Phytophthora ramorum: National Program Review

USDA-APHIS-PPQ

Riverdale, MD

December 15-16, 2009

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1. Executive Summary

On December 15 and 16, 2009, USDA APHIS Plant Protection and Quarantine (PPQ) conducted a National Review on the *Phytophthora ramorum* regulatory program at APHIS Headquarters in Riverdale, Maryland. The APHIS PPQ *P. ramorum* program, in place since 2002, has been successful in limiting the artificial spread of sudden oak death disease beyond generally infested areas through plant quarantine, while providing a regulatory framework that facilitates the movement of commodities. The two-day review was attended by several stakeholders representing the National Plant Board (NPB), Federal and state nursery industry organizations, USDA Forest Service (FS), USDA Agricultural Research Service (ARS), the Nature Conservancy, Research Scientists, university researchers, and APHIS PPQ program managers. The primary goal of this meeting was to develop clear program vision, goals, and action plans. In addition to the status of the *P. ramorum* regulatory program and the recent Quality Assurance Review, presentations were made on the current scientific knowledge regarding *P. ramorum*. Finally, the meeting included facilitated discussions intended to support APHIS PPQ's ongoing efforts to better align the regulatory framework with stakeholder concerns about several key regulatory issues nationally and to gather feedback on parts of the program that are working well and those that need improvement. A summary of the program review outcomes including vision statement, short and long-term goals, action items, and key measures/deliverables are presented in this report.

High-level action items identified by the group were:

A. Detailed analysis of APHIS data on host plants, positive finds, plant imports, risk analysis, and spread.
B. For nursery production, define, identify, and rank Critical Control Points (CCPs) and develop a systems approach or Best Management Practices (BMPs) in collaboration with NPB and Industry.
C. Develop regulatory options that are timely and in alignment with BMPs/CCPs and the current state of scientific knowledge.
D. Define research and knowledge gaps that can determine risk and test cost-effective soil remediation strategies at the National Ornamentals Research Site at Dominican University of California (NORS-DUC) facility and elsewhere.
E. Develop rapid diagnostic tools for use in the field that would aid in the identification of infected plants and facilitate movement of pathogen free plant material.
F. Review and revise the current nursery and Q37 protocols in consultation with the NPB and nursery industry.

The review provided an opportunity to share and gather information from various stakeholders on the program's vision and goals, as well as identifying both short- and long-term action items as part of ongoing efforts by APHIS PPQ to improve the *P. ramorum* regulations, policies, and procedures.

2. Background

In 2009, several initiatives were undertaken by APHIS PPQ and NPB to review the *P. ramorum* quarantine program. During this period, APHIS solicited input from stakeholders with the goal of evaluating the program's operational components and identifying program strengths, weaknesses, and areas needing improvement through a number of activities, including:

A. NPB / PPQ *P. ramorum* working group meetings held in May and June 2009;
B. NPB Field Trip Report issued in August 2009;
C. The Quality Assurance Review Report issued in October 2009;
D. NPB / PPQ dialogue meeting held in November 2009; and
E. Discussions were conducted with several county, state, federal, and industry representatives, as well as university and federal researchers covering regulatory, operational, nursery surveys, data management, BMPs, funding, research, outreach, and communication issues.

The above efforts culminated in the National Program Review held in Riverdale, MD on December 15 – 16, 2009.

3. Objectives and Review Process

The primary goals of the National Program Review on December 15-16, 2009, were to work together to clarify the program vision, goals, and recommend action plans. The first day of the review process was devoted to sharing knowledge on the current status of the program, learning about recent advances in the science of *P. ramorum*, providing an update on the recent Quality Assurance Review, and obtaining feedback from the attendees on the operational aspects of the program that are working well and those that need improvement. The second day was devoted to discussing details of stakeholder surveys, articulating program vision and goals, and developing short- and long-term actions items. Through sharing and gathering information in this session, APHIS is considering its program policies and practices to see how to better protect the United States from *P. ramorum* while preserving international trade and interstate commerce in nursery stock.

