Wanted egg parasitoids: Ooctonus vulgatus parasitizes Philaenus spumarius in Corsica and is probably widely distributed in Europe

Xavier Mesmin, Marguerite Chartois, Guénaëlle Genson, Jean-Pierre Rossi, Astrid Cruaud, Jean-Yves Rasplus

3rd European Conference on
Xylella fastidiosa and XF-ACTORS final meeting

Wanted egg parasitoids: *Ooctonus vulgatus* parasitizes *Philaenus spumarius* in Corsica and is probably widely distributed in Europe

Mesmin X.; Chartois M.; Genson G.; Rossi J.-P.; Cruaud A.; Rasplus J.-Y

CBGP, INRAE, CIRAD, IRD, Montpellier SupAgro, Univ Montpellier, Montpellier, France

INTRODUCTION – MATERIALS & METHODS

Although this research field has been overlooked, **vector biological control** could be an interesting environmentally friendly lever to help **lower vector density.** Ultimately, it could slow down *Xylella fastidiosa* propagation.

M&M

- 5-10 handfuls of 8 **top branches of *Cistus monspeliensis*** collected per site.
- Sample collection in **Corsica** in early **February.**
- **2019** (4 sites) and **2020** (5 sites), total of **1107 eggs.**
- Leaf cuttings with ***P. spumarius*** **eggs** set on moistened filter paper inside Petri dishes (Fig. 1).
- Daily monitoring of **insect emergence.**

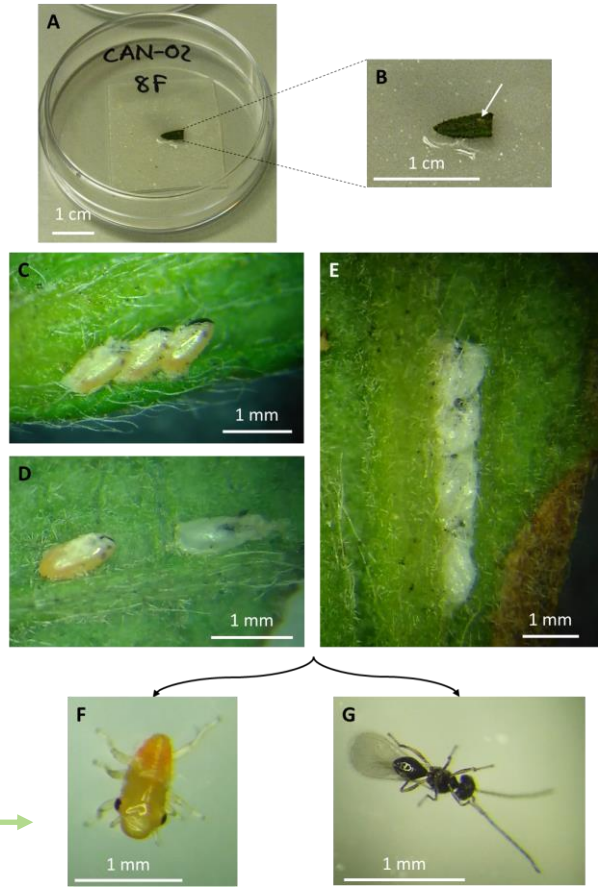


Fig.1 Illustration of the hatching experiment set to identify emerging insects and quantify parasitism rates of *Philaenus spumarius*

OOCTONUS VULGATUS PARASITIZES *PHILAENUS SPUMARIUS* WITH VARIABLE PARASITISM RATES THROUGHOUT CORSICA

Morphological and molecular identifications converge on:

Ooctonus vulgatus Haliday, 1833 (Hymenoptera, Mymaridae)

