REPORT TO THE LEGISLATURE

2022

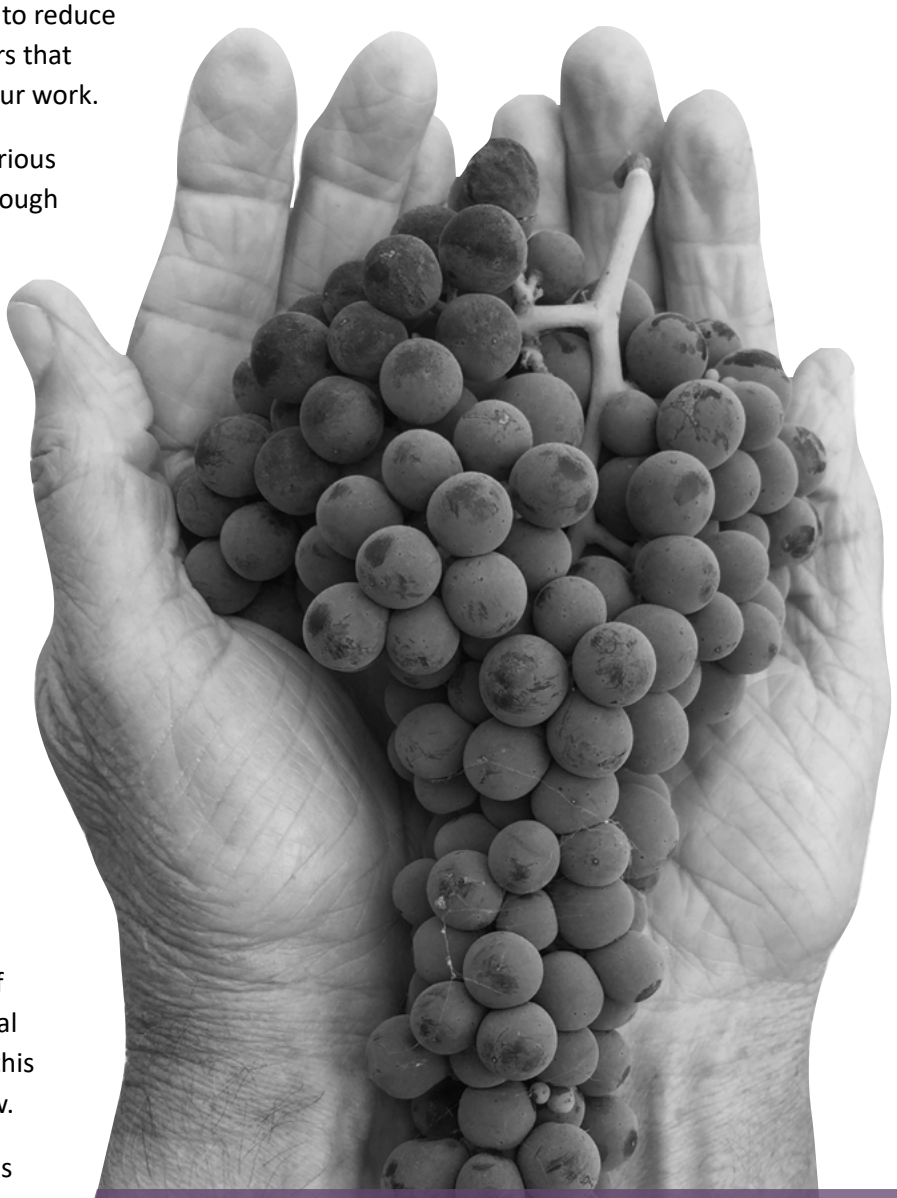
cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

Pierce's Disease Control Program

STATEMENT OF THE SECRETARY

22 years ago, the headline in Wine Spectator magazine read “California Vineyard Apocalypse.” The first sentence of that story was “Time may be running out on the California wine industry as we know it.”

It’s a useful exercise to remember where we started with the Pierce’s Disease Control Program. It wasn’t just another pest, or just another disease. And it still isn’t, although together we have done much to reduce the threat and walk back the apocalyptic fears that characterized the first months and years of our work.



As much as our growers, researchers, and various partner organizations have accomplished through this program, it remains important to maintain our vigilance. In 2021, for example, we detected a GWSS infestation in Solano County, on the doorstep of many of Northern California’s prized vineyards. The effort to detect, contain, and eradicate this infestation began quickly and continues in earnest, as you’ll read in the pages that follow.

I encourage you to read this annual report not merely as a data source, but as a chapter in a remarkably successful story that we are still writing, every day. The substantial research we’ve done to mitigate the impacts of this pest/disease complex is a testament to the willingness of growers to fund and support this work. That research is possible because of the day-to-day work of our farmers, program staff, county agricultural commissioners and other partners, keeping this threat at bay for more than two decades now.

The Pierce’s Disease Control Program remains a model of public-private partnership. I offer my thanks to the growers, vintners, and stakeholders who built this program with our department, and I extend my commitment to stay the course.

Karen Ross, Secretary

California Department of Food and Agriculture

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EXECUTIVE SUMMARY

This report is being submitted as mandated by Section 6046(i) of the California Food and Agricultural Code and provides the Legislature with an update on the California Department of Food and Agriculture's (CDFA) expenditures, progress, and ongoing priorities and challenges 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), pictured below, 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 $73 billion within the state and $170.5 billion nationally. The Pierce's Disease Control Program (PDCP) works to halt the spread of GWSS until research finds solutions to PD.

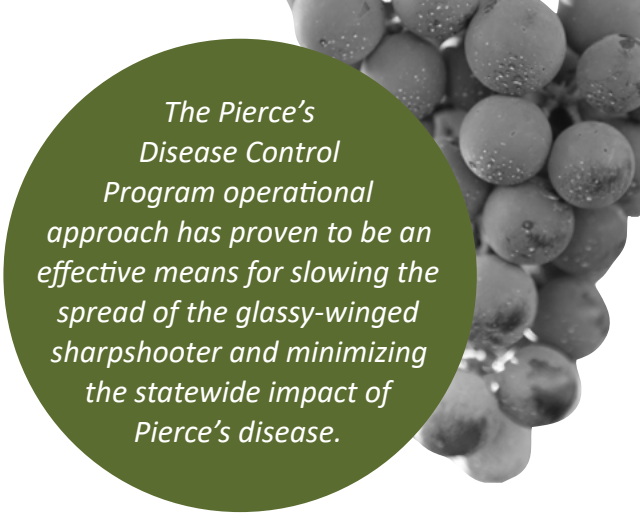
The PDCP's operational approach relies on five major components: ***contain the spread***, ***statewide survey and detection***, ***rapid response***, ***outreach***, and ***research***. Since the inception of the PDCP in 2000, these components have proven to be an effective means for slowing the spread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

In 2021, a new GWSS infestation was found in Northern California for the first time in over a decade. Initial finds in the city of Vacaville in Solano County triggered delimitation and treatment activities. The PDCP continued to support Solano County in 2022 with its efforts to eradicate GWSS. Although there were additional finds in 2022, they did not result in any expansion of the original infested area boundaries. Thus, PDCP remains optimistic that the continued efforts will result in eventual eradication in the Vacaville area.

