



Deliverable summary D5.2

Relationship between propagule size and pressure, host density, habitat and colonisation probability by non-native forest pathogens

Project acronym: **HOMED**
Project full title: **Holistic Management of Emerging forest pests and Diseases**
GA n°: **771271**
Start date of the project: **October 1st 2018**
Duration: **48 months**
Project coordinator: **Herve Jactel (INRA)**
Planned delivery date: **M24**
Actual submission date: **M36**
Work package: **WP5**
WP leader: **ISA**
Lead beneficiary: **INRAE**
Partners involved: **INRAE**
Version: **01**

Dissemination Level	
PU Public	PU
CI Classified, as referred to Commission Decision 2001/844/EC	
CO Confidential, only for members of the consortium (including the Commission Services)	

1. Summary

Objectives:

The objective is to determine whether an Allee effect can reduce the production of inoculum by *Hymenoscyphus fraxineus*, the Ash dieback causal pathogen, at low pathogen density.

Ash is often at low density either in mixed forest stands or in hedges in agricultural landscapes. The existence of an Allee effect for *H. fraxineus* would strengthen the host density limitation of disease severity, significantly mitigating the overall severity of Ash dieback at landscape scale.

Rationale:

H. fraxineus is dispersed only by ascospores, the conidia acting only as spermatia.

An Allee effect could be significant for *H. fraxineus* because the pathogen is heterothallic. Thus, sexual partners need to meet on the rachides in the litter for apothecia and inoculum to be produced. The conidia are rain splashed-dispersed and have a limited dispersal range. The encounter of sexual partners could thus be limiting at low infected rachides density in the litter.

To determine whether the Allee effect is significant for *H. fraxineus*, we studied Ash dieback severity and the determinants of inoculum production over a gradient of Ash density. The rationale was to obtain a range of *H. fraxineus* population density, which can be characterised by the density of infected rachides in the litter. The overall density of ash rachides in the litter is related to Ash density and possibly, the proportion of these that are infected by *H. fraxineus*.

For that, a network of 30 plots was established in Champenoux (NE France), with plots both in forest and hedges. The host density and disease severity were determined in summer 2020 (Ash basal area and crown dieback level). The density and infection status of rachides in the litter as well as apothecia density in the litter and spore inoculum load in the air were determined during both 2020 and 2021 summers.

A good relation was found between apothecia production and ascospore load in the air, confirming that the bulk of inoculum is produced locally. The production of apothecia (nb of apothecia per infected rachis dry weight) was significantly linked to the density of infected rachis in the litter (g.m⁻²), with very limited apothecia production at very low infected rachis density, suggesting that an Allee effect significantly reduced inoculum production at low Ash density.