



Citrus Canker



Canker is a highly contagious, bacterial disease that attacks citrus. Although it is one of citrus' most serious maladies, it doesn't harm people or animals. The three strains of canker are Asian, B and C. The Asian form of canker is the most virulent (infective).

Asian-strain symptoms are brown raised lesions surrounded by an oily, water-soaked margin and a yellow ring or halo. Old lesions on leaves may fall out, creating a shot-hole effect. Twig symptoms show as slightly raised, tan, dead tissue surrounded by dark oil water-soaked margins. Canker can attack any part of the tree including the leaves, fruit, branches or trunk. Infected trees are weakened, causing leaves to drop, the tree to die back, and fruit to drop prematurely.

Canker is found in many parts of the world where citrus is grown such as Africa, Asia and South America. The disease was most likely brought to the U.S. on infected fruit or plant material from an infected area outside the country.

Growers must abide by the Citrus Health Response Plan. The plan requires that all growers register citrus production sites by signing the *Commercial Citrus Grove and Caretaker Compliance Agreement*. The Agreement specifies the requirements for grove survey, disease management, decontamination and other issues. A key component of any plant pest and disease eradication or control program is surveillance. The growers must survey their grove for canker and other pests. Decontamination is essential to control the spread of citrus canker as well as other citrus pests and diseases. Canker management will be the responsibility of the grower/caretaker based on best management practice guidelines put forth by the appropriate State Extension personnel.

Groves which are affected face serious risks. The growers are faced with potential loss of investment. On average the loss of harvestable oranges due to citrus canker, will equal 335 boxes/ acre. The average harvest of healthy trees will equal 389 boxes/ acre. The growers are also faced with additional management costs to control the citrus canker. The diseased fruit could still be used for juice because citrus pulp is too acidic for the bacteria to survive. The appearance alone of canker would prevent the sale of diseased fruit on the fresh market where it's worth more than if it were sold for juice.

A quarantine zone is established to prevent growers from spreading the disease by moving fruit out of an infected area to other uninfected citrus-producing areas. Because growers must transport their fruit to packing houses and processing plants to sell it, the quarantine essentially prevents them from getting paid. If countries, to which Florida exports citrus, ban Florida citrus because of canker, which has happened in the past, growers can lose the market for an entire crop, which means they don't get paid for that season.

More information is available at <http://www.freshfromflorida.com/pi/canker/> and <http://edis.ifas.ufl.edu/cg040>.



Laurel Wilt



Laurel Wilt is a fungal disease associated with an exotic ambrosia beetle that affects red bay (an important species for coastal wildlife), and avocado production. The fungus causes wilted foliage, discoloration of plant vascular structure and sawdust tubes. It has been detected in Georgia, South Carolina, Florida and Mississippi. The disease also affects sassafras, swamp bay, pondspice, pondberry and camphor.

The beetle that spreads this disease is an exotic beetle from Asia. It is smaller than the Lincoln's beard on a penny and a powerful flyer. By the time symptoms appear in plants the beetles have probably infested many trees in the area. Biological controls are not yet available. Pesticides are not recommended because of the number of non-target species that would be harmed.

Human movement of infested plant material is instrumental in spreading this disease over long distances. Therefore, it is best not to move plant material from the wild to home plantings, and not to transport mulch or firewood over long distances. Use mulch and firewood locally.

View a PowerPoint program with pictures of the insect, infected plant materials and disease symptoms at <http://www.protectingusnow.org/> under the heading scripted PowerPoint presentations. Further information is available at the Florida Department of Agriculture and Consumer Services, Division of Plant Industry at http://www.freshfromflorida.com/pi/enpp/pathology/laurel_wilt_disease.html including a video, most current updates of new infestation areas, county by county identification as well as national infestation, control campaigns, and consumer services. Also on this site is a *Save the Guac* campaign or direct link at <http://www.savetheguac.com/>.





