Forest ecosystems face unprecedented challenges from the rising rate of influx of alien invasive pests and pathogens resulting from increased global trade. Moreover, climate change predictions suggest that many additional alien pests and pathogens may become problems in forests as temperatures increase and rainfall patterns change. Recent indications of the potential for pathogens to transfer between hosts and the inter-specific hybridisation possible between related pathogens increase concerns over the possibility of escalations in damage in the future. Why are these organisms such a threat? Using examples drawn from wide-scale environmental damage caused to tree populations and forest ecosystems in Europe and elsewhere in the world, in this talk, we will illustrate the potential of alien pathogens to reduce biodiversity, alter ecosystems beyond recognition and impact on human requirements of forests.

Classic examples of devastation by alien invasive pathogens affecting trees include Dutch elm disease, caused by *Ophiostoma novo-ulmi*, Jarrah dieback caused by *Phytophthora cinnamomi*, canker stain disease of *Platanus* caused by *Ceratocystis platani*, and white pine blister rust arising from accidental trans-Atlantic transfer of *Cronartium ribicola*. Many other examples exist in Europe and elsewhere in the world. Each of these pathogens still causes severe ecosystem damage in areas of introduction. Recent findings obtained from the application of state-of-the-art tools in molecular biology are reshaping our knowledge of alien invasive pathogens. The advent of these molecular biological techniques has greatly enhanced our ability to analyse aspects related to the biology, taxonomy, hidden biodiversity and temporal and spatial structuring of genetic diversity in organisms. Molecular diagnostic assays have resulted in improved detection methods for pests and pathogens based on molecular profiles, that are essential for accurate and rapid detection and enhanced understanding of the pathways of dispersal locally and internationally. This information greatly increases the reliability of pest risk assessment procedures and the development of phytosanitary measures aimed at eradicating, containing or managing these pests. The possibility of regulating the ‘plants for planting’ pathway, one of the major routes through which alien invasive problems are now entering and being dispersed in Europe, will be discussed.

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