

# ***Phytophthora ramorum* – Economic Impacts and Challenges for the Nursery Industry<sup>1</sup>**

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## **Abstract**

In March 2004, a large wholesale nursery in southern California, which ships to interstate receivers, was found to have *P. ramorum* infected nursery stock. As a result, several of the southeastern states placed a ban on all nursery stock shipping from California. Federal regulatory agencies were not able to provide background information and current research data to the states in a timely manner. As a consequence, many states instituted specific bans on host and associated host plants (HAP) of *P. ramorum* or on HAP to the genus level.

Complicating this situation, many southeastern states had a lack of confidence in California regulatory programs intended to prevent the transmission of the pathogen via nursery stock. Much of this mistrust had a foundation in the lack of communication of existing epidemiology, the gaps in basic biological information on *P. ramorum* and the lack of harmonization of regulatory approaches between California, Oregon, Washington and the Federal government.

Many state regulatory agencies were not aware of the USDA Sudden Oak Death (SOD) Compliance Agreements that formed the basis of operation for nurseries within the regulated counties of California since 2003. Further, they were unaware of the recommended Best Management Practices and how these are directly linked to current research findings that validate them. Equally, communication regarding the purpose and value of the USDA – Forest Service and California Department of Forestry and Fire Protection monitoring programs, which began in early 2000, was lacking.

When the state regulatory agencies, the federal regulatory agencies and the industry are not extensively communicating, the most severe economic consequences always fall to the industry.

*Key words:* *Phytophthora ramorum*, confirmed nursery, economic impacts

## **Economic impacts associated with instituting prevention programs**

Economic burdens inherited by the industry may take the form of a one-time cost, such as soil management, or a recurring cost, such as prophylactic crop treatments. The extent of this burden will differ depending on the physical and geographical location of the nursery, environmental factors/influences and disease pressures. In addition to the costs associated

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with prevention programs, such as switching the type of soil-less media component, nurseries may opt to alter their product mix and grow less susceptible varieties. In a ripple effect of economic impact, this strategy has clear potential repercussions in the long-distance market area if specific crops cannot be grown locally and are not available in prime shipping slots, such as springtime.

Economic burdens are also associated with implementing tracking programs for inventory management and audit trails, water disinfection programs, including choice of treatment and associated water testing, and costs associated with labor practices.

Labor practices may include the redesign and implementation of the nursery field layout, wherein non-host material is interspersed as two meter or wider swaths between HAP. It is widely accepted that economics of scale and efficiency are gained when managing large, uniform blocks of crops; however, large blocks need to be broken up, should a find occur, in order to minimize the impact of a mandated or voluntary destruction protocol.

Another management practice that may be desirable to a nursery is to implement ELISA prescreening tests during the time of year when the pathogen is most prevalent. This has clear labor consequences and costs. If an ELISA screen is positive for general *Phytophthora* spp. (a *P. ramorum*-specific ELISA screen is not available at this time), then the nursery may opt to apply fungicides. The concern is that treatment may be unnecessary for two reasons; the first being that there is no established threshold directly correlated with the presence of *P. ramorum* or the likelihood of the pathogen on any host. Treatment would most likely be triggered based on background population numbers alone. Secondly, current ELISA kits are not specific for *Phytophthora* but also react to Pythiaceae fungi, so treatment may be for the wrong pathogen and unnecessary. Lastly, the treatment may actually mask incipient *P. ramorum* infections.

## **2004 Challenges Associated with the Implementation of the Confirmed Nursery Protocol (CNP) and the Trace-Forward Protocol**

Nurseries may be found to be infected when sampled during the annual nursery inspection or as a result of a trace-back from a nursery that received infected product. Once a nursery has been confirmed to be infected via ELISA prescreen and nested PCR, the CNP is implemented. The main challenge with this protocol in 2004 was the delay in completion of the delimitation survey due to either a backlog at the state level if concurrent finds occur at multiple nurseries in the same state or the fact that the extracted DNA for the nested PCR test must be funneled through one USDA lab in Beltsville, MD. Due to the backlog in testing, salable plants are destroyed.

Additionally, a confirmed nursery has two options under the CNP. They may either hold product within a 10-meter hold area for a 90-day period and resample twice within that period, or the nursery may destroy all HAP to the genus level within the production lot plus two

meters and the 10-meter hold area. As a result of the backlog in sampling and testing, it is impossible to resample twice during a 90-day period and nurseries generally opt to destroy the plants in the 10-meter hold areas. Once again, healthy, salable plants are needlessly destroyed.

State Regulatory agencies that are attempting to track down the potentially infected material in their state are frustrated because they receive a full listing of all the HAP that were shipped into their state over the previous 12 months instead of a prioritized list of what product was found to be infected at the confirmed nursery. Unfortunately the information is provided to them prior to the completion of the confirmed nursery delimitation survey so the state agency has to determine which nurseries may be at highest risk of receiving infected product while not knowing what product was actually infected.

Another challenge the industry faces is having HAP product from one vendor commingled with product from another vendor. Should a trace forward identify that a nursery may have received infected product, all vendor HAP are pulled together and samples are pooled together. This makes the assumption that there is only one source of infected material and all vendors now have their product held pending test results. Frequently the retail yard requests that the product be disposed of properly because they cannot afford to wait the 4-6 weeks for the test results from the state or the federal government. In each case, the confirmed nursery pays for the disposal of all vendors product and for all product replacement costs.

One state, in particular, had applied the CNP at the retail level, which resulted in non-host material being held, all vendor's material being held, and the closing of many retail yards until the error in their interpretation was discovered and corrected.

Another challenge the industry faced was the remediation of trace-forward product. Finding an acceptable method of destruction (either incineration or deep burial) was, at times, very time consuming. In some locations, conflicting jurisdictions and regional or county regulations added to the cost and frustration. This resulted in retail yards holding the product for two or more months while waiting for an acceptable site to be located. This created a high level of concern for the retailer's reputation due to name-association with SOD. Reputations are difficult to rebuild after such events as well as being costly to repair.

## **Improvements for the Future**

Improvements for the future need to include the following:

- The transfer of information in a timely manner;
- The potential utilization of UPC codes to determine origin of product (nationally and internationally);
- The trace-forward protocols to include prioritized list of infected plants from the confirmed nursery;
- Validation of accurate, timely tests;
- More accredited lab facilities;
- The avoidance of multi-vendor pooling of samples.

Due to the high financial consequences of *P. ramorum* introductions/occurrence, the industry needs all regulatory components to be functional, timely, and seamlessly coordinated. The following regulatory programs play a critical role in achieving this:

- The annual nursery inspection;
- USDA SOD Compliance Agreements;
- County Agriculture agencies linkage with State agencies;
- Restrictions on buy-ins from outside of the country;
- USDA SOD Order.