









Pierce's Disease Control Program

REPORT TO THE LEGISLATURE 2021

cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

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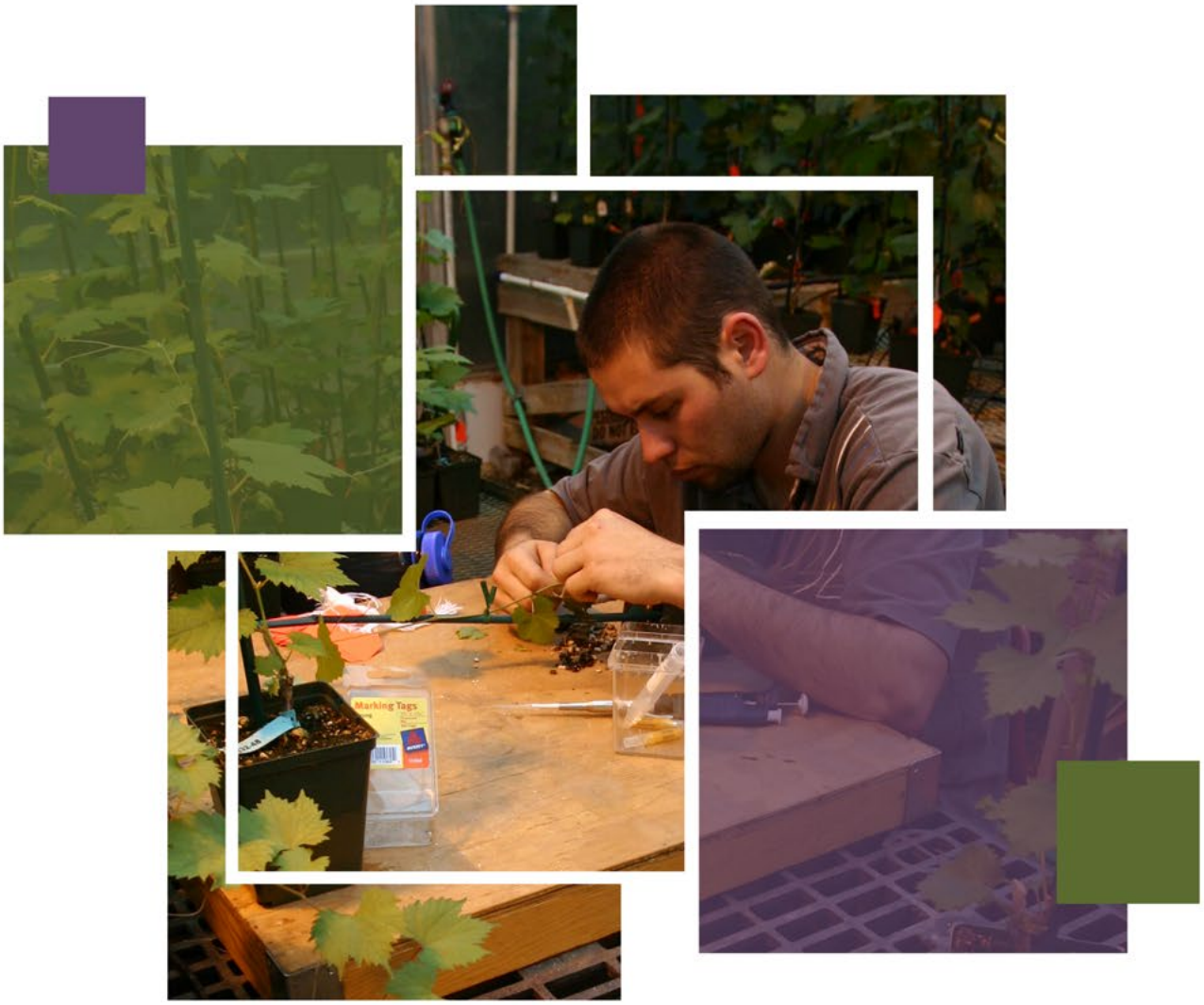
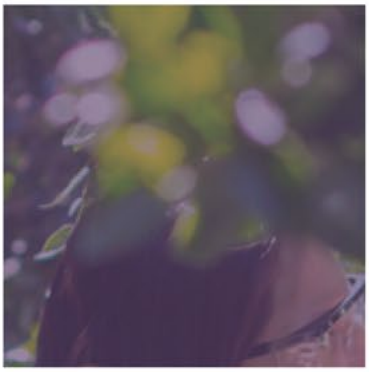




STATEMENT OF THE SECRETARY

In 2021, the Department of Food and Agriculture detected a GWSS infestation in Solano County, too close to many of Northern California's prized vineyards for comfort. I take heart in the excellent response of our Pierce's Disease Control Program, our growers, our local partners, and our stakeholders. The effort to detect, contain, and eradicate this infestation is well underway, as you'll read in the pages that follow.

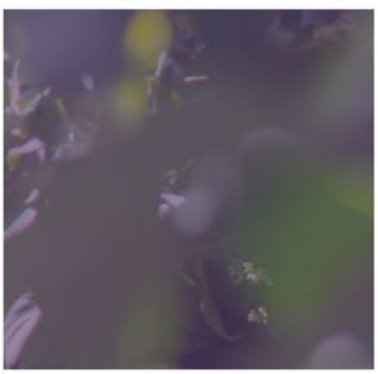
As concerning as such an infestation may be, I encourage you to take a moment to consider how growers' and stakeholders' assessment of such an event is tempered and nuanced now in comparison to the way it would have been some 21 years ago, when this insect and this plant disease catapulted themselves into California's consciousness. For the growers, stakeholders and government officials who have been involved in the establishment and funding of this program since that time, you may recall the outright fervor and fear that came with each new detection, each successive gathering of growers, residents and public officials, as we all pulled together to understand and respond to this unprecedented threat.

I encourage you to read this annual report with the origins, history, and trajectory of this program in mind: what we've been through together, what we've accomplished at this point, and what is still ahead. The progress and the difference I see today are rooted in the research we've done to mitigate the impacts of this pest and disease complex. The major milestones, of course, are projects like the development of disease-resistant rootstocks and the long-term value of biocontrol. But we've also built this entire program on a foundation of "smaller science" that is no less important. We've gained each new foothold along this path thanks to researchers who filled in the finer points of the pest's reproductive cycles, provided the knowledge that sharpshooters spend winter months as adults in citrus, or collected the data showing that area-wide management programs could enable growers to hold the line on infestations in the San Joaquin Valley that may have seemed insurmountable at one time.

What we have all gained over the past 20-plus years is confidence. From detection and response to communication and research, this is a mature, effective, prudent, and exemplary program. It is a testament to the power of a true public-private partnership, and the credit for that goes to the growers, vintners, and stakeholders who have created and sustained it.

Karen Ross, Secretary

California Department of Food and Agriculture



EXECUTIVE SUMMARY






This report is being submitted in compliance with California Food and Agricultural Code Section 6046(i) and provides the Legislature with an update on the California Department of Food and Agriculture's (CDFA) expenditures, progress, and ongoing priorities in combating Pierce's disease (PD) and its vectors in California. PD is a lethal disease of grapevines. It is a serious threat to grapevines throughout the southern United States and is particularly threatening to California's thriving winegrape industry. The bacterial pathogen which causes PD, *Xylella fastidiosa* (*Xf*), has been present in California for more than a century.

