



PPQ 2023 Annual Report

Optimizing Pest Management: Specialty Crop Pests

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Introduction

The goal of the Specialty Crop Pests (SCP) Program is to protect U.S. fruits and vegetables, tree nuts, horticulture, and nursery crops from adverse impacts associated with invasive pests, such as crop damage or threats to international trade and interstate commerce. The U.S. Department of Agriculture's (USDA) Plant Protection and Quarantine (PPQ) program works with State, Tribal, university, and industry partners to develop and implement practices, policies, and regulations that prevent or mitigate impacts for invasive pests of Federal regulatory significance. These activities include verifying pest distribution, identifying and mitigating risk pathways to prevent long distance spread of the pests, developing and implementing diagnostic tools and pest mitigation strategies, and communicating with the public to gain support for program strategies.

These efforts help U.S. farmers export their products, prevent damage to specialty crop production (helping to ensure the availability of fresh fruits and vegetables), and protect natural resources, including forests and residential landscapes. The program currently addresses numerous pests and diseases, including exotic fruit flies, a variety of citrus pests and diseases, the glassy-winged sharpshooter (GWSS), spotted lanternfly (SLF), pale cyst nematode, navel orange worm (NOW), and *Phytophthora ramorum*, among others.

Overall, the program directly protects specialty crop production worth more than \$11.5 billion in 2022 (USDA Animal and Plant Health Inspection Service [APHIS] internal analysis based on National Agricultural Statistics Survey data). The program indirectly protects additional specialty crop production valued at \$7.6 billion in 2022, by preventing the spread of these damaging pests and diseases to new areas (based on APHIS internal analysis based on National Agricultural Statistics Service data). Without the SCP program, trading partners might not accept a variety of U.S. fruits and vegetables. The value of

trade in specialty crops that could potentially be disrupted without the SCP program was \$3.6 billion in 2022, according to an internal APHIS report using data from the Foreign Agricultural Service's Global Agricultural Trade System.

Grape Pests

The SCP program targets several devastating pests and diseases, including GWSS, EGVM and SLF, that could affect grape production and impact export markets.

European Grapevine Moth (EGVM)

In August 2016, PPQ declared the successful eradication of EGVM from California. In FY 2023, PPQ, in collaboration with the California Department of Food and Agriculture (CDFA), county departments of agriculture, and industry partners, continued monitoring for EGVM with more than 22,000 traps placed in 37 participating counties. APHIS and cooperators found no infestations. PPQ is evaluating what level of survey to continue and how to expand surveys to incorporate other grape pests.

Glassy-Winged Sharpshooter (GWSS)

PPQ also continued the successful, cooperative GWSS program designed to suppress populations of this pest where it is established. GWSS is a vector for Pierce's disease, which is lethal to grapevines. The program's suppression and regulatory activities work to prevent the spread of the vector and disease across California. In FY 2023, the program continued to conduct surveys and other regulatory activities including inspections of nursery stock and bulk citrus for the pest in 49 California counties, and continued area-wide suppression activities in affected agricultural production areas of 4 California

counties. With citrus growers' voluntary suppression treatments, the program covered 20,327 acres. Of the more than 30,000 shipments of nursery stock from infested areas, California county inspectors rejected three shipments due to GWSS life stages being present. Together, the EGVM and GWSS programs directly protected 828,000 acres of grape production worth \$5.5 billion in the State of California in 2022 (National Agricultural Statistics Survey Noncitrus Fruit and Nuts 2022 Summary).

Spotted Lanternfly (SLF)

In FY 2023, PPQ and cooperators continued addressing SLF using funding provided through Specialty Crop Pests and with \$6 million in funding available under Plant Protection Act Section 7721. This invasive pest is now found in 16 States, including Connecticut, Delaware, Illinois, Indiana, Maryland, Michigan, Massachusetts, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Virginia, and West Virginia. Juvenile spotted lanternflies, known as nymphs, and adults prefer to feed on the invasive tree of heaven (*Ailanthus altissima*) but also feed on a wide range of crops and plants, including grapes, apples, hops, walnuts, and hardwood trees. We do not have enough data to determine the impacts on agriculture. Thus far, vineyards have been the most adversely affected agricultural commodity, mostly due to SLF acting as a stressor to vines. As they feed, the pest leaves behind a sticky, sugary residue called honeydew that attracts other insects and promotes sooty mold growth, which can further damage the plant.

