

Field Identification of Citrus Canker Symptoms and Decontamination Procedures ¹

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Identifying Citrus Canker

Citrus canker, caused by the bacterial pathogen *Xanthomonas citri* subsp. *citri*, is a serious disease of citrus. Most citrus cultivars are susceptible; grapefruit, Mexican lime, and some early oranges are the most susceptible. 'Navel', 'Pineapple', and 'Hamlin' oranges are moderately susceptible. Mid-season oranges, 'Valencia' oranges, tangors, tangelos, and other tangerine hybrids are less susceptible, and tangerines are tolerant. The disease causes necrotic dieback, general tree decline, premature fruit drop, and fruit blemishes. Severely infected trees become weak, unproductive, and unprofitable.



Figure 1. Necrotic canker lesions on grapefruit stems, leaves, and fruit

The citrus leafminer (*Phyllocnistis citrella*) has increased the vulnerability and susceptibility of citrus trees to canker. Leaves and stems damaged by the citrus leafminer are more likely to be infected because the wounds allow the bacterium to easily penetrate the tissue (Fig. 2). When leafminer feeding galleries become contaminated with the bacterium, the number of lesions and the area infected greatly expand and result in enormous inoculum production. The leaf lesions sometimes fall out, leaving holes. This is known as the "shot hole effect" and is most common with old grapefruit lesions.

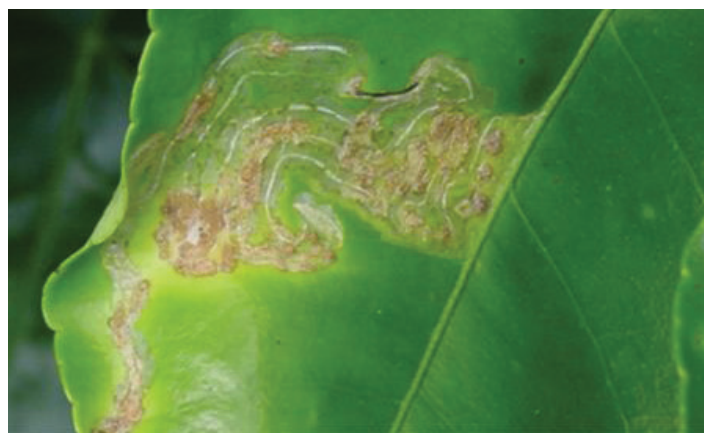


Figure 2. Canker lesions in leafminer galleries on upper side of leaf

Leaf Symptoms. Lesions appear within five to seven days under warm, moist conditions between 82°F and 86°F.

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The early leaf symptoms appear as slightly raised, tiny, blister-like lesions (Fig. 3). When leaf lesions are young, the yellow halo is most prominent (Fig. 4). As the lesions age, they turn tan to brown, and a water-soaked margin appears surrounded by a yellow ring or halo. The center of the lesion becomes raised and corky. The lesions are usually visible on both sides of the leaf (Fig. 5).



Figure 3. Young, blister-like lesions of citrus canker



Figure 4. Young lesions of citrus canker with yellow halo



Figure 5. Old lesions of citrus canker displaying the "shot hole effect"

Stem and Twig Lesions. Stem lesions often indicate infection has been present for at least a year. They serve as a reservoir for persistent inoculum and are able to produce inoculum for up to four years. When they occur on woody tissue, they are the same color as the branch but have a raised, wart-like surface (Fig. 6a). Symptoms on twigs and fruit are similar

and consist of dark brown or black raised corky lesions surrounded by oily or water-soaked margins (Fig. 6b). As the lesions mature, they appear scabby or corky



Figure 6a. Young lesions of citrus canker on young twigs



Figure 6b. Young lesions of citrus canker on young twigs

Fruit Lesions. Young lesions are raised, blister-like, tan, and can be surrounded by yellow halos, depending on fruit maturity (Fig. 7). As lesions age, they become dark brown to black with brown to black sunken, corky centers, and they may have yellow halos (Fig. 8). Old lesions often have a gray appearance. Generally, the lesions are circular and vary in size. Lesions cause blemishes and early fruit drop, thereby reducing fruit yield (Fig. 9). The internal quality of the fruit is not affected.



Figure 7. Young, blister-like canker lesions on fruit



Figure 8. Old lesions of citrus canker on grapefruit



Figure 9. Fruit drop caused by a severe canker outbreak

Decontamination Procedures

Citrus canker is highly contagious and can be spread rapidly by wind-driven rain, storm events such as tornadoes and tropical storms, equipment, and human movement within groves (Fig. 10). Movement of infected or exposed trees, seedlings, and propagative material is the primary means of spreading the canker pathogen over long distances. Contaminated clothing, tools, lawnmowers, and other landscaping equipment, as well as ladders, containers, and other items associated with harvesting are also potential sources for transmission to susceptible tissue.

