



United States Department of Agriculture

# Plant Protection and Quarantine: Helping U.S. Agriculture Thrive— Across the Country and Around the World



# 2019

Annual Report

Animal and Plant Health Inspection Service

APHIS 81-05-022



## **Plant Protection and Quarantine:**

Helping U.S. Agriculture Thrive—  
Across the Country and Around the World



## In 2019, PPQ kept potentially damaging plant pests out of the country.

Inspected and pre-cleared **4 billion pounds** of fresh fruits and vegetables and more than **1 billion** plants and bulbs from **26** countries before they shipped to the United States

**Worked** with the U.S. Department of Defense in fiscal year 2019 to inspect **137,816** military passengers, **405,598** shipments of personal goods (including household goods and vehicles), and **513,157** pieces of cargo before they returned stateside

**Cleared 21,270** shipments containing more than **1.75 billion** plant units and **550** tons of seeds, intercepting **1,059** quarantine pests at plant inspection stations

**Identified 70,218** pests—about half of which were quarantine significant—found in imported shipments, allowing PPQ and U.S. Customs and Border Protection to take quick action to prevent pest entry

**Oversaw** approximately **40,000** in-transit and port-of-entry treatments on imported commodities to mitigate pest risks

**Inspected 13.6 million** passengers' bags in Hawaii and Puerto Rico before they left for the U.S. mainland, intercepting **284,683** prohibited agricultural products and **1,985** quarantine pests

**Conducted 99,131** inspections of agricultural commodities before they left Hawaii and Puerto Rico for the U.S. mainland; conducted **5,575** treatments to mitigate pest risks

**Issued 24,525** permits for plants, plant products, soil, and certain organisms, as well as **9,058** response letters—also responded to **13,260** inquiries about imports and plant health permits

**Cleared** through post-entry quarantine **403** normally prohibited high-risk cultivars and germplasm from **22** plant genera, making safe new plant varieties available to U.S. importers and producers

**Seized 4,331** prohibited agricultural items valued at over **\$2.3 million** from retail stores, internet sales, and during express courier package inspections, removing prohibited products from commerce and eliminating dangerous and costly invasive pests that pose a threat to U.S. agriculture—also conducted **30** national recalls

All numbers reflect calendar year 2019 unless otherwise noted.



## We fought back against the spread of invasive plant pests that threatened our Nation's crops and forests.

**Eliminated** plum pox virus from the United States, protecting **1.3 million acres** of commercial stone fruit orchards, whose crops are worth **\$6.8 billion** annually with a **\$5 billion** export value

**Eradicated 11 of 12** exotic fruit fly outbreaks in the United States that started in 2018 and 2019

**Eradicated** Asian longhorned beetle from all of New York City

**Reduced** boll weevil populations by **52 percent** in the Lower Rio Grande Valley and **87 percent** in Tamaulipas, Mexico, working closely with our State, industry, and Mexican government partners

**Conducted 217** surveys with partners in **50 States** and **3 Territories**, detecting **13** new or re-introduced species before they caused significant damage

**Protected** specialty crop production nationwide worth more than **\$21 billion** by preventing the spread of damaging pests to new areas

**Released** more than **790,000** stingless wasps—marking a **29-percent** increase over 2018—to help control emerald ash borer beetle populations and protect U.S. ash trees, and added **3** new States and **74** new counties to the release program

**Protected** more than **661 million acres** of rangeland and forage crops worth over **\$8.7 billion** from damage caused by grasshoppers and Mormon crickets

**Allocated \$66 million** to support **407** projects in **49 States** and **3 Territories** to prevent the introduction or spread of invasive plant pests and diseases

**Provided \$6.35 million** to support **27** clean plant centers in **17 States** and Territories that diagnose, clean, and distribute disease-free stock of fruit trees, grapes, hops, berries, citrus, sweet potato, and roses to growers



## We helped U.S. agriculture thrive in the global marketplace.

**Provided** critical support—such as inspecting and certifying shipments, conducting technical negotiations, and providing online trade tools—for the export of U.S. plants and plant products valued at **\$86 billion** in fiscal year 2019

**Negotiated** with foreign governments to release **243** U.S.-origin shipments of plants and plant products worth more than **\$100 million** that were held at ports abroad due to paperwork issues or plant health concerns

**Processed 856,527** Lacey Act declarations, helping to combat illegal trade of protected plant species

**Issued 674,217** Federal phytosanitary (plant health) certificates directly or through authorized State and county cooperators to aid the export of U.S. plants and plant products to **209** international destinations

**Worked** through the North American Plant Protection Organization to advance seed health in trade, including working with countries throughout the Americas to harmonize seed trade requirements and further implement the international standard for seed movement

**Worked** with **182** International Plant Protection Convention members to adopt **8** new international standards that facilitate safe agricultural trade

**Advanced** worldwide use of the new global electronic export certification system that will reduce costs and prevent fraud in the certification of agricultural exports

**Worked** with international organizations and North American maritime and shipping industries to promote voluntary sea container cleaning guidelines that will help prevent the spread of damaging pests

## Message From the Deputy Administrator



Five years ago, we challenged ourselves to find new and better ways to help U.S. agriculture thrive—across the country and around the world. We set in motion an ambitious agenda to transform the United

States' plant health safeguarding system and make agricultural trade safer. At the same time, we invested in our employees and took steps to make our organization stronger.

Since then we've made significant progress. We implemented risk-based sampling in our plant inspection stations and started implementing it in the maritime cargo environment, helping to focus inspections on imported shipments that are more likely to have a pest problem. We continue testing and evaluating the use of molecular diagnostics at U.S. ports of entry because of their potential to help speed the clearance of low-risk cargo and detect high-risk pests that physical inspection would miss.

Domestically, we improved the collection, management, and accessibility of quality data to strengthen policy and operational decision making. We also trained canines to find specific pests in the field, including Mexican fruit fly, plum pox virus, and coconut rhinoceros beetle. Soon, these dogs could help PPQ determine an infestation's boundaries, identify pest-free areas, and detect traces of insect larvae or plant diseases in imported cargo and mail.

Internationally, we led the development and implementation of the International Plant Protection Convention's global ePhyto system,

which allows countries to electronically exchange fraud-resistant phytosanitary certificates at very low cost. These critical documents make trade safer by attesting that a country's exports meet the importing country's plant health requirements. We also worked with our Canadian partners and the maritime industry to form the North American Sea Container Initiative (NASCI), which promotes best practices for cleaning sea containers to reduce the global spread of pests.

These advancements have positioned us to realize significant results for U.S. agriculture. Working with our State and industry cooperators, we have achieved an astonishing number of plant pest and disease eradications from the United States in the last 5 years. They include plum pox virus, the world's most devastating stone fruit disease; pink bollworm, which used to cost the U.S. cotton industry \$32 million annually in control costs and yield losses; European grapevine moth, which threatened California's \$4 billion annual grape crop; and dozens of exotic fruit fly outbreaks in California, Florida, and Texas, which threatened billions of dollars' worth of crops in those States. In addition, we declared the tree-killing Asian longhorned beetle eradicated from all areas of New York City and parts of Ohio.

On the trade side, our work has supported U.S. agricultural exports valued at \$137 billion annually on average between 2015 and 2019. For example, in 2019 we opened the market for U.S. blueberries to Vietnam with an estimated value of \$10 million upon maturity; in 2018, corn to Myanmar with an estimated value of \$6 million; and in 2017, U.S. rice (estimated market of \$40 million) and California strawberries (estimated market of \$10

million) to China. Over the last 5 years, APHIS and cooperators issued over 680,000 phytosanitary certificates annually on average for U.S. plant and plant product exports. We negotiated with foreign governments to release more than 1,400 U.S.-origin plant and plant product shipments worth nearly \$300 million that were held at ports abroad due to paperwork issues or plant health concerns. And, we worked with 182 International Plant Protection Convention members to adopt 47 new international standards and protocols that facilitate safe agricultural trade.

I am pleased to share these and many other achievements in the pages of this report.

I am also excited to work with all of you—our employees, partners, and stakeholders—as we look to the future and challenge ourselves again to find even more ways to help U.S. agriculture thrive—across the country and around the world.

Sincerely,

Osama El-Lissy  
Deputy Administrator  
Plant Protection and Quarantine  
Animal and Plant Health Inspection Service  
U.S. Department of Agriculture

We safeguard U.S. agriculture and natural resources against the entry, establishment, and spread of economically and environmentally significant pests and facilitate the safe trade of agricultural products.

## Table of Contents

3 Strengthening Pest Exclusion



11 Optimizing Pest Management and Eradication



23 Making Agricultural Trade Safe and Supporting U.S. Exports



31 Strengthening Our Organization



35 Recognizing PPQ's Employees





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## Strengthening Pest Exclusion

To protect American farms and forests from harmful plant pests and foreign animal diseases, PPQ has created a system of safeguards that begins overseas in other countries, continues through U.S. ports of entry, and extends across the Nation. It's called the Safeguarding Continuum. All along the continuum, PPQ experts assess risks associated with pests that hitchhike on and in the agricultural products we import and take action to protect U.S. agriculture and natural resources while keeping international trade and travel moving.

In our 2014 to 2019 Strategic Plan, we established two objectives for strengthening safeguarding along this continuum. The first: to address risks at the first opportunity—when the likelihood of pest exclusion is greatest. The second: to make better use of the information we collect at each point along the continuum to target and reduce threats to U.S. agricultural and natural resources.

Throughout 2019, we made significant progress in three strategic initiatives we introduced in 2018. These initiatives help us use available resources in a way that maximizes risk management all along the Safeguarding Continuum. They include developing an offshore greenhouse certification program to minimize the risks associated with the high volumes of plant cuttings that enter our country every day, implementing risk-based sampling to maximize the effectiveness of our port-of-entry inspections, and moving closer to operational use of molecular diagnostics at our ports of entry to detect high-risk pests that physical inspection would miss.

### Taking the Fight Offshore

One of the most effective ways to ensure the safe movement of commodities and other products into the United States is to address pest threats where they originate. When we take action to prevent or deal with pests in imported goods before they reach our shores, we significantly increase our ability to protect the health and marketability of our Nation's agricultural and natural resources.

### Pre-Clearing Commodity and Military Shipments

In 2019, our commodity preclearance program spanned 26 countries and covered 72 different types of commodities. Through this program, we inspected and pre-cleared 4 billion pounds of fresh fruits and vegetables and more than 1 billion plants and bulbs. This work not only ensures the safety of imported commodities, but also benefits importers whose inspected, pre-cleared, and certified products may pass through U.S. ports of entry without delay.

To help the U.S. military prevent the spread of foreign animal diseases and plant pests, we worked with the U.S. Department of Defense to inspect military equipment, cargo, and household goods returning stateside. This included inspecting 137,816 military passengers, 405,598 shipments of personal goods (including household goods and vehicles), and 513,157 pieces of cargo in fiscal year 2019 before they returned stateside, facilitating military readiness by speeding the safe entry of these items into the United States.



In 2019, we inspected and pre-cleared 4 billion pounds of fresh fruits and vegetables and more than 1 billion plants and bulbs from 26 countries before they shipped to the United States.



PPQ officers inspected nearly 13.6 million passengers' bags in Hawaii and Puerto Rico before they left for the U.S. mainland, intercepting 284,683 prohibited agricultural products and 1,985 quarantine pests.

#### Facilitating Safe Trade and Travel Between Hawaii, Puerto Rico and the Mainland

Hawaii and Puerto Rico, while part of the United States, have plant pests that are not established on the mainland. These pests, including certain fruit flies, scale insects, beetles, and mealybugs, are a threat to mainland agriculture. To prevent their spread, PPQ inspected nearly 13.6 million passengers' bags before they left Hawaii and Puerto Rico in 2019, intercepting 284,683 prohibited agricultural products and 1,985 quarantine pests. We also conducted 99,131 inspections and 5,575 treatments of agricultural commodities that shipped from Hawaii and Puerto Rico to the mainland. This work safeguards mainland agriculture while facilitating interstate trade and travel.

#### Expanding Offshore Certification

PPQ certifies overseas treatment and production facilities that ship high-demand, large-volume commodities to the United States, such as orchids, geraniums, *Dracaena*, and niger seed, a common ingredient in bird seed. These certifications verify that the facilities and their operations meet our standards and regulatory requirements, helping to protect U.S. plant health from harmful invasive pests and serious plant diseases.

