Sample pages from:

A Pocket Guide for Grape IPM Scouting in the North Central and Eastern U.S.

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A Pocket Guide for Grape IPM Scouting in the North Central and Eastern U.S.

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Insect and mite pests

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Sample pages from the disease section

Powdery mildew
Uncinula necator

Powdery mildew can infect all green tissues and give them a whitish gray, powdery appear-ance. Colonies occur mostly on the upper leaf surface. Early berry infections can result in split berries, secondary rots and undesir-able flavors in wine. Late diffuse infections are largely invisible but can still predispose the berries to rots.

Rachis infection

Infected shoots show dark gray, feathery patches (above, left), which appear reddish brown on dormant canes (above, right).

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Powdery mildew – *continued*

Cleistothecia

In late summer, the fungus produces small, golden-brown to black fruiting bodies (cleisto-thecia) on infected plant parts. Cleistothecia overwinter in bark crevices. The cleistothecia release ascospores during rains of 0.1 inch (2.5 mm) or more between bud break and fruit set. In regions with mild winters, the fungus can also survive in dormant buds, which develop into "flag shoots." Powdery mildew is favored by high humidity and tem-peratures of 68 to 81ºF (20 to 27ºC). Wetness is not required for infection. Temperatures above 95ºF (35ºC) inhibit new infec-tions. Begin monitoring at immediate prebloom, checking leaves inside the canopy closest to the trunk. On Concord vines, the disease appears first on the rachis around bloom and is rarely seen on foliage until later in summer.

Berry infection

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Botrytis bunch rot
Botrytis cinerea

Botrytis bunch rot is a fruit rot, but it also can affect other plant parts. In spring, buds and young shoots may be infected and turn brown. In late spring, V-shaped or irregular brown patches may appear on leaves. Inflorescences may become blighted and wither away. Some flower infections remain latent until veraison. From veraison onward, the fungus can infect grape berries directly through the epidermis or through wounds. Compact clusters, powdery mildew infection, hail and insect damage (e.g., grape berry moth) can predispose grapes to infection. Infected white grapes turn brown; purple grapes become reddish.

In wet weather, a grayish mold develops on infected berries.

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Botrytis bunch rot – *continued*

The disease is favored by temperatures of 59º to 68ºF (15º to 20ºC) and free water or at least 90 percent humidity, and it spreads rapidly during moist periods, especially close to harvest. In certain cultivars, slow-developing, late-season infections are termed "noble rot" because they contribute to the production of exceptionally sweet wines. The fungus overwinters in mummi-fied fruit and other infected plant parts.

Left, a blighted flower cluster. Right, during dry weather, infected berries dry up.

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Insect pests of leaves

About leafhoppers

Several leafhopper species feed on grape foliage in the eastern United States (see page 12 for a comparison). All feed on the undersides of leaves, puncturing cells and sucking out the contents. In general, native juice grape (labrusca) varieties are much more tolerant of leafhoppers than hybrid or vinifera varieties.

Insect pests of leaves

Potato leafhopper

The adult leafhopper is pale to bright green and about 1/8 inch long. Adults are very active, jumping, flying or running when disturbed. The immature forms, or nymphs, are pale green and wingless. They run forward, backward or sideways when disturbed. The potato leafhopper does not overwinter north of the Gulf states. Adults migrate north each spring on southerly winds and are deposited during May and June in spring rains.

Adult potato leafhopper

3 mm

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Potato leafhopper – *continued*

Potato leafhoppers can be very destructive on hybrid or vinifera varieties that are sensitive to the toxins they inject while feeding. Feeding is concentrated on young tissues near the shoot tips. On sensitive varieties, only a few adults are needed to cause leaf yellowing and cupping or shortened shoot internodes. This insect is typically a minor pest in labrusca grapes.

Sensitive varieties can display yellowed leaves and "cupping" after potato leafhopper feeding.

