

État de l'épidémie en Italie et rôle des vecteurs



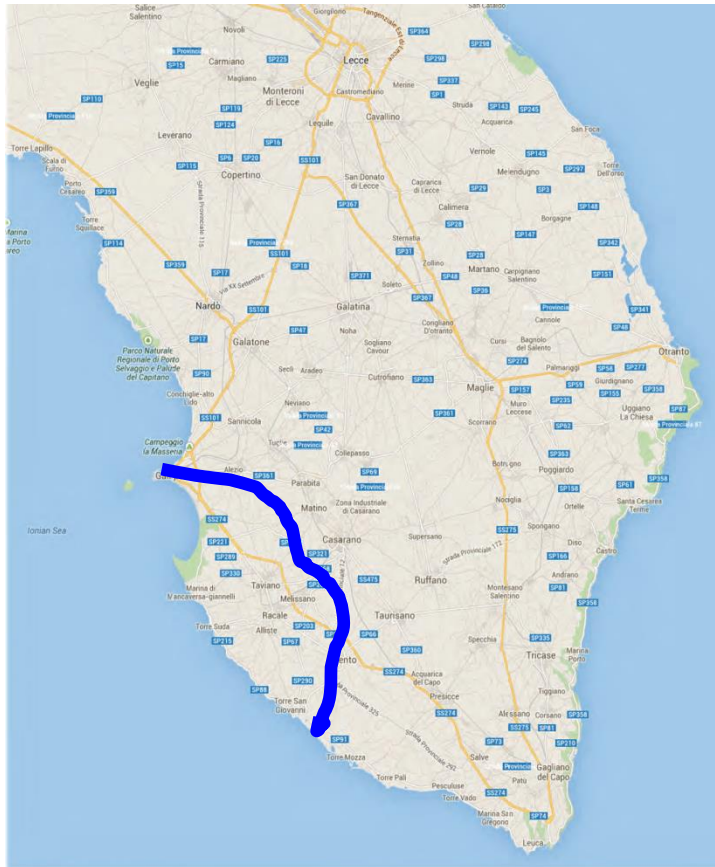
Domenico Bosco

DISAFA - Entomologia, Università degli Studi di Torino et CNR IPSP, Torino - Italie