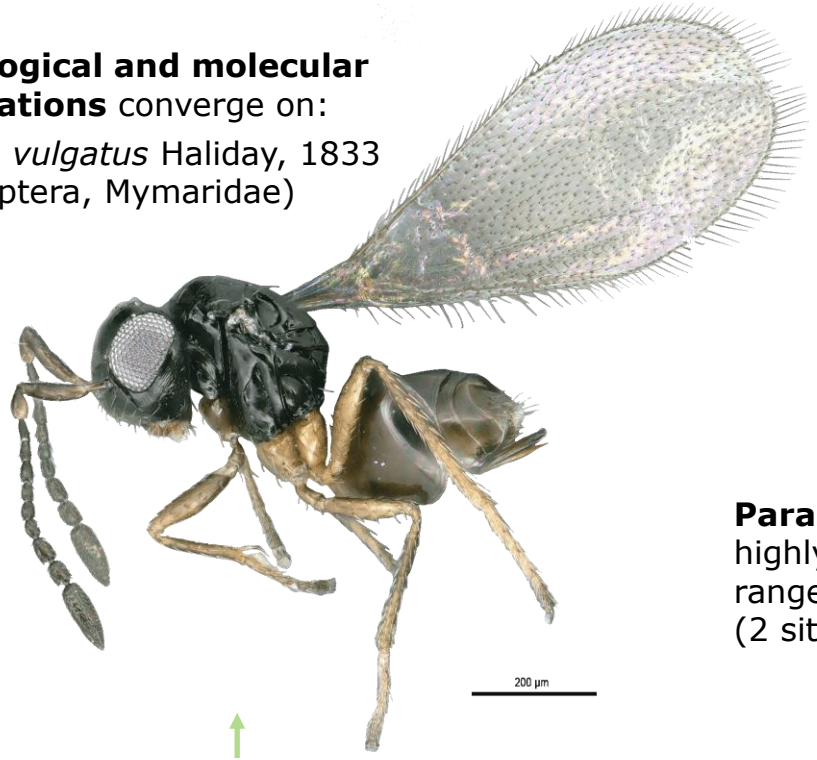
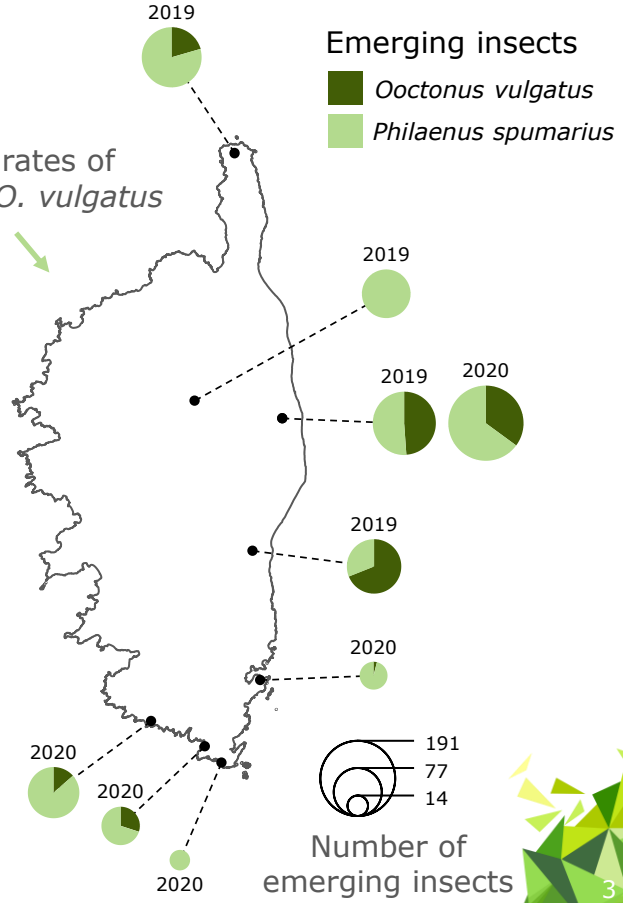


Fig. 2 *Ooctonus vulgatus*, habitus

Fig. 3 Parasitism rates of *P. spumarius* by *O. vulgatus*



Parasitism rates are highly variable and range from 0 % (2 sites) to 69 %

SPECIES DISTRIBUTION MODELS PREDICT THAT THE PARASITOID IS WIDELY DISTRIBUTED IN EUROPE

M&M

Species distribution models fitted on all available occurrences of *O. vulgatus* (Fig. 4) to **predict habitat suitability of this parasitoid in Europe.**