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Comparison of grape and potato leafhoppers

Character	Grape leafhopper	Potato leafhopper
Color	Light yellow	Green-yellow
Behavior	Walks forward	Walks sideways
Position on vine	On inner canopy leaves	On leaves on ends of shoots
Most susceptible	Labrusca grapes	Vinifera and hybrid grapes
Damage symptoms	Stippling on leaf surface, becoming red/brown when severe.	Leaf yellowing and cupping on wine grapes. Stippling on juice grape leaves.

Other leafhoppers

Threebanded leafhopper, *Erythroneura tricincta,* and Virginia creeper leafhopper, *Erythroneura ziczac,* can both be found in eastern U.S. vineyards. Their biologies are similar to that of grape leafhopper. The threebanded leafhopper adult is brown and black with some orange flecks on the wings. The Virginia creeper leafhopper adult is pale yellowish or white with a zigzag stripe down each wing and distinctly red cross-veins.

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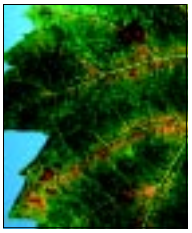
Mite pests of leaves

Twospotted spider mite

This mite can cause severe damage to wine grapes if populations reach high densities. The mite's feeding removes leaf tissue, causing yellowing and then bronzing. Thin-leaved varieties are most susceptible. These mites overwinter in leaf litter, develop on weeds in spring and move onto the vine as ground cover dries in summer. Water-stressed vines are most at risk. The most effective method of con-trol is to protect predatory mites. Biological con-trol is achieved with one predatory mite per 10 twospotted mites (see page 30).

Twospotted spider mites can be seen with a 20X hand lens.



Bronzing on the upper side of the leaf is a symptom of mites feeding below.

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Chemical injury

Phenoxy herbicide injury

Grapevines are injured by 2,4-D and related phenoxy compounds at concentrations in parts per billion. Herbicide applications that drift from field crops such as corn and wheat are the most common sources. Aerial applications to field crops have injured grapevines several miles from the point of application. More often, ground application in an adjacent field or the use of so-called "weed and feed" products for lawn care adjacent to a vineyard are the sources of injury. Young leaves at the tips of shoots become smaller than usual. They are irregularly shaped, often fan-shaped, and crystalline in texture.

A normal leaf (right) and a 2,4-D-injured Concord grape leaf (left) showing the difference in size and the fanlike shape that occurs with this injury.

Nutrient deficiency

Magnesium deficiency

A deficiency of magnesium appears first on the basal leaves of shoots as a yellowing between the veins. Some of the affected leaves will maintain a halo of green on their margins, which confirms this nutritional deficiency. Symptoms progress to dead blotches on the leaves, which may be a rusty-red. These symptoms are often associated with high levels of potassium (possibly from fertilization) in acid soils. Applying dolomitic lime and/or magnesium foliar sprays may be a remedy. Leaf petiole analysis can confirm this deficiency.

Early symptoms: green leaf margins with yellow between the veins.

Advanced stage: yellow between the veins interspersed with brown or often rust-colored areas.

Abiotic vine condition

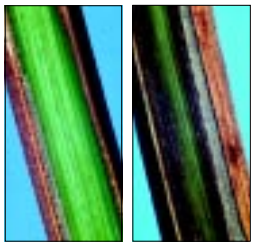
Winter injury

To assess the kill of dormant fruiting buds from low winter temperatures, gather 10 canes of the same quality that would be retained during pruning. Store them at room temperature for a minimum of 48 hours, then make cross-sections of fruiting nodes. Systematically evaluate damage to buds and alter pruning practices accordingly. Healthy cambium tissues are green; injured cambium tissues immediately below the bark or older wood become brownish. Even when these tissues appear completely dark brown, they may be viable and worth saving to maintain balanced growth.

A cross-section with dead primary bud in the middle and live secondary and tertiary buds on the sides.

Healthy tissue

Injured tissue



Winter injury – *continued*

Portions of severely winter-injured vines may begin to grow and then collapse around the time of bloom or shortly thereafter.

Winter injury as it appeared in early July on the Baco Noir variety. Shoot growth may begin on injured vines because of the mechanical uptake of water and nutrients. Shoots then collapse early in their development because woody portions of the vine lack live cambium tissue.