Xylella fastidiosa subspecies *pauca* CoDiRO strain



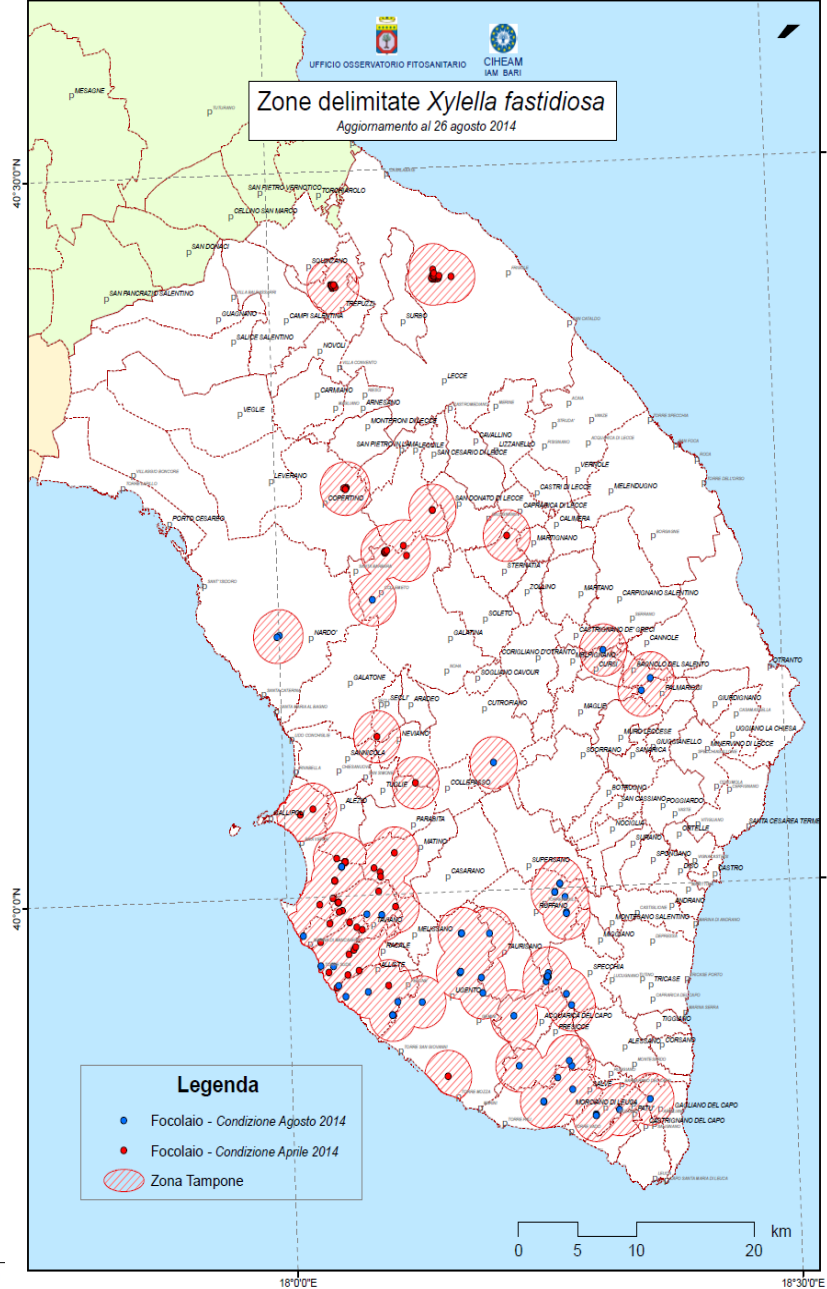
Automne 2013



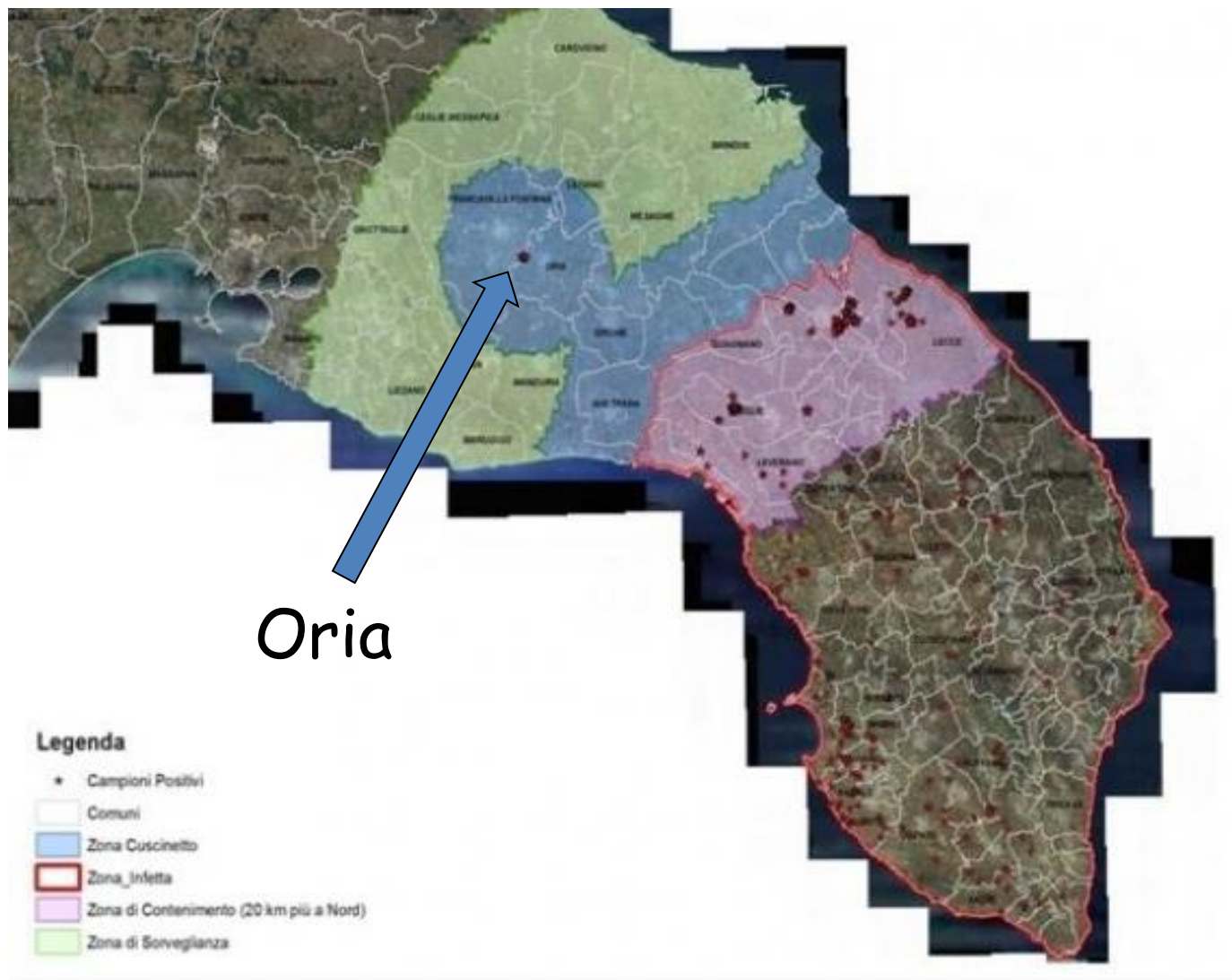
Avril 2014



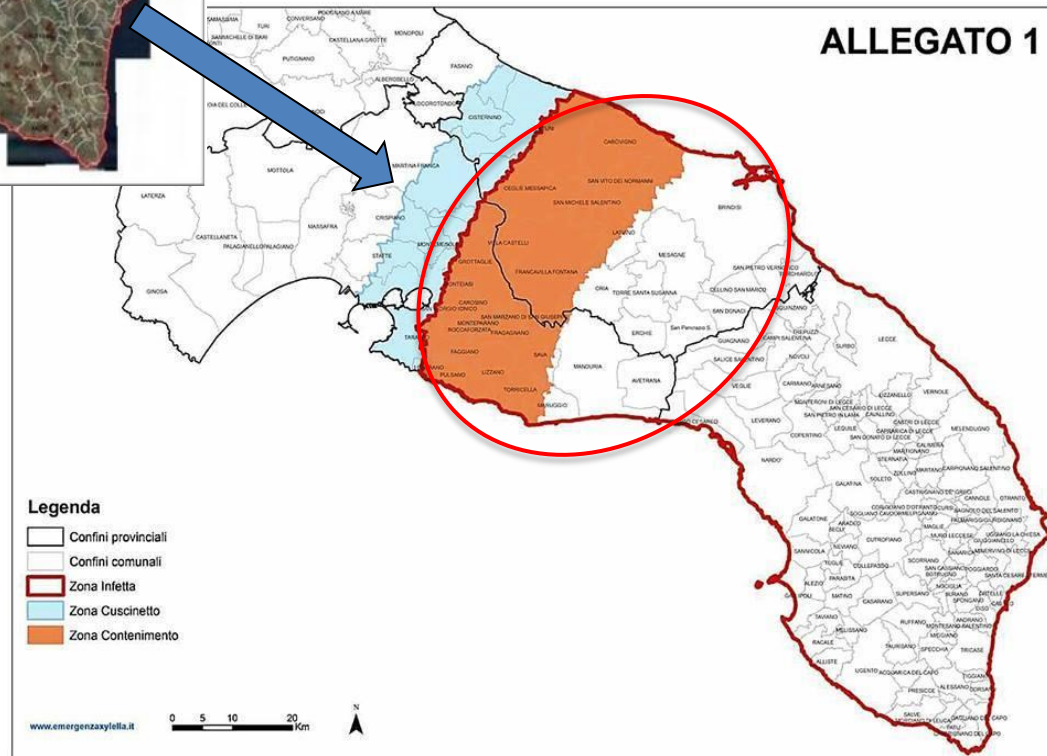
Août 2014



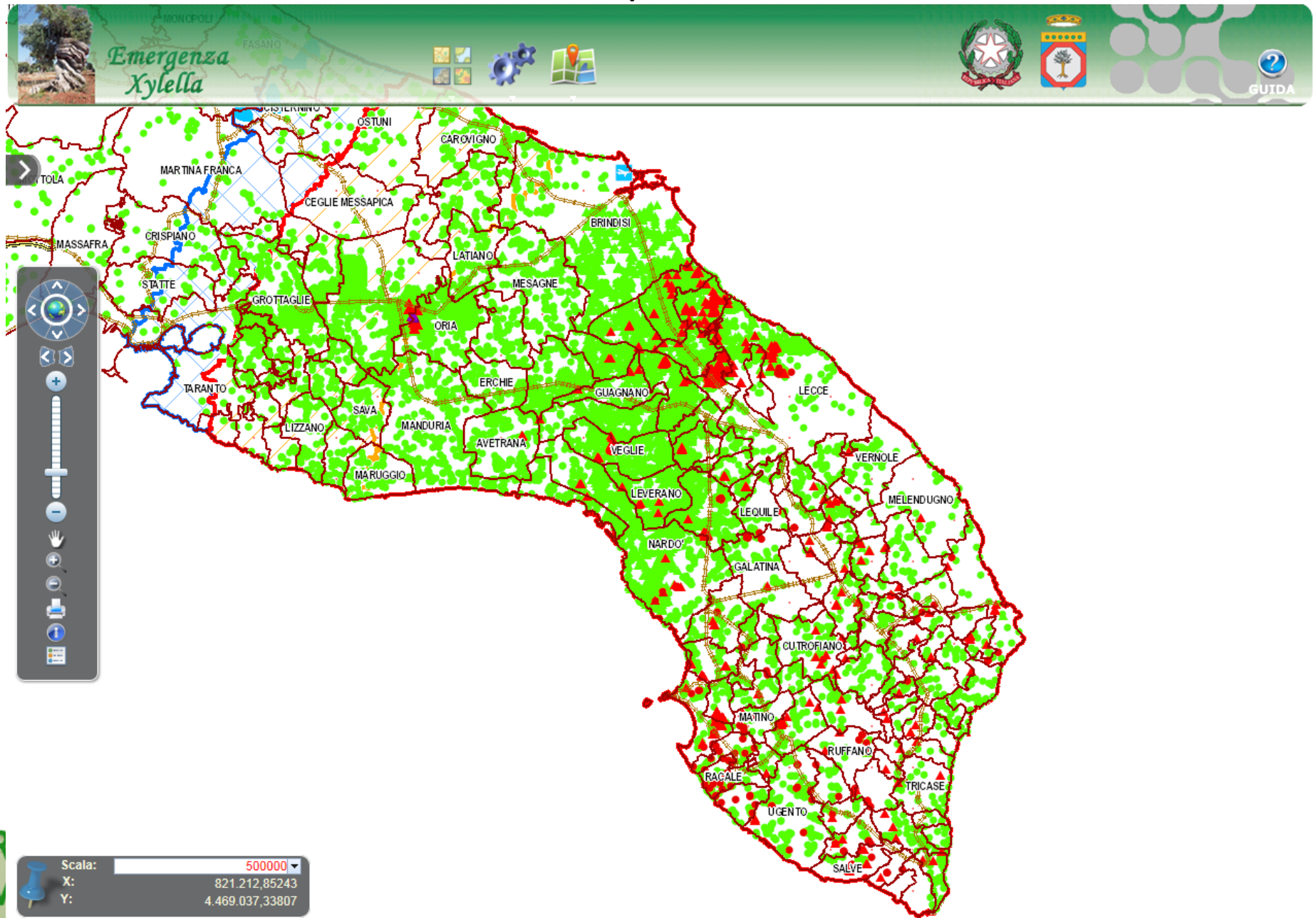
Juin
2015



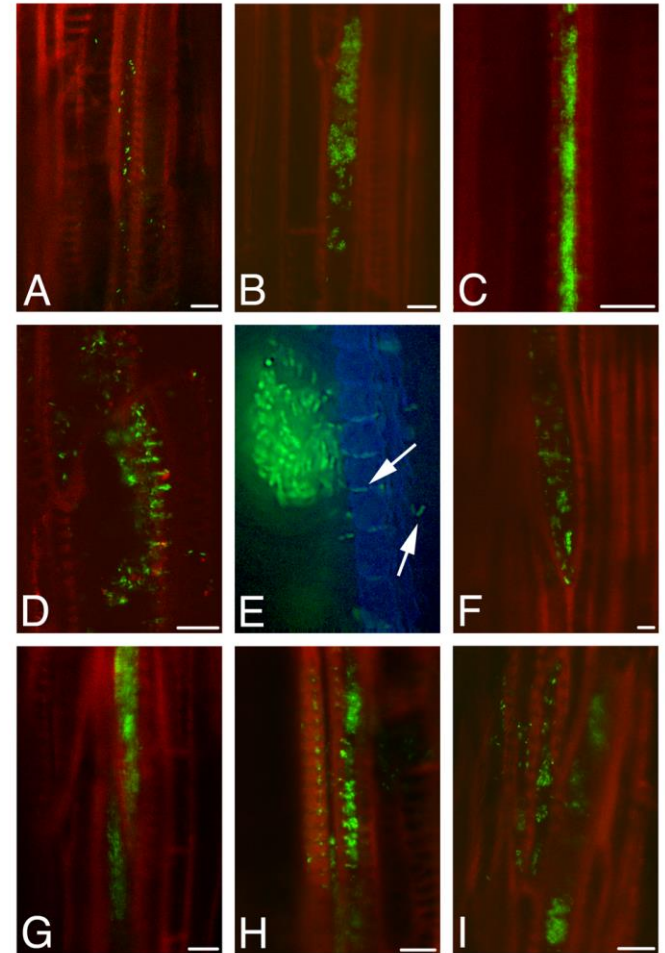
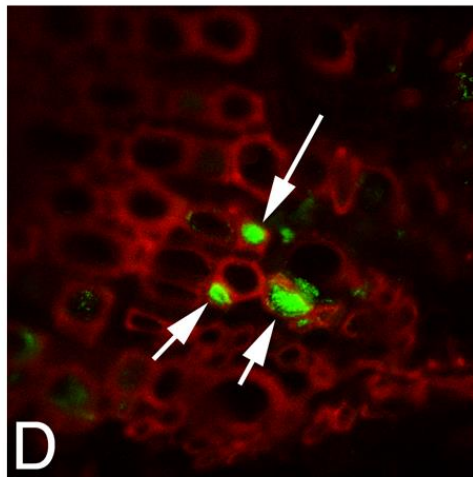
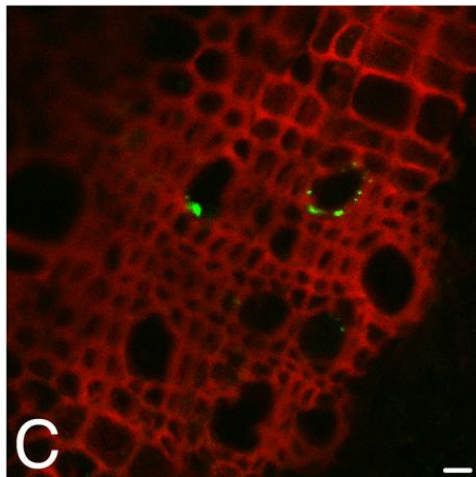
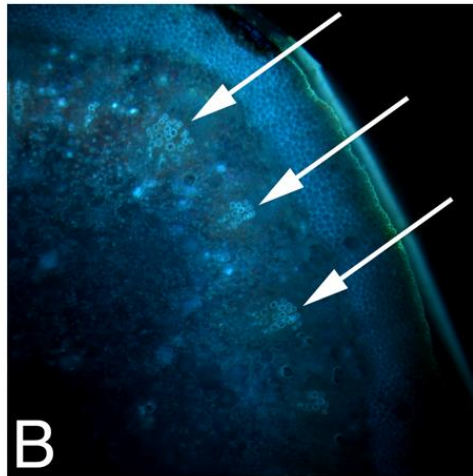
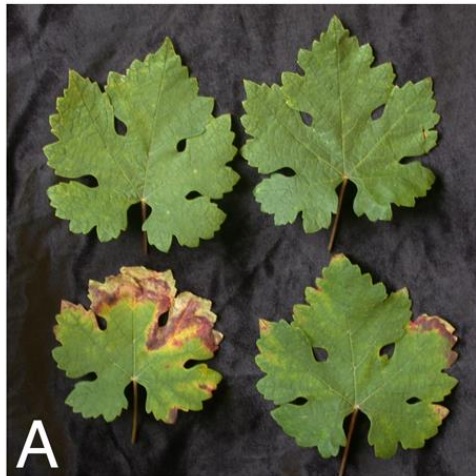
Décision d'exécution (UE) 2016/764 de la commission du 12 mai 2016 modifiant la décision d'exécution (UE) 2015/789 relative à des mesures visant à éviter l'introduction et la propagation dans l'union de *Xylella fastidiosa* (Wells et al.)



