

Invasion potential of *Xylella fastidiosa*: an emerging threat for Europe

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Outline presentation

- Reasoning
 - Situation Italy since 2013
 - Implementation EU
- *Xylella fastidiosa* biology
- Findings NL 2014
- Survey NL 2015

Background of *Xylella fastidiosa* outbreak



On 21 October 2013 Italy reported to EU the occurrence of *Xylella fastidiosa* in the Apulia Region (Lecce Province)

First report of *Xylella fastidiosa* under field conditions in the EU

Infected area around 8000 ha (600.000 trees) and 1000 ha was severely affected leading to tree death.



(EFSA Journal 2015; 13(1) 3989)



Typical leaf scorch symptoms



(Nigro F. et al., 2013)



Various other patterns of necrosis can also occur

Dessicated leaves and mummified fruit remain attached to the shoots

(Nigro F. et al., 2013)

(Nigro F. et al., 2013)



Disease incidence reached the 100%

(Nigro F. et al., 2013)



Rapid dieback of shoots and branches followed by collapse and tree death

(Nigro F. et al., 2013)



(Nigro F. et al., 2013)



(Nigro F. et al., 2013)



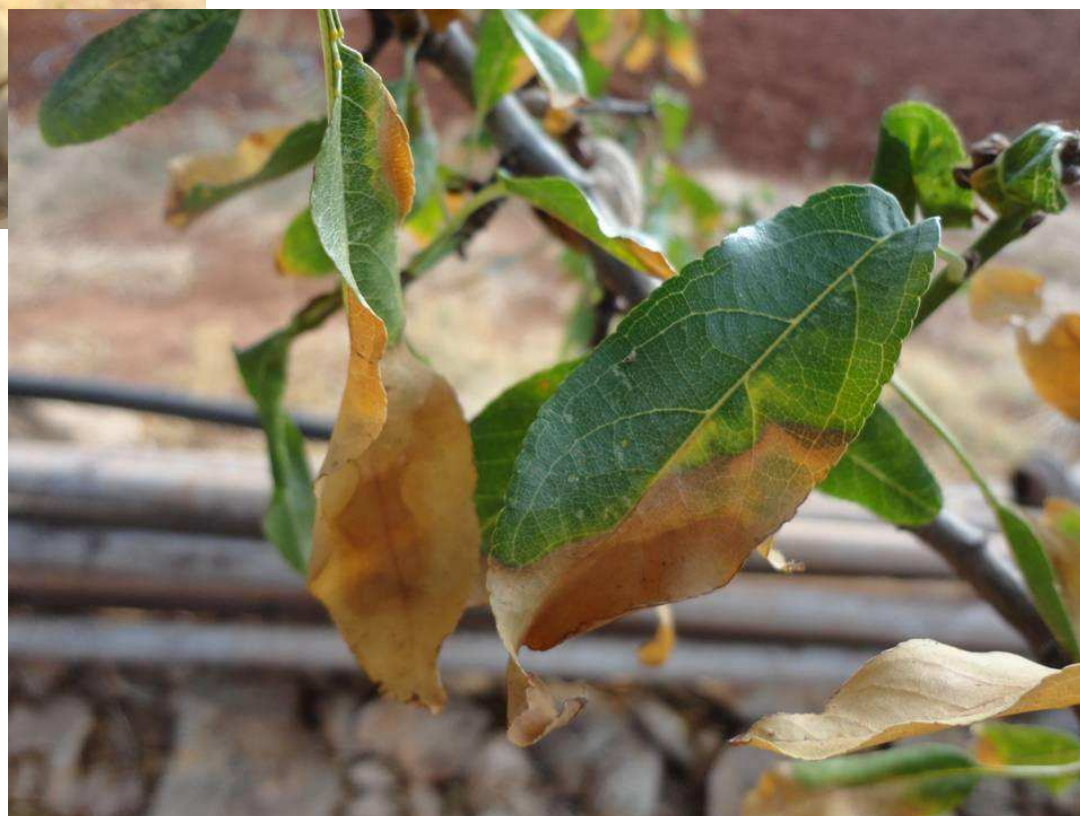
Nerium oleander



(Boscia et al., 2014)



