



CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

OFFICIAL NOTICE FOR THE CITY OF SAN BERNARDINO PLEASE READ IMMEDIATELY

NOTICE OF TREATMENT FOR THE ASIAN CITRUS PSYLLID

On January 8, 2018, the California Department of Food and Agriculture (CDFA) confirmed the presence of the causative bacterial agent of the citrus disease huanglongbing (HLB) from insect vectors collected in the city of San Bernardino, San Bernardino County. HLB is a devastating disease of citrus worldwide and is spread through feeding action by populations of the Asian citrus psyllid (ACP), *Diaphorina citri* Kuwayama. In order to determine the extent of the infestation, and to define an appropriate response area, additional survey took place for several days over a one-square mile area, centered on the detection site. The results of this additional survey indicated that the infestation is sufficiently localized to be amenable for effective implementation of the California Department of Food and Agriculture's (CDFA) current ACP and HLB response strategies, which include treatment for ACP.

A Program Environmental Impact Report (PEIR) has been certified which analyzes the ACP and HLB treatment program in accordance with Public Resources Code, Sections 21000 et seq. The PEIR is available at <http://www.cdfa.ca.gov/plant/peir/>. The treatment activities described below are consistent with the PEIR.

In accordance with integrated pest management principles, the CDFA has evaluated possible treatment methods and determined that there are no cultural or biological control methods available to control ACP in this area.

The treatment plan for the ACP infestation will be implemented within a 400 to 800-meter radius of each detection site, as follows:

- Tempo® SC Ultra (cyfluthrin), a contact insecticide for controlling the adults and nymphs of ACP, will be applied from the ground using hydraulic spray equipment to the foliage of host plants; and
- Merit® 2F or CoreTect™ (imidacloprid), a systemic insecticide for controlling the immature life stages of ACP, will be applied to the soil underneath host plants. Merit® 2F is applied from the ground using hydraulic spray equipment, whereas CoreTect™, if used in place of Merit® 2F, is applied by inserting the tablets into the ground and watering the soil beneath the host plants.

Public Notification:

Residents of affected properties may be invited to a public meeting where officials from CDFA, the Department of Pesticide Regulation, the Office of Environmental Health Hazard Assessment, and the county agricultural commissioner's office will be available to address residents' questions and concerns. Residents are notified in writing at least 48 hours in advance of any treatment in accordance with the Food and Agricultural Code, Section 5779 and 5401-5404. Following the treatment, completion notices are left with the residents detailing precautions to take and post-harvest intervals applicable to the citrus fruit on the property. Treatment information is posted at http://cdfa.ca.gov/plant/acp/treatment_maps.html.

Asian Citrus Psyllid
Official Notice
Project RS-0415
Page 2

Press releases, if issued, are prepared by the CDFA information officer and the county agricultural commissioner, in close coordination with the program leader responsible for treatment. Either the county agricultural commissioner or the public information officer serves as the primary contact to the media.

For any questions related to this program, please contact the CDFA toll-free telephone number at 800-491-1899 for assistance. This telephone number is also listed on all treatment notices.

Enclosed are the findings regarding the treatment plan, a map of the treatment area, work plan, integrated pest management analysis of alternative treatment methods, and a pest profile.

Attachments

FINDINGS REGARDING A TREATMENT PLAN FOR THE ASIAN CITRUS PSYLLID

On January 8, 2018, the California Department of Food and Agriculture (CDFA) confirmed the presence of the causative bacterial agent of the citrus disease huanglongbing (HLB) from insect vectors collected in the city of San Bernardino, San Bernardino County. HLB is a devastating disease of citrus worldwide and is spread through feeding action by populations of the Asian citrus psyllid (ACP), *Diaphorina citri* Kuwayama. Based on the survey data, pest biology, information from California's Huanglongbing Task Force, recommendations provided to me by the Department's Primary State Entomologist and Primary State Plant Pathologist, and experience gained from the United States Department of Agriculture's (USDA) control efforts in the southeastern United States, I have determined that an infestation of ACP exists which is infected with the causative agent of HLB.

