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Investigating the role of the meadow spittlebug (*Philaenus spumarius*) and its major host plant (*Cistus monspeliensis*) in the spread of *Xylella fastidiosa* in Corsica

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Introduction

Using *Philaenus spumarius* (Hemiptera: Aphrophoridae) as a sentinel insect, we recently demonstrated that *Xylella fastidiosa* (Xf) was widely distributed throughout Corsica (Cruaud *et al.*, 2018). During this survey, *P. spumarius* appeared to be the most abundant vector and field observations revealed that it mostly developed and fed on *Cistus monspeliensis*. We designed a large-scale survey to investigate the role of *P. spumarius* and *C. monspeliensis*, mostly asymptomatic, in the dynamics of Xf in Corsica (Fig.1).

Materials & Methods

Network of 64 experimental plots of 500m² each (Fig.2) with :

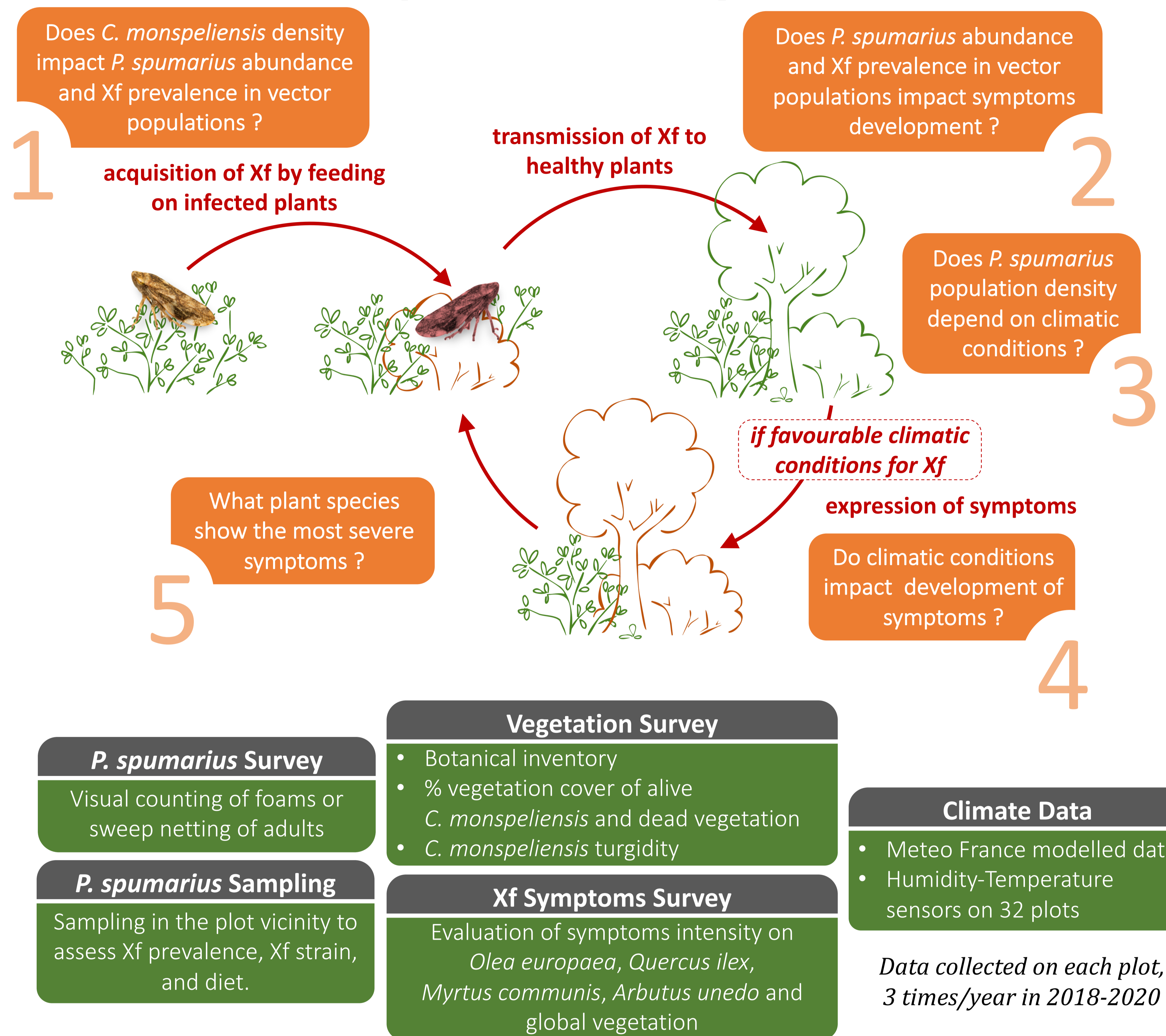
1. A density gradient in *C. monspeliensis*
2. Diverse environmental and climatic conditions with :
 - a) An altitudinal gradient ranging from 0 to 600m
 - a) A diversity of vegetation types ranging from shrubland, *Cistus* vegetation, low and high Maquis, to forest