Prunus dulcis - Almond



(Boscia et al., 2014)



Prunus avium - cherry



(Boscia et al., 2014)

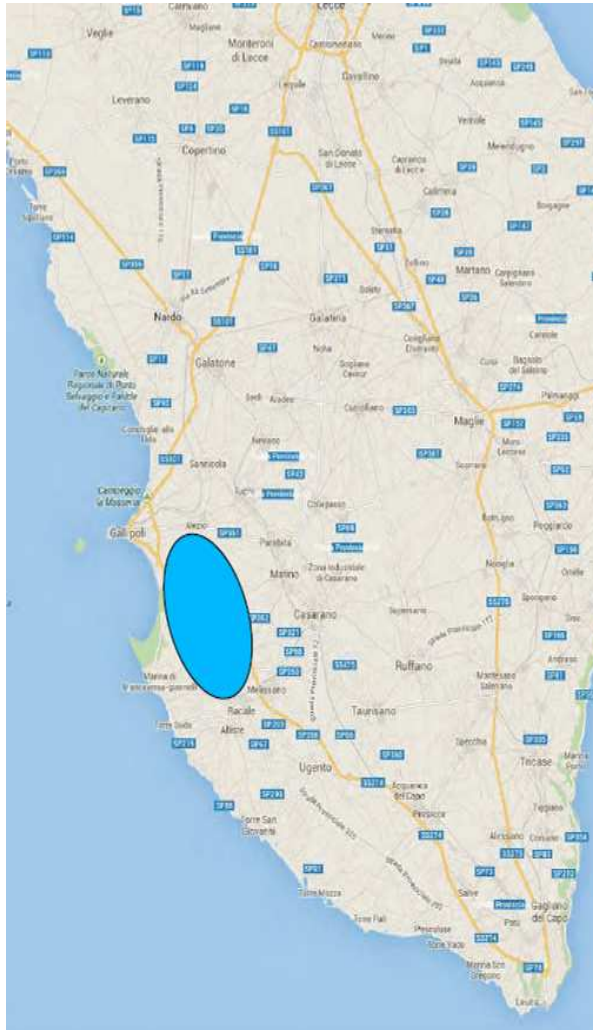


Polygala myrtifolia



(Boscia et al., 2014)