ACP is an exotic insect that is originally from Asia. It has been introduced into Central and South America, the Caribbean, and Mexico. In the United States, ACP has been found in Alabama, Arizona, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, Texas, and California (Alameda, Contra Costa, Fresno, Imperial, Kern, Kings, Los Angeles, Madera, Merced, Monterey, Orange, Placer, Riverside, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Solano, Stanislaus, Tulare, Ventura, and Yolo counties). ACP feeds on members of the plant family Rutaceae, primarily on *Citrus* and *Murraya* species, but is also known to attack several other genera. The psyllids cause injury to their host plants via the withdrawal of large amounts of sap as they feed and via the production of large amounts of honeydew, which coats the leaves of the tree and encourages the growth of sooty mold, which blocks sunlight from reaching the leaves. However, the most serious damage caused by ACP is due to its vectoring the phloem-inhabiting bacteria in the genus *Candidatus Liberibacter*, the causal agents of HLB. HLB is considered one of the most devastating diseases of citrus in the world, because it causes trees to produce inedible fruit and results in the eventual death of infected trees. Symptoms of HLB include yellow shoots with mottling and chlorosis of the leaves, misshapen fruit, fruit that does not fully color, and fruit that has a very bitter taste making it inedible for human consumption. HLB is in some southeastern U.S. states such as Florida and Texas, as well as in central Mexico.

These pests present a major threat to citrus grown within the State. California is the top citrus-producing state in the U.S., with total production valued at over \$2.2 billion. Additionally, the establishment of ACP in currently uninfested areas of California would increase the need for pesticide use by commercial and residential citrus producers, as well as require enforcement of quarantine restrictions. Recent studies in Florida have shown that the presence of HLB increases citrus production costs by up to 40 percent and has resulted in a loss of over \$7 billion and 6,600 jobs over the last five years. The causative bacteria of HLB has been found in Los Angeles, Orange, and Riverside counties. Infected trees are destroyed when discovered, but the threat of reintroduction continues. Allowing the establishment of ACP in currently uninfested areas of California could pave the way for HLB to spread rapidly. HLB would have severe consequences to both the citrus industry and to the urban landscape via the decline and the death of citrus trees.

This decision to proceed with treatment is based upon a realistic evaluation that it may be possible to address the threat posed by ACP using currently available technology in a manner that is recommended by California's HLB Task Force. In making this decision, the CDFA has evaluated possible treatment methods. In accordance with integrated pest management principles, the following is the list of options that I have considered for the treatment of this ACP infestation: 1) physical controls; 2) cultural controls; 3) biological controls; and 4) chemical controls.

Based upon input from my professional staff, including memorandums from the Primary State Entomologist and Primary State Plant Pathologist, and the input of experts familiar with ACP and HLB, I have concluded that there are no cultural or biological control methods that are effective to treat the ACP that allow the CDFA to meet its statutory obligations. To treat ACP in this area, I am ordering applications of pesticides be made using ground-based equipment to all ACP hosts within an 800-meter radius around the detection site and any subsequent sites. The ACP option selected is a chemical control measure that involves the use of insecticides targeting both the adult and immature stages of ACP. This option was selected based upon biological effectiveness, minimal public intrusiveness, cost, and minimal impacts to the environment.

A Program Environmental Impact Report (PEIR) has been prepared which analyzes the ACP and HLB treatment program in accordance with Public Resources Code (PRC), Sections 21000 et seq. The PEIR was certified in December 2014, and is available at <http://www.cdfa.ca.gov/plant/peir/>. The PEIR addresses the treatment of the ACP and HLB at the program level and provides guidance on future actions against the ACP and HLB. It identifies feasible alternatives and possible mitigation measures to be implemented for individual ACP and HLB treatment activities. The ACP and HLB program has incorporated the mitigation measures and integrated pest management techniques as described in the PEIR. In accordance with PRC Section 21105, this PEIR has been filed with the appropriate local planning agency of all affected cities and counties. No local conditions have been detected which would justify or necessitate preparation of a site specific plan.

Sensitive Areas

The treatment area has been reviewed by consulting the California Department of Fish and Wildlife's California Natural Diversity Database for threatened or endangered species. The CDFA also consults with the United States Fish and Wildlife Service, the National Marine Fisheries Service and the California Department of Fish and Wildlife when rare and endangered species are located within the treatment area. Mitigation measures will be implemented as needed. The CDFA will not apply pesticides to bodies of water or undeveloped areas of native vegetation. All treatment will be applied to residential properties, common areas within residential development, non-agricultural commercial properties, and right-of-ways.

Work Plan

The proposed program area encompasses those portions of San Bernardino County which fall within a one-square-mile area around the property on which ACP have been detected, and any subsequent detection sites within the program boundaries. A map of the project boundaries is attached. The work plan consists of the following elements:

1. **ACP Monitoring.** Yellow panel traps will be placed within an 800-meter radius around each HLB detection site to monitor post-treatment ACP populations. Traps will be placed at a density of 100 traps per square mile and will be serviced on a regular schedule, generally once every two weeks.
2. **ACP and HLB Visual Survey.** All host plants will be inspected for ACP and for HLB symptoms within an 800-meter radius around each HLB detection site, at least twice a year. ACPs and HLB-symptomatic plant tissue will be collected and forwarded to the CDFA Plant Pest Diagnostic Center (PPDC) for identification and analysis.

