



Seasonal pattern, hosts and abundance of the potential vectors of *Xylella fastidiosa* in Mallorca (Balearic Islands, Spain).

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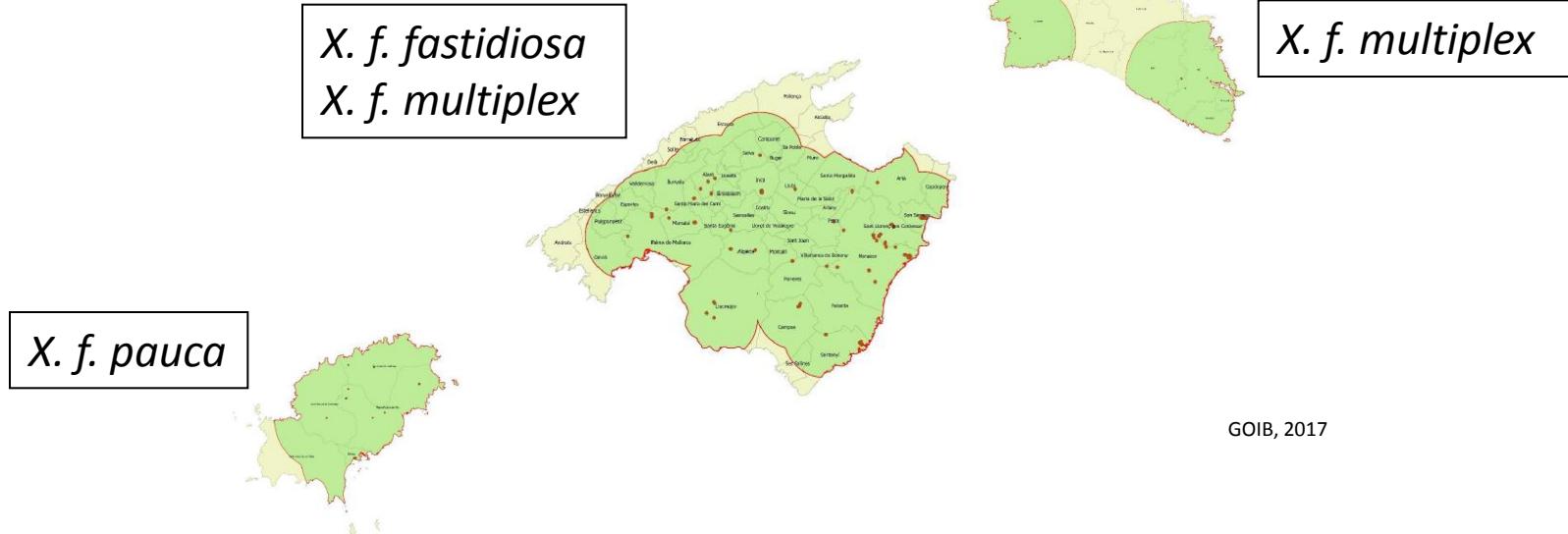
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CURRENT SITUATION IN THE BALEARIC ISLANDS

X. fastidiosa was first detected in October 2016 in Mallorca.

Up to October 2017, **511 confirmed cases** (Mallorca, Menorca and Ibiza)





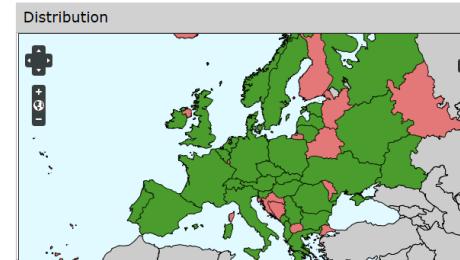
OBJECTIVES:

- To study the species composition of the potential insect vectors for *X. fastidiosa*, particularly the family Aphrophoridae (SO. Cicadomorpha)
- To study the seasonal pattern of potential vectors in different crops in Mallorca.
- To detect the presence of the bacterium in the vector by using molecular tools.



PREVIOUS RECORDS OF POTENTIAL VECTORS IN THE BALEARICS.

