

PIERCE'S DISEASE CONTROL PROGRAM

REPORT TO THE LEGISLATURE for calendar year 2018

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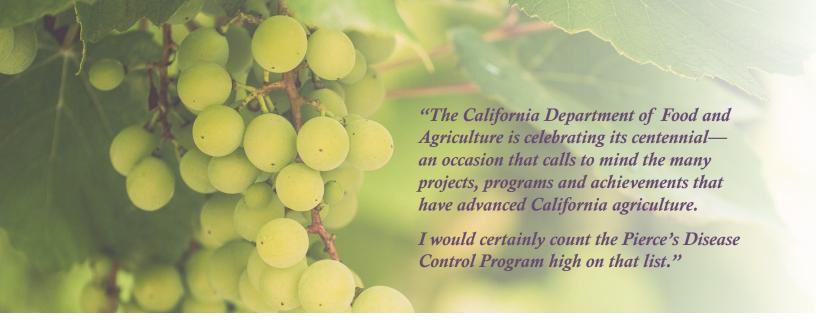
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Environmental Compliance



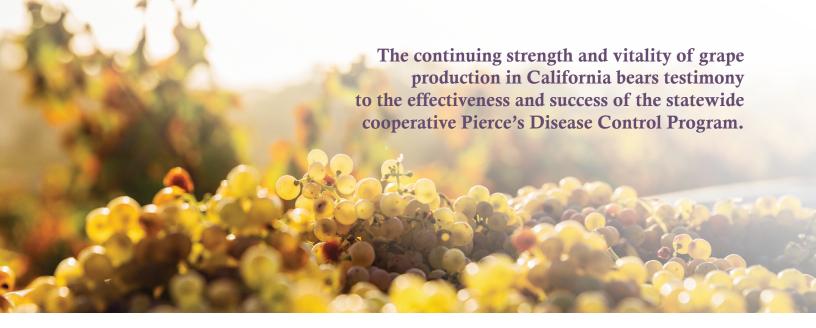


STATEMENT of the secretary

As 2019 begins, the California Department of Food and Agriculture is celebrating its centennial — 100 years since the state Legislature created what we now know as "CDFA." It is an occasion that calls to mind the many projects, programs, and achievements under this department's purview that have advanced California agriculture over the past century. I would certainly count the Pierce's Disease Control Program high on that list.

In that vein, it's fitting that the Pierce's Disease/Glassy-winged Sharpshooter Board and the Pierce's Disease Control Program began 2019 with a fond "farewell" to Bob Wynn upon his retirement as Statewide Coordinator — a position he has held since the program was created nearly two decades ago. Bob is the first to say that he has had a lot of help. He credits excellent staff as well as help from the wine and grape community, from nursery and citrus growers, from researchers, and from a wide array of regulatory partners, all of whom support this great industry. But it's also true that Bob's talents for bringing the right people together under the right circumstances, and then providing clear, concise, transparent information to help them do the job, have often been the secret to this program's lasting success. He is a masterful communicator, a frank and honest advisor, and a respected colleague. He has left this program and CDFA in excellent shape, and he has earned our respect as well as our friendship in the process.

Karen Ross, Secretary
California Department of Food and Agriculture



EXECUTIVE summary

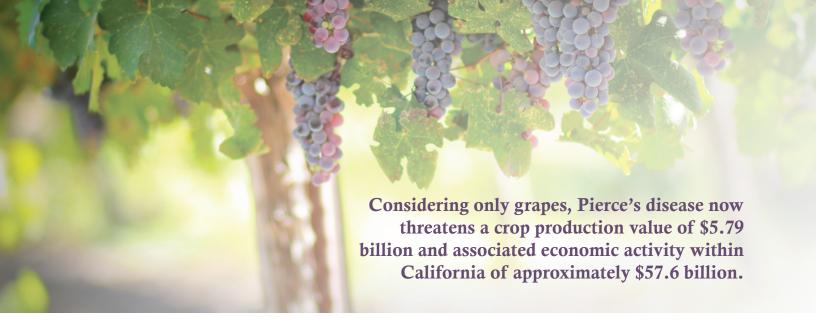
Pierce's disease (PD) is a lethal disease of grapevines and a serious concern throughout the southern United States. The disease is particularly threatening to California's thriving winegrape industry, which generates annual economic activity of \$57.6 billion within the state and \$114 billion nationally. The bacterial pathogen which causes PD, *Xylella fastidiosa (Xf)*, has been present in California for more than a century and while many insects can vector *Xf*, the establishment and spread of the glassywinged sharpshooter (GWSS) in California in the 1980s and 1990s created a new and serious danger. The Pierce's Disease Control Program (PDCP) works to halt the spread of GWSS until research finds solutions to PD.

The PDCP's operational approach relies on five major components: contain the spread, statewide survey and detection, rapid response, outreach, and research. Since the inception of the PDCP in 2000, these components have proven to be an effective means for slowing the spread of GWSS and minimizing the statewide impact of PD.

The PDCP implements its statewide strategy through the collaboration of several agencies and cooperators. The United States Department of Agriculture (USDA), the California County Agricultural Commissioners, the University of California, the Pierce's Disease and Glassy-winged Sharpshooter Board, and the Pierce's Disease Advisory Task Force all contribute to the success of the program.

Funding for the PDCP comes from three primary sources: the USDA's Animal and Plant Health Inspection Service, California's winegrape growers, and (on occasion) the State General Fund.