3. HLB Disease testing. All collected symptomatic host tree tissues and ACP life stages will be tested by the PPDC for the presence of HLB.
4. Treatment. All properties with host plants within a 400 to 800-meter radius around each HLB detection site will be treated according to the following protocol to control ACP:
 - a. Tempo® SC Ultra, containing the contact pyrethroid insecticide cyfluthrin, will be applied by ground-based hydraulic spray equipment to the foliage of host plants for controlling the adults and nymphs of ACP. Treatment may be re-applied up to six times annually if additional ACPs are detected.
 - b. Either Merit® 2F or CoreTect™, containing the systemic insecticide imidacloprid, will be applied to the root zone beneath host plants for controlling developing nymphs and providing long term protection against reinfestation. Merit® 2F is applied as a soil drench, while CoreTect™ tablets are inserted two to five inches below the soil surface and watered in to initiate tablet dissolution. CoreTect™ is used in place of Merit® 2F in situations where there are environmental concerns about soil surface runoff of the liquid Merit® 2F formulation, such as host plants growing next to ponds and other environmentally sensitive areas. Treatment may be re-applied once annually if additional ACPs are detected.

Public Information

Residents of affected properties may be invited to a public meeting where officials from the CDFA, the California Department of Pesticide Regulation, the Office of Environmental Health Hazard Assessment, and the county agricultural commissioner's office will be present to address residents' questions and concerns. Residents are notified in writing at least 48 hours in advance of any treatment in accordance with the Food and Agricultural Code (FAC), Section 5779. After treatment, completion notices are left with the residents detailing precautions to take and post-harvest intervals applicable to the citrus fruit. Information concerning the ACP program will be conveyed directly to local and State political representatives and authorities via letters, emails, and/or faxes. Treatment information is posted at http://cdfa.ca.gov/plant/acp/treatment_maps.html. Press releases, if issued, are prepared by the CDFA information officer and the county agricultural commissioner, in close coordination with the program leader responsible for treatment. Either the county agricultural commissioner or the public information officer serves as the primary contact to the media.

For any questions related to this program, please contact the CDFA toll-free telephone number at 800-491-1899 for assistance. This telephone number is also listed on all treatment notices.

Duty to Act

Under my statutory authority, as Secretary of the California Department of Food and Agriculture, I have decided, based upon the likely environmental and economic damage that would be inflicted by an established infestation of HLB in this area, that it is incumbent upon me to attempt to address this threat.

My duty to act, and this decision, is based upon authority set forth in Sections 24.5, 401.5, 403, 407, 408, 5401-5405, and 5761-5764 of the FAC, authorizing and mandating the Secretary to: thoroughly investigate the existence of the pest; determine the probability of the pest spreading to other areas;

