Imperial County Agricultural Briefs

Features

From your Farm Advisors

July, 2010

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Residents are the First Line of Defense against Asian Citrus Psyllid, and Citrus Greening Disease

By Donna Henderson

Huanglongbing, or Citrus Greening Disease, is a devastating disease of citrus plants caused by the bacteria *Candidatus* Liberibacter asiaticus. The Asian Citrus Psyllid (ACP), *Diaphorina citri*, is a vector or carrier for this bacterium. Symptoms of the disease include asymmetrical blotchy leaves, yellowing shoots, dieback of twigs, branches, and eventual tree death. Fruit are lopsided, small, sometimes remaining half green, and bitter (figure 1). There is no cure for the citrus greening disease. California's total citrus production has averaged 3.2 million tons per season over the past three seasons, or 24 percent of the nation total (USDA). California supplies 80 percent of the nation's fresh-market oranges, and 87 percent of the nation's lemons. Florida grows oranges mainly for juice.

In California, the ACP was first discovered on August 27, 2008, in San Diego County. In October 2008, it was found in Imperial County. Later, in August 2009, the ACP was found in Orange County. And then in August 2009, it was found in Los Angeles County. In late August 2009, over 100 psyllids were discovered in a FedEx package shipped to Sacramento. Recently, I received a letter in the mail from CDFA informing me my home residence would be a participant in the Asian Citrus Psyllid (ACP) eradication program. Imperial County is one of the southern California counties that have detected the presence of the invasive insect ACP. Currently our county participates in a quarantine that limits transport of citrus plants and fruit into the county. Our county is also participating in a proactive eradication program, whereby all citrus trees in ACP detection zones are to be monitored and sprayed with insecticide to kill the ACP. As a plant pathologist, I was very pleased to get such a notice in the mail, as the saying goes, “an ounce of prevention is worth a pound of cure”. Every citizen in Imperial County should be as concerned to do their part to help keep the ACP out of our citrus plants, let me explain why.

A similar story with a sad ending has already played out in Florida. Back in 1998 in Palm Beach County, Florida, the ACP was first detected in a resident’s backyard Orange Jasmine plant. It only took until 2001 for the ACP to spread to 31 other Florida counties, due mostly to the movement of nursery plants, and the natural movement of the insect. Then, in 2001 ACP was introduced into the Rio Grande Valley on potted nursery stock from Florida. It wasn’t long before ACP was found in Alabama, Hawaii, Georgia, Louisiana, Mississippi, and South Carolina in 2006 to 2008. Although ACP was first detected in 1998 in Florida, there was no detection of the citrus greening disease until 2005. It took Florida 7 years after the introduction of ACP to finally detect citrus greening disease. Now, all citrus growing counties in Florida have confirmed detection of the citrus greening disease. Florida's $9 billion citrus industry reports losses of $300 million annually as a result of ACP and citrus greening. Almost 60,000 acres of trees have been removed so far, comprising approximately 10% of Florida's commercial citrus production. Florida growers are spending on average $500 per acre annually on their ACP and citrus greening control and eradication efforts. And the condition continues to worsen.

There are a few lessons that the rest of the country has taken from Florida's experience, and the reasoning behind the strict quarantine and eradication efforts. Firstly, scientists have acknowledged the huge role that uninspected nursery plants and local plant transportation had in the spread of the disease. The spread of the insect and subsequently the disease had a substantial start through nursery stock movement and through introduction of ACP by planting or transporting common host ornamental plants like Orange Jasmine. Orange Jasmine is a common plant used in floral arrangements and landscapes.

Secondly, symptoms of citrus greening were delayed for years in infected citrus plants. There is a latency period between infection and symptom development. Depending on tree size and other factors, the latency period can be between 6 months and 2 years, or longer. During this latency period, psyllids can acquire the pathogen from asymptomatic trees; however, the rate of acquisition may be lower than from symptomatic trees containing higher levels of the pathogen. A scenario that played out in Florida was the unintentional harboring of the disease in infected trees. Infected asymptomatic trees are overlooked, creating a primary source from which the disease will continue to spread. That is why a primary management strategy against the disease is controlling the ACP, so it has less chance of spreading a hard-to-detect disease to new plants. The second control method is to cull and destroy infected plant material. Although here in California we have not yet detected citrus greening disease, that doesn't mean there is no disease. From Florida's experience we know that symptoms of the disease can be delayed 2 years of more. Therefore, our foremost priority is the need to prevent the ACP insect from spreading. Without the insect host, the bacteria cannot infect healthy trees.

