



PPQ 2025 Annual Report
Risk Analysis and Methods Development

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Introduction

The U.S. Department of Agriculture’s Plant Protection and Quarantine (PPQ) program uses the best available science and technologies to develop more effective tools for detecting, identifying, managing, and eradicating invasive pests. These advances keep PPQ and its partners on the cutting edge in the fight against harmful plant pests and diseases.

As global trade continues to expand, the pressure of invasive pest and disease introductions will also increase. To keep ahead of the threat, PPQ continually applies the latest science and technology to develop the most effective survey and diagnostic methods, diagnostic support, treatment technologies, risk evaluations, and strategic program alternatives. PPQ also analyzes pest interception data to identify the imports with the highest risk. Then PPQ can address the problem at its source.

Risk Analysis

PPQ's Plant Pest Risk Analysis (PPRA) unit develops pest risk analyses and epidemiological approaches to support and improve pest exclusion programs and decision making. In fiscal year (FY) 2025, PPQ completed approximately 250 risk analyses associated with imports, exports, invasive pest threats, and other programmatic requirements. This total includes 41 analyses to open, expand, or maintain export markets for U.S. producers and 28 risk assessments for import requests from foreign countries. PPRA's work also included evaluations of 40 newly detected pests, 38 assessments of Federal Noxious Weeds or other potential weed threats of concern to the United States, 21 evaluations of off-shore pests to identify the greatest threats and help PPQ prioritize resources, seven new or updated suitability maps for off-shore pests of concern, four pathway analyses and spread models, and 14 New Pest Response Guidelines to proactively prepare for emergency responses. These products identify potentially harmful plant pests and diseases and help PPQ decide what mitigating actions to take to prevent their entry into or limit their spread or economic impact within the United States.

Methods Development

The Plant Protection Methods Development (PPMD) program develops scientifically viable and practical tools for exotic plant pest exclusion, detection, and management. These tools preserve economic opportunities for farmers and industries who engage in interstate commerce and international trade, and safeguard U.S. agricultural and natural resources from invasive plant pests. The program is essential to PPQ's mission by developing and validating tools for detecting exotic pests in survey programs; molecular diagnostic tests and identification tools for pest identification; integrated pest management methods, including biological control, to help eliminate or manage invasive pests; and phytosanitary treatments to support interstate and international trade.

A major focus of the program is to develop and implement biological control technologies that allow for the use of natural enemies alone, or in combination with other control tactics, to effectively mitigate the impacts of introduced, invasive insect pests, weeds, and plant pathogens, while minimizing impacts to the environment.

In FY 2025, the PPMD program continued developing and improving technologies, tools, and treatments for APHIS plant pest and disease programs targeting invasive species such as Mexican fruit fly, rangeland grasshoppers, mollusks, and spotted lanternfly (SLF), and key cotton, citrus, and forest pests. Specifically, the program evaluated pesticides and trapping methods to enhance the detection and management of invasive land snails, identifying a safe bait suitable for urban use. The program also funded the development and validation of high-throughput nucleic acid extraction protocols for pathogens in woody plant tissues, reducing sampling and extraction bottlenecks, lowering per assay cost, and increasing PPQ's diagnostic capacity. This work enables high-volume pathogen diagnostics during plant health emergencies.

Additionally, the PPMD program partially funded numerous high-value deliverables, including: interactive digital identification tools for economically significant fruit flies, tortricid pests, and longhorned beetles to support pest exclusion, early detection, and control of invasive plant pests; AI-supported geometric morphometrics methods for fast, image-based identification of quarantine pests; molecular diagnostic tools for pest thrips and the two-spotted leafhopper (a newly detected cotton pest) to support PPQ's rapid response efforts; a comprehensive inventory of rapid molecular diagnostic methods for economically important fruit fly species; and advanced methods for mass rearing and strain development of fruit flies to support suppression of these high-impact pests through sterile insect technique.

The PPMD program maintains rearing facilities for biological control agents in Arizona, California, Massachusetts, Michigan, Texas, and Guatemala. PPQ partners with USDA's Agricultural Research Service (ARS), the U.S. Fish and Wildlife Service, State departments of agriculture, universities in 30 States and Territories, and 2 Native American Tribes to evaluate and establish biological control agents for invasive plants, pests, and diseases. The biological control program has been responsive in developing biological control agents to address invasive pests and weeds such as Japanese beetle, spotted wing drosophila, SLF, box tree moth, invasive shot hole borers, Roseau cane scale, air potato, and houndstongue. As of September 2025, the biological control program rears, releases, and monitors the establishment and impact of 14 agents attacking two invasive arthropods and 14 exotic weeds.

The PPMD program also supports research related to invasive honey bee health. Managed honey bee colonies add at least \$15 billion to the value of U.S. agriculture each year through increased yields and superior quality harvests (O'Brien, D. 2019 ARS Microscopy Research Helps Unravel the Workings of a Major Honey Bee Pest). In FY 2025, the program continued to fund priority projects with other Federal agencies as well as university and non-profit researchers that support managing, suppressing, and eradicating Varroa mites and other pests and diseases contributing to a decline in honey bee health. These projects included investigating a multidisciplinary approach for tackling emerging disease outbreaks, management techniques to improve overwintering success, and detection and management of the parasitic Tropilaelaps mites that feed on honey bee eggs, larvae, and pupae. Research efforts will continue into 2026.