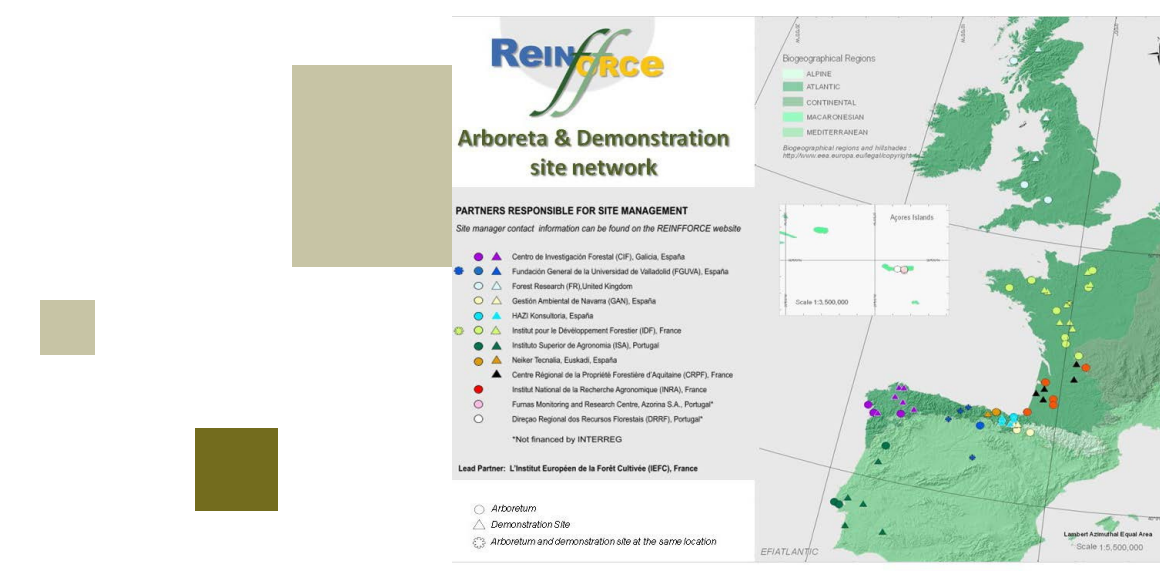


# Using the REINFFORCE network as sentinel to monitor emerging pest and disease invasion in Europe

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## Context and Objective

The connected world that we know nowadays, is the result of globalization and a huge increase of exchange of products and people. This extreme connection can introduce emerging pests and diseases and impact both ecosystems and bioeconomy.

The HOMED project, which is financed by Horizon 2020, tries to limit this threat by gathering knowledge and innovation at all stages of the epidemic process: detection, installation, eradication and control. This project gathered together 23 partners from 15 different countries across Europe to better understand the establishment of pathogens in forests, as well as developing models to predict which areas have the highest risk of being infected, and also tested tools to detect any future contamination or introductions (traps/sentinel plantations).

A task dedicated to early detection of emerging pest and diseases used the REINFFORCE arboretum as a sentinel network

- to firstly detect any invasive species in Europe
- and secondly to provide accurate forest health data across Europe.

### The REINFFORCE.NET network,

- 38 arboretum covering a large latitudinal range (from Portugal 37° to Scotland 58°)
- 35 different species per site

We explored the capacity of the network to **detect the presence of 4 well known emerging pest and diseases** (pictures on the left)

- *Contarinia pseudotsugae* on Douglads fir
- *Gonipterus scutellatus* on eucalyptus Sp.
- *Dryocosmus kuriphilus* on Chestnut
- *Corythucha arcuata* on oaks.

## Method

During the summer of 2019 and 2021 the following data were monitored by visual assessment on all sites : defoliation, discolouration, crown mortality, presence/absence of the pest/disease on site. Then we compared field observations with existing distributions maps using QGIS.

- 1** *Contarinia pseudotsugae*: as the distribution area doesn't overlap with the REINFFORCE network yet the results are consistent with no new detection.
- 2** *Corythucha arcuata*: we confirm the efficiency in detecting a species in areas where we already knew it was present.
- 3** *Dryocosmus kuriphilus*: we assume that our results are biased because of the large mortality rate for chestnut species in the arboreta where we were supposed to find this insect. This low survival rate associated to the low infestation in 2021 may explain why we don't have reliable conclusions on this invasive species.
- 4** *Gonipterus scutellatus*: our results show that we can be optimistic about the detection of this species using our network, because trees are growing fast and are suffering like other stands under epidemic conditions, providing an opportunity to set up a first monitoring system for this insect that does not yet exist in Spain.

