

Loss of tree species has cumulative impact on biodiversity

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Atlantic oak woodlands on the west coast of Scotland. Credit Ruth Mitchell

Diseases affecting different UK tree species have been shown to have a

multiplying effect on the loss of associated biodiversity, according to new research published in the *Journal of Ecology* by James Hutton Institute scientists and partners in the UK and Portugal. The research team reveals that the decline of ash and oak trees may affect more species than just the ones that only use oak and ash as their habitat.

In the UK, the common ash hosts 45 species that are only found on [ash trees](#), and sessile and pedunculate oaks host 326 species that are only found on [oak trees](#). However, if both [tree species](#) were to be lost, the number of species at risk is 512 due to an additional 141 species that only use oak and ash.

Lead author of the study Dr. Ruth Mitchell, an ecologist within the James Hutton Institute's Ecological Sciences department, said that "When a plant pest or pathogen kills a plant, particularly when it results in the wide-spread loss of one [plant species](#), it also impacts on those species such as insects, mosses, lichens, mammals, birds and fungi that use that plant species for feeding, for nesting or as a living space."

"The impact of plant pests and pathogens on associated biodiversity is rarely considered when [risk assessments](#) for plant pests and pathogens new to the UK are made."

"This work shows that such impacts may be considerable, particularly if multiple host plants are lost that support the same biodiversity, as is the case with the number of different diseases currently impacting the UK's trees."



Dead oak tree due to acute oak decline. Credit Ruth Mitchell

Many species use ash, oak and other tree species and thus should be resilient to the loss of ash and oak as they can use other tree species.

However, when the researchers looked at 24 mixed ash and oak woodlands within the UK, they found that only 21% of the sites were able to continue to support species that use ash and oak if ash and oak were lost. This was because the other tree species that would support this biodiversity were not present at the site, although the site conditions were often suitable for them to grow.

The authors suggest that in risk assessments, higher impact scores should

be given to pests and pathogens affecting hosts occurring with other host plant species already impacted by pests and pathogens.

The work provides further support for a major theme in recent guidance on sustainable forestry, which advocates that [species](#) diversity of multipurpose and conservation woodlands should be increased to enhance their resilience.

Dr. Mitchell added that "current pest and pathogen risk assessment approaches that ignore the cumulative, cascading effects shown in this study may allow an insidious, mostly overlooked, driver of biodiversity loss to continue."

Defra Chief Plant Health Officer, Professor Nicola Spence, commented that "this work reiterates the importance of protecting our native trees. It confirms that the value of our interconnected ecosystems is often more than may immediately meet the eye, and the importance of intelligent woodland management plans to support resilience. Such combinatorial analysis is beneficial to our understanding and further development of available 'toolkit'."

More information: Ruth J. Mitchell et al, Cumulative impact assessments of multiple host species loss from plant diseases show disproportionate reductions in associated biodiversity, *Journal of Ecology* (2021). [DOI: 10.1111/1365-2745.13798](https://doi.org/10.1111/1365-2745.13798)

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