Among the many major accomplishments over the life of the program are the detection and eradication of 18 incipient infestations of GWSS. The continuing strength and vitality of grape production in California bears testimony to the effectiveness and success of the statewide cooperative PDCP.



BACKGROUND

the threat

Pierce's disease (PD) is a fatal bacterial disease of grapevines that is spread by certain types of insects, such as leafhoppers. It has been present in California for more than 100 years and in the past has caused sizable losses to viticulture in localized "hotspot" areas of the state. Until recently, it did not pose a severe threat to the majority of areas currently under grape production. This situation changed dramatically with the arrival of the glassy-winged sharpshooter (GWSS), an aggressive insect vector of PD. Because of this insect, viticulture in traditionally safe growing regions is now at risk from the disease.

Considering just grapes, PD now threatens a crop production value of \$5.79 billion and associated economic activity within California of approximately \$57.6 billion. Other crop and ornamental plant resources such as almonds (\$5.6 billion), susceptible types of citrus (\$934 million), stone fruits (\$885 million), and shade trees are also at risk, either from the PD strain of the bacterium or from related strains found elsewhere in the world. The Pierce's Disease Control Program (PDCP) was established within the California Department of Food Agriculture (CDFA) to minimize the statewide impact of PD.





Vines and leaves showing symptoms of Pierce's disease

pierce's disease

Pierce's disease in grapevines was first noted in California near Anaheim around 1884. The disease is caused by a strain of the bacterium *Xylella fastidiosa* that kills grapevines by triggering cell death in the plant. Several strains of this bacterium exist, attacking and causing damage to different host plants including grapes, citrus,

stone fruits, almonds, oleander, and certain shade trees, such as oaks, elms, maples, and sycamores. The University of California reported that the disease destroyed over 1,000 acres of grapevines in Northern California between 1994 and 2000, causing \$30 million in damage. There is currently no known cure for PD.

the glassy-winged sharpshooter

The glassy-winged sharpshooter was first reported in California in 1994 but probably arrived in the state in the late 1980s. It is native to the southeastern United States and northeastern Mexico and feeds on the xylem fluid of a large number of plants. This sharpshooter builds up large populations on a diverse array of host plants and is a strong flyer, traveling greater distances than native sharpshooters.

California's first indication of the severe threat posed by this new disease and vector combination occurred in Temecula in Riverside County in August 1999, when over 300 acres of grapevines infested with GWSS were destroyed by PD. Losses continued to mount in Temecula and other infested areas in following years, eventually exceeding 1,100 acres statewide by 2002. The GWSS clearly has the potential to increase both the incidence and severity of PD in California.

As observed in the Temecula infestation, GWSS:

- Builds to high populations that substantially increase the number of insects vectoring the destructive Xylella fastidiosa bacteria to crops;
- Travels longer distances in a shorter time than other sharpshooters;
- Makes use of more breeding habitats and plant hosts than native vectors; and
- Transmits the bacteria from vine to vine, resulting in an exponential increase in disease incidence in vineyards.

The combination of PD and GWSS constitutes an unprecedented threat to California's multi-billion dollar grape and wine industry, as well as to almonds, oleander, and other crop and ornamental plants.

Exposed eggs, nymph, and adult female GWSS



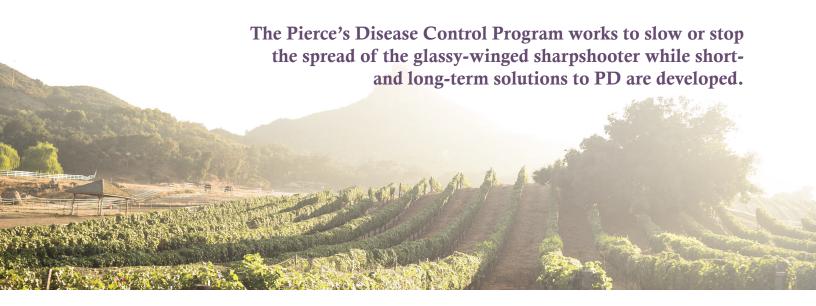




1 Report of the Pierce's Disease Research and Emergency Response Task Force. April 2000.

Pierce's Disease and Glassy-Winged Sharpshooter in California





PROGRAM description

The Pierce's Disease Control Program (PDCP) works to minimize the impact of Pierce's disease (PD) in California. The strategy is to slow or stop the spread of the glassy-winged sharpshooter (GWSS) while short- and long-term solutions to PD are developed. This strategy relies upon the following five elements:

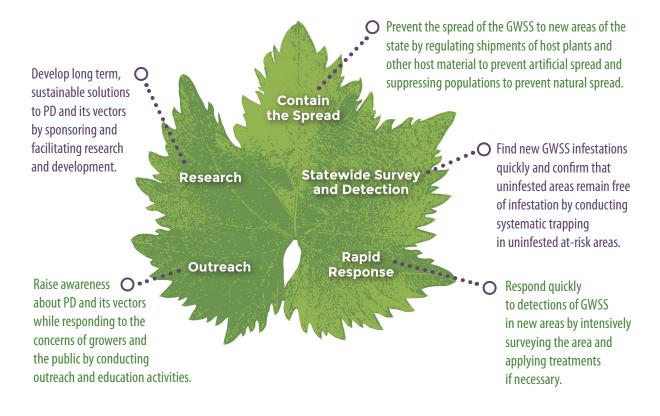


photo: Rufus O Dea for Unsplash

PROGRAM DESCRIPTION

organization

The PDCP is a partnership that includes the California Department of Food and Agriculture (CDFA), the County Agricultural Commissioners, the United States Department of Agriculture (USDA), the University of California (UC), other state and local agencies, industry, and agricultural organizations throughout the state.

