



# Measuring the threat from a distance

## A sentinel plantation in Palma de Mallorca to test the susceptibility of Belgian trees to several subspecies of *Xylella fastidiosa*

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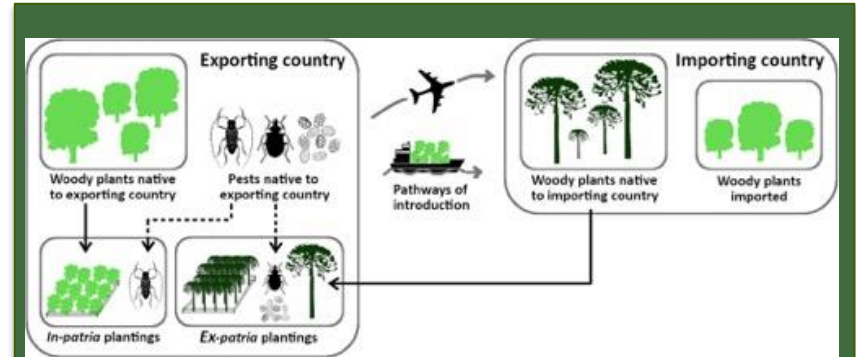
# INTRODUCTION & METHODS

**Sentinel plantations:** a promising tool to collect valuable information on plant-pathogen interactions. Efficient to discover new significant threatening organisms, but also a potential for identifying new host plants for known pathogens.

**Objective of this study:** investigate the susceptibility of selected Belgian potential host plant species to *Xylella fastidiosa*.

**Method:** establish and monitor *ex-patria* plantings (Fig. 1) in a *Xylella*-contaminated area, the campus of the University of the Balearic Islands (UIB), in Palma de Mallorca.

**Procedure:** First, official approval was obtained from the local government and from the UIB Authorities. Then, 27 individuals of 3 plant species (*Prunus domestica* cv. opal, *Salix alba*, *Quercus petraea*), acquired from Belgian producers with phytosanitary certificates but also checked for *X. fastidiosa*, were brought to Mallorca and planted in March 2018 (Fig. 2).



**Figure 1.** Sentinel plantations (Eschen et al., 2019)

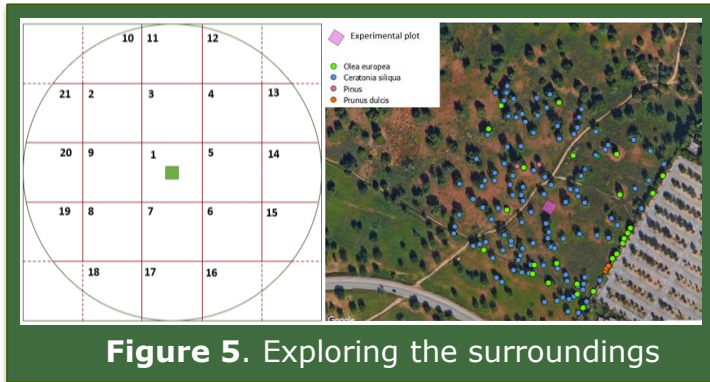


**Figure 2.** Moving the sentinel plants

# METHODS

**Plantation:** the trees were planted following a random design adapted to potential gradients (slope, humidity): Figs. 3-4.

**Exploring the surroundings:** within a 100 m radius around the plantation, the abundance and the infectivity of the potential insect vectors as well as the sanitary state of the local vegetation were regularly assessed (Fig. 5).

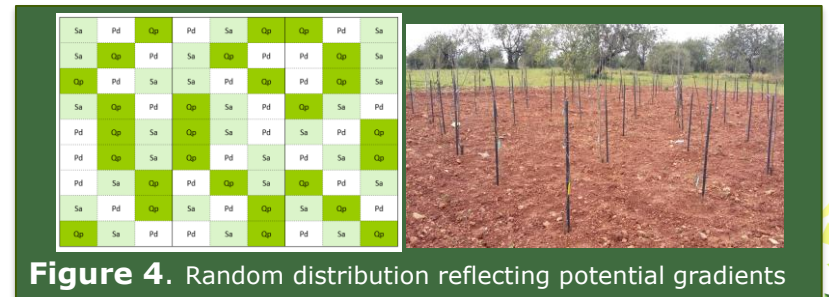


**Figure 5.** Exploring the surroundings

**"Spy plants":** local *Rosmarinus officinalis* was planted at regular intervals within the 100 m radius, in order to monitor infection status in the area.



