

# Will planting exotic trees increase pest and pathogen risk in the UK?

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## 1. Problem

The UK government is considering mass-planting nonnative trees to increase biodiversity and resilience to climate change<sup>[1,2]</sup>. Introducing new trees could, however, unintentionally bring invasive forest pests and diseases<sup>[3,4]</sup>.

### Research question:

Does phylogenetic proximity or climatic similarity of nonnative forestry trees influence the risk of invasive forest pests and diseases in the UK?

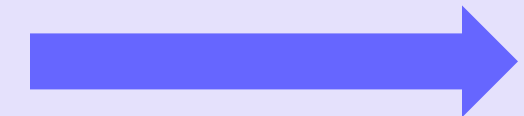


## 4. Systematic review

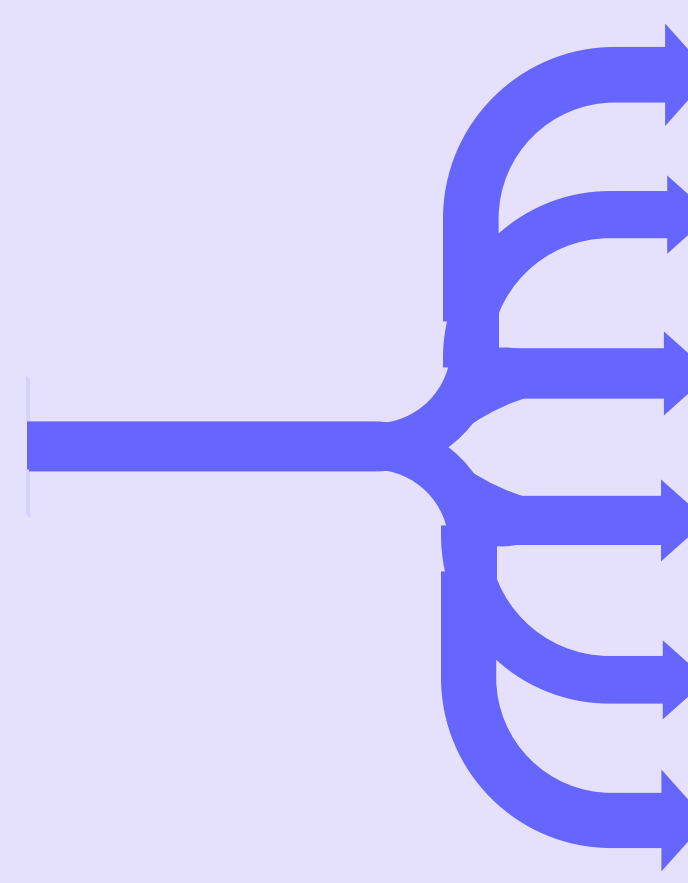
Identify patterns between nonnative tree introductions and tree pest/ disease invasions from literature. Studies show that exotic pests and diseases are more likely to jump to new hosts that are phylogenetically proximate to their original host<sup>[5,6]</sup>. How widespread is the evidence for this and what other factors could contribute to the likelihood that a pest or disease will become invasive in the UK?