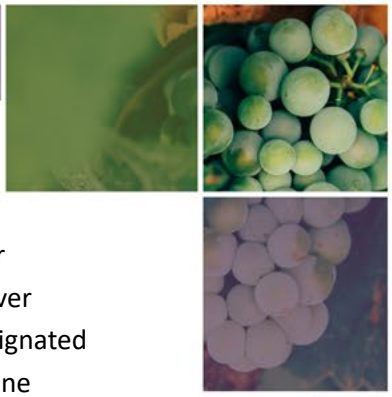
While many insects can vector *Xf*, the establishment and spread of the glassy-winged sharpshooter (GWSS) in California in the 1980s and 1990s created a new and serious threat of significant statewide damage. At risk is California's grape and wine industry, which generates annual economic activity of $57.6 billion within the state and $114 billion nationally. 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 in collaboration with several agencies and cooperators. The United States Department of Agriculture (USDA), the California County Agricultural Commissioners, the University of California (UC), the Pierce's Disease and Glassy-winged Sharpshooter Board (PDCP/GWSS 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 the State General Fund on occasion.

In 2021 a new GWSS infestation was found in Northern California for the first time in over a decade. Five GWSS were initially found on two traps in the city of Vacaville in Solano County. The delimitation around these finds started the next day, with assistance from the PDCP and neighboring counties. The year ended with the infestation delimited, a response plan implemented, and resources committed to supporting Solano County with their efforts to eradicate GWSS.

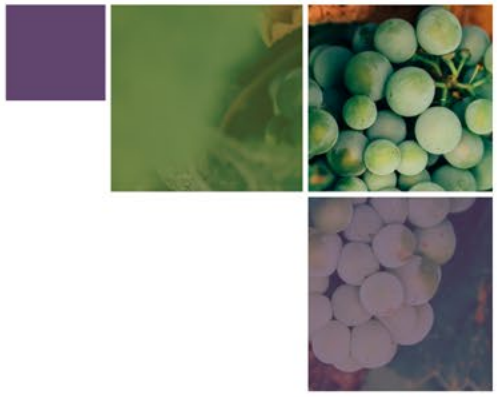


Since 2001, the PD/GWSS Board has invested $49.5 million of industry funds to support over 250 research grants to protect vineyards, prevent the spread of pests and diseases, and deliver practical and sustainable solutions. Research is focused on PD and GWSS, but also other designated pests and diseases of winegrapes, including brown marmorated stink bug, European grapevine moth, grapevine fanleaf disease, grapevine leafroll disease, grapevine red blotch disease, spotted lanternfly (SLF), and mealybugs.

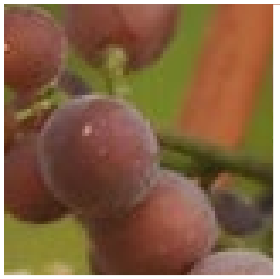
The PD/GWSS Board designated the SLF as a threat to winegrapes in 2020, and they, along with the PD Advisory Task Force, received updates on this pest from CDFA's Plant Health Division. While no research proposals on SLF were received in 2021, the PD/GWSS Board created a communications toolkit to educate the industry about this threat. Learn more about the pest and see the tools, in English and Spanish, online at bit.ly/SLFtools.

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.

ABBREVIATIONS & ACRONYMS	
ATP	Approved Treatment Program
CACASA	California Agricultural Commissioners and Sealers Association
CCVTGPDCD	Consolidated Central Valley Table Grape Pest & Disease Control District
CDFA	California Department of Food & Agriculture
GWSS	Glassy-winged sharpshooter
PD	Pierce's disease
PDCP	Pierce's Disease Control Program
PD/GWSS BOARD	Pierce's Disease and Glassy-winged Sharpshooter Board
SLF	Spotted lanternfly
UC	University of California
USDA	United States Department of Agriculture
Xf	Xylella fastidiosa



The PDCP's operational approach relies on five major components:



1. Contain the Spread

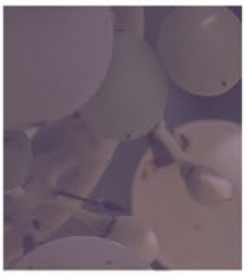
2. Statewide Survey & Detection

3. Rapid Response

4. Outreach

5. Research

BACKGROUND



The Threat

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 GWSS, an aggressive insect vector of PD. Because of this insect, viticulture in traditionally safe growing regions is at risk from the disease. Considering only grapes, PD threatens a crop production value of $4.48 billion, associated economic activity within California of approximately $57.6 billion, and $114.1 billion annually to the national economy. Other crops and ornamental plants such as almonds ($5.62 billion), susceptible types of citrus ($2.5 billion), stone fruits ($908 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. To counter this threat, the PDCP was established within the CDFA to minimize the statewide impact of PD.

Pierce's Disease

Vine showing symptoms of PD.

PD in grapevines was first noted in California near Anaheim around 1884. The disease is caused by a strain of the bacterium *Xf* 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 UC reported that the disease destroyed over 1,000 acres of grapevines in Northern California between 1994 and 2000, causing $30 million in damages.[1] There is currently no known cure for PD.

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

The Glassy-winged Sharpshooter

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

Adult GWSS.

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

GWSS clearly has the potential to increase both the incidence and severity of PD in California. As observed in various infestations, the sharpshooter:

- Builds to high populations that substantially increase the number of insects vectoring the destructive *Xf* 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, and other crop and ornamental plants.

Pierce's Disease and Glassy-winged Sharpshooter in California

PROGRAM DESCRIPTION

The PDCP works to minimize the impact of PD in California. The strategy is to slow or stop the spread of GWSS while short- and long-term solutions to PD are developed. This strategy relies upon the following five elements:

1. **CONTAIN THE SPREAD**
   Prevent the artificial spread of GWSS to new areas of the state by regulating shipments of host plants and other host material and prevent the natural spread of GWSS by suppressing populations.

2. **STATEWIDE SURVEY AND DETECTION**
   Find new GWSS infestations quickly and confirm that uninfested, at-risk areas remain free of infestation by conducting systematic trapping.

3. **RAPID RESPONSE**
   Respond quickly to detections of GWSS in new areas by intensively surveying the area and applying treatments if necessary.

4. **OUTREACH**
   Raise awareness about PD and its vectors by providing information, answering questions, and responding to the concerns of growers and the public through outreach and education activities.

5. **RESEARCH**
   Develop long-term, sustainable solutions to PD and its vectors by sponsoring and facilitating research and development.



Organization

The PDCP is a partnership that includes the CDFA, the County Agricultural Commissioners, the USDA, the UC, other state and local agencies, industry, and various agricultural organizations throughout the state.

A statewide coordinator directs the program following 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 county agricultural commissioners to ensure program activities meet all statutory and regulatory requirements. Scientists at the CDFA 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.

County Workplans

The county agricultural commissioners are responsible for conducting local PDCP activities. These activities are guided by workplans developed by the county agricultural commissioners and submitted to the CDFA for approval.

As stated in the law (California Food and Agricultural Code Section 6046(i)), county workplans must include the following elements:

- Identification of a local coordinator;
- Ongoing training of employees in the biology, survey, and treatment of PD and its vectors;
- Proposed response to the discovery of the disease and its vectors (including delimitation and treatment);
- A system to track and report new infestations; and
- Outreach presentations and training in local communities that respond to local concerns.

Some program activities are conducted year-round. County agricultural commissioners submit monthly activity reports to the CDFA. 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 BOARD

The PD/GWSS Board is composed of 14 representatives from the winegrape industry, plus one member from the public. The purpose of the PD/GWSS Board is to provide recommendations to the Secretary of CDFA on the use of funds collected under the PD/GWSS winegrape assessment, a statewide value-based assessment that has raised approximately $78.3 million over the last 20 years. The PD/GWSS Board is advised by committees established to focus on specific areas and issues.

PIERCE'S DISEASE ADVISORY TASK FORCE

The Pierce's Disease Advisory Task Force is composed of county agricultural commissioners, scientists, agricultural industry representatives, and other experts. The Task Force reviews program progress and develops recommendations for the Secretary of CDFA. Similar to the PD/GWSS Board, the Task Force is advised by committees established to focus on specific areas and issues.