Asian Citrus Psyllid
Notice of Treatment Findings
Project RS-0415
Page 4

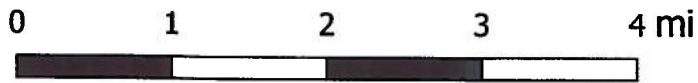
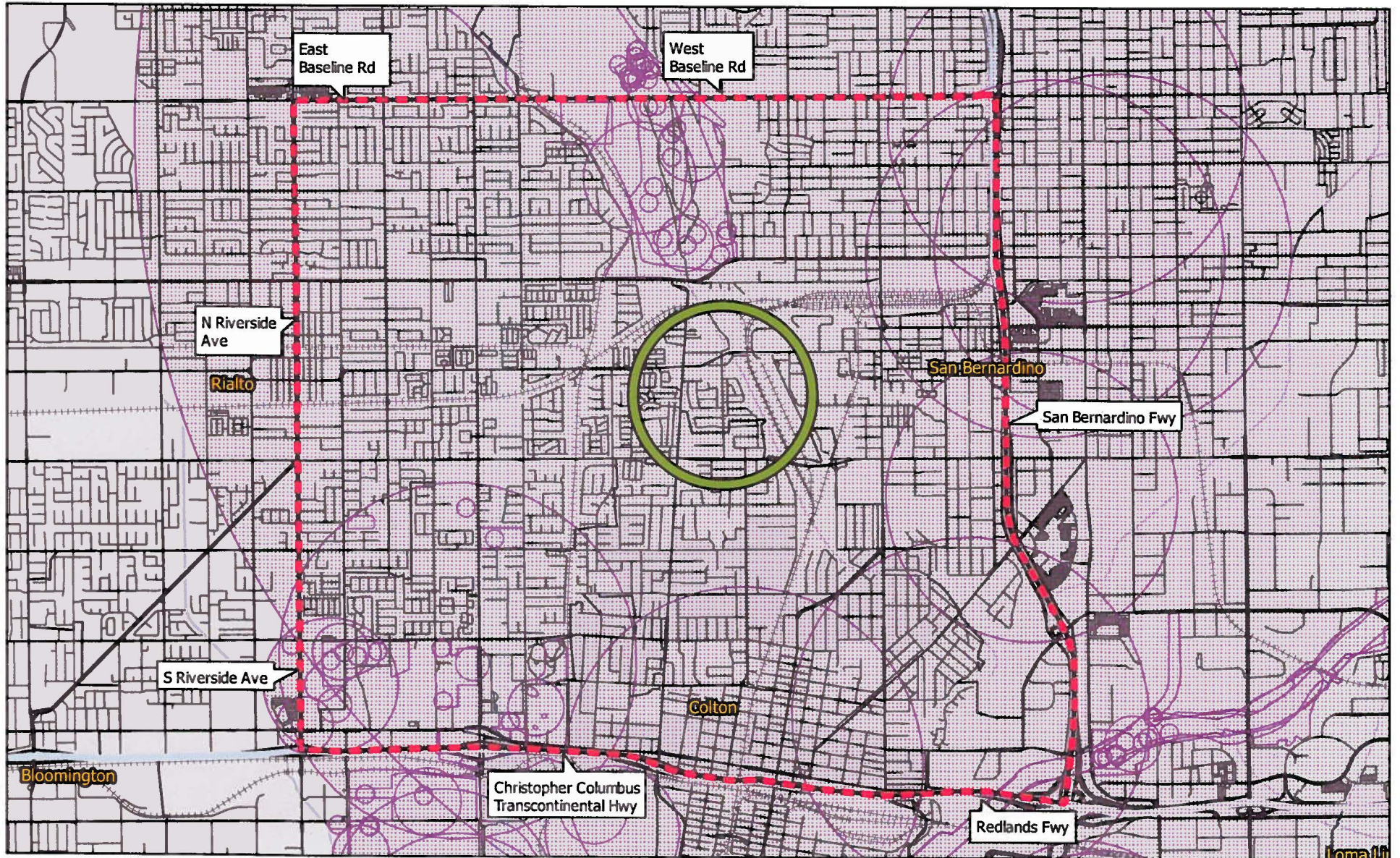
adopt regulations (Title 3 of the California Code of Regulations, Section 3591.21) as are reasonably necessary to carry out the provisions of this code; abate a pest from the established treatment area; and, to prevent further economic damage. The project work plan above describes the CDFA's actions that are necessary to mitigate the effects of this pest.

Signature on File

Karen Ross, Secretary

Jan 25, 2018
Date

Asian Citrus Psyllid San Bernardino, San Bernardino County 2018



- Maximum Program Boundary
- Proposed 800 Meter Treatment Area

- Sensitive Environmental Area
- Treatment Mitigations in Place



Asian Citrus Psyllid Work Plan
March 2017

I. Trapping and Visual Survey

A. Urban and Rural Residential Detection Trapping and Visual Survey

This is a cooperative State/County trapping program for the Asian Citrus Psyllid (ACP) to provide early detection of an infestation in a county. Traps are serviced by agricultural inspectors. The trap used for ACP detection is the yellow panel trap, which is a cardboard panel coated with stickum on each side. ACP becomes entangled on the sticky surface and cannot move off of the trap. Yellow panel traps have proven successful at detecting infestations of ACP. At all locations where traps are placed, the host plant is visually inspected for ACP. If ACP is detected, the host will be visually surveyed for additional ACP and symptoms of Huanglongbing (HLB).

- Trap Density: Five to 16 traps/square mile.
- Trap Servicing Interval: Every two to four weeks.
- Trap Relocation and Replacement: Traps should be replaced and relocated every four to eight weeks to another host at least 500 feet away, if other hosts are available.
- Visual surveys and/or tap sampling are conducted once at each trapping site when the trap is placed.

B. Delimitation Trapping and Visual Survey Outside of the Generally Infested Area

The protocols below are the actions in response to the detection of ACP in counties north of Ventura County and the Tehachapi Mountains.

1. Response to the collection one or more ACP

a. Trapping

Density will be 25 to 100 traps per square mile in a 1.5 mile radius, to form a nine-square mile delimitation area. Traps will be serviced weekly for one month. If no additional ACP are detected, the traps will be serviced monthly for two years past the identification date. Additional detections may increase the size of the delimitation survey area and will restart the two-year clock on the trap servicing requirement.

b. Visual Survey

All find sites and adjacent properties will be visually surveyed for ACP and HLB. Additional sites may be surveyed as part of the risk-based survey.