In 2019, PPQ concluded a 2-year trial program for offshore greenhouse certification. The United States imports more than 1 billion plant cuttings annually, and nearly half of all plants sold in U.S. retail stores start from cuttings produced offshore. Given this high volume and its associated pest risk, PPQ and the U.S. nursery industry collaborated to develop the program, which requires participating offshore facilities to adhere to minimum production and sanitation standards and traceability protocols that reduce pest risks.

During the trial program, PPQ personnel at the Miami and Atlanta plant inspection stations processed 6,797 shipments containing 1.3 billion cuttings from certified and non-certified facilities to compare pest action rates. Throughout the last 2 months of the program, certified facilities consistently averaged 90 percent compliance, and several facilities repeatedly achieved 100 percent compliance. Based on the results, PPQ will formally establish the program in 2020. The voluntary certification program will help reduce pest pressure on the United States while providing incentives for importers to send pest-free cuttings.



In total, PPQ inspectors at our 16 plant inspection stations cleared 21,270 shipments containing more than 1.75 billion plant units and 550 tons of seeds, intercepting 1,059 quarantine pests.

#### Teaming Up With Other Countries To Prevent Pest Spread

In 2019, we continued to work with countries around the world to stop the spread of damaging plant pests, including Asian gypsy moth (AGM) and exotic fruit flies. AGM is a devastating forest pest with a wide host range. Experts estimate that if it were to become established in the United States, AGM could cause



Through the Greater Caribbean Safeguarding Initiative, PPQ has partnered with 15 Caribbean countries to implement the Don't Pack a Pest traveler outreach program. The program, which includes port-of-entry signage and community outreach, reminds travelers not to pack certain foods, plants, or other items that could harbor pests and to always declare agricultural items.

billions of dollars in losses and control costs. To keep this pest out of our country, PPQ leads a multinational AGM vessel certification program. As a result of our technical coordination with the governments of Canada, Russia, Japan, China, and Korea, we expect 2019 data to be similar to 2018 for most ports, when we hit an all-time high for Far Asia-origin vessels complying with the certification requirements—exceeding 92 percent. Several of the larger ports—Long Beach and Los Angeles, CA; New Orleans, LA; Tacoma, WA; and New York City/Newark, NJ—all exceeded 96 percent compliance, with compliance in New York City/Newark at over 99 percent.

PPQ continued collaborating with regional partner organizations and countries throughout the Caribbean to prevent the introduction and spread of high-risk plant pests, including exotic fruit flies and the tomato leafminer (*Tuta absoluta*). We supported plant quarantine training and pest surveys, shared scientific and technical expertise, assisted with emergency response and preparedness, and cooperated on pest exclusion activities to create a perimeter defense against the movement of pests.

In 2019, PPQ and cooperating countries increased surveillance for these priority plant pests to provide an early-warning system to protect U.S. citrus, stone fruits, vegetables, and other specialty crops. In addition, we expanded public outreach to travelers moving between the United States and the Caribbean to raise awareness about the importance of declaring agricultural items when they arrive in the United States, helping to reduce the threat of fruit flies and other pests in this high-risk pathway. Together, these efforts protect the Caribbean and the United States from pest threats and facilitate regional safe trade and economic growth.

#### Zeroing In on Higher Risk Shipments at U.S. Ports of Entry

PPQ continually evaluates, tests, and applies cutting-edge tools and technologies that allow us and our U.S. Customs and Border Protection (CBP) partners to more effectively detect and address plant pests and diseases arriving in foreign shipments and passenger bags. We are also refining our ability to use the pest interception data we collect during port-of-entry inspections to better predict and reduce pest threats approaching our shores. Together these advances are strengthening our ability to exclude pests, focus resources on the highest risks, and safeguard our Nation's agricultural security, all at the speed of commerce.

#### Establishing an Advanced Analytics Team

As part of our daily work, PPQ and our CBP and State partners collect a tremendous amount of port interception and pest survey data. PPQ is maximizing that data's value by embracing advanced analytics, an area that applies quantitative methods—such as network analysis, information theory, statistics, data mining, simulation, and optimization—to predict future events or discover patterns that would be otherwise undetectable. These methods will help us anticipate, prepare for, and when possible, stop future pest incursions. To realize this capability, PPQ created an Advanced Analytics Team in 2019.

The analytics team will continuously scan and analyze the complex and ever-changing phytosanitary landscape in which we operate. They will use advanced quantitative methods to help us better predict future plant health challenges and explore new or not-yet-imagined solutions for addressing plant health issues as they are emerging, and in some cases, before they ever happen. For example, the team will work on analyzing trends in pest interception data

and using machine learning to predict the detection of actionable pests in imported shipments, among other projects. They will also coordinate ongoing analytics activities across our organization and make recommendations to PPQ's Management Team on how we as a whole can better use analytics in our business processes.

### Risk-Based Sampling

For the last few years, PPQ has been developing a new and more effective way to sample imported commodities for inspection at U.S. ports of entry. The method is called risk-based sampling (RBS). Its objective is to reduce inspections on low-risk items, increase inspections on higher risk items, and incentivize importers to bring in pest-free products.

PPQ took its first steps toward implementing RBS about 4 years ago when we stopped sampling

incoming shipments of plants for planting at a flat rate (usually 2 percent) and started calculating the number of boxes to inspect based on a shipment's size and the number of sample units and plant taxa it contains. This process, called hypergeometric sampling, makes it possible for our inspectors to detect pests more consistently and efficiently because they know exactly how many boxes they need to look at to confidently determine if there is a pest in an incoming shipment.

Over the last 3 years, PPQ has carefully analyzed the data generated by hypergeometric sampling to improve plant inspections. In 2019, we continued to focus inspections at plant inspection stations on higher risk shipments by regularly updating our sampling calculator with the latest pest action rate data. The calculator computes exactly how many samples an inspector should pull from an incoming shipment based on the risk associated with the type of plants it contains and their country of origin. This tool helps us intensify sampling of higher risk items, which will lead to better safeguarding in this pathway overall.

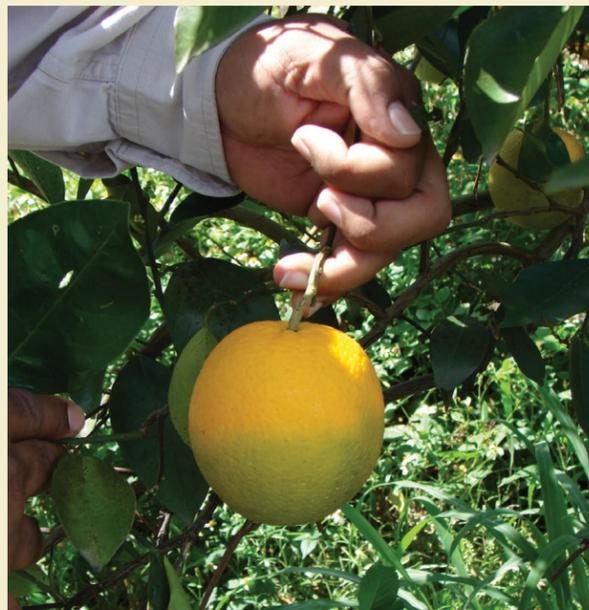
We also worked with CBP on a trial program to expand RBS use in the cargo environment at the ports of entry. In 2019, the trial included seven southern ports of entry and six commodities for which we have sufficient pest interception data and have consistent import volumes throughout the year. The results show significant reductions in the amount of time CBP officers spent inspecting fruit and vegetable commodities that have a track record of low or no pest issues. Instead, they focused on higher risk shipments that are more likely to have a pest problem.



PPQ and U.S. Customs and Border Protection conducted a successful trial program to expand risk-based sampling use in the cargo environment at the ports of entry.

### Identifying Intercepted Pests With Greater Speed and Accuracy

PPQ continues to test and evaluate the use of molecular diagnostics (MDx) at U.S. ports of entry to enhance existing pest identification methods and expedite quarantine decision making. This technology rapidly and accurately identifies intercepted pests and diseases to the species level, helping to speed the clearance of low-risk cargo and better focus our port inspection resources on the highest import risks. It



Using molecular diagnostics, PPQ sequenced the Asiatic strain of the bacterium that causes Huanglongbing, allowing us to improve our monitoring of one of the world's most serious citrus diseases.

also has the potential to alert us to new or undisclosed infestations in other countries.

In 2019, PPQ reviewed pests and pathways of concern to determine our priorities for MDx testing in the port environment. We evaluated MDx training and staffing needs and created training and staffing plans to support MDx use at the ports. In addition, we established processes that will help us to identify, develop, and implement targeted MDx testing at the ports, and to evaluate results to inform policy, operations, and further scientific and technological development. In fiscal year (FY) 2020, we will test these processes to identify, develop, approve, and implement two species-specific MDx testing projects at plant inspection stations.

PPQ has been applying MDx outside of the port environs. For example, using next-generation sequencing, PPQ's Beltsville, MD, laboratory developed a process in 2019 that successfully sequenced the first full genome of the Asiatic strain of bacterium that causes Huanglongbing (HLB), or citrus greening disease, from citrus root tissue. Citrus roots are a challenging source from which to obtain HLB genomic sequences because the vast majority of bacteria present are non-target organisms. This genomic information helps PPQ and our partners to better monitor the spread of distinct strains of this serious pathogen.

### Safeguarding U.S. Specialty Crops Against Seed-Borne Pathogens

For years PPQ has worked closely with State and Federal cooperators, producers, importers, and trading partners to safeguard U.S. agriculture against seed-borne diseases. In 2019, PPQ responded to two seed-borne threats: pospiviroids, which can cause disease in potatoes, tomatoes, peppers, and other specialty crops;

and tomato brown rugose fruit virus (ToBRFV), which causes severe fruit loss in tomatoes and peppers. By applying the best available science and collaborating closely with our partners and stakeholders, we are able to safeguard against the introduction and the spread of these quarantine pests.

**Pospiviroids:** In July 2018, PPQ learned that a shipment of imported tomato seed, which had been re-exported to another country, was positive for quarantine pospiviroids. In response, we put in place a program in late 2018 to assess the prevalence of these pathogens in tomato seeds imported from select countries. Surprised by the number of positive test results, we published a Federal Order in August 2019 requiring exporting countries to test and certify that the seeds are negative for quarantine pospiviroids or that they were produced in a country free of those pospiviroids.

**ToBRFV:** When imported tomatoes infected with ToBRFV were found in California and Florida grocery stores and a single infected tomato plant was found in a community garden in Florida in 2019, PPQ took immediate action to safeguard U.S. tomato and pepper production worth more than \$2.3 billion annually. This included issuing a Federal Order that imposed restrictions on imports of tomato and pepper seed lots and transplants from all countries where the virus exists. The order also placed restrictions on tomato and pepper fruit from countries with ToBRFV and Canada, requiring shipments to be visually inspected and certified free of disease symptoms before they left for the United States. In addition, U.S. Customs and Border Protection (CBP) increased inspections of tomato and pepper seed, plant, and fruit imports. Together, these actions are safeguarding the United States against the introduction of this disease while facilitating the safe trade of healthy tomatoes and peppers.



In 2019, PPQ took immediate action to safeguard U.S. tomato and pepper production worth more than \$2.3 billion annually against tomato brown rugose fruit virus, which can cause severe fruit loss.



In 2019, PPQ's Smuggling, Interdiction, and Trade Compliance (SITC) officers conducted a special operation to gather intelligence on a potential pathway for Oriental fruit fly. During the operation, they conducted 2,480 package inspections, issued 244 emergency action notices, cited 3 violations, and seized a total of 4,739 pounds of mangoes that were destined to States at high risk of Oriental fruit fly introduction.

### Safeguarding Beyond the Border

We work across the country to detect prohibited products and foreign pests and diseases that evaded safeguarding measures or entered the United States through illegal means.

### Finding Pests Before They Cause Harm

PPQ officers scour markets and retail stores while analysts monitor internet sales looking for prohibited or restricted agricultural products that may have entered into the country illegally. These products may harbor invasive plant pests or foreign animal diseases that could harm our Nation's crops, livestock, or forests. In 2019, PPQ seized 4,331 prohibited agricultural items valued at over \$2.3 million from retail stores, internet sales, and during express courier package inspections, removing prohibited products from commerce and eliminating dangerous and costly invasive pests that pose a threat to U.S. agriculture. We also conducted 30 national recalls of illegally imported agricultural products. PPQ continues to focus on closing illegal pathways for high-risk agricultural goods in order to safeguard high-value agriculture industries and the more than 2 million farms operating in the United States.