Since 2001, the PD/GWSS Board has invested $52.3 million of industry funds to support over 266 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



The Pierce's Disease Control Program operational approach has proven to be an effective means for slowing the spread of the glassy-winged sharpshooter and minimizing the statewide impact of Pierce's disease.

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. In late 2022, the PD/GWSS Board approved an agreement with the National Academy of Sciences to conduct a comprehensive review of its grapevine virus research program to ensure growers' dollars continue to be invested wisely in research to find solutions to winegrape pests and diseases.

As the spread of SLF in other states continues to threaten California's agriculture and natural resources, the PD/GWSS Board has continued to provide outreach support for the industry through various outreach materials and ad campaigns in industry publications.

The PDCP faced several challenges in 2022: heat waves increased pest activity and hampered statewide activities due to heat illness concerns; stakeholders faced obstacles with the decreased availability of approved treatment products; and the increased costs for labor and services permeated every aspect of the PDCP's operations. As a result of these hurdles staff was forced to prioritize areas of concerns and program activities. The PDCP has shown resiliency despite these challenges, but will be looking to focus on constructing feasible solutions to promote program stability and effectiveness in 2023 and beyond.

Among the many major accomplishments over the life of the program are the detection and eradication of 18 nascent 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

ABBREVIATION OR ACRONYM	TERM
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*

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 the late 90's, 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 $5.23 billion, associated economic activity within California of approximately $73 billion, and $170.5 billion annually to the national economy. Other crops and ornamental plants such as almonds ($5.03 billion), susceptible types of citrus ($2.46 billion), stone fruits ($1.1 billion), and shade trees are at risk. To counter this threat, the PDCP was established within the CDFA to minimize the statewide impact of PD.

Pierce's Disease

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 in the world, 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 damage.[1] There is currently no known cure for PD.

Vine showing symptoms of 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
cdfa
CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE
GWSS Eradicated Area
GWSS Infested Area
County at Risk from PD/GWSS
Shasta
Trinity
Humboldt
Tehama
Glenn
Butte
Mendocino
Nevada
Colusa
Yuba
Placer
Lake
Sutter
El Dorado
Yolo
Sonoma
Napa
Sacramento
Amador
Solano
Calaveras
Tuolumne
Marin
San Joaquin
Contra Costa
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Santa Cruz
Madera
Fresno
San Benito
Tulare
Monterey
Kings
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles
Riverside
Orange
San Diego
Imperial
December 31, 2022

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

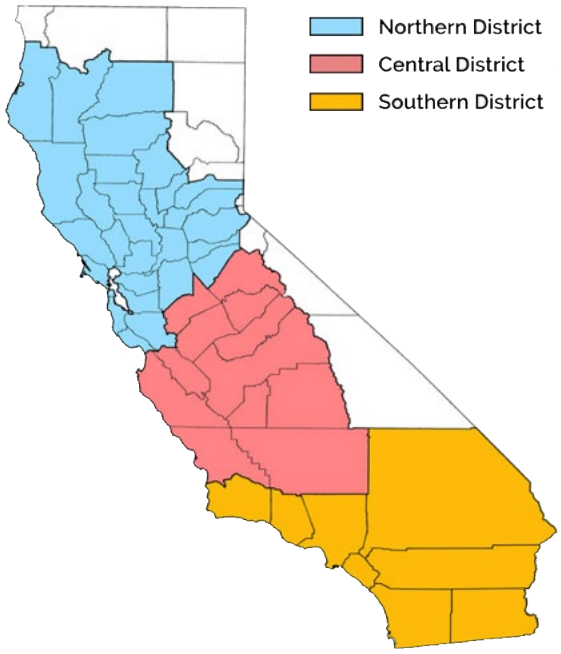
Develop long-term, sustainable solutions to PD and its vectors by sponsoring and facilitating research and development.

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 toward finding solutions to PD.

PIERCE'S DISEASE CONTROL PROGRAM DISTRICTS



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.

In compliance with California Food and Agricultural Code Section 6046(g), 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 $81.8 million over the last 21 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.

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 2022, there were 37,200 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 91 egg masses, 11 nymphs, and four 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 11 presents the results of the ongoing nursery inspection and shipment certification program.

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.