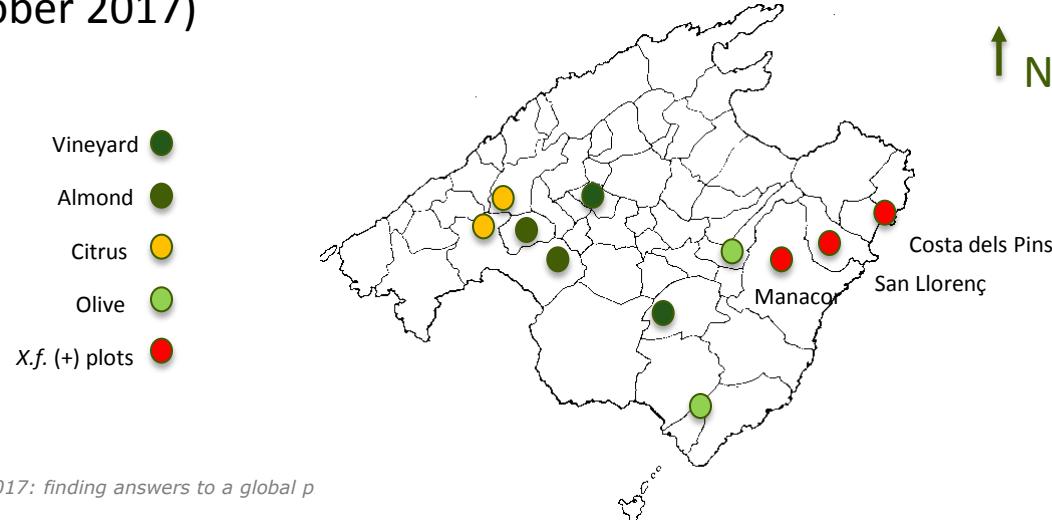
- Group poorly studied
- Species are very common. No pest. No control.
- 42 potential species in Europe (exc. Cicadidae)
- 3 species reported in the Balearics (EFSA, 2015)
 - *Philaenus spumarius*: Proven vector in USA (Severin, 1950; Purcell, 1980) and Italy (Saponari et al., 2014)
 - *Neophilaenus campestris*
 - *Neophilaenus lineatus*



<http://www.fauna-eu.org/>

METHODOLOGY:

- Eight organic farming orchards were selected, 2 for each crop: **citrus, almond, olive** and **vineyard**. Sampled biweekly from March to November trees and herbaceous cover.
- Positive plots: orchards where positive plants to *X. fastidiosa* were confirmed (sampling only April and October 2017)



