Imperial College London

UKRI — Natural Environment Research Council

2024_72_Kew_LK: Understanding the role of non-native tree introductions in driving new species interactions

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The distributions of many plant species are changing due to human activities, including through intentional plantings outside of native ranges. This movement creates the potential for novel interactions with native organisms, but also for plant-associated species to follow their hosts and expand to new hosts. Whilst many of these novel interactions will be benign, spillover of pests and pathogens to the native flora may have severe consequences. The potential for such harm is one of the concerns surrounding the inclusion of non-native species in tree planting efforts.

As part of commitments towards mitigating climate change, the UK Government has set ambitious targets for woodland creation and increased tree cover. With few native tree species (c. 50) relative to Europe as a whole (c. 450), it is proposed that to adapt UK treescapes to the future climate and ensure resilience to biotic threats we should plant mixes of native and non-native species. Yet, it is also suggested that wider planting of novel non-native species will increase risks to tree health by providing a route for introduction of new pests and pathogens. Current guidance on species selection for woodland creation focuses predominantly on matching with the ecological conditions of the planting site and there is a lack of advice around potential biotic risks associated with different non-native trees.

The likelihood of spillover of organisms from non-native trees to the existing flora is in part governed by phylogenetic relatedness, as pest and pathogen host ranges show phylogenetic signal. We can thus leverage information from phylogenetic trees to help predict future risk of novel interactions. Added to this, the UK has a history of non-native tree introductions over several centuries, furthering the opportunity to address the role that they play in the establishment of new interactions.

This project will combine biological records, phylogenetic and spatial data to evaluate how the introduction of non-native trees has shaped species interactions in the past and predict how they may influence future interactions. The student will: 1. Explore whether non-native trees have facilitated the establishment and spread of new tree-associated organisms. 2. Estimate the likelihood of novel non-native trees increasing pest and pathogen threats to the existing UK flora. 3. Consider how to select species for diversifying UK treescapes that maximise biodiversity benefits whilst minimising risks. A key output will be recommendations to guide choice of non-native species for future tree planting efforts.

The student will join the Plant Health and Adaptation Team at Kew and work alongside researchers investigating the health and resilience of UK trees, woodlands and forests. Kew's unique collections can also be used to help address the project aims, potentially supported by fieldwork, depending on the interests and skill development targets of the candidate.

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