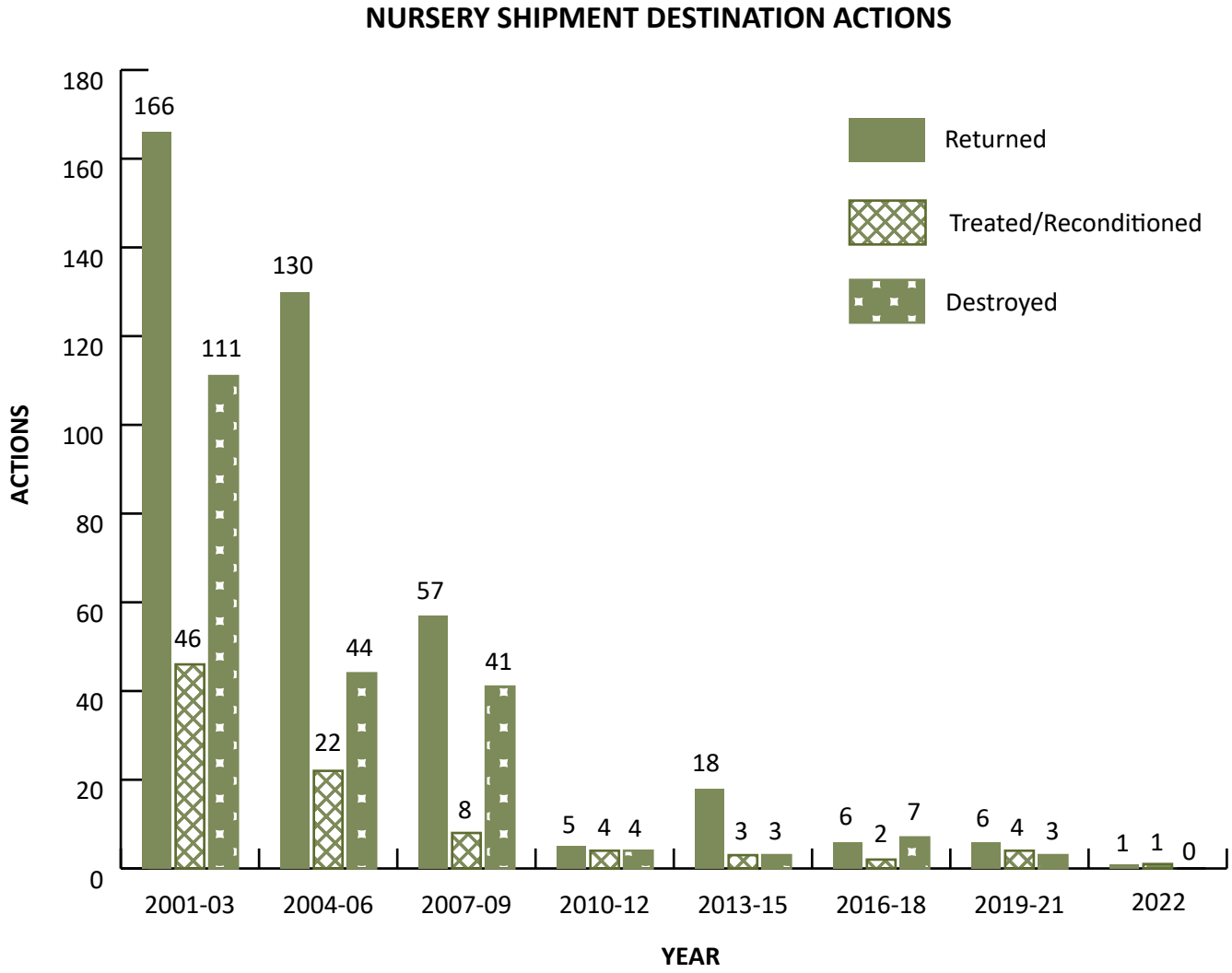
Shippers and receivers who violate nursery stock regulations are subject to fines. In 2022, an administrative penalty of $1,000 was levied against one company.

Nursery employees inspecting a tree.

Inspector checking for GWSS egg masses.

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	69,00	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%
2022	37,200	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 2022, nine participating nurseries shipped approximately 1.94 million plants in 9,846 shipments. There was a total of 29 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 2022 trapping efforts are as follows:

2022 ATP NURSERY TRAPPING SUMMARY

NURSERY YARDS PARTICIPATING	NURSERY ACRES	TRAPS DEPLOYED	TRAPS WITH >10 GWSS
29	1,405	2,905	231

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 2022, PDCP staff placed water-sensitive paper in shipments at each participating nursery a minimum of once a month. Out of 311 water-sensitive papers inspected, 26 indicated the need for retreatment of the shipment.

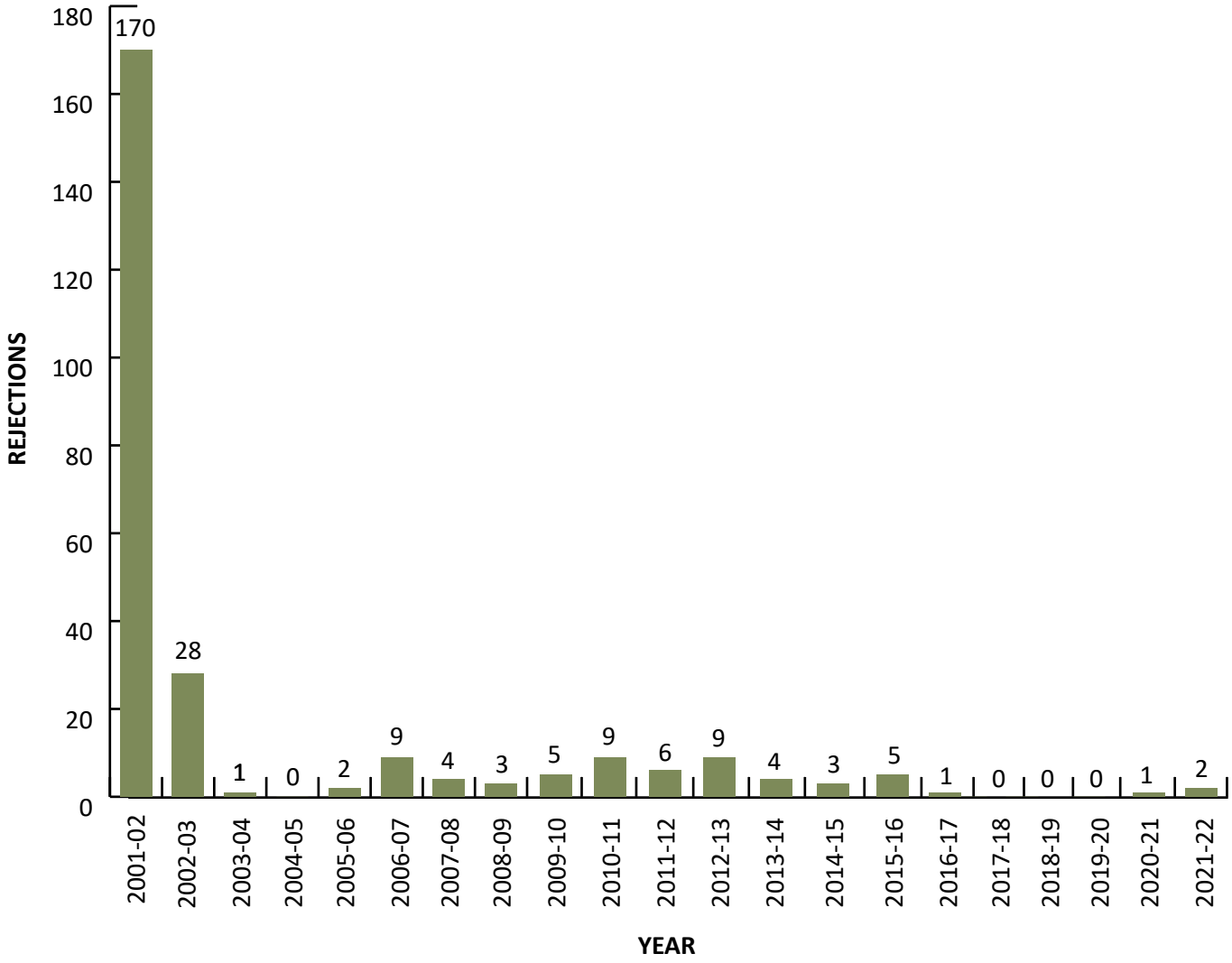
Under the ATP, county inspectors may choose to monitor GWSS egg masses found at destination on treated shipments of nursery stock. In 2022, a total of 14 egg masses were monitored in insect rearing sleeves by destination counties, with no viable GWSS emergences.