There is a strong correlation between new SLF populations and major transportation pathways, such as railroads and interstate corridors. PPQ conducts targeted treatments and, in some areas, removes SLF's preferred host plant, tree of heaven, from transportation hubs with the aim of reducing the risk of SLF spread to new areas. PPQ and cooperators also continue to conduct treatments on the leading edge of the infestation and to eradicate isolated infestations. In FY 2023, PPQ and cooperators treated 4,637

properties covering 6,455 acres in affected areas included in the program’s environmental assessment (EA).

The program completed National Environmental Policy Act documentation to conduct treatments in four affected States in FY 2023 that were not included in the previous environmental assessments—Indiana, Massachusetts, Michigan, and Rhode Island. APHIS prepared a programmatic, nationwide EA to address all other known and potential SLF treatment areas in the United States.

The program continues to evaluate new treatment strategies, and in FY 2023, PPQ and cooperators identified two potential biological control organisms, one that targets the tree of heaven and two that target SLF. PPQ will continue to evaluate them and develop methods to rear them in the laboratory. Additionally, PPQ began working with the National Association of State Departments of Agriculture and the National Plant Board to develop a national strategic plan outlining the future direction of the SLF program. With the strategic plan, PPQ aims to harmonize the approach across States to slow SLF’s spread, develop consistent outreach messaging for a nationwide audience, and more effectively use existing State and Federal resources.

Citrus Diseases and Asian Citrus Psyllid

Citrus fruits are high-value specialty crops and a nutritious food for consumers around the world. The United States was the sixth largest exporter of citrus by value and volume in 2022 (International Trade Centre database). PPQ supports the citrus industry’s continued ability to produce, harvest, process, and ship citrus fruits and nursery stock despite the presence of diseases such as citrus canker, citrus greening or Huanglongbing (HLB), sweet orange scab, and citrus black spot, which decrease fruit quality, increase production costs for producers, and threaten export markets for fruit from affected areas.

HLB is the most serious disease of citrus currently impacting Florida and Texas, and threatening the citrus crop in Arizona, California, and Louisiana, and most recently, Mississippi, where it was recently detected in a residential area. The insect vector, the Asian citrus psyllid (ACP), spreads the disease. Through the Citrus Health Response Program, PPQ and State partners also conduct surveys for other diseases not known to occur in the United States, including citrus leprosis virus and citrus variegated chlorosis.

PPQ and cooperators in citrus-producing States perform multi-pest surveys providing timely information about the presence of pests and diseases to growers and State government partners. This information allows growers to take necessary actions to manage their groves and allows PPQ and States to update quarantine boundaries and regulations to prevent the spread of serious citrus pests and diseases through the movement of regulated materials. Based on the results of surveys, the Agency adjusted quarantine boundaries during FY 2023 for HLB in California.

In areas affected by citrus pests and diseases, PPQ's flexible regulatory protocols have minimized the impact of the quarantines on growers, who can move citrus out of quarantined areas to packinghouses if they follow mitigation procedures to prevent the disease or its insect vector from spreading. PPQ works with citrus nurseries across the United States to ensure that nursery stock produced in areas quarantined for citrus diseases is free from the pests, ensuring that clean plants are moving between the States and available for citrus producers and residential use. In FY 2023, approximately 560 businesses had compliance agreements with PPQ and moved regulated host materials such as citrus fruit and nursery stock under more than 40,000 certificates and limited permits that PPQ issued.

PPQ and cooperators continued extensive surveys that establish citrus black spot-free production units, and low prevalence areas for citrus canker in Florida, for export packing to the European Union. PPQ also supports area-wide management efforts in Texas and California for citrus pests and diseases.

In FY 2023, PPQ and cooperators continued to conduct risk-based surveys for HLB in residential and commercial citrus areas in California to ensure they detect the disease quickly if it is present.

Additionally, PPQ assists CDFA in aggressively responding to positive detections of HLB (thus far in residential areas only) and implementing an area-wide management approach for ACP population control. PPQ continued biological control efforts targeting ACP. This program, which employs a predatory wasp against ACP, augments other management methods, especially in residential areas in Arizona, California, Louisiana, and Texas, where use of chemical pesticides is undesirable.

Additionally, PPQ and CDFA continued surveys for citrus yellow vein clearing virus in Tulare County, California, after the disease was first detected there in FY 2022.

These citrus health activities directly protect citrus production on 588,200 acres in the United States worth approximately \$2.5 billion for the 2022-2023 growing season (National Agricultural Statistics Survey Citrus Fruits 2023 Summary). Without PPQ's activities, citrus exports could be at risk each year. In 2021, the value of U.S. citrus exports totaled approximately \$771 million (Foreign Agricultural Service Global Agricultural Trade System).