The program materials, including agenda, list of attendees, details of the Quality Assurance Review, power point presentations on the *P. ramorum* regulatory program, and scientific advances, can also be accessed through the following web link:

http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/index.shtml

The process used during the program review included the following steps:

A. Knowledge Sharing Process: Program background/status of current science
B. Program Assessment by Stakeholders
C. Key Recommendations from Stakeholders
D. Development of a Program Framework and Vision
E. Development of Priority Action Items

4. Key Points from presentations on *P. ramorum* APHIS-PPQ Program and current scientific knowledge

The following abstracts summarize the content of presentations included in the program review:

A. **Program History:** Prakash Hebbar – APHIS National Program Manager for *P. ramorum*:

The presentation covered the history of the USDA-APHIS *P. ramorum* program since its inception in 2001. The Federal regulatory program, as it stands today, has adapted to the

growing needs of the stakeholders despite diminishing resources by actively collaborating with other Federal agencies, industry and universities, establishing cooperative/compliance agreements in states affected by *P. ramorum*, posting scientifically based protocols, conducting annual surveys, and improving outreach and education. The combination of these efforts has resulted in reducing the number of detections of diseased nursery stock.

B. **Quality Assurance Review:** Regan Thomas, Program Analyst, APHIS-PPQ

The presentation provided a summary of the findings and recommendations from the National *P. ramorum* Quality Assurance Review that was conducted between April - August 2009, at the direction of NPB and PPQ Executive Team. The primary goals of this review were to evaluate the program's business practices for strengths and weaknesses and to identify areas in need of improvement. Program information was collected through three data gathering components which included: 1) site visits to nurseries in California, Connecticut, North Carolina, Oregon, and Washington; 2) focus group discussions at the Southern Plant Board meeting in Greenville, SC, and California Oak Mortality Task Force Symposium in Santa Cruz, CA; and 3) interviews and surveys of state and Federal program officials.

Several key issues and opportunities identified by the review team were: a) Spread of *P. ramorum* cannot be totally prevented, however, without the APHIS PPQ quarantine program, the spread of the pathogen would likely have been more extensive in both the nursery and natural environment and had a greater impact on trade; b) The implementation of BMPs developed to significantly reduce the risks to the nursery trade should be expanded; c) APHIS' *P. ramorum* Program has increased awareness of the benefits that improved management offers to the overall plant health, and therefore outreach efforts should be enhanced; d) Continue program focus on infected host-material and increase focus on the pathogen occurring in soil/water. In particular, better soil mitigation methods are needed; e) Rapid field-based diagnostic tools to help detect the pathogen much faster are needed; f) Research efforts need to be expanded to address several key questions pertaining to pathogen pathways, dispersal, and disease etiology.

C. **Current status and future prospects for control of *Phytophthora ramorum* in nurseries:** Jennifer Parke, Plant Pathologist, Oregon State University, Corvallis, OR.

This presentation reviewed the latest advances in scientific research on *P. ramorum* conducted by North American and European investigators and described how this new knowledge could be applied to more effectively manage *P. ramorum* in nurseries. Considerable progress has been made in understanding the variation in susceptibility to *P. ramorum* between and within several host genera, their sporulation capacity, and their ability to infect roots and stems. This will allow the selection of more disease-tolerant hosts. Research on root infection, systemic spread, and latent infections highlight the need to consider the possibility of *P. ramorum* infection even when foliar symptoms are not apparent. Substantial progress in understanding disease epidemiology has occurred through controlled laboratory and greenhouse experiments and field experiments. Splash dispersal and plant-to-plant contact appear to be important for spread within nurseries with extended periods of leaf wetness likely required for infection. Preliminary findings suggest that airborne dispersal of sporangia is not the primary mechanism of pathogen spread. *P. ramorum* can be spread by infested irrigation water, but may be managed effectively with

biofiltration and other water treatment methods. Investigations of the soil phase of *P. ramorum* have provided several insights for management of this pathogen. In positive nurseries, soil-borne inoculum of *P. ramorum* is common, persistent, a likely source of recurrent infestations, and difficult to mitigate. Infested nursery soil is also a likely source of contamination for run-off water. The detection of *P. ramorum* in streams near several nurseries underscores our lack of understanding about the water ecology of this pathogen, and the need to better understand potential risks of pathogen spread from waterways to the landscape.

