

Re-assessing *Phytophthora ramorum* Regulatory Framework – Impact of Pathogen Presence in Commercial Nurseries and Wild Land Environments

Executive Summary

Since the publication of the *P. ramorum* interim rule in 2007, APHIS-PPQ has explored several avenues to obtain consensus on the objectives of the regulatory program and meet its goals. The principal objective of the program, which is to protect native biodiversity and wild land environment from Sudden Oak Death (SOD) disease, was reaffirmed during recent stakeholder consultations. For the past several years, input from stakeholders, better scientific knowledge, and novel detection methods have helped APHIS to develop and implement several scientifically-based protocols and remediation strategies that have reduced the risk of the pathogen being moved through shipments of infested nursery stock. Despite the progress made, *P. ramorum* continues to be moved around and has subsequently established itself in a number of retail and wholesale nurseries in several non-regulated states and through these nurseries into streams and waterways. Newly developed diagnostic methods have improved the detection levels of this cryptic pathogen in nursery stock. Based on 10 years (2001-2010) of regulatory data, enhanced understanding of the science, and current realities, the general consensus is that a more targeted and focused regulatory framework is needed to reduce the potential for pathogen movement in nursery stock in order to protect valuable forest resources and the nursery industry. In addition to survey and detection within nurseries, implementation of Best Management Practices (BMPs) is crucial to avoid the introduction and/or reoccurrence of *P. ramorum* within the nursery production system. Industry-wide application of BMP's is still at an early stage. Under the current *P. ramorum* policy, APHIS regulates establishments only in the regulated states of California, Oregon, and Washington, whether they ship host or non-host plants and whether diseased plants are detected or not.

Under the revised framework proposed here, interstate shipping establishments will be regulated wherever it occurs not only when diseased host plants are found, but also when the *P. ramorum* pathogen is detected in soil, water, or other articles. This will require establishments that are confirmed for the presence of *P. ramorum* to be under compliance and complete a Critical Control Point (CCP) assessment. Implementation of Best Management Practices (BMP) will be required to be address any shortfalls identified in the CCP before interstate movement of host material can occur.

This approach will further reduce risk by shifting program emphasis more towards mitigating the risk within the entire domestic nursery production system rather than in just the 3 currently regulated states. This proposed shift would not affect the current quarantine regulations that are in place in 14 counties in California and a portion of the Curry County in Oregon where the disease (SOD) is evident in the environment

The proposal categorizes the movement of restricted articles from regulated areas and associated regulatory requirements into three broad areas:

- 1) Regulating the interstate movement of host plants from nurseries and other restricted articles from areas where *P. ramorum* is established and is causing disease on plants (e.g., areas where SOD occurs, as in CA and OR)

August 2, 2011

- 2) Regulating the interstate movement of host plants from nurseries that use water that has tested positive for *P. ramorum* (e.g., irrigation ponds, rivers, and streams that test positive for *P. ramorum* as determined through official regulatory samples); and
- 3) Regulating the interstate movement of host plants and other restricted articles from wholesale and retail nurseries that have tested positive for *P. ramorum* on plants, in soil or water.

Revising our current regulations will address several regulatory, commercial, and environmental issues raised by stakeholders; allow APHIS PPQ to use its resources more strategically to address *P. ramorum* issues; and provide incentives for BMP adoption within the nursery production system.

Background and History of *P. ramorum* Regulatory program

P. ramorum causes mortality of several oak tree species and also twig and foliar diseases in numerous native and non-native ornamental plants, shrubs and trees. This disease on nursery stock has been reported in the United States, Canada, the United Kingdom, and elsewhere in Europe. It has also been detected in limited areas of the environment on trees in the United States and the United Kingdom. The primary potential threat of *P. ramorum* is to the forest ecosystems. A Federal quarantine was enacted when *P. ramorum* was discovered in several counties in California and in a portion of a county in Oregon. The quarantine has since been expanded to 14 counties in California and a significantly larger area within the same county in Oregon where the disease is present in the environs. After *P. ramorum* was discovered in the nursery system on the west coast, an emergency Federal Order was enacted for the entire states of California, Oregon, and Washington in an effort to eliminate the disease in the nursery environment and prevent further movement. At present an interim rule (7 CFR 301.92), provides the regulatory framework for movement of nursery stock from both the quarantined areas and the regulated areas in California, Oregon, and Washington. Although, the current regulation has been successful in reducing the long-distance human-assisted movement of *P. ramorum*, it continues to be found in nursery stock, soil, and/or water in a small number of nurseries in several states across the nation and the pathogen continues to be detected each year in nurseries that have been previously negative.