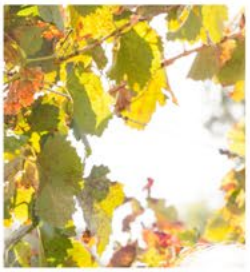
PIERCE'S DISEASE RESEARCH SYMPOSIUM PLANNING GROUP

The Pierce's Disease Research Symposium Planning Group is composed of representatives from the USDA, the UC, and the CDFA. This group assists with planning the Pierce's Disease Research Symposium by providing input on the format, content, and schedule of the event.

CALIFORNIA AGRICULTURAL COMMISSIONERS AND SEALERS ASSOCIATION / GLASSY-WINGED SHARPSHOOTER ADVISORY GROUP

The California Agricultural Commissioners and Sealers Association (CACASA)/GWSS Advisory 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 program is designed to prevent the spread of 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 grapes were first adopted in 2000. Regulations on bulk citrus were added later, following finds of live GWSS in bulk citrus shipments. Permanent program regulations were adopted in 2003. In 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 54% of California's 13,587 licensed nurseries are located in GWSS-infested counties. Many of these nurseries ship to 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.

INSPECTION RESULTS

- In 2021, there were 39,800 shipments of nursery stock from infested areas destined to non-infested areas. Two viable life stages of GWSS were discovered at the destination. Origin county inspectors stopped 29 egg masses, two nymphs, and six adults from moving in nursery stock shipments.
- Over 90% of all rejections since 2001 have been for viable GWSS egg masses. The table on page 15 presents the results of the ongoing nursery inspection and shipment certification program.

Nursery employees inspecting a tree.

Inspector checking for GWSS *egg masses.*

ENFORCEMENT ACTIONS

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

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

- ***RESTRICTION:***

  The nursery is restricted from shipping certain species of host material out of the infested area for a period of time, until the pest risk is mitigated.

- ***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 include:

- ***TREATMENT/RECONDITION AND RELEASE:***

  The nursery shipment is treated with an effective material and/or receives a 100% visual inspection with no additional finds and is released to the receiver.

- ***RETURN:***

  The shipment is returned to its origin.

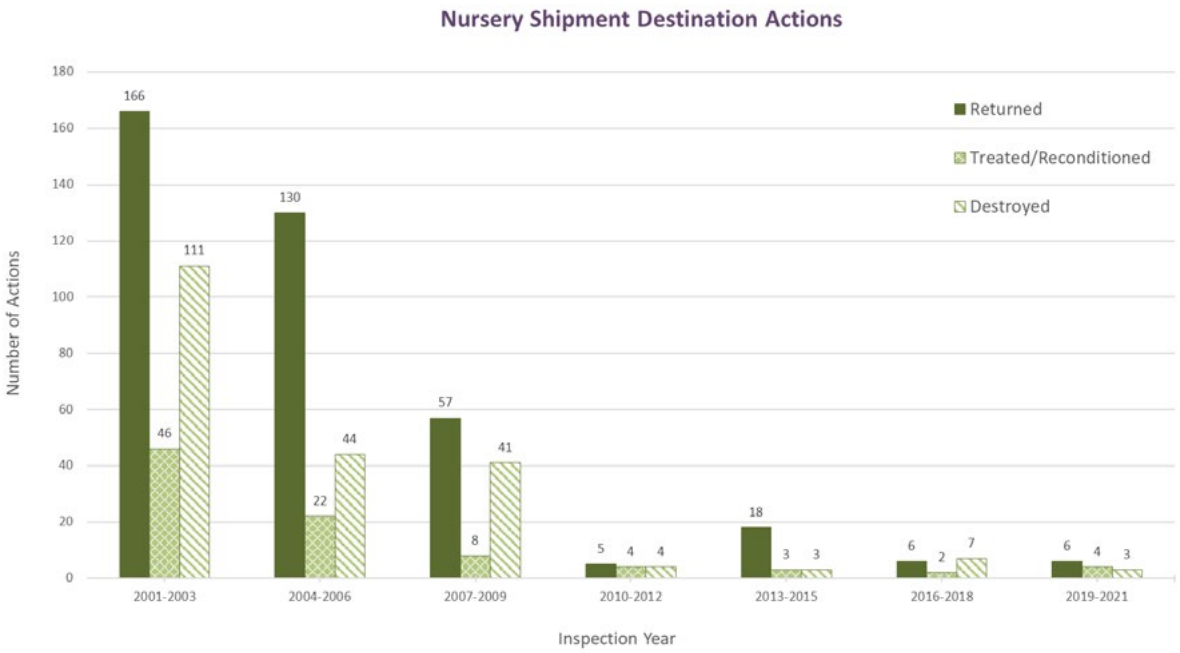
- ***DESTRUCTION:***

  The shipment is destroyed.

Shippers and receivers who violate nursery stock regulations are subject to fines. In 2021, an administrative penalty of $150 was levied against one company.

REGULATED NURSERY SHIPMENT RESULTS

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%
2019	43,300	6	99.99%
2020	40,800	5	99.99%
2021	39,800	2	99.99%



NURSERY STOCK APPROVED TREATMENT PROGRAM

The Nursery Stock Approved Treatment Program (ATP) launched in 2008, following a successful three-year 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 2021, nine participating nurseries shipped approximately 2.22 million plants in 10,968 shipments. There was a total of 30 nursery yards associated with these nine 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 as part of the pest management plan to monitor pest pressure. 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 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.

All trapping at ATP nurseries is conducted by county or PDCP staff. Results from the 2021 trapping efforts are as follows:

NUMBER OF NURSERY YARDS	NUMBER OF NURSERY ACRES	NUMBER OF TRAPS DEPLOYED	NUMBER OF TRAPS WITH >10 GWSS
30	1,410	2,948	164

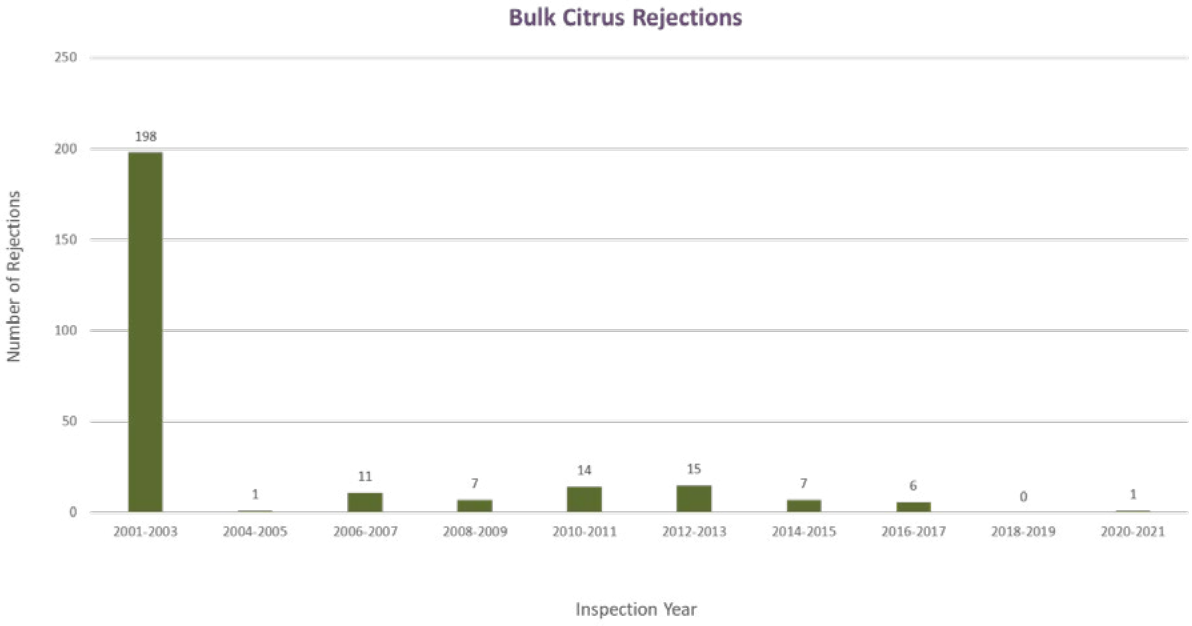
Nursery stock being shipped under this program must be treated with approved products under the supervision of licensed county inspectors. Additional treatment monitoring includes quality control checks by PDCP staff using water-sensitive paper. Yellow sheets of water-sensitive paper are placed within 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 ensure proper coverage. In 2021, PDCP staff placed water-sensitive paper in shipments at each participating nursery a minimum of once a month. Out of 297 water-sensitive papers inspected only seven indicated the need for retreatment of the shipment.

