CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

OFFICIAL NOTICE
FOR VENTURA COUNTY
PLEASE READ IMMEDIATELY

AMENDMENT TO THE NOTICE OF TREATMENT FOR THE ASIAN CITRUS PSYLLID

In 2015, Asian citrus psyllids (ACP), *Diaphorina citri* Kuwayama, have been identified from the cities of Ojai, Oxnard, Simi Valley, Thousand Oaks, Ventura, Moorpark, Santa Paula, Fillmore, Camarillo, and other surrounding municipalities in Ventura County. These detections indicate that a breeding population exists in the areas. To control the spread of ACP, the California Department of Food and Agriculture (CDFA) will implement its ACP treatment work plan, which includes treatment with foliar and soil-applied insecticides.

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 integrated pest management principles, the CDFA has evaluated possible treatment methods and determined that there are no physical, cultural, or biological control methods available to eliminate the ACP from 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. 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, ACP work plan, map of the treatment area, integrated pest management analysis of alternative treatment methods, and a pest profile.

Attachments

AMENDMENT TO THE NOTICE OF TREATMENT
REGARDING THE ASIAN CITRUS PSYLLID

In 2015, Asian citrus psyllids (ACP), *Diaphorina citri* Kuwayama, were identified from the cities of Ojai, Oxnard, Simi Valley, Thousand Oaks, Ventura, Moorpark, Santa Paula, Fillmore, Camarillo, and other surrounding municipalities in Ventura County. Based on the survey data, pest biology, information from California's Huanglongbing Task Force, recommendations provided to me by the California Department of Food and Agriculture's (CDFA) 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 in the area.

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 (Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Tulare, and Ventura 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 most serious damage caused by ACP is due to its vectoring the phloem-inhabiting bacteria in the genus *Candidatus* Liberibacter, the causal agents of huanglongbing (HLB). HLB is considered one of the most devastating diseases of citrus in the world. 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 unfeasible for human consumption. 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.

Under my statutory authority, as Secretary of the CDFA, I have decided, based upon the likely environmental and economic damage that would be inflicted by this infestation of ACP, that it is incumbent upon me to address this threat. This pest presents 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 $1.8 billion. Additionally, the establishment of ACP in 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 6600 jobs over the last five years. Because HLB has been detected in Mexico, the establishment of ACP in California will pave the way for HLB to spread. HLB would have severe consequences to both the citrus industry and to the urban landscape via the decline and the death of citrus trees.

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 Food and Agricultural Code (FAC) authorizing and mandating the Secretary to: thoroughly investigate the existence of the pest; to determine the probability that the pest will spread; to 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; to abate the pest within the established treatment area; and, to prevent further economic damage. In order to determine the extent of the infestation, and to define an appropriate response area, an additional survey took place, centered on the detection site. The results of this additional survey indicate that the infestation is sufficiently localized to be amenable for effective implementation of the CDFA's ACP emergency response strategies, which include treatment. Emergency action is needed to protect California from the negative environmental and economic impact this pest will

cause, should it be allowed to remain in this area and spread. The enclosed project plan describes the actions to be taken by the CDFA which are necessary to mitigate the spread of this pest.

This decision, to proceed with a treatment program, 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. Treatment needs and environmental conditions are outlined in the attached work plan. In making this decision, the CDFA has evaluated possible treatment methods. In accordance with integrated pest management principles, the following is a list of the options that I have considered for the treatment of this ACP infestation: 1) mechanical 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, I have concluded that there are no mechanical, cultural, or biological controls that are effective to treat ACP that allow the CDFA to meet its statutory obligations. To treat ACP in this area, I am ordering ground applications of pesticides be made to all ACP hosts within a 400- to 800-meter radius around the detection sites. A description of the alternative treatment methods considered, and methodologies chosen, is contained in the attached alternatives analysis.

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. Mitigation measures will be implemented as needed. 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. 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.

Treatment Plan

The proposed project area encompasses those portions of Ventura County which fall within a nine-square mile area around each property in which ACP has been detected. A map of the detection sites with the project boundaries and the proposed treatment work plan is attached. In summary form, the treatment plan consists of the following elements:

1. Delimitation. Yellow panel traps will be placed throughout the project area to delimit the infestation and to monitor post-treatment ACP populations. Yellow panel traps are placed at a density of up to 100 traps in the core square mile and 50 traps per square mile in the surrounding eight square miles. Additional traps may be added to further delimit the infestation and to determine the efficacy of treatments. These traps will be serviced on a regular schedule for a period equal to two years beyond the date of the last ACP detection.

