

# Plant Imports, Phytophthoras, and Forest Degradation<sup>1</sup>

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## Abstract

Numerous ‘exotic’ tree pathogens are arriving in Europe, North America, and elsewhere due to flaws in current international plant health sanitary and phytosanitary (SPS) protocols. These include lack of protection against the many organisms unknown to science, an emphasis on promoting trade rather than promoting environmental biosecurity, a steadily increasing globalization of the trade in rooted plants, and the failure of regulatory authorities to take meaningful and effective action (Brasier 2005, 2008; Liebhold et al. 2012, Webber 2010). The United Kingdom, for example, has experienced multiple major tree disease events involving introduced pathogens in commercial forests, woodlands, and urban trees over the past decade, from alders and horse chestnuts to pines and larches (Brasier 2012). The situation in the United Kingdom is effectively a full blown, though largely un-trumpeted, forest and amenity tree biosecurity emergency.

*Phytophthora* species are particularly well suited to spread on imported plants, being frequently soil inhabiting, favored by irrigation and other factors in intensive nurseries, and occurring as latent sporulating infections in symptomless host material (e.g., Denman et al. 2009, Vercauteren et al. 2013). About half of the current disease outbreaks in the United Kingdom are caused by introduced *Phytophthora* spp., among them two different evolutionary lineages of *P. ramorum* (EU1 and EU2). The possible scale of the *Phytophthora* threat is further indicated by an estimate that there may be 100 to 500 *Phytophthora* spp. unknown to science in underexplored ecosystems – the “invasives in waiting” (Brasier 2009). A significant proportion of these unknowns could be a threat to forest health in the future if they are introduced beyond their native range.

Much of the blame for the forest biosecurity crisis is attributed to high-volume plant imports. However, specialist plant collecting nurseries, amateur and professional plant collectors, and person-to-person transfer of imported plants are also part of the problem; although it should be emphasized that many plant collecting professionals, such as those attached to botanic gardens, often operate to the highest quarantine standards. It is now well documented that chestnut blight was introduced into Britain in 2011 on highly specialized imports of *Castanea sativa* Mill. Small, highly specialized plant imports are suspected to have been involved in the recent introduction of *P. tropicalis*, *P. kernoviae*, *P. niederhauseri* and the new EU2 lineage of *P. ramorum* (Van Poucke et al. 2012) into the United Kingdom. However, conclusive evidence is often difficult to obtain. Sometimes this is because affected plant material or relevant documentation has been destroyed. Sometimes it results from a requirement for official confidentiality about the relevant parcels of imports and the locations of infested propagation sites. The latter practice is highly questionable as it is probably one of the major blocks to achieving adequate plant biosecurity, obscuring reality from the public and the press. The need for better education of nurserymen, horticultural journalists, and the wider public is another (Brasier 2008).

The risk of bringing in unknown *Phytophthora* spp. on plants from underexplored forest ecosystems is illustrated by recent dedicated surveys in parts of Asia, such as Nepal and Taiwan, where the apparently endemic species *P. himalsilva* sp. nov. and *P. lateralis* have been discovered in remote forest locations (Brasier et al. 2010, Vettrano et al. 2011). Similar surveys indicate that Nepal may also be inadvertently introducing exotic *Phytophthora* spp. into its Himalayan foothill areas. Thus, in recent soil samples from a visually healthy forest area in the remote Bajura District of western Nepal, only two, probably endemic, forest *Phytophthora* spp. were found. This was in marked contrast to similar samples from a degraded forest area near Kathmandu, in the vicinity of a nursery specializing in introduced *Castanea* spp. These samples yielded nine *Phytophthora* species, many of them species already prevalent in forests elsewhere in the world and therefore probably recently introduced exotics (A. Vannini, A.M. Vettrano and C.M. Brasier, unpublished data). Until the present,

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<sup>1</sup> A version of this paper was presented at the Sudden Oak Death Fifth Science Symposium, June 19-22, 2012, Petaluma, California.

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<sup>3</sup> Disclaimer: The views expressed are solely those of the author and do not represent the views of any institution.  
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such studies have been fragmentary and carried out largely by committed volunteers. Many more such studies are needed, as they are critical to enhancing our knowledge base in the fight against the importation of exotic pathogens into forest ecosystems. Is it time for regulators, funding agencies, and plant collectors to get involved?

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