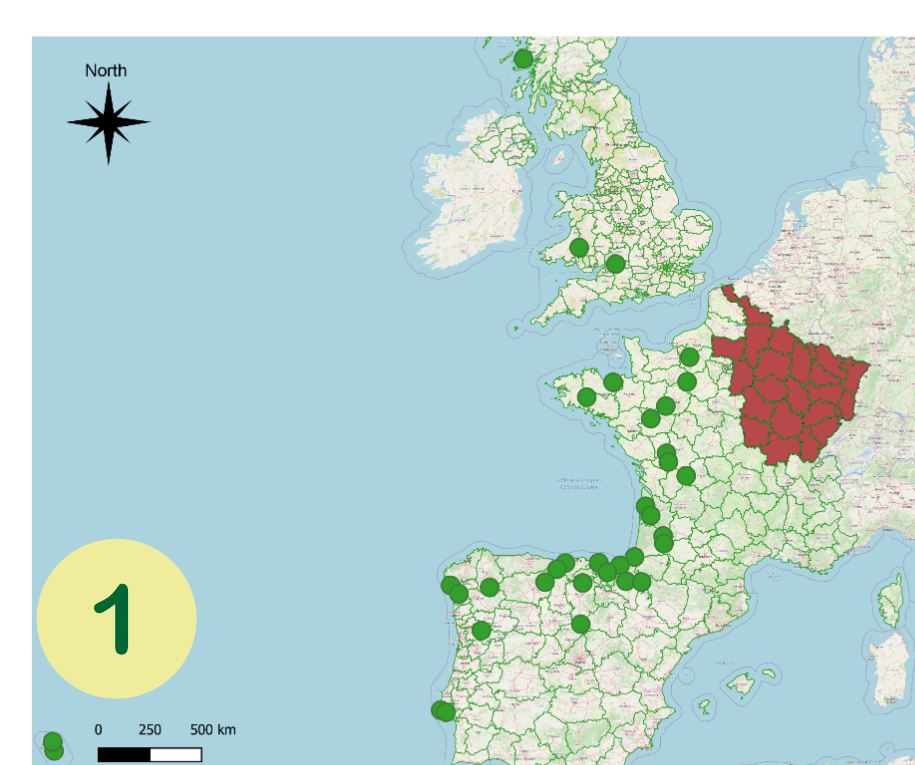
## CONCLUSION

The use of REINFFORCE network as sentinel arboretum for the detection of pests and pathogens is a **promising tool** mainly because it allows to control a large set of tree species in a limited time and space. The tree size and plot size within each arboretum is an important parameter to get good results.

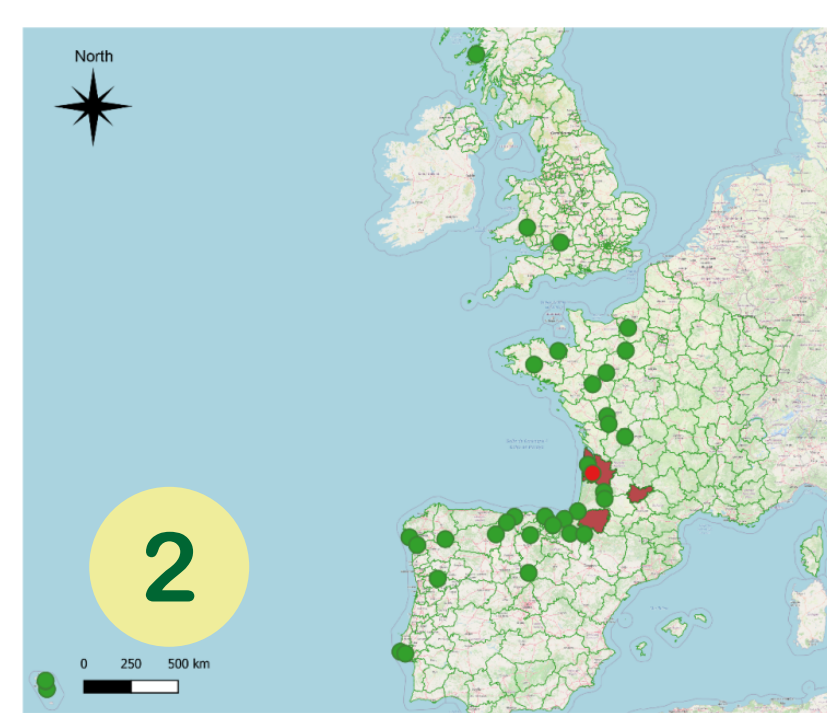
Seasonality of attack of many agents make difficult to select best date for monitoring, but should be explored further for tall trees with a good survival rate.