2. Visual survey and tap sampling. All host plants will be inspected at all locations where traps are placed. Host plants at other properties will be surveyed within a 400- to 800-meter radius around each detection site.

3. Treatment. Properties within 400 to 800 meters of each detection site will be treated according to the following protocol. Treatments will be repeated, if necessary, as per label instructions.

   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.

   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.

Public Information

Residents of affected properties are 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 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.

Public information concerning the ACP project will consist of press releases to the public and direct notification of project developments to concerned local and State political representatives and authorities. Press releases are prepared by the CDFA information officer and the county agricultural commissioner, in close coordination with the project leader responsible for treatment. Either the county agricultural commissioner or the public information officer serves as the primary contact to the media.

If you have any questions related to this program, please contact Victoria Hornbaker, Program Manager, at (916) 654-0317.

FOR KAREN ROSS — 12/7/15

Karen Ross, Secretary — Date

Attachments

ASIAN CITRUS PSYLLID
VENTURA, VENTURA COUNTY
2015

cdfa

MAXIMUM PROGRAM BOUNDARY

ORIGINAL MAXIMUM PROGRAM BOUNDARY

PROPOSED 400M TREATMENT BOUNDARY

SENSITIVE ENVIRONMENTAL AREA / TREATMENT MITIGATIONS IN PLACE

Asian Citrus Psyllid (ACP) Work Plan

I. Urban and Rural Residential Detection Trapping and Visual Survey

The California Department of Food and Agriculture (CDFA) maintains a cooperative State/county trapping program for ACP to provide early detection of any infestation in the county. Traps are serviced by agricultural inspectors. The trap used for ACP detection is the yellow panel trap, which is a two-sided board coated with stickum. ACP becomes entangled on the sticky capture surface. 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 there is evidence that ACP exists, the host will be visually surveyed for ACP samples.

1) Yellow Panel Traps
   a) Trap Density: Five to 16 traps/square mile.
   b) Trap Servicing Interval: Every two to four weeks.
   c) Trap Relocation and Replacement: Traps should be replaced and relocated every four to six weeks to another host at least 500 feet away if other hosts are available.

2) Visual and Tap-Sample Survey
   a) Trap Sites: Visual surveys and tap sampling should be conducted once at each trapping site when the trap is placed or relocated at that site.
   b) Detection Survey: Twenty sites per square mile should be visually inspected and tap sampled each month. These sites should be rotated each month if hosts are available at alternate sites.

II. Delimitation Trapping and Visual Survey

The protocols below may be used upon the detection of a single psyllid. Any detection of ACP not associated with a regulatory incident shall trigger a delimitation survey. This survey shall continue for two years past the last psyllid found.

1) Yellow Panel Traps
   a) Trap Density: 100 traps per square mile in the core square mile (0.5 mile radius from detection site), and 50 traps per square mile in the first buffer (1.5 mile radius from detection site).
   b) Trap Servicing Interval: First week: daily in the core, twice a week in the buffer. Second week and longer: weekly for all traps.
   c) Trap Relocation and Replacement: Traps do not need to be relocated. Traps should be replaced every six weeks or sooner if needed.
   d) Post-Treatment Monitoring: Trap densities will remain at this level for two years past the last psyllid detected.

2) Visual and Tap Sample Survey
   All properties within 400 to 800 meters of the initial detection may be surveyed. Initial surveys should be door-to-door, moving outward in all directions from each detection site. Additional detection locations shall be used as new epicenters to expand survey boundaries.

3) Transect Survey
   If high or scattered ACP populations are found in the initial inspections, a transect survey may be implemented to rapidly determine the extent of the infestation. This involves inspecting a minimum of 20 properties per square mile and/or placing 20 traps per

square mile along eight radii in the cardinal directions (e.g., north, northeast, etc.). Transect surveys extend between five and 20 miles beyond a detection site, depending on the situation.

III. Treatment

Trigger: Treatment is warranted upon the detection of one or more psyllids.

Treatment Area: Treatments are normally 400 meters around each detection site, but may extend to 800 meters depending on number of specimens, proximity to previous finds, etc. Only host plants are treated.

Treatment Plan: Both foliar and systemic insecticides will be applied. Foliar insecticides are useful for immediate reduction of the adult population in order to eliminate dispersal, while systemic insecticides are necessary to kill the sedentary nymphs and provide long term protection against reinfestation. The frequency of the treatments 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.

1) Foliar Treatment
Tempo® SC Ultra (cyfluthrin) is a pyrethroid contact insecticide. Treatment will initially occur once, and may subsequently re-occur up to six 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. Affected properties will be notified in writing at least 48 hours prior to treatment. Following treatment, completion notices are left with the homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property.

