

Plant Pathology Fact Sheet

Grape Crown Gall

by John Hartman

Crown gall is a common, devastating grape disease that has been known to result in losses of entire vineyards in Kentucky. Besides grapes, over 600 types of plants are known to be susceptible to crown gall, including apples, stone fruits and brambles.

Symptoms

This disease is characterized by galls or knobby overgrowths that form on susceptible plant tissues, such as roots, trunk and arms of grape vines (FIGURE 1). New galls first appear in early summer as a white, fleshy callus growth. Galls turn brown by late summer and become dry and corky in the fall. The woody tumors may be gnarled with rough surfaces (FIGURE 2). Galls can develop rapidly and completely girdle a young vine in one season, or they may take a few years to develop. Galled vines frequently produce inferior shoot growth and portions of the vine above the galls may die. Galls located on major roots or the root crown can disrupt the translocation of water and mineral elements, leading to poor growth, gradual dieback, and sometimes death of vines. In general, crown gall-infected plants are more susceptible to adverse environmental conditions, especially winter injury.



FIGURE 1. CROWN GALL CAUSING ROUGH-SURFACED SWELLING ON A GRAPE TRUNK.

Cause and Disease Cycle

Grape crown gall is caused by the soil-borne bacterium, *Agrobacterium vitis*. Crown gall diseases of many other plants in Kentucky



FIGURE 2. SURFACE OF CROWN GALL ON GRAPEVINE.

are caused by a closely related bacterium, *Agrobacterium tumefaciens*. *A. vitis* survives for long periods of time in soil, in galls and in diseased plants. The grape crown gall bacterium may be widely present in Kentucky soils and may be systemically present in many grape vines, but the bacterium seldom causes disease unless the vine is injured.

Once the bacterium enters a grape cell or cells through a wound, it donates a portion of its DNA to the grape plant. This piece of DNA codes a message for the plant to make food for the bacterium and to make plant galls. The grape incorporates the bacterial DNA into its own and begins to make galls. Thus, instead of making normal tissues, the grape makes galls, or disorganized tissue that no longer functions for the grape vine.

Injuries allowing entry of *A. vitis* into grape tissues and cells may result from the intermittent freezing and thawing weather conditions common to Kentucky winters. These freeze/thaw conditions may not occur as often in other grape-growing regions, such as New York or California. Overwintering bacteria may be spread to wound sites by splashing rain, via running water, on cultivation implements, or on pruning tools. Contaminated nursery stock may be another source of the disease.

Disease Management

- **USE DISEASE-TOLERANT CULTIVARS.** In general, *Vitis vinifera* grapes are more susceptible than *V. labrusca*. Highly susceptible cultivars include Baco Noir, Cabernet Franc, Cabernet Sauvignon, Chancellor, Chardonnay, Gewürtztraminer, Limberger, Merlot, Muscat Ottonel, Pinot Blanc, Pinot Gris, Pinot Meunier, Pinot Noir, Riesling, and Sauvignon Blanc. Less susceptible cultivars include Cascade, Catawba, Concord, Delaware, Einset Seedless, Foch, Fredonia, Ives, Steuben, Vanessa, and Ventura.

- **AVOID PLANTING SITES WITH A HISTORY OF CROWN GALL, or wait at least 5 years before replanting in infested soils.**

- **PLANT VINES IN WELL-DRAINED SOIL.**

- **AVOID WOUNDING.** Minimize root injuries during planting and adopt management practices that minimize wounding. Planting in northeast-facing sites may reduce freeze injury. Hill up soil around grapevines or otherwise protect the lower trunk in the fall to reduce winter injury and resulting wound sites needed for infection. Hilling also ensures the development of new scion shoots that may be needed for trunk renewal. In some areas growers bury young vines in the fall to reduce freeze injury.

- **PLANT ONLY CERTIFIED DISEASE-FREE NURSERY STOCK.** Generally, remove and destroy infected plants; however, galls on the upper parts of the trunk or on canes can sometimes be pruned out.

- **USE THE DOUBLE OR MULTIPLE TRUNK SYSTEM OF TRAINING.** This system may be useful for minimizing losses due to crown gall. If one trunk is infected, it can be removed. The remaining trunk can be pruned leaving a full number of buds until the second trunk can be renewed.

- **MANTAIN GENERAL PLANT HEALTH.** Grape vines with poor vigor are more susceptible to winter injury, thus it is important to manage the crop and other grape diseases so as to insure maximum vine vigor.

- **THERE ARE NO EFFECTIVE CHEMICAL CONTROLS AVAILABLE TO MANAGE GRAPE CROWN GALL.** A petroleum-based product called Gallex can be painted on individual galls, causing them to shrink temporarily. This treatment is costly and needs to be re-applied periodically. The biological control microbial antagonists used to manage crown gall in other crops at planting, such as nursery stock, do not work for grapes. Soil fumigation is generally not effective for destroying the pathogen.

Additional Resources

- Midwest Grape Production Guide (Ohio State University, 2005)
<http://ohioline.osu.edu/b919/index.html>
- Midwest Small Fruit Pest Management Handbook (Ohio State University, 2004)
<http://ohioline.osu.edu/b861/index.html>

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