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 2021 through September 2022), live GWSS were found in only two out of approximately 20,388 certified destination inspections of bulk citrus. The Program achieved a success rate of 99.9%. This successful compliance level is attributed to the cooperative efforts of bulk citrus program participants.

BULK CITRUS REJECTIONS



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.

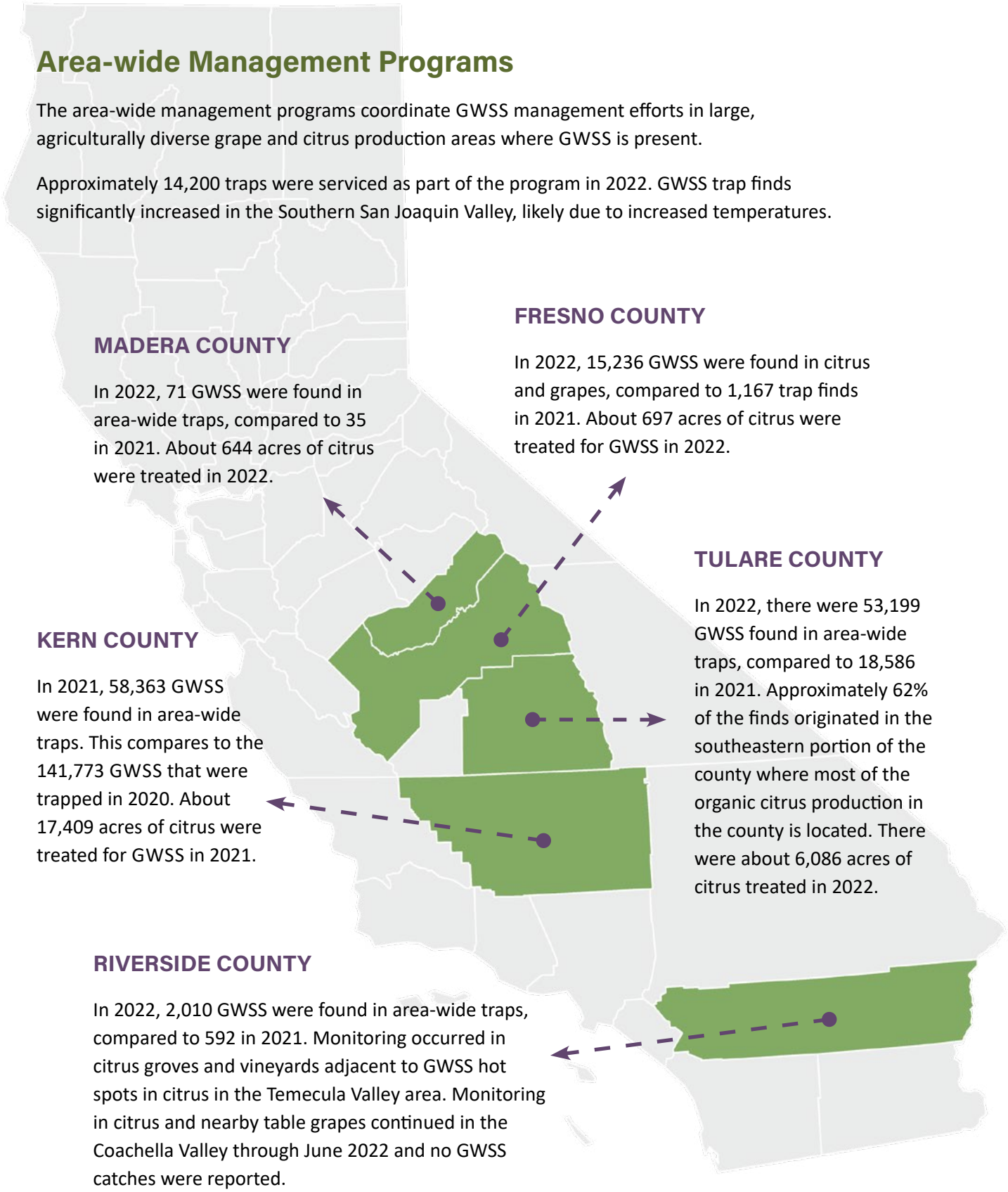
Approximately 14,200 traps were serviced as part of the program in 2022. GWSS trap finds significantly increased in the Southern San Joaquin Valley, likely due to increased temperatures.

MADERA COUNTY

In 2022, 71 GWSS were found in area-wide traps, compared to 35 in 2021. About 644 acres of citrus were treated in 2022.

FRESNO COUNTY

In 2022, 15,236 GWSS were found in citrus and grapes, compared to 1,167 trap finds in 2021. About 697 acres of citrus were treated for GWSS in 2022.



TULARE COUNTY

In 2022, there were 53,199 GWSS found in area-wide traps, compared to 18,586 in 2021. Approximately 62% of the finds originated in the southeastern portion of the county where most of the organic citrus production in the county is located. There were about 6,086 acres of citrus treated in 2022.

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.

RIVERSIDE COUNTY

In 2022, 2,010 GWSS were found in area-wide traps, compared to 592 in 2021. Monitoring occurred in citrus groves and vineyards adjacent to GWSS hot spots in citrus in the Temecula Valley area. Monitoring in citrus and nearby table grapes continued in the Coachella Valley through June 2022 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 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. 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 repeated life cycles, the parasitic wasps help increase the overall suppression of GWSS populations.

Since the start of the biological control program, more than 2.82 million biological control agents have been released at agricultural, riparian, and urban sites in 16 counties in California. Two *Cosmocomoidea* species were mass reared in 2022 by the PDCP (*C. ashmeadi* and *C. morrilli*) at the CDFA-PDCP Arvin Biological Control facility in Kern County. In 2022, a total of 59,333 biological control agents were released at 176 field sites in eight counties (Fresno, Kern, Madera, San Diego, Santa Clara, Solano, Tulare, and Ventura), compared to 29,066 biological control

Biocontrol agents laying eggs inside GWSS eggs.

Biocontrol agents emerging from GWSS eggs.

GWSS adults and egg masses.