A Statewide Coordinator directs the program in accordance with the policies and priorities established by the Secretary of the CDFA. Program staff are located throughout the state and are responsible for coordinating and implementing the elements of the program. This includes working closely with the County Agricultural Commissioners to ensure that program activities are conducted in accordance with all statutory and regulatory requirements. Scientists at CDFA's Plant Pest Diagnostics Center provide pest identification services. Biological control agents are produced at a facility in Arvin and released where needed. Researchers throughout the state and elsewhere conduct research geared towards finding solutions to PD.

PIERCE'S DISEASE CONTROL PROGRAM DISTRICTS



ATP	Approved Treatment Program	PD	Pierce's disease
CACASA	California Agricultural	PD/GWSS Board	Pierce's Disease and Glassy-winged
	Commissioners and Sealers		Sharpshooter Board
	Association	PDCP	Pierce's Disease Control Program
DFA	California Department	UC	University of California
	of Food & Agriculture	USDA	United States Department
GVM	European grapevine moth		of Agriculture

PROGRAM DESCRIPTION

county workplans

The County Agricultural Commissioners are responsible for conducting local PDCP activities, which are guided by workplans submitted to and approved by CDFA. As stated in the law (California Food and Agricultural Code Section 6046), county workplans must include the following elements:

- Outreach presentations and training in local communities that respond to local concerns;
- Ongoing training of employees in the biology, survey, and treatment of PD and its vectors;

- Identification of a local coordinator;
- Proposed response to the discovery of the disease and its vectors (including delimitation and treatment); and
- A system to track and report new infestations.

Audits are conducted in one or more counties each year to verify the accuracy and appropriateness of charges and expenditures.

advisory groups

Several groups advise the PDCP, including:

Pierce's Disease and Glassy-winged Sharpshooter (PD/GWSS) Board

The PD/GWSS Board is composed of 14 representatives from the winegrape industry, plus one member from the public. It provides recommendations to the Secretary of CDFA on the use of funds collected under the PD/GWSS winegrape assessment, which is a statewide value-based assessment. This has raised approximately \$60.6 million over the last 17 years. The Board is advised by committees established to focus on specific areas and issues.

Pierce's Disease Advisory Task Force (Task Force)

The Task Force, composed of County Agricultural Commissioners, scientists, agricultural representatives, and other experts, reviews program progress and develops recommendations for the Secretary. Similar to the PD/GWSS Board, the Task Force is advised by committees established to focus on specific areas and issues.

Pierce's Disease Research Symposium Planning Group

This group, composed of USDA, UC and CDFA representatives, provides input on the format, content, and schedule of the Pierce's Disease Research Symposium.

California Agricultural Commissioners and Sealers Association (CACASA) / Glassy-winged Sharpshooter Advisory Group

This group is composed of agricultural commissioner representatives from each of the five CACASA area groups in the state. This group meets periodically to discuss issues of statewide and regional concern and to promote program consistency and good communication among state and county cooperators.



CONTAIN the spread

The Contain the Spread element of the Pierce's Disease Control Program is designed to prevent the spread of the glassy-winged sharpshooter (GWSS) to uninfested areas of the state on articles and commodities shipped from infested areas. Emergency regulations governing the movement of nursery stock and bulk grapes² were first adopted in July 2000. Regulations on bulk citrus were added later, following finds of live sharpshooters in bulk citrus shipments. Permanent program regulations were adopted in July 2003. In GWSS partially infested areas, area-wide management programs were established to suppress GWSS populations and to reduce their damage and spread.

nursery

Nursery stock is a high-risk commodity for spreading GWSS. Approximately 53% of California's 13,000 licensed nurseries are located in sharpshooter-infested counties. Many of these nurseries ship to the non-infested areas of the state.

Activities to mitigate the risk of moving GWSS on nursery stock include:

- Inspection of nursery stock in infested areas prior to shipping to non-infested areas;
- · Treatment of nursery stock when necessary;
- · Certification of shipments;
- Inspection of nursery stock at receiving nurseries prior to sale; and
- Trapping in and near nurseries shipping to non-infested areas.

2 Bulk grapes were found to not be a pest risk, so they are no longer regulated.

inspection results

In 2018, there were 34,400 shipments of nursery stock from infested areas to non-infested areas. No viable life stages of GWSS were discovered at destination. Origin county inspectors stopped 51 egg masses, one nymph, and three adults from moving in nursery stock shipments.

Over 90% of all rejections between 2001 and 2018 have been for viable GWSS egg masses. The table below presents the results of the ongoing nursery inspection and shipment certification program.

YEAR	NUMBER OF SHIPMENTS	GWSS FOUND AT DESTINATION	% FREE OF GWSS AT DESTINATION
2001	57,600	149	99.74%
2002	65,800	77	99.88%
2003	65,000	40	99.94%
2004	76,700	64	99.92%
2005	72,600	84	99.88%
2006	69,000	47	99.93%
2007	73,100	46	99.94%
2008	62,600	37	99.94%
2009	53,700	23	99.96%
2010	50,600	6	99.99%
2011	44,500	4	99.99%
2012	44,600	2	99.99%
2013	45,800	6	99.99%
2014	44,000	12	99.97%
2015	38,000	6	99.98%
2016	36,000	9	99.97%
2017	36,700	6	99.98%
2018	34,400	0	100%





Origin county nursery stock inspections

enforcement actions

Enforcement actions are taken against nurseries and shipments that are in violation of the regulations. Actions can be taken at origin or destination.