PPQ and its partners also continuously scan agricultural production areas and the environment looking for signs of pests that may have slipped into the United States. Our goal: detect new or re-introduced pests and diseases early and respond rapidly to prevent large-scale agricultural, environmental, and economic losses. Together, we conducted 217 surveys with partners in 50 States and 3 Territories, detecting 13 new or re-introduced species—before they caused significant damage. These surveys demonstrated to our trading partners our freedom from high-risk pests that we target nationally.

## Case Study

### Closing a High-Risk Pathway



When a break bulk cargo vessel arrived at the Houston Seaport with two shipments of hydroelectricity equipment on June 9, 2018, a group of PPQ and U.S. Customs and Border Protection (CBP) employees in Texas proved the strength of our safeguarding partnership. The cargo was packed in approximately 400 large wood crates and destined to travel across Texas and into Arkansas on open flatbed trucks. Although the wood packaging was clearly stamped with the International Plant Protection Convention's ISPM 15 mark, indicating that it had been successfully treated according to international standards, the wood crates were infested with live wood-boring pests.

Houston Seaport CBP Agriculture Specialists worked diligently to inspect the wood crates encasing the \$40 million shipment. Their exemplary work and vigilance demonstrated their ongoing commitment to the joint CBP/PPQ mission to protect U.S. agriculture.

"Sirex woodwasp is a quarantine pest capable of causing serious damage to pine plantations and forests in the southern United States," said Stuart Kuehn, PPQ's State Plant Health Director for Texas. "As soon as PPQ confirmed the wood-boring pests were in fact

Sirex woodwasps, CBP issued several emergency action notifications ordering the re-export of the infested shipments."

The importer's attorney then asked CBP to separate the imported equipment from its packaging so that the equipment could enter. But given the imminent pest risk, PPQ and CBP denied that request. The attorney then filed a protest with the Court of International Trade, requesting an emergency temporary restraining order. After much deliberation, the judge determined no jurisdiction and transferred the case to the U.S. Court for the Southern District of Texas. During the hearing, CBP officers testified about their inspectional processes, and PPQ experts defended our decision making process and authorities, presenting the molecular analysis report and other supporting information. After carefully reviewing all of the evidence, the court denied the plaintiff's motions and upheld the re-export order.

On July 3, the vessel carrying the infested shipment left the Houston Seaport. Two weeks later, once the product was re-fumigated, the vessel returned to Houston. CBP officers intensively re-inspected the cargo. This time, they did not find any live pests and allowed the cargo to enter the United States. This team's cross-agency cooperation protected the United States against the introduction of Sirex woodwasp and helped to safeguard Texas' \$18 billion timber industry and the jobs of more than 60,000 people in that State.

In 2019, as a direct result of the Houston wood pest interceptions, PPQ sent a team of technical experts to the European nations that had exported the infested wood packaging material (WPM). The team wanted to know why wooden crates bearing the ISPM 15 mark would nevertheless be infested. The team discovered

that, in certain countries, ISPM 15 recommended practices were not being followed. These issues varied by country, but included applying the ISPM 15 mark before treatment, commingling treated and untreated wood, and using one instead of two heat sensors. Our experts also noted examples of mismanaged ISPM paperwork. We presented our findings to each country and requested corrective action to ensure only ISPM 15-compliant wood packaging materials are sent to the United States.

The ripples of these successes flowed well into 2019. "After this high-profile court loss, along with another one, our Texas staff has noted that companies are now reaching out to PPQ and CBP more often for guidance on the requirements for imported wood packaging material," said Jon Daniels, PPQ's Texas Supervisor of Maritime Operations. "These court decisions have also resulted in industry working on solutions, such as tracking overseas companies that send non-compliant WPM, seeking ways to minimize WPM use, and exploring the funding of research programs into alternatives to wood packaging material."



*The Sirex woodwasp is a quarantine pest capable of causing serious damage to pine plantations and forests in the southern United States. Photo courtesy of Vicky Klasmer, Instituto Nacional de Tecnologia Agropecuaria, Bugwood.org.*



# Optimizing Pest Management and Eradication

When foreign pests capable of harming our Nation’s forests, damaging U.S. crops, or disrupting trade become established in the United States, PPQ works closely with Federal, State, Tribal, and industry partners to control and, when possible, eliminate them from our country. In 2019, we eradicated a number of plant pests and contained and suppressed others to prevent their spread and keep export markets open.

In our Strategic Plan, we established two objectives for optimizing pest management and eradication. The first: to more fully coordinate with and engage our partners to determine where we can and should focus our resources to yield the greatest results. The second: to explore how we might integrate and wisely use the unique capacities of all partners to strengthen and extend PPQ’s domestic programs.

In 2019, we advanced three strategic initiatives that we introduced last year. These initiatives make use of the latest technologies to strengthen our effectiveness and deliver more results for the industries we serve. They include improving data-driven decision making in our domestic pest programs, exploring the use of unmanned aircraft in field operations, and expanding the use of canines for surveys and other pest detection activities.

### On the Cutting Edge of Plant Health Protection

PPQ continuously evaluates, adapts, and adopts the best available science, tools, and technologies to improve its plant protection methods. From the use of mobile data collection tools to unmanned aircraft,

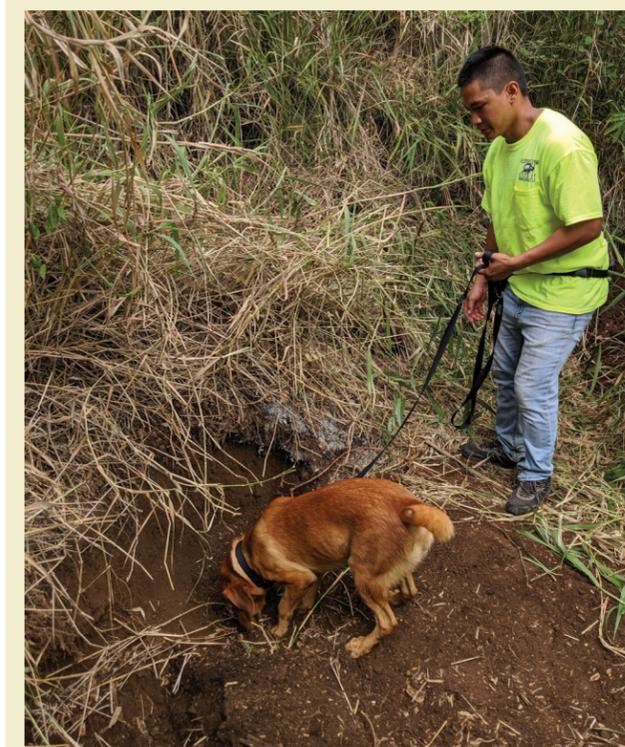
these advances keep PPQ and its partners on the cutting edge in the fight against harmful plant pests and diseases.

### Expanding the Use of Canines and Unmanned Aircraft

PPQ has been working on a number of initiatives to make our pest management and eradication programs more efficient and effective. One of these initiatives included challenging our dog teams to detect a wide range of plant pests and diseases, such as Mexican fruit fly (Mexfly) and coconut rhinoceros beetle (CRB). Following several years of successful trials in controlled and natural environments, we deployed two canine teams trained to find CRB in Hawaii in October 2019. We plan to finish training and make the Mexfly-detecting canine team fully operational in 2020. We have also launched a trial project with an independent canine facility to determine whether canine teams could detect spotted lanternfly egg masses.

On top of these efforts, we continue to train canine teams to detect prohibited agricultural products in international cargo, passenger bags, and mail parcels that could carry foreign plant pests or animal diseases, such as African swine fever, into our country and seriously harm our country’s food crops, forests, farms, and environment—and the livelihoods of America’s farmers and ranchers.

For several years, we have been exploring how we could use unmanned aircraft systems (UAS) to support a range of operational needs, including releasing sterile insects, surveying trees, and monitoring rangeland health. Recently, we have started optimizing those systems that proved feasible and cost-effective for field use. To support this effort, we hired a Methods



In late 2019, PPQ deployed two canine teams operationally to sniff out coconut rhinoceros beetles in Hawaii.

Development Engineer and trained two employees as UAS remote pilots. We also obtained an exemption from the Federal Aviation Administration allowing us to perform agricultural-related services nationwide with small UAS, including aerial pesticide applications to support eradication programs.

### Making Better Data-Driven Decisions

PPQ uses extensive data collected from the field and ports to fuel most of our decisions. For example, we use this data to plan, conduct, and evaluate our domestic safeguarding efforts. We also use it to demonstrate pest-free areas in support of U.S. exports, enable the development of new science-based methods and models to improve targeting, and demonstrate accountability to our stakeholders.

In 2019, we began developing web-based applications we call “dashboards.” These dashboards provide a near real-time picture of survey, detection, and treatment

activities for several domestic pest management programs, including grasshopper and Mormon cricket, spotted lanternfly, fruit fly, European cherry fruit fly, and coconut rhinoceros beetle. We also formed a joint committee with the National Plant Board to strengthen domestic pest programs and decision making and to improve data quality and accessibility via these dashboards.

To serve critical pest program data to stakeholders in a more consistent way, we are developing a comprehensive domestic Federal quarantine database and web-based map. This effort includes integrating several authoritative datasets, such as the U.S. National Grid, which we will use as our new locational grid standard for domestic pest programs. In addition, we are building a data warehouse that will seamlessly present PPQ and cooperator pest program data for efficient access and stronger decisions. As a result of these efforts, we have already successfully created a spotted lanternfly model that ranks areas based on the likelihood of infestation, helping stakeholders make critical decisions about future State surveys.

### Turning Innovation Into Action

The Agricultural Act of 2014 authorized permanent funding for the National Clean Plant Network and the Plant Pest and Disease Management and Disaster Program. PPQ is charged with allocating this funding to strengthen the Nation’s infrastructure for pest detection and surveillance, identification, and threat mitigation, while working to safeguard the nursery production system. In 2019, PPQ funded 407 projects in 49 States, Guam, Puerto Rico, and the Northern Mariana Islands, giving cooperators the funds they need to put their innovative ideas into action and ensure effective program delivery.



In 2019, PPQ provided \$6.35 million to support 27 clean plant centers. These centers diagnose, clean, and distribute disease-free planting stock, helping U.S. specialty crop producers stay competitive in the global marketplace.

We selected projects through an intensive, criteria-driven process to ensure we wisely invest our resources, and those of our cooperators, to support priority initiatives and respond to high-risk pest threats that could jeopardize U.S. specialty crop production. In 2019, funded projects supported comprehensive response efforts against the spotted lanternfly in Pennsylvania, New Jersey, New York, Virginia, Delaware, and North Carolina; exotic fruit fly detections in Florida and Texas; various detection, methods development, or outreach projects to protect forests from harmful pests in 22 States; citrus commodity surveys in California and Louisiana; and enhanced surveys for grape commodity pests and diseases in 15 States. In addition, we provided \$6.35 million to support 27 clean plant centers in 17 States

and Territories that diagnose, clean, and distribute disease-free stock of fruit trees, grapes, hops, berries, citrus, sweet potato, and roses to growers.

### Maximizing PPQ and Partner Actions To Deliver Results

Strategic partnerships are a critical part of our pest management and eradication success. We work with numerous groups to fight back against invasive plant pests. This includes grower and industry associations, State and local officials, academia, other Federal agencies, and foreign governments.

Our most important domestic partner is the National Plant Board (NPB)—an organization of plant regulatory officials from State departments of agriculture. Not only do we work together to effectively address plant pests and diseases that may threaten U.S. production and disrupt U.S. access to valuable export markets, but we also collaborate with the NPB to determine when, where, and how we take action to yield the greatest results.

An example of this is the NPB Firewood Working Group. In 2017, PPQ approached the NPB to discuss a new approach for our emerald ash borer (EAB) program. EAB is an invasive forest pest from Asia that kills ash trees and can move long distances hiding in firewood. This beetle has spread to 35 States and the District of Columbia despite 17 years of quarantine regulations, including firewood movement restrictions, to combat it. PPQ saw a need to be more nimble while continuing to base our decisions on the best science available. We took steps to focus our resources on a more promising strategy: proposing to end the EAB quarantine and focus on fighting EAB using biological control. This strategy involves releasing small, stingless wasps that are natural

enemies of EAB in Asia. So far, we have released these wasps in 29 States, the District of Columbia, and 3 Canadian provinces, and we recovered their offspring in 19 States. That means the wasps are establishing, reproducing, and, more importantly, attacking and killing EAB.