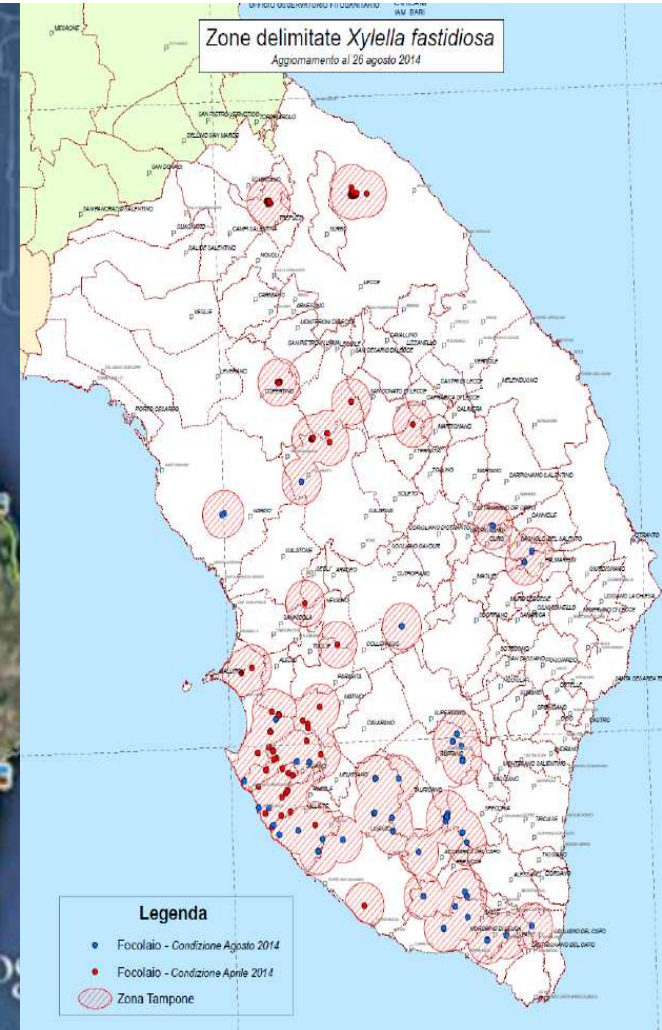
October 2013



February 2014



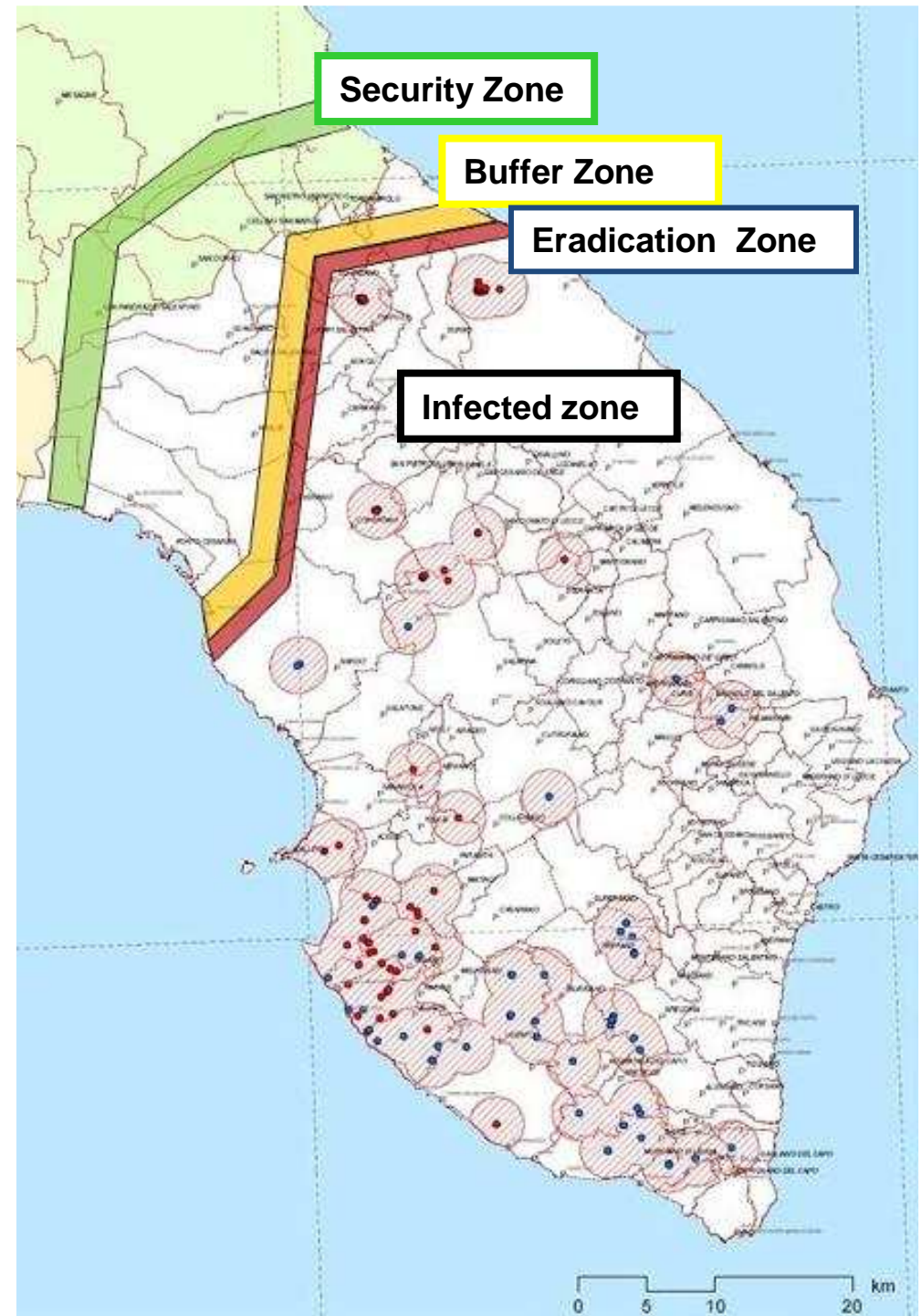
August 2014



(Boscia et al., 2014)

Almost the entire province is considered as **infected zone**.