California is one of the last citrus-producing regions in the world that has yet to be impacted, but citrus greening could invade California at any time. The quarantine is in place for prevention; hopefully our situation won't turn out quite as dire as in Florida. The most likely sources of a potential infestation would be from goods shipped to California from Florida, Mexico, Hawaii or Asia. For example, a shipment of fresh curry leaves (a host plant) was intercepted from Hawaii that was infested with ACP. The citrus greening may also find its way to California through self-introduction via wind currents and migration.

It is very important for our citrus industry that we uphold the quarantine and not be tempted to bring in lemons, limes, oranges, or various nursery reared plants from other states and countries. Imperial County has a substantial citrus industry, and citrus greening disease will lead to a heavy financial loss for our county and state if the disease appears and begins to spread throughout California. We have a chance to learn from Florida's mistakes in order to protect California's citrus industry. If you would like to learn more about citrus greening disease, and how you can scout your own backyard or citrus grove for ACP, the following website has very good information:

http://www.californiacitrusthreat.com/huanglongbing-citrus-greening.html

If you suspect that your citrus plants have ACP, please contact the Agricultural Commissioner's Office in your county. Imperial County Agricultural Commissioner's office can be contacted at (760) 482-4314.

Symptoms of Citrus Greening Disease on Lemon include blotchy asymmetrically mottled leaves and small, greenish, lopsided fruit.

Asian Citrus Psyllid Detection Methods Include Yellow Sticky Cards Near Citrus Plants (Left), Adult Asian Citrus Psyllid (Right).

Introduction of Asian Citrus Psyllid through transplants (left), and imported curry leaves (right)

Common Insect and Disease Host is the Orange Jasmine plant (left), Orange Jasmine included in floral arrangement (right).

WORM PEST MANAGEMENT IN ALFALFA IN IMPERIAL VALLEY, CALIFORNIA

ERIC T. NATWICK

In the low desert region of southern California and Arizona, beet armyworm, *Spodoptera exigua*, alfalfa caterpillar, *Colias eurytheme*, and Granulate cutworm, *Agrotis subterranea* (Fabricius), must be managed for successful alfalfa hay production. Considerable progress has been made toward the control of the worm pests through integrated pest management (IPM). Under IPM insecticide applications are occasionally needed to maintain population densities of worm pests below damaging levels.

Although IPM strategies have reduced the reliance on insecticides they are still one of the important IPM tools need for worm pest control. The beet armyworm, alfalfa caterpillars and granulate cutworms are commonly controlled in low desert alfalfa with Steward, Intrepid, Lannate or one of several pyrethroid insecticides registered for alfalfa hay production.

Alfalfa caterpillar, *Colias eurytheme* is a warm weather pest with as many as seven generations in the low desert between May and October. Alfalfa caterpillar is capable of completing a lifecycle during the growing period between cuttings. The yellow alfalfa butterflies flying over tall alfalfa likely have emerged from the field. The female butterflies lay eggs singly, standing on end, on the upper surface of alfalfa leaves in fields with re-growth under 6 inches. Larvae hatch in 3 to 10 days, grow to about an inch long and pupate in approximately 2 weeks. Alfalfa caterpillars are green with white stripes down their sides and are distinguished from beet armyworm by their velvety appearance (Anonymous 1985).

All alfalfa caterpillars consume leaves and large larvae are most destructive. In contrast to armyworms, the caterpillars do not skeletonize leaves, consuming the midrib. A small 0.25 inch long black wasp, *Cotesia medicaginis*, is a parasite of alfalfa caterpillar. The wasp stings very small caterpillars laying an egg inside. Wasp eggs hatch and the wasp larvae consume the body contents of the caterpillars. *Cotesia medicaginis* parasitized larvae are lighter than normal in color, being somewhat shiny rather than velvety on the surface, and swollen toward the rear. The wasp larva can be exposed by grasping the caterpillar at each end of the swelling and pulling it apart. A parasitized caterpillar dies before it reaches 0.5 inch in length (Anonymous 1985).