Future prospects for managing *P. ramorum* in nurseries include application of a systems approach for detecting and mitigating sources of *Phytophthora* contamination. Results of a three-year study were described in which intensive sampling revealed CCPs in the nursery production cycle. CCPs included placement of container plants on *Phytophthora* - contaminated ground, contamination of ground by leafy debris, accumulation of standing water, use of contaminated irrigation water, re-use of contaminated pots, and on-site contamination of potting media. Identification of CCPs has led to the development of specific BMPs tailored to eliminate these sources of contamination. Advantages of this systems approach over conventional end-point inspection methods and recommendations for future directions were described.

D. **Migration pathways of *P. ramorum*:** Nik Grunwald, Research Plant Pathologist, USDA ARS, Horticultural Crops Research Laboratory, Corvallis, OR.

The presentation detailed at length the state-of-the-art molecular techniques that are now being used by USDA ARS to track migration pathways of *P. ramorum*. Specifically, this works establishes pathogen population structure, predominate migration patterns, and population diversity in U.S. nurseries and other countries. Approximately 300 isolates collected from 19 states between 2004 and 2009 revealed that out of the three known lineages in the United States, the most common and genetically diverse lineage was NA1. The two eastward migration pathways revealed that NA1 isolates clustered into two groups, one containing isolates from Connecticut, Oregon, and Washington and the other containing isolates from California and the remaining states. The study on migration pathways of *P. ramorum* provided confirmation for APHIS trace back studies, especially the major outbreak in 2004 that was the result of nursery shipments from the West to locations across the United States. The research also concluded that the introduction of U.S. and European lineages were from three distinct geographic origins outside the country. APHIS PPQ and ARS are actively collaborating and the current research conducted at ARS supports the quarantine program implementation.

E. **Detection of *Phytophthora ramorum* in Soil and Water at Retail Nurseries in the Southeastern United States:** S.N. Jeffers, J. Hwang, Y.A. Wamishe, S.W. Oak, and G.C. Colburn, Clemson University, Clemson, SC, USDA Forest Service-Forest Health Protection, Asheville, NC **,** Gainesville State College, Gainesville, GA.

The presentation gave an overview of a collaborative project on *P. ramorum* between Clemson University, USDA-FS, and USDA-APHIS. Between 2003 and 2005, woody ornamental plants infested or infected with *P. ramorum* were shipped all over the United States from several nurseries in California and Oregon. The southeastern United States received many of these contaminated plants and is considered at high risk for pathogen

establishment. To date, SOD has not been reported in the Eastern states. The overall objective of the collaborative efforts has been to determine if *P. ramorum* has escaped from contaminated plants and become established at the nurseries receiving these plants. Water and soil samples were collected at targeted nurseries (primarily retail) in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. To detect *P. ramorum*, soil samples were baited with camellia and rhododendron leaf pieces and water samples were filtered through polycarbonate membranes and then plated. As of December 2009, the study concluded that *P. ramorum* continues to be delivered to nurseries in the Southeast on container-grown plants. Results show that the pathogen has escaped from these plants into nursery soil and water and appears to be established and active at some sites, which may have resulted in re-infection of plants within these nurseries. The pathogen also has been detected in run-off water inside and outside some of these nurseries. Commercial algaecides were demonstrated to have significant potential for the mitigation of *P. ramorum* in waterways and irrigation supplies.