EXAMPLES OF SAMPLING SITES





CAPTURE OF INSECTS

- Spittlebug foam



- Sweeping net



- Bagging



- Vacuum



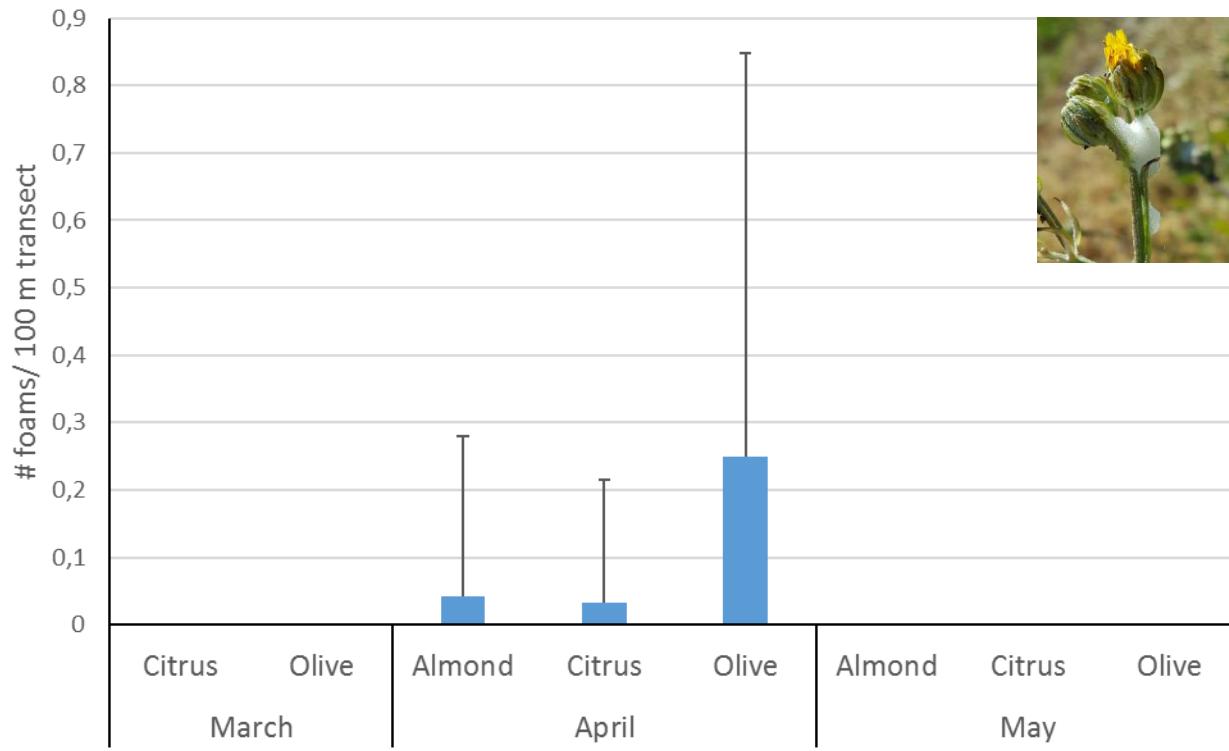


SUMMARY OF SAMPLING METHODS

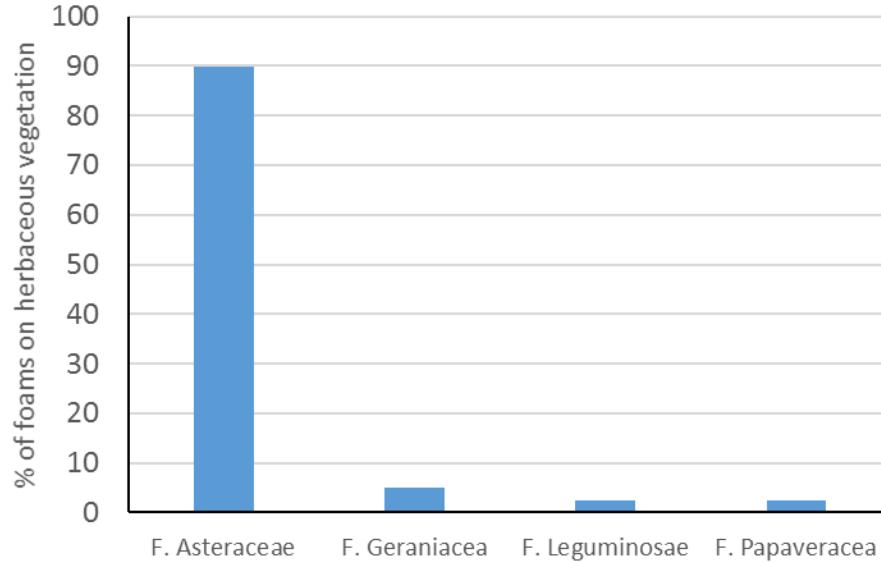
Type of crop/plant	Foam sampling	Sweeping net	Bagging	Vacuum
Herbaceous plants	30 samples along 100 m (unit 0,25 cm ²)	10 sweeps / 2 m ² 5 samples/ crop	-	-
Olive	-	6 trees- 2 sweeps/ tree 5 samples/ crop	Bagging 30 trees. 2 branches per sample 15 samples	-
Almond	-	-	-	3 branches / 5 trees 15 samples/ site
Citrus	-	-	-	3 branches / 5 trees 15 samples/ site
Vineyard	-	-	-	5 rows x 100 m 5 samples/ site