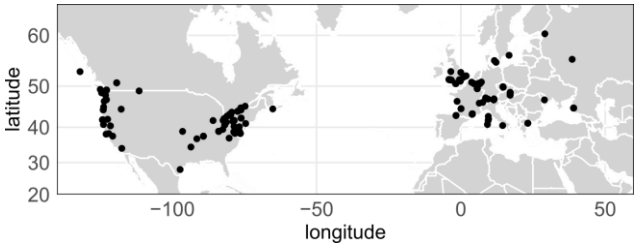


Fig. 4 Occurrences of *O. vulgatus* used to predict habitat suitability

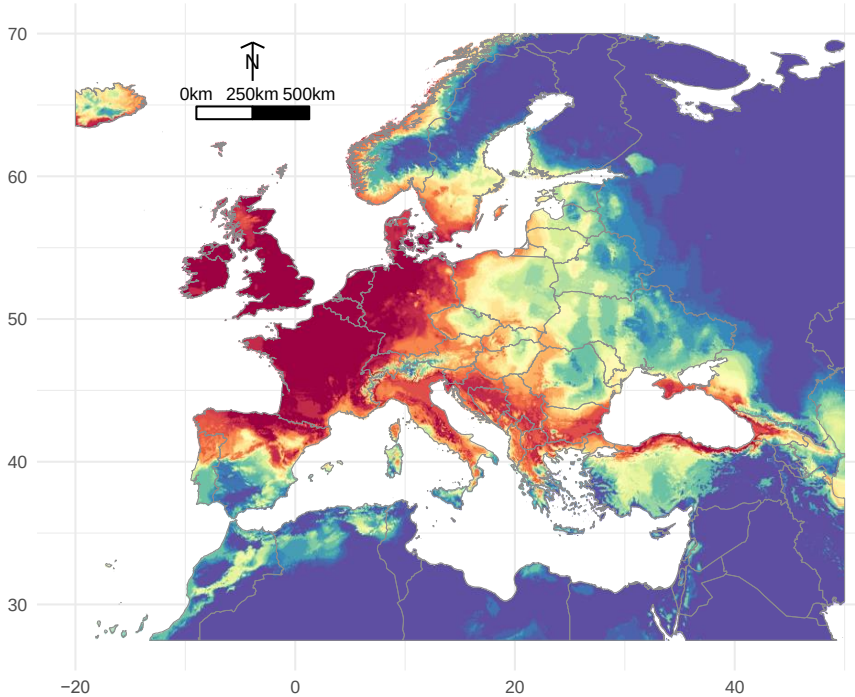


Fig.5 Predicted habitat suitability of *O. vulgatus* in Europe

Proportion of models predicting *O. vulgatus* presence (%)

0 25 50 75 100

- *O. vulgatus* occurs or is likely to occur in **many EU regions where *P. spumarius* also occurs** (Fig. 5).
- **Mass release** could **increase natural parasitism rates** of eggs of *P. spumarius*.

EGG PARASITOIDS ARE PROMISING BIOCONTROL AGENTS

- Known *P. spumarius* natural enemies include **egg parasitoids**, **adult parasitoids** [1] and **adult predators** [2]
- Egg parasitoids have a unique combination of features that probably makes them promising biocontrol agents for **inundative vector control**:

They kill the pest **before the adult stage**	→	**Short term effect** on vectors (and on *Xf* propagation if parasitism is massive) are expected
Host **eggs** are **immobile**	→	Inundative release can be **restricted to egg laying sites** which increases practical feasibility and reduces costs
Egg parasitoids usually exhibit a **high level of specialization**	→	**Side effects** on the local entomofauna are **unlikely**

Provided that host specificity is confirmed and that mass rearing is possible, *O. vulgatus* could contribute to **IPM of *P. spumarius*,** and more generally, of Xf pathosystem

References:

[1] G. Molinatto et al., *Insects*. **11**, 607 (2020)

[2] A. Liccardo, A. Fierro, F. Garganese, U. Picciotti, F. Porcelli, *PLOS ONE*. **15**, e0232363 (2020)

Part of the work presented in this poster is published in X. Mesmin et al., *PeerJ*. **8**, e8591 (2020).