F. **Epidemiological models for Sudden Oak Death: Predicting risks and optimizing control**: Christopher A Gilligan, Epidemiology & Modeling Group, Department of Plant Sciences, University of Cambridge, Downing Street, Cambridge, CB2 3EA, UK

The presentation described the use of disease modeling to predict spread of SOD in California and the importance of matching the scale of control to the inherent, but often uncertain, scale of the epidemic spread. A joint effort between University of Cambridge, University of North Carolina and University of California, Davis used a state-wide model taking into account the intrinsic heterogeneity of susceptible vegetation throughout California and historical weather data, each resolved to 250m x 250m, using GIS methods. Onto this was grafted a stochastic, spatially-resolved epidemic model for disease spread. The model encompassed two scales of dispersal to account for occasional long-distance, movement and short-distance intensification. The dispersal parameters and transmission rates were estimated from data for historic state-wide spread and recent local intensification in Humboldt County. The model can be used not only to predict the risks of future spread of infection and disease within different vegetation eco-regions in California but also to compare the effectiveness of different control strategies at a range of scales of interest from the state to local.

For example, control around a localized outbreak such as that in Humboldt County, include control at the origin, control ahead of symptomatic infection, and the use of a barrier. Current projections are that eradication is not possible but successful reduction in the density and rate of spread of infection is possible when control begins soon after the introduction of infection. Preliminary results in examining new localized outbreaks suggest that rapid introduction of control at the origin of the disease along with a replanting scheme ahead would be expected to lead to a substantial delay and reduction in spread.

The current model also showed that getting the balance of detection right can lead to effective management of disease, whereas over- or under-investment in detection relative to control can lead to markedly ineffective management of disease. The preliminary investigation of the UK situation was used to illustrate how we might adapt the models to predict spread in the Eastern United States. User-friendly models, originally developed from the work on citrus canker can also be used to allow policymakers to investigate different control scenarios and to engage with stake-holders.

5. Program Assessment by Stakeholders

To better understand the current opinion of stakeholders on the APHIS PPQ *P. ramorum* program and to obtain inputs from the diverse group, two methods were employed at the December 2009 meeting:

A. Facilitated discussion (Day 1)

B. Pre-meeting questionnaire and facilitated discussion (Day 2)

Day One—Stakeholder perspectives on the current *P. ramorum* program:

The participants expressed their opinion through a facilitated discussion on the program aspects they thought were working well and those that needed improvement. The various bulleted items are listed as follows:

Working well

- Molecular diagnostics are working well and turn-around time has improved
- BMPs reduce disease when applied and work well
- Dramatic reduction in nursery detections – 2004-2009 (in the west)
- Improved time for trace-forward list and improved genotyping
- SOD has not established in forests outside the West Coast
- New survey tools developed: stream baiting and aerial surveys to monitor forest health
- We now know more on how to eliminate spread and possible eradication from forest
- Establishment of NORS/DUC facility in California is a step forward
- Program has been able to restrict movement of infested material
- Communication between stakeholders has improved
- Scientific research has made progress
- Program has offered numerous training opportunities
- Program has facilitated commerce

Needs Improvement

- Utilization, implementation, and understanding the effectiveness and value of BMPs
- Incentives, craft outreach, education, and research for implementation of BMPs
- More information needed on environmental impact, movement of pathogen and its ability to cause disease
- Understanding the significance of *P. ramorum* in nurseries and water in the Eastern states
- Visual inspections are inadequate; need to focus on organism and not the disease
- Lack of field-based assays for diagnostics and test results are not timely
- Soil detection methods need to be improved
- Sampling strategy needs improvement– soil, media, foliage, water, containers