To prepare for a potential change in regulations, NPB members favored the development of a firewood quarantine template and toolkit that States could use to develop their own approach to the firewood pathway. In 2018, they formed the NPB Firewood Working Group, which included support from PPQ, to begin developing the materials. The group members looked at all existing State-level firewood movement regulations, identified commonalities, and created a State-customizable template for firewood regulations. They also developed best management practices for firewood producers, distributors, and retailers, as well as firewood movement outreach strategies targeting campers and other outdoor enthusiasts. In December 2019, they completed the materials. The working group will roll out the template and toolkit in 2020 to help States better control the movement of the firewood pathway if the Federal EAB quarantine restrictions end.

### Eradicating Cotton Pests

For decades, PPQ has worked with growers, the cotton industry, affected States, and Mexico to eradicate two of the most destructive cotton pests—boll weevil and pink bollworm—from all commercial cotton-producing areas in the United States. As a result of our coordinated efforts, PPQ and cooperators have eliminated boll weevil from 99.5 percent of the United States’ 13.7 million cotton acres. The Lower Rio Grande Valley is the last zone within the United States where boll weevil persists. To accelerate progress toward eradicating

the pest from this area, we continue to work with the Mexican and U.S. cotton industries to eradicate boll weevil from Tamaulipas, a source of constant pest pressure along the U.S.–Mexico border. In 2019, we entered into the fourth year of a cooperative agreement with the North American Plant Protection Organization to help fund boll weevil treatments in northern Mexico. We also continued meeting regularly with Mexico’s National Service for Agrifood Health, Safety, and Quality. This government agency began an organized program and provided increased operational oversight



Photo courtesy of F. Benci, Boll Weevil Research Laboratory, Bugwood.org.

In 2019, PPQ entered into the fourth year of a cooperative agreement with the North American Plant Protection Organization to help fund boll weevil treatments in northern Mexico. These treatments have reduced boll weevil populations by 52 percent in the Lower Rio Grande Valley and 87 percent in Tamaulipas, Mexico.

in 2019 to further reduce boll weevil populations in northern Mexico and move us closer to eradication in both countries. In 2019, boll weevil populations were reduced by 52 percent in the Lower Rio Grande Valley and 87 percent in Tamaulipas, Mexico.

In 2018, USDA Secretary Sonny Perdue officially announced the successful eradication of pink bollworm from all commercial cotton-producing areas in the continental United States. This announcement marked the end of a century-long battle against this devastating pest that caused cotton losses of 20 percent or more in affected areas. PPQ is now carrying out its post-eradication plan, which includes ongoing monitoring and rapid response to small-scale outbreaks, should they occur in the future. By controlling and eradicating these pests, PPQ protects U.S. cotton production worth \$27 billion annually, significantly lowers production costs, and helps maintain strong export markets abroad.

#### Protecting Field Crops and Rangeland

PPQ cooperates with Federal, State, Tribal, and local agencies to protect U.S. field crops and rangelands from harmful pests, including grasshoppers and Mormon crickets, imported fire ant, Karnal bunt, and witchweed. This work helps protect important natural and agricultural resources that rural communities depend on for income.

**Grasshoppers and Mormon Crickets:** Each year, PPQ tracks and monitors grasshopper and Mormon cricket populations on rangeland in 17 western States. If left uncontrolled, detrimental grasshopper species and Mormon crickets could devastate crops such as alfalfa, wheat, barley, and corn. They could also significantly reduce rangeland animal food supplies, causing significant economic losses for U.S. livestock producers. In 2019, based on survey results and the needs of land managers, PPQ treated more than 116,000 acres of rangeland, helping to protect approximately 230,500 acres of rangeland forage and wildlife habitat. We also finalized an environmental impact statement per the National Environmental Policy Act. This document assesses the effect of various grasshopper and Mormon cricket treatments on the environment to ensure PPQ's actions do not impact wildlife habitat, wetlands, and beneficial insect species. By providing ongoing information and advice to land managers and conducting control treatments where needed, the program protects 661 million acres of rangeland and resources valued at nearly \$8.7 billion.

**Imported Fire Ant:** Imported fire ant (IFA) infests more than 367 million acres in 14 States and Puerto Rico. This invasive pest eats crops, inflicts painful stings, and builds large nests that can damage farm equipment. PPQ and our cooperators work to prevent the human-assisted spread of IFA to other areas by regulating the interstate movement of high-risk commodities, such as baled hay and other products that could harbor the pest.

PPQ and cooperators from USDA's Agricultural Research Service (ARS) have been developing cutting-edge tools to facilitate the safe interstate movement of agricultural products. This includes working with a private firm to develop rapid identification test kits for IFA. In



At the request of Tribes, government agencies, and private landowners, PPQ coordinates area-wide grasshopper and Mormon cricket treatments, when conditions warrant, helping to protect more than 661 million acres of rangeland and forage crops worth over \$8.7 billion.

2019, States were able to purchase field-deployable rapid identification test kits that can identify red IFA in 10 minutes. Their use can help facilitate interstate shipments that would otherwise have been held at agricultural checkpoints for 12 to 24 hours pending an identification. PPQ, ARS, and the private firm are now developing an improved testing kit that can identify red, black, and hybrid IFA. Also, in 2019, PPQ published the second edition of the Imported Fire Ant Program Manual for use by State and Federal regulatory officials.

#### Supporting Specialty Crops

PPQ works with State and Tribal partners, universities, and industry to develop and carry out policies and regulations to protect U.S. fruits and vegetables, tree nuts, and nursery crops from damage and trade disruptions due to invasive pests. In 2019, our efforts directly protected U.S. specialty crop production valued at \$9.4 billion. In total, PPQ protects specialty crop production nationwide worth more than \$21 billion and export markets valued at \$8.9 billion.

**Citrus Diseases:** PPQ stands shoulder-to-shoulder with citrus growers to combat citrus canker, Huanglongbing (HLB or citrus greening), Asian citrus psyllid, sweet orange scab, and citrus black spot. Our Citrus Health Response Program supports the U.S. citrus industry's continued ability to produce, harvest, process, and ship citrus fruits and nursery stock despite the presence of these diseases. We use flexible regulatory protocols that allow growers to move citrus out of quarantined areas to packinghouses if they follow mitigation procedures to prevent the disease or its insect vector from spreading. As a result, nearly 10,000 businesses moved regulated host materials such as citrus fruit and nursery stock under compliance agreements in fiscal year 2019.

Through the Citrus Health Response Program, we also supported the production and release of the *Tamarixia* wasp in 2019. This parasitoid wasp kills the Asian citrus psyllid (ACP)—the gnat-sized insect that spreads HLB—and has helped reduce ACP populations in Texas by more than 50 percent and by as much as 99 percent around California release sites.

Research remains a critical priority if we're going to ensure the U.S. citrus industry survives and thrives long term. Since 2013, PPQ has led the HLB multi-agency coordination group, which has invested nearly \$38.5 million to speed the development of tools that could help the U.S. citrus industry fight back against HLB. Projects have focused on four critical areas: ACP control, infected tree therapies, technologies to protect new plantings against HLB infection, and early detection technologies. In 2019, cooperators conducted field trials of several promising citrus varieties, evaluated treatments and nutrient applications that have shown promise in lab settings, and explored the molecular and genetic aspects of the disease to combat HLB and ACP, to name a few.

**Exotic Fruit Flies:** PPQ takes the threat of exotic fruit fly outbreaks very seriously. Working with State partners, our goal is 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. This year, we successfully eradicated 11 of 12 exotic fruit fly outbreaks that started in 2018 and 2019.

Releasing sterile fruit flies has proven to be crucial in preventing and eradicating outbreaks. The sterile males mate with wild female flies, preventing reproduction. In 2019, PPQ released between 100 and 150 million sterile Mexican fruit flies (Mexflies) per week in southern Texas to maintain a 25-mile wide sterile fly barrier along the Mexican border, helping to reduce incursions of wild Mexflies. We expect to start construction on a new sterile Mexfly rearing facility in Texas in 2020 and are developing plans for another facility in California. Together, these facilities will provide frontline protection in the fight against exotic fruit flies in the United States. Also in



PPQ's Citrus Health Response Program continued to produce and release the *Tamarixia* parasitoid wasp (shown left attacking an ACP nymph) in 2019. The wasps have reduced ACP populations in Texas by more than 50 percent and by as much as 99 percent around California release sites.



In 2019, PPQ continued to work closely with the New York State Department of Agriculture and Markets and the Canadian government to control the European cherry fruit fly in the United States and maintain key export markets.

2019, we established a technical working group to systematically review all our fruit fly programs and engage technical experts from all over the United States and around the globe to ensure that our fruit fly response and eradication programs stay on the cutting edge.

In 2017, PPQ detected the European cherry fruit fly (ECFF) for the first time in the United States in traps placed in parks and on public lands along the Niagara River in Niagara County, NY. ECFF is a serious pest of cherries that damages ripening fruit, causing it to rot and fall off the tree. In heavily infested areas, the fly can destroy up to 100 percent of ripening cherries. If this pest were to become established in New York, it could threaten U.S. commercial cherry production valued at more than \$850 million. In 2019, PPQ continued to work closely with the New York State Department of Agriculture and Markets and the Canadian government to control this pest in the United States and maintain key export markets. Our program staff implemented trapping, treatments, and a systems approach for managing ECFF; tested trap and lure combinations; conducted larval studies to determine ECFF's host range; delimited ECFF infestations with cooperation from area residents and cherry growers; established policies to facilitate safe trade for the New York cherry industry; and successfully prevented the movement of the pest outside of the quarantine area.

**Grape Pests:** PPQ works with a number of cooperators to protect U.S. grape production from damaging pests and diseases, including glassy-winged sharpshooter and European grapevine moth (EGVM). PPQ and partners eradicated EGVM from the United States in 2016 and continue monitoring for the pest in all grape-growing areas of California, with zero detections in 2019. This monitoring will continue through 2020 to ensure that any new EGVM introductions would be detected quickly. PPQ and cooperators also continued their efforts to control glassy-winged sharpshooter populations and prevent the pest's spread in California. Together, we conducted surveys in 49 counties, treated more than 21,000 acres, and inspected over 28,000 nursery stock shipments from infested areas, protecting 925,000 acres of grape production worth more than \$5.7 billion in 2019.

**Potato Pests:** Working with State departments of agriculture and the potato industry, PPQ is fighting back against two major potato pests: pale cyst nematode in Idaho and golden nematode in New York. In Idaho, PPQ and partners continue to reduce viable pale cyst nematode populations since it was first detected in 2006. The program's containment measures and robust detection methods have prevented spread of pale cyst nematode outside of an 8.5-mile radius in the southeastern part of the State, helping to keep 99 percent of the State's potato acreage free of this pest. In 2019, the program sanitized more than 2,500 pieces of farm equipment and collected and screened approximately 24,000 soil samples in Idaho for the presence of pale cyst nematode. PPQ continues to support research into alternatives to methyl bromide treatments for infested fields, such as trap crops that stimulate nematode eggs to hatch but do not allow the pest to complete its life cycle, and new potato varieties developed to be fully resistant to pale cyst nematode.



PPQ employees collect soil samples in an Idaho potato field to screen for pale cyst nematodes, a major potato pest. These surveys are necessary to delimit the pest and protect U.S. access to valuable export markets.

PPQ and the New York State Department of Agriculture and Markets maintain an active control and mitigation program in New York to prevent the spread of golden nematode. As a result, this pest has never been found outside of regulated areas. In recent years, we adopted strategies already used in the Idaho program and began focusing regulatory activities on infested and associated fields rather than along geographic boundaries. As a result, we have been able to reduce the regulated area by more than 1.1 million acres—or 85 percent—allowing farmers to grow and trade crops without restrictions. Together, the Idaho and New York programs protect 968,300 acres of potato production nationwide and export markets worth more than \$229 million in 2019.