Under the ATP, county inspectors may choose to monitor GWSS egg masses found at destination on treated shipments of nursery stock. In 2021, a total of eight egg masses were monitored in insect rearing sleeves by destination counties, with no viable GWSS emergences.

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. Once temperatures cool, GWSS 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 2020 through September 2021), live GWSS were found in only one out of approximately 23,673 certified destination inspections of bulk citrus. This successful compliance level is attributed to the cooperative efforts of bulk citrus program participants.

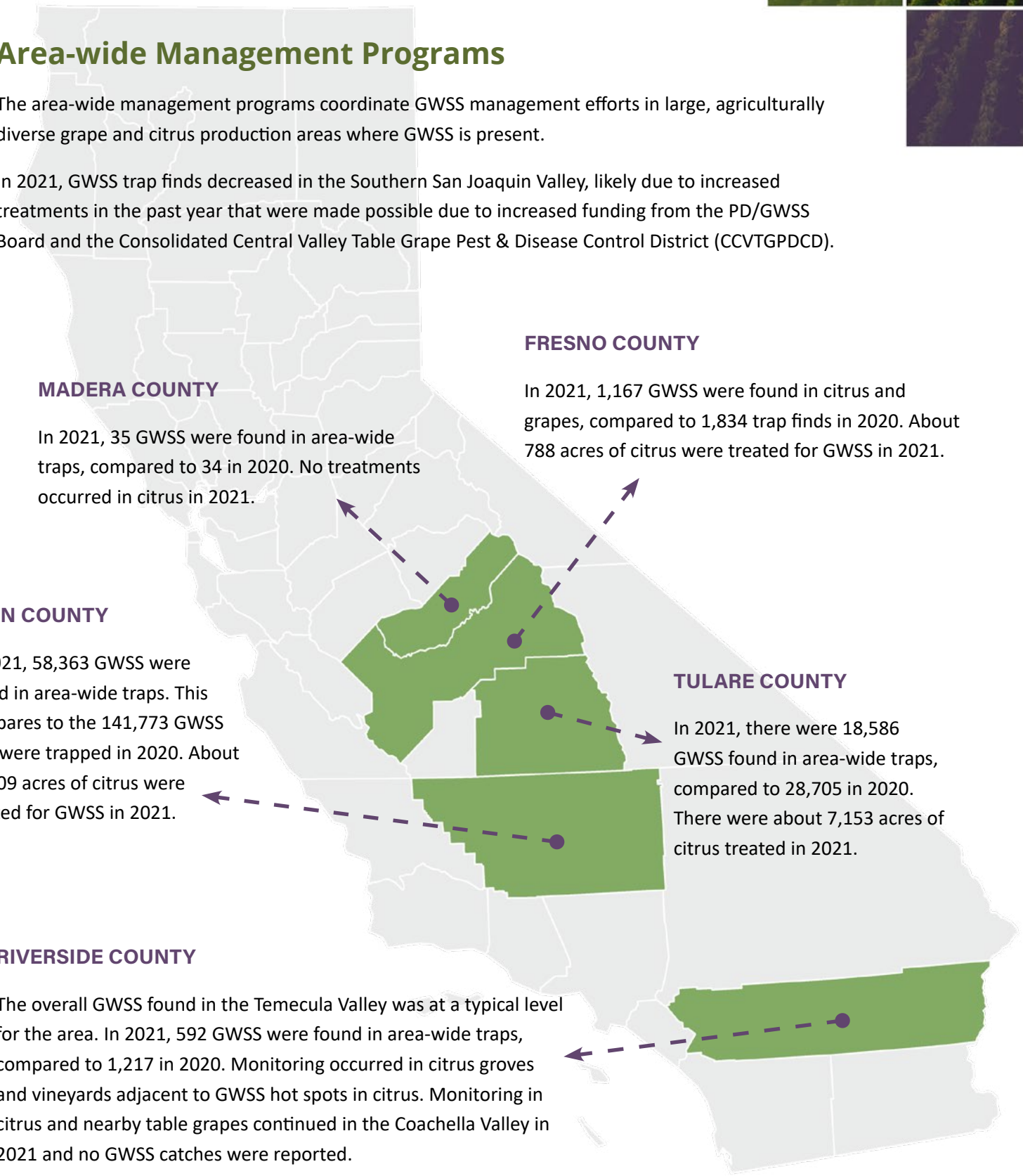


Citrus harvest and inspections.

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.

In 2021, GWSS trap finds decreased in the Southern San Joaquin Valley, likely due to increased treatments in the past year that were made possible due to increased funding from the PD/GWSS Board and the Consolidated Central Valley Table Grape Pest & Disease Control District (CCVTGPDCD).



MADERA COUNTY

In 2021, 35 GWSS were found in area-wide traps, compared to 34 in 2020. No treatments occurred in citrus in 2021.

FRESNO COUNTY

In 2021, 1,167 GWSS were found in citrus and grapes, compared to 1,834 trap finds in 2020. About 788 acres of citrus were treated for GWSS in 2021.

KERN COUNTY

In 2021, 58,363 GWSS were found in area-wide traps. This compares to the 141,773 GWSS that were trapped in 2020. About 17,409 acres of citrus were treated for GWSS in 2021.

TULARE COUNTY

In 2021, there were 18,586 GWSS found in area-wide traps, compared to 28,705 in 2020. There were about 7,153 acres of citrus treated in 2021.

RIVERSIDE COUNTY

The overall GWSS found in the Temecula Valley was at a typical level for the area. In 2021, 592 GWSS were found in area-wide traps, compared to 1,217 in 2020. Monitoring occurred in citrus groves and vineyards adjacent to GWSS hot spots in citrus. Monitoring in citrus and nearby table grapes continued in the Coachella Valley in 2021 and no GWSS catches were reported.

Biological Control

The PDCP has been using biological control as a key component of its integrated pest management approach to controlling GWSS since 2001. Biological control is one component of a number of strategies that are integrated to manage GWSS in California. Biological control is often of greatest value where other control strategies can be problematic, for instance in residential and natural areas where other control options are limited, expensive, and may have undesirable ecological impacts.

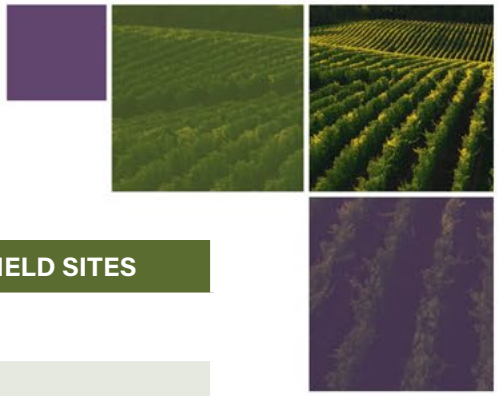
Biocontrol agents laying eggs inside GWSS *eggs.*

Biocontrol agents emerging from GWSS *eggs.*

The incorporation of biological control in the integrated pest management of GWSS has contributed to the eradication of at least 10 of the 18 incipient infestations of GWSS. Biological control has also been utilized in existing partially infested counties in the San Joaquin Valley (Fresno, Kern, Madera, and Tulare) to help prevent the expansion of the boundaries of the infested areas.

