

Crown Gall

(Agrobacterium vitis)

December, 2015

Crown gall is an important disease of wine grapes when they are grown in cold climates. Incidence may range from a few vines in a vineyard to 100% of the vines. Gall development may result in girdling of vines and reduced vigour and yield.

Symptoms

Gall formation on the aerial part of the vines is the most common symptom associated with this disease. The bacterium which causes crown gall may be present in plants that do not show any symptoms. Galls are usually noticed as swellings near the base of the vine and up the trunk. Galls on roots of grape are not typical; however the bacteria can induce a localized necrosis of roots. Young galls are soft, creamy to greenish in colour, with no bark or covering. As they age, the tissue darkens to brown. The surface becomes open and the texture becomes moderately hard and very rough. The surface tissue of the galls turns black as it dies, but the bacterium remains alive in the vine.

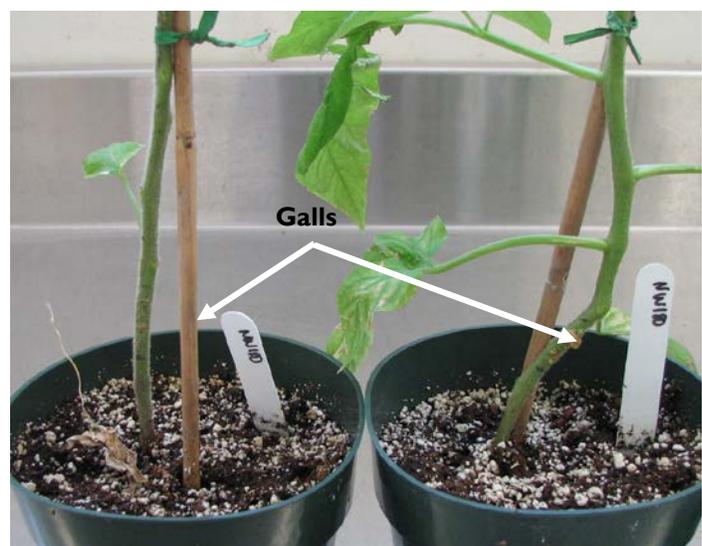


Crown gall on grape vine

Disease Cycle

The crown gall bacterium survives systemically inside the grapevine. The primary source of diseased vines appears to be through propagation of diseased wood. The bacterium remains inside the vine until there is an injury to the trunk and only then invades the outer part of the trunk where it causes rapid cell multiplication and distortion of tissue producing galls. Most grape cultivars are susceptible to crown gall. Major outbreaks are generally restricted to the varieties that are most susceptible to winter injury. The amount of crown gall present from year to year appears to be related to the severity of the preceding winter and the maturity of the vines.

The crown gall bacterium may also survive in vineyard soils in vine debris, but the importance of soil-borne inoculum in replanted vineyards is not well understood. It is believed that the majority of infections are a result of contaminated planting material.



Crown galls forming on 'Merlot' grape seedling. Photo courtesy Agriculture and Agri-Food Canada

Control

Control of crown gall can at best be referred to as an attempt to manage this disease.

Before Planting

Losses of grape plants due to crown gall may be minimized with some considerations before vineyard sites are selected and before vineyards are planted. Criteria to consider include the following:

- Select sites with good air and water drainage.
- Avoid planting in frost-prone areas.
- Select rootstocks that are resistant to crown gall. Certain rootstocks such as Courderc 3309, 101-14 Mgt, and Riparia Gloire are resistant, whereas Teleki 5C and 110 Richter are susceptible. Resistant rootstocks can reduce the amount of crown gall that appears on susceptible scions.
- Select hardy varieties where possible. In general, *V. vinifera* cultivars are all highly susceptible.
- Prepare sites with nutrients and lime before planting if necessary to avoid vine stress due to poor nutrition or low pH.
- Consider pest control programs for nematodes and phylloxera before planting through the use of soil fumigation or rootstocks. Feeding damage by these pests provides sites for the entry of crown gall bacteria.
- Plant old vineyard areas where crown gall was present only after grapevines have been removed for at least 2 years. This is important because crown gall bacteria can survive in the remnants of the old grape plants until the debris decomposes. Success in reducing crown gall from the soil by leaving soil fallow or rotating to other crops may vary depending on the amount of vine debris that is left in the soil, and how fast it breaks down.
- Do not propagate wood taken from galled vines.
- Specify that plant material you purchase be propagated from crown gall free plants. Producers must promote the production of certified indexed crown gall free vines.
- Hot water treatment of vines is effective in reducing crown gall infection levels in planting materials. Hot water treatment is required for vines imported from France or Germany for the prevention of phytoplasma diseases.



Fig. 3. Aerial crown gall on grapevine.
Photo courtesy Agriculture & Agri-Food Canada

After Planting

There is little that can be done to control this disease once it is established in the vineyard.

- Avoid injury to vines (winter, mechanical and human). Remove suckers when shoots are small (3 to 6 cm) to reduce trunk damage and promote rapid healing of wounds. Removing larger shoots before they harden will result in clean and small scars.
- Hill young vines with 30 cm or more of soil or other material to protect them from cold temperatures. Remove this material carefully to avoid mechanical damage.
- Prune to delay budbreak (late pruning) on varieties prone to early bud break.
- In France, application of K₂O instead of nitrogen fertilizers is used to improve resistance of the vines to cold.
- Biological control of grape crown gall has been effective in trials, and is a promising management tool for the future.