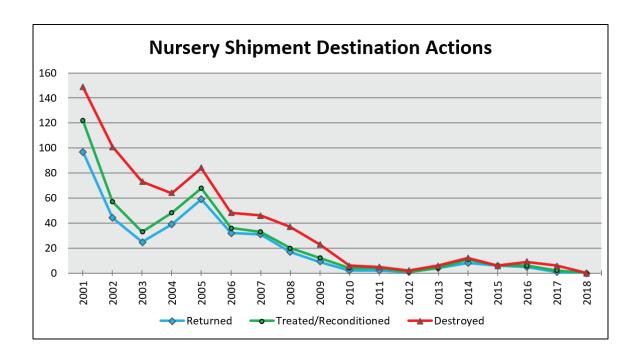
Actions that can be taken at the origin of nursery shipments consist of the following:

- RESTRICTION: The nursery is restricted from shipping certain species of host material out of the infested area for a period of time.
- SUSPENSION: The nursery is suspended from shipping all host material out of the infested area until the pest risk is mitigated.
- REVOCATION: The nursery's compliance agreement is revoked and it cannot ship any host material out of the infested area for an established period of time.

Actions that can be taken at the destination of nursery shipments consist of the following:

- TREATMENT: The nursery shipment is treated with an effective material.
- RETURN: The shipment is returned to origin.
- **DESTRUCTION:** The shipment is destroyed.

Shippers and receivers who violate nursery stock regulations are subject to fines. In 2018, administrative penalties were levied against five companies totaling \$5,000.



nursery stock approved treatment program

The Nursery Stock Approved Treatment Program (ATP) was implemented in June 2008 following the successful three-year Nursery Treatment Pilot Program. With the ATP, qualified nurseries are allowed to ship nursery stock, treated with specified materials, to non-infested areas without an origin inspection. These materials are 100% efficacious at killing emerging GWSS nymphs.

In 2018, there were eight participating nurseries that shipped approximately 3.3 million plants in 12,779 shipments. There were a total of 25 yards associated with these eight nurseries. Forty-six counties received plant material from ATP nurseries throughout the year, with no viable GWSS found in any shipments.

Trapping is conducted in ATP nurseries by county or Pierce's Disease Control Program (PDCP) staff to ensure pest free standards are met. Traps are maintained at two traps per acre in all ATP nurseries. If a trap exceeds the threshold of

10 GWSS within a two-week period, then all host plant material within a 100-foot radius is placed on hold and must be treated within five days. If a hold treatment is not conducted within five days, plants within the 100-foot radius are held for a minimum of two weeks from the time the next treatment is applied. The 2018 trapping effort included 2,857 traps deployed in 1,343 acres across 25 nursery yards, with 104 traps exceeding the 10 GWSS threshold.

Nursery stock being shipped under this program must be treated with the pesticide Sevin (carbaryl) or Tame (fenpropathrin). All treatments are witnessed by licensed county inspectors. Additional monitoring

of treatments includes quality control checks by PDCP staff using water-sensitive paper. Yellow sheets of water-sensitive paper are placed within the nursery stock shipment at various heights and locations. When the pesticide droplets make contact with the paper, it turns from yellow to blue. After treatment, the sheets are checked to see if they were hit by the spray. In 2018, PDCP staff placed water-sensitive paper in shipments at each participating nursery a minimum of once a month. Out of 209 water-sensitive papers inspected only ten indicated the need for retreatment of the shipment.

Under the ATP program, county inspectors may choose to monitor GWSS egg masses found at destination on treated shipments of nursery stock. In 2018, a total of two egg masses from two ATP yards were monitored in insect rearing sleeves by destination counties. There was no viable GWSS emergence.





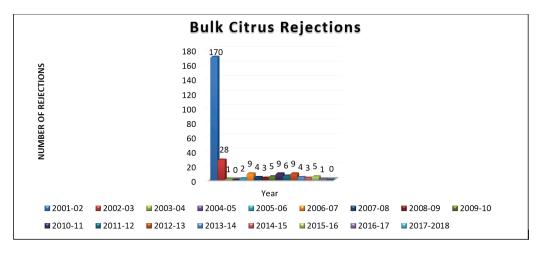


Water sensitive paper

bulk citrus

Citrus trees are primary hosts for GWSS throughout the year. When the weather is warm, the insects are active and will flee the disturbances associated with harvest. However, once the weather turns cold, the sharpshooters are relatively inactive, and can end up in picking bags with harvested fruit, ultimately turning up at processing facilities in other parts of the state.

During the most recent citrus-shipping season (October 2017 through September 2018), live GWSS were found in zero out of approximately 17,329 certified destination inspections of bulk citrus. This shipping season achieved a success rate of 100%. This success is attributed to the cooperative efforts of bulk citrus program participants.











Citrus harvest and inspections

area-wide management programs

The area-wide management programs coordinate GWSS management efforts in large, agriculturally diverse grape and citrus production areas where GWSS is present.

Madera County C

In 2018, there were 10 GWSS found in area-wide traps, compared to three in 2017. About 420 acres of citrus were treated for GWSS in 2018.

Fresno County

Area-wide trapping for GWSS in citrus groves was implemented in 2003. In 2011, traps were added to grapes near the existing infested area and the San Joaquin River. In 2018, there were about 230 GWSS found in citrus and grapes, compared to 205 trap finds in 2017. About 1,240 acres of citrus were treated for GWSS in 2018.