C. Commercial Grove Trapping

In counties with substantial commercial citrus production and are not generally infested with ACP, traps are placed within the groves at the density of one trap per 40 acres. Traps are replaced every month and submitted for screening.

In areas that are generally infested with ACP, agricultural inspectors visually survey commercial groves for plant tissue displaying symptoms of HLB and collect ACP which are tested for HLB.

II. Treatment

CDFA's treatment activities for ACP vary throughout the state and depend on multiple factors. Factors CDFA considers prior to treatment include:

Asian Citrus Psyllid Work Plan
March 2017

- Determination if suppression of ACP is feasible;
- The proximity of the ACP infestation to commercial citrus;
- Whether growers are conducting coordinated treatment activities;
- The level of HLB risk;
- Consistency with the overall goal of protecting the state's commercial citrus production.

A. Treatment scenarios throughout the state in which treatment will occur:

- In areas with commercial citrus production that are generally infested with ACP, and where all growers are treating on a coordinated schedule; CDFA may conduct residential buffer treatments to suppress ACP populations.
- In areas with commercial citrus production that are not generally infested with ACP; CDFA will conduct residential treatments in response to ACP detections.
- In areas where HLB is detected, CDFA will conduct residential treatments to suppress ACP populations.
- In areas where ACP has not been previously detected, or where ACP has been detected at low densities, CDFA will conduct residential treatments to prevent ACP establishment or suppress populations.

CDFA's current policy is to not conduct treatments in areas that are generally infested if there is limited or no commercial citrus production in the area, or if all growers in the area are not treating.

1. Treatment Protocols

A Program Environmental Impact Report (PEIR) has been certified which analyzes the ACP treatment program in accordance with Public Resources Code, Sections 21000 et seq. The PEIR is available at <http://www.cdfa.ca.gov/plant/peir>. The treatment activities described below are consistent with the PEIR.

In accordance with the integrated pest management principles, the CDFA has evaluated possible treatment methods and determined that there are no physical, cultural, or biological control available to eliminate ACP from an area.

In general, when treatment has been deemed appropriate, CDFA applies insecticides to host trees in the residential (urban) areas in a 50 to 800-meter radius around each detection site. Only ACP host plants are treated.

a. Within two miles of International Border with Mexico

- CDFA will treat the residential area within an 800-meter buffer of the border.

b. Within a Generally Infested Area With Commercial Citrus Production

- CDFA will treat the residential area within a 400-meter buffer surrounding commercial citrus groves if the growers are conducting coordinated treatments.
- A Notice of Treatment (NOT) will be issued.

c. Outside of the Generally Infested Area

Asian Citrus Psyllid Work Plan
March 2017

The actions below are in response to the detection of one ACP in counties north of Ventura County and the Tehachapi Mountains.

- Detection of one ACP - All properties with hosts within 50-meter radius of the detection site will be treated.
- A NOT will be issued.

The actions below are in response to the detection of two or ACP in Fresno, Madera, Kern, Kings, and Tulare counties.

- Detection of two or more ACP on one trap or one or more ACP detected on separate traps within 400 meters of each other within a six month period – All properties with hosts within a 400-meter radius will be treated.
- In a commercial citrus environment, where there are few residences in the area, CDFA will treat the residential area within an 800-meter buffer surrounding commercial citrus groves if the growers are conducting coordinated treatments.

d. In response to an HLB Detection

- All properties within an 800-meter radius of the detection site will be treated. A NOT will be issued.
- A NOT will be issued.

2. Treatment Methodology

The treatment protocol consists of both a foliar and a systemic insecticide. The foliar insecticide is used for immediate reduction of the adult population in order to prevent the adults from dispersal. The systemic insecticide is a soil treatment used to kill the sedentary nymphs and provide long term protection against reinfestation. Treatment frequency is dependent on the insecticide applied and severity of the infestation. Treatments will end no later than two years after the last psyllid detection in the treatment area.

CDFA uses registered pesticides and follows the label directions. The treatment protocol may be adjusted to use only the foliar or the systemic insecticide to allow for mitigations in special situations.

a. Foliar Treatment

Tempo® SC Ultra (cyfluthrin) is a pyrethroid contact insecticide. Treatment will initially occur once, and subsequent applications may occur for up to three times annually if additional psyllids are detected. This material will be applied to the foliage of all host plants using hydraulic spray or hand spray equipment.

b. Soil Treatment

A systemic soil application will be made using either Merit® 2F or CoreTect™.

- Merit® 2F (imidacloprid), is a neonicotinoid systemic insecticide. Treatment will initially occur once, and a subsequent application may occur once on an annual basis if additional psyllids are detected. This material will be applied to the soil within the root zone of host plants.

