News Reporting

झारखंड केंद्रीय विश्वविद्यालय, रांची के डॉ. पूरबी शइकिया ने देशी वनों पर आक्रामक पादप प्राजाति की तीव्रता पर अंतरराष्ट्रीय प्रसिद्ध पत्रिका 'नेचर' में शोध आलेख प्रकाशित किया

झारखंड केंद्रीय विश्वविद्यालय, रांची की डॉ. पूरबी शइकिया ने अंतरराष्ट्रीय प्रसिद्ध पत्रिका 'नेचर' (प्रभाव कारक/ Impact factor 64.8) में विदेशी आक्रामक प्रजातियाँ की गंभीरता के विषय पर एक शोधलेख विश्वस्तर के शोधकर्ताओं के एक समूह के साथ अगस्त 2023 में प्रकाशित किया है । यह शोध लेख https://doi.org/10.1038/s41586-023-06440-7 पर उपलब्ध है।

इस लेख में, उन्होंने विश्व भर में गैर-स्थानीय पादप प्रजातियों (invasive species) के आक्रमण के स्थापना और आक्रमण की तीव्रता पर स्थानीय पादप समुदायों की जैववर्गीय और कार्यात्मक विविधता, मानव दबाव, और पर्यावरण का विश्लेषण किया है। उनके शोध से स्पष्ट होता है कि मानवी तत्व पौधों पर आक्रमण की पूर्वानुमान करने में महत्वपूर्ण हैं और आक्रामक प्रजातियाँ की तीव्रता स्थानीय विविधता के अंतर्निहित है, जिसमें उच्च विविधता कम आक्रमण की गंभीरता की भविष्यवाणी करती है । तापमान और वर्षा आक्रामक पादप प्रजातियों के पूर्वानुमान में महत्वपूर्ण चर (variable) सामने के रूप में चिन्हित किया गया हैं। यह शोध गैर-स्थानीय आक्रामक पादप प्रजातियों के वैश्विक परिचित्र प्रस्तुत करता हैं, जिसपर देशी वनों के जैववर्गीय और कार्यात्मक विविधता पर पादप प्रजातियों की स्थापना और प्रसार में मानवजनित प्रभाव महत्वपूर्ण भूमिका निभाते हैं। डॉ. शइकिया ने पूर्व में नेचर जर्नल में शोधकर्ताओं इसी समूह के साथ एक और शोध लेख प्रकाशित किया था, जो वन वृक्ष सहजीवन तथा जलवायु नियंत्रण के वैश्विक विश्लेषण पर आधारित था (https://doi.org/10.1038/s41586-019-1128-0)' ।

Article

Native diversity buffers against severity of non-native tree invasions

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Determining the drivers of non-native plant invasions is critical for managing native ecosystems and limiting the spread of invasive species[1,2]. Tree invasions in particular have been relatively overlooked, even though they have the potential to transform ecosystems and economies[3,4]. Here, leveraging global tree databases[5–7], we explore how the phylogenetic and functional diversity of native tree communities, human pressure and the environment influence the establishment of non-native tree species and the subsequent invasion severity. We find that anthropogenic factors are key to predicting whether a location is invaded, but that invasion severity is underpinned by native diversity, with higher diversity predicting lower invasion severity. Temperature and precipitation emerge as strong predictors of invasion strategy, with non-native species invading successfully when they are similar to the native community in cold or dry extremes. Yet, despite the influence of these ecological forces in determining invasion strategy, we find evidence that these patterns can be obscured by human activity, with lower ecological signal in areas with higher proximity to shipping ports. Our global perspective of non-native tree invasion highlights that human drivers influence non-native tree presence, and that native phylogenetic and functional diversity have a critical role in the establishment and spread of subsequent invasions.

Plant invasions have multifaceted impacts on ecosystems and human wellbeing across the globe[1–3,8]. It is expected that plant invasions will continue to increase in the coming decades owing to human-assisted introduction and naturalization of these species, with ever-growing impacts on biodiversity within native forest ecosystems[1,9,10]. These invasions will undoubtedly also have considerable economic impacts in managed landscapes by disrupting timber production, agriculture and human livelihoods[11–17]. In particular, non-native trees represent an important and increasing concern globally, as they are often actively planted far outside their native ranges for forestry, reforestation, residential, or ornamental purposes[4,18]. Along with the passive spread of non-native species, the active propagation of trees by humans can often result in an increased potential to become problematic invaders[4,19–21]. Given the prominent roles of trees in shaping the structure and functioning of ecosystems, such tree invasions have the capacity to alter plant composition, productivity, biodiversity and the services provided to humans[1,4,22]. Previous research in invasion ecology has expanded our understanding of community-level properties that influence ecosystem susceptibility to invasion[23–25], as well as traits that make plant species more likely to become invasive[26–30]. However, most work has been restricted to local and regional scales[31,32], with contrasting ecological mechanisms affecting invasion success in different regions. We thus lack a global unified theory of the human and ecological drivers of tree species invasions[33]. Developing an integrated global understanding of ecological and anthropogenic forces that drive non-native tree invasions is critical to improve decision making in conservation and management.

Countless ecological mechanisms have been proposed to explain the susceptibility of different ecosystems to invasion by non-native species in different locations. Traditionally, more diverse or ecologically complex systems are thought to exhibit 'biotic resistance' to invasion[23,34–39]. This hypothesis is based on the assumption that greater diversity in the native community fills the available ecological niches and reduces available resources, limiting niche space to novel species. However, most work has focused on testing this hypothesis using species richness as an indicator of niche filling[23,35], which may not fully capture the proportion of niches that are filled in the native community. Instead, more informative metrics for niche filling may be phylogenetic or functional diversity. Phylogenetic diversity accounts for evolutionary similarity and represents a reasonable proxy for similarity between taxa, whereas functional diversity directly addresses the underlying mechanism of biotic resistance (that is, the breadth of ecological niches filled), but may be more difficult to measure. Conversely, there is also evidence for the opposite pattern in some ecosystems, whereby a more diverse community is indicative of a more favourable habitat, where a wide range of invasive species might survive. This 'biotic acceptance'[25,40,41] hypothesis leads to the expectation that highly diverse sites are optimal for many plant species and could promote invasion of non-native species. Nonetheless, we still lack a unified understanding of the relative importance of these two competing processes, and their variation across the globe, leading to ongoing calls to resolve this 'invasion paradox'[25].

Invasion success is also likely to depend on the ecological strategy of the invading species relative to the recipient native community. One school of thought is that environmental constraints are the primary drivers of plant species distributions. Therefore, to be successful, invasive species ought to be similar to native species that are adapted for that region, especially in extreme environments[42]. Under this 'environmental filtering hypothesis'[43,44] (or 'preadaptation hypothesis'), invasive species will be more successful if their traits mirror those of the native community[45]. For example, to be successful in a harsh desert environment, non-native plants would need to be ecologically similar

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