

## Update on Stem Gall (Canker)

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Cranberry stem gall has erupted sporadically in Wisconsin for at least 25 years. The problem also has been reported from every other major cranberry-growing region. In 1998 and 2001 stem gall was especially common in central Wisconsin. Although stem gall commonly was called “canker” because of affected stems’ rough, cracked surfaces, a close view of the symptoms reveals bumps and galls on uprights and runners. When the galls encircle the stem, all leaves, flowers, and fruit above the galled area die. Stem gall can range from being a minor nuisance to very ugly, affecting large portions of beds. Entire vines generally are not killed, and new uprights arise from the runners. However, it takes about three years before the affected areas regain full production. Also, weeds tend to crop up in voids left by dead uprights.

Stem gall often shows up in a somewhat linear pattern along the length of a bed and is sometimes worse near the bed ends. This suggests that mechanical injury might have a role, since beaters run the length of beds and can “rough up” the vines as they turn at the ends. Another form of wounding is low-temperature or “winter” injury, and gall symptoms have sometimes been noted in areas of the bed that were not protected by ice or snow, or where vines underwent freeze/thaw cycles. When woody plants recover from injury, they form callus tissue, which causes stem swelling. However, the galls that we’ve observed are different from callus. We do not believe that stem gall is merely a plant’s normal, healthy response to wounding.

### What causes stem gall?

Stem gall was a topic in the 1999 Cranberry School Proceedings (pp. 22-24). At that time, we suspected that the soilborne pathogen *Agrobacterium*, which causes galls on other plants, might be involved. While *Agrobacterium* may have a role, we think it’s more complex than that. Our current thinking on stem gall is that it may not be caused by one pathogen, but perhaps by a collection of bacteria that produce indole acetic acid (IAA) which is an auxin type of plant hormone. Plants make their own IAA which is essential for cell elongation. However, many bacteria (including non-pathogens) found on plants and in soil also produce IAA. Usually production of IAA by non-pathogens has no bad effects on the plant. However, if they’re present in large enough numbers and make enough IAA, bacteria can cause abnormal development of the vascular tissues needed for water and carbohydrate movement in cranberry plants. When we inoculate tissue culture cranberry plants with IAA-producing bacteria or with *Agrobacterium*, the plants develop galls. Applying synthetic IAA (purchased from a chemical company) also induces galls, suggesting that it’s IAA and not the bacteria per se that causes symptoms.

To prove that bacteria are the cause of stem gall, we must reproduce gall symptoms on woody plants by inoculating with the suspected pathogens. So far we have not been able to reproduce symptoms on woody cranberry. This is somewhat troubling, because in the field it’s the woody parts of stems that get galls. We’ve tried

injecting woody stems directly and even dousing cranberry sods with high doses of bacteria, but galls have not developed. However, these experiments are ongoing—we haven't given up.

We think that bacteria have a role in stem gall, but it's clear that the environment plays an overwhelming role. The bacteria that make IAA and *Agrobacterium* are found in healthy beds as well as diseased beds; they cause trouble only under certain environmental conditions. What are those conditions? Anything that wounds stems and abundant water that allows bacteria to enter wounds. The winter that preceded the 2002 season was mild, with many freeze/thaw cycles and poor ice cover. This probably injured plants. At many sites where stem gall was severe, beds had been re-flooded during a late April cold snap. We think that during the re-flood, or perhaps even when irrigating for frost protection, bacteria entered through wounds. In the spring, when plants are breaking bud, the new vascular tissues are particularly sensitive to IAA. Microscopic evidence suggests that the abnormal growth that leads to stem gall starts as soon as plant growth resumes in the spring.

### **Managing stem gall**

Managing stem gall depends on protecting plants from injury. So, take it easy with the beaters, and do your best to protect vines during winter. Also, if vines get too long (e.g., from lack of sanding), they tend to get lifted and ripped during freeze/thaw cycles. Even though copper is bactericidal, we do not recommend spraying copper. With bacterial diseases of other plants, copper is not effective when bacteria are actually inside the plant, as they are with stem gall. If you look at the labels for Champ, Kocide, and some other copper compounds, you will see that dormant sprays are recommended for control of “bacterial stem canker” of cranberry. This is puzzling, because our study of cranberry stem gall is the first aimed at identifying the cause. Apparently the fungicide manufacturers figure that if blueberry has a bacterial stem canker (which it does), then cranberry must have something similar. There simply is no data to support the label recommendations. Finally, stem gall occurs so sporadically and unpredictably, that you would waste a lot of money spraying it where the problem might never develop at all.