

A3795

Cranberry stem gall

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Cranberry stem gall has occurred sporadically in Wisconsin since the 1980s and has been reported in Massachusetts and Quebec. Usually only a small portion of a planting is affected, and yield losses are insignificant. However, it takes 2–3 years for vines to regain full productivity following a severe outbreak. Stem gall occurs in both older peat-based beds and in newer sandy beds. In Wisconsin, stem gall has been observed on several cultivars including Ben Lear, McFarlin, Pilgrim, Searles, and Stevens. Additional cultivars affected in Massachusetts include Early Black and Howes. Controlled studies on the susceptibility of cranberry cultivars to stem gall have not been conducted.

Stem gall sometimes has been referred to as “canker” or “beater damage,” because the rough, swollen stems superficially resemble cankers caused by fungi or wound callus tissue that develops on other woody plants when they recover from injury. However, research has shown that stem swelling and galls on cranberry are caused by bacteria rather than by fungi. Although symptoms are worse where plants have been injured, the swelling is not caused by wound callus tissue.

Symptoms

When viewed from a distance, the most obvious symptom of stem gall is shoot dieback. The browning and death of upright shoots (“uprights”) sometimes follows a pattern, as though related to the movement of harvest equipment. However, shoot dieback often occurs in irregular patches, especially near the ends of beds where

floodwater enters first and exits last. Symptoms at the ends of beds also may be related to areas where harvest machinery slows down to turn, causing prolonged contact between beaters and plants. Although shoots begin to die back before cranberry plants flower, symptoms become most noticeable during the flowering and fruit set stages.



From a distance, shoot dieback is the most obvious symptom of cranberry stem gall.

Dieback may appear in relatively straight lines (left) or in irregular patches (below).



Uprights and runners affected by stem gall are swollen and rough with split, peeling bark. A closer look reveals numerous small galls and bumps beneath the bark. Galls can be confined to a small portion of the stem or they may extend for several inches along an upright or runner. When galls encircle stems, everything growing above the galls dies. Entire vines are not killed, however, and new shoots arise from healthy portions of stems below the galls. Symptoms have been noted on woody stems in the field but not on the current year's growth.



Close-up of the distinctive galls.

Cause and disease development

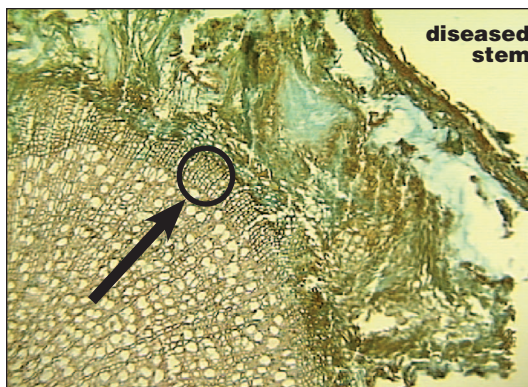
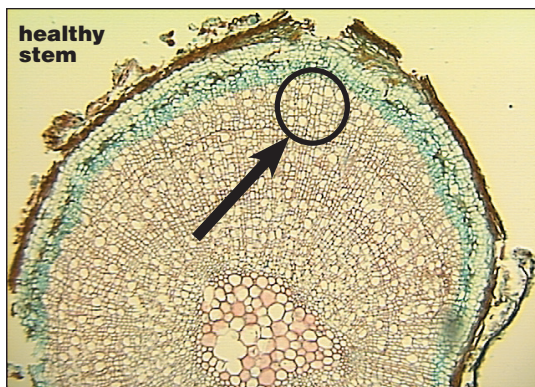
Stem gall is probably caused by various bacteria that produce the plant growth hormone indole-acetic acid (IAA). The most prominent groups of IAA-producing bacteria found in galls are species of *Enterobacter*, *Erwinia*, and *Pantoea*. These bacteria likely enter plants through wounds created by harvest machinery, winter injury, and/or leaf drop. Research suggests that infection occurs sometime between fall harvest and budbreak the following spring. Once inside the plant, bacteria multiply to large populations. High levels of IAA result in abnormal development of the vascular tissues (i.e., tissues through which water, nutri-

ents, and carbohydrates move). In particular, water-conducting vessels of galled stems are narrow and inefficient, leading to shoot wilting and dieback. Tissues just below the outer bark grow excessively, resulting in stem swelling and galls. The rapidly growing galls break through the bark and cause it to split and peel from stems.

The bacteria involved in stem gall are common in soil and can be found in cranberry beds with no past history of the disease. Also, symptoms can be severe one year and absent the following year. This suggests that stem gall is highly dependent on the environment, rather than dependent only on the presence of bacteria. However, the conditions that favor



Arrows point to diseased (lower) and healthy (upper) stems.



Cross-sections of cranberry stems under the microscope. Water-conducting vessels of the outermost ring in the diseased stem (right) are narrower than the healthy vessels (left). Note also the greatly expanded tissue just beneath the bark of the diseased stem.

infection and gall formation are not known. In Wisconsin the most severe outbreaks have occurred in seasons following mild winters, when vines have not had a continuous ice and/or snow cover. Exposed vines experience widely fluctuating temperatures, which can cause cracks and wounds through which bacteria invade.

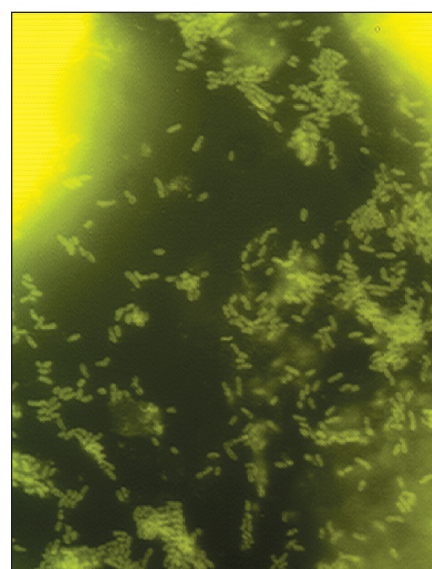
Control

The bacteria that cause stem gall may enter plants through wounds created by harvest machinery, so special care should be taken to not injure plants during harvest. If possible, beaters should be lifted while turning machinery at the ends of beds.

Protecting plants with a continuous cover of ice during winter is important for many reasons and also should help reduce the incidence of stem gall. In addition, vines should be kept relatively short by regular sanding and mowing. Excessively long vines that become encased in ice may be subjected to lifting and tearing when water freezes and thaws.

New shoots arise from healthy tissues below galls, allowing vines affected by stem gall to recover. Affected areas should be irrigated sufficiently to promote shoot growth. Additional fertilization is not recommended because weed growth is favored in areas of the canopy that have been opened up due to cranberry vine dieback.

Because stem gall is caused by bacteria, fungicides will not control this disease. Of the products registered for use on cranberry, only those containing copper are antibacterial. However, copper compounds generally are not effective against diseases in which bacteria reach high populations inside plants, as is the case with stem gall. Also, the sporadic nature of stem gall—severe one year and absent the next—makes it impossible to know when and where treatment will be needed.



Bacterial cells within a gall.

Related information

For detailed information about other cranberry disorders, refer to the following Extension publications:

- *Cottonball Disease of Cranberry* (A3194)
- *Cranberry Fruit Rot Diseases* (A3745)
- *Fungal Leaf Spot Diseases of Cranberry in Wisconsin* (A3711)
- *Cranberry Pest Management in Wisconsin* (A3276)—updated annually



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