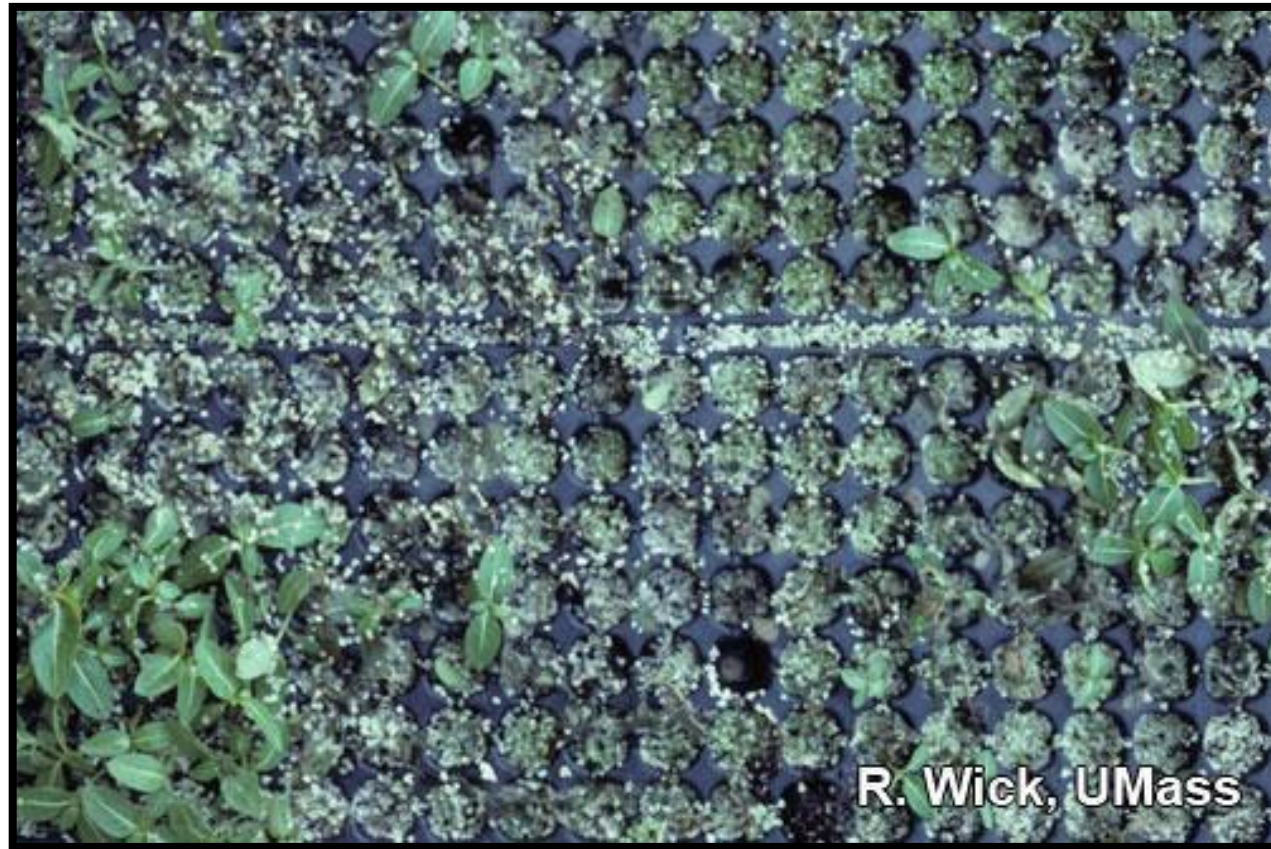
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Botrytis sporulation and tan stem canker on tender *Bacopa (Sutera)*

Scouting for Damping off

- **Common disease of germinating seeds and young seedlings.**
- **Seeds may fail to emerge (pre-emergence damping off).**
- **Young seedlings may wilt, with water soaked stem lesion at soil line.**
- **Plants often die in a circular pattern.**

Damping Off (*Phytophthora*) on Vinca



Damping off can be caused by species of *Pythium*, *Phytophthora*, or *Rhizoctonia*.
A laboratory diagnosis is required to determine the exact cause of damping off.