Testing of biological control agents.

agents released in 2021. This year GWSS biological agents were released at several sites within the new eradication area in Solano County and successful parasitism on GWSS eggs was detected by Solano County officials.

Information gained through field 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 2022, a total of 580 viable egg masses were sampled during those surveys. A total of 2,374 wasp adults emerged out of the GWSS eggs sampled. Combined data showed that 53% of GWSS eggs were parasitized in the field, compared to 36% parasitism in 2021.

PDCP Biological Control staff are also responsible for monitoring GWSS populations in Kern County. Every week the number of GWSS eggs, nymphs, and adults are counted at multiple field sites around Bakersfield. This data is used to optimize areawide treatments against GWSS. In 2022, total 46,651 adults were found, compared to 29,491 adults in 2021.

PARASITISM RATE OF GWSS EGGS AT FIELD SITES IN 2022

COUNTY	PARASITISM RATE
Fresno	70%
Kern	56%
San Diego	53%
Tulare	48%
Ventura	28%

Production of GWSS host plant.

Field release of biological control agents.

C. ashmeadi

C. morgani

C. morrilli

Biological control agents under production.

NUMBER OF BIOLOGICAL CONTROL AGENTS RELEASED IN 2022

COUNTY	RELEASE SITES	BIOLOGICAL CONTROL AGENTS			TOTAL
		C. ASHMEADI	*C. MORRILLI*	*C. NOVIFASCIATA*	
Fresno	16	3,028	3,812	0	6,840
Kern	65	12,646	9,545	6[1]	22,197
Madera	3	0	1,712	0	1,712
San Diego	5	2,150	1,640	0	3,790
Santa Clara	8	400	0	0	400
Solano	48	3,050	1,250	0	4,300
Tulare	16	4,406	2,875	0	7,281
Ventura	15	5,930	7,413	70	13,413
TOTAL (2022)	**176**	**31,610**	**28,247**	**76**	**59,933**

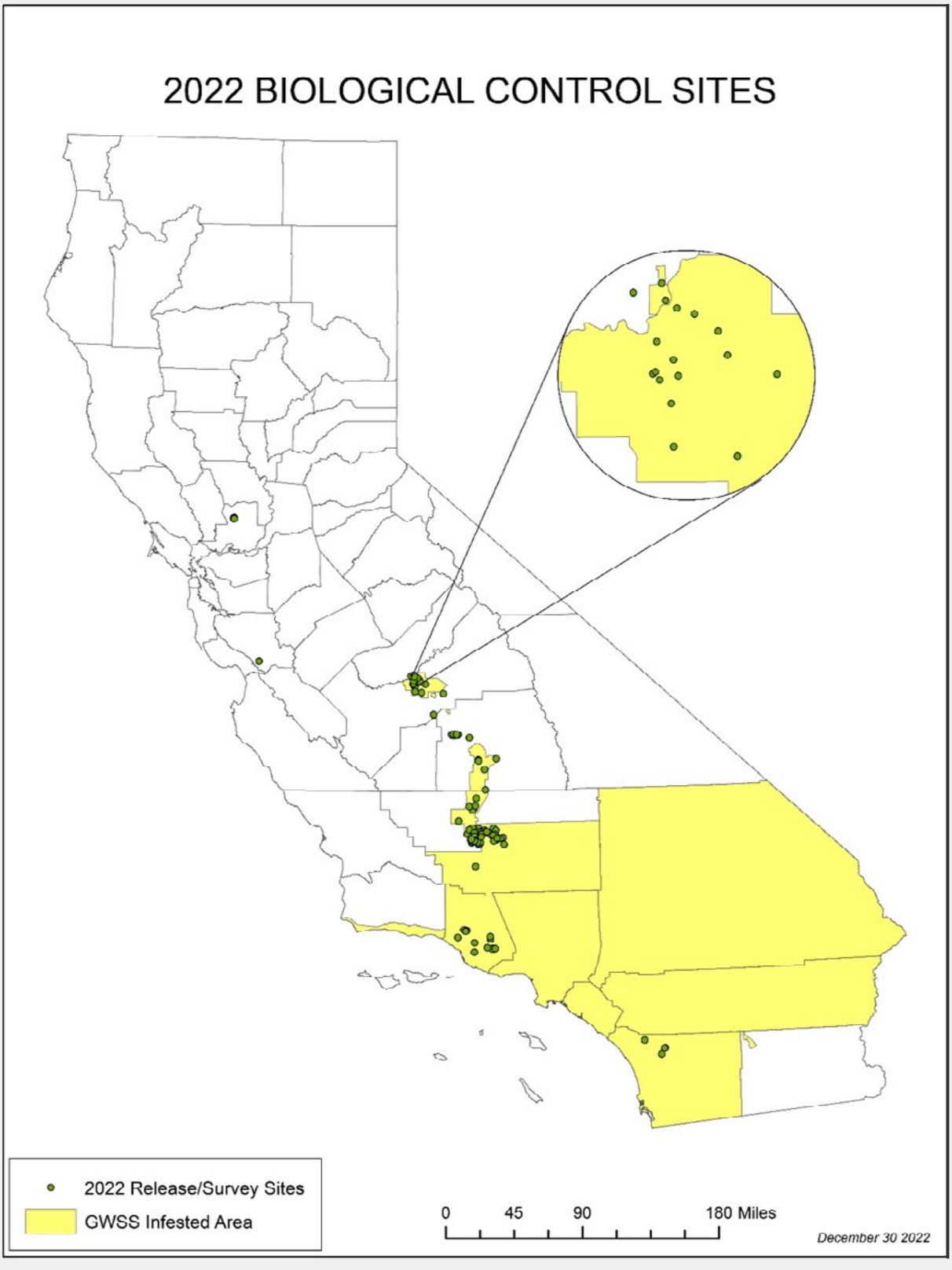
1 *Wasps are usually produced using eggs laid by GWSS in colonies at the Arvin Field Station, but sometimes production of biological control agents is augmented through the use of field-collected GWSS eggs. Sometimes the team collects native species of parasitoids that parasitize the GWSS eggs before they were collected, hence the occurrence of* Cosmocomoidea novifasciata *in the production system. These were collected, counted, identified, and released with the other parasitoids.*