Plan officiel September 12th 2016



X. fastidiosa colonizes the xylem of host-plants...



Newman et al. 2003. *Appl. Environ. Microbiol.*

.... and therefore it is transmitted by xylem-sap feeder insects



Picture: Rodrigo Krugner



Picture: Colleagues from Bari University

Xylem-sap feeders belong to the order Hemiptera, sub-order Cicadomorpha

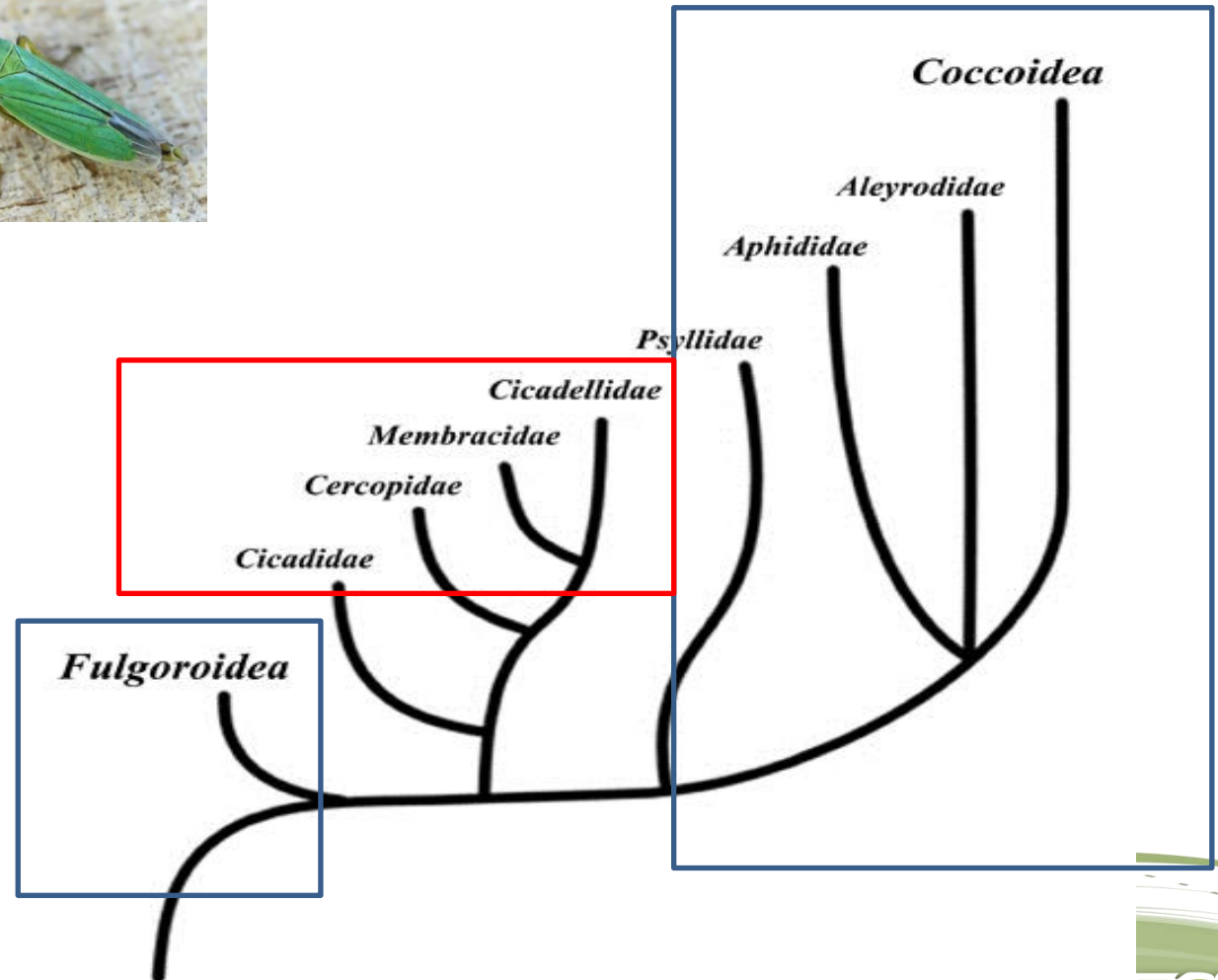
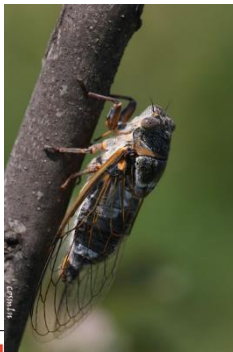
leafhoppers



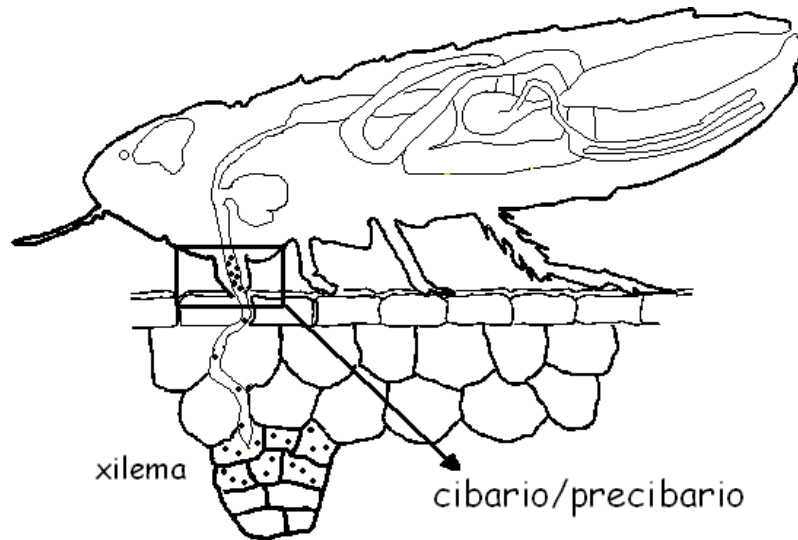
spittlebugs



cicadas



What do we know about Xf and transmission by vectors?



The transmission of *Xf* by insects is peculiar in that it does not require a latent period yet the bacteria are persistently transmitted

Bacteria are restricted to the alimentary canal and do not infect systemically the insect body. They adhere to and multiply in the pre-cibarium (part of the foregut)

Among the European xylem-sap feeder species, only *Philaenus spumarius* is a proven vector of the «CoDiRO» strain of Xf

ARTHROPODS IN RELATION TO PLANT DISEASE

Infectivity and Transmission of *Xylella fastidiosa* by *Philaenus spumarius* (Hemiptera: Aphrophoridae) in Apulia, Italy

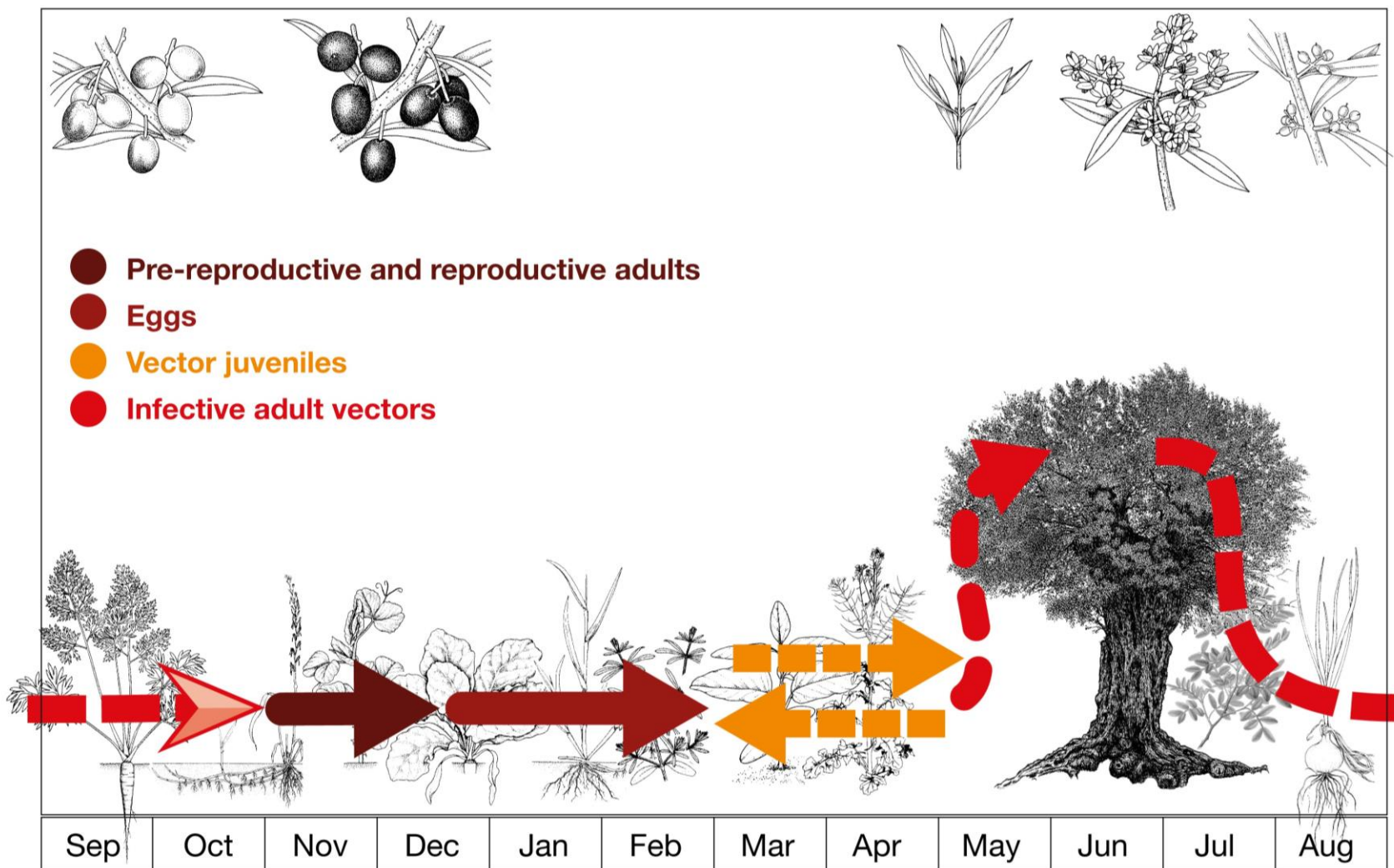
MARIA SAPONARI,¹ GIULIANA LOCONSOLE,¹ DANIELE CORNARA,² RAYMOND K. YOKOMI,³
ANGELO DE STRADIS,¹ DONATO BOSCIA,¹ DOMENICO BOSCO,⁴ GIOVANNI P. MARTELLI,²
RODRIGO KRUGNER,³ AND FRANCESCO PORCELLI^{2,5}