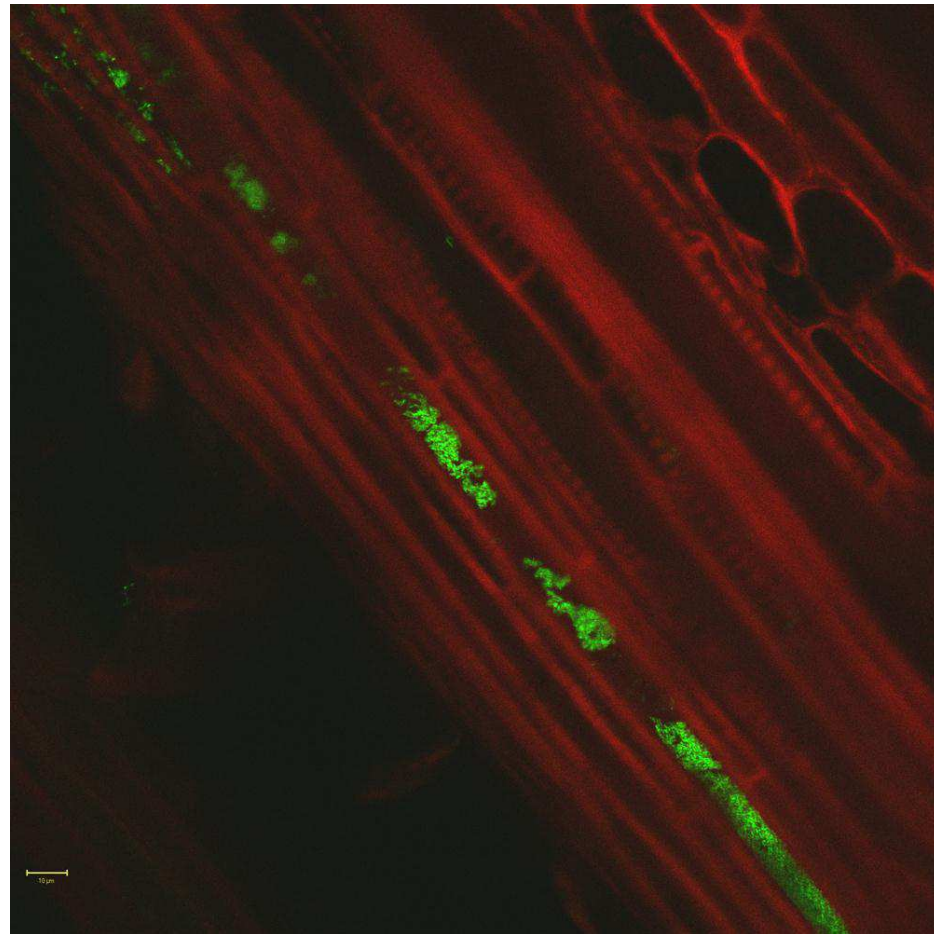
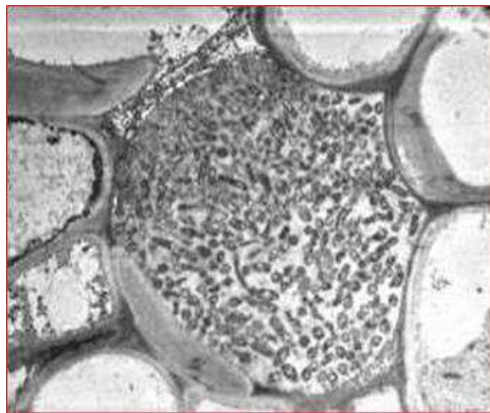
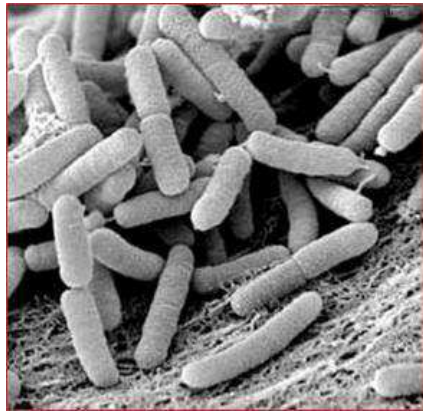
- **Buffer zone:** with a width of at least 2 km from the Adriatic to the Ionian coast.
- **Security zone:** with a width of at least 2 km to the north of the buffer zone.
- **Eradication zone:** 1 km band of the infected area adjacent to the buffer zone.