NUMBER OF BIOLOGICAL CONTROL AGENTS EMERGED FROM FIELD-COLLECTED GWSS EGG SAMPLES IN 2022

COUNTY	COLLECTION SITES	BIOLOGICAL CONTROL AGENTS						TOTAL
		C. ASHMEADI	*C. MORGANI*	*C. MORRILLI*	*C. NOVIFASCIATA*	*C. WALKERJONESI*	*UFENS* SPP.	
Fresno	16	77	0	4	0	0	153	234
Kern	65	366	0	0	0	0	328	694
Madera	3	0	0	0	0	0	0	0
San Diego	5	916	10	33	0	149	131	1,239
Tulare	16	98	0	0	0	0	41	139
Ventura	15	54	0	0	3	10	0	67
TOTAL (2022)	**120**	**1,511**	**10**	**37**	**3**	**159**	**653**	**2,373**

GWSS STAGES OBSERVED DURING FIELD-SCOUTING IN KERN COUNTY

YEAR	LIFE STAGES		
	EGG MASS	NYMPH	ADULT
2017	1,784	1,834	18,595
2018	2,412	1,501	27,243
2019	2,277	1,866	33,053
2020	1,823	4,581	47,417
2021	2,751	1,485	29,491
2022	1,502	1,019	46,651
MEAN	**2,092**	**2,048**	**33,742**


2022 BIOLOGICAL CONTROL SITES
2022 Release/Survey Sites
GWSS Infested Area
0
45
90
180 Miles
December 30 2022

STATEWIDE SURVEY AND DETECTION

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.

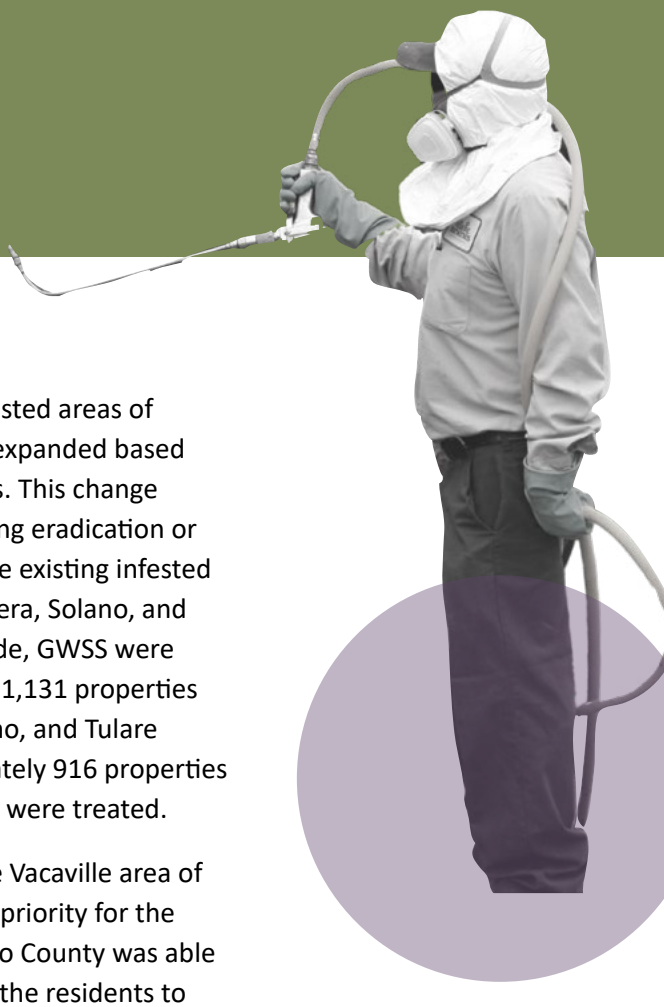
Yellow panel traps are deployed in 43 counties that are not infested or are partially infested with GWSS. The GWSS are attracted to the trap's bright yellow color and stick to its adhesive surface. County and state personnel service traps regularly during the trapping season. Each trap is checked every 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 2022. During the peak of the trapping season, approximately 33,000 traps were deployed and serviced statewide.

In 2022, PDCP staff provided detection training to 469 employees from 46 counties, CDFA, and nurseries. 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.

Yellow panel trap covered with GWSS.

GWSS inspector.

RAPID RESPONSE



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.

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

In 2022, the existing infested areas of Fresno and Clovis were expanded based on historical find records. This change was in addition to ongoing eradication or suppression efforts in the existing infested portions of Fresno, Madera, Solano, and Tulare counties. Statewide, GWSS were found on approximately 1,131 properties in Fresno, Madera, Solano, and Tulare counties, and approximately 916 properties (infested plus adjacents) were treated.

Eradication efforts in the Vacaville area of Solano County remain a priority for the PDCP. Fortunately, Solano County was able to obtain approval from the residents to treat approximately 85% of the residential properties in the project area. Solano County's public outreach accomplishment is crucial to the success of the eradication efforts of GWSS in the Vacaville area. Solano County provided 924 foliar and/or soil treatments to 825 properties in 2022. Solano County plans to continue to monitor their 200+ traps during the winter months.

Despite Solano's success with treatments, the county's diligent detection and survey efforts yielded additional finds in 2022. County staff found a total of 77 adults, 12 nymphs, and 244 egg masses, 20 of which were confirmed to be viable. Some parasitized egg masses have been observed in the area, demonstrating that

the biological control agents caused them to perish. The initial treatment boundaries were expanded due to recent finds, most notably in the southernmost tip of the infested area boundaries. However, the finds did not result in an expansion of the original infested area boundaries.

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. Consenting 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 2022, 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.

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 www.cdpr.ca.gov/docs/emon/pubs/ehapreps.html.

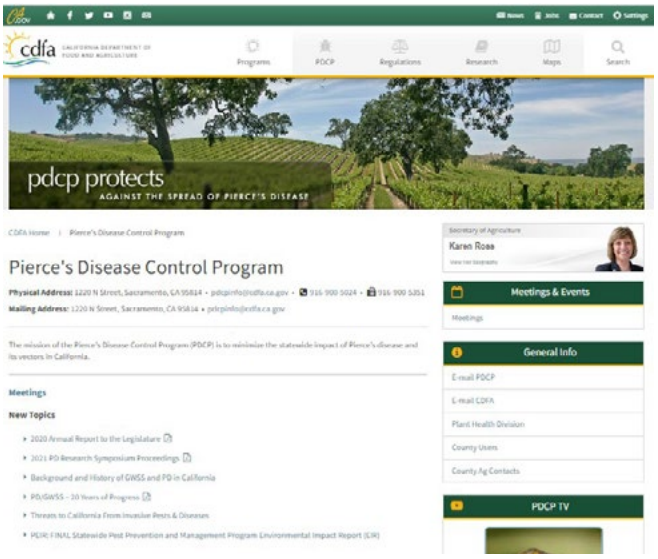
OUTREACH AND EDUCATION

County Agricultural Commissioner Outreach Activities

In 2022, 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, 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.