RESULTS: ABUNDANCE OF FOAMS PER CROP



RESULTS: % OF FOAMS FOUND ON PLANT HOST FAMILIES



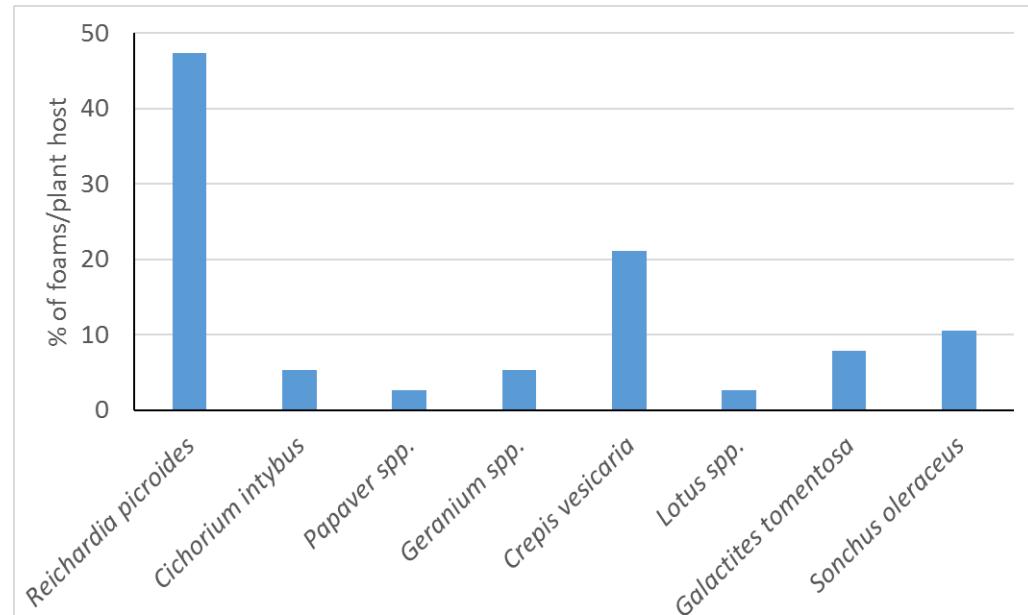
F Asteraceae: *Cichorium intibus*, *Crepis vesicaria*, *Galactites tomentosa*, *Sonchus oleraceus*, *Reichardia picroides*.

F. Geraniaceae: *Geranium* sp.

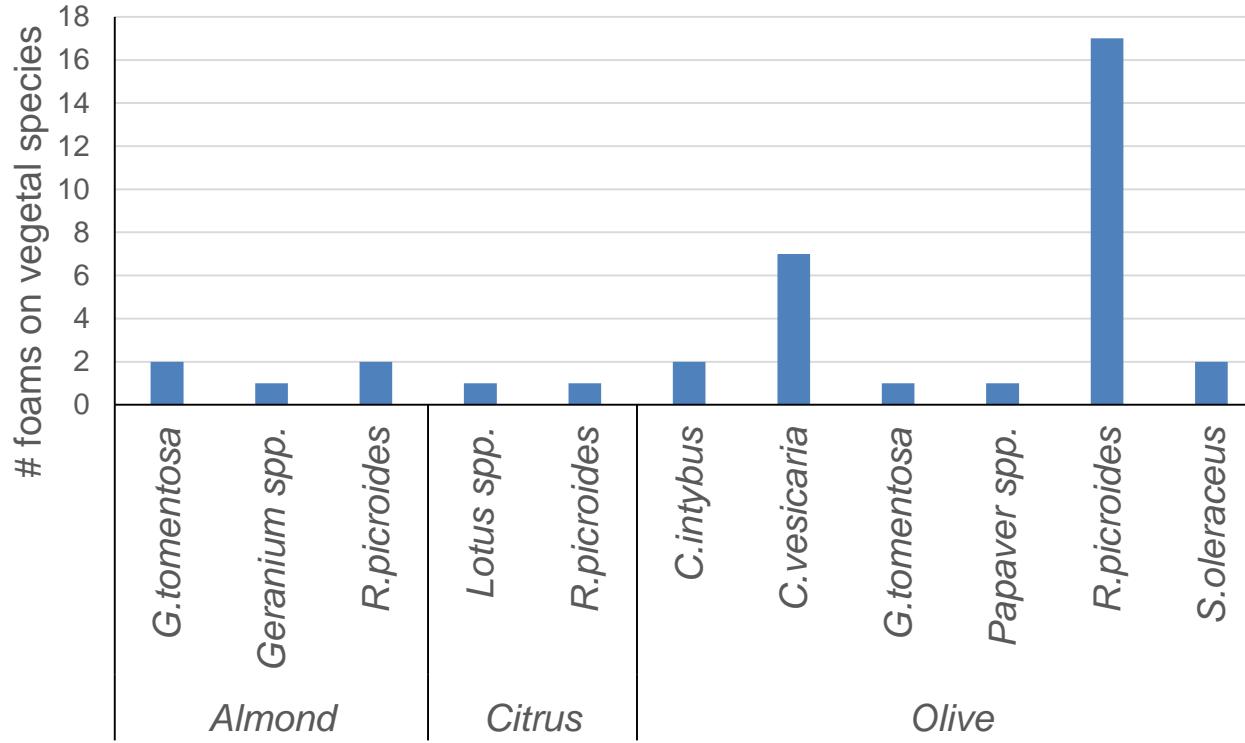
F. Leguminosae: *Lotus* sp.