Management guidelines. Damage may be avoided by cutting hay early. However, timing of early cutting is critical to obtain satisfactory yield and to avoid serious damage. Monitor fields weekly from June through October, checking 2 to 3 times per week during periods of heavy infestations, by taking 5 sweep counts in 4 to 5 field locations. Check for *Cotesia medicaginis* parasitism. Treatment with an insecticide when field counts average 10 non-parasitized caterpillars per sweep. *Bacillus thuringiensis* may give satisfactory control of alfalfa caterpillars without adversely affecting beneficial species, and leaves no undesirable residue on the hay. When caterpillars ingest *B. thuringiensis*, they cease feeding, but may remain on plants 3-4 days before dying (Anonymous 1985).

Beet armyworm is a common pests in desert alfalfa from June through September, occasionally damages alfalfa in April or May in the low desert valleys of Southern California. Egg masses of both species are deposit on the upper side of leaves. White cottony scales cover beet armyworm egg masses. Eggs hatch in a few days and larvae reach full size in 2 to 3 weeks. Larvae pupate on or under the soil surface. Adults of both species are brown nocturnal moths with a 1¼ wing span. Moths emerge to re-infest alfalfa or to infest other crops. There are at least 5 generations of beet armyworm per year in the low desert; the final generation of each species overwinter as pupae in the soil. Beet armyworm larvae are smooth-skinned and are usually olive green, but color varies from bright green or purplish green. They have very fine dark stripes on their backs and pale yellow stripes on each side. An intense black spot on the lateral margin of the first legless segment is a distinguishing characteristic. First instar larvae of both species web terminal leaves together and skeletonize the leaves, later dispersing through the crop. Spiders and various species of predacious bugs prey on the larvae of both armyworm species. *Hyposoter exigua* wasps prey on both armyworm species by depositing an egg in the larvae. A *Hyposoter exigua* larva hatches from the egg and parasitizes the armyworm larva (Anonymous 1985).

Management guidelines. Sample for parasitism by pulling the heads from ½ inch long armyworms, squeezing the body contents out from the anal end toward the head end. *Hyposoter exigua* larvae will be pushed out of parasitized armyworms. Monitor fields weekly by making 5 sweep counts at each of 4 to 5 locations per field using a standard sweep net. Check fields 2 to 3 times per week when heavy populations begin to develop. Treat with an insecticide when there are 15 non-parasitized ½ inch armyworms of either species per sweep, or 10 or more non-parasitized alfalfa caterpillars and armyworms combined per sweep. (Anonymous 1985).

Cutworms are occasional pests of desert alfalfa in the Central Valley, but are frequent pests in low desert bed-planted alfalfa. Granulate cutworm, *Agrotis subterranea* (Fabricius), and the variegated cutworm, *Peridroma sausia* (Hübner), are the two species that most commonly attack desert alfalfa. Cutworm adults are night-flying moths in the Family: Noctuidae. The white to greenish eggs are laid in irregular masses, on alfalfa leaves or stems often near the base of the plant. Eggs darken as they approach hatching. Larvae can grow up to 2 inches long. The heavy-bodied larvae appear as smooth-skinned caterpillars of various colors and patterns and frequently roll into a C-shape when disturbed. Larvae hide under loose soil, in soil cracks or under duff during the day, move to the plants at night to feed (Anonymous 1985). Variegated cutworm populations may develop in weedy areas and migrate into seedling stands or mature stands. Seedling alfalfa stands can be severely damaged by cutworms cutting the seedlings off at or just below the soil surface. Established fields are damaged when cutworms cut off new growth of feed on the alfalfa foliage (Anonymous 1985).

Granulate cutworm is a devastating pest of bed planted alfalfa, but can also be a pest of alfalfa planted between borders. Low desert alfalfa fields are attacked by granulate cutworm from May through October, but the pest is resident in fields throughout the year. Established alfalfa fields can be severely injured when cutworms cut off new shoots at or below ground level following hay harvest. The pest often goes undetected after cutting and hay removal. The problem becomes apparent when the field is watered back and there is little or no re-growth due to cutworms feeding. Cutworms feeding on shoots, thereby holding back re-growth, deplete starch reserves in the crowns, weakening the plants, making them susceptible to disease. Granulate cutworm is nocturnal, but will move from daytime hiding places and climb into the alfalfa canopy to feed in the evening.