J. Econ. Entomol. 107(4): 1316-1319 (2014); DOI: <http://dx.doi.org/10.1603/EC14142>



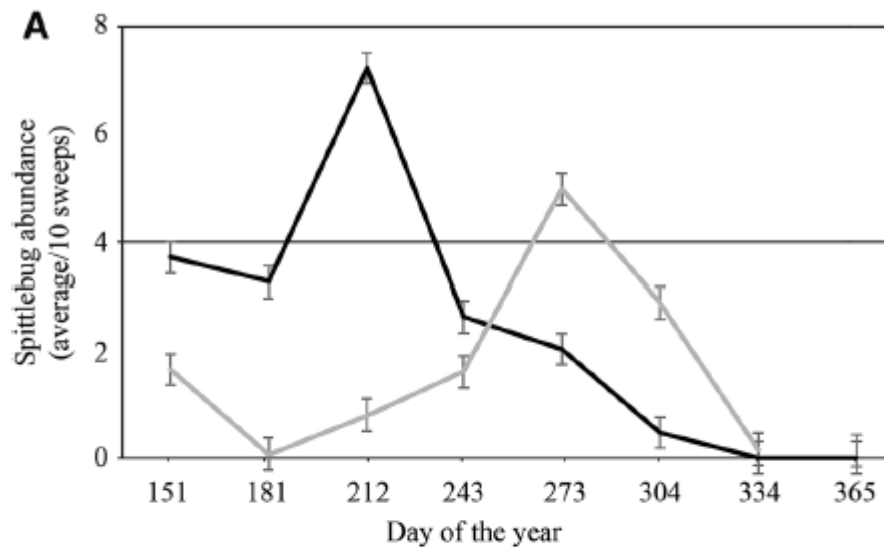
Spittlebugs in the olive agroecosystem

Philaenus spumarius

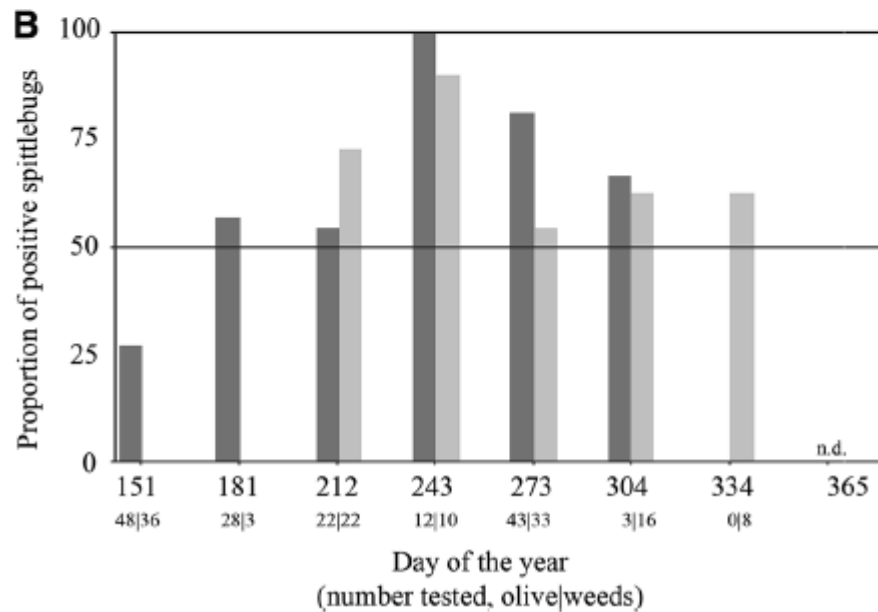


From Francesco Porcelli, UNIBA

Version: 05 November 2015 22:25



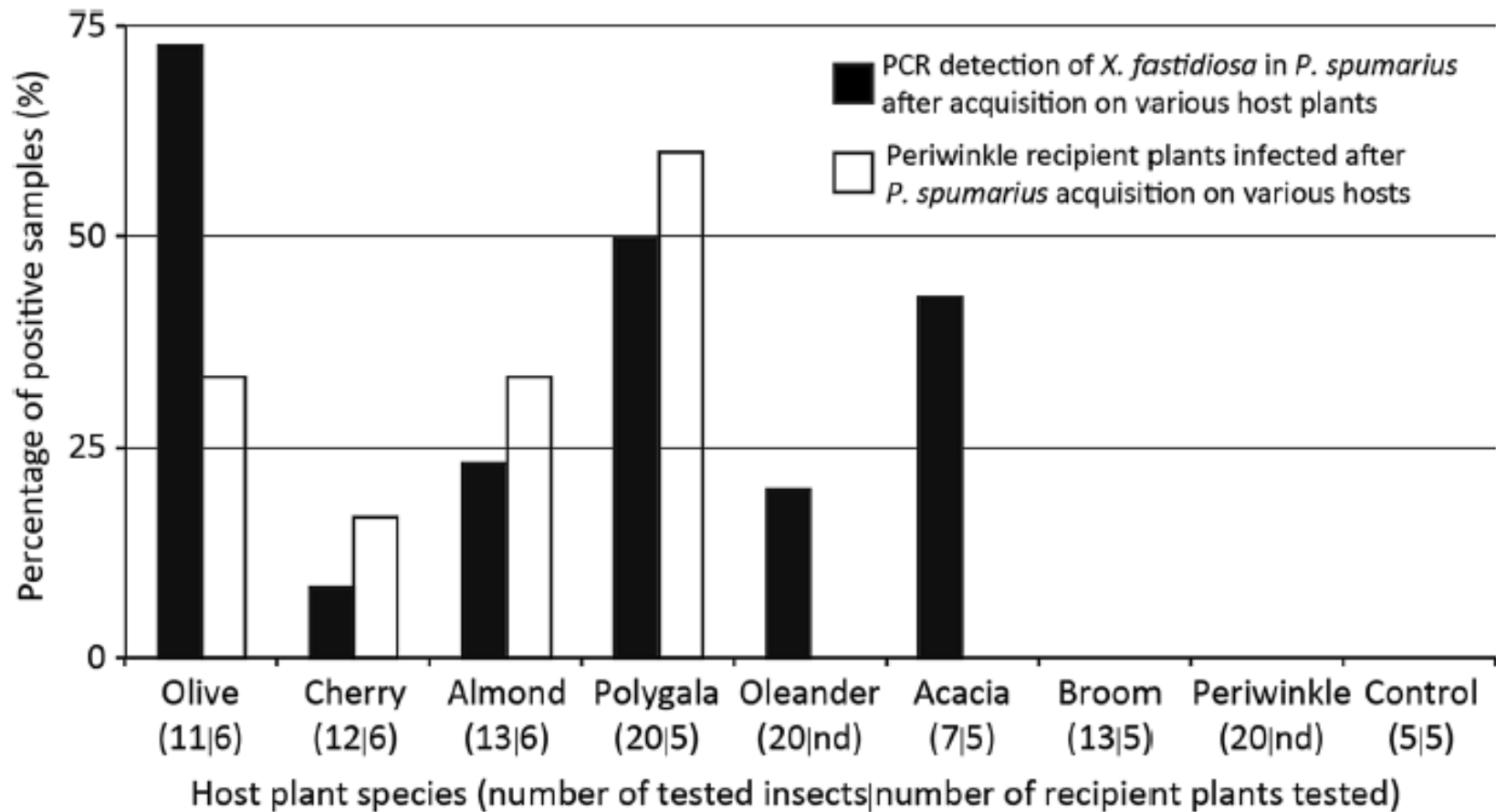
Adult population abundance
in olive orchards