Summary of recommendations from Program Reviews and Working Groups

In 2009 and 2010, APHIS and the National Plant Board (NPB) gathered stakeholder input and implemented several initiatives to evaluate the program's operational components and identifying program strengths, weaknesses, and areas needing improvement. Stakeholders included the nursery industry, Continental Dialogue Initiative, California Oak Mortality Task Force (COMTF), The Nature Conservancy, and the scientific community. The consulting process included: 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; and d) NPB / PPQ dialogue meeting held in November 2009. These efforts culminated in the *P. ramorum* National Program Review, which was held in Riverdale, MD on December 15–16, 2009. The primary goal of the *P. ramorum* National Program Review was to clarify the program vision and goals and recommend action plans. As a follow-up to the review,

APHIS-PPQ established several regulatory working groups, consisting of Federal and state agencies, to provide a forum to discuss regulatory issues related to the *P. ramorum* program. The findings of the above review process have been published and consultations are on-going with the various stakeholders.

Several short-term action items have been initiated, including a review of the confirmed nursery protocols, in-depth analysis of port-of-entry (Q37) data, re-initiation of the *P. ramorum* National Survey, analysis of data on positive host species and nurseries, piloting nursery assessment teams to assist nurseries, and several applied research efforts on soil remediation. Research initiatives on soil and water remediation and disease epidemiology are being coordinated by APHIS-PPQ's Center for Plant Health Science and Technology (CPHST) at the National Ornamental Research Site at Dominican University in California. Discussions are ongoing on long-term action items such as developing clear guidelines (triggers) for regulation and deregulation, revision of Q37 program and revision of regulatory protocols for *P. ramorum* nurseries that include BMPs, and the establishment of CCPs.

Maintaining the regulatory status of areas currently quarantined for SOD in CA and OR

Since the initial outbreak of SOD in the environment in California and later in Oregon, 14 counties in California and one county in Oregon have been quarantined for the presence of *P. ramorum* and shipments of several articles that are pathways for movement from these areas are restricted. Efforts to manage the disease in the wild land were curtailed in California due to lack of effective eradication methods. Several years of efforts to eradicate SOD in Oregon have resulted in limited success, thus, the program has shifted towards slowing the movement of *P. ramorum* into new areas. There is still the risk of pathogen movement from quarantined areas through infected plant material, soil, and related articles. As available eradication methods are not generally effective against *P. ramorum* in the natural environment, the consensus is to maintain the current quarantine status of areas in California and Oregon and to adopt strategies to slow the movement of the pathogen, when feasible.

- 1. Regulated Area Category: Requirements for interstate shipment of regulated articles from areas where *P. ramorum* is established in the natural environment and is causing disease (SOD) on plants:** Regulated articles and conditions for movement would remain similar to those that currently exist for the areas under quarantine for SOD in the natural environment in California and Oregon. In addition, the same regulatory requirements would exist for additional areas within the United States that are determined to have *P. ramorum* established in the natural environment and causing disease (SOD) on plants. Removal of an area from quarantine would require a minimum of two years of negative disease survey data from the affected area beginning at the time of the last confirmed positive. Methods for large-scale eradication of the *P. ramorum* pathogen in natural environment are currently not available.

Proposed regulations on the movement of host nursery stock interstate from nurseries utilizing water for irrigation from irrigation ponds, water ways, and streams confirmed for the presence of *P. ramorum*

In spite of success in limiting the interstate movement of the pathogen through nursery stock, surveys conducted by APHIS-PPQ and state cooperators in several quarantined, regulated, and non-regulated areas in the United States have shown that the pathogen can survive within nurseries, in soil and irrigation ponds and eventually move into adjoining water ways (streams, rivers). Since the initial discovery of the pathogen in the wild lands of the coastal counties of California, and later in the State's nurseries, extensive surveys for *P. ramorum* outside the nursery environment (vegetation and waterways) have been conducted by the USDA Forest Service (FS), State Departments of Forestry, Natural Resources, and university researchers. The survey results suggest that in the 15 California and Oregon counties that are currently quarantined, the source of the pathogen in the waterways is largely the sporulating host trees, however the source of the pathogen in the waterways in the regulated areas are linked to nurseries where *P. ramorum* is established in their soils.