**Plum Pox Virus:** On October 17, 2019, USDA declared the eradication of plum pox virus (PPV) from the United States. For 19 years, the United States battled PPV, the most devastating viral disease of stone fruit worldwide. If established, it could have jeopardized the United States' stone fruit industry; diminished commercial nursery production, including ornamental and dooryard plantings; impacted specimen plants at botanical gardens and arboreta; and negatively impacted urban and native landscapes. From the beginning, the PPV eradication program was a cooperative effort among PPQ, USDA's Agricultural Research Service, departments of agriculture in impacted States, the Tuscarora Nation, industry, academia, growers, and homeowners. Working with our partners, PPQ eliminated this disease, thereby protecting the United States' stone fruit industry, which includes 1.3 million commercial production acres valued at \$6.8 billion annually, with an annual export value in excess of \$5 billion. The cooperative PPV eradication program enabled the uninterrupted trade of stone fruits throughout the country and internationally, helping the multi-billion-dollar nursery and fresh stone fruit industries maintain market shares in an increasingly competitive environment.

**Naval Orangeworm:** Since 2015, PPQ has cooperated with California's tree nut industries to combat the navel orangeworm (NOW), which threatens California's \$8 billion pistachio and almond crops. Working with industry, PPQ scientists adapted the sterile insect technique (SIT) we used to help successfully eliminate pink bollworm from the United States to target this pest. The released sterile male moths suppress reproduction when they mate with wild female moths. At the end of 2019, PPQ received \$6 million in Federal

appropriations to support the ongoing rearing and release of sterile NOWs. In 2020, PPQ will incorporate SIT into an area-wide navel orangeworm management program to help reduce the pest's populations and protect at-risk pistachio and almond orchards in California.



PPQ scientists have adapted sterile insect technique—a tool we successfully used to help eliminate pink bollworm from the United States—to protect at-risk pistachio and almond orchards in California from navel orangeworm.



At our Brighton, MI, facility, PPQ rears stingless wasps that attack and kill the emerald ash borer beetle. In 2019, a total of 790,282 wasps were released in 29 States and the District of Columbia to help control beetle populations and protect U.S. ash trees.

### Combating Tree Pests

PPQ continues its battle against two destructive, wood-boring beetles: the Asian longhorned beetle (ALB) and emerald ash borer (EAB). ALB is an invasive insect that feeds on a wide variety of trees in the United States, eventually killing them. If it were to become established here, this beetle could become one of the most destructive and costly species ever to enter the country. The beetle threatens urban and suburban shade trees, recreational resources such as parks, and forest resources and wildlife. It could also harm industries such as maple syrup production, hardwood lumber processing, nurseries, and tourism.

The ALB most likely came to the United States inside wood packaging material from Asia. Since 1996, the beetle has been found in five States: New York (1996), Illinois (1998), New Jersey (2002), Massachusetts (2008), and Ohio (2011). We have eradicated infestations in Illinois; New Jersey; and parts of New York, Massachusetts, and Ohio. In 2018, we declared eradication in three Ohio townships. In 2019, we declared eradication from all of New York City. Eradication efforts continue on central Long Island, NY; in Worcester County, MA; and in the Tate Township area of Clermont County, OH.

Progress against EAB has been more elusive. Despite best efforts, the domestic quarantine has not stopped this pest from significantly spreading its range. It is now found in 35 States and the District of Columbia, and it has killed more than 100 million ash trees. In 2018, APHIS published a proposed rule to end our domestic regulatory activities, which includes actions such as issuing permits, certificates, and compliance agreements; making site visits; and conducting investigations of suspected violations. If we decide to end the domestic quarantine, PPQ would instead focus available EAB resources on further developing and releasing biological controls (biocontrol) to manage the pest.

For several years, PPQ has used EAB's natural enemies—tiny stingless wasps—as biocontrol agents. So far, we have released these wasps in 29 States and 309 counties, the District of Columbia, and 3 Canadian provinces. During 2019, PPQ released wasps in 3 new States (Maine, Nebraska, and Rhode Island) and 74 new counties. The goal of releasing these biocontrol wasps is to have them establish, reproduce, and more importantly, attack and kill EAB. In 2019, PPQ reared and released 29 percent more of these stingless wasps than we did in 2018. A total of 790,282 wasps were released in 2019 to help control EAB populations and protect U.S. ash trees. Early observations show that young regenerating ash trees are benefiting from these biocontrol releases.

### Spotted Lanternfly

PPQ and our cooperators used over \$30 million in various funds in FY 2019 to continue addressing the spotted lanternfly (SLF) infestation in the southeast portion of Pennsylvania and seven other States: Delaware, Maryland, New Jersey, New York, North Carolina, Virginia, and West Virginia. These eight states have joined together in the cooperative fight against this pest. Our goal is to detect, contain, control, and suppress SLF populations and safeguard agricultural and forest industries. To accomplish this goal, we are carrying out an area-wide integrated pest management strategy that includes detection surveys, control measures to treat the pest and its preferred host, and outreach activities. APHIS is not planning to enact a Federal quarantine at this time. Instead, States are enacting quarantines to prevent its further spread. Several State quarantines require businesses and organizations to obtain a permit before they move products, vehicles, or other conveyances within or out of SLF-quarantined areas. The permit details conditions the businesses must meet to prevent the pest's spread. We also continue to safeguard against the introduction of this pest into other parts of the country through port-of-entry inspections and by targeting critical pathways from countries known to have SLF.

In 2019, PPQ launched a robust SLF public awareness effort through Hungry Pests, our invasive species outreach program. This effort included online videos, public service announcements, social media posts, outreach materials, a business action kit, and English- and Spanish-language radio media tours. Throughout 2019, APHIS supported the SLF Cooperative Program for Pennsylvania and other States to ensure consistent messaging and outreach coordination.

PPQ and 22 States will survey for SLF in 2020 through the Cooperative Agricultural Pest Survey program. These surveys will help us quickly detect and rapidly respond to incursions outside the current quarantine areas and help protect economically important commodities, such as grapes, stone fruit, apples, and our forests, from this pest. We are also partnering with research entities to develop detection tools and techniques, test control measures, and explore potential biological control options for use in the cooperative program.

# Case Study

## How PPQ and Our Partners Eradicated Plum Pox Virus

Just how big is America's stone fruit industry? Its growers collectively tend 1.3 million acres of commercial orchards. Annually, their crops are worth \$6.8 billion with an export value exceeding \$5 billion. But two tiny enemies threatened this huge and prosperous industry: the microscopic plum pox virus (PPV), and the gnat-sized aphids that spread the virus from tree to tree.

PPQ and our partners vanquished this threat from the United States. On October 17, 2019, in a ceremony in Washington, DC, USDA Under Secretary Greg Ibach declared PPV disease eradicated from our country. In addition to industry, homeowners, wildlife, and plant enthusiasts will also reap the benefits of this eradication.

### Plum Pox Virus (PPV) at a Glance



**The disease:** This is the world's most devastating viral stone fruit disease. PPV severely reduces yield and blemishes fruit, making it unmarketable. The virus can infect almonds, apricots,

cherries, nectarines, peaches, and plums, among other stone fruit varieties. It makes stone fruit trees more vulnerable to other, potentially fatal viruses. PPV can also infect wild, backyard, and urban stone fruit plants.



**How it spreads:** Aphids spread the virus by feeding on an infected tree and getting the virus in their mouthparts. Then they fly off and start feeding on PPV-free

trees, infecting them with the virus. The disease can also spread when people transport infected nursery stock or graft infected buds onto healthy trees.

**States with detections:** The first detection was in Pennsylvania in 1999, with subsequent detections in 2006 in Michigan (one tree) and New York.

### The Eradication Game Plan

#### A Science-Based Response

In a plant health emergency, we need science in a hurry. PPQ's Science and Technology (S&T) delivers it. S&T's many critical contributions to the PPV eradication program included:

- Gathering experts from USDA's Agricultural Research Service and foreign nations to form a technical working group, ensuring our response was based on the best science available;
- Developing and validating a tree-sampling survey protocol, including how many trees to sample, how many leaves to collect from each tree, and where on the tree to collect them;
- Developing and validating molecular diagnostics (think DNA testing) to screen samples and confirm positive finds;
- Establishing PPV testing certification for member laboratories of the National Plant Diagnostic Network to ensure we had the capacity to test the large sample volume; and
- Auditing the quality of that testing through our National Plant Protection Laboratory Accreditation Program.



### Partnerships

From the beginning, the PPV eradication program was a cooperative effort among PPQ; State departments of agriculture in New York, Pennsylvania, and Michigan; the Tuscarora Nation; industry; academia; growers; and homeowners. Together, we carried out a coordinated program that included collecting and testing plant samples, removing diseased and suspect trees, and temporarily banning the planting of PPV-susceptible stone fruit varieties.

Working in cooperation with our partners, we eradicated the disease from Pennsylvania and Michigan in 2009 and western New York in 2012. In all States, PPQ surveyed residential properties, while the State departments of agriculture surveyed commercial orchards. In 2018, USDA and its cooperators completed 3 consecutive years of stone fruit field surveys in eastern New York with no further detections, putting eradication in our grasp.

### Laurene Levy's Enormous Contributions



PPQ's Laurene Levy, who passed away in 2017, played a crucial role in PPV's eradication. When she worked for USDA's Agricultural Research Service (ARS) in the 1990s, she

recognized the U.S. stone fruit industry's vulnerability to this disease. She applied her expertise in plant pathology to validate a molecular diagnostics PPV test. Scientists still use a modified version of her test today, and it is officially part of the International Plant Protection Convention's PPV protocol.

After the first U.S. PPV detection in Pennsylvania in 1999, Levy led the scientific effort to combat the disease. She organized a large meeting of scientists from ARS and PPV-affected European countries, as well as stone fruit farmers.

"I am so happy Laurene lived to see plum pox eradicated from Pennsylvania, but I wish she could have celebrated the nationwide eradication with us in 2019," said Vessela Mavrodieva, Assistant Laboratory Director of PPQ's Beltsville lab and Levy's close colleague and friend. "Laurene put so much energy into the program. She insisted on visiting farmers and

talking to them one-on-one. PPV was her baby. I was so proud of our work, which made us feel like we were making a real difference."

National Science Program Coordinator Don Seaver also saw Levy's efforts as pivotal to PPV's eradication. "Laurene helped develop the eradication strategy and, most importantly, convinced everyone eradication was possible," he said. "This was not an easy sell, because eradication required destroying infected trees plus all stone fruit trees in a certain buffer area around it."

"This was a time- and labor-intensive operation for PPQ Field Operations," said Mafalda Weldon, Director of the Plum Pox Virus Eradication Program. "Our surveyors, many of them seasonal employees, had the delicate task of asking homeowners for access to their properties. Surveying meant going from tree to tree, collecting leaves from certain areas of each tree, and sending the samples in for testing."

When the results were positive, more hard work followed. "They needed to coordinate the removal of infected trees, plus those trees in a buffer around the infected trees," explained National Operations Manager Phillip Mason. "This was tough work, but we knew we could defeat this disease."

### Keeping PPV Out

PPQ wants to ensure PPV never returns to the United States. To keep it out permanently, we're:

- Continuing monitoring surveys post-quarantine release;
- Ensuring that our National Clean Plant Network centers can provide PPV-free "mother stock" to nurseries that request it; those nurseries can adopt protocols to ensure the descendants of that clean stock remain clean until they're sold;
- Implementing robust, science-based controls for importation of PPV host planting material to prevent reentry; and
- Continuing communication with PPV-affected Canada to help prevent PPV incursions from that country.

"We have been consistently applying the best science and methods to our operations and regulations for foreign imports and U.S. exports of stone fruit commodities," said National Policy Manager Lynn Evans-Goldner. "Our science-driven regulatory approach delivered this success."

Seaver notes that PPQ owes a debt to all of the PPQ employees, cooperators, academics, and farmers who worked so hard to eradicate PPV over the years. "We're the folks holding the reins at the end of the program," he said. "I am grateful and humbled by all the talent and dedication applied to this program over the years that made eradication possible."



# Making Agricultural Trade Safe and Supporting U.S. Exports

When global trade brings tremendous benefit, it also brings risk. Potentially harmful plant and animal pests and diseases can hitchhike on or in the plants, fruit, vegetables, and other products we trade. To help the world move billions of dollars in commodities without spreading invasive pests and diseases, PPQ works with countries around the globe to promote a safe, fair, and predictable trade system. This system, built on internationally and regionally harmonized, science-based plant health measures, not only reduces pest risks, but also helps to create a level playing field for U.S. products abroad.