F. Papaveracea: *Papaver* sp.

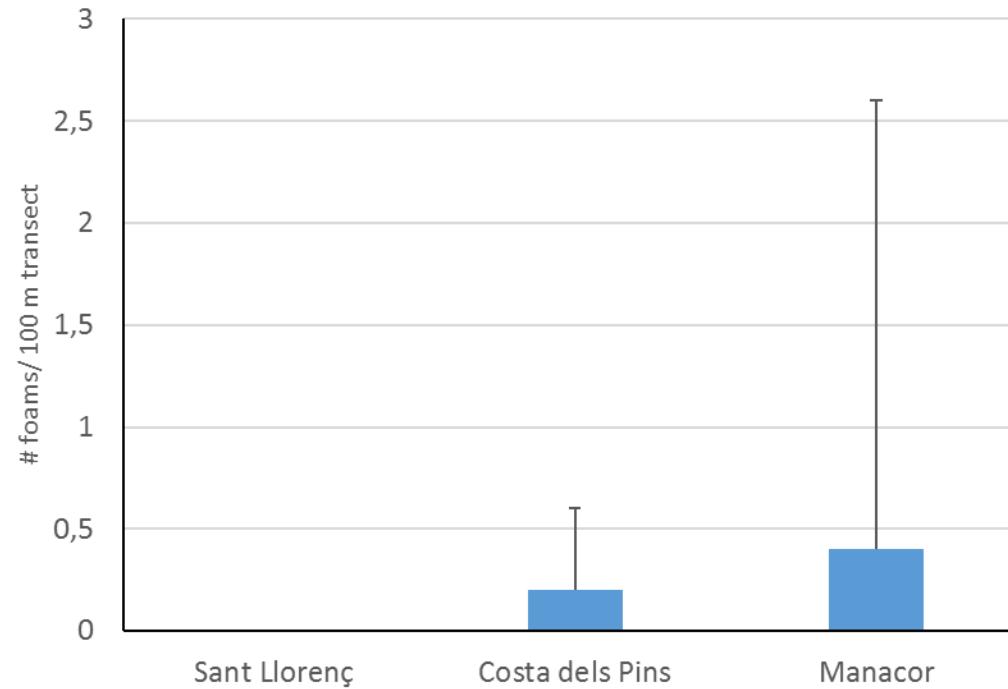
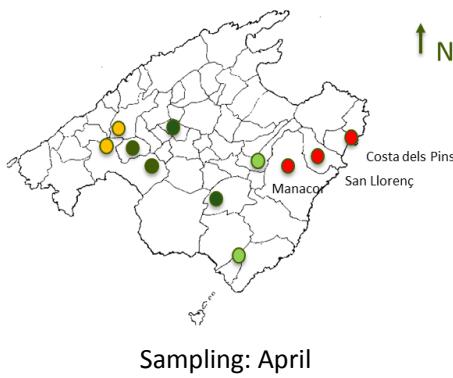
RESULTS: % OF FOAMS PER PLANT HOST SPECIES