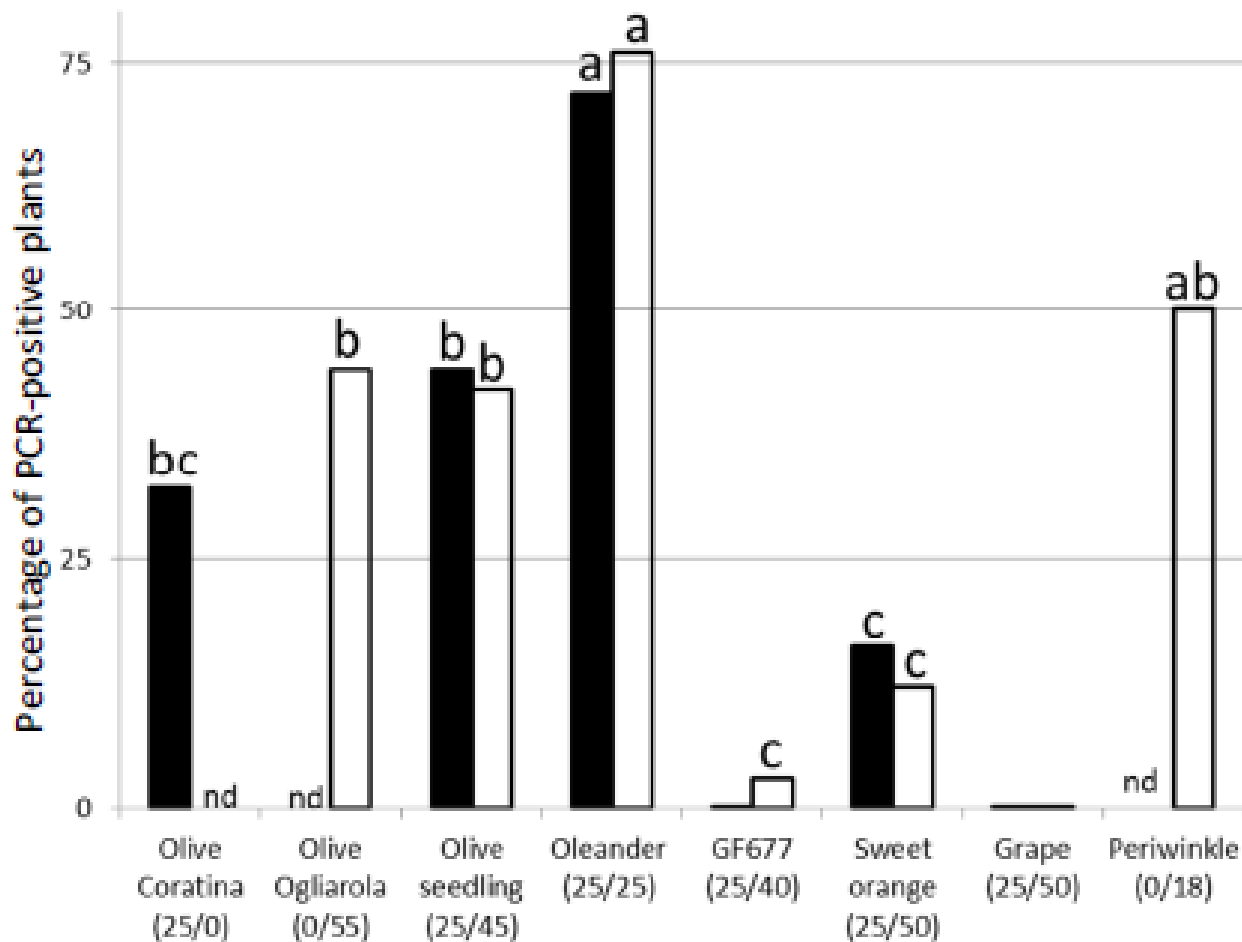
Proportion of infected adults in
olive orchards

Cornara et al., 2016 Journal of Pest Science

Xf acquisition capability from selected plants



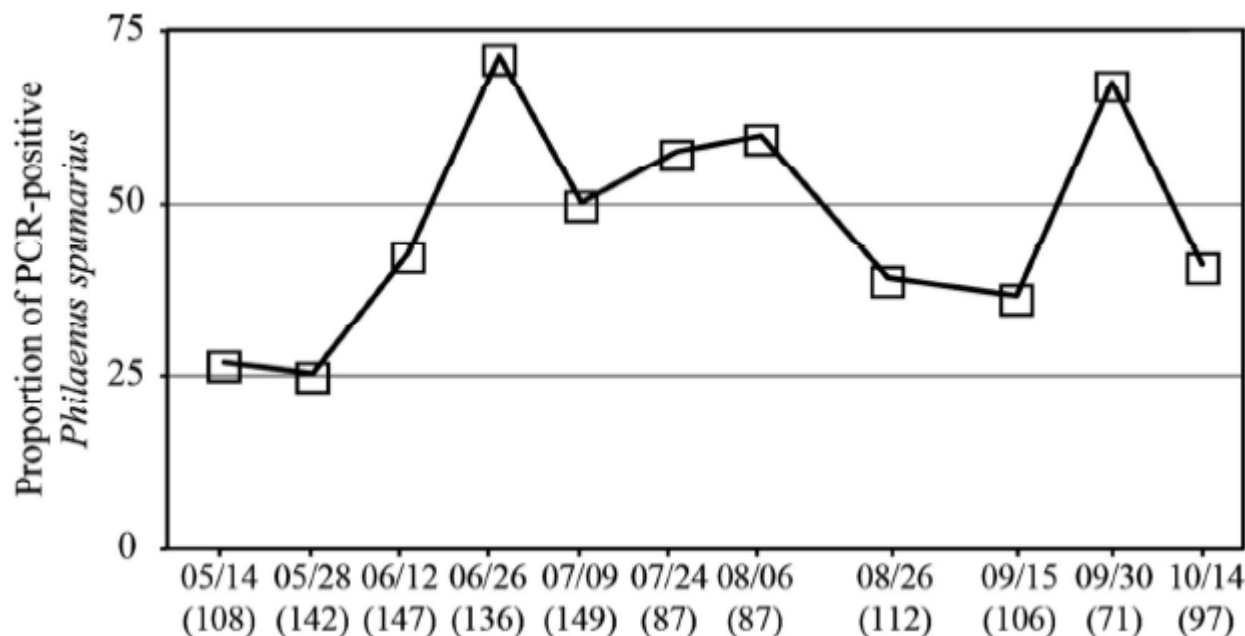
Cornara et al., 2016 Journal of Pest Science



Xf transmission efficiency to selected plants (field-collected adults of *Philaenus spumarius* in 2014 and 2015)

Cornara et al., 2016 Journal of Applied Entomology

Natural infectivity of field-collected *Philaenus spumarius* in 2015 (as estimated by PCR)



Cornara et al., 2016 *Journal of Applied Entomology*

Main Auchenorrhyncha species collected in olive orchards in the Salento area of Puglia Region of Italy

Table 1. Classification and total number of captured species during the 2-yr survey

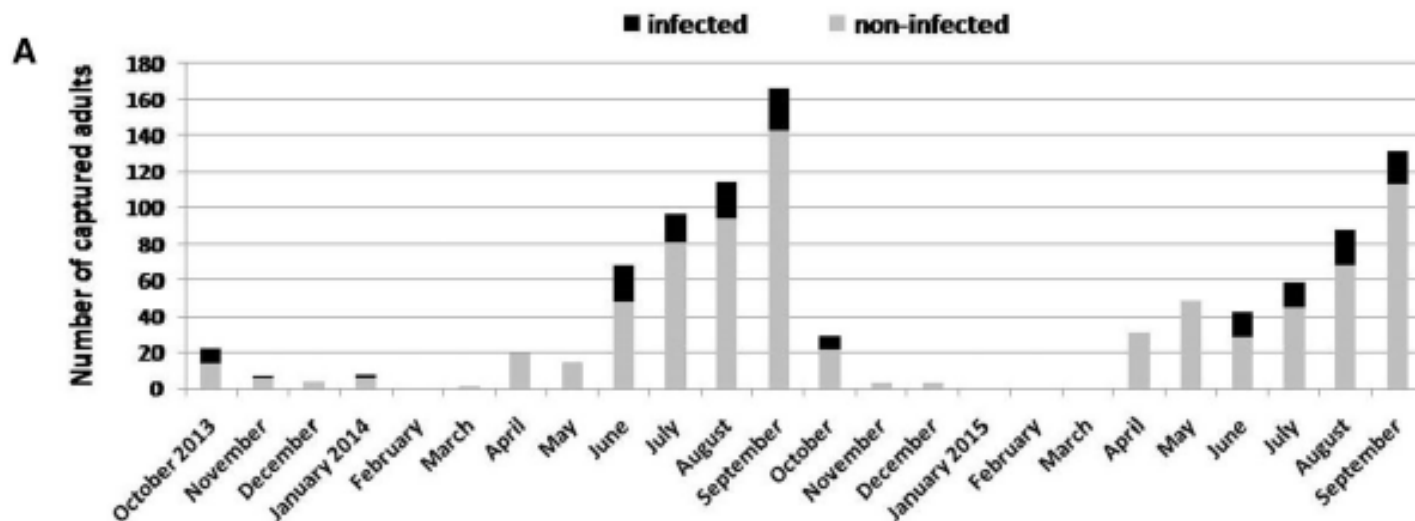
Infra order	Superfamily	Family	Species	N ^a	P (%) ^b
Cicadomorpha	Cercopoidea	Aphrophoridae	<i>Philaenus spumarius</i> (L.)	955	39.8
			<i>Neophilaemus campestris</i> (Fallèn)	207	8.6
		Cercopidae	<i>Cercopis sanguinolenta</i> (Scopoli)	12	0.5
	Cicadoidea	Cicadellidae	<i>Allygus modestus</i> Scott	28	1.2
			<i>Anoplotettix putoni</i> Ribaut	172	7.2
			<i>Fieberiella florii</i> (Stål)	26	1.1
			<i>Synophropsis lauri</i> (Horvart)	86	3.6
			<i>Euscelis lineolatus</i> Brullé	195	8.1
			<i>Conosanus obsoletus</i> (Kirschbaum)	13	0.5
			<i>Exitianus capicola</i> (Stål)	39	1.6
			<i>Thamnotettix zelleri</i> (Kirschbaum)	286	11.9
			<i>Psammnotettix</i> spp.	2	0.1
			<i>Anaceratagallia</i> spp.	13	0.5
			<i>Agalmatium flavescens</i> (Olivier)	363	15.1
			<i>Metcalfa pruinosa</i> Say	1	0.04
			Total	2,398	
Fulgomorpha	Fulgoroidea	Issidae			
		Flatidae			
		Total			

^a N: number of individuals captured.

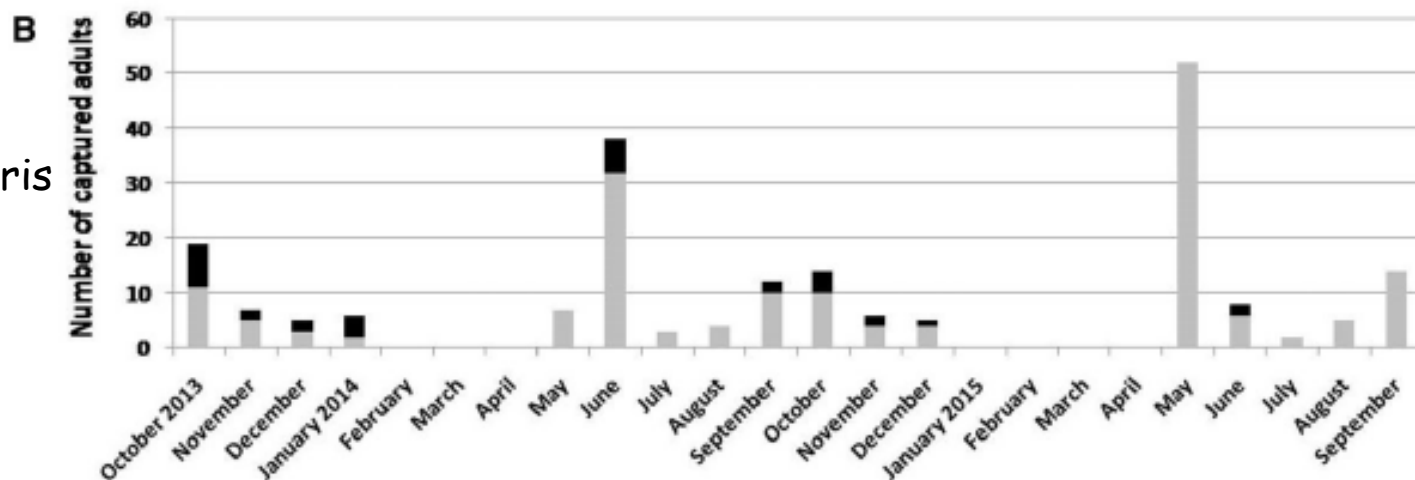
^b P (%): Percentage of individuals of each species among the total number of insects collected.