GWSS biological control agents are tiny, parasitic wasps (parasitoids). These parasitic wasps are favored as biological control agents due to a short life cycle that allows rapid population increase compared to GWSS, and a very narrow host range so non-targeted insects are unaffected. The female wasps lay their eggs inside GWSS eggs and the immature wasp then completes its development by feeding on the GWSS egg. Once the wasp adult emerges, it will mate, and search for GWSS eggs to lay more eggs. Through the repeated life cycles, the parasitic wasps help increase the overall suppression of GWSS populations.

Since the start of the biological control program, more than 2.76 million biological control agents have been released at agricultural, riparian, and urban sites in 16 counties in California. Three Cosmocomoidea species were mass reared in 2021 by the PDCP (*C. ashmeadi*, *C. morgani*, and *C. morrilli*) at the CDFA-PDCP Arvin Biological Control facility in Kern County. A total of 29,066 biological control agents were released in seven counties (Fresno, Kern, Madera, San Diego, Santa Barbara, Tulare, and Ventura).



COUNTY	YEARLY PARASITISM OF GWSS EGGS AT FIELD SITES
Fresno	95%
Kern	32%
San Diego	59%
Tulare	95%
Ventura	20%

Information gained through monitoring allows us to develop management decisions regarding the value of specific biological control agents in suppressing GWSS in California. Post-release field surveys were conducted in six counties (Fresno, Kern, Madera, San Diego, Tulare, and Ventura) to evaluate the impact of the biological control agents on GWSS in the field. In 2021, a total of 822 GWSS egg masses were sampled during those surveys. A total of 2,492 wasp adults emerged out of the 822 GWSS eggs sampled. Combined data showed that 36% of GWSS eggs were parasitized in the field.

C. ashmeadi

C. morgani

C. morrilli

Biological control agents under production.

NUMBER OF BIOLOGICAL CONTROL AGENTS RELEASED IN 2021

COUNTY	NUMBER OF SITES	BIOLOGICAL CONTROL AGENTS				TOTAL
		C. ASHMEADI	*C. MORGANI*	*C. MORRILLI*	*UFENS SPP.*	
Fresno	18	157	485	412	0	1,054
Kern	63	5,962	939	3,298	0	10,199
Madera	3	50	40	20	0	110
San Diego	5	1,325	695	808	0	2,828
Santa Barbara	1	900	100	190	0	1,190
Tulare	29	1,321	912	1,025	5[1]	3,263
Ventura	26	1850	2,964	5,608	0	10,422
TOTAL (2021)	**145**	**11,565**	**6,135**	**11,361**	**5**	**29,066**

1 *Ufens* spp. is a kind of byproduct during the rearing process when we use field-collected GWSS eggs for rearing wasps. Most of times we use the GWSS eggs harvested from GWSS adults in Arvin Field Station greenhouses, and those eggs had not been exposed to other wasps. However, when we do not have enough supply of GWSS eggs from the greenhouse GWSS colony, we need to use field-collected GWSS eggs to maintain the wasp colony. The field-collected GWSS eggs could had been exposed to other wasps such as *Cosmocomoidea* spp. or *Ufens* spp. (usually, *U. ceratus* or *U. principalis*). When a few *Ufens* spp. wasps were harvested during the rearing process at laboratory, we released back into the field and record the number.

GWSS adults and egg masses.

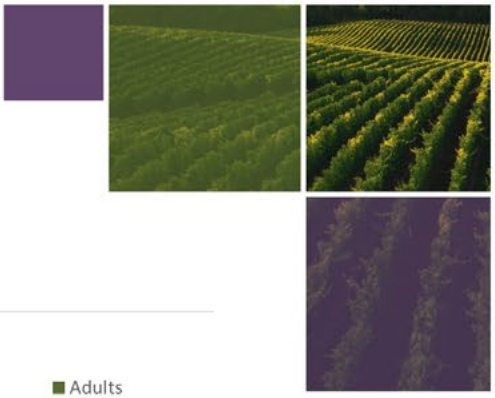
Testing of biological control agents.

Production of GWSS host plant.

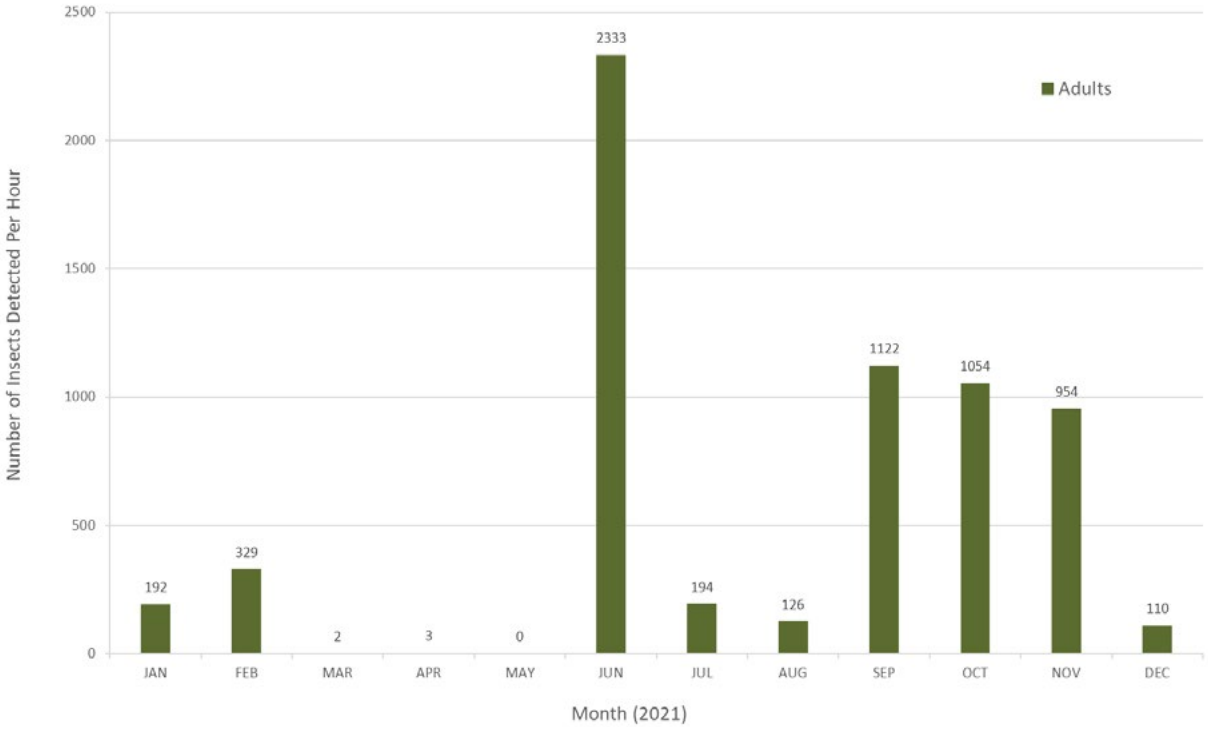
Field release of biological control agents.