2) Soil Treatment
   a) Merit® 2F (imidacloprid), is a neonicotinoid systemic insecticide. Treatment will initially occur once, and may subsequently re-occur once on an annual basis if additional psyllids are detected. This material will be applied as a soil drench to the root zone beneath host plants. Affected properties will be notified in writing at least 48 hours prior to treatment. Following treatment, completion notices are left with the homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property.

   b) 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, and may subsequently re-occur once on an annual basis if additional psyllids are detected. This material will be inserted as tablets into the root zone beneath host plants, two to five inches below the soil surface, and the soil watered to initiate tablet dissolution. Affected properties will be notified in writing at least 48 hours prior to treatment. Following treatment, completion notices are left with the homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property.

IV. 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.

V. Public Notification

Residents of affected properties are 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 Food and Agricultural Code 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 project will be conveyed directly to local and State political representatives and authorities via letters, emails, and/or faxes. Press releases, if issued, are prepared by the CDFA information officer and the county agricultural commissioner, in close coordination with the project leader responsible for treatment. Either the county agricultural commissioner or the public information officer serves as the primary contact to the media.

INTEGRATED PEST MANAGEMENT ANALYSIS OF ALTERNATIVE TREATMENT METHODS FOR CONTROL OF THE ASIAN CITRUS PSYLLID
February 2015

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. The CDFA is participating in research to develop a plant volatile attractant to enhance the trap, but the results are preliminary and are currently under review.

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. The remaining soil may have to be protected against new plants sprouting up by regular herbicide sprays or by tarping. For these reasons, host removal is considered economically inefficient and too intrusive to use over the entirety of the 400- to 800-meter radius treatment area used for ACP. Additionally, host removal could promote dispersal of female psyllids in search of hosts outside of the treatment area, thus spreading the infestation.

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. One species of entomopathogenic fungus, *Isaria fumosorosea* (*Paecilomyces fumosoroseus*) (Hypocreales: Cordycipitaceae), recently has been shown to be effective at suppressing ACP populations, but it is not yet registered for use on food crops, including citrus, in California. The CDFA is cooperating with the University of California at Davis in pursuing authorization to conduct research in California on this fungus for use against 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 now actively 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/pnasiancitruspsyllid.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 Fresno, Imperial, Kern, Los Angeles, Madera, Orange, Riverside, San Bernardino, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Tulare, and Ventura counties. The ACP has 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 extremely 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.

Host List

SCIENTIFIC NAME	COMMON NAMES
Aegle marmelos	bael, Bengal quince, golden apple, bela, milva
Aeglopsis chevalieri	Chevalier's aeglopsis
Afraegle gabonensis	Gabon powder-flask
Afraegle paniculata	Nigerian powder-flask
Amyris madrensis	mountain torchwood
Atalantia monophylla	Indian atalantia
Atalantia spp.	
Balsamocitrus dawei	Uganda powder-flask
Bergia (=*Murraya*) *koenigii*	curry leaf
Calodendrum capense	Cape chestnut
X Citroncirus webberi	
Choisya arizonica	Arizonia orange
Choisya ternate	Mexican or mock orange
Citropsis articulata	Katimboro, Muboro, West African cherry orange
Citropsis gilletiana	cherry-orange
Citropsis schweinfurthii	African cherry-orange
Citrus aurantiifolia	lime, Key lime, Persian lime, lima, limón agrio, limón ceutí, lima mejicana, limero
Citrus aurantium	sour orange, Seville orange, bigarde, marmalade orange, naranja agria, naranja amarga
Citrus hystrix	Mauritius papeda, Kaffir lime
Citrus jambhiri	rough lemon, jambhiri-orange, limón rugoso, rugoso
Citrus limon	lemon, limón, limonero
Citrus madurensis (=*X Citrofortunella microcarpa*)	calamondin
Citrus maxima	pummelo, pomelo, shaddock, pompelmous, toronja
Citrus medica	citron, cidra, cidro, toronja
Citrus meyeri	Meyer lemon, dwarf lemon
Citrus × *nobilis*	king mandarin, tangor, Florida orange, King-of-Siam
Citrus × *paradisi*	grapefruit, pomelo, toronja
Citrus reticulata	mandarin, tangerine, mandarina
Citrus sinensis	sweet orange, orange, naranja, naranja dulce
Citrus spp.	
Clausena anisum-olens	anis
Clausena excavata	clausena
Clausena indica	clausena
Clausena lansium	wampi, wampee

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