Ben Moussa et al., 2016 Journal of Economic Entomology

Philaenus spumarius



Neophilaenus campestris



Ben Moussa et al., 2016 Journal of Economic Entomology

Table 3. Average monthly incidence of *X. fastidiosa*-infected *Auchenorrhyncha* specimens collected during a 2-yr survey

Month	<i>P. spumarius</i>		<i>N. campestris</i>		<i>E. lineolatus</i>	
	M _c ^a	M _i ^b	M _c	M _i	M _c	M _i
Oct.	25.5	8.0	16.5	6.0	4.5	0
Nov.	5.0	0.5	6.5	2.0	13.0	0.5
Dec.	3.5	0	5.0	1.5	24.0	5.5
Jan.	4.0	1.0	3.0	2.0	25.5	11.0
Feb.	0	0	0	0	13.0	0
Mar.	0.5	0	0	0	6.5	0
April	25.0	0	0	0	2.0	0
May	32.0	0	29.5	0	1.5	0
June	55.0	17.0	23.0	4.0	7.5	1.0
July	77.5	14.5	2.5	0	0	0
Aug.	101.0	20.0	4.5	0	0	0
Sept.	148.5	21.0	13.0	1.0	0	0

^a M_c: Mean of captured individuals.

^b M_i: Mean of infected individuals.

Ben Moussa et al., 2016 Journal of Economic Entomology

In summer 2015 we collected in olive orchards of the Veneto Region of Italy:

280 *Philaenus spumarius*



71 *Cicadella viridis*



they all tested negative for *Xylella fastidiosa*

Should we test potential vector insects for
X. fastidiosa monitoring programs?

Phenology and ecology of *P. spumarius* in olive orchards of the Liguria and Puglia Regions of Italy at the macrocosm, mesocosm and microcosm levels



main aims:

phenology and description of the stage-structured populations of *Philaenus spumarius*

host-plant association of nymphs and adults and host-plant shifting over time

influence of the phenological phase of host-plants on spittlebug colonization

estimation of population abundance over time

population dynamics modeling



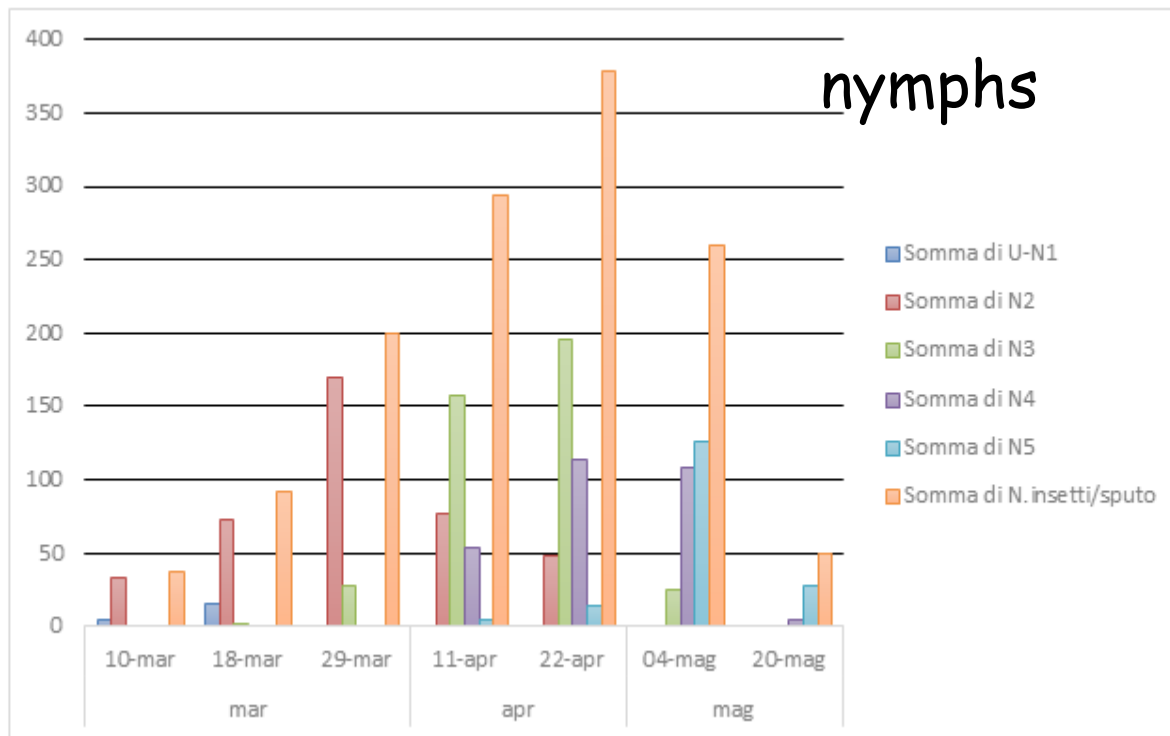
Paris – 16 septembre 2016

Séminaire : *Xylella fastidiosa* un an après ?

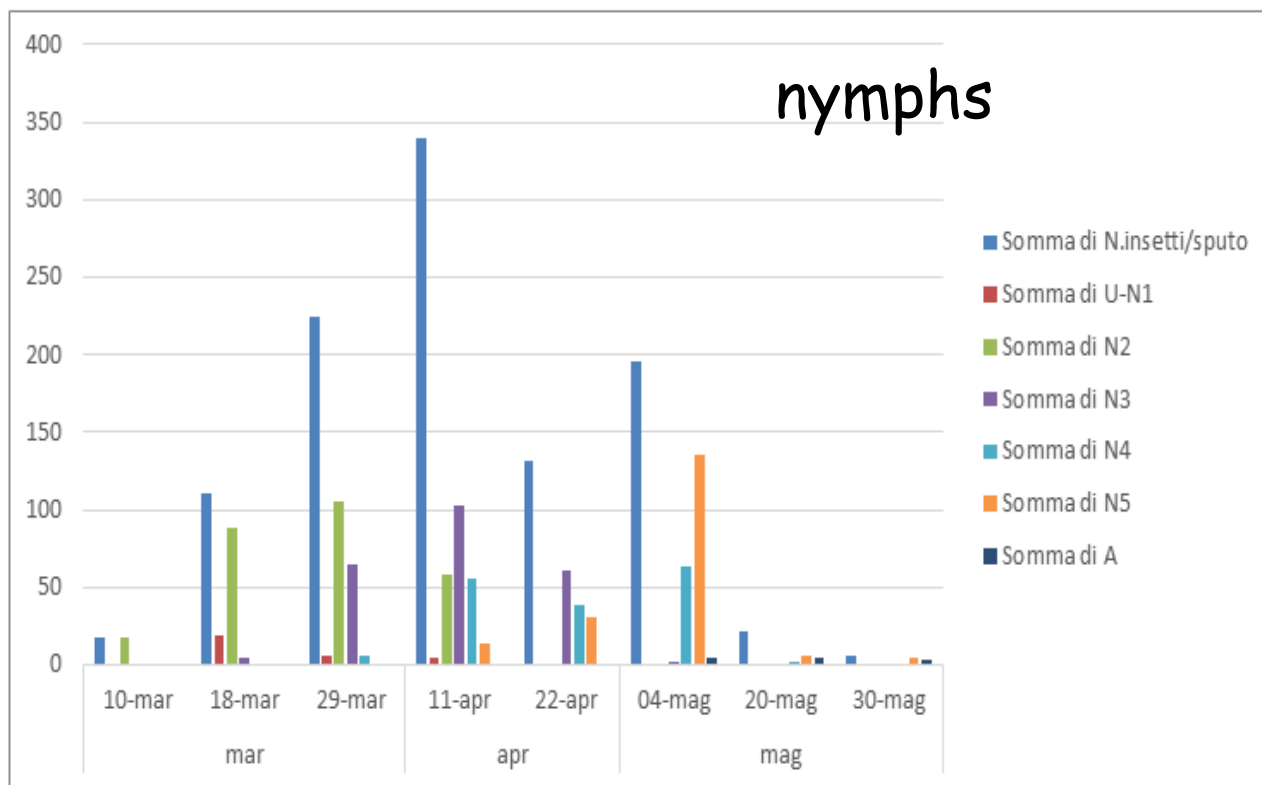
Connaissances acquises et perspectives de recherche et développement



Phenology of *P. spumarius* in olive orchards of the Liguria Region of Italy: Arnasco



Phenology of *P. spumarius* in olive orchards of the Liguria Region of Italy: Finale Ligure



Phenology of *P. spumarius* in olive orchards of the Puglia Region of Italy: Locorotondo and Valenzano