RESULTS: NUMBER OF FOAMS FOUND ON PLANT HOST SPECIES PER CROP



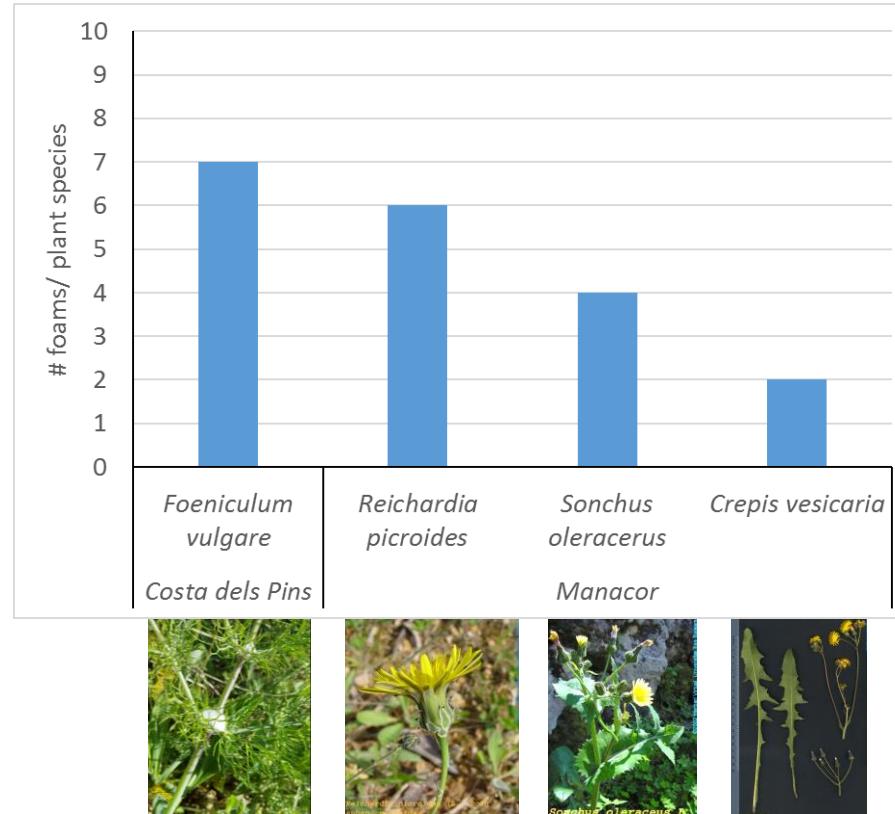
RESULTS: ABUNDANCE OF FOAMS IN *X. FASTIDIOSA* POSITIVE PLOTS