O Tulare County

In 2018, there were 8,189 GWSS found in area-wide traps, compared to 10,579 in 2017. There were about 7,000 acres of citrus treated in 2018.

Kern County O

The boundaries of the Kern County infested area remained the same as last year. The infested area includes agricultural lands as well as the city of Bakersfield and several smaller Kern County communities.

In 2018, there were about 37,250 GWSS found in area-wide traps. This compares to the 52,008 GWSS that were trapped in 2017. These numbers show the continued downward trend below the 201,060 GWSS that were found in 2015.

In 2018, about 9,190 acres of citrus were treated for GWSS.

Riverside County (

In 2018, the overall GWSS catch in the Temecula Valley was down to more typical levels following a significant spike the previous year. This increase in GWSS populations in 2017 prompted a new strategy of increased monitoring for GWSS in several hot spots in the citrus/grape interface to help guide Pierce's disease and GWSS management in the area.

biological control

Since 2001, the Pierce's Disease Control Program (PDCP) has been implementing biological control as an important component of its integrated pest management approach to controlling the glassy-winged sharpshooter (GWSS). GWSS biological control agents are tiny, parasitic wasps. The female wasps lay their eggs inside GWSS eggs and the immature wasp then completes its development by feeding on the GWSS egg. The wasp adult then emerges, mates, and searches for GWSS eggs. Through the repeated life cycles, the parasitic wasps kill GWSS eggs and thus contribute to suppression of GWSS populations.

In 2018, three *Cosmocomoidea* species were under mass production (*C. ashmeadi*, *C. morgani*, and *C. morrilli*) at the CDFA-PDCP Arvin Biological Control facility in Kern County. A total of 59,543 biological control agents were produced, including the three *Cosmocomoidea* species as well as three others (*C. novifasciata*, *C. walkerjonesi*, and *Ufens spp.*). A total of 43,464 biological control agents were released at field sites in seven counties (Fresno, Kern, Madera, San Diego, Santa Clara, Tulare, and Ventura). Since the start of the Program, approximately 2.66 million biological control agents have been released at agricultural, riparian, and urban sites in sixteen counties in California.



Biocontrol agents laying eggs inside GWSS eggs



Biocontrol agent emerging from GWSS eggs







C. morgani

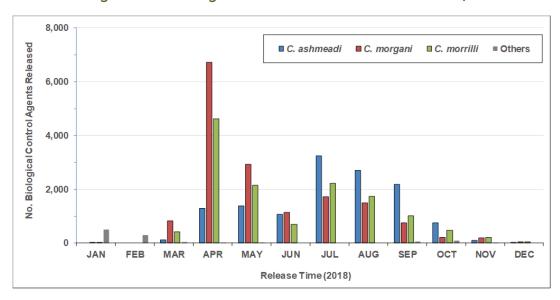


C. morrilli

Biological Control Agents Released in 2018

COUNTY	NUMBER	IBER BIOLOG			AL CONTROL AGENTS			
COUNTY	OF SITES C. ASHMEA	C. ASHMEADI	C. MORGANI	C. MORRILLI	C. NOVIFASCIATA	C. WALKERJONESI	<i>UFENS</i> SPP.	TOTAL
Fresno	14	1,332	1,620	1,227	0	0	2	4,181
Kern	30	3,755	2,859	2,517	3	1	245	9,380
Madera	3	171	387	465	0	0	25	1,048
San Diego	5	1,450	2,885	2,177	0	0	0	6,512
Santa Clara	8	0	0	800	0	0	0	800
Tulare	23	2,396	2,199	1,456	25	4	524	6,604
Ventura	22	3,759	6,102	4,925	88	6	59	14,939
2018 TOTAL	105	12,863	16,052	13,567	116	11	855	43,464

Number of Biological Control Agents Released Over Time in 2018 (combined data)



Post-release field surveys were conducted in six counties (Fresno, Kern, Madera, San Diego, Tulare, and Ventura) to determine the activity of the biological control agents in the field. In 2018, a total of 965 leaves bearing GWSS eggs were sampled during the surveys. *C. ashmeadi* was the predominant species and *Ufens* species were found over a wide geographic area. Other species found included *C. morgani, C. morrilli, C. novifasciata*, and *C. walkerjonesi*.

The combined data showed that approximately 64% of GWSS eggs were parasitized in the field, with varying parasitism rates, depending on location and season. The parasitism rates per county were:

• Fresno County: 74%

• Kern County: 63%

Madera County: 68%

• San Diego County: 70%

• Tulare County: 75%

• Ventura County: 38%

Seasonally, parasitism rates were low early in the season (January - April) but stayed above 50% afterwards, reaching up to 93% in October. Apparently, GWSS eggs laid by overwintered GWSS adults outnumbered the parasitic wasps in spring but the wasp populations were able to catch up later once host eggs became abundant in the field. These findings indicate that the parasitic wasps have contributed significantly to the suppression of GWSS populations.

In 2018, the Biological Control group monitored the seasonal occurrence of GWSS life stages in Kern County to support the area-wide management program. Using visual survey and beat-net methods, GWSS life stages were monitored every week at multiple field sites where persistent GWSS populations had been found. GWSS adults and egg masses (including parasitized or old eggs) were detected throughout the year while early- and late-instar nymphs were observed March through October. Fresh egg masses first occurred in late February and were found through September.