In our Strategic Plan, we set a goal of increasing the safety of agricultural trade and expanding economic opportunities for U.S. products in the global marketplace by promoting widespread use of science-based standards, resolving plant health barriers to trade, and helping U.S. producers meet foreign market access requirements.

Two years ago, we introduced four strategic initiatives that promise to make agricultural trade more predictable, fair, and safe. They include achieving the electronic exchange of phytosanitary certificates through a global ePhyto system, developing a regulatory framework to manage pest risks linked with the international movement of seed, developing strategies to address pest risks from electronic commerce, and promoting the use of voluntary guidelines to reduce pest risks associated with the global movement of sea containers.

## Creating a Safe, Smooth-Functioning Trade System

PPQ sits at the negotiating tables of two of the world’s renowned plant health standard-setting organizations: the International Plant Protection Convention (IPPC) and the North American Plant Protection Organization (NAPPO). Through these forums, PPQ is building important international and regional relationships that help the United States advance plant health protection standards and harmonized regulatory approaches that are necessary for the safe expansion of global agricultural trade.

## Promoting Safe Trade Through Effective International Collaboration

Strategic international relationships are critical to achieve a safe, fair, and predictable trade system. These relationships create a stronger basis for addressing trade-related pest and disease threats, resolving plant-health trade problems, establishing science-based trade standards, and advancing mutually beneficial trade goals. For example, PPQ worked with the IPPC’s other 182 member countries in 2019 to adopt 8 new international standards, including one on the use of fumigation as a phytosanitary measure. This standard will increase the safety of bilateral trade by harmonizing operational requirements for fumigation treatments of plant commodities to prevent pest introductions.



In 2019, PPQ worked through the International Plant Protection Convention to encourage global adoption of eight new science-based trade standards that contribute to a safe, fair, and predictable trade system.

At the regional level, PPQ helped NAPPO conduct a workshop in Costa Rica on seed health and trade in March 2019 for more than 50 government and industry participants from the Americas. The workshop focused on implementing ISPM 38, the international standard for seed trade. It covered procedures for establishing phytosanitary import requirements, inspection guidelines, seed sampling and testing, and guidelines for certifying seeds for export and re-export. The workshop also advanced the importance of harmonizing seed trade requirements among countries in the Americas.



In 2019, PPQ helped the North American Plant Protection Organization conduct a workshop on the international standard for seed movement and the importance of harmonizing seed trade requirements among countries in the Americas.

In addition, NAPPO—with input from PPQ and others—proposed that the IPPC develop an annex to ISPM 38. This annex would focus on the use of industry seed production practices in systems approaches to provide phytosanitary security and certify seed movement. It would provide a valuable alternative to the costly and lengthy consignment-by-consignment certification approach used now. The IPPC agreed and has made developing the annex a high priority.

Outside of the IPPC and NAPPO, PPQ continued building influential relationships with key foreign counterparts to advance shared goals. This included regular engagements with the chief plant protection officers of Australia, Canada, and New Zealand. Since 2009, this group, known as the “Quads,” has effectively promoted safe trade concepts and influenced the global plant health policy agenda. This year, the Quads helped shape the IPPC’s 10-year strategic framework, which defines global plant health priorities for the next decade. The Quads also agreed on coordinated strategies for advancing a number of key issues, such as ensuring future work on commodity-focused standards will create new opportunities for exporting specific plant products; influencing the global approach for managing pest risks associated with e-commerce and sea containers; introducing new concepts for monitoring emerging pest threats at the global level; promoting updated risk management approaches that will ensure phytosanitary measures are based on and proportional to actual pest risks; and, advancing the recognition and harmonized use of third party accreditation.

#### Advancing the Global Use of Modern Technologies

Internationally, PPQ has been instrumental in building the world’s first global electronic phytosanitary (ePhyto) system, which went live in 2018. Phytosanitary certificates are critical documents attesting that a country’s plant or plant product exports meet the importing country’s plant health requirements. The ePhyto system makes their exchange fast, efficient, and fraud-resistant. At the time of this report, 10 countries, including the United States, use it, and more than 70 countries are in the process of adopting the ePhyto system. In November 2019, PPQ hosted an ePhyto workshop for 27 plant health officials from 23 African countries to help them learn how to connect their countries to the system, either through a national system or via the generic system. In addition, PPQ was able to share key phytosanitary tools and knowledge with workshop participants, helping to improve plant protection services in the Africa region and strengthen our relationship with our African plant health counterparts.



PPQ hosted a workshop in 2019 for plant health officials from 23 African countries to help them learn how to connect their countries to the global ePhyto hub.



PPQ has been working with international and domestic partners, global shipping organizations, and other relevant industries to promote practical, voluntary guidance for cleaning sea containers and preventing the spread of hitchhiking pests.

#### Helping the World Address Critical High-Risk Pest Pathways

PPQ continues to help the global community tackle high-risk pest pathways such as sea containers, international seed trade, and internet-based trade. In 2019, we furthered our work with the Canadian Food Inspection Agency, U.S. and Canadian border protection agencies, North American shippers, and global shipping companies to promote the use of practical, voluntary guidance for cleaning and inspecting sea containers. In April, we promoted this initiative at the 2019 IPPC Commission on Phytosanitary Measures meeting, highlighting the North American approach to managing the sea container pathway. And in September, we hosted the IPPC Sea Container Task Force meeting in Baltimore, MD. This meeting brought together experts from seven countries, global shipping organizations and other relevant industries, NAPPO, and representatives from IPPC to finalize international guidance for improving industry capacity to clean containers and reduce pests in the sea container pathway.

Two years ago, PPQ took the first steps toward creating a holistic systems approach to reduce risks associated with seed trade. The approach is called the Regulatory Framework for Seed Health (or ReFreSH). It is based on the internationally recognized system for reducing the risk of food safety hazards. ReFreSH leverages industry best practices for managing pest risk, making international seed movement safer. In 2019, we made

good progress in advancing ReFreSH. We completed pest risk assessments for three representative seed commodities to help define the ReFreSH framework; finished a joint PPQ–industry concept paper describing the scope, history, and design of ReFreSH; developed an accreditation standard to guide participation in the ReFreSH systems approach; and drafted a ReFreSH manual, which details the information participants must supply when enrolling in the program. In addition, we’ve started developing a systems approach pilot that builds on our current National Seed Health Accreditation Pilot.

For nearly a decade, PPQ has been monitoring the online trade of plants, plant and animal products, and live plant pests, and we have started developing strategies to effectively address risks associated with these imports. In 2019, we continued to build relationships with many of the larger online retailers, especially those using social media to promote product movement. We employed a variety of tools to search and identify regulated plant products sold online and continue to investigate new tools. We also shared e-commerce safeguarding information with trading partners to expand international participation and expertise. And we conducted outreach to large online retailers, other vendors, and purchasers to help them understand why certain products are regulated and may be restricted or prohibited.



In 2018, PPQ negotiated plant health requirements and resolved plant health trade barriers to help open, expand, and retain U.S. access to foreign markets worth nearly \$23 billion, including securing access for U.S. corn to Myanmar, expanding access for U.S. rice to Colombia, and retaining access for U.S. soybeans to China.

### **Securing Economic Opportunities Abroad for U.S. Products**

U.S. agricultural exports bring significant value to our economy. In 2019, international sales of U.S. farm and food products totaled \$136.7 billion. These exports created a trade surplus of more than \$4.5 billion, helping to energize our economy and support more than 1 million American jobs. PPQ's work to negotiate science-based phytosanitary requirements with foreign trading partners and remove plant health-related trade barriers is essential to helping America's farmers reach new customers and ensuring that U.S. products are treated fairly in the global marketplace.

### **Sustaining and Expanding Key Export Markets**

Each year, PPQ conducts technical negotiations with countries around the world to open, expand, or maintain export markets for U.S. commodities. In addition, we provide technical expertise to the Office of the U.S. Trade Representative and USDA's Foreign Agricultural Service as they pursue other diplomatic channels, such as the World Trade Organization, to help resolve trade barriers for U.S. exporters.

In our technical negotiations, we use science, data, and international guidelines to remove plant health-related barriers to American products. In 2019, our scientists completed 50 export pest risk analyses, which helped to address or resolve plant health concerns that limited U.S. access to key markets. For example, we completed analyses that helped remove trade barriers affecting soybean exports to Vietnam and palm exports to the Caribbean. PPQ also developed phytosanitary vacuum steam treatments—an environmentally safer alternative to methyl bromide fumigation—for red oak and walnut logs to facilitate the movement of these high-value exports to international markets.

In 2019, we completed 20 bilateral meetings and 12 technical meetings to establish practical, science-based phytosanitary requirements for the safe trade of live plants and fresh fruits and vegetables. Through these meetings, we helped the United States realize significant trade opportunities. For example, we opened new markets for U.S. producers, like U.S. blueberries to Vietnam with an estimated value of \$10 million upon maturity; and, we reopened market access for U.S. citrus to New Zealand, valued at \$14 million, and U.S. oranges to Vietnam, valued at \$10 million. We also retained critical export markets, including the European Union, valued at \$3.65 billion annually, and Thailand, valued at \$95 million annually. In addition, we successfully resolved phytosanitary issues for 243 shipments of U.S. origin products worth a total of \$102 million that were held in foreign ports.



In 2019, PPQ developed vacuum steam treatments for red oak and walnut logs to facilitate the movement of these high-value exports to international markets.



PPQ is conducting a 3-year survey of soybeans as they move from the farm to local, regional, and export grain elevators in 19 States to learn more about weed seed levels at each point in the supply chain. We are using this information to help industry reduce weed seeds in soy exports.

One of the most significant plant health issues facing U.S. exports, particularly soybeans, is weed seeds. To help U.S. producers and exporters overcome this potential trade barrier, we collaborated with other USDA agencies, industry, and academia to develop a systems approach designed to reduce weed seeds in U.S. grain exports. The systems approach includes weed management strategies; harvesting, handling, and storage best practices; and trade support to help maintain the flow of U.S. soybeans by quickly addressing any technical issues associated with exported shipments. We began implementing the systems approach with the soybean industry in 2018. In 2019, we facilitated the export of more than 23.1 million metric tons of soybeans to China without any interruptions.

The systems approach includes a 3-year national survey. This year, we sampled soybeans from the 2018 crop as they moved from the farm to local, regional, and export grain elevators in 19 States to learn more about weed seed levels at each point in the supply chain. We will repeat the survey with the 2019 and 2020 crops. We are using the information we collect to objectively determine levels of weed seed contamination in U.S. soybeans at key points across the supply chain, including at the farm gate, at local and regional elevators, and at export, so that industry can target actions to reduce contamination.

### **Certifying the Health of U.S. Exports**

U.S. exporters rely on PPQ and its State and county partners to inspect and certify plants and plant products being shipped to markets overseas. These export certificates attest that the United States is presenting products that meet the importing countries' requirements. Thanks to PPQ's electronic certification system, the once time-intensive, manual process of issuing phytosanitary certificates is now fast, efficient, and fraud-resistant. PPQ also maintains a database of foreign countries' plant and plant product import requirements. With these tools, our nationwide team of Export Certification Specialists and their cooperators issued more than 674,000 certificates in 2019.

# Case Study

## Cultivating a New Approach to Seed Health

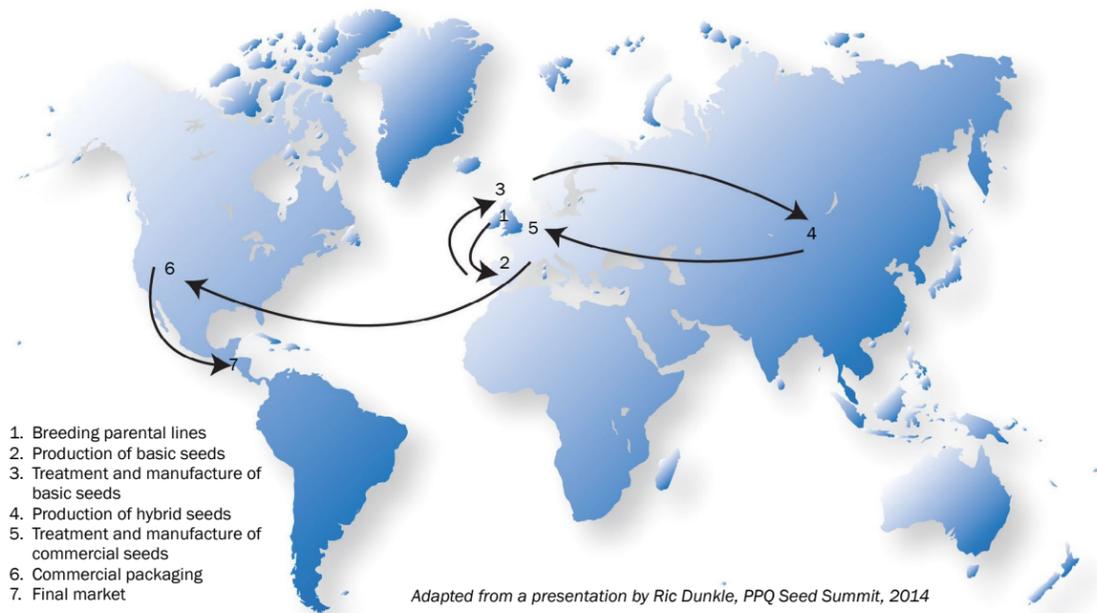
To be competitive in today's global market, U.S. producers need access to diverse varieties of healthy seed from around the world. They also need sufficient safeguards to protect their industries against the introduction and distribution of damaging seed-borne diseases. That's why PPQ has been working with the U.S. seed industry, international and domestic partners, and scientific organizations to develop smart regulatory strategies that will help reduce pest contamination during seed production and facilitate healthy seed trade.