NUMBER OF BIOLOGICAL CONTROL AGENTS EMERGED FROM FIELD-COLLECTED GWSS EGG SAMPLES IN 2021

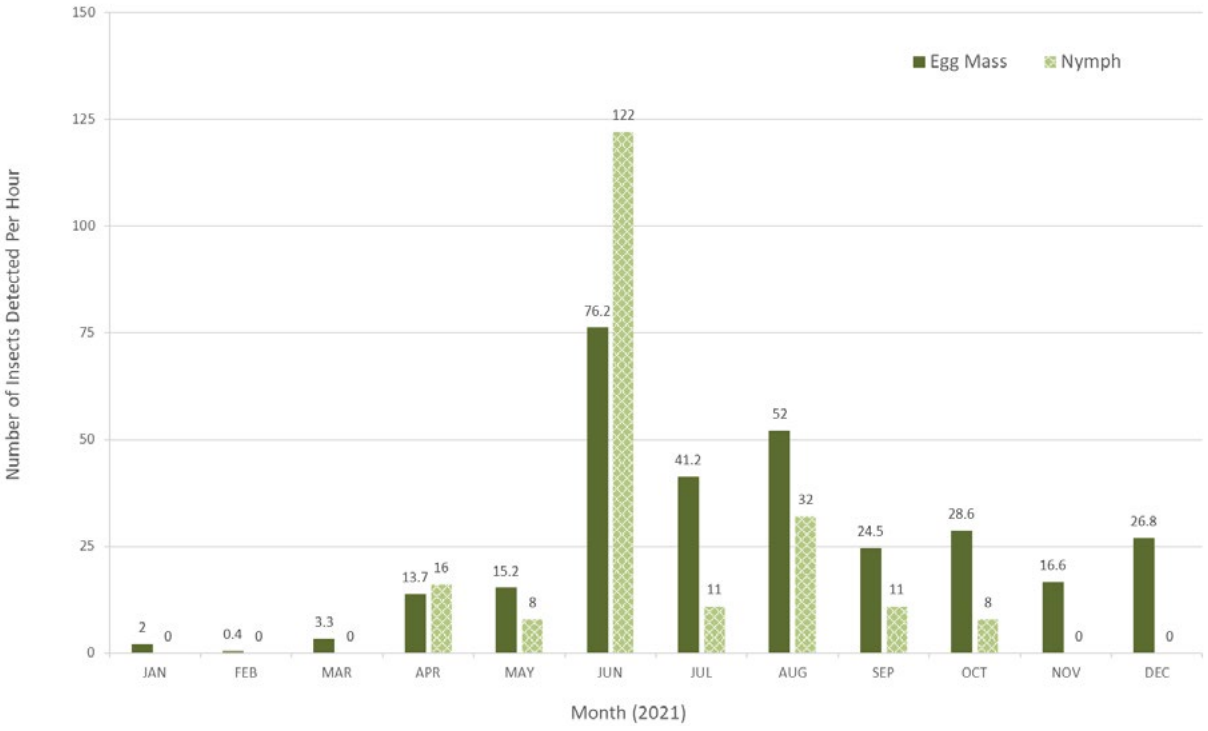
COUNTY	NUMBER OF SITES	BIOLOGICAL CONTROL AGENTS						TOTAL
		C. ASHMEADI	*C. MORGANI*	*C. MORRILLI*	*C. NOVIFASCIATA*	*C. WALKERJONESI*	*UFENS* SPP.	
Fresno	18	6	0	0	0	0	138	144
Kern	63	367	0	0	0	0	1,102	1,469
Madera	3	0	0	0	0	0	0	0
San Diego	5	332	0	15	0	6	49	402
Tulare	29	46	0	0	0	0	166	212
Ventura	26	109	15	0	27	3	111	265
TOTAL (2021)	**144**	**860**	**15**	**15**	**27**	**9**	**1,566**	**2,492**



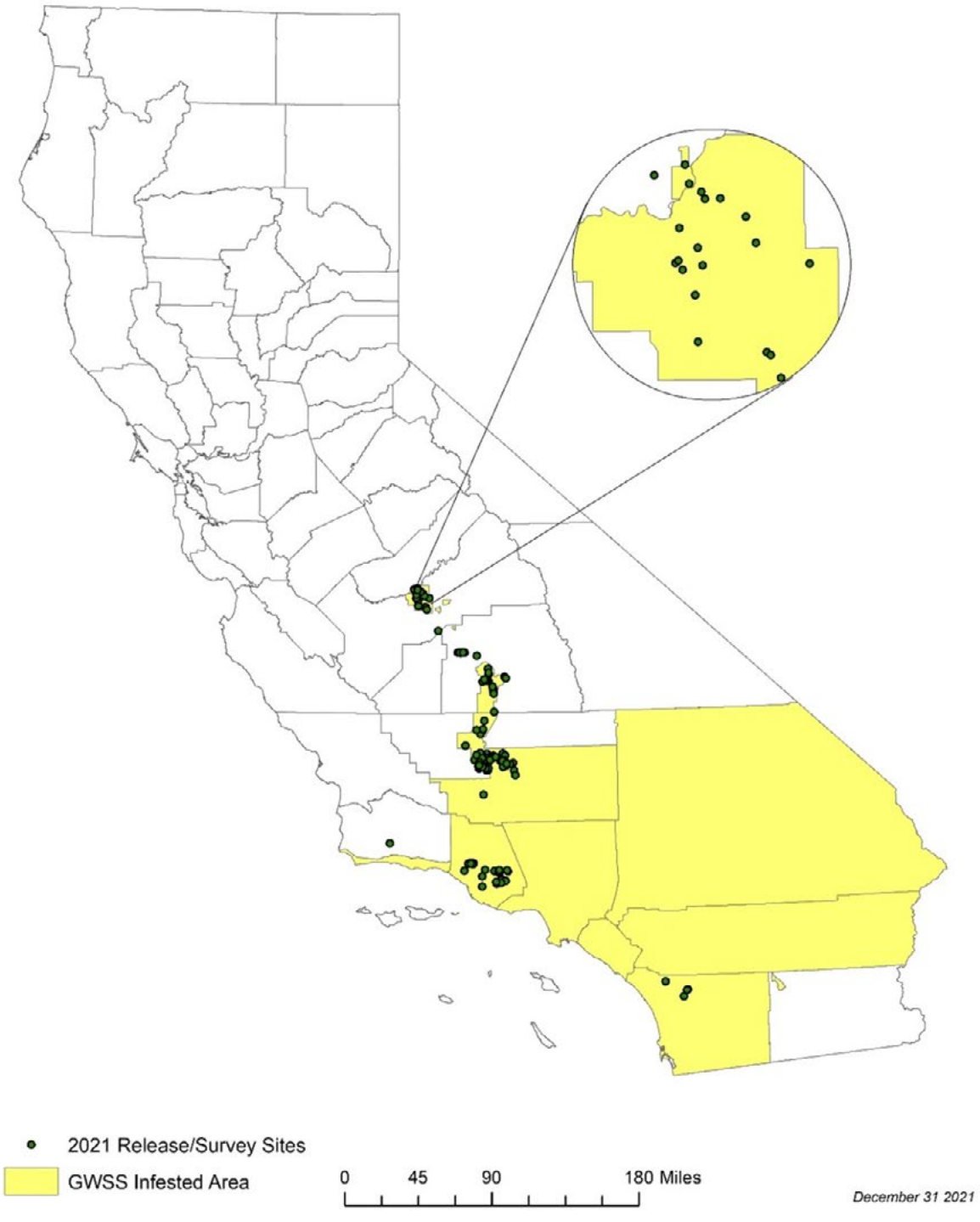
Seasonal Occurance of Adult GWSS in Kern County, 2021



Seasonal Occurrence of GWSS Nymphs and Egg Masses in Kern County, 2021



2021 BIOLOGICAL CONTROL SITES



STATEWIDE SURVEY AND DETECTION

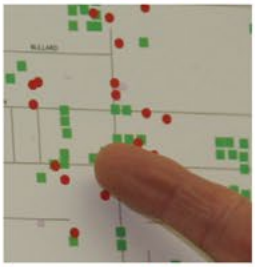
GWSS *inspector.*

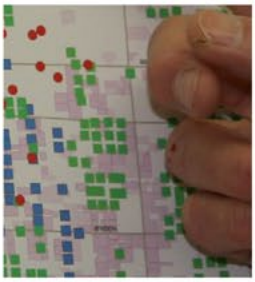
The Statewide Survey and Detection element of the program is designed to locate new GWSS infestations quickly and confirm that non-infested areas remain free of infestation. Activities focus on systematically trapping in urban and residential areas and nurseries to determine if GWSS are present.