Emergency measures EU in 2014

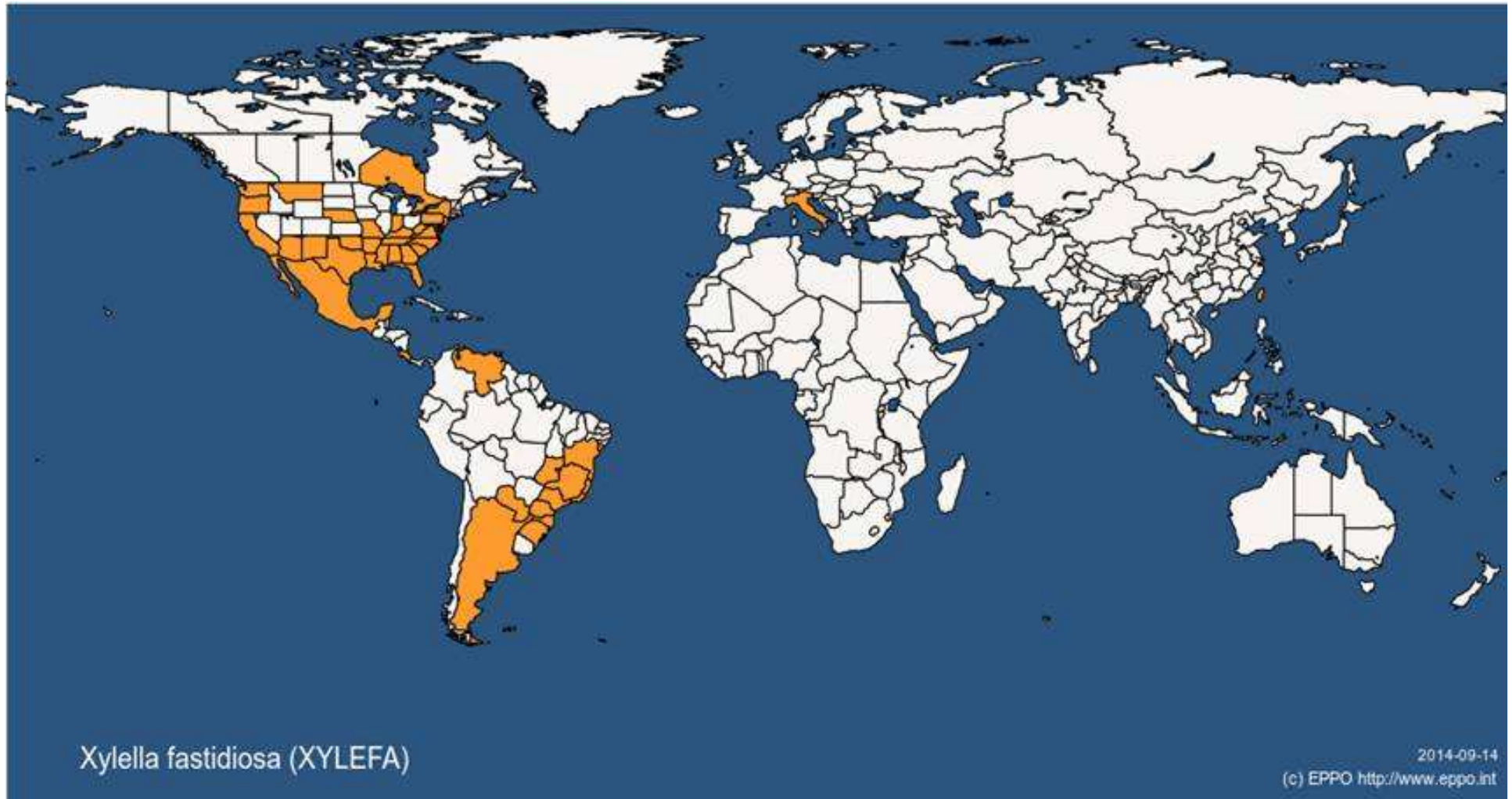
- Regulated host plants: *Catharanthus, Malva, Nerium, Olea, Portulaca, Prunus, Quercus, Sorghum, Vinca.*
- Potential host plants: *Acer, Alfalfa, Ambrosia, Carya, Cercis, Citrus, Coffea, Ecelia, Fraxinus, Ginkgo, Helianthus, Hemerocallis, Jacaranda, Lagerstroemia, Liquidambar, Magnolia, Morus, Platanus, Ratibada, Rubus, Salvia, Sambucus, Ulmus, Vaccinium, Vitis*