Asian Citrus Psyllid Work Plan
March 2017

- CoreTect™ (imidacloprid) is a neonicotinoid systemic insecticide. It is used in place of Merit® 2F in situations where there are environmental concerns about soil surface runoff of the liquid Merit® 2F formulation, such as host plants growing next to ponds and other environmentally sensitive areas. Treatment will initially occur once, with a subsequent application once on an annual basis if additional psyllids are detected. This material is a pelletized tablet and is inserted into the soil and watered in within the root zone of host plants.

**INTEGRATED PEST MANAGEMENT ANALYSIS OF ALTERNATIVE TREATMENT
METHODS FOR CONTROL OF THE ASIAN CITRUS PSYLLID
January 2017**

The chemical treatment program used by the California Department of Food and Agriculture (CDFA) for control of the Asian citrus psyllid (ACP), *Diaphorina citri* (Hemiptera: Psyllidae), targets multiple life stages. A contact insecticide is used for an immediate control of adults in order to prevent spread, and a systemic insecticide is used to control developing nymphs and to give the plant long term protection from re-infestation. The contact insecticide preferentially used contains the synthetic pyrethroid cyfluthrin, while the systemic insecticide contains the synthetic neonicotinoid imidacloprid. Both products have been shown to be effective against ACP elsewhere, particularly in Florida. The California Huanglongbing Task Force, a joint government, university, and industry group formed in 2007 to provide guidance to the CDFA on matters pertaining to ACP and huanglongbing has endorsed the use of these chemicals in the CDFA's treatment program.

Below is an evaluation of alternative treatment methods to control ACP which have been considered for treatment programs in California.

A. PHYSICAL CONTROL

Mass Trapping. Mass trapping of adults involves placing a high density of traps in an area in an attempt to physically remove them before they can reproduce. The current available trapping system for ACP relies on short distance visual stimulus, and is not considered effective enough to use in a mass trapping program.

Active Psyllid Removal. Adult ACPs are mobile daytime fliers, and adults could theoretically be netted or collected off of foliage. However, due to their ability to fly when disturbed, and the laborious and time-prohibitive task of collecting minute insects from several properties by hand, it would be highly unlikely that all adults could be captured and removed. Nymphs attach themselves to developing leaves and stems via their proboscis. Therefore, physical removal of the nymphs would entail removal of the growing shoots which will stunt the tree and reduce fruit production. For these reasons, mechanical control is not considered to be an effective alternative.

Host Removal. Removal of host plants would involve the large scale destruction of plants and their roots by either physical removal or phytotoxic herbicides. Additionally, host removal could promote dispersal of female psyllids in search of hosts outside of the treatment area, thus spreading the infestation. For these reasons, host removal is considered inefficient and too intrusive to use over the entirety of the treatment areas used for ACP.

B. CULTURAL CONTROL

Cultural Control. Cultural controls involve the manipulation of cultivation practices to reduce the prevalence of pest populations. These include crop rotation, using pest-resistant varieties, and intercropping with pest-repellent plants. None of these options are applicable for ACP control in an urban environment, and may only serve to drive the psyllids outside the treatment area, thus spreading the infestation.

C. BIOLOGICAL CONTROL

Microorganisms. No single-celled microorganisms, such as bacteria, are currently available to control ACP.

Nematodes. Entomopathogenic nematodes can be effective for control of some soil-inhabiting insects, but are not effective, nor are they used, against above ground insects such as psyllids.

Parasites and Predators. There have been two parasites released in Florida against ACP, but only one of these are considered somewhat successful there, namely *Tamarixia radiata* (Hymenoptera: Eulophidae). This insect has been released into the environment in southern California. The CDFA is working with the citrus industry to pursue options for incorporating this parasite into treatment programs statewide. In addition, a second wasp has been recently released by the University of California Riverside, *Diaphorencyrtus aligarhensis*.

Sterile Insect Technique (SIT). SIT involves the release of reproductively sterile insects which then mate with the wild population, resulting in the production of infertile eggs. SIT has neither been researched nor developed for ACP, nor has it been developed for any species of psyllids, and is therefore unavailable.

D. CHEMICAL CONTROL

Foliar Treatment. A number of contact insecticides have been researched for use against ACP elsewhere, particularly in Florida. Contact insecticides are more effective against adult ACPs than the sedentary nymphs because adults actively move around on plants, thereby coming into contact with residues, whereas nymphs have to be directly sprayed in order for them to come into contact. The following product has been identified for use by the CDFA, based on a combination of effectiveness against ACP, worker and environmental safety, and California registration status.

Tempo® SC Ultra is a formulation of cyfluthrin which is applied to the foliage of all host plants. Tempo® SC Ultra is a broad-spectrum synthetic pyrethroid insecticide which kills insects on contact. Tempo® SC Ultra has no preharvest interval, which makes it compatible with residential fruit-growing practices.