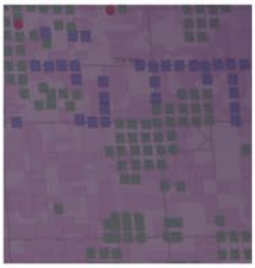
Yellow panel traps are deployed in 43 counties that are not infested or are partially infested with GWSS. The GWSS are attracted to the trap's bright yellow color and stick to its adhesive surface. County and state personnel service traps regularly during the trapping season. Each trap is checked every 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 spring 2021. During the peak of the trapping season, approximately 33,000 traps were deployed and serviced statewide.

Yellow panel trap covered with GWSS.

In 2021, PDCP staff provided detection training to 402 employees from 46 counties, CDFA, USDA, nurseries, and citrus packing houses. Much of this was done remotely via virtual meeting platforms. Staff conducted quality control inspections of county trapping programs when feasible. 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.







RAPID RESPONSE

Soil drench treatment of host material in a GWSS *infested area by a pest control operator.*

The Rapid Response element of the program involves responding quickly to detections of GWSS in new areas. When GWSS are found in a new area, a delimitation survey is conducted by county biologists, sometimes with assistance from the PDCP. Delimitation surveys consist of high-density trapping and visual inspections of preferred host plants in the area to determine if an infestation is present and, if so, to identify the boundaries. 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 2021, one new GWSS infestation was found, in the Vacaville area of Solano County, and one existing infested area, in Kern County east of Highway 65 and south of Famoso Road in the North Kern area, was expanded. These changes were in addition to ongoing eradication or suppression efforts in the existing infested portions of Fresno, Madera, and Tulare counties. Statewide, GWSS were found on approximately 1,136 properties in Fresno, Madera, Solano, and Tulare counties, and approximately 3,849 properties (infested plus adjacents) were treated.

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 agricultural officials 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 given advance notification of the treatment date and time, information on the material to be used, and a phone number to call for more information. In 2021, residents in the proposed treatment areas were invited to participate in virtual public meetings.

To help protect local 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 before treatment.

Treatment

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

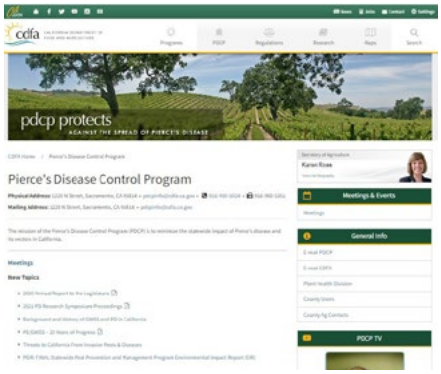
Treatment Monitoring

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 https://www.cdpr.ca.gov/docs/emon/pubs/ehapreps.htm.

OUTREACH

County Agricultural Commissioner Outreach Activities

In 2021, local county agricultural staff and industry members played key roles in maintaining program visibility and stakeholder awareness. Due to the pandemic, many of these activities were conducted virtually. County public outreach and education efforts included the distribution of PD and GWSS informational material to local retail, production and shipping nurseries, as well as 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.



Homepage of the PDCP website.

Website

CDFA hosts a website for the PDCP featuring 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. This website is located at www.cdfa.ca.gov/pdcp and is effective for providing current and reliable information to interested parties.

Pierce's Disease and Glassy-winged Sharpshooter Board's Outreach Program

California winegrape growers faced similar conditions in 2021 that has challenged them in the past few years: wildfires, pests and disease pressures, and the unprecedented COVID-19 pandemic. The public health crisis has continued to disrupt existing marketing and distribution channels, and transform best practices in communication.

The PD/GWSS Board's outreach and education program focuses on sharing information, research developments, and actionable recommendations for designated pests and diseases of winegrapes, so that growers see a return on their investment. While leading scientists

work toward finding solutions to PD and other serious winegrape pests and diseases, growers can learn from research results and apply them directly in the field. The PD/GWSS Board strives to support growers through its outreach program. Strategies for the outreach and education program in 2021 included:

- Informing audiences of ongoing activities and successes in the search for solutions to PD and its vectors;
- Informing audiences of ongoing activities and research efforts addressing other designated pests and diseases of winegrapes;
- Providing information and news on pest detections, rapid responses, and other containment efforts;
- Providing information on how the industry assessment, federal, and state funds have been used to protect the California winegrape industry; and
- Promoting the PD/GWSS Board's capacity to leverage grower committed funding by drawing down state and federal governmental support.

One of the biggest communications efforts in 2021 was spreading the word about SLF. Industry and government partners have come together many times before to safeguard California grapes and wine from invasive insects, including the eradication of European grapevine moth and our unprecedented efforts against GWSS. Past successes can be in part attributed to having many eyes in the field – growers, farmers, ranchers, agricultural workers, inspectors, and the general public.

Newly designed SLF *fact sheet.*

Quick action is essential for addressing emerging threats, such as SLF, and the PD/GWSS Board funded a communications toolkit to help people learn what the pest looks like in its various life stages and how to report any findings. The toolkit is available in English and Spanish online at bit.ly/SLFtools. It includes a pest alert, video, brochure, rack card, flyer, poster, postcard, and banner.

A solid, consistent, and strategic communications approach speaks to the sensibilities of growers, and a variety of communication vehicles are utilized to reach them in the most appropriate, cost-effective, and convenient manner. The following communications activities were used to connect with growers and other industry partners in 2021:

» **QUARTERLY NEWSLETTER**: Highlights PD/GWSS Board actions, research advances, and research project reports, and is mailed to over 7,000 winegrape growers, industry stakeholder, and elected officials. Issues can be viewed online cdfa.ca.gov/pdcp/newsletters.html. Top feature stories in 2021 include:

- Wines Made From PD-Resistant Grapevines Spotlighted at Unified Wine & Grape Symposium: bit.ly/3q68Mym
- Which Parts of the State Are Most at Risk for SLF?: bit.ly/3q68Mym
- Field Trials Show Promising Results for Three Solutions to PD: bit.ly/31YvEIq
- Is GWSS Resistance to Insecticides Growing?: bit.ly/31YvEIq
- PD/GWSS Board Funds 12 New and Seven Continuing Research Projects: bit.ly/3F5zq0D
- Practical Tips for Managing Grapevine Red Blotch Virus: bit.ly/3F5zq0D
- Defending California from the Grapevine-Loving SLF: bit.ly/3mdgiGJ


CALIFORNIA PD/GWSS BOARD
Partnership for Winegrape Pest Solutions
FALL 2021/ WINTER 2022
bulletin
cdfa
INSIDE THIS ISSUE
Defending California from the Grapevine-loving Spotted Lanternfly
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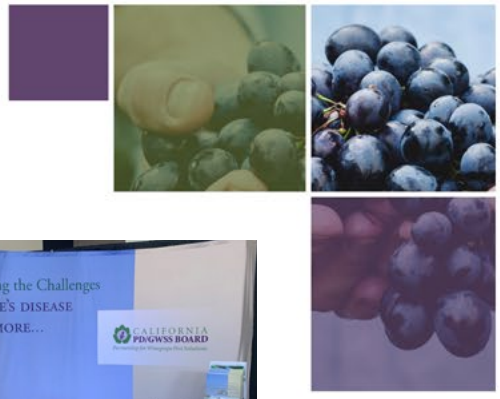
New Glassy-Winged Sharpshooter Infestation in Solano County
PAGE 3
On the Research Front
PAGE 4
PD/GWSS Board Welcomes New Research Coordinator

Fall/Winter 2021 quarterly newsletter.