In non-regulated areas of the United States, where symptomatic plants are not present in the environment, the relatively recent detections of *P. ramorum* in waterways appears to be the consequence of nurseries where *P. ramorum* has become established in the soil profile. Once the ground or soils upon which a nursery is located becomes infested, eradication is difficult. Established infestations may result in contamination of water ponds, used for irrigation or holding run-off water. Run-off from infested ponds often facilitates further movement of *P. ramorum* into adjoining streams and rivers. Since 2010, APHIS-PPQ reinitiated nursery surveys to detect *P. ramorum* pathogen using sensitive water and soil baiting tests in several non-regulated states.

Since 2007, the FS has been monitoring streams and the surrounding vegetation associated with positive nurseries in several states in the vicinity of nurseries where *P. ramorum* had been detected in nursery stock. Surveys conducted by USDA-FS since 2007 in 476 locations in the East have identified 8 positive streams in 5 (MS, AL, GA, FL, and NC) states associated with *P. ramorum* infested nurseries. Outside of the quarantine counties, in both the regulated and non-regulated areas around the country, there have been only two (in Mississippi and Washington State) highly localized instances where *P. ramorum* has been detected on vegetation adjacent to a positive stream bed or ditch. The infected vegetation was removed and subsequent monitoring has not revealed any additional infections on surrounding host plants. The initial source of the pathogen in the above two instances was a positive nursery located within meters of the positive plants. FS surveys have also shown that once *P. ramorum* has been detected in a stream/river, subsequent tests of the same waterways have always been positive indicating that the pathogen has established itself, most probably in the soil profile at its source and/or along the stream. The risk maps developed by APHIS and FS have shown several areas/states in the south and the east of the country to be at risk for disease establishment.

Therefore, we propose regulating interstate movement of host nursery stock from nurseries using water for irrigation from waterways, streams or ponds found to be positive for *P. ramorum* host plants. BMPs (e.g., chlorination of water; improved sanitation practices) should be in place to

protect host plants from becoming infested with *P. ramorum* before the nursery is certified as an interstate shipper of host nursery stock.

2. Regulated Area Category: Requirements for nurseries that ship host nursery stock interstate and use water for irrigation from irrigation ponds, waterways, and streams confirmed for the presence of *P. ramorum*:

Certification would be required for the interstate movement of host plants from nurseries that utilize water for irrigation from irrigation ponds, water ways and streams confirmed for the presence of *P. ramorum*. BMPs would be required to mitigate *P. ramorum* from irrigation water before the nursery is certified for inter-state shipment of host nursery stock.

Risk based strategic use of resources to address *P. ramorum* movement in nursery stock

When *P. ramorum* was initially discovered on host plants in wild lands in the mid 1990's and soon after in nurseries in California, Oregon, and Washington, very little was known on the extent of its presence and the perceived risk of pathogen movement from the environment into nurseries and vice-versa. To address the risk of its further movement in 2004, interstate shipments of *P. ramorum* host plants from the entire states of California, Oregon, and Washington were regulated.

Since the detection of *P. ramorum* in nurseries in 2001, a total of 464 nurseries located in 27 states have tested positive for the pathogen. The detections were in both retail and interstate shipping nurseries located mainly in the regulated states of California (40%), Oregon (18%), and Washington (17%), and the rest of the country accounted for the remaining 26%. The majority (70%) of these detections were in 2004 and 2005 due to infected plant material being shipped interstate. Although trace incidents have been reduced significantly since 04-05, nationally *Phytophthora ramorum* continues to be detected either on plants, or in soil and water in a smaller number of nurseries surveyed. At present, almost 60-70% of the detections still occur in the regulated states of CA, OR and WA, and a smaller number in non-regulated states.

Nurseries in non-regulated states are subject to only temporary regulations (Emergency Action Notifications) and are not subject to annual certification surveys. In spite of the presence of *P. ramorum* in several nurseries in the currently regulated states and in a few non-regulated states, disease outbreak on host trees or other host vegetation in wild lands surrounding the positive nurseries has not occurred so far at any of the sites. The risk associated with the movement of the pathogen from infested waterways and streams into landscapes is still being researched. Risk maps based on disease epidemiological models developed in the United States and in the United Kingdom have shown that the presence of the pathogen and the host along with optimal climatic conditions is necessary to cause an environmental outbreak of the disease. Based on the current science and 10 years of regulatory data, we propose to focus the regulatory framework to include all positive interstate shipping nurseries throughout the United States and to deregulate those nurseries where *P. ramorum* has never been detected in the regulated areas of CA, OR and WA. However, interstate shipping nurseries located in the 14 quarantined counties in CA and Curry County Oregon will continue to be regulated. Nurseries that are recipients of infected host plants through trace forwards and are certified that the pathogen has not established at the site however, will not be included under the revised regulatory framework.