### A Complicated Pathway

The first step was understanding current seed production and trade practices. Working closely with the U.S. seed industry, we discovered that seeds travel a complex, multi-country route before they reach their final destination.

"Seed companies may locate breeding and multiplication programs in several countries, and they may distribute seeds from those countries to many other countries," explained PPQ Senior Risk Manager Ed Podleckis. "In addition, they might export seeds produced in one country to a second country for processing. Then they may send the seeds to many other destinations—including back to the country of origin."

To complicate matters, when seed is produced, the destination countries and their import requirements may not be known. In fact, a number of years can pass between when the seed is produced and when it is exported to its final destinations, making it difficult to verify that the seeds meet the importing country's phytosanitary requirements.



Adapted from a presentation by Ric Dunkle, PPQ Seed Summit, 2014

### Creating a Seed-Specific Standard

To address some of these issues, PPQ worked through the International Plant Protection Convention—an international forum made up of 184 member countries, including the United States—to adopt the International Standard for Phytosanitary Measures (ISPM 38) for the international movement of seeds.

"This standard helps national plant protection organizations identify, assess, and manage the pest risk associated with the global movement of seeds for planting," said John Greifer, Assistant Deputy Administrator for International Phytosanitary Standards. "Its guidance harmonizes how countries inspect, sample, and test seeds and certify them for export and re-export."

Regionally, the North American Plant Protection Organization (NAPPO) and PPQ are promoting the implementation of this standard throughout the Western Hemisphere. In 2019, NAPPO, with PPQ support, hosted an Americas-focused ISPM 38 implementation workshop in Costa Rica.

### A Systematic Approach to Reducing Seed-Borne Diseases

Domestically, PPQ has been working in collaboration with the U.S. seed industry, the National Plant Board, and academia to develop a holistic approach to systematically reduce pest contamination risks across the seed production continuum. This approach is known as "ReFreSH," short for the Regulatory Framework for Seed Health.



ReFreSH is based on the internationally recognized principles for reducing the risk of safety hazards in food. It will leverage industry best practices and use testing and integrated pest management measures at critical points in the seed production process to verify seed health and make international seed movement safer.

"In the last 2 years, we've made significant strides in developing ReFreSH," Podleckis said. "Specifically, we completed the ReFreSH concept paper that describes the reasons for ReFreSH and the process used to design it. We also drafted a ReFreSH accreditation standard, which outlines participation requirements as well as participant roles and responsibilities."

Currently, PPQ is preparing a ReFreSH Manual, which participating entities will use as a template for describing the procedures and processes they will use to meet the accreditation standard. PPQ has started developing a trial project with Brazil that will allow us to monitor the effectiveness of a systems approach and

make adjustments before we fully implement ReFreSH. Our counterparts in Mexico, Chile, Canada, Australia, and New Zealand have also expressed interest in developing systems approach pilots with us.

### International Support Increases

The concept behind this U.S.-developed approach is gaining strength internationally. In August 2018, NAPPO, with support from other regional and national plant protection organizations and industry experts, proposed that the IPPC develop a systems approach annex to the international standard on seed movement.

This annex would support national plant protection organizations' accreditation of systems approaches that incorporate existing industry seed production practices,

which would provide a valuable alternative to the costly and lengthy consignment-by-consignment certification approach used now.

"The IPPC has made the annex a high priority for development," Greifer noted.

### Next Steps

"Although full implementation of ReFreSH is still some years away, 2019 marked another year of solid progress," Podleckis said. "PPQ is working to complete the manual and establish first bilateral then multilateral pilots to validate the effectiveness of ReFreSH in reducing pest risks and facilitating safe seed trade."





# Strengthening Our Organization

### Our Most Valuable Resource: PPQ Employees

Every accomplishment in this report reflects the hard work of PPQ's diverse and dedicated workforce of nearly 2,900 people. They apply their unique talents and skills to achieve PPQ's mission and provide global plant protection leadership. The PPQ Management Team is committed to equipping and empowering our employees for continued success.

### Preparing PPQ for the Future

To make sure PPQ has the right people with the right skills working on the right things well into the future, we are implementing our Human Capital Plan. The plan, completed in 2018, identified critical skills and knowledge that our workforce will need to have to better achieve our mission in the coming years. For example, it identified molecular diagnostics as a key area for growth. In 2019, we began developing hiring and training plans to make sure our employees can unleash the full potential of these high-tech testing methods.

In line with our Human Capital Plan, we are actively building our knowledge management capacity. This will ensure we create, retain, share, and apply employee knowledge systematically and strategically. We also worked hard in 2019 to fill mission-critical vacancies. Overall, we hired 477 employees, many of whom were recruited under special hiring authorities, including Schedule A, Veterans' Recruitment Appointment, and the Peace Corps noncompetitive eligibility programs. To support our new and experienced employees, we offered a wide range of technical and non-technical training throughout the year.

### Supporting Employees

In 2017, we established the Center for Advisory Resources for Employees (CARE). CARE includes our Advisory Group, which seeks to strengthen the bonds of cooperation between our unions and management, and a new ombudsman unit. Our ombudsmen are helping employees at every level—management, non-management, union, and non-union—resolve difficult workplace situations and manage conflict in a way that promotes healthy working relationships.

The CARE team travels to work sites that are experiencing a variety of challenges. The team assesses each situation and creates specific action plans—with accountability—to help supervisors create a more productive, healthy, and safe work environment. The team also focuses on what PPQ does right. For example, they visited the Asian longhorned beetle program in Worcester, MA, to learn what makes that work unit such a powerhouse of positive energy and high morale. Through extensive employee surveys, they identified the program's best practices. Based on what the CARE team learned, they are developing a workshop on these practices. This workshop will give managers and supervisors the opportunity to engage with and empower their staffs. The workshop's outcome will be a plan for implementing the practices specific to a unit's work environment and culture.

PPQ leadership wants every employee to have plenty of opportunities for career development and advancement. Over the past 3 years, PPQ's Guiding

Coalition has led the Developmental Assignment Program (DAP). This program gives employees an opportunity to expand their career experiences and gain new skills by working on an assignment outside their normal scope of work. Those assignments create products requested by PPQ managers, and all of the DAP products meet key PPQ needs.



Under PPQ's Developmental Assignment Program, Plant Health Safeguarding Specialist Colin Park, working with National Operations Manager Betsy Randall-Schadel, developed and delivered a project that improves data quality, tracking, and analytics for PPQ's *Phytophthora ramorum* program and will facilitate data-driven decisions.

### Strengthening PPQ With Diversity

PPQ's workplace diversity is a key element of our mission success. This diversity enriches our workforce and makes us a more innovative and productive team. It also helps us to reflect the many stakeholders we serve—from consumers and farmers, to importers and exporters, just to name a few—strengthening our effectiveness and credibility. To promote diversity and inclusion at PPQ, we have Civil Rights and Diversity Advisory Committees at the national and local levels. They deliver robust diversity and inclusion programs that celebrate the accomplishments of Americans in underrepresented groups, including women; African Americans; American Indian and Alaska Natives; Caribbean Americans; Hispanics; Lesbian, Gay, Bisexual, and Transgender Americans; and veterans. The National Committee also works with the PPQ Management Team to address equal employment opportunity (EEO) issues and establish strategies to achieve PPQ's EEO goals and objectives.

In 2019, PPQ's Diversity and Inclusion Work Group—a strategic planning group that complements the efforts of PPQ's National Civil Rights and Diversity Advisory Committee (NCRDAC)—completed its work on a "living" Diversity and Inclusion Plan. The plan will help employees understand that diversity encompasses a wide range of experiences, knowledge, and strengths, and that employee diversity in age, background, ethnicity, physical abilities, beliefs, sex, and other attributes makes them better able to accomplish PPQ's missions and goals. Its key strategies include providing recommendations and tools for recruitment and outreach to improve the diversity of the PPQ workforce; educating selecting officials on hiring initiatives and goals; creating a list of resources and tools that selecting officials can use to help diversify their work units; and creating a team to monitor the implementation of each goal and its objectives.

In addition, the NCRDAC published the PPQ 2019 Diversity and Inclusion Planning Tool. This highly visual year-at-a-glance calendar highlights special heritage months, events, meetings, and other activities. PPQ staff use it to participate in planned EEO and civil rights activities or to plan their own activities. In addition, this year, one of the committee members joined the board of USDA's Hispanic American Cultural Effort (HACE) as APHIS' representative. HACE's mission is to promote personal and professional growth through diversity at USDA.



Field Operations Outreach Coordinator Camille Morris (left) talks with Cameron Clifton, a student at North Carolina Agricultural and Technical University, during a career fair in September 2019.

We also look externally to strengthen our program delivery through diversity by reaching out to stakeholders who have a limited ability to read, write, speak, or understand English. PPQ has contracted with an interpretation and translation service to help us better serve people with limited English proficiency (LEP) because of their national origin. Employees can use the service as part of their regular work when engaging with industry, stakeholders, and customers. Services include document translation to or from most foreign languages, as well as real-time language interpretation over the phone to help staff conduct business or exchange important information. This promotes better communication with LEP stakeholders who seek our services or need to understand and comply with our regulations to safeguard American agriculture.

To help our country's youth realize a career safeguarding American agriculture and the environment, PPQ participates in APHIS-coordinated summer AgDiscovery and Safeguarding Natural Heritage programs. AgDiscovery programs last for 2 to 4 weeks at colleges and universities across the country and target middle and high school students interested in learning more about plants, animals, and agribusiness. The students gain experience through hands-on labs, workshops, and field trips. APHIS also collaborates with Tribal colleges and universities and other Native American-Serving Institutions to deliver Safeguarding Natural Heritage (SNH), a 2-week summer outreach program that

helps students ages 14 to 17 explore careers in plant and animal science, wildlife management, and agribusiness. SNH students participate in hands-on labs, workshops, discussion groups, field trips, and character- and team-building activities led by Tribal elders, practitioners, and professionals, university professors, and U.S. Government scientists while living on a college campus. In 2019, PPQ participated in six AgDiscovery and five SNH programs. In addition, we welcomed three Native American interns. We also benefited from two HACE interns we brought aboard in 2019. All of our interns experienced real-world work opportunities, helping them gain valuable experience while delivering products or services that support PPQ's ability to achieve its mission.



# Recognizing PPQ's Employees

Every day, PPQ employees give their all to deliver extraordinary results for our stakeholders. This section highlights some of the exemplary work that was recognized in 2019.

## American Phytopathological Society Honors PPQ Employees for Scientific Contributions

The American Phytopathological Society (APS) honored three PPQ employees for their work and contributions to the field of plant pathology. These scientists received the recognition during the society's 111th annual meeting in Cleveland, OH, in August 2019.



*Phil Berger*

Phil Berger, former Director of PPQ's Center for Plant Health Science and Technology, received APS' Excellence in Regulatory Affairs and Crop Security Award for outstanding contributions to regulatory plant pathology, crop security, and trade enhancement efforts. Berger, who retired from PPQ in December 2018 after 16 years of service, advanced the use of diagnostic technologies in regulatory decision

making. He championed the development of rapid pest detection techniques and diagnostics for Huanglongbing disease. He also founded PPQ's National Plant Protection Laboratory Accreditation Program.