[HLB Multi-Agency Coordination \(MAC\) Group](#)

PPQ established the HLB Multi-Agency Coordination (MAC) response framework in December 2013 to help address the citrus industry's immediate and long-term needs in dealing with this devastating disease. In addition to PPQ, the MAC is comprised of representatives from USDA's Agricultural

Research Service (ARS), National Institute of Food and Agriculture, and Office of Pest Management Policy; the Environmental Protection Agency; State departments of agriculture in Arizona, California, Florida, and Texas; citrus research organizations in California, Florida, and Texas; and citrus industry organizations in California, Florida, and Texas. Between FY 2014 and 2019, the HLB MAC group has funded a total of 105 projects carried out by State cooperators, universities, private companies, and Federal agencies. The projects focused on strategies for vector control, therapies for infected trees, sustainability of new plantings, early detection technologies, best management practices for citrus groves, and support for the development of HLB-resistant citrus varieties.

In FY 2019, the HLB MAC shifted focus towards determining the best management practices for producing citrus under the threat and pressure of HLB. PPQ first supported the Florida Citrus Research and Field Trials (CRaFT) project to conduct field evaluations of strategies that showed previous scientific evidence of success and then initiated similar projects in California and Texas. These long-term projects evaluate interactions between methods, treatments, environments, rootstock/scion combinations, and growing practices in the different conditions in each State. In FY 2023, PPQ provided HLB MAC funds to all three States for the ongoing projects. Additionally, PPQ supported a project to propagate and perform greenhouse and field trials for new citrus varieties developed using CRISPR precision breeding to create resistance to HLB.

Tree Fruit and Nursery Stock Pests

PPQ works with State and Tribal partners, universities, and industry to develop and carry out programs to protect tree fruit and nursery crops from damage and trade disruptions due to invasive pests. Through these activities, PPQ directly protects nursery stock production worth approximately \$1.3 billion in 2019, (the most recent year that data is available), and tree fruit production worth approximately \$1.7 billion in 2021 (APHIS internal analysis based on National Agricultural Statistics Survey data). By preventing pests and diseases like exotic fruit flies and *Phytophthora ramorum* from spreading to new areas, the program indirectly protects approximately \$6.8 billion in fruit and nursery stock production (APHIS internal analysis based on National Agricultural Statistics Survey data).

Exotic Fruit Flies

PPQ takes the threat of exotic fruit fly outbreaks very seriously. These insects are among the most destructive, feared, and well-publicized pests of fruits and vegetables around the world. Working with State partners, we aim to detect an outbreak early and respond rapidly. Our swift and effective action protects crops and the industries that depend on them, as well as valuable foreign export markets.

PPQ protects a wide variety of specialty crops (particularly tree fruit and citrus) through exotic fruit fly exclusion and detection activities. One of the Agency's key strategies is maintaining a barrier against the northward movement of Mediterranean fruit fly (Medfly). Medfly is one of the most destructive agricultural pests in the world, attacking more than 300 cultivated and wild fruits and vegetables.

APHIS, through its cooperator Moscamed, produced an average of one billion sterile Medfly per week in FY 2023 to mitigate northward movement from Mexico and Guatemala, and to release in high-risk areas of California and Florida on a preventative basis.

In FY 2023, the international cooperative program continued addressing Medfly outbreaks that began in FY 2019, in the program-designated free areas of Mexico and Guatemala. USDA continued to assist collaborators in Mexico by funding the additional production of 200 million sterile Medfly for release in Chiapas. The program also applied aerial bait spray treatments in program areas of Guatemala. APHIS and cooperators will continue addressing the high number of detections predicted for FY 2024 in an effort to prevent the northward spread of the pest. Through these and other efforts, the program focuses on effectively managing Medfly in Guatemala and southern Mexico and maintaining internationally recognized Medfly-free areas in Peten, Guatemala, and Belize which include approximately 149,000 square kilometers combined.

Since 2015, when the first Medfly outbreak occurred in the Caribbean, PPQ has worked with partner countries in the region to improve surveillance for Medfly and other exotic fruit flies. In FY 2022, eight Caribbean countries participated in this effort with active trapping and surveillance programs. The number of countries participating was lower than in past years due to issues associated with the pandemic, weather-related events, issues with infrastructure, and competing priorities with other pest and disease programs, among others. PPQ is working with partners in the Caribbean to develop FY 2024 plans for fruit fly trapping and will continue to support surveillance in the Caribbean through technical assistance.