Nonnative tree introduced



Pest/pathogen introduced



Phylogenetic similarity?<sup>[4,5]</sup>

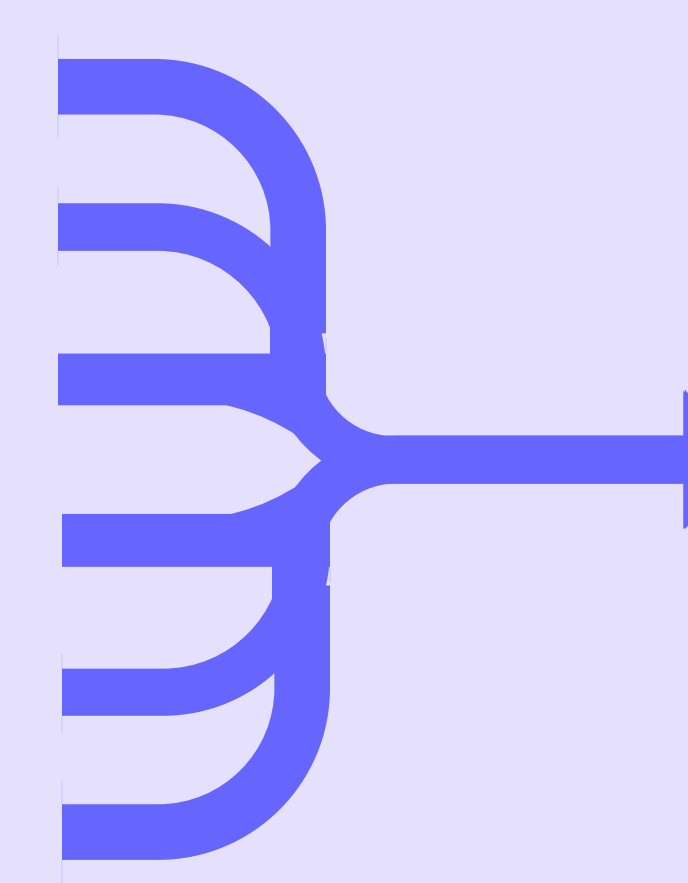
Host range biodiversity?<sup>[4]</sup>

Climatic similarity?<sup>[6]</sup>

Tree characteristics?<sup>[6]</sup>

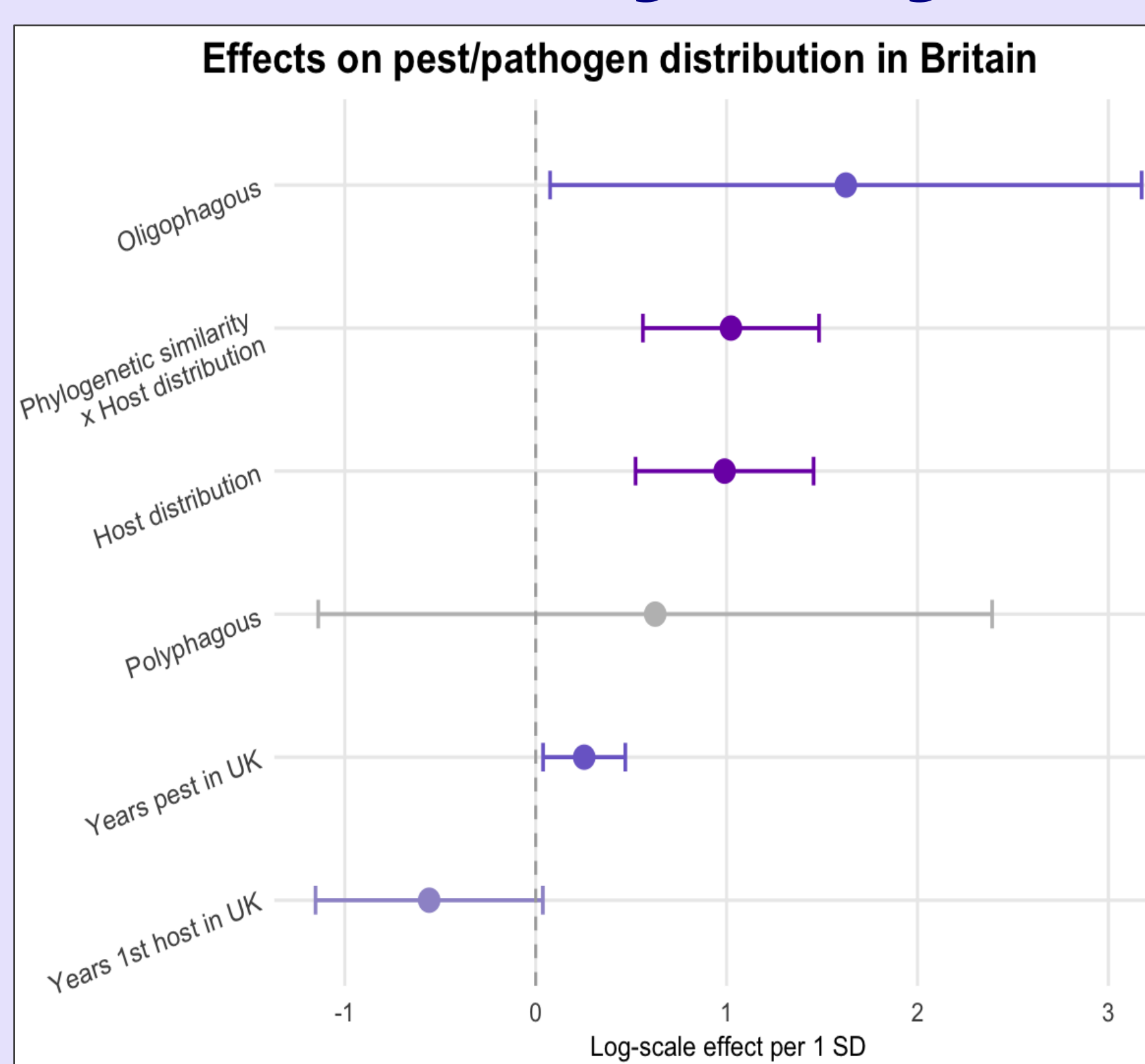
Introduction frequency?<sup>[7]</sup>

Local biodiversity?<sup>[8]</sup>



P&D establishment