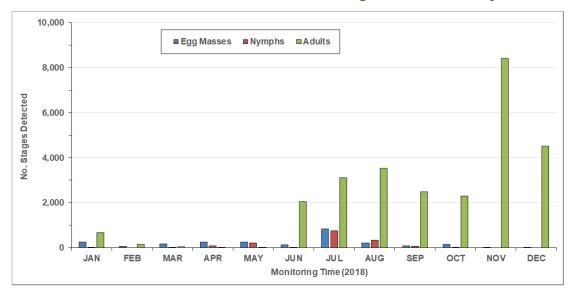
Number of Biological Control Agents Emerged from Field-collected GWSS Egg Samples in 2018

COUNTY	NUMBER	BIOLOGICAL CONTROL AGENTS						TOTAL
COUNTY	OF SITES	C. ASHMEADI	C. MORGANI	C. MORRILLI	C. NOVIFASCIATA	C. WALKERJONESI	<i>UFENS</i> SPP.	IVIAL
Fresno	14	548	0	0	0	0	331	879
Kern	30	828	0	0	0	0	630	1,458
Madera	3	20	0	0	0	0	46	66
San Diego	5	495	0	54	19	196	56	820
Tulare	23	311	0	0	0	0	153	464
Ventura	22	117	12	21	44	59	162	415
2018 TOTAL	97	2,319	12	75	63	255	1,378	4,102

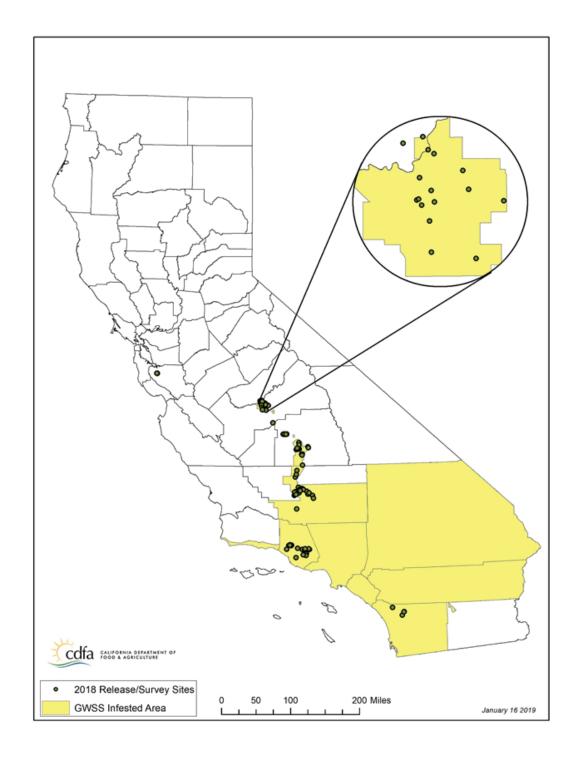
Unlike previous years, GWSS adults in larger numbers were detected in November-December and a few eggs were laid by the adults when provisioned with host plants under greenhouse condition. This suggests that a portion of overwintering GWSS adults may be able to lay

eggs promptly, once environmental conditions become favorable. The monitoring data provided more information on local GWSS populations for the area-wide management program.

Seasonal Occurence of GWSS Life Stages in Kern County



Biological Control Release Sites in 2018





STATEWIDE survey and detection

The Statewide Survey and Detection element of the Pierce's Disease Control Program is designed to locate new glassy-winged sharpshooter (GWSS) infestations quickly and confirm that non-infested areas remain free of infestation by systematically trapping urban and residential areas and nurseries to determine if GWSS are present.

GWSS are detected by using yellow panel traps that are deployed in 43 counties that are not infested or are only partially infested with GWSS. The GWSS are attracted to the trap's bright yellow color and become stuck on the adhesive surface. County and state personnel service traps on a regular basis during the trapping season.

Each trap is checked every second or third week and moved to a new location every six weeks. New traps are used as needed. Detection and delimitation protocols were updated and distributed to each county participant in the spring of 2018. During the peak of the trapping season, approximately 33,000 traps were deployed and serviced statewide for GWSS detection and survey.

During 2018, Program staff provided detection training to 566 employees from 39 counties, Approved Treatment Program participating nurseries, and citrus packing houses. Staff assisted county personnel with field surveys and also conducted quality control inspections of County trapping programs. These inspections are done to ensure that proper identification of target insects, trap placement, host selection, servicing schedules, and record keeping are being performed correctly and at the desired levels.



Yellow panel trap in crape myrtle



Training nursery personnel



RAPID response

The Rapid Response element of the Pierce's Disease Control Program (PDCP) involves responding quickly to detections of glassy-winged sharpshooters (GWSS) in new areas.

When one or more GWSS are found in a new area, a delimitation survey is conducted by county biologists, occasionally with assistance from the PDCP, to determine if an infestation is present and, if so, to identify the boundaries. Delimitation surveys consist of high density trapping and visual inspections of preferred host plants in the area.

If an infestation is present and treatment is necessary, residents of the area are notified. Treatments in urban and residential areas are applied under the supervision of the county agricultural commissioner and funded by the PDCP. In agricultural settings, treatments are the responsibility of the grower and must be conducted in a manner approved by the county agricultural commissioner.

In 2018, no new GWSS infestations were found in California. However, in areas of Fresno, Madera, and Tulare counties, which were already undergoing eradications or suppression efforts, GWSS were found on approximately 860 properties. In response, approximately 1,275 properties (infested plus adjacents) were treated. The number of properties treated was lower in 2018 compared to previous years.



Visual surveys are conducted in response to new glassy-winged sharpshooter finds

pre-treatment communication with residents of treatment areas

Extensive public outreach and communication activities are conducted to ensure residents in affected areas are kept well informed of program and treatment activities.