Mediterranean Fruit Fly



The Mediterranean fruit fly (Medfly) is one of the most destructive agricultural pests in the world. Because it's attracted to 260 host fruits, nuts and vegetables, which includes avocados, figs, guavas, grapefruit, lemons, mangoes, oranges, peppers, tangerines, tomatoes, peppers, and others. It is considered enemy No. 1 for the agriculture and citrus industries in Florida and elsewhere. As its name suggests, the Medfly is not native to the continental U.S. Infestations in California and Florida in recent years are believed to have been caused by travelers carrying in infested produce and plant material. Females are capable of producing hundreds of eggs leading to population explosions under Florida conditions.

The Medfly is smaller than a housefly. The top of its back is mottled with yellowish-white and black areas. The abdomen has two distinct cross bands. The front edge of the wing has many small dark/clear areas. Females puncture host fruits, nuts and vegetables and lay eggs inside. Maggots hatch from the eggs and feed and grow inside these host fruits, nuts and vegetables. A Medfly life cycle lasts between 20 and 21 days in Florida but doubles in cooler climates when temperatures are cooler in the winter. Female Medflies can lay between 300 and 800 eggs in their lifetime.

Medfly is eradicated using a combination of different methods, which include quarantine, ground and aerial treatments of the pesticide spraying, and sterile fly releases. A cooperative state and federal program monitors more than 56,000 fruit fly traps across the state as part of an early fruit fly detection network to prevent fruit fly introductions. The most effective tool against Medfly, particularly in large infestations is the malathion bait spray. The mixture is made up of 2.4 ounces of malathion diluted with 9.6 ounces of corn syrup spread over a one-acre-size area. The Medfly dies after it eats the bait spray. The bait spray can be applied to host plants from the ground or from the air and is effective because of the high number of flies and the large size of the treatment areas.

In addition to the monitoring program, the Sterile Insect Technique and Mediterranean Fruit Fly Preventive Release Program (PRP) began in 1999. Millions of sterile Medflies are released throughout high-risk areas of the state. Sterile Medflies are a good preventative measure. Sterile Medflies are eradicated in laboratories outside the continental U.S. and imported. The flies are not radioactive and pose no health threat to people or the environment. One hundred sterile flies are released for every Medfly to ensure that wild females mate with sterile males, preventing the wild females from getting pregnant. Between 500,000 and 1 million sterile flies are released per square mile in primary treatment zones. About 250,000 flies are released per square mile in buffer zones. Previous Medfly eradication programs in Hawaii and California have shown that sterile fly release is only effective in eradicating new Medfly infestations when it follows applications of the malathion bait spray to reduce the Medfly population.

Care is taken in pesticide use to protect human non-target animal health. Nighttime aerial applications used by the Florida Med Fly eradication program helped protect bees because bees are less active at night. Preventing airplanes and helicopters from spraying water bodies by creating buffer zones, as practiced by the Florida Medfly eradication program, help shield aquatic life.

Trees don't have to be destroyed to eradicate Medfly. However, quarantine areas are established during a Medfly infestation to restrict the movement of fruit to prevent further spread of the pest. Quarantine restrictions can't be lifted until the area goes through three Medfly life cycles, about three months, without a fly found. Because Medflies usually emerge during the warm summer months, quarantine restrictions often stretch into Florida's citrus season, which begins in September or October. Growers in the quarantine areas must bear the cost of treating their fruit before or after they harvest it. Ground treating the fruit costs about \$5 an acre.

If countries, to which Florida exports citrus, ban Florida citrus because of Medfly, growers may not have a market for an entire crop, meaning they won't get paid for the season.

More information is available at <http://www.freshfromflorida.com/press/2011/07012011.html>.





White Flies

More than 1500 species of Whiteflies have been identified and 65 species attack citrus across the globe. These tiny white flies are found on the underside of leaves where they feed on plants by tapping into the plants phloem. As the whiteflies suck plant sap out of the leaves, they introduce toxic saliva, secrete honeydew that encourages mold growth, and introduce viruses and bacteria that lead to diseases.