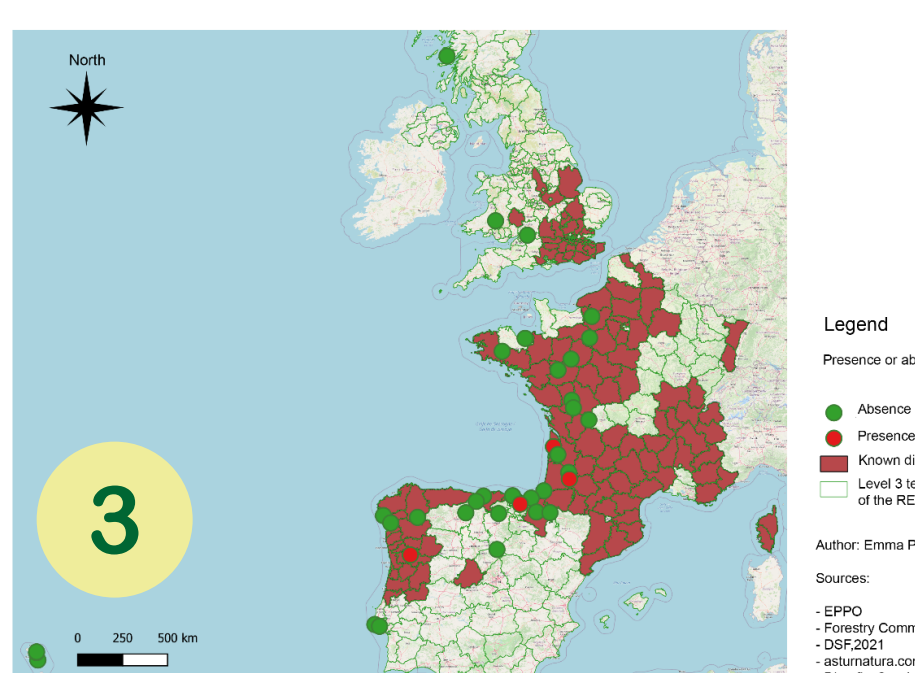
Presence of the pathogen *Contarinia pseudotsugae* throughout the REINFFORCE network



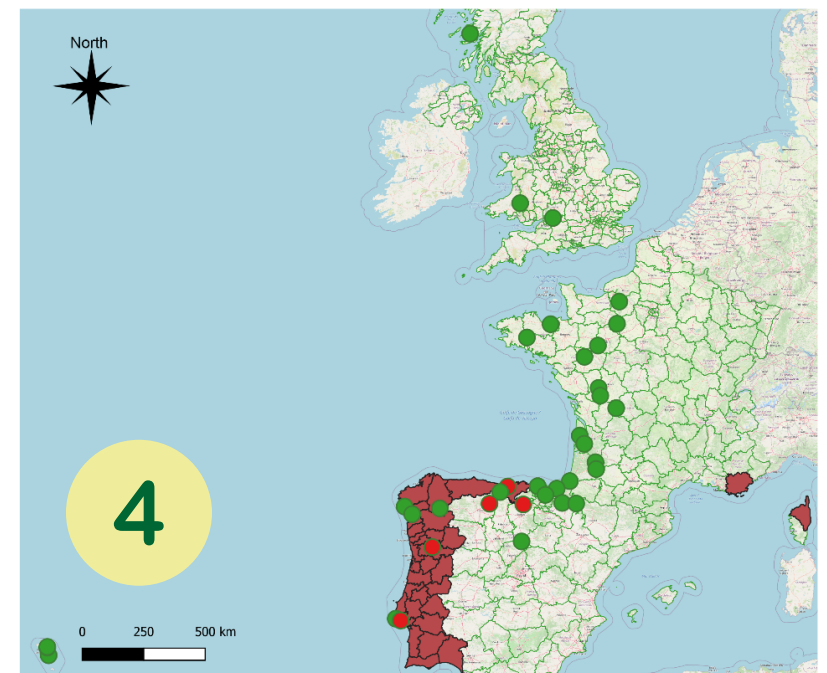
Presence of the pathogen *Corythucha arcuata* throughout the REINFFORCE network



Presence of the pathogen *Dryocosmus kuriphilus* throughout the REINFFORCE network



Presence of the pathogen *Gonipterus scutellatus* throughout the REINFFORCE network



Reinforce is maintained by a consortium of 11 organisations actively monitoring all sites on their own resource - see : <https://reinforce.iefc.net>. Thanks to co-authors :

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