A public meeting or other outreach activity for community members precedes treatment in urban and residential areas. This provides residents the opportunity to learn about and discuss the treatment process with program and environmental health specialists. Door-to-door contacts, direct mail, and/or local media are used to inform residents of public meetings. Occupants of all properties scheduled for treatment are provided advance notification of the treatment date and time, information on the material to be used, and a phone number to call for more information.

To help protect area wildlife, a database of threatened and endangered species is consulted to determine if any listed species are present in the treatment area. All appropriate federal and state agencies are notified prior to treatment.



Soil injection treatment of a tree in a glassy-winged sharpshooter infested area by a pest control operator

treatment

Public safety is CDFA's number one concern whenever treatments are applied. Program staff and cooperators ensure that only registered materials are applied, in strict compliance with label and other restrictions. The pesticide Merit (imidacloprid) has proven very effective against the GWSS. It is used in treatment programs in urban and residential settings and can be used for both foliar and soil treatment applications.

treatment monitoring

The Environmental Monitoring Branch of the California Department of Pesticide Regulation has previously monitored pesticide treatments to determine resulting residue levels. This information is used by the PDCP to assess application rates and coverage. Sampling results and related monitoring reports are available on the Department of Pesticide Regulation's website at http://www.cdpr.ca.gov/docs/emon/epests/gwss/.



OUTREACH

county agricultural commissioner outreach activities

In 2018, local county agricultural staff and industry members played key roles in maintaining program visibility and stakeholder awareness. County public outreach and education efforts included the distribution of PD and GWSS informational material to local retail, production, and shipping nurseries, landscape companies, members of the grape growing community, and others.

Industry trade publications, cooperative extension newsletters, and media interviews also proved to be successful methods of outreach. Some counties also participated in continuing education seminars and conducted training for landscapers, pest control operators, nursery employees, and nursery association members.

website

In March 2000, the CDFA activated a highly successful website focused on PD and the GWSS: www.cdfa.ca.gov/pdcp and it continues to be used as an effective tool for providing current and reliable information to interested parties.

The website features information on program activities, survey guidelines, regulatory guidelines, announcements of upcoming meetings and events, the GWSS host list, and other information. In addition, the website provides an interactive interface that allows direct activity reporting by local entities.

pierce's disease and glassy-winged sharpshooter board's outreach

A core component of the PD/GWSS Board's work is its outreach and education program, which keeps winegrape growers informed about activities funded by the grower assessment, as well as other program related activity.

The primary objectives of the outreach and education program in 2018 were to:

- Inform winegrape growers of the research milestones accomplished on their behalf
- · Update winegrape growers on ongoing field trials
- Educate growers on any newly designated pests and diseases

This year, as in the previous two, possible increases of Pierce's disease in the North Coast area of California seemed to be on the minds of most winegrape growers across much of Northern and Central California. The increase of PD once again put a spotlight on PD and its vectors, and the continuing threat posed to the winegrape industry. In addition to the focus on PD, vine mealybug and red blotch remained a significant concern for winegrape growers across the state.

The following communication channels and materials were used in 2018:

- · Quarterly newsletters
- · Website message board
- Facebook page
- YouTube video channel
- "Meeting the Challenges of Pierce's Disease and More" brochure
- · Photography library
- · Videotaped researcher interviews

- Monthly e-newsletter
- Fact sheets on newly designated pests and diseases
- · Trade show display

The monthly e-newsletter was sent to over 1,400 stakeholders, including over 600 California winegrape growers. It has proven to be useful for promptly getting program information out to all stakeholders. Articles from the e-newsletter were often reprinted verbatim in some of the wine trade publications. In addition to the monthly e-newsletter, a quarterly newsletter was produced and mailed directly to California's 7,000+ winegrape growers and other stakeholders.

Research Milestones and Field Trial Updates

Research field trials continued to be of great interest to growers and were featured on the website, in the monthly e-newsletter, and quarterly newsletters.

A new trade show display and brochure featuring field trial updates were created and shared with growers at trade shows throughout the state. Video updates of the traditional breeding and gene stacking field trials were filmed in late 2018 and will be completed and released in early 2019.

Both the traditional breeding of PD-resistant grapevines and the "gene stacking" approach, using modified rootstocks to limit the impact of PD in winegrapes, were the most asked about by wine grape growers. The prerelease to nurseries in 2017 of vines that have been bred traditionally to be resistant to PD was cause for excitement among grape growers. There was also the continued progress toward commercialization of the benign strain of *Xylella fastidiosa* that protects grapevines from PD.

OUTREACH

Other Designated Pests and Diseases

Besides PD and GWSS, the Board has designated other pests and diseases that are a threat to California's winegrape industry. The list now includes the European grapevine moth (eradicated from California in 2016), brown marmorated stink bug, all mealybug pests of wine grapes, and the diseases of red blotch, grapevine leafroll, and fanleaf virus.

Information regarding these other designated pests and diseases was communicated to winegrape growers around the state through the Board's regular communication channels and materials. Additionally, a pop-up display was developed with an infographic featuring the steps for designating a new pest or disease.

Media Coverage

In 2018, news articles and reports about PD and GWSS continued to appear in print media and on internet websites, with some television and radio coverage. The coverage was a mix of how growers were coping with PD, the increases of PD in some California regions, and research updates on PD, GWSS, and other designated pests and diseases. Red blotch was again making headlines in 2018, along with other pests and diseases that pose a threat to California's grape industry.