**Figure 3.** Creating the plantation



**Figure 4.** Random distribution reflecting potential gradients

# RESULTS & DISCUSSION

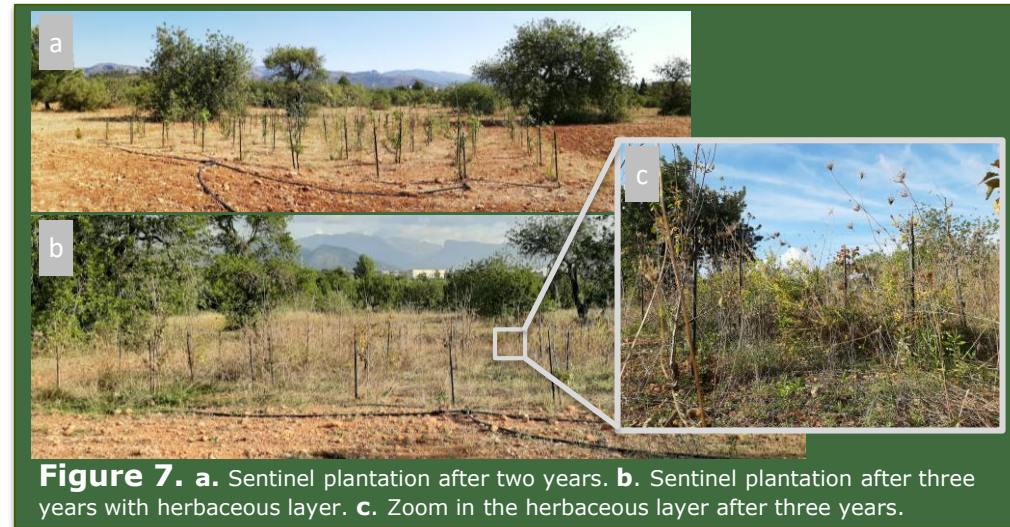
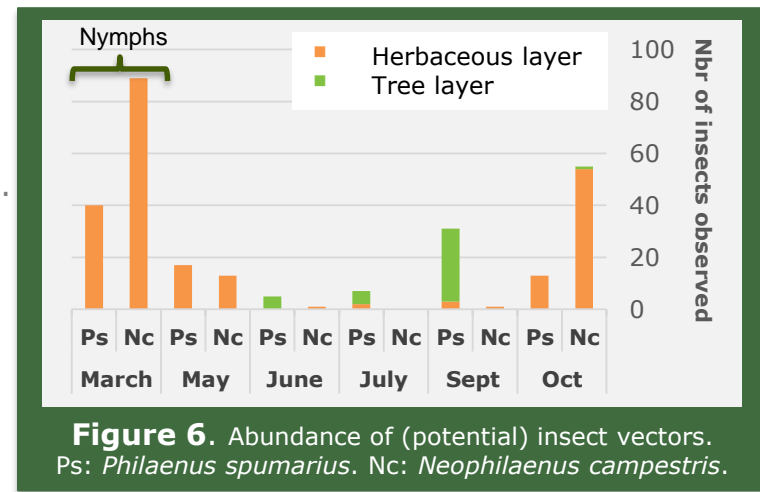
**Insects:** insect vectors present in the 100m area around the plot. Abundance fluctuated during the season (Fig. 6). However, no detection of the bacteria by qPCR of Harper *et al.* (2010).

**Plants:** *Xylella*-like symptoms appeared on the three species of sentinel plants, but also on *R. officinalis*. However, again no bacteria detection by PCR in any of the plants.

## Discussion:

- *X. fastidiosa* present on campus (detections in 2017), but probably at low rates.
- Insect density considered low with less than 1 adult/m<sup>2</sup> (Bosco *et al.*, 2019 ; EFSA PLH, 2019).
- Destruction of herbaceous layer when planting the trees. Re-sowing grass but still relatively bare soil around the plantation because of tilling (Fig. 7). → Disruption of the vector population and less probabilities for the insects to reach the plantation.

This would explain the lack of results in the first years. Symptoms probably due to other environmental factors.





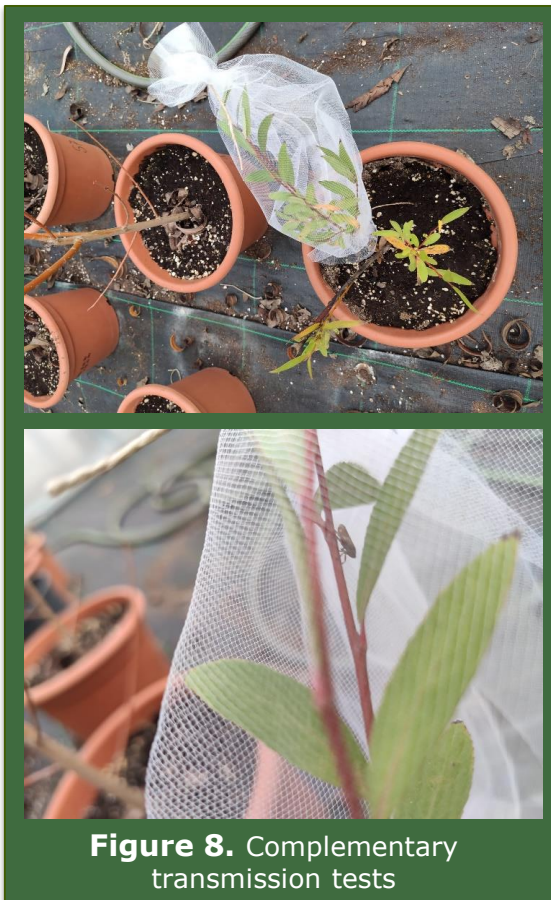
# CONCLUSIONS & PERSPECTIVES

## An efficient tool ?

- Valuable results on pest/pathogen-host interactions obtained in other sentinel plantation surveys.
- However, the environmental components and conditions greatly influence the outcome of the studies and the choice of an optimal location is essential.
- In the case of *X. fastidiosa*, a location with high infectious pressure of the bacterium is required to obtain information of potential pathosystems.
- In addition, large time scale always has to be considered. Our sentinel plantation is still under examination and would stand for four years minimum.

**A second, more focused experiment:** complementary transmission tests (Fig.8) are carried out in parallel in a UIB insect-proof greenhouse.

- New small plants of willows and poplars sent to Mallorca and netted with *P. spumarius* collected in the most infected places of the Islands (200 insects).
- Transmission period of four days (5 insects/branch).
- Prevalence rate : 17% (qPCR of Harper *et al.*, 2010).
- The plants will be tested one year later (in progress).



**Figure 8.** Complementary transmission tests