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 www.cdfa.ca.gov/pdcp and is effective for providing current and reliable information to interested parties.



Homepage of the PDCP website.

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

The focus of the PD/GWSS Board's outreach and education program is sharing information, research advancements, and actionable recommendations for designated pests and diseases of winegrapes so growers see a return on their investment in the annual Pierce's Disease and Glassy-Winged Sharpshooter Assessment. While leading scientists work toward finding solutions to PD and other serious winegrape pests and diseases, growers can learn from research results and apply new techniques and strategies directly in the field.

Strategies for the outreach and education program in 2022 included:

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

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 2022:

- **Quarterly Newsletter:** Highlights PD/GWSS Board actions, research advances, and research project reports, and is mailed to over 7,000 winegrape growers, industry stakeholders, and elected officials. Issues can be viewed online at www.cdfa.ca.gov/pdcp/newsletters.html.


CALIFORNIA PD/GWSS BOARD
Partnership for Winegrape Pest Solutions
ISSUE 4 - 2022
bulletin
cdfa
INSIDE THIS ISSUE
California on High Alert for Spotted Lanternfly
While no infestations of the invasive spotted lanternfly have been found in the state during the California Department of Food and Agriculture's recent annual survey of over 600 sites, dead spotted lanternflies have been found during several routine agricultural inspections.
These finds emphasize the importance of the state's proactive approach to keeping the pest out of California and preparing for its possible arrival. The CDFA is focusing its efforts on detection, exclusion, research, and outreach, and has an action plan in place in case a spotted lanternfly infestation is found in the state.
The destructive spotted lanternfly is a threat to many important commercial crops and affects people's enjoyment of the outdoors. The insect is harmless to humans and animals, but feeds on a wide range of plants and trees, with damage seen in vineyards, nurseries, and urban, suburban, and rural environments. The pest spreading to California would be problematic for the wine industry since it feeds on grapevines, ultimately reducing yield, diminishing quality, and potentially killing the vines, and can be expensive to treat.
The public can play a critical role in keeping an eye out for the distinctive-looking insect. To learn more about the pest and to see pictures of what it looks like in its various life stages, visit:
SPOT THE SPOTTED LANTERNFLY!
CDFA Pest Hotline: 1-800-491-1899
Report online:
Learn more:
Snag it. Snap it. Report it.
continued on next page
PAGE 2
Pierce's Disease Control Program Statewide Coordinator Retires
PAGE 3
On the Research Front
- Propagating the Premier US Grape Collection for Protection in a Foundation Greenhouse
- Identification of Novel Central Valley Trichoderma Isolates for Biological Control of Pierce's Disease in California
- Investigating the Relationship Between Grapevine Red Blotch Virus Titer Levels, Years of Infection and Symptomology
PAGE 4
Winegrape Assessment Rate Set at $1.25 for 2022 Harvest
New Members Join Pierce's Disease Advisory Task Force

Fall 2022 quarterly newsletter.

Top feature stories in 2022 included:

- Pierce's Disease-Resistant Vines Get Put to Work: bit.ly/3Qs7737
- Improved Decision-making for Grapevine Diseases: bit.ly/36ox2pl
- What to do with Tree-of-Heaven Near Vineyards: bit.ly/3Nm6S6S
- Doing More with Less: Slowing the Spread of Vine Mealybug: bit.ly/3Gw5aya

- PD/GWSS Board Funds 17 New and Five Continuing Research Projects: bit.ly/3k8NAZD
- Insects Deployed for Glassy-Winged Sharpshooter Eradication in Solano County: bit.ly/3iqSocf
- California on High Alert for Spotted Lanternfly: bit.ly/3Zo2ivM
- Winegrape Assessment Rate Set at $1.25 per $1,000 of Value for the 2022 Harvest: bit.ly/3kbanUg

» **Monthly E-newsletter:** Shares PD/GWSS Board activities, Pierce's Disease Control Program reports on containment and treatments, and relevant media coverage. The monthly e-newsletter is sent to over 1,200 winegrape growers and industry stakeholders, with a 37% average open rate.

» **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 www.cdfa.ca.gov/pdcp/PD_GWSS_Board.html.

» **Research on Demand Videos:** Published recordings of researchers' presentations from the most recent Pierce's Disease Research Symposium on the PD/GWSS Board's website to share the latest research on winegrape pests and diseases more broadly with California winegrape growers. The free educational videos are available at www.youtube.com/@PD-GWSS-Board and were viewed over 575 times in 2022.

» **Industry Tradeshows:** Participated in three industry tradeshows, engaging with growers and industry colleagues at in-person events on the North Coast, Central Coast and Central Valley. Event 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 spotted lanternfly.

» **Spotted Lanternfly Outreach Campaign:** Launched a print and digital advertising campaign in English and Spanish to raise awareness of the invasive pest. The advertisements feature photographs of the spotted lanternfly life stages and the time of year to look for them. The digital assets are available for download at bit.ly/3vT3p9b and were shared with winegrape grower associations, county agricultural commissioners, and other industry partners to add to their websites and educational materials. Print ads ran quarterly in three winegrape industry publications and online ads ran bimonthly on one winegrape industry media website. Social media advertising reached over 280,000 people from June - December 2022.

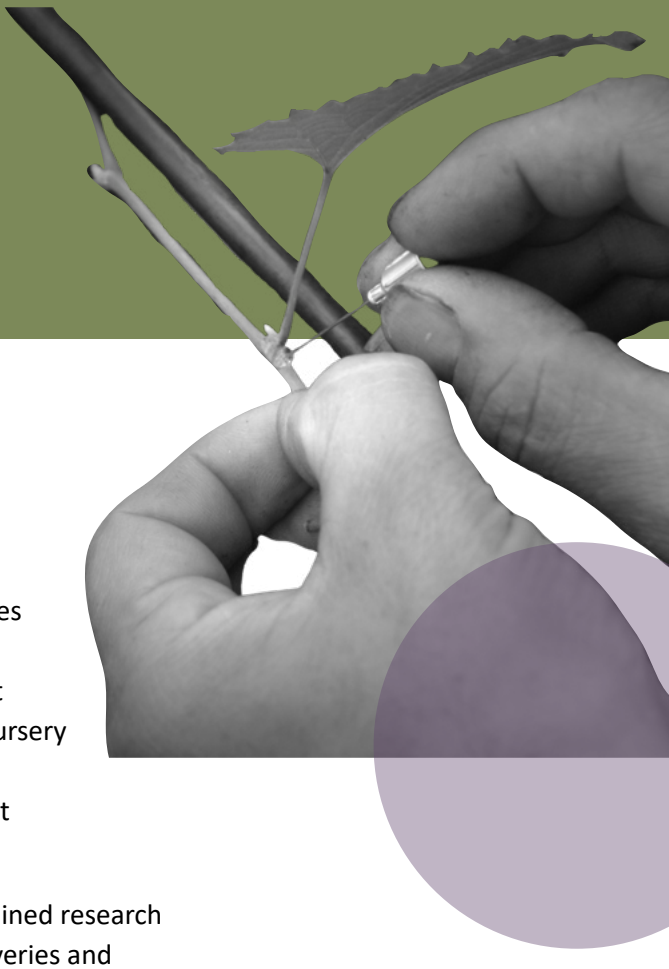
Spotted lanternfly advertisement.

