PPQ 2024 Annual Report

Risk Analysis and Methods Development

Table of Contents

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. We also analyze pest interception data to identify the imports with the highest risk. Then we 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) 2024, PPQ completed approximately 287 risk analyses associated with imports, exports, invasive pest threats, and other programmatic requirements. This total includes 28 analyses to open, expand, or maintain export markets for U.S. producers and 41 risk assessments for import requests from foreign countries. PPRA's work also included evaluations of 41 newly detected pests, 54 evaluations of offshore pests to identify the greatest threats and help prioritize resources, 12 pathway analyses and spread models, and 10 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 in order 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 2024, the PPMD program continued developing and improving methods, tools, and technologies in support of PPQ's mission. To help combat the worst onslaught of invasive fruit flies in history, PPMD developed less expensive mass rearing diet formulations and improved insect shipping, packaging, and release methods for the Mexican fruit fly Sterile Insect Technique (SIT) program, as well as an aerial bait spraying method, five new lures for male attraction, and improved wax bait stations against the Mediterranean fruit fly. These deliverables will significantly strengthen PPQ's ability to protect U.S. agriculture against one of the most serious threats it is currently facing.

The PPMD program also delivered improved methods for mass rearing box tree moth and maintained laboratory colonies of several pest and biocontrol insect species for method development purposes. To enable fast and accurate pest identification, the program developed molecular identification methods for false codling moth and a molecular approach to detecting hybridization in the Old-World bollworm. Supporting efforts to control two recently detected invasive land snails, which pose a risk to U.S. agriculture and carry human and livestock diseases, PPMD delivered chemical control and trapping methods.

In addition, the program developed a synthetic lure to aid giant African snail detector dog training, which was provided to PPQ's Professional Development Center. The program also developed a large number of methods and tools supporting operations across all PPQ program areas, including protocols to monitor treatment effectiveness of insecticide applications, spot treatments, and portable vacuums as a

treatment for spotted lanternfly (SLF); a high-throughput sequencing (HTS) metabarcoding protocol for fast and efficient identification of fungal pathogens in plant tissues; biocontrol methods against multiple insect pests and weeds, and many more.

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 2024, the biological control program rear, release, and monitor 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 pests. 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 2024, 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 2025.