Brown marmorated stink bug has been designated as a serious pest of grapevines



RESEARCH

Research continues to be an integral part of the Pierce's Disease Control Program (PDCP). In 2018, the flurry of research activity that began at the start of the program continued with approximately 29 projects being conducted by some of the nation's top plant health researchers. Projects ranged from lab-based investigations at the molecular and genomic levels to field trials in experimental and commercial vineyards. The information generated is providing valuable insight into the biology, ecology, and behavior of Pierce's disease (PD) and its vectors. Additionally, 16 projects on other pests and diseases of winegrapes were in progress in 2018, increasing the knowledge base available for developing management solutions to these pests and diseases.

This extensive and sustained research effort has yielded discoveries and approaches that show promising potential. These include conventional plant-breeding methods to develop grapevines resistant to PD, non-virulent strains of *Xylella fastidiosa* to displace and outcompete pathogenic strains, identifying the mechanisms and processes leading to bacterial infection and spread, and elucidating the biochemical pathways that result in disease symptoms and death. Scientists have developed plant metabolites that block damage-causing pathways and processes, and are

experimenting with ways to introduce them into the plants via specially-developed rootstocks, topical applications, and other means. Several grapevine scions and rootstocks bred for PD resistance using traditional methods have been field tested and provided to Foundation Plant Services at UC Davis for possible commercialization.

In April 2017, five cultivars were pre-released to nurseries for propagation testing purposes. Small lots of wine have been produced from some of these new PD-resistant cultivars and have performed well in wine tastings. Field testing of grapevine plant material developed using transgenic approaches began in 2010 and continued through 2018.

In 2013, a Technology Facilitator was brought in to advise on developing and commercializing these promising discoveries, and in 2014 the services of a Viticulture Consultant were obtained to ensure the field trial test vineyards were properly managed.

research symposium

The PDCP has organized 14 annual research symposia since 2001 to foster communication and information sharing among scientists and stakeholders on the latest research progress and findings on PD.

The 15th Pierce's Disease Research Symposium was held in 2018. Approximately 80 people from California and other states attended this important event to learn more about PD. The symposium also included presentations on research and outreach projects being conducted on other serious winegrape pests and diseases, including grapevine viruses and vine mealybug.

As in prior years, a compendium of progress reports was prepared and distributed at the symposium. The 2018 proceedings contain 45 reports and can be viewed online at https://www.cdfa.ca.gov/pdcp/Research.html. Additional research progress reports and other research-related information is available at: http://www.piercesdisease.org/.



research proposal solicitation and reveiw

In 2018, the PDCP partnered with the Unified Grant Management for Viticulture and Enology Program at UC Davis to conduct its research and outreach proposal solicitation and review process. In addition to calling for proposals on PD and its vectors, the request for proposals also called for proposals on other serious pests and diseases of winegrapes.

A total of 27 proposals were received and reviewed, with 15 projects totaling \$3.4 million selected for funding using California PD/GWSS winegrape assessment funds. In addition, 11 ongoing projects were approved to continue for another fiscal year. Later in the year three additional projects, totaling approximately \$473,000, were added.



ENVIRONMENTAL compliance

In 2018, the California Department of Food and Agriculture (CDFA) continued its efforts to ensure that the Pierce's Disease Control Program (PDCP) is conducted in an environmentally responsible manner. These efforts included holding public meetings in advance of treatment activities, adhering to a special notification and consultation process with federal and state environmental stewardship agencies prior to treatment, and ensuring that pesticide applications are performed by licensed pest control professionals in strict accordance with California pesticide laws and regulations.

A statewide programmatic environmental impact report (EIR) was released for the PDCP in mid-2003. A legal challenge was filed against the environmental impact report shortly thereafter. Although a trial court found the environmental impact report to be adequate, the State Appeals Court later reversed the trial court's ruling. In 2010, the CDFA contracted with an environmental consulting firm and began preparing the environmental analyses, documents, and risk assessments called for by the Appeals Court. In 2012 it was decided to combine the efforts of this project with a similar one being

conducted for the CDFA's statewide plant health and pest prevention program. This work continued through 2014 and in late December the final EIR for the CDFA statewide plant pest prevention program, including the PDCP, was certified by the secretary. The full document is available at http://www.cdfa.ca.gov/plant/peir/index.html.

Following the December 2014 final EIR completion, a legal challenge was filed against it. In early 2018 the trial court ruled in favor of the plaintiffs and issued an injunction to the PDCP and CDFA to stop all urban treatment activities. The CDFA is appealing the decision of the trial court, and in May 2018 a stay to the treatment injunction was granted. The appeal process will continue in 2019.



FINANCIAL statement

REVENUE	FY 2017 18 (ACTUAL)	FY 2018 19 (BUDGETED)
Federal (United States Department of Agriculture)	\$15,921,967	\$15,574,754
CDFA (General Fund)*	\$1,269,623	\$2,468,745
Industry (PD/GWSS Board winegrape assessment)	\$2,925,898	\$5,485,490
TOTAL REVENUE	\$20,117,488	\$23,528,989

^{*} FY 2018-19 amount was encumbered in FY 2017-18

EXPENDITURES	FY 2017 18 (ACTUAL)	FY 2018 19 (BUDGETED)
Personal Services	\$3,266,131	\$3,268,885
Operating Expenses	\$5,898,992	\$9,384,422
Total County Payments	\$10,952,365	\$10,875,682
TOTAL EXPENDITURES	\$20,117,488	\$23,528,989