What is *Xylella fastidiosa*???



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

Distribution



Broad host range

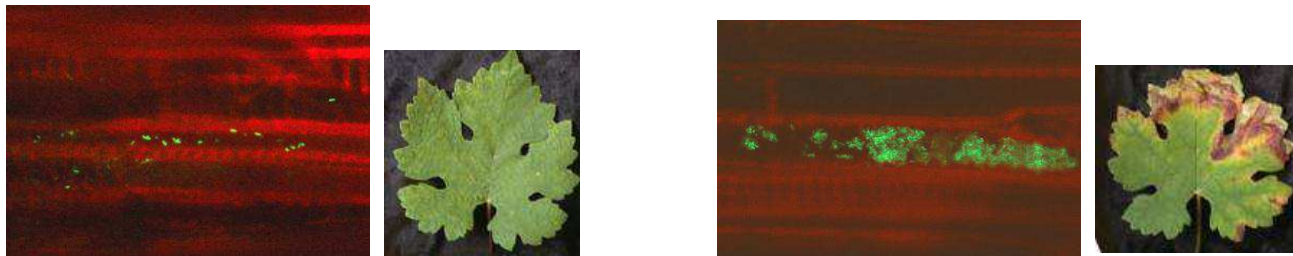
- *Acer macrophyllum*
- ***Citrus sinensis***
- *Coffea sp.*
- *Fraxinus dipetala*
- *Medicago hispida*
- *Platanus occidentalis*
- ***Prunus sp.***
- *Quercus sp.*
- *Rosmarinus officinalis*
- *Rubus sp.*
- *Vinca major*
- ***Vitis sp.***
-
- **> 60 families, 120 genera**
- **and 300 species.**



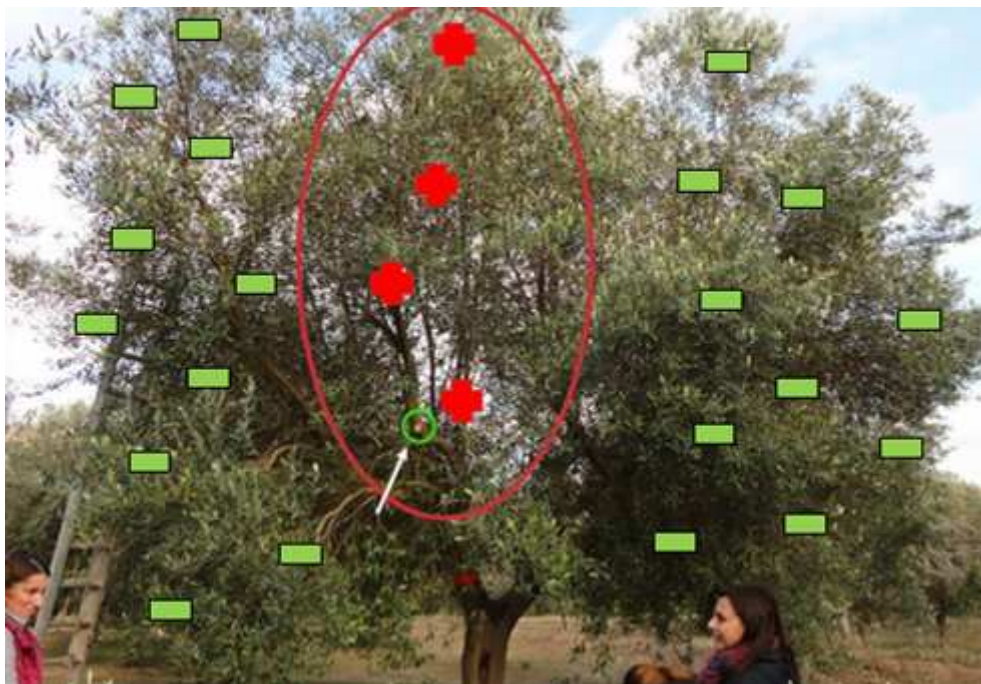
(Purcell and Hopkins, 1996 *Annu. Rev. Phytopath*)

