

# The Origin of the Deadly Tree Disease by *Phytophthora ramorum*

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## EDITORIAL

The harmful tree pathogen *Phytophthora ramorum* is thought to have originated in East Asia's laurosilva forests, according to recent research. The study was part of an EU Horizon 2020 project called Pest Organisms Threatening Europe, which aimed to learn more about the origins of numerous *Phytophthora* species that are particularly harmful to trees in the UK and Europe. In 2017 and 2018, Forest Research scientists went on expeditions to Vietnam and Japan's forests to collect rivers and soils for *Phytophthoras*. The work was done in collaboration with others. Many distinct *Phytophthora* species were identified, including ones that were previously unknown to science, but the most notable was *P. ramorum*, which was discovered in northern Vietnam and southwest Japan.

*P. ramorum*, a species that was brought to North America and Europe over two decades ago, has killed millions of oak trees in the United States and a similar number of larch trees across the western British Isles. The 70 *P. ramorum* isolates collected during the surveys were analyzed, revealing eight novel genetically and behaviorally

different lineages in the area. Although they demonstrate varying degrees of relatedness to the North American and European lineages, the eight Asian species do not correspond to any of the identified lineages actively invading Europe and North America, with one Asian lineage from Japan most closely related to the NA2.

*P. ramorum* is a native dweller of the laurosilva forests that exist between eastern Indochina and Japan, according to several lines of evidence. The lineages discovered are evolutionarily old and have diverse adaptations; they are thought to have diverged from a common ancestor million years ago. The numerous glacial periods that induced geographic isolation and permitted genetic divergence within the ancestral population of *P. ramorum* are thought to have fueled their evolution. The findings also raise other important concerns, such as why, if some *P. ramorum* lineages are native to Japan, native Japanese larch in that nation appears to be disease-free, in contrast to what happens to the same host in the UK? Also, as comparison to the two existing *P. ramorum* lineages, how big of a threat do the other new *P. ramorum* lineages offer to shrubs and trees in the UK?

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