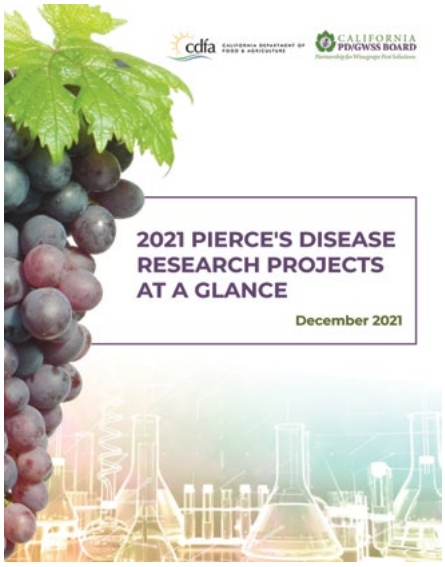
» **MONTHLY E-NEWSLETTER:** Shares PD/GWSS Board activities, PDCP reports on containment and treatments, and relevant media coverage. E-newsletters are sent to over 1,200 winegrape growers and industry stakeholders, with a 28% average open rate which is higher than the industry standard.

» **WEBSITE:** Provides comprehensive information on the PD/GWSS Board, PD/GWSS winegrape assessment, pests and diseases designated by the PD/GWSS Board, and research projects funded by the PD/GWSS Board. Visit the website at https://www.cdfa.ca.gov/pdcp/PD_GWSS_Board.html.



- **INDUSTRY TRADESHOWS:** Participated in three industry tradeshows, engaging with growers and industry colleagues at in-person events in the North Coast and Central Valley. Attendees who stopped by the booth were most interested in learning more about the PD/GWSS Board's research program, the GWSS infestation in Solano County, and SLF.
- **2021 PIERCE'S DISEASE RESEARCH PROJECTS AT A GLANCE:** Created an inviting and approachable executive summary with brief research project summaries to accompany the 2021 Pierce's Disease Research Symposium Proceedings. View online at https://www.cdfa.ca.gov/pdcp/Research.html.
- **SOCIAL MEDIA:** Shared PD/GWSS Board news, research advancements and applications, and relevant media coverage through Facebook and YouTube. The PD/GWSS Board Facebook page has over 320 followers and the YouTube channel has over 45 subscribers.
- **MEDIA OUTREACH:** Maintained regular relations with key wine and agricultural media to keep them apprised of story opportunities, research successes, and PD/GWSS Board activities; provided background information and images to assist media in accurately reporting PD/GWSS Board news and research; and developed and distributed press releases, including news about the newly designed SLF outreach material.

PD/GWSS booth at a Central Valley tradeshow.

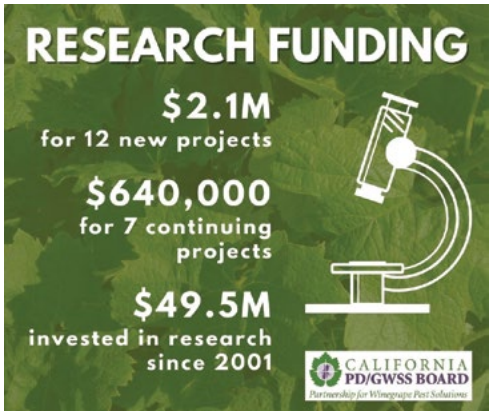


Cover of 2021 PD Research Projects at a Glance summaries.

Media Coverage

News articles and reports about PD and GWSS continued to appear in print and online media in 2021, with some television and radio coverage. There were 17 news articles about the PD/GWSS Board, including reporting on the Solano County GWSS infestation, annual assessment rate, research funding, research projects and advances, PD-resistant vines, funding to expand the area-wide treatment program, SLF, the PD/GWSS Board's new research coordinator, and the Pierce's Disease Research Symposium.

RESEARCH



A breakdown of how funds are distributed to various research projects.

Research continues to be an integral part of the PDCP. In 2021, the flurry of research activity on PD and its vectors that began at the start of the program continued, with approximately 19 active projects led 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 being generated is providing valuable insight into the biology, ecology, and behavior of PD and its vectors. Additionally, 24 projects on other PD/GWSS Board-designated pests and diseases of winegrapes were in progress in 2021, increasing the knowledge base available for developing management solutions.

This extensive and sustained research effort has yielded discoveries and approaches that show good potential for leading to solutions. These include using conventional plant-breeding methods to develop grapevines resistant to PD, using non-virulent strains of *Xf* to displace and outcompete pathogenic strains, identifying the mechanisms and processes leading to bacterial infection and spread, and elucidating the biochemical pathways which 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. Field testing of grapevine plant material developed using transgenic approaches began in 2010 and continued through 2021.

Researcher grinding tissue for single-sample testing.

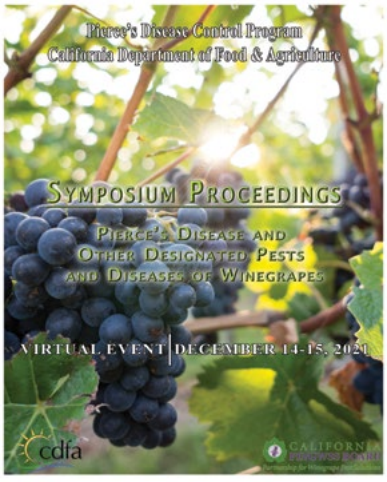
In 2021, the PD/GWSS Board hired a research coordinator to review, guide, and facilitate the Board's research funding program. They are working to ensure the industry is getting the best research investment from their assessment dollar.






Research Symposium

The PDCP has organized 16 research symposia since 2001 to foster communication and information sharing among scientists and stakeholders on the latest research progress and findings on PD. Due to the pandemic, the PDCP hosted its first-ever virtual symposium in December 2021. The symposium featured presentations on current PD/GWSS Board-funded research and outreach projects on PD, GWSS, and other winegrape pests and diseases. New this year, grower presentations were added to increase dialogue between researchers and stakeholders, and an executive summary of current research projects was prepared in addition to the annual proceedings of full progress reports. All proceedings documents and videos of selected presentations can be viewed online at https://www.cdfa.ca.gov/pdcp/Research.html.



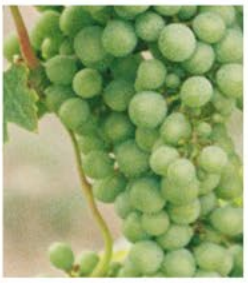
2021 Symposium Proceedings.

Research Proposal Solicitation and Review

In 2021, the PDCP partnered with the Unified Grant Management for Viticulture and Enology Program at the 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 17 proposals were received and reviewed, with 12 projects totaling over $2.1 million over the next three years selected for funding using California PD/GWSS winegrape assessment funds. In addition, 16 ongoing projects were approved to continue for another fiscal year including some receiving no-cost extensions due to delays caused by the pandemic.

ENVIRONMENTAL COMPLIANCE



In 2021, the CDFA continued its efforts to ensure that PDCP's activities are 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 before treatment, and ensuring that pesticide applications are performed by licensed pest control professionals in strict accordance with California pesticide laws and regulations.

The Department remains committed to fulfilling its legislative mandate to prevent the spread of harmful pests while complying with the California Environmental Quality Act to ensure the protection of agriculture, the environment, and other natural resources. The PDCP and CDFA plan to revise the previous statewide programmatic environmental impact report in 2022.

FINANCIAL STATEMENT

REVENUE	FY 2020-21 (ACTUAL)	FY 2021-22 (BUDGETED)
Federal (United States Department of Agriculture)	$16,299,641	$17,380,837
Industry (PD/GWSS Board winegrape assessment)	$4,968,351	$3,538,000
Industry (CCVTGPDCD)	$600,000	$0
CDFA (General Fund)	$0	$476,885
TOTAL REVENUE	**$21,867,992**	**$21,395,772**

EXPENDITURES	FY 2020-21 (ACTUAL)	FY 2021-22 (BUDGETED)
Personal Services	$3,269,414	$3,577,073
Operating Expenses	$6,494,908	$5,420,884
Total County Payments	$12,103,670	$12,397,765
TOTAL EXPENDITURES	**$21,867,992**	**$21,395,722**