Fig.2
Network of plots

● Hot and dry
● Cold and dry
● Cold and moist

Fig.1 Schematic propagation of *Xylella fastidiosa* in the environment by *P. spumarius* & research questions



Results and Discussion

Fig.3a *P. spumarius* abundance variation along a gradient of habitat moisture and temperature

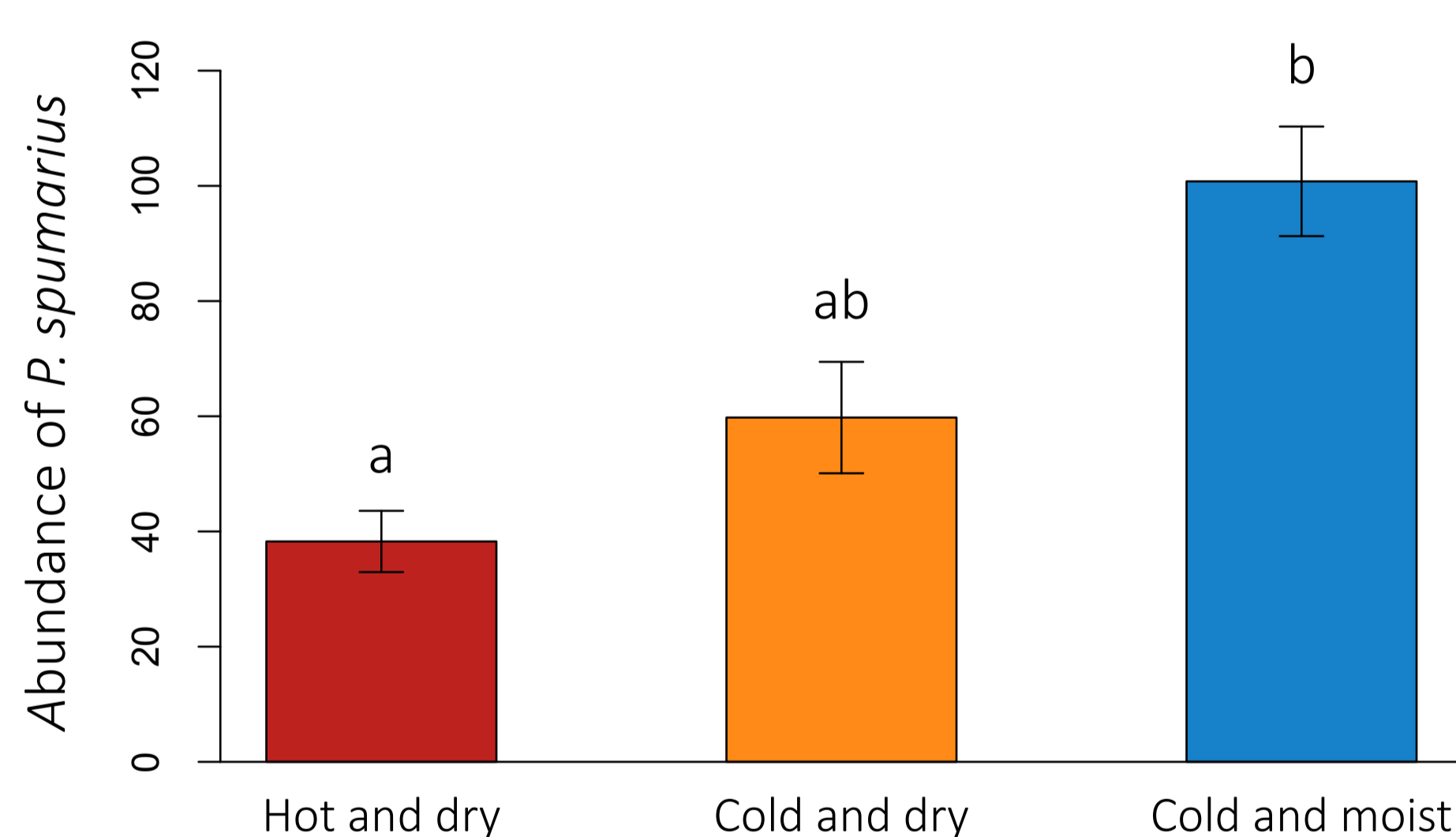


Fig.3b Symptoms expression along a gradient of habitat moisture and temperature

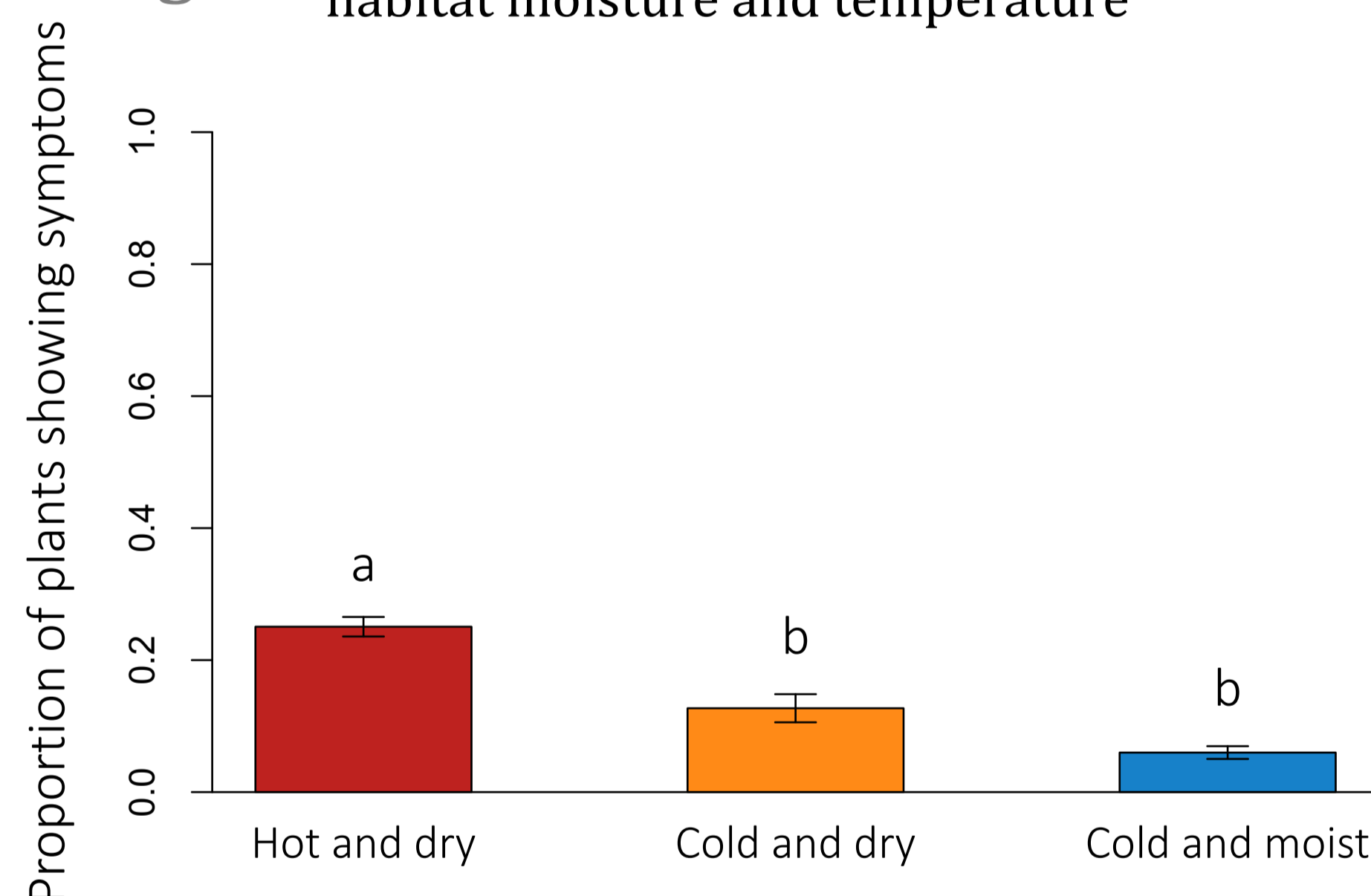


Fig.3c Symptoms expression among plant species

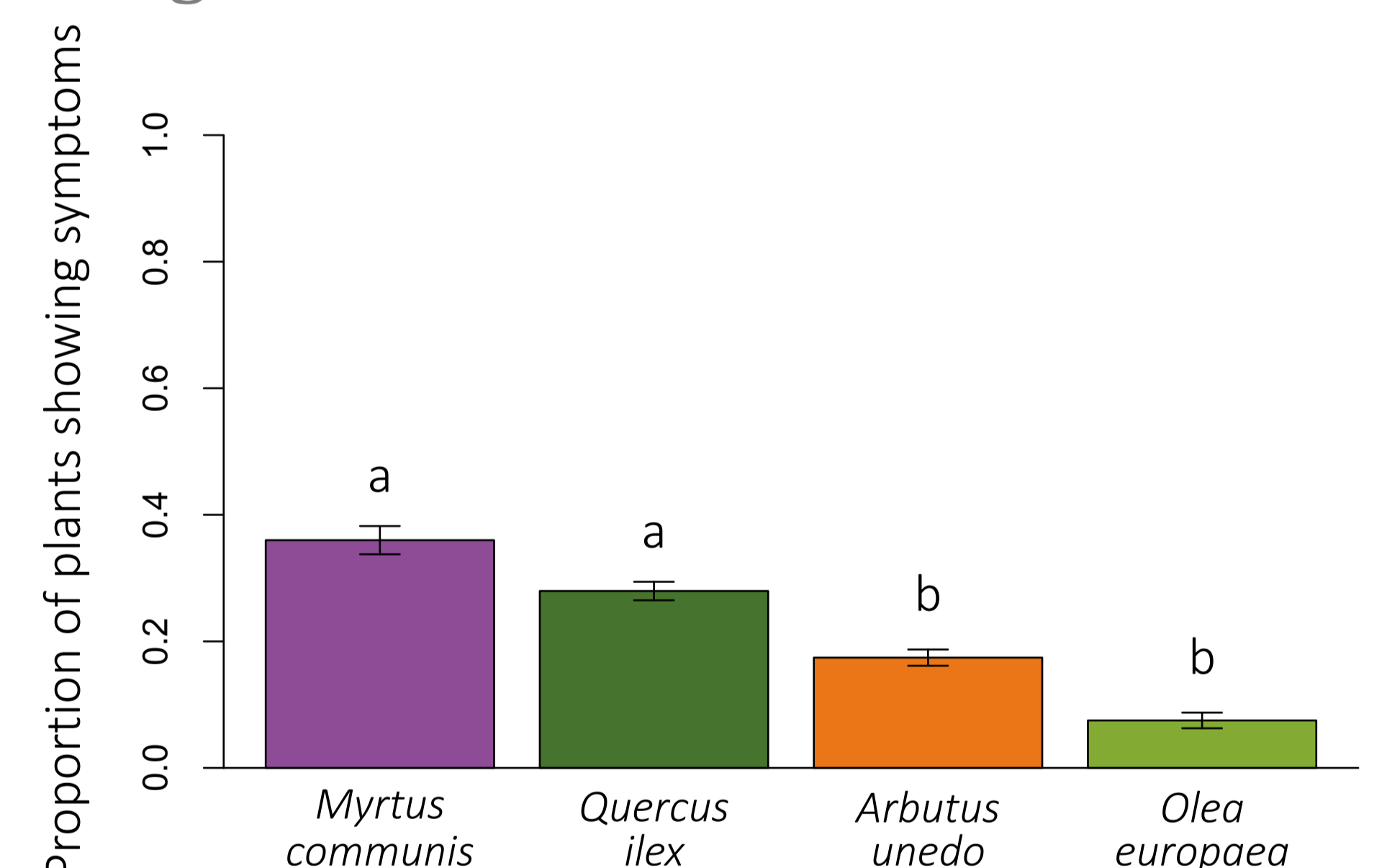


Fig.3 First results on data from spring 2018 to summer 2019

