Crown Gall Persists in California

Crown gall continues to be a widespread problem in vineyards throughout California mainly due to many plantings of contaminated and infected material produced under mist propagation.

Increased use of sprinkler irrigation has also provided a climate more favorable for disease development.

Crown gall, also known as black knot, attacks woody plants including walnut trees, fruit trees, bush berries, shrubs and rose bushes as well as grapevines. There are three types (biovars) of crown gall bacterium called *Agrobacterium tumefaciens*. Although biovars 1 and 2 have been detected in grapevines occasionally, biovar 3 is the most common type found in grapes.

Research indicates that *A. tumefaciens* is systemic in vines, a characteristic apparently limited to grapes. Consequently, the bacterium may be internal in mother plants and propagation wood without producing any signs of symptoms. Thus, presumed disease-free propagation material may harbor the pathogen, which may later cause galls if wounds are present and the environment is conducive. For unknown reasons, contaminated stock remains free of infection when planted in some regions.

The systemic nature of the bacterium is a major problem for nurseries since it is difficult to determine if propagation material is free of bacteria. Several methods, including use of DNA probes, have been developed to detect the presence of the bacterium. Thus it now appears possible to index all material to be used for propagation purposes. Mist propagation of stock by nurseries is seldom used because environmental conditions highly favor infestation and infection of material.

According to the University of California's *Grape Pest Management* manual, opinion on the significance of the disease has varied greatly because many factors affect its severity, such as location of galls, cultivars, cultural practices, and the influence of climate.

Crown gall is most severe in moist climates where frosts are common. Freeze damage causes wounds that enable the bacterium to infect multiple sites on canes, often producing a beaded appearance. Under these conditions, the disease can destroy a vineyard.

The galls girdle the tissue, preventing the flow of nutrients. They also offer sites for invasion by various fungal pathogens and some insects. The effects of crown gall on vine vigor may also be subtle. Studies on Zinfandel grapes have shown that galls on the crown can cause a 10 percent decrease in yield and vine vigor, the latter determined by can diameter and new growth.

On the other hand, the disease caused no detectable effects on vines with mildly infected crowns—less than 25 percent of the crown circumferences was covered by galls. In some cases a

slight increase in vine vigor was noted; this was not surprising as it is known that girdling, if not severe, can cause temporary increases in growth.

Still, the long-term effect of crown gall on California vineyards is difficult to assess or predict, especially in regions where disease severity appears to be relatively mild.

Even in vineyards where infection incidence is low, crown gall has the potential to become a major problem when cultivars are grafted or budded with new cultivars of choice.

It is difficult to prevent the bacteria from infecting the cuts; the result is killing or weakening of the scions. It also is likely that mildly infected vines will not live as long as healthy ones.

To avoid crown gall, it is essential to used indexed stock certified to be free of the bacterium. Sanitation practices and avoidance of injuries help to prevent contamination and infection of plant material.

Equipment, work areas and soil must be kept clean and plants should be handled carefully to avoid contamination. Although experiments have indicated that fumigation does not eradicate the bacterium in field soil, some nurseries claim it has reduced disease incidence. Fumigation of bedding soil is more effective than fumigation of soil in vineyards.

Once infected, the growth of galls can be curbed by a spot treating each infected vine by hand. The Gallex will not eradicate the bacterium from the vines, but will eliminate existing galls.

Another control alternative is the use of *Agrobacterium radiobacter*, also known as Galltrol, which is a highly effective biological control agent. But, unfortunately, it does not have an effect on biovar 3. Since most infections on grapes are caused by this biovar, investigators are searching for other bacterial strains that may control it.

Another method of prevention being studied is immersing dormant cuttings in 122-degree water for 30 minutes which seems to kill biovar 3 strains. Researchers are working on other solutions to avoid crown gall infection in vineyards, including developing mother blocks of bacterium-free plant material, using tissue culture to propagate plants, thus eliminating the bacteria from the system. □

James Rice Moves to Environmental Data Centers

Environmental Data Centers Inc., a national company that provides OSHA and EPA regulatory compliance services to industry, has recently named James K. Rice to market their services in the Central Valley.

EDC provides comprehensive customized compliance programs designed to reduce companies' liability for fines and penalties associated with noncompliance with OSHA and EPA, including EPA Community Right-to-Know chemical reporting, Hazard Communications and training, lockout/tagout and Bloodborne Pathogens programs.

Rice will be responsible for providing the full range of EDC services in the Central Valley and can be reached at (209) 439-1869. □