Ongoing work in Torino and Bari: mesocosm studies



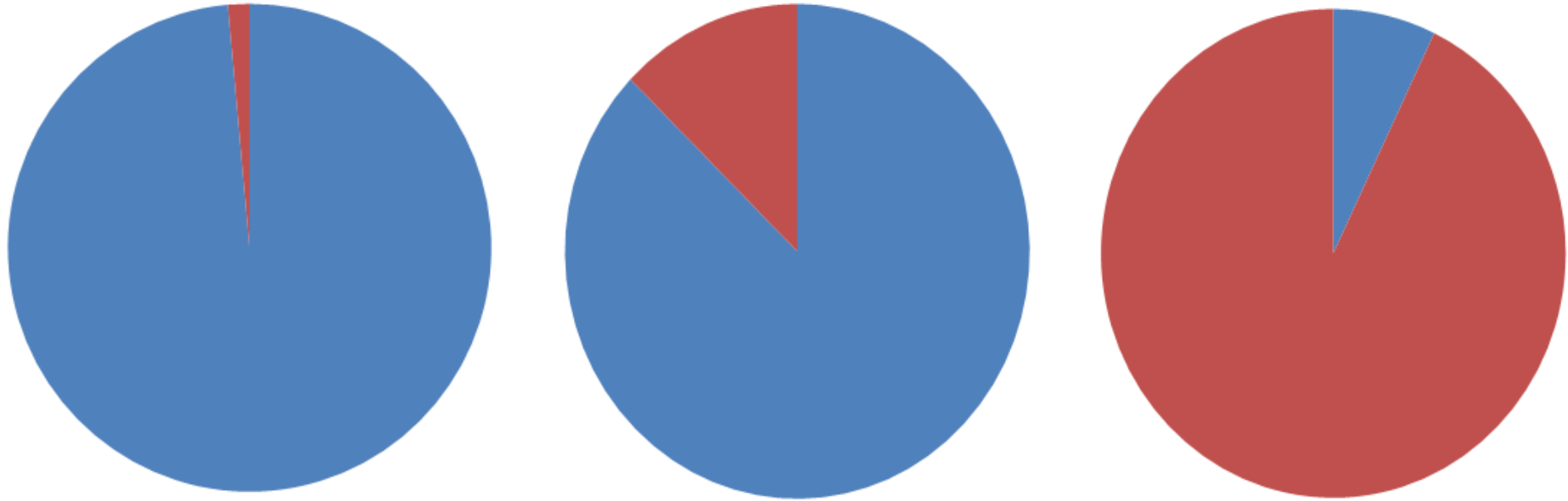
Life cycle/phenology under controlled conditions: host plants, temperature and initial level of population

Ongoing work in Torino and Bari: microcosm studies



Fecundity assays with single couples of spittlebugs

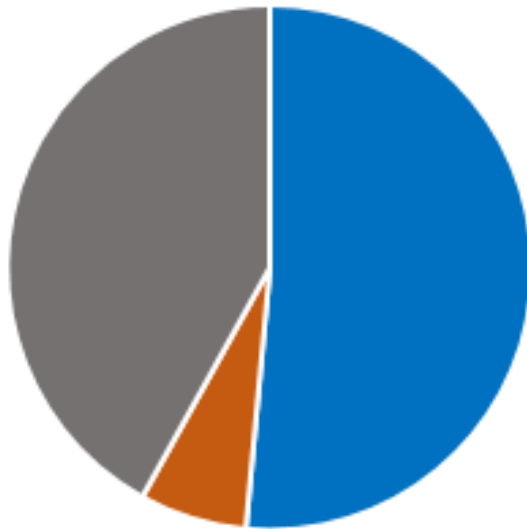
Does ecology matter?



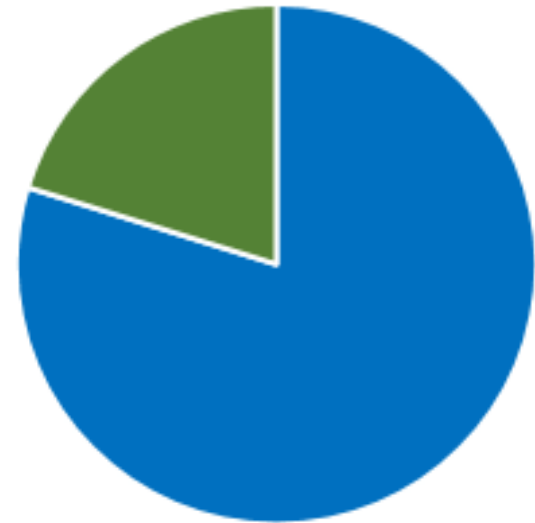
■ *Philaenus spumarius*

■ *Neophilaenus campestris*

Does ecology matter?



■ Philaenus spumarius ■ Neophilaenus campestris ■ Aphrophora alni



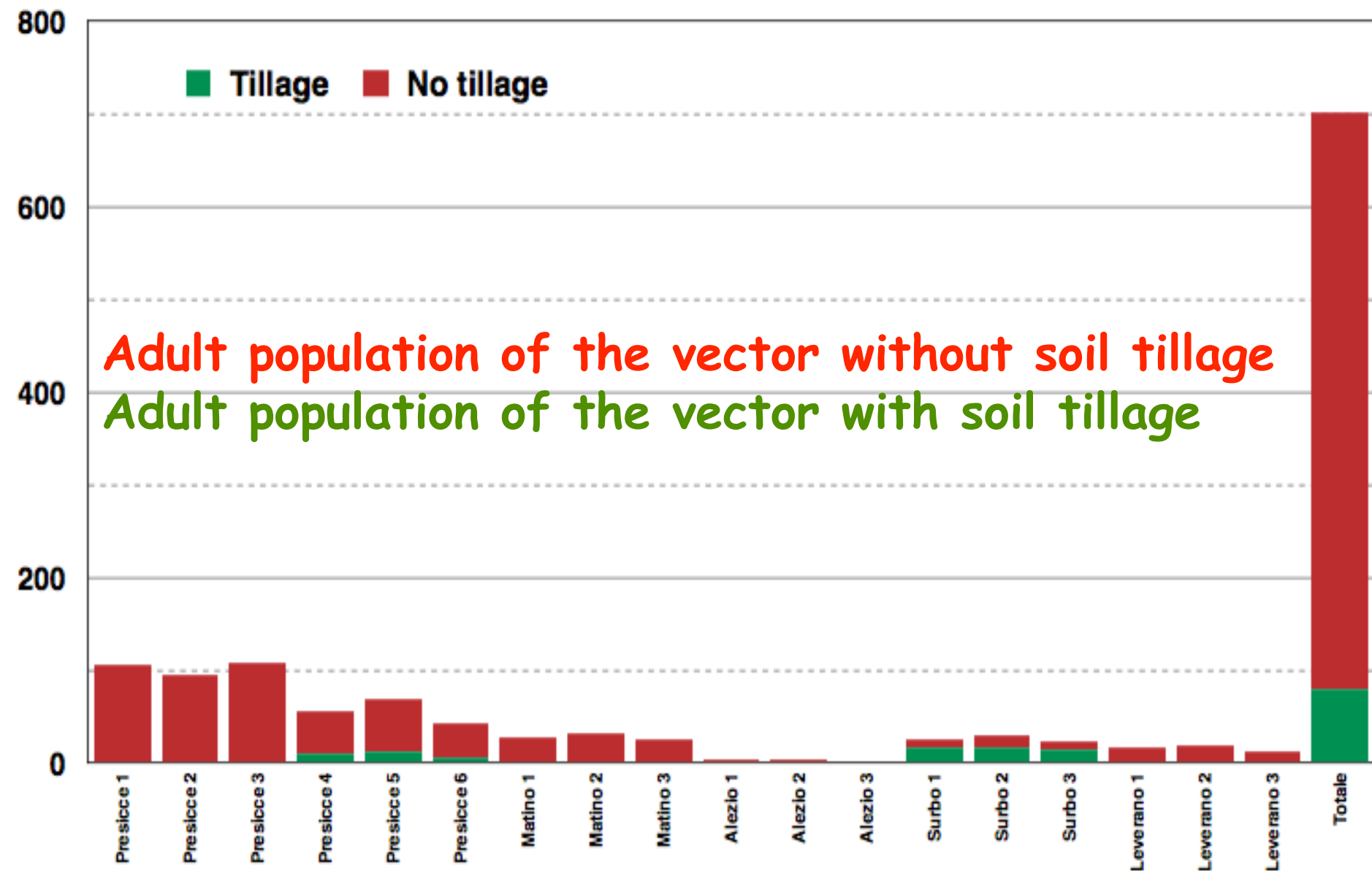
■ Philaenus spumarius ■ Cicadella viridis

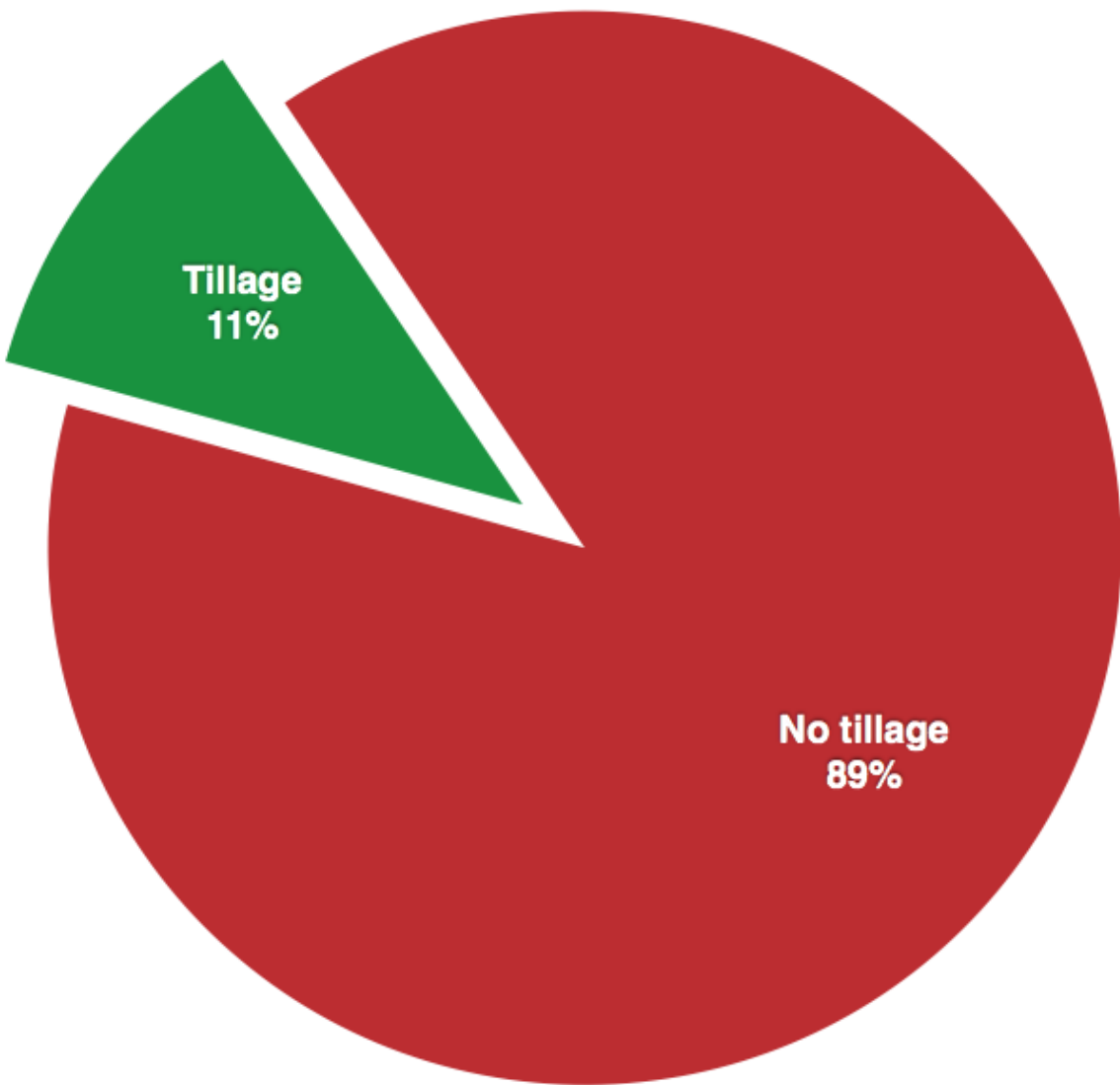
Does ecology matter?

