Ball Horticultural Company
622 Town Road
West Chicago, IL 60185-2698
USA
ballhort.com

**Disease:** Crown Gall

**Pathogen:** *Agrobacterium tumefaciens*

- Considered a soilborne bacterium, but can survive not only in soil and plant tissue but also in water.
- Young, actively growing plants are more susceptible to infection and tumor development and possibly to increased distribution of the bacterium throughout the plant.
- Infects through fresh wounds that may be caused by harvesting/cutting, transplanting, mechanical shearing, pinching or insect feeding.
- The bacterium can be moved by water splash, but a wound (or natural opening) is still required for the bacterium to penetrate the plant tissue and cause infection. Shears/blades may not only move the bacterium from plant-to-plant, but they also produce fresh wounds for the bacterium to enter. Infection can also occur through the roots when grown in an infested substrate or irrigated from a contaminated water source.

**Symptoms:** Tumor-like growths, or galls, may occur on the roots, crown, stem or leaves. These slightly hardened overgrowths initially appear smooth and are white or cream in color. As the tumor grows and increases in size, the surface becomes bumpy and uneven. Eventually the outer cells of the tumor begin to turn brown, die and bacterial cells are sloughed off.

- The first signs of gall formation may be seen about 8-12 days after infection, developing into small galls after about 2-3 weeks depending on host, temperature and humidity.

*Lobelia erinus* with stem and leaf galls caused by *Agrobacterium tumefaciens*

**Host Range**: Mainly an issue on dicotyledonous plants. Has a large **experimental** host range encompassing over 330 genera in 93 different plant families. An experimental host is not necessarily one that would become infected under natural conditions.

- Images of symptoms caused by *Agrobacterium tumefaciens* on various hosts can be found at the following link: http://plant-clinic.bpp.oregonstate.edu/crown-gall

**Detection/Confirmation**: The bacterium can typically be detected in young gall tissue by molecular methods, but detection in asymptomatic plant parts is difficult and unreliable. Therefore, random sampling/testing of asymptomatic plants is not recommended. After the initial confirmation of an outbreak, the presence of characteristic stem and leaf galls is generally sufficient to diagnose the disease. HOWEVER, it is important not to confuse normal callusing at the basal stem of a cutting for crown gall.

**Control:** There is no cure for infected plants, and chemical prevention is largely ineffective.

**Clean up**: If one cutting in a tray has symptoms it is possible other cuttings are infected as well, ESPECIALLY if the plants have been mechanically sheared or pinched. Bagging and discarding the entire tray, substrate and cuttings is recommended.

- Do not compost since the bacterium can survive in the soil.
- Other crops grown next to or under infected plant material could become infected through water splash, drip or shared water uptake, but the risk of infection is reduced if the plants have not been pinched, cut, or sheared. These other crops should be frequently scouted for gall-like symptoms.
- Other crops that may have been sheared/pinched without sanitizing the blades after the infected crop, should also be closely scouted.
- Remove any substrate/debris from surfaces and apply a disinfectant to surfaces that were in contact or close proximity with the infected cuttings/trays. Oxidizing agents (such as Zerotol, Virkon S), quaternary ammonium compounds (KleenGrow, Physan 20, GreenShield) and hypochlorite (bleach) can be used.
- Closely follow label rate and contact times.
- Clean and sanitize any cutting blades or shears used on the crop.

**Other Technical Information:**

- After infection, the bacterium transfers a segment of its DNA into the plant host cell, which then integrates into the host plant genome and the presence of the bacterium is no longer necessary (which can make detection more difficult). After integration, tumor-causing genes in the transferred segment of DNA cause the plant cell to start over-synthesizing auxin and cytokinins which results in uncontrolled plant cell division and growth and the subsequent formation of a primary tumor (gall) at the site of infection.
- The ability of the bacterium to systemically move within the plant and produce secondary tumors has been demonstrated for several hosts. Secondary tumors have been induced by aseptically wounding the upper stem on plants previously inoculated at the crown. This means cuttings taken from an infected stock plant may appear asymptomatic, but tumors could potentially develop at cut/wound sites days to weeks later. Differences exist among plant species, but movement of the bacterium inside the plant is now believed to be more universal than historically thought (due in part to improved detection methods).