Soil Treatment. A number of systemic insecticides have been researched for use against ACP elsewhere, particularly in Florida. Systemic insecticides are particularly effective against psyllid nymphs because nymphs spend much of their time feeding, thereby acquiring a lethal dose. The following products have been identified for use by the CDFA, based on a combination of effectiveness against ACP, worker and environmental safety, and California registration status.

Merit® 2F is a formulation of imidacloprid which is applied to the root system of all host plants via a soil drench. Imidacloprid is a synthetic neonicotinoid insecticide which controls a number of other phloem feeding pests such as psyllids, aphids, mealybugs, etc.

CoreTect™ is a formulation of imidacloprid which is applied to the root system of all host plants via insertion of a tablet into the soil, followed by watering. It is used in place of Merit® 2F in situations where there are environmental concerns about soil surface runoff of the liquid Merit® 2F formulation, such as host plants growing next to ponds and other environmentally sensitive areas.

E. RESOURCES

Grafton-Cardwell, E. E. and M. P. Daugherty. 2013. Asian citrus psyllid and huanglongbing disease. Pest Notes Publication 74155. University of California, Division of Agriculture and Natural Resources Publication 8205. 5 pp.
<http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pnasiaancitruspsyllid.pdf>.

Grafton-Cardwell, E. E., J. G. Morse, N. V. O'Connell, P. A. Phillips, C. E. Kallsen, and D. R. Haviland. 2013. UC IPM Management Guidelines: Citrus. Asian Citrus Psyllid. Pest Notes Publication 74155. University of California, Division of Agriculture and Natural Resources. <http://www.ipm.ucdavis.edu/PMG/r107304411.html>.

PEST PROFILE

Common Name: Asian Citrus Psyllid

Scientific Name: *Diaphorina citri* Kuwayama

Order and Family: Hemiptera, Psyllidae

Description: The Asian citrus psyllid (ACP) is 3 to 4 millimeters long with a brown mottled body. The head is light brown. The wings are broadest in the apical half, mottled, and with a dark brown band extending around the periphery of the outer half of the wing. The insect is covered with a whitish waxy secretion, making it appear dusty. Nymphs are generally yellowish orange in color, with large filaments confined to an apical plate of the abdomen. The eggs are approximately 0.3 millimeters long, elongated, and almond-shaped. Fresh eggs are pale in color, then, turn yellow, and finally orange at the time of hatching. Eggs are placed on plant tissue with the long axis vertical to the surface of the plant.

History: Asian citrus psyllid was first found in the United States in Palm Beach County, Florida, in June 1998 in backyard plantings of orange jasmine. By 2001, it had spread to 31 counties in Florida, with much of the spread due to movement of infested nursery plants. In the spring of 2001, Asian citrus psyllid was accidentally introduced into the Rio Grande Valley, Texas on potted nursery stock from Florida. It was subsequently found in Hawaii in 2006, in Alabama, Georgia, Louisiana, Mississippi, and South Carolina in 2008. ACP was first found in California on August 27, 2008 in San Diego County. Subsequent to this initial detection in San Diego County, the ACP has been detected in 25 other California counties (Alameda, Contra Costa, Fresno, Imperial, Kern, Kings, Los Angeles, Madera, Merced, Monterey, Orange, Placer, Riverside, San Benito, San Bernardino, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, San Mateo, Solano, Stanislaus, Tulare, Ventura, and Yolo counties). The ACP has demonstrated the potential to establish itself throughout California wherever citrus is grown.

Distribution: ACP is found in tropical and subtropical Asia, Afghanistan, Saudi Arabia, Reunion, Mauritius, parts of South and Central America, Mexico, the Caribbean, and in the U.S. (Alabama, Arizona, California, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, and Texas).

Life Cycle: Eggs are laid on tips of growing shoots; on and between unfurling leaves. Females may lay more than 800 eggs during their lives. Nymphs pass through five instars. The total life cycle requires from 15 to 47 days, depending on environmental factors such as temperature and season. The adults may live for several months. There is no diapause but populations are low in the winter or during dry periods. There are nine to ten generations a year, with up to 16 noted under observation in field cages.