Disease symptoms

- Heterogeneity of symptoms
- Symptom development is dependent on host plant species
- In general, plants show drying, scorching, wilting, eventually followed by plant death as it colonises the xylem (restrict water movement)
- Many host plants do not express any symptoms

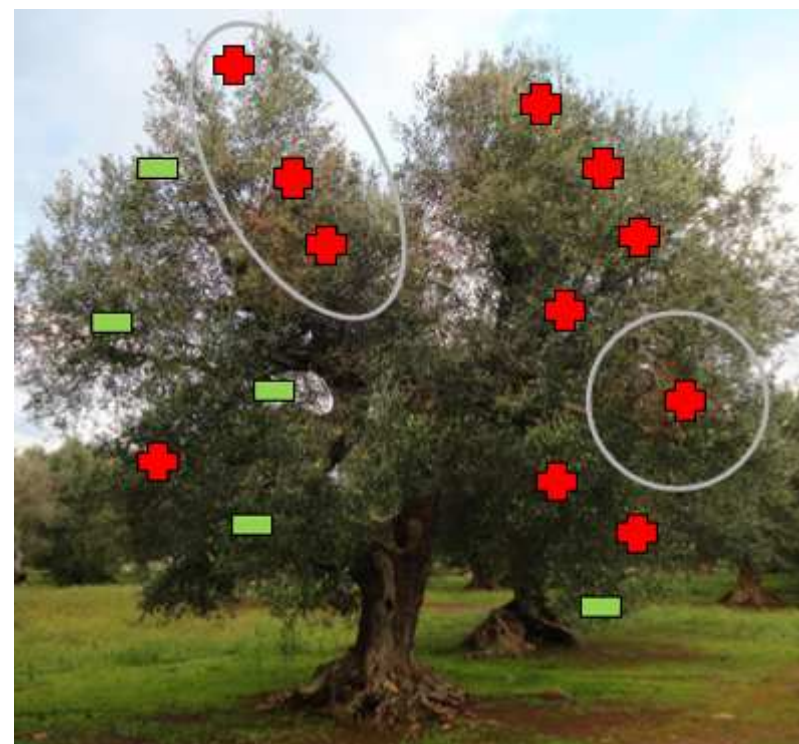


(Chatterjee et al., 2008 Annu. Rev. Phytopath.)

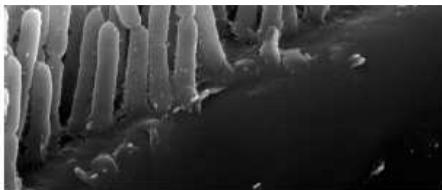
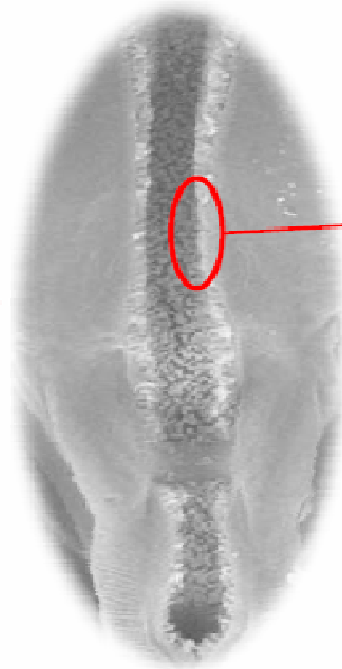