Yes!

Olive orchards in different environmental conditions have a very different faunistic composition!

Preliminary experiences on vector control of nymphs and adults in Puglia Region

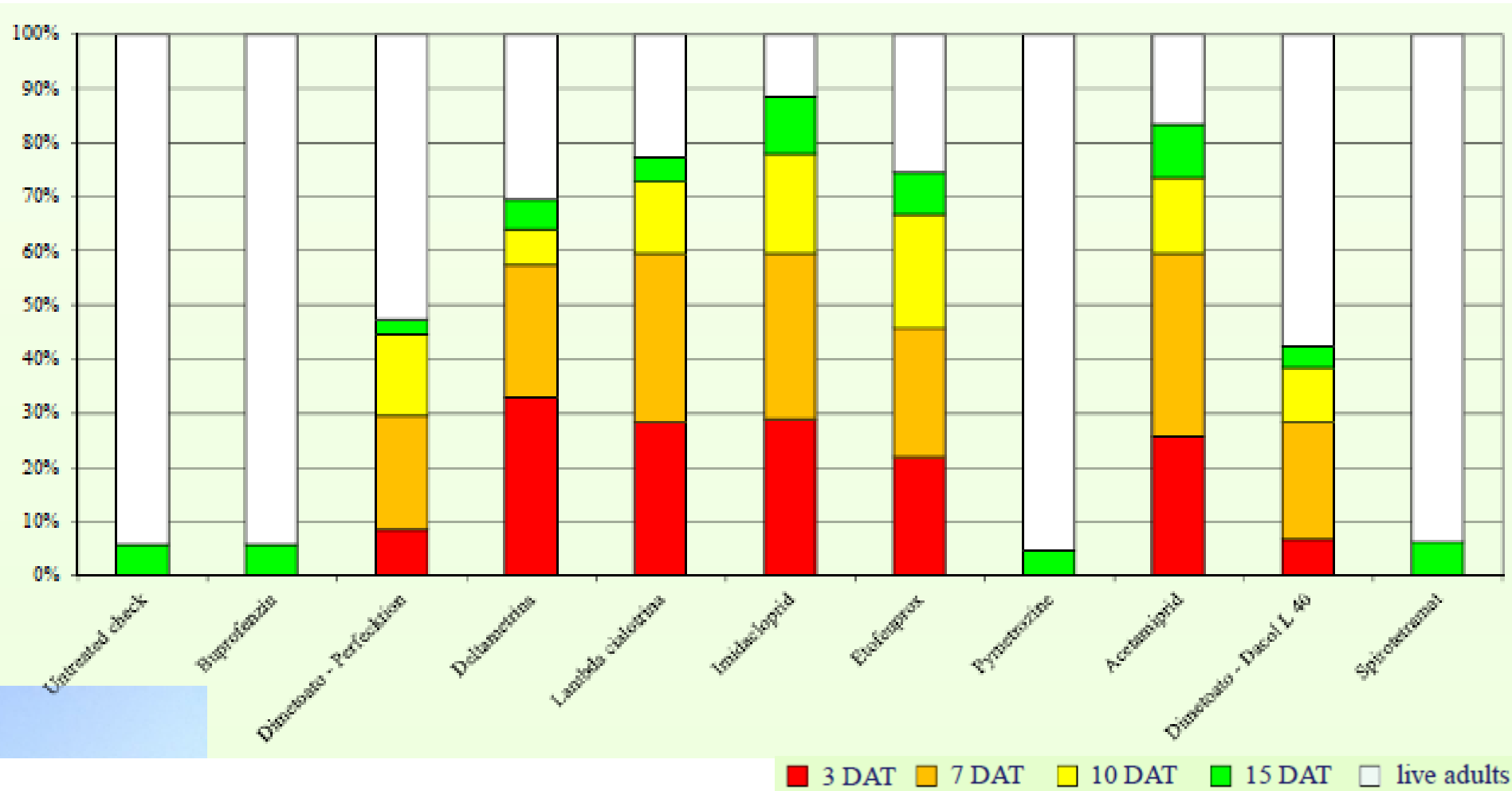




Adult population of the
vector without soil tillage

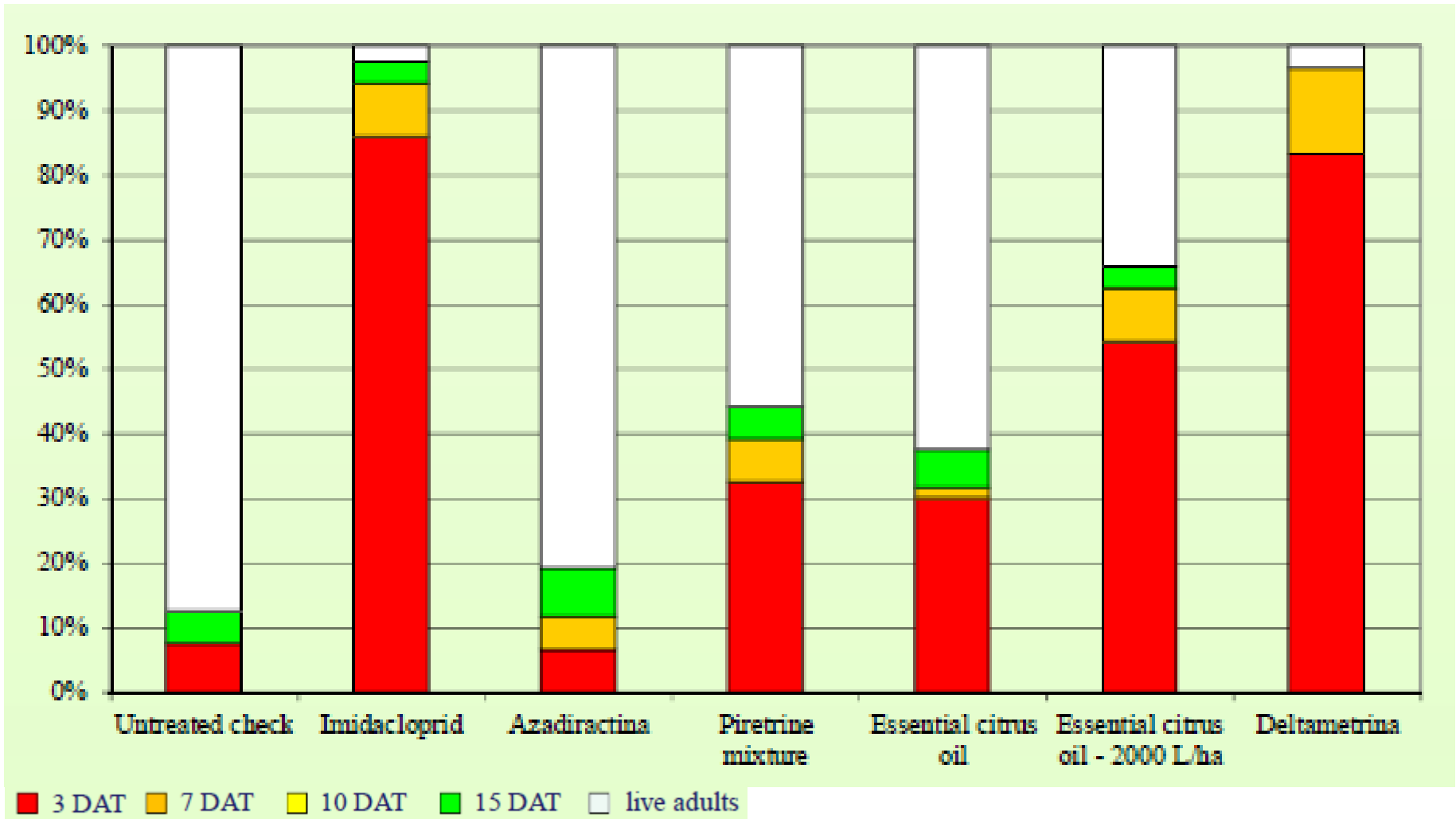
Adult population of the
vector with soil tillage

Insecticides tested on *Philaenus spumarius* adults on olive



Dongiovanni et al., 2016. FAO-IPPC-CIHEAM International Workshop on *Xylella fastidiosa*

Insecticides tested on *Philaenus spumarius* adults on olive



Dongiovanni et al., 2016. FAO-IPPC-CIHEAM International Workshop on *Xylella fastidiosa*

Other ongoing or planned research

Characterization of *P. spumarius* microbiome
(Wolbachia and foregut microbiome)

Genetic characterization of *P. spumarius*
populations

Influence of the landscape (fragmented/non
fragmented) on the population abundance of *P.*
spumarius

Chemical ecology and behavioral response of *P.*
spumarius to plant volatiles

Remerciements:

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Merci de votre
attention!