Whiteflies are tiny – about 1/10 to 1/16 of an inch and appear to the naked eye like tiny moths. When a heavily infested plant or group of plants is disturbed the flies rise like whiteclouds of winged adults. Some of the species have become serious pests of vegetable crops, greenhouse plants and ornamental plants. In colder climates, whiteflies die outdoors and survive only in greenhouses and indoor plants, but Florida's year-round warmth allows year round survival indoors and outdoors. In Florida, several generations can overlap causing constant damage. Large numbers of tiny whiteflies seriously weaken plants, leading to yellowing, leaf drop and very poor growth.

Chemical control of Whiteflies is challenging because they develop resistance to pesticides. An integrated pest management control process is best. Integrated Pest Management (IPM) includes biological control using natural predators, parasites or diseases, mechanical control using sticky or pheromone traps, physical removal of insects, cultural controls that disrupt the life cycle of the pest and chemical controls. IPM of whiteflies may include the use of parasite in controlled greenhouse settings but is not practical outdoors. Sticky yellow traps in greenhouses is also effective but may be limited outdoors because of the number of traps needed perhaps as many as one sticky trap for two small plants. Hand held vacuums have been used to physically remove whiteflies early in the morning when they are slow moving and then bags of captured flies are frozen for 24 hours to kill the insects. Again the size of crop area and type of crop make this technique a challenge outdoors or in certain crops. Chemical controls, applied by a licensed applicator, may be used in a rotation so that pests do not become resistant to a particular chemical pesticide. Predatory insects may be purchased in quantity and let loose in infested areas when pesticides are not in use or between applications. All treatments are best prior to heavy infestations so scouting and identifying a growing problem is important to avoid such heavy infestations.

More information is available at <http://www.freshfromflorida.com/pi/>, or <http://entnemdept.ufl.edu/fasulo/whiteflies/>, or http://solutionsforyourlife.ufl.edu/hot_topics/agriculture/whiteflies.html and <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7401.html>



Citrus Greening



Citrus Greening, also known as yellow dragon disease (huanglongbing), is one of the most serious citrus diseases in the world. It is a bacterial disease that reduces citrus production and makes the fruit unmarketable. In its worse infectious state it can kill the citrus trees. There is no cure for a tree infected with the disease. In Asia, Africa, the Arabian Peninsula and Brazil, infected trees decline and die within a few years. It was first identified by farmers in China in the late 1800s.

Citrus Greening was first found in the United States in 1998 and by 2005, spread to much of Southern Florida. It is spread by two insects; the Asian citrus psyllid and the African citrus psyllid but only the Asian psyllid has been detected in the United States. The insects spread the disease by feeding on an infected tree, moving to a non-infected tree and transmitting the disease as it feeds. It can also be spread by grafting infected budwood onto non-infected trees. It is not spread by contact with contaminated personnel or tools, nor by wind or rain. Symptoms include yellowed, blotchy mottling of leaves. The disease may also cause small, narrow leaves and stems that make the plant have a shortened, stunted look. Fruit from these trees is small, misshapen and often remain green even when ripe. Fruit is bitter, medicinal or sour. In addition, seeds do not develop and fruit set on the trees is poor. Diagnosis is often difficult because the disease remains latent for some time before expressing itself (2 years) and early symptoms can be confused as mineral deficiencies.

The exact time or event that introduced Citrus Greening to Florida is unknown. Frequent travel, increased tourism and immigration have increased the risk of importing exotic plant diseases into the United States. It is also possible that infected plant material was smuggled in to the U.S. with the intent of propagating that citrus variety.

To prevent transmission of Citrus Greening or its transmission agent the Asian Citrus Greening, infected trees are removed and all live plant materials are prohibited from being shipped outside of areas quarantined. To protect U.S. plant health government inspectors clear imported plants and seeds. Homeland security works at U.S. ports and airports to inspect fruit and vegetables and food items imported illegally.

Additional information is available at:

http://www.aphis.usda.gov/plant_health/plant_pest_info/citrus_greening/index.shtml
and <http://www.freshfromflorida.com/pi/chrp/greening/citrusgreening.html>.