The PD/GWSS Board also partnered with the CDFA Plant Health and Pest Prevention Services Division to create artwork for outdoor advertising in the Central Valley.

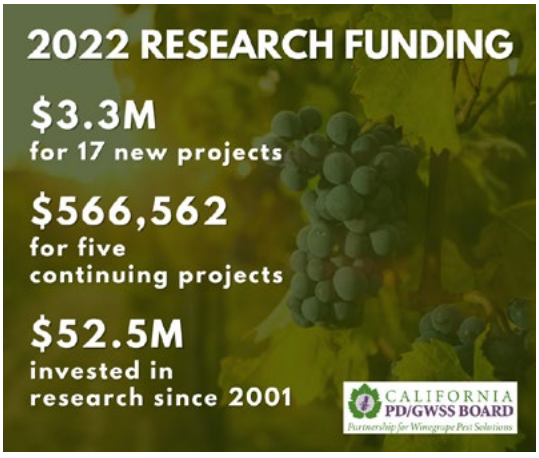
» **Social Media:** Shared PD/GWSS Board news, research advancements and applications, and relevant media coverage through Facebook and YouTube. The PD/GWSS Board Facebook page has over 320 followers, a 17% increase since 2021, and reached over 260,000 people. The PD/GWSS Board YouTube channel has 60 subscribers, a 36% increase since 2021, and videos were viewed over 2,300 times with over 92 hours of watch time.

» **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. In 2022, there were 18 news articles mentioning the PD/GWSS Board, including reporting on the annual assessment rate, research funding, research projects and advances, the threat of PD and GWSS, the Solano County GWSS infestation, and spotted lanternfly.

RESEARCH



Research continues to be an integral part of the PDCP. In 2022, 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 provides valuable insight into the biology, ecology, and behavior of PD and its vectors. Additionally, 19 projects on other PD/GWSS Board-designated pests and diseases of winegrapes were in progress in 2022, increasing the knowledge base available for developing management solutions.



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

This included support for virus testing by the University of California Foundation Plant Services in Davis as they move their critically important grapevine foundation nursery stock to screenhouses in response to the threat of grapevine viruses.

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 2022.

In 2022, the PD/GWSS Board's research coordinator continued to review, guide, and facilitate the PD/GWSS Board's research funding program. They are working to ensure the industry is getting the best research investment from their assessment dollars.

In late 2022, the PD/GWSS Board approved an agreement with National Academy of Sciences to conduct a comprehensive review of its grapevine viruses research program. Over the next two years they will review current knowledge on grapevine red blotch virus and grapevine leafroll-associated virus type 3, research outcomes and gaps, and approaches for future research. They will also assess the PD/GWSS Board's current virus research projects, proposals for new funding, and the PD/GWSS Board's process for reviewing and selecting research proposals to fund. The final report will guide the PD/GWSS Board's strategy for research funding. The PD/GWSS Board conducted a similar review with the National Academy of Sciences focused on PD and GWSS in 2004, which paved the way for many of the PD research successes over the past two decades.

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. After hosting its first-ever virtual symposium in December 2021, the next symposium is expected to be held in 2023. This biennial event features presentations on current PD/GWSS Board-funded research and outreach projects on PD, GWSS, and other winegrape pests and diseases, as well as grower presentations aimed at increasinge dialogue between researchers and stakeholders. A proceedings of full progress reports is also prepared. All proceedings documents and videos of selected presentations can be viewed online at www.cdfa.ca.gov/pdcp/research.html.

Research Proposal Solicitation and Review

In 2022, the PDCP partnered with the Unified Grant Management for Viticulture and Enology Program at the UC, Davis to facilitate its research and outreach proposal solicitation and review process, while the Board's research coordinator worked with expert scientific reviewers to evaluate the proposals. The annual request for proposals invites proposals on PD, its vectors, and other serious pests and diseases of winegrapes.

A total of 22 proposals were received and reviewed, with 17 projects totaling over $3.3 million over the next three years selected for funding using California PD/GWSS winegrape assessment funds. In addition, 14 ongoing projects were approved to continue for another fiscal year including some receiving no-cost extensions.

ENVIRONMENTAL COMPLIANCE

In 2022, 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.

Licensed pest control professionals performing pesticide applications.

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 continue to revise the previous statewide programmatic environmental impact report in 2023.

FINANCIAL STATEMENT

Industry Fund (PD/GWSS Board Winegrape Assessment)

REVENUE

FY 2021-22 (ACTUAL)	FY 2022-23 (PROJECTED)
$3,500,824	$4,608,000

EXPENDITURES

EXPENDITURE TYPE	FY 2021-22 (ACTUAL)	FY 2022-23 (PROJECTED)
Personal Services	$71,293	$71,293
Operating Expenses	$220,707	$220,707
Research and Outreach	$1,952,945	$3,482,651
County Payments	$1,115,405	$1,800,000
TOTAL EXPENDITURES	**$3,360,350**	**$5,574,651**

Other Funds

REVENUE

REVENUE SOURCE	FY 2021-22 (ACTUAL)	FY 2022-23 (PROJECTED)
Federal (United States Department of Agriculture)	$15,774,893	$15,774,893
CDFA (Emergency Fund)	$376,885	$888,944
TOTAL REVENUE	**$16,151,778**	**$16,663,837**

EXPENDITURES

EXPENDITURE TYPE	FY 2021-22 (ACTUAL)	FY 2022-23 (PROJECTED)
Personal Services	$3,558,071	$3,650,000
Operating Expenses	$2,204,295	$2,154,337
County Payments	$11,184,768	$13,865,033
TOTAL EXPENDITURES	**$16,947,134**	**$19,669,370**