

---

# Host range expansion is density dependent

Bastien Castagneyrol<sup>\*1</sup>, Hervé Jactel , Ekehard Brockerhoff , Nicolas Perrette ,  
Maximilien Larter , Sylvain Delzon , and Dominique Piou

<sup>1</sup>INRA - UMR BIOGECO – Institut National de la Recherche Agronomique - INRA (FRANCE),  
Université Sciences et Technologies - Bordeaux I – France

## Abstract

The realised host range of herbivores is expected to increase with herbivore population density. Theory also predicts that trait similarity and phylogenetic relatedness between native and exotic plants is expected to increase the susceptibility of introduced plants to feeding by native herbivores. Whether the ability of native herbivores to extend their host range to introduced species is density-dependent is still unknown. We addressed this question by monitoring pine processionary moth (PPM, *Thaumetopoea pityocampa*) attacks during nine consecutive years on 41 pine species (8 native and 33 introduced) planted in an arboretum. The survey encompassed latent and outbreak periods. A total of 28 pine species were attacked by PPM. There was no difference in the probability of attack between native and introduced pine species. Host range increased and was more phylogenetically clustered during outbreak than latent periods. When population density increased, PPM expanded its diet breadth by attacking introduced pine species that were closely related to native hosts. This study demonstrates the density-dependence of host range expansion in a common pine herbivore. Importantly, it supports the idea that the degree of phylogenetic proximity between host species can be a better predictor of attacks than the introduction status, which may help to predict the outcomes of new plant-herbivore interactions.

**Keywords:** Arboretum, Density dependence, Exotic species, Forestry, Host range, Pine processionary moth

---

<sup>\*</sup>Speaker