Decontamination is a key practice to prevent the spread of citrus canker. Before decontaminating, remove any limbs, fruit, soil, or leaves from yourself, vehicles, and all equipment. This includes small personal items such as hats, jackets, and picking sacks. Leave any debris on the property to prevent further spread. If the grove location has an automatic decontamination spray system in place, confirm it is working properly before proceeding through it (Figs. 11a, 11b, and 11c). Due to mechanical issues or lack of solution, it may not be fully operational. Since all citrus groves do not have automatic decontamination stations or the system

may not be functioning properly, it is best for grove workers and managers to be equipped with spray bottles of personal and equipment decontamination solution (Fig. 12). If an automatic system is not available, a hand spray bottle for personal decontamination is sufficient. The decontamination solution is like a mild soap. Using the spray bottle, apply a light mist to your arms, hands, and the bottoms of shoes. A rule of thumb is if it came in contact with a citrus tree, then apply the decontamination solution; therefore, it may also be necessary to apply it to your chest and legs.

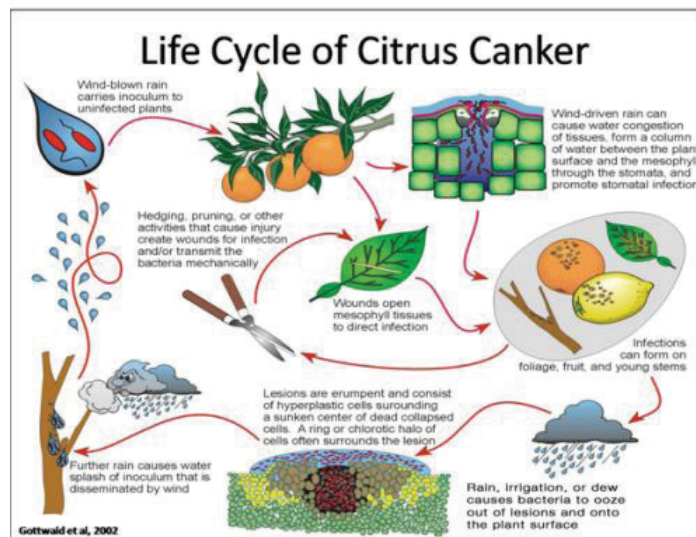


Figure 10. Citrus canker life cycle



Figure 11a. Automatic personnel decontamination station

To decontaminate vehicles and equipment, a one-gallon garden sprayer is simple and lightweight for storage and transport. When applying, begin spraying at the top of the vehicle and/or equipment and move downward until the spray material is running off. Other areas to spray include, but are not limited to, the tops of tool boxes, tires, and wheel wells. Unless it is designated as a two-in-one solution, the decontamination solutions are intended for either personnel or equipment. Do not use the solution designated

for equipment on your skin as it is harsher than the personal solution. Equipment decontamination solutions should be checked monthly for quaternary ammonium chloride (QAC) concentration to ensure effectiveness.



Figure 11b. Automatic vehicle and equipment decontamination station



Figure 11c. Large tank used for storage of decontaminant for automatic systems



Figure 12. Types of spray bottles

Decontamination training is required annually for grove workers and harvesters. Trainings can be scheduled through local UF/IFAS Extension offices. Personnel are required to decontaminate upon exiting a grove. The exception to this rule applies to harvesters. Harvesters are required to decontaminate upon entering and exiting

a grove regardless of whether an infection is known to exist. State regulations require all vehicles and equipment exiting citrus groves to be decontaminated. A grove owner/caretaker may also require decontamination upon entering groves. If you suspect citrus canker, provide a digital photo to your local county Extension office for assistance with identification and management options.

Additional Information

For more information about citrus canker, visit these websites:

USDA Animal and Plant Health Inspection Service
http://www.aphis.usda.gov/plant_health/plant_pest_info/citruscanker/index.shtml

Approved Decontamination Products and Methods
<http://www.freshfromflorida.com/pi/chrp/schedules/decontamination.pdf>

Citrus Canker Extension Program
<http://canker.ifas.ufl.edu>

Citrus Health Response Program
<http://www.doacs.state.fl.us/pi/canker/>

Citrus Leafminer, *Phyllocnistis citrella* Stainton (Insecta: Lepidoptera: Phyllocnistinae)
<http://edis.ifas.ufl.edu/in165>

Florida Citrus Pest Management Guide: Citrus Canker
<http://edis.ifas.ufl.edu/cg040>

UF/IFAS Extension Offices
<http://solutionsforyourlife.ufl.edu/map/index.html>