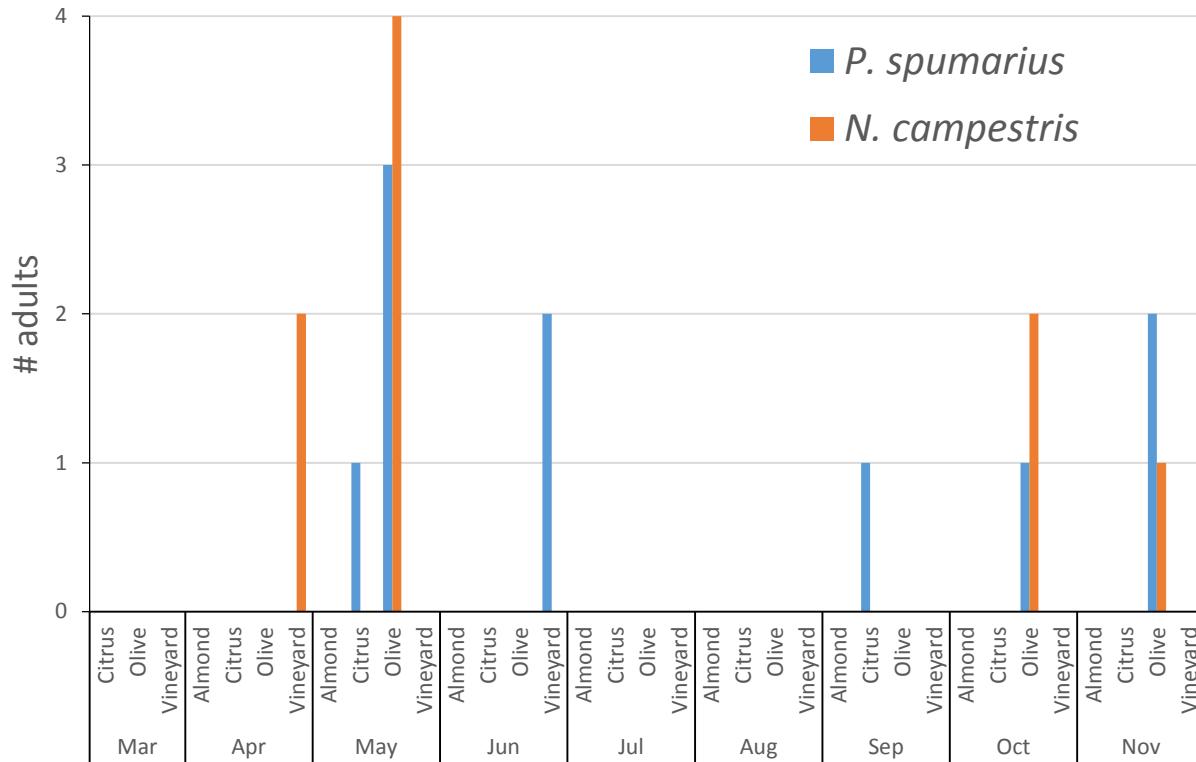
RESULTS: NUMBER OF FOAMS PER PLANT HOST SPECIES IN X. FASTIDIOSA POSITIVE PLOTS

F. Asteraceae (63,2 %) : *Crepis vesicaria*, *Sonchus oleraceus*, *Reichardia picroides*.

F. Umbelliferae (36,8 %) : *Foeniculum vulgare*.



RESULTS: ABUNDANCE OF ADULTS PER TYPE OF CROP

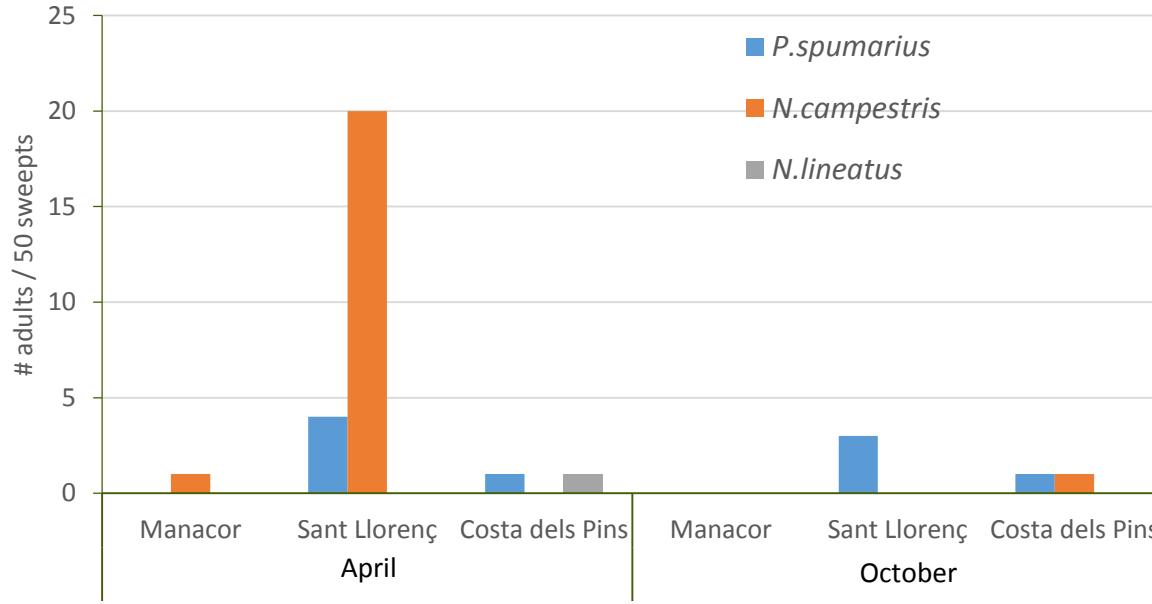


RESULTS: SPECIES COMPOSITION (ONLY APHROPHORIDAE)