Scouting for Downy Mildews

- On some plants, downy mildew infection may look similar to injury from foliar nematodes. In both cases, angular lesions are bounded by leaf veins.
- Look for fluffy gray, brown, purple or white sporulation on the underside of leaves.
- Key host plants include: alyssum, argyranthemum, bacopa, bracteantha (sundaze), coleus, creeping phlox, helianthus, garden impatiens (NOT New Guinea Impatiens), osteospermum, pansy, salvia, snapdragon....

Downy Mildew



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Look on the underside of the leaves for the grayish sporulation.

Downy Mildew



**Look for brown, irregular lesions on leaves, and leaf drop.
Coleus leaves are twisted and distorted before dropping.**

Impatiens Downy Mildew



Beginning of leaf drop with white sporulation on underside of garden impatiens leaf. It's too late to save impatiens plants with these advanced symptoms. Preventive fungicide applications need to be applied during greenhouse production.

Impatiens Downy Mildew



White sporulation on underside of leaf.

Scouting for Impatiens necrotic spot virus (INSV)

- Some of the more common symptoms of INSV include target leaf spots, necrotic areas, mottling and ringspots.
- Wide host range. Vectored by thrips.
- Symptoms vary according to plant species.
- Young plants are especially vulnerable to infection.
- There is no cure. Infected plants must be rogued.

Impatiens Necrotic Spot Virus



Ringspots and unusual line patterns may occur on garden impatiens leaves.

Impatiens Necrotic Spot Virus



Ringspots can develop on leaves.

Impatiens Necrotic Spot Virus



Chlorotic mottling on nonstop begonias.

Impatiens Necrotic Spot Virus



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Ringspots may be one of the symptoms of INSV infection on *Lobelia*.

Agdia Immuno Strip Test

Control line= test working

Line = positive test



Tests can be completed in your office in as little as 20 minutes.

www.agdia.com

Scouting for Powdery Mildew

- **Look for faint, white mycelium on leaves of African violet, begonia, calibrachoa, dahlia, gerbera daisy, hydrangea, verbena, roses, kalanchoe, petunia, wishbone flower, zinnia, viola...**
- **Look on older leaves, and on both upper and lower leaf surfaces.**
- **Use a hand lens to look for the fungal threads to distinguish from powdery-white spray residue.**

Powdery Mildew



White powdery colonies of powdery mildew on dahlia leaves.

Powdery Mildew



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Powdery white colonies on gerbera daisy.

Scouting for Crown and Root Rots

- **Leaves turn yellow and wilt.**
- **Plants may be stunted.**
- **Inspect roots. They may be discolored, and turn brown or black.**
- **Laboratory analysis is needed to determine the causal agent.**

Phytophthora Crown Rot



Chlorosis and necrotic brown lesions on leaves.

Phytophthora Crown Rot



Brown, discolored roots. Laboratory testing is needed to distinguish Phytophthora from the more commonly observed Pythium root rot on this geranium.

Pythium – Black Leg



Shiny brown to black water soaked tissue at base of cutting stem. Leaves, wilt, yellow and die. Fungus gnat larvae are also often found in diseased tissue.

Rhizoctonia



Rhizoctonia



Diagnostic right angled branching of *Rhizoctonia* viewed under the microscope.

Tobacco Mosaic Virus (TMV) on Petunia



Leaf mottling, distortion and stunting can occur. TMV is spread by handling (mechanically), not by insects.

Abiotic Disorders

High Salts



Excess salts (from slow release fertilizer) resulted in edge burn and plant death.

Edema (intumescences)



White, crusty eruptions resembling grains of salt, develop along the leaf veins.

Edema (intumescences)



Corky, tan swellings on underside of ivy geranium leaf. Spider mite or thrips feeding damage may be confused with edema.