*Mary Palm*

The society named former Pest Management Director Mary Palm, who retired in May 2019 after 35 years of PPQ service, as the APS 2019 Fellow. Palm's work has had significant impact on the field of plant pathology, especially in the areas of mycology, fungal systematics, and regulatory plant pathology. Throughout her career, she also excelled as a leader and role model. Deeply committed to APS, Palm served on many committees, including the Mycology Committee and Financial Advisory Committee. She also took on leadership roles, such as the Public Policy Board's Fellow to the White House Office of Science and Technology Policy and, most recently, as the APS President from 2018 to 2019.



*Avijit Roy*

Molecular Biologist Avijit Roy received the Lee M. Hutchins Award for 10 years of published research in APS journals on basic or applied aspects of diseases of perennial fruit plants. Roy's significant contributions to citrus virology included eight research papers on the citrus tristeza and citrus leprosis viruses. His investigations and outcomes have vastly improved scientists' understanding of these economically damaging diseases and directly supported the health of the citrus industry.



Resource Management Services Assistant Director Stacie Cain received the National Plant Board President's Award at the 93rd National Plant Board annual meeting in Montana's Big Sky Country.

### National Plant Board Gives PPQ Employee the 2019 President's Award

National Plant Board (NPB) President Ann Gibbs announced that Stacie Cain, PPQ's Resource Management Services Assistant Director, received the 2019 President's Award. Cain received the honor during the NPB's annual meeting in Kalispell, MT, for her exceptional service to the NPB and its membership.

Gibbs described how Cain helped States navigate many obstacles in fiscal year 2019, including issues with ezFedGrants, continuing resolutions, and Departmental policy changes. She was instrumental in expediting funding for individual States and gave NPB members regular updates and suggestions to move their agreements forward. Cain was an invaluable resource for both NPB leadership and its members.

### APHIS Administrator's Awards

Each year, APHIS' Administrator honors exceptional people in the agency whose efforts have transformed our work and fortified our safeguarding mission. This year, USDA Under Secretary Greg Ibach joined Administrator Kevin Shea to help celebrate the accomplishments of a number of PPQ employees, including those who served on the agency's eFile Team and the Nebraska Flood Response Team.



PPQ's Executive Director Matt Rhoads (back row, far left) served on the eFile Team along with colleagues (not pictured) Steven Crook, Director of Permitting and Compliance Coordination, and Nicole Russo, Director of Analysis and Support. The team earned an Administrator's Award.

### eFile: Building a Modern Permitting System

In July 2019, the APHIS eFile Team launched the first pilot of the eFile system. This new system, which is being rolled out in phases, is improving APHIS customer experience by reducing regulatory burdens and offering intuitive, user-friendly digital experiences for permit applicants. PPQ employees who worked on this 3-year effort include staff from Permitting and Compliance Coordination and Quarantine Policy, Analysis, and Support.



PPQ's Pest Detection and Emergency Programs Director Valerie Defeo (back row, third from left) served on the Nebraska Flood Response Team, which received an Administrator's Award.

### Nebraska Flood Response

The Nebraska Flood Response Team brought eyes in the sky and boots on the ground to help meet the challenges of unprecedented flooding in Nebraska in 2019. The team conducted aerial surveillance to locate stranded livestock, damaged infrastructure, and potential hazards. They also managed the removal and disposal of animal carcasses from more than 100 different sites. PPQ's Pest Detection and Emergency Programs Director Valerie Defeo participated in the agency team, providing invaluable emergency response experience and leadership. Human health and safety and American agriculture all benefited from their efforts.

### Deputy Administrator's Awards

Each year, PPQ Deputy Administrator Osama El-Lissy recognizes the exemplary people—employees, partners, and cooperators—who made significant contributions towards achieving PPQ's mission of safeguarding American agriculture in the previous year. He also honors one outstanding employee whose work has helped to transform our agency.

### 2018 Safeguarding Award

This year, PPQ Deputy Administrator Osama El-Lissy presented the Safeguarding Award to the Houston Interagency Agriculture Team for their vigilance in protecting U.S. agriculture in 2018. This team, which included PPQ and U.S. Customs and Border Protection (CBP) employees, proved the strength of our safeguarding partnership.

Working together, the team uncovered an infestation of live wood-boring pests in an imported shipment of hydroelectricity equipment packed in approximately 400 wood crates in June 2018. The shipment was destined to travel across Texas and into Arkansas on open flatbed trucks. When PPQ confirmed the wood-boring pests were Sirex woodwasps, which are actionable at U.S. ports of entry, CBP issued several emergency action notifications ordering the re-export of the infested shipments.

Although the importer filed temporary restraining orders with two Federal courts to keep the shipments in the United States, PPQ, CBP, and the U.S. Department of Justice presented detailed evidence supporting our processes, decisions, and authorities. In the end, the court upheld CBP's re-export order, and the importer received a significant financial penalty.



Tyrone Jones (right), National Trade Director for Forestry Products, accepts the 2018 Deputy Administrator's Safeguarding Award on behalf of the Houston Interagency Agriculture Team from Deputy Administrator Osama El-Lissy.

Thanks to their diligence and cooperative work, the team prevented live wood-boring pests from entering the United States, helping to safeguard Texas' \$18 billion timber industry and the jobs of more than 60,000 people in that State.

### 2018 Outstanding Employee Award

Deputy Administrator El-Lissy presented the Outstanding Employee Award to Molecular Biologist Michael Stulberg. Stulberg helped to resolve a long-standing problem for many PPQ researchers and scientists, especially those analyzing DNA sequences, who lacked access to critical software needed to interpret and understand their data.

To fix this problem once and for all, Stulberg joined APHIS' Big Data and Scientific Computing Working Group in 2018. Thanks to his scientific expertise and personal experience, he helped the group gain agency



Molecular Biologist Michael Stulberg (right) accepts the 2018 Deputy Administrator's Outstanding Employee award from Deputy Administrator Osama El-Lissy.

approval for a comprehensive list of critically important scientific software. Now, PPQ employees have access to hundreds of scientific software applications, including open-source and commercial products, which were previously off limits. Stulberg also helped establish a process for giving certain scientists super-user access to test new software products, helping to keep PPQ on the cutting edge.

Stulberg's work led to fundamental changes within PPQ and advanced how scientists can perform their work within the Agency's IT framework. His high-impact efforts contributed significantly to the achievement of PPQ's mission. And he did it all as a collateral duty while performing his regular work, which included conducting an above-average number of confirmatory tests for regulated or quarantine plant pathogens.



Ed Podleckis (right), Senior Risk Manager, accepts the award on behalf of the Tomato Seed Testing Project Team from Deputy Administrator Osama El-Lissy.

**2018 Team Award: Tomato Seed Testing Project Team**

The Tomato Seed Testing Project Team initiated, implemented, and improved an identification and detection program to evaluate the presence of quarantine pospiviroid pathogens in imported tomato seeds. The large cross-functional project included staff from Field Operations, ports of entry, plant inspection stations, Science and Technology, Policy Management, and CBP. This exceptional collaboration underpinned the project's success and serves as a template for future seed testing initiatives. Based on information the team collected, APHIS published a Federal Order requiring that imports of tomato and pepper seeds from all countries are accompanied by a phytosanitary certificate with an additional industry declaration ensuring additional safeguarding.



Ryan Bahleda (right), PPQ Supervisory Officer in Pennsylvania, accepts the award on behalf of the Spotted Lanternfly Process Improvement Team from Deputy Administrator Osama El-Lissy.

**Spotted Lanternfly Process Improvement Team**

PPQ has diligently worked to improve the spotted lanternfly (SLF) operational processes through innovation, consistent communication, and the overcoming of hiring difficulties. As the SLF program gained momentum, its Process Improvement Team bolstered communication with all stakeholders at many levels, in many forms. The team addressed hiring issues and secured necessary staff in Pennsylvania to ensure operations and oversight. By the end of the 2019 treatment season, nearly 700,000 ailanthus trees were treated with insecticide or herbicide, over 13 times the number of trees treated the previous year. The SLF program saw dramatic improvements like these results in all recordable categories.



Dean Denham (left), Supervisory Management Analyst, and Stacie Cain, Assistant Director of Resource Management Services, accepted the award on behalf of the Cooperative Agreements Team from Deputy Administrator Osama El-Lissy.

**Cooperative Agreements Team**

Cooperative agreements are a valuable instrument used to accomplish PPQ's mission of safeguarding American agriculture and facilitating safe trade. This year, the awarding and administering of cooperative agreements was especially challenging, but the small, talented, and dedicated Cooperative Agreements Team persevered. They collaborated, provided outstanding customer service, and ensured our cooperators received up-to-date information. They also provided reports/status updates to PPQ management, trained Federal personnel and cooperators, and contributed to a seamless and efficient process that successfully administered PPQ's Cooperative Agreements Program.



Trend Analyst Carissa Marasas accepts the award on behalf of the Pest Exclusion Analytics Team from Deputy Administrator Osama El-Lissy.

**Pest Exclusion Analytics Team**

The Pest Exclusion Analytics Team conducted a 6-month trial focused on optimizing pest exclusion analysis in PPQ, to great effect. The team—6 analysts from 4 staffs—solicited 40 pest exclusion analytic projects that touched on almost every part of PPQ's pest exclusion operations. Ten of these projects were particularly complex. Their project successfully modeled what could only be achieved when dedicated experts—trained in quantitative and qualitative analytic methods—worked closely and iteratively with programs. This pilot successfully informed the Office of the Deputy Administrator's decision to establish a full-time, dedicated unit capable of developing and deploying advanced analytic methods and delivering products designed to optimize pest exclusion and safeguarding activities carried out by PPQ and our partners at CBP.



Carlos Martinez (right), Field Operations Executive Director, accepts the award on behalf of the SITC Special Operation Mango Frenzy from Deputy Administrator Osama El-Lissy.

**SITC Special Operation Mango Frenzy**

Smuggling, Interdiction, and Trade Compliance (SITC) officers and analysts planned an express courier operation to gather intelligence on fresh Indian and Thai mangoes that entered the United States. The operation looked at 5 years of data and determined express couriers were the main source of fruit fly introductions on host material into the country. The SITC teams worked with CBP at the FedEx hub in Tennessee and the DHL hub in Kentucky, resulting in 2,480 package inspections, 244 Emergency Action Notices, and 3 violations. The SITC operation included a total of 4,739 pounds of mangoes, where 77 percent of the packages were destined to hotels and motels in Texas, California, Georgia, Tennessee, and Florida—all States at high risk of Oriental fruit fly introduction. In 2020, SITC plans to further evaluate express couriers and effectively close this pathway of fruit fly introduction.

## PPQ Employees Earn Awards for Reaching Major Safeguarding Milestones

In April, Deputy Administrator Osama El-Lissy traveled to Florida to celebrate two significant safeguarding milestones: the grand opening of a new sterile insect rearing facility in Sarasota and processing 1 billion plant units in a single year at the Miami Plant Inspection Station.

### Sarasota Sterile Insect Release Facility

Deputy Administrator El-Lissy praised Abbie Fox, PPQ's Fruit Fly Exclusion and Detection Program Director (right, center), for overseeing one of the most successful plant protection programs in the Nation. Wild Mediterranean fruit flies have been detected only twice in the State since 1998. That is an incredible statistic given the volume of domestic and international trade and tourism that comes through Florida. It is also a testament to the quality of the Preventive Release Program and the fruit fly trappers in Florida—both of which Fox has directed since 2012.

He also recognized John Renshaw (right, bottom) for his expertise, guidance, and tireless efforts in overseeing the design and construction of Florida's new Sterile Insect Release Facility. Throughout the planning, design, and construction of this facility, Renshaw was the voice of knowledge, wisdom, and guidance that carried it forward. His unmatched level of technical knowledge and leadership has ensured that almost 100 million irradiated flies are continuously ready to be released each week.



### Miami Plant Inspection Station

Deputy Administrator El-Lissy praised the Miami Plant Inspection Station's entire staff (above) for their work processing 1 billion plant units in a single year—an achievement that underscores the staff's deep commitment to safeguarding America's agricultural and natural resources. In addition, the Miami-Dade County Office of the Mayor and the Board of County Commissioners presented a proclamation to the staff declaring Thursday, April 18, 2019, as the "USDA Miami Plant Inspection Station Day."

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