Domestically, PPQ and State cooperators maintain the cooperative Preventative Release Program, which releases sterile fruit flies in high-risk areas to prevent any introduced Medflies or Mexican fruit flies (Mexflies) from reproducing and establishing a population in the United States. In the Los Angeles area in California, PPQ and cooperators release 120 million sterile Medflies per week, and in 4 port areas in

Florida, 80 million per week. PPQ and cooperators also maintain a detection network of more than 160,000 traps in California, Florida, Puerto Rico, Texas, New York, and other States vulnerable to exotic fruit fly incursions.

When outbreaks occur, APHIS and cooperators implement immediate emergency response activities to eradicate them. In FY 2023, PPQ and CDFR detected the Tau fly for the first time in the United States. This fruit fly is native to Asia and, like many fruit flies, has a broad host list including citrus, peppers, tomatoes, cucumbers, melons, and avocados. The program also detected and is responding to four outbreaks of the Oriental fruit fly. For both Oriental fruit fly and the Tau fly, APHIS uses traps with attractants to eliminate the outbreaks. In FY 2023, PPQ completed the eradication of two outbreaks in California that were initially detected in FY 2022: a Mexfly outbreak in San Diego County and an Oriental fruit fly outbreak in Orange County. When outbreaks occur, PPQ and cooperators implement immediate emergency response activities to eradicate them.

During FY 2023, there were no new detections of Mexfly in the Lower Rio Grande Valley, home to the Texas citrus industry. In November 2022, the program completed the response to a large Mexfly outbreak and released the last 42.91 square miles from quarantine. At its largest point, the multi-outbreak incident had covered 1,172 square miles. In FY 2023, PPQ continued releasing an improved strain of sterile Mexflies that allows males and females to be separated. Releasing only male sterile flies improves efficiency in controlling wild Mexfly populations.

PPQ also continued to address the European cherry fruit fly (ECFF) in New York during FY 2023. This temperate fruit fly species differs from the tropical species that PPQ more typically detects and eradicates in Florida, Texas, or California, by having only one lifecycle per year, whereas other species

have many lifecycles per year and can usually be eradicated within several months. PPQ declares an outbreak eradicated if there are no detections within three lifecycles. Additionally, one of ECFF's primary hosts is the honeysuckle plant, which is widespread throughout New York, surrounding States, and Canada.

PPQ and cooperators in New York enforce quarantine regulations over the 3,223 square-mile affected area to reduce the risk that ECFF will spread to other cherry-producing areas. Cherry producers can mitigate damage the pest may cause to crops through current management practices. In FY 2023, PPQ worked with cherry producers to streamline regulatory measures that allow the movement of cherries out of the quarantine areas. In place of requiring trapping in orchards, inspectors now conduct "float tests" in the orchard and at the processing plants—when the cherries are submerged in water, fruit fly life stages float to the surface—to determine whether any ECFF are present in shipments. This change reduces requirements for growers in their fields while meeting the goal of preventing ECFF from spreading through cherry shipments.

[Navel Orangeworm \(NOW\)](#)

In FY 2023, PPQ and cooperators in California and Arizona continued implementation of the NOW areawide program, targeting the NOW moth which is a serious pest of tree nut crops, including almonds, pistachios, and walnuts. Adult moths exploit gaps or splits in the nut shells or hulls where they lay eggs inside the nuts. Newly hatched larvae feed and contaminate the nuts with insect waste and secondary fungal spores that may produce poisonous aflatoxins.

PPQ uses its Phoenix Rearing Facility (PRF) in Arizona to produce sterile NOW moths and ships them to California, where they are released by airplane over participating pistachio and almond orchards. PPQ

produced and released approximately 750,000 sterile NOW moths per day for early-season releases in the spring over half of the acreage with the emerging generation of wild NOW moths, and increased production to approximately 1.5 million per day in the summer. PPQ continued to provide a portion of the sterile NOW moths for research initiatives conducted by ARS and the University of California-Riverside. PPQ and cooperators continue to evaluate the impact of the release of sterile moths and the other integrated pest management measures on NOW in tree nut crops.

Phytophthora ramorum (P. ramorum)

PPQ protects natural resources and nursery stock production and trade by limiting the spread of *P. ramorum* from quarantine areas and affected nurseries through regulatory strategies and adoption of mitigations and changes to cultural practices. *P. ramorum*, which causes sudden oak death, can be moved through host nursery stock and can affect a variety of forest trees. The disease is present in coastal northern California and a small area in Curry County, Oregon. In FY 2023, Oregon State officials continued surveys related to a positive detection outside the quarantined area the previous year. PPQ will update quarantine regulations to include the new area when the delimiting surveys are completed. Because of the presence of *P. ramorum* in the surrounding environment, nurseries within the quarantine area that ship interstate must meet annual certification survey and sampling requirements to prevent the movement of potentially infested material. The program also regulates nurseries outside the quarantine area that have been confirmed positive for *P. ramorum* in plants, water, or other regulated articles.

