UNIVERSITY OF GEORGIA EXTENSION | In cooperation with North Carolina State University and Virginia Tech

VITICULTURE MANAGEMENT

Authors:
Cain Hickey, University of Georgia
Phillip Brannen, University of Georgia
Brett Blaauw, University of Georgia
Mark Hoffmann, North Carolina State University
Mizuho Nita, Virginia Tech
Doug Pfeffer, Virginia Tech

Design and illustrations:
Megan McCoy, University of Georgia

Diseases referenced from: Compendium of Grape Diseases, Disorders, and Pests (second edition). 2015. Editors W.F. Wilcox, W.D. Gubler, and J.K. Uyemoto. APS Press.

Bitter rot photo: Andy Allen, University of Missouri

Anthracnose photo: Bruce Bordelon, professor, Horticulture and Landscape Architecture, Purdue University

Grape flea beetle photo: Natasha Wright, Cook's Pest Control, Bugwood.org

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CULTURAL PRACTICES

Viticultural practices optimize vineyard health, profitability, and sustainability and improve crop quantity and quality. Like pest management, viticultural practices should be implemented in a timely fashion throughout the growing season to maximize practice efficiency and benefit gain.

DISEASES

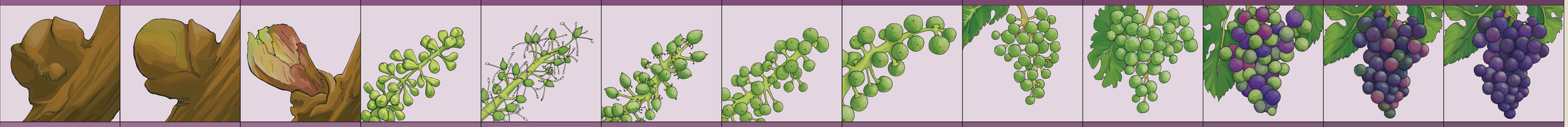
Disease control in grapes is critical, as grapes are susceptible to a wide range of pathogens. Implementing timely and adequate cultural practices will greatly help to suppress diseases. In addition, grapes, more so than many horticultural commodities, require aggressive fungicide programs throughout the year to maintain vine health.

**Column headings for the disease and insect management sections are based on the stages observed in the Southeast Regional Bunch Grape Integrated Management Guide.*

INSECTS

Integrated pest management in the vineyard combines a variety of techniques and tools to control pests. It starts with correctly identifying the insect and understanding its timing and activity within a crop throughout the season. Monitoring and evaluating the identified pest abundance and crop injury can help determine the correct method for effectively managing the pest.

1	2	3	4	5	6	7	8	9	10	11	12	13
DORMANT	BUD SWELL	BUD BREAK	PREBLOOM	BLOOM	FRUIT SET	BB-SIZED FRUIT	PEA-SIZED FRUIT	BERRY TOUCH	BUNCH CLOSURE	VERAISON	PREHARVEST	HARVEST
DORMANT	BUD SWELL	BUD BREAK AND NEW SHOOT SPRAYS*	PREBLOOM	BLOOM	POSTBLOOM*	FRUIT SET*	EARLY COVER SPRAYS*	BERRY TOUCH AND BUNCH CLOSURE*	LATE COVER SPRAYS*	VERAISON	PREHARVEST	POSTHARVEST*



CANE AND SPUR PRUNING should be completed during vine dormancy. Pruning is typically completed from December through March in Southeastern U.S. vineyards. Pruning sets the crop potential by retaining buds that are anticipated to bear fruitful shoots. Pruning is also used to remove dead or diseased grapevine wood.

Any final pruning should be completed during bud swell. Bud swell alarms growers of impending bud break, a critical stage for frost protection and the first stage when green tissues are observed.

SHOOT THINNING should occur when shoots are about 3-7" long, preferably as early as it's possible to identify fruitful vs. non-fruitful shoots and before tendrils grab neighboring shoots. Shoots should be thinned to roughly 3-5 shoots per linear foot of cordon or cane.

FROST DAMAGE is of concern once buds have broken. Air mixing (via wind machine) and delayed pruning are commonly implemented in an attempt to avoid frost injury to vine tissues.

SAMPLING involves collecting leaf tissues (petioles and/or blades) from opposite flower clusters at the bottom of the shoot. Tissues should be submitted for nutritional analyses, particularly in suspect cultivars or blocks. If needed, administer ground-applied fertilizer.

LEAF REMOVAL should be implemented immediately after fruit set, optimally before the growth of BB-sized berries. Leaf removal at this early stage acclimates grapes to ambient radiation and temperatures, reducing the threat of severe fruit sunburn relative to leaf removal after berries reach pea size. Fruit zone leaf removal hastens cluster drying, improves spray penetration, and therefore offers better bunch rot control relative to unmanaged fruit zones.

SHOOT POSITIONING is more efficient when implemented before tendrils strongly grab to wires and neighboring shoots. Shoots should be positioned to accommodate the intended training system—doing so will maximize leaf exposure and limit leaf shading.

CANOPY HEDGING is typically first necessary when berries reach pea size. Hedging should be implemented repeatedly as needed through veraison, after which it is often not required. To ensure optimal canopy sunlight and spray penetration, lateral shoots should be hedged from the side of primary shoots, and primary shoots should be hedged at their apex before they bend over and shade the canopy.

LEAF REMOVAL amounting to a "cleanup pass" may be required around bunch closure to remove foliage that has regrown into the fruit zone.

SAMPLING involves removing leaf tissues from fully expanded leaves at the tops of primary shoots for nutritional analyses. Growers can choose to sample specific vines or regions if deficiency symptoms are evident at veraison.