Management guidelines. Cutworms are most injurious in fields with high plant residue. Pre-plant tillage and abatement of weedy refuge areas around fields help prevent cutworm infestations (Anonymous 2006). Flood irrigation will drown many cutworm larvae. Flood irrigation during daylight hours will attract Egrets, Ibis, gulls and other birds that prey on the cutworm as the advancing water forces the larvae from hiding. Cutworms can be detected by looking under duff and carefully digging to a depth of one inch deep in loose soil near alfalfa crowns. When cutworm numbers exceed one or two per foot of row or severe damage is apparent, treatment with an insecticide is usually warranted. Intrepid, pyrethroid insecticides, Steward and are the only efficacious insecticides for control granulate cutworm in low deserts alfalfa.

Anonymous 1985. Integrated pest management for alfalfa hay. Univ. Calif. Statewide IPM Proj., Publication 3312. 96 pp.
Anonymous 2006. UC IPM Pest Management Guidelines, Alfalfa.
http://www.ipm.ucdavis.edu/PMG/r1300911.html

U.S. Department of Agriculture (USDA)
USDA #M1911 - Earthquake

Declaration Information

The following table illustrates the declaration information.

Eligible Primary County(s):	Imperial
Eligible Contiguous County(s):	Riverside, San Diego
Event:	May 7, 2010, Major Disaster Declaration (DR-1911-CA) as a result of the earthquake beginning April 4, 2010, and continuing
Assistance made available by designation:	• Emergency farm loans for actual losses as a direct result of the disaster • Up to a maximum of $500,000 • Interest rate 3.75 percent
Application deadline:	**January 7, 2011**
Who may apply:	Farmers and ranchers who conduct family-sized farming operations
How to apply:	• Contact local Farm Service Agency (FSA) office listed in the local telephone directory under U.S. Government, Agriculture •Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD)
USDA website for additional information:	www.fsa.usda.gov/pas/disaster/assistance1.htm

SAVE THE DATE

JULY 13, 2010

ADVANCES IN DESERT WEEDS

http://groups.ucanr.org/Adv_Des_Weeds_2010/

Desert Weed Management Conference

University of California, Riverside, Palm Desert Graduate Center in Palm Desert, California

Registration is $65 before June 25th and after it will be $80

A one-day symposium featuring the latest information in invasive plant biology and control. The symposium will cover weeds that are encroaching the desert region of Southern California, Arizona and Southern Nevada. This conference will provide land managers, biologists and those interested in weed management with the latest research and ideas on weed biology and control strategies. Specifically, speakers will present information that is relevant to land managers concerned with Tamarisk (*Tamarix* spp.), Sahara Mustard (*Brassica tournefortii*), nonnative desert grasses including annuals (*Schismus* spp. and *Bromus* spp.) and perennials (*Pennisetum* spp.), and invasive weed impacts to wildlife.

BROUGHT TO YOU BY:

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

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CIMIS REPORT AND UC DROUGHT MANAGEMENT PUBLICATIONS

Khaled Bali and Steve Burch*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of June 1 to August 31 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Irrigation Management Unit (339-9082). Please feel free to call us if you need additional weather information, or check the latest weather data on the worldwide web (http://wwwcimis.water.ca.gov/cimis/welcome.jsp).

Table 1.Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	June		July		August	
	1-15	16-30	1-15	15-31	1-15	16-31
Calipatria	0.39	0.40	0.39	0.38	0.35	0.32
El Centro (Seeley)	0.36	0.38	0.38	0.37	0.32	0.29
Holtville (Meloland)	0.38	0.39	0.39	0.38	0.34	0.31

* Irrigation Management Unit, Imperial Irrigation District.

Link to UC Drought Management Publications http://ucmanagedrought.ucdavis.edu/

Heat and Farm Safety Bilingual Information

Khaled M. Bali

The University of California Communication Services News & Information Outreach program published a bilingual brochure on information that helps you stay safe in the farm.

For information about heat and farm safety in English and Spanish, please visit the AsisTel website:
AsisTel is a bilingual toll-free information line, available nationwide. 1-800-514-4494.
www.asistel.org.

AsisTel de la UC: 1-800-514-4494
Servicio de Información en Español: http://espanol.ucanr.org