The nurseries must remain free of *P. ramorum* for three consecutive years to be deregulated. All positive interstate shipping nurseries must participate in a compliance program using protocols to eliminate the pathogen and implement required mitigations focused on critical control points to reduce the risk of

reintroduction. During FY 2023, 16 nurseries participated in the program—three nurseries were added to the program, and PPQ released four nurseries which completed the program requirements.

Potatoes

PPQ addresses two major potato pests, pale cyst nematode (PCN) in Idaho and the golden nematode (GN) in New York. Together, these efforts protected 32.9 billion pounds harvested from 895,600 acres of U.S. potatoes, valued at approximately \$5.1 billion in 2022 (National Agricultural Statistics Service). In 2022, the United States exported more than 550,000 metric tons (\$303.6 million) of fresh and seed potatoes (Foreign Agricultural Service Global Agricultural Trade System).

Pale Cyst Nematode

In FY 2023, PPQ processed 7,894 soil samples including samples from Idaho and other States. PCN has not been detected outside of Idaho, and fumigations of infested fields in Idaho have reduced PCN populations by 99 percent since the pest was first detected in 2006.

The program conducted 832 regulatory treatments in FY 2023 of farm equipment to prevent the spread of PCN out of regulated areas. There are currently 32 PCN-infested fields, and the current regulated area is 6,535 acres, of which 3,542 acres are infested fields, and 2,993 acres are associated fields. The infested fields are in an 8.5-mile radius that spans a portion of northern Bingham County and southern Bonneville County. In FY 2023, the program conducted eradication treatments on 7 infested fields, totaling 754 acres. In the treated fields that no longer show PCN viability, according to a greenhouse bioassay test, producers can plant potatoes with continued monitoring by PPQ and cooperators to ensure PCN is not present.

During the greenhouse bioassay (three rounds of greenhouse bioassay that is the equivalent of three crop cycles), the program tests the viability of any PCN nematodes found in the soil. If the nematodes are found to be non-viable (they fail to reproduce under favorable conditions in the presence of a host), the fields from which they came are eligible to immediately return to potato production at the landowners' discretion.

The PCN program requires infested fields that return to potato production to undergo full-field surveys following each of three subsequent potato crops to check for viable PCN populations. These fields remain regulated but benefit from reduced sanitation requirements. In 2023, a farmer planted potatoes in one eligible field; this is the first round of in-field bioassay for two of the fields and the second round of in-field bioassay for the third field. The fields will be sampled following harvest and analyzed for the presence of viable nematodes. The program is working with ARS, the University of Idaho, and other cooperators to develop PCN-resistant potato varieties. PPQ has funded several projects on PCN-resistant potato varieties through Plant Protection Act Section 7721 for this long-term effort.

Golden Nematode

In FY 2023, PPQ and New York cooperators continued an effective survey and regulatory program targeting golden nematode (GN) with a focus on deregulation of all eligible land. Adopting strategies used in the more recently established PCN program, the GN program is focusing on fields that are either infested or associated with infested fields rather than political boundaries such as townships. PPQ, working closely with the New York State Department of Agriculture and Markets (NYS AGM), has removed more than 1.2 million acres from the GN regulated area in New York since 2010, allowing several farmers to grow their crops without continued restrictions.

PPQ continues to manage an active control and mitigation program to prevent GN from spreading from the remaining 90,307 regulated acres, including 5,945 acres that are infested with GN in portions of 8 New York counties. The program enforces regulations designed to prevent the spread of GN and requires sanitation treatments of on-farm equipment and other items moving out of the quarantine area. In FY 2023, the program processed a total of 6486 soil samples. 4,353 were for Maine and Michigan and 2,133 were for the GN program in New York. The program conducted 326 regulatory treatments of farm and earthmoving equipment to prevent the spread of GN out of regulated areas and certified 3 shipments of potatoes to Canada, totaling 160,000 pounds.

PPQ has cooperated with USDA's ARS, NYS AGM, and Cornell University to develop GN-resistant potato varieties for several decades. The program is now headquartered at a newly renovated laboratory on the Cornell University campus to continue this and other work on methods of eradicating GN. The program has developed a total of 45 GN-resistant varieties. Because the pest can overcome resistant potato varieties over time, continued development of new GN-resistant varieties is necessary.