BIRD NETTING should be placed immediately upon berry softening and color change to prevent bird depredation. Do not underestimate the amount of crop that can be damaged or removed by wildlife.

SCOUTING for nutrient disorders and systemic infections should occur throughout the entire post veraison to preharvest period, when vines become stressed and are allocating resources away from leaves to ripening fruit. Red leaves are indicative of nutrient disorders but may can also indicate systemic infections. If time is limited, flag vines and plan to tend to them after harvest.

HARVEST decisions are cultivar-, region-, and site- specific. Use grape chemistry analyses, sensory perception (taste, color, fruit integrity), intended wine style, and predicted weather patterns to make judicious harvest decisions.

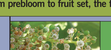
Botryosphaeria canker
Remove and destroy diseased canes and vines. Apply active fungicides after each day of pruning. Delay pruning as much as is practical.

Crown gall
Remove dead vines.

Anthracnose Remove and destroy diseased canes and vines during the dormant period. Spray lime sulfur at late dormancy. Apply active fungicides until berry touch. Berries are resistant at ~50 days after bud break as soluble solids rise above 5-7%.

Phomopsis Remove diseased canes through pruning during the dormant period. Spray lime sulfur at late dormant. Apply active fungicides as soon as green tissue emerges in the spring, and continue through veraison. Fruit infections mainly occur between cluster emergence and early postbloom, and generally cease at green pea size.

Powdery Mildew Remove diseased canes through pruning during the dormant period. Spray lime sulfur at late dormancy. Apply active fungicides as soon as green tissue emerges in the spring, and continue through postharvest. During the period from prebloom to fruit set, the fruit is particularly susceptible to powdery mildew infection, but fruit infection is still a risk until approximately four weeks after bloom.



Downy Mildew Leaves are always susceptible to infection. Fruit, rachises, and pedicels are resistant at about four weeks after bloom. Apply active fungicides in rotation. Fungicide resistance, particularly to the strobilurin fungicides, is prevalent.

Black Rot Remove mummified fruit and any diseased tissues during dormant pruning. Apply active fungicides from bloom until veraison. Prebloom until six weeks postbloom is a critical infection period.

Botrytis Canopy management is very important. Highly active fungicides should be applied at early bloom to fruit set, just before berry touch, veraison, and two weeks after veraison through preharvest. Resistance is common, so rotate fungicide classes. Use Captan often during the season to further suppress this disease.

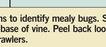
Ripe Rot Remove mummified fruit and any diseased tissues during dormant pruning. Infected fruit do not show symptoms until they ripen. Apply active fungicides from bloom until harvest.

Bitter Rot Remove mummified fruit and any diseased tissues during dormant pruning. Apply active fungicides from prebloom until harvest.

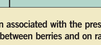
Pierce's Disease Spray insecticides as soon as sharpshooter vectors are detected in the spring; early infections are more likely to result in mortality. Cold winters reduce the impact of the disease, and winter pruning is important to remove infected canes. Destroy infected vines as soon as symptoms confirm the disease.

Mealybug Examine under bark and twigs using a hand lens to identify mealy bugs. Scout for mealybugs by looking under the bark and near base of vine. Peel back loose bark on canes and look for the presence of grape mealybug crawlers.

Mealybug Signs of mealybugs are sticky honeydew and black sooty mold, and mealybugs are often associated with the presence of ants on the vines. For further evidence of mealybugs, check clusters for waxy, white residue between berries and on rachises.



Sharpshooter/Leafhopper Place several double-sided yellow sticky traps per block and check traps weekly for sharpshooters/leafhoppers.



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Mite Examine twigs using a hand lens for European red mite eggs, which are round and reddish orange.

Mite Check leaves for chlorotic spots and bronzing. Using a hand lens, check the underside of the leaf along the leaf veins. Manage if more than 10 mites per leaf.

Climbing Cutworm Monitor bud feeding in early spring. If damage is present, look for cutworms under bark, on cordons, trunk, and at soil level.

Thrips On cool days after budbreak, open shoots or gently tap buds over white paper to check for thrips.

Grape Flea Beetle Check for feeding on unfolding leaves and buds from small, metallic blue-green beetles.

Grape Flea Beetle Check for feeding on leaves and buds from small, metallic blue-green beetles and larvae that are brown with black dots.

Grape Berry Moth Flight periods of grape berry moth can be monitored using commercially available pheromone-baited traps. For the first three flights, expect 50% emergence at 187, 869, and 1094 degree days above a base of 47 °F after first male catch.

Grape Berry Moth Monitor grape berry moth using pheromone-baited traps and look for webbing in the clusters when berries are small—larvae will web multiple berries together.

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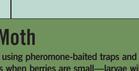

Japanese Beetle and Green June Beetle Check for shiny green- and copper-colored beetles. Feeding skeletonizes leaves and is concentrated in the upper part of the vine canopy. The large, green June beetles may feed on the fruit. Severe feeding by beetles after veraison can have significant impact on fruit quality.

Spotted Wing Drosophila (SWD) Berries become attractive to SWD at 15 brix. SWD presence in vineyards can be monitored with homemade traps, commercial lures, and larvae in fruit. Control decisions should be influenced by the farm's history of SWD infestations.

Grape Root Borer Monitor flight activity of grape root borer using commercially available pheromone-baited traps and examine soil near base of vine for empty pupal skins.

Yellow Jacket The key to yellow jacket management is keeping the fruit intact, for example, by minimizing disease, fruit splitting, and bird damage. Scout for wasp nests in the vineyard, in nearby buildings, or in nearby trees. Manage through nest removal or traps.

Sour Rot Late-season fruit injury and drosophila invasion are critical to establishment and spread of this disease caused by yeasts and *acetobacter* bacteria. Sour rot generally does not start prior to 10 brix or veraison.