



PPQ 2022 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, golden nematode, plum pox virus, light brown apple moth, European grapevine moth (EGVM), navel orange worm, and *Phytophthora ramorum*, among others.

Overall, the program directly protects specialty crop production worth more than \$11 billion in 2021 (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 nearly \$7 billion in 2021, by preventing the spread of these damaging pests and diseases to new areas (based on APHIS analysis using Economic Research 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 \$4.3 billion in 2021, 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 2022, PPQ, in collaboration with the California Department of Food and Agriculture (CDFA) and industry partners, continued monitoring for EGVM with more than 22,000 traps placed in 37 participating counties. PPQ 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 2022, 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 27,132 acres. Of the more than 27,000 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 829,000 acres of grape production worth \$5.2 billion in the State of California in 2021 (National Agricultural Statistics Survey Noncitrus Fruit and Nuts 2021 Summary).

Spotted Lanternfly (SLF)

In FY 2021, PPQ and cooperators continued addressing SLF using funding provided through Specialty Crop Pests and with \$7.5 million in funding available under Plant Protection Act Section 7721. This invasive pest is now found in 14 States, including Connecticut, Delaware, Indiana, Maryland, Michigan, Massachusetts, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, 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 2022, PPQ and cooperators treated 4,802 properties covering 6,150 acres in affected areas included in the program's environmental assessment (EA).

The program is continuing efforts to complete National Environmental Protection Act documentation in the four additional States where SLF has been identified and are not covered under the current EA—

Indiana, Massachusetts, Michigan, and Rhode Island. Once the program completes the supplemental EA for these four States requiring immediate treatment, PPQ will begin preparing 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 2022, PPQ and cooperators identified three 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 2021 (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 in areas when found.

HLB is the most serious disease of citrus currently impacting Florida and Texas, and threatening the citrus crop in Arizona, California, and Louisiana. 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 2022 for HLB in California, citrus canker in Alabama and Texas, and citrus black spot in Florida.

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 2022, approximately 614 businesses had compliance agreements with PPQ and moved regulated host materials such as citrus fruit and nursery stock under more than 18,800 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 2022, 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 cooperators confirmed the presence of citrus yellow vein clearing virus in Tulare County, California; efforts are ongoing to determine the extent of disease spread and develop an appropriate regulatory response.

These citrus health activities directly protect citrus production on 668,100 acres in the United States worth approximately \$2.91 billion for the 2021-2022 growing season (National Agricultural Statistics Survey Citrus Fruits 2022 Summary). Without PPQ's activities, citrus exports could be at risk each year. In 2021, the value of U.S. citrus exports totaled approximately \$968 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. In FYs 2019 and 2020, PPQ provided HLB MAC funds towards the Florida Citrus Research and Field Trials (CRaFT) project to conduct field evaluations of strategies that showed previous scientific evidence of success. This long-term project brought in growers, as collaborators, to evaluate interactions between methods, treatments, environments, rootstock/scion combinations, and growing practices.

In 2021, building on the CRaFT approach in Florida, PPQ initiated similar projects in California and Texas. Each State is at a different stage of disease progression, but they share the common goal of robust healthy trees and a productive industry. This approach offers an opportunity to evaluate the impact of tools available for all challenges that HLB poses in different environmental conditions. The results of these projects will benefit all citrus-growing regions in the United States that are threatened by this devastating disease. In FY 2022, PPQ provided funding to California and Florida for these ongoing projects. Texas continued using funds provided in FY 2021 under a 2-year cooperative agreement.

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, 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 *P. 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 2022 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 2022, 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. Overall, the number of outbreaks decreased from 1,619 in FY 2021 to 804 in FY 2022. PPQ, through the cooperator Moscamed, also continued the production and release of sterile Medfly and aerial bait spray treatments in the program area of Guatemala. 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 147,900 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. Going forward, PPQ will continue to support surveillance in the Caribbean through technical assistance and work with partners to continue to increase participation in this early warning network as resources allow.

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, PPQ and cooperators implement immediate emergency response activities to eradicate them. PPQ and CDFA completed eradication for two exotic fruit fly outbreaks in June 2022 and detected three new outbreaks in summer 2022, including an Oriental fruit fly (OFF) outbreak in Los Angeles County, an OFF outbreak in Orange County, and a Mexfly outbreak in San Diego County. The Los Angeles and Orange County outbreaks are in residential areas and do not impact agriculture. PPQ and CDFA completed eradication for the Los Angeles County OFF quarantine at the end of September. PPQ established an incident management team for the Mexfly outbreak, which covers more than 4,000 acres of agricultural production. The program's regulations allow growers who implement required protocols to ship their products out of the quarantined area. PPQ is releasing approximately 11 million sterile Mexflies per week in the area along with implementing trapping and regulatory protocols. PPQ expects to complete the remaining two responses in summer 2023.

In FY 2022, the program continued response activities for a Mexfly outbreak in the Lower Rio Grande Valley, the home of the Texas citrus industry, which experiences frequent incursions of the pest. During FY 2022, the program enhanced sterile fly release activities and worked with growers to identify additional measures to help contain the outbreak. Growers removed unmanaged groves, eliminating reservoirs of Mexfly host material. With the sterile fly program enhancements and grower cooperation, the program was able to reduce the size of the quarantine from 1,172 square miles at its largest point to 191 square miles at the end of the fiscal year. The commercial citrus acreage under quarantine was reduced from more than 9,000 acres to approximately 850 acres. The program expects to complete the response in November 2022 and release the area from quarantine.

In FY 2022, PPQ began the transition of the strain of sterile Mexflies released in Texas from the Willacy strain (where both males and females are released) to the black pupae strain, which 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 2022. 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 2022, 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.

Light Brown Apple Moth (LBAM)

In FY 2022, PPQ reclassified LBAM as a nonquarantine pest and removed the domestic LBAM quarantine regulations in California and Hawaii effective December 17, 2021. When PPQ first confirmed detections of LBAM in the United States in 2007, the best science available indicated that this moth would be a pest of economic significance. Over time, however, it became clear that LBAM does not cause as much crop damage as initially anticipated. PPQ is revising import requirements for certain fruits imported from Australia and New Zealand by removing the requirement for a phytosanitary certificate containing an additional declaration that states the shipment is free of LBAM. These changes will comply with international standards under the International Plant Protection Convention, which do not allow for countries to regulate imports for a specific pest more than it regulates it domestically.

Navel Orangeworm (NOW)

In FY 2022, 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 2022, 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. Currently, 19 nurseries participate in the program. In FY 2022, three nurseries completed the program, and PPQ released them from 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 protect 300,000 acres of potatoes in Idaho, valued at \$981 million in 2020 (National Agricultural Statistics Survey Quick Stats), and 14,300 acres in New York, valued at \$45 million in 2018 (National Agricultural Statistics Survey 2018 Potatoes Summary). These programs indirectly protect approximately 1 million acres of potato production nationwide worth \$2.9 billion in 2020 (APHIS analysis using National Agricultural Statistics Survey data).

Pale Cyst Nematode

In FY 2022, PPQ processed 6,398 soil samples for the PCN eradication effort in Idaho, and 5,493 samples from detection surveys in 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 1,701 regulatory treatments in FY 2022 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 6,568 acres, of which 3,542 acres are infested fields, and 3,026 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 2022, the program conducted eradication treatments on 5 infested fields, totaling 452 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 2022, farmers planted potatoes in three eligible fields; 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 2022, 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 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 quarantined area. In FY 2022, the program processed 8,084 soil samples for the GN deregulation effort in New York. The program conducted 268 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.