At present in a regulated area, *P. ramorum* detections in a nursery on host plants triggers regulatory actions, however, presence in soil or water within the confines of a nursery or outside in the wild lands does not. There is ample scientific evidence now to justify establishment of a regulatory action on such facilities where the presence of *P. ramorum* in the nursery environment poses a significant risk and requires mitigation of infested soil, potting media and or water, unwashed pots, or infected nursery stock. The cryptic nature of the pathogen, especially on asymptomatic plants and in potting media renders its detection difficult and this has on some occasions, resulted in the pathogen being shipped interstate. While an APHIS regulatory framework exists for nursery inspections in the regulated areas and for certification of interstate shipments of host plants, inspection of nursery shipments in non-regulated areas are not required. When *P. ramorum* is detected in a nursery located in a non-regulated area, the only regulatory trigger is a short term Emergency Action Notification and yearly sampling. Further inspections after the defined quarantine period is completed are not required. Regulating nurseries for the presence of the pathogen will reduce further inter-state movement of the pathogen via nursery stock. Unlike disease development in the natural environment, which is highly influenced by climatic conditions and geography, the nursery environment provides a microclimate that is conducive for pathogen proliferation and disease development irrespective of its location. A large portion of the regulatory resources currently used for surveying non-host nurseries in California, Oregon, and Washington could be better utilized to survey and certify infected host nurseries located around the country.

We therefore propose to regulate nationally only those nurseries that ship interstate and are also confirmed for the presence of *P. ramorum* in plants, water, soil, or on any related articles. Conversely, we are proposing that nurseries in states previously regulated for *P. ramorum* that have never or are no longer infested with *P. ramorum* be de-regulated. Depending upon the persistence of *P. ramorum* in nurseries, performance-based BMPs will be required for interstate shippers.

3. Regulated Area Category: Requirements for interstate shipping nurseries that are positive for *P. ramorum* (in soil, water or plants)

Certification requirements for interstate movement of *P. ramorum* host plants from nurseries that are infested (positive) for *P. ramorum* would be largely similar to those that currently exist in the regulated states. Regulations will be applied on nurseries when *P. ramorum* is detected not only on plants, as currently practiced, but also when the pathogen is detected in water, soil, or any other component of a nursery. All positive nurseries will be under APHIS compliance agreements and will be provided with the APHIS CCP/BMP guidance document/checklist and in some cases adopt BMPs based on Critical Control Point assessment in order to ship host plants interstate. After 2 years of negative survey data (plant and water testing), a nursery would be deregulated.

For repeat positive nurseries, additional certification requirements would include increased frequency of inspection and sampling, as well as a mandatory CCP assessment. Once assessments have been completed, the repeat positive nurseries would then be required to select appropriate performance based BMPs to address CCP issues identified in the assessment report. After the implementation and adherence to appropriate BMPs and 2 years of negative survey data (plant and water testing), nurseries would only be

required to adhere to an annual inspection and sampling and plant certification for interstate movement.

Conclusion

By realigning the current regulatory framework with the scientific knowledge and the need for enhanced efficacy, APHIS plans to meet the objectives of the regulatory program and the program vision statement developed during the National Program Review in 2009. The *P. ramorum* Program Review concluded that, “*The program will take a proactive approach to protect native biodiversity, wild lands, and managed landscapes from Phytophthora ramorum through a system of voluntary (which we interpret as performance based Best Management Practices) and mandatory approaches focused on Critical Control Points.*” Key concepts that will help us to better utilize limited resources, address risks associated with pathogen movement into the environment, reduce the regulatory burden, and application of risk-based regulations across the country are:

- a) Maintain the regulatory status of environmental areas currently under quarantine for SOD disease in California and Oregon
- b) Regulate only host nurseries shipping interstate and confirmed positive for the presence of the disease and/or presence of the pathogen *P. ramorum*; (e.g. on plants, in potting media, pots, water, soil or related articles)
- c) De-regulate host nurseries previously regulated where *P. ramorum* can no longer be detected and non-host nurseries where *P. ramorum* has never been detected within currently regulated (non quarantine) areas in California, Oregon, and Washington;
- d) Regulate interstate movement of host plants from nurseries that utilize water sources where *P. ramorum* is present.

Revising the regulations will address several concerns raised by stakeholders and enable APHIS to use its resources more strategically to address *P. ramorum* issues in the nursery production system. The regulatory framework discussed herein will provide incentives to nurseries that are pro-active in reducing the risk associated with the presence of *P. ramorum* in their host plant production systems.