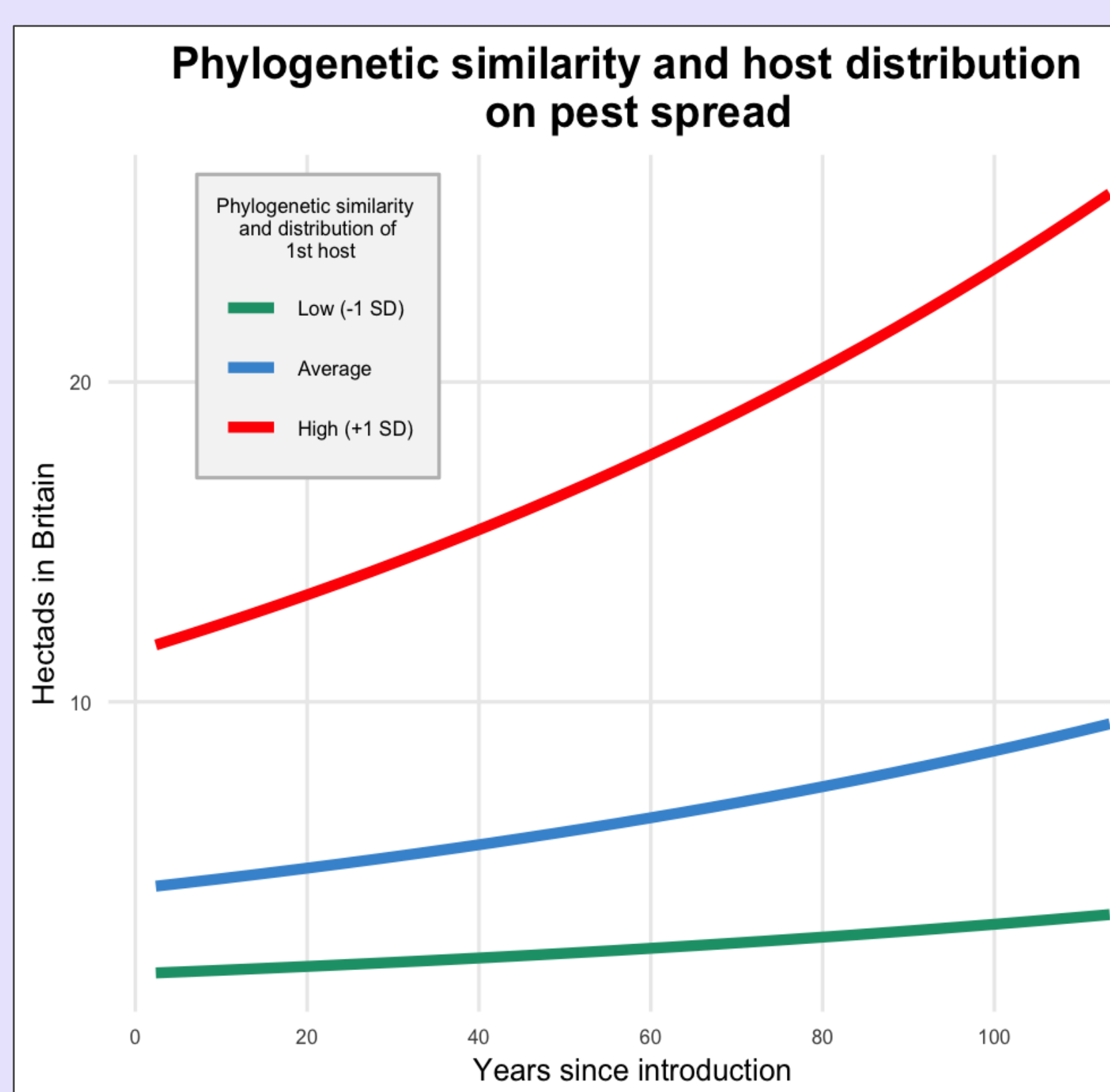
## 5. Preliminary analysis



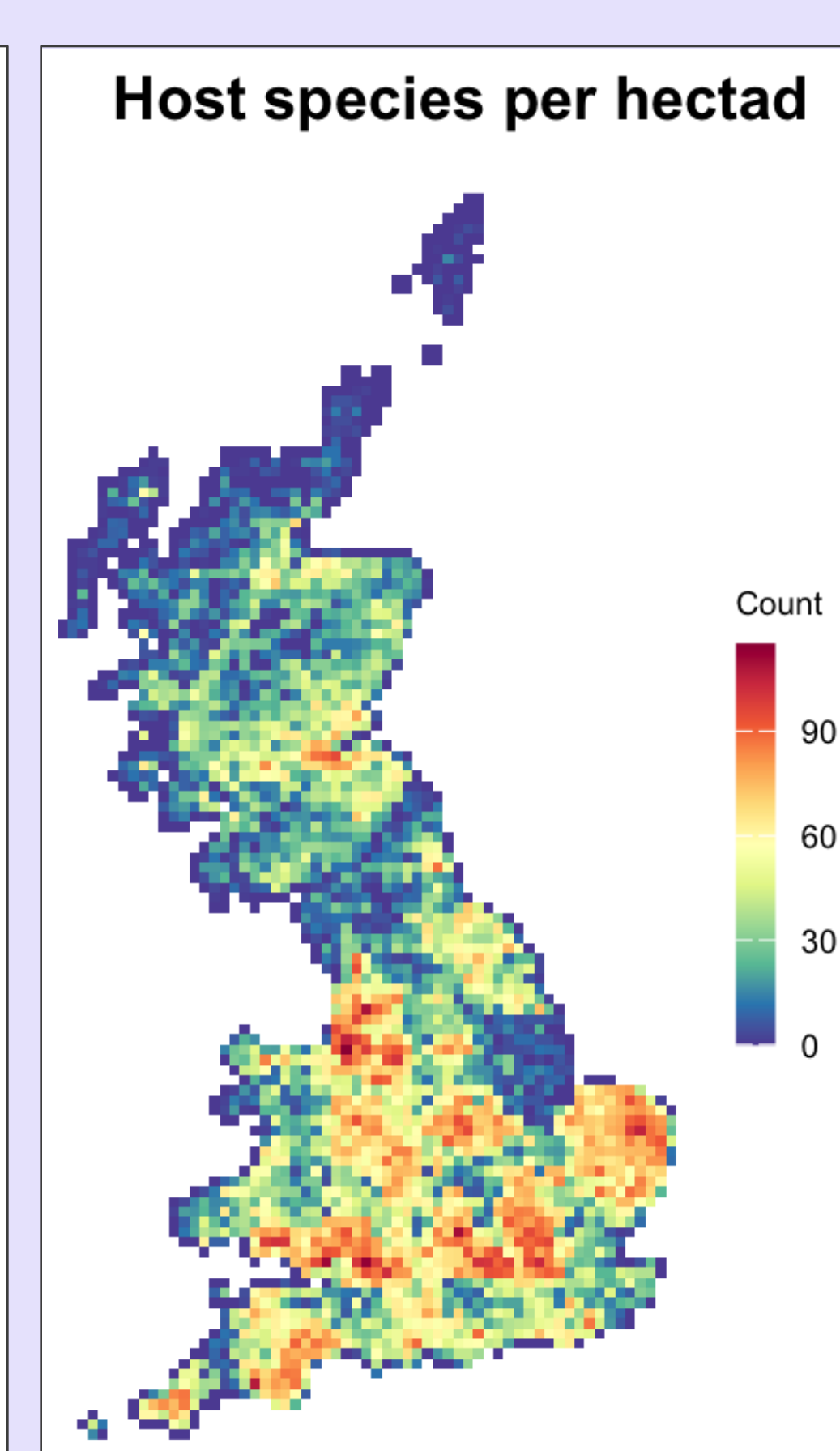
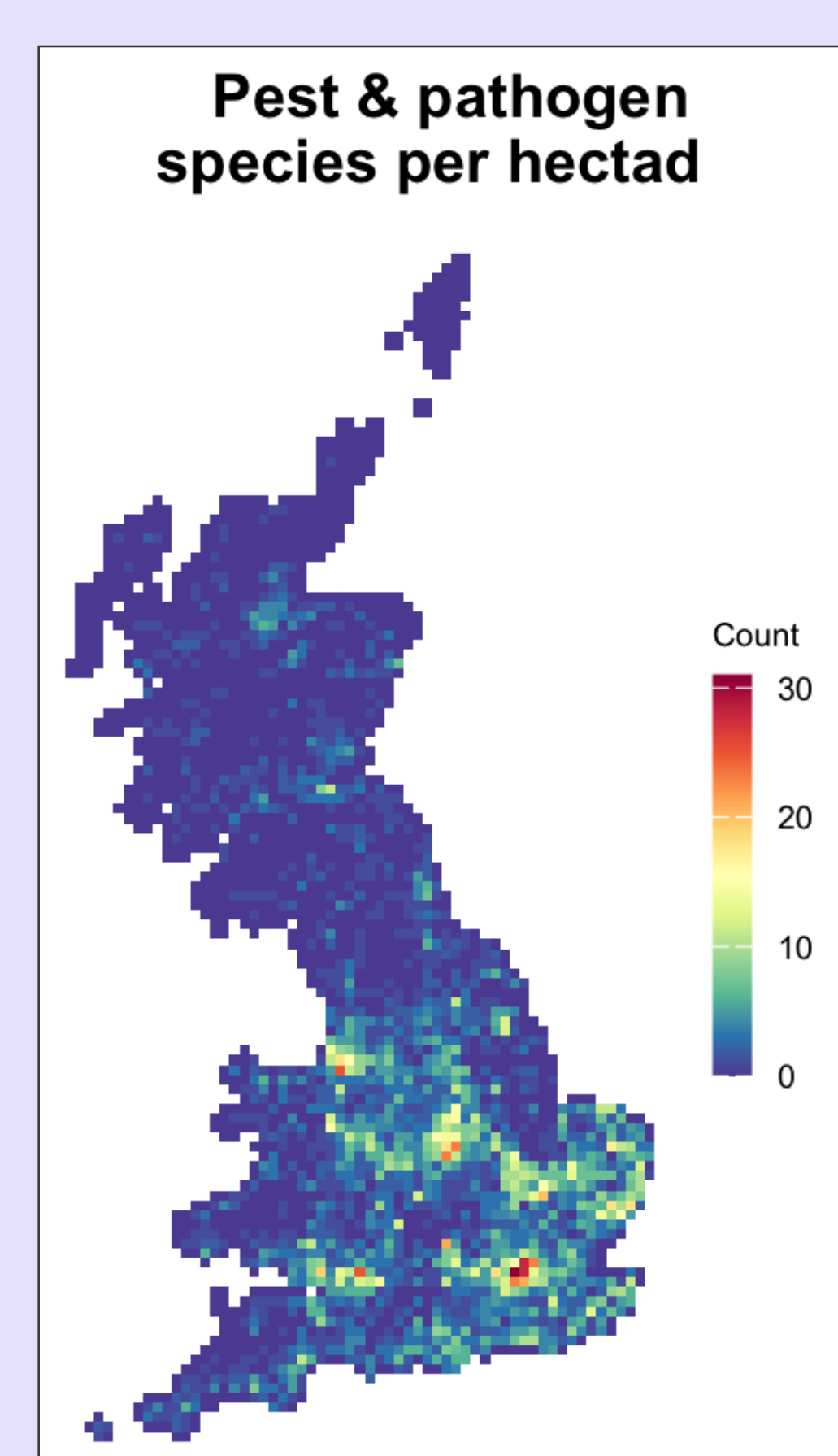
Pest/pathogen spread higher when 1<sup>st</sup> recorded host is closely related to UK flora and widely distributed across Britain. ( $1.02 \pm 0.24$  per 1 SD increase,  $p < 0.0001$ ). Oligophagous host breadth and time since introduction significant covariates. P&D region, 1<sup>st</sup> recorded host region, 1<sup>st</sup> host history in UK and monophagous or polyphagous host breadth had no significant effect.

### Main takeaway

Phylogenetic similarity of introduced nonnative trees to UK flora increases exotic pest/pathogen establishment in Britain.



Deviance explained by model = 45%



### Recording bias?

1<sup>st</sup> records of pest or pathogen introductions are overrepresented in the South, especially in London. Could be reporter bias (Forest Research in Southeast, RHS Wisley). However, most exotic plants are imported to the south<sup>[10]</sup>. Exotic tree diversity and abundance is also higher in South.

**Challenges:** only 1 native conifer in the UK – may affect phylogenetic comparisons.