Crop	Family	Species
Olive	Aphrophoridae	<i>Philaenus spumarius</i>
		<i>Neophilaenus campestris</i>
Citrus	Aphrophoridae	<i>Philaenus spumarius</i>
Almond	-	-
Vineyard	Aphrophoridae	<i>Neophilaenus campestris</i>



RESULTS: ABUNDANCE OF ADULTS IN HERBACEOUS VEGETATION IN *X. FASTIDIOSA* POSITIVE PLOTS



RESULTS: SPECIES COMPOSITION (ONLY APHROPHORIDAE) IN *X. FASTIDIOSA* POSITIVE PLOTS

Area	Species	Total individuals
Sant Llorenç	<i>Neophilaenus campestris</i>	20
	<i>Philaenus spumarius</i>	4
Costa dels Pins	<i>Neophilaenus lineatus</i>	1
	<i>Philaenus spumarius</i>	1
Manacor	<i>Neophilaenus campestris</i>	1



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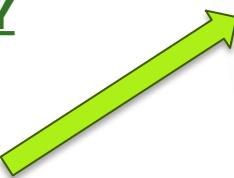


LIFE CYCLE & SEASONALITY

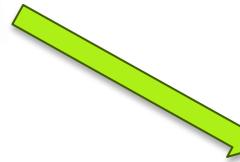
Spring



March- April



Summer May to Sept
Other plant hosts?
High Temp./No cover.



Autumn



http://donegal-wildlife.blogspot.com.es/2012_05_01_archive.html

Winter



December to February



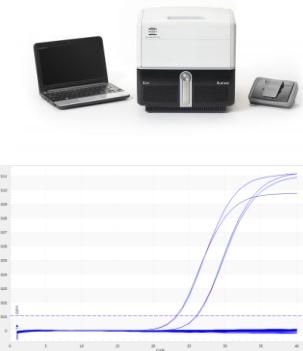
October- November



RESULTS: MOLECULAR DETECTION OF *X. FASTIDIOSA* IN POTENTIAL VECTORS (APHROPHORIDAE)



INSECT SPECIES	CAPTURED	ANALYSED ¹	POSITIVES
<i>Neophilaenus campestris</i>	27	27	0
<i>Neophilaenus lineatus</i>	1	1	0
<i>Philaenus spumarius</i>	4	4	0
<i>Philaenus spumarius f. marginella</i>	2	2	0
<i>Philaenus spumarius f. typica</i>	2	2	0
<i>Philaenus spumarius f. populella</i>	2	2	0
<i>Philaenus spumarius f. fasciata</i>	1	1	0
Total:	39	39	0



¹ Following EPPO protocol 7/24(2), all samples were analysed by qPCR (Harper *et al.*, 2010) with DNA extracted by CTAB from insects heads without eyes.



IN CONCLUSION:

- The highest number of nymphs was found during April in plant covers associated to olive and almond crops.
- Nymphs showed preference for particular herbaceous plant species such as *Reichardia picroides*, *Crepis vesicaria*, *Sonchus oleraceus* and *Phoeniculus vulgare*.
- In summer, adults were not detected in the main crops.
- In autumn, adults were detected in the main crops (olive) and were more abundant in the plant cover
- In general, *Neophilaenus campestris* showed to be more abundant than *Philaenus spumarius* and *Neophilaenus lineatus*.



ACKNOWLEDGEMENTS

Many thanks to the owners of the orchards used for this project.

We thank the *Govern de les Illes Balears* for funding this project.

Also to Toni Sureda, Andrea Amoroso, M. A. Tugores and N. Barros for technical assistance. Also to Dr. M. Mus for his help on plants identification.