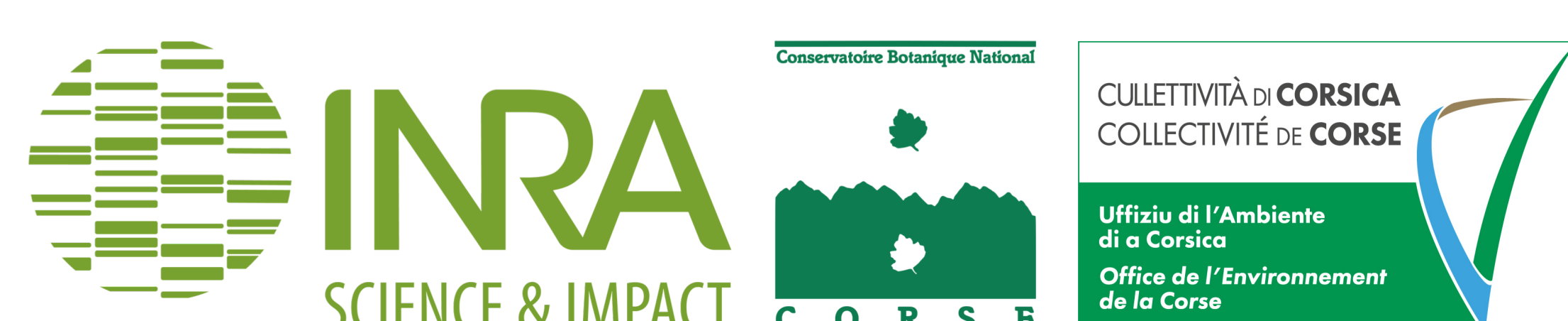
First results suggest that :

- *P. spumarius* abundance increased in cool and humid habitats (Fig.3a), plants were more frequently symptomatic in hot and dry habitats (Fig.3b).
- *Olea europaea* and *A. unedo* expressed fewer symptoms than *M. communis* and *Q. ilex* (Fig.3c).
- Symptoms were particularly intense in the spring 2018 probably due to unusual drought in 2017.
- There was no significant correlation between *P. spumarius* abundance in season n-1 and frequency of symptomatic plants in season n.
- *P. spumarius* abundance increased with *C. monspeliensis* density.

The survey will continue until 2020. Molecular detection of *X. fastidiosa* in *P. spumarius* and diet analysis will complement our understanding of the interaction network involving vectors, bacteria and plants [work in progress]. Then, we will be able to compare the abundance of insects carrying Xf and the frequency and intensity of symptoms in infected plants on several consecutive years.

Reference cited

Cruaud, A., Gonzalez, A.A., Godefroid, M., Nidelet, S., Streito, J.C., Thuillier, J.M., Rossi, J.P., Santoni, S. and Rasplus, J.Y., 2018. Using insects to detect, monitor and predict the distribution of *Xylella fastidiosa*: a case study in Corsica. *Scientific reports*, 8(1), p.15628



To know more about our team work...



- [Talk]** Rasplus J-Y *et al.*, Reconstruction of the plant-vector trophic networks involved in the spread of *Xylella fastidiosa* through hybrid capture.
- [Talk]** Streito J-C *et al.*, A barcode database to identify the vectors of *Xylella fastidiosa* in Europe.
- [Poster]** Mesmin X *et al.*, *Ooctonus vulgatus* (Hymenoptera, Mymaridae), a potential biocontrol agent to reduce the populations of *Philaenus spumarius* (Hemiptera, Aphrophoridae) in Europe.