Hosts and Economic Importance: ACP feeds mainly on *Citrus* spp., at least two species of *Murraya*, and at least three other genera, all in the family Rutaceae. Damage from the psyllids occurs in two ways: the first by drawing out of large amounts of sap from the plant as they feed and, secondly, the psyllids produce copious amounts of honeydew. The honeydew then coats the leaves of the tree, encouraging sooty mold to grow which blocks sunlight to the leaves. However, the most serious damage caused by ACP is due to its ability to effectively vector three phloem-inhabiting bacteria in the genus *Candidatus Liberibacter*, the most widespread being *Candidatus Liberibacter asiaticus*. These bacteria cause a disease known as huanglongbing, or

citrus greening. In the past, these bacteria have been difficult to detect and characterize. In recent years, however, DNA probes, electron microscopy, and enzyme-linked immunosorbent assay tests (ELISA) have been developed that have improved detection. Symptoms of huanglongbing include yellow shoots, with mottling and chlorosis of the leaves. The juice of the infected fruit has a bitter taste. Fruit does not color properly, hence the term "greening" is sometimes used in reference to the disease. Huanglongbing is one of the most devastating diseases of citrus in the world. Once infected, there is no cure for disease and infected trees will die within ten years. The once flourishing citrus industry in India is slowly being wiped out by dieback. This dieback has multiple causes, but the major reason is due to HLB. In California, the disease has only been found in residential areas of Los Angeles, Orange, and Riverside counties.

Host List

SCIENTIFIC NAME

Aegle marmelos
Aeglopsis chevalieri
Afraegle gabonensis
Afraegle paniculata
Amyris madrensis
Atalantia monophylla
Atalantia spp.
Balsamocitrus dawei
Bergia (=Murraya) *koenigii*
Calodendrum capense
X Citroncirus webberi
Choisya arizonica
Choisya ternata
Citropsis articulata
Citropsis gilletiana
Citropsis schweinfurthii
Citrus aurantiifolia

Citrus aurantium

Citrus hystrix
Citrus jambhiri
Citrus limon
Citrus madurensis
 (=X *Citrofortunella microcarpa*)
Citrus maxima
Citrus medica
Citrus meyeri
Citrus x nobilis
Citrus x paradisi
Citrus reticulata
Citrus sinensis
Citrus spp.
Clausena anisum-olens
Clausena excavata

COMMON NAMES

bael, Bengal quince, golden apple, bela, milva
 Chevalier's aeglopsis
 Gabon powder-flask
 Nigerian powder-flask
 mountain torchwood
 Indian atalantia

 Uganda powder-flask
 curry leaf
 Cape chestnut

 Arizonia orange
 Mexican or mock orange
 Katimboro, Muboro, West African cherry orange
 cherry-orange
 African cherry-orange
 lime, Key lime, Persian lime, lima, limón agrio, limón ceutí, lima mejicana, limero
 sour orange, Seville orange, bigarde, marmalade orange, naranja agria, naranja amarga
 Mauritius papeda, Kaffir lime
 rough lemon, jambhiri-orange, limón rugoso, rugoso
 lemon, limón, limonero
 calamondin

 pummelo, pomelo, shaddock, pompelmous, toronja
 citron, cidra, cidro, toronja
 Meyer lemon, dwarf lemon
 king mandarin, tangor, Florida orange, King-of-Siam
 grapefruit, pomelo, toronja
 mandarin, tangerine, mandarina
 sweet orange, orange, naranja, naranja dulce

anis
 clausena

<i>Clausena indica</i>	clausena
<i>Clausena lansium</i>	wampi, wampee
<i>Clymenia polyandra</i>	a-mulis
<i>Eremocitrus glauca</i>	Australian desert lime
<i>Eremocitrus hybrid</i>	
<i>Esenbeckia berlandieri</i>	Berlandier's jopoy
<i>Fortunella crassifolia</i>	Meiwa kumquat
<i>Fortunella margarita</i>	Nagami kumquat, oval kumquat
<i>Fortunella polyandra</i>	Malayan kumquat
<i>Fortunella spp.</i>	
<i>Limonia acidissima</i>	Indian wood apple
<i>Merrillia caloxylon</i>	flowering merrillia
<i>Microcitrus australasica</i>	finger-lime
<i>Microcitrus australis</i>	Australian round-lime
<i>Microcitrus papuana</i>	desert-lime
<i>X Microcitronella spp.</i>	
<i>Murraya spp.</i>	curry leaf, orange-jasmine, Chinese-box, naranjo jazmín
<i>Naringi crenulata</i>	naringi
<i>Pamburus missionis</i>	
<i>Poncirus trifoliata</i>	trifoliolate orange, naranjo trébol
<i>Severinia buxifolia</i>	Chinese box-orange
<i>Swinglea glutinosa</i>	tabog
<i>Tetradium ruticarpum</i>	evodia, wu zhu yu
<i>Toddalia asiatica</i>	orange climber
<i>Triphasia trifolia</i>	trifoliolate limeberry, triphasia
<i>Vepris (=Toddalia) lanceolata</i>	white ironwood
<i>Zanthoxylum fagara</i>	wild lime, lime prickly-ash