Assessment of Potential Economic and Environmental Impacts Caused by *Phytophthora ramorum* in Europe[1]

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Abstract

Economic and environmental impacts of *Phytophthora ramorum* in Europe were evaluated within the European Union framework 6 project on "Risk Analysis for *P. ramorum* a pathogen threat to Europe" (RAPRA). Impact assessment was conducted according to three different scenarios: 1. "Nursery System" - describes losses occurring in nurseries where special growing conditions and trade with plant material influence spread and dimension of the disease, 2. "Northern European Tree Host System" - based on observations in the United Kingdom, the Netherlands and Germany where infections of trees (beech, red oak) at forest or park sites only occur, when *Rhododendron* as a foliage host is present to a certain extent and 3. "Southern European Tree Host System" where a potential foliage host is *Quercus ilex* growing as an understory plant in combination with susceptible tree hosts. Taking climatic conditions favourable for the pathogen, distribution of host plants and pathogen distribution into account, the present economic and environmental impact in Europe is minimal to moderate. Potential impacts depend on the host system: for nurseries, facing higher costs for hygiene measures, treatments of plant material and trade impacts, no changes are expected in the future as long as basic conditions like plant health regulations are not altered noticeable. In the "Northern European Tree Host System" present impacts are moderate and restricted to few areas where *Rhododendron* are associated with tree hosts and environmental impact is caused. The potential impact is expected to be not more than moderate as long as no widely distributed foliar hosts of Northern European forests occur. In the "Southern European Tree Host System" present impacts are minimal since the pathogen does not occur in the environment. But here potential impact is assumed major if *P. ramorum* would be introduced and spread in the unique Mediterranean laurel and *Q. ilex* forests.

Key words: *Phytophthora ramorum*, sudden oak death, economic impact, environmental impact, plant health.

Introduction

Potential impacts caused by *Phytophthora ramorum* in Europe were assessed within the European Union (EU) framework 6 project on Risk Analysis for *P. ramorum*, a recently recognized pathogen threat to Europe and the cause of Sudden Oak Death in the United States (U.S.) (RAPRA, www.rapra.csl.gov.uk). Impacts are to be expected where climatic conditions are favorable for the development of the pathogen and susceptible host plants are present. This comes on the one hand true for nurseries

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growing host plants with optimized growing conditions for the pathogen. For the natural environment on the other hand there are different areas in Europe more or less suitable for the pathogen, depending on the distribution of host plants and climate data. In order to cover the most important scenarios, three different impact scenarios were assumed (see also Steeghs 2007):

1. The **Nursery System** describes losses occurring in nurseries where special growing conditions and trade with plant material favour spread and dimension of the disease.
2. The **Northern European Tree Host System** with *Rhododendron* as a foliar host next to tree hosts (for example beeches) which is based on observations in the United Kingdom (U.K.), the Netherlands and Germany where infections of trees (beech, red oak) at forest or park sites only occur, when *Rhododendron* as a foliage host is present to a certain extent where the pathogen produces enough inoculum.
3. The **Southern European Tree Host System** with maquis and heathland plants growing as understory plants in combination with susceptible tree hosts with *Quercus ilex* as a potential foliage host where the pathogen produces enough inoculum.

Results and Conclusions

Based on the three scenarios the present economic and environmental impacts caused by *P. ramorum* in Europe are minimal to moderate (Table 1). Nurseries are facing higher costs especially for additional hygiene measures, treatments of plant material and impacts on trade with host plants of *P. ramorum*. These impacts are not expected to change in the future as long as basic conditions (like plant health regulations) are not altered noticeably. In the Northern European Tree Host System present impacts are moderate. They are restricted to few areas where rhododendrons are associated with tree hosts (special areas in the Netherlands and Great Britain). In these areas environmental impacts were caused to a certain extent. The potential impact for Northern European areas at risk is expected to be not more than moderate as long as no other foliar hosts with potential for high inoculum production in the forests and parks occur. In the Southern European Tree Host System present impacts are minimal since the pathogen does not occur in the environment. But potential impact is assumed major if *P. ramorum* would be introduced into the Mediterranean laurel and *Quercus ilex* forests. Climatic conditions for establishment and spread of the pathogen in these regions are very favourable according to R. Baker, 2006, Central Science Laboratory, U.K., member of RAPRA consortium, unpublished climate matching results for *P. ramorum*).

Table 1—Present and potential impacts of *Phytophthora ramorum* in Europe for three different host plant systems (scenarios)

Scenarios	Present Impact[1]	Potential Impact[1]	Likelihood[2]
Nurseries	moderate	moderate	very likely
Northern Europe	moderate	moderate	likely
Southern Europe	minimal	major	possible

[1] rating: minimal, minor, major, moderate, massive (according to DEFRA 2005)

[2] rating: very unlikely, unlikely, possible, likely, very likely (according to DEFRA, 2005)

Compared to the Sudden Oak Death situation in the U.S., Europe is facing - up to now - a very different impact situation: impacts due to *P. ramorum* in Europe are less severe and very restricted so that containment measures can help to prevent spread to other European regions at risk (like Mediterranean areas with susceptible tree hosts and favourable climate). The benefit of the phytosanitary measures has to be evaluated within a cost-benefit analysis.

Literature Cited

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