- Tracebacks unsuccessful
- Program needs exit triggers and strategies, know the process for coming in/out of regulation
- Nursery Protocols
- Q37 – international import regulations need to be updated
- Data collection and analysis needs to be expanded
- Inadequate resources for trace forwards and state lab certifications
- Review cost effectiveness of what resources to deploy and how to deploy them
- Research needs to be expanded
- Clarification and consensus on what the program is trying to achieve – Goals

Day 2—Responses to pre-meeting questionnaire:

A pre-meeting questionnaire was emailed to the participants requesting responses on the following three questions; 1) Describe a successful future for your business, program, or agency as it relates to *P. ramorum*; 2) Describe the factors keeping you from achieving the success you articulated in question 1; and 3) Describe how we could overcome the obstacles you presented in your previous response. On Day 2 of the meeting, the questionnaire responses were discussed and used as the basis for a facilitated discussion. Ten key points/recommendations were captured from the discussion.

Consolidated responses from participant pre-meeting questionnaires on various issues are summarized as follows:

1. A successful future as it relates to *P. ramorum* program will:
   - **Regulatory Program**: Provide consistent regulatory control that is effective in preventing spread of *P. ramorum*, and have a harmonized regulation with federal regulation pre-empting state actions
   - **BMPs:** Eliminate risk at origin through quality assurance, have effective BMPs, have cost effective control
   - **Industry Issues:** Maintain commerce across the country with minimal disruption, protect both nursery and forestry industries, not destroy business based on positive finds
   - **Environment:** Protect native biodiversity, prevent wild land incidents of SOD and spread from nurseries
   - **Research:** Support ongoing research at federal level, have sound science guiding regulatory decisions
   - **Funding:** Adequately fund and support activities (eradication, detection)

2. Factors hindering success are:
   - **Regulatory Program:** Program lacks strategic direction, goals, performance measures; lack of comfort with the current Federal Order; weak Federal Order; inconsistent regulatory restrictions – plant pests of similar biology and risk; meager resources spent on traceback and trace-forward work; overlay of state regulations that hinder interstate commerce; regulations focus on the plant not the disease;

unclear protocols that are not fully science-based; ineffective management of asymptomatic plants; program has not kept up with the science

- **BMPs:** Lack of BMPs and a manual with clear direction for highly-susceptible hosts, science-based protocols for nurseries to produce healthy nursery stock
- **Industry Issues:** Expense of testing for *P. ramorum;* small business affected more by the regulations
- **Environment:** Lack of consensus on risk – geographic areas and risk factors, movement of infected plants as pathways continues
- **Research:** Gaps in our knowledge on the pathogen/disease
- **Funding:** Lack of funding, resource limitations
- **Communication:** Ineffective communication across the programs; sharing of data between the states; lack of timely notification of infested plant materials

3. How can we overcome the problems:
   - **Regulatory Program:** Develop common vision; strengthen regulatory program; review requirements for regulated articles moving in interstate commerce; regulate pathogen instead of the host material; re-evaluate program to determine re-allocation of resources; increase effectiveness of the program; increase effectiveness of port inspections
   - **BMPs:** Develop nationwide BMPs with critical control points; develop low-cost strategies; practical and sustainable; enhance management of highly susceptible hosts; develop systems-based approach
   - **Industry Issues:** Encourage mandatory/voluntary implementation that is site-specific for individual nurseries
   - **Research:** Develop scientifically verified BMPs; develop fast, cheap, accurate field test kits; and develop treatment option for soil; NORS-DUC a step forward towards developing good science-based decisions

The 10 Key Points and Recommendations captured from the discussion are:

1. Program vision, goals, and mission statement need to be well defined and incorporated on the Web site.
2. Regulatory program/protocols need to be updated based on new science/information.
3. Harmonization between import (Q37) and domestic regulations.
4. Clear consistent goals/success/metrics need to be clarified – eradication vs. management.
5. BMPs based on clearly identified critical control points should be adapted to the local situation and be adopted
6. Need to adopt a systems approach in collaboration with industry/NPB.
7. Need clear regulatory exit strategies – triggers for regulation/deregulation.
8. Need to improve diagnostics tests – rapid diagnostic tools.
9. Review mitigation of soils and substrate/research at NORS-DUC, others.
10. Need to update environmental risk assessment by detailed analysis of available data, and fill in data gaps on the pathogen /disease (e.g., *P. ramorum* genotypes).

6. Program Framework and Vision

A facilitated discussion on program framework and vision touched on several themes that pertained to effective and transparent regulations, protocols based on critical control points and best available science, voluntary/mandatory BMPs, instilling confidence among growers, options for deregulation, clear performance standards, effective soil treatment and mitigation options, better detection methods, assessment of risk, research, protection of natural resources/forests, and prevention of long-distance spread.

The consensus was that the program vision can be achieved by a) determining the actual environmental risk and, b) in cooperation with stakeholders, incorporate a system that encourages both voluntary and mandatory approaches in nurseries, leading to c) confidence among the growers and resulting in clean stock, open trade, and protection of natural resources.

Based on the discussions, the vision statement for the program was articulated as follows:

Vision Statement

The program will take a proactive approach to protect native biodiversity, wild lands, and managed landscapes from *Phytophthora ramorum* through a system of voluntary and mandatory (best management practices) approaches focused on critical control points.

7. Priority Action Item Development

The two-day program review culminated in developing high-priority action items that were identified as either short- or long-term. Various breakout groups developed a list of five items for each category and presented them to the larger group. There was considerable overlap between the breakout groups' priority action items. Through majority vote, the entire group either accepted or rejected the proposed action items. The agreed upon action items are consolidated to eliminate duplication and are presented below.

Short-term action items (Actions completed within 1 year)

- Define systems approach which includes BMPs and CCPs
- Tailor and revise regulatory options and protocols in conjunction with BMPs/CCPs
- Evaluate Q37 program for host plant import program
- Analyze, in detail, available APHIS data on hosts and detections
- Develop rapid, low-cost field diagnostics
- Review soil/substrate/water mitigation methods
- Develop triggers for regulation and deregulation

Long-term action items (Actions completed within 3-5 years)

- Define, develop, and rank data for CCPs
- Application of systems approach on a wider scale and their implementation in nurseries – produce clean stock
- Review and revise Q37 for host plant import program
- Identify and define data gaps and knowledge to determine risks
- Fast-track diagnostic kits that are low-cost, rapid and for use on-site
- Develop soil mitigation strategies/methods – at NORS-DUC
- Measure control strategy using U.S. Nursery Certification Program protocol and its epidemiological (spread/disease) impact

8. Next Steps / Recommendations

Effective communication and follow through among key stakeholders (Federal agencies, states, industry, NGOs) is the cornerstone to a successful *P. ramorum* program. To this end, a management framework will be established that will allow key stakeholders to come together to share information and provide input into program implementation. Current working groups/committees will be realigned into three focal areas; a nursery practices coordination group, a research coordination group, and a regulatory working group.

In February 2010, APHIS PPQ began soliciting names from key stakeholders who wish to participate in one or more of these groups. The efforts of the working groups will be administered through an executive committee. The executive committee's role will be to coordinate the overall effort and, as cross-cutting issues arise, to bring together individual members from each group to discuss and address those issues. One of the first tasks these groups will take on is providing input into implementation of recommendations from the program review.

As previously mentioned, several initiatives on various aspects of the *P. ramorum* program were undertaken in 2009 to gather input and make recommendations for program improvement. While the recommendations that came out of those initiatives were varied and comprehensive, there were several broad-based strategies that wove a common theme, thus providing a guiding direction for the program's future. The recommendations presented below are a compilation of these broad-based strategies. Many specific tasks that fall under these groups have already been initiated.

The working/coordination groups and their specific initiatives are:

A. **Nursery Practices Coordination Group** will consist of Federal and state agencies, and industry groups. Its charge will be to share information and coordinate ongoing work of developing voluntary nursery production practices that reduce the incidence of *P. ramorum* on plants and within nurseries. Immediate items to be addressed by this group include:

- Reviewing and collating existing literature on *Phytophthora* management in nursery and agricultural systems to identify principles that may assist in mitigating the threat of *P. ramorum* and also to identify data gaps in knowledge that limit program success (cross-link with Research Coordination Group).

- Defining, identifying, and ranking critical control points and use them to develop a systems approach, incorporating best management practices in collaboration with Federal agencies, the NPB, universities, and industry.

- Evaluating the effectiveness and costs/benefits of ongoing initiatives such as the Oregon Grower Assisted Inspection Program and the U.S. Nursery Clean Stock Program as funded by Farm Bill (Section 10201). (Action initiated).

B. **Research Coordination Group** will consist of Federal and state agencies, industry groups, and NGOs. Its charge will be to share information on ongoing *P. ramorum* research. Immediate items to be addressed by this group include:

- Reviewing and collating existing literature on *Phytophthora* management in nursery and agricultural systems to identify principles that may assist in mitigating the threat of *P.*

ramorum and also to identify data gaps in knowledge that limit program success (cross-link with Nursery Practices Coordination Group).

- Developing rapid, sensitive field-based diagnostic tools that would aid in the production of clean plants.

- Defining research and knowledge gaps that determine risk of *P. ramorum* in soil and water and test cost-effective remediation methods.

- Updating environmental risk assessment by conducting a detailed analysis of available data, epidemiological models, scientific expertise, and fill in data gaps on the pathogen/disease to determine the risk to native biodiversity, wild lands, and managed landscapes.

- Compiling and conducting an in-depth analysis of survey and detection data, soil and water positives, traceforward and traceback information, and population genetics to better understand the movement and extent of establishment of *P. ramorum* within the nursery industry.

- Developing a research work plan that takes into account knowledge gaps identified in the various reports issued during 2009.

C. **Regulatory Working Group** will consist of Federal and state agencies. Its charge will be to provide input and feedback to the *P. ramorum* program on regulatory issues. Immediate items to be addressed by this group include:

- Reviewing and revising regulatory protocols to take into account CCPs, high-risk plants, as well as soil and water positives. (Action initiated - e.g., confirmed nursery protocol, compliance agreements, trace-forward/-backs)

- Conducting in-depth analysis of port-of-entry data and revising the current Q37 protocols as appropriate to strengthen the artificial introduction of *P. ramorum* into the United States. (Action initiated)

- Conducting a national nursery survey for *P. ramorum* in 2010 as funded by Farm Bill (Section 10201). (Action initiated)

- Developing clear guidelines (triggers) for regulation/deregulation.

9. Conclusion

The two-day review attended by representatives from the NPB, nursery industry, USDA FS, USDA ARS, The Nature Conservancy, research scientists, subject matter experts, and APHIS PPQ provided a forum for the exchange of ideas and building consensus. The primary goals of this meeting, which were to develop clear program vision, goals, and action plans, were largely met. The presentation on the recent Quality Assurance Review and the scientific presentations were extremely important to bring the stakeholders and APHIS managers up to speed with the latest in scientific advances. Analysis and scientific review of program-gathered data will continue to guide the APHIS PPQ regulatory actions. The review process was helpful in articulating program visions, goals, and clearly defined action items.

APHIS PPQ will strive to continue to facilitate the National dialogue and to improve alignment of efforts among all parties. APHIS PPQ, through conference calls, dialogues and meetings, encourages and looks forward to receiving regular feedback on parts of the program that are working well and those that need improvement. The program will continually improve through engagement of stakeholders.

APHIS PPQ appreciates the contributions of NPB, the nursery industry, USDA Forest Service and USDA Agricultural Research Service, Clemson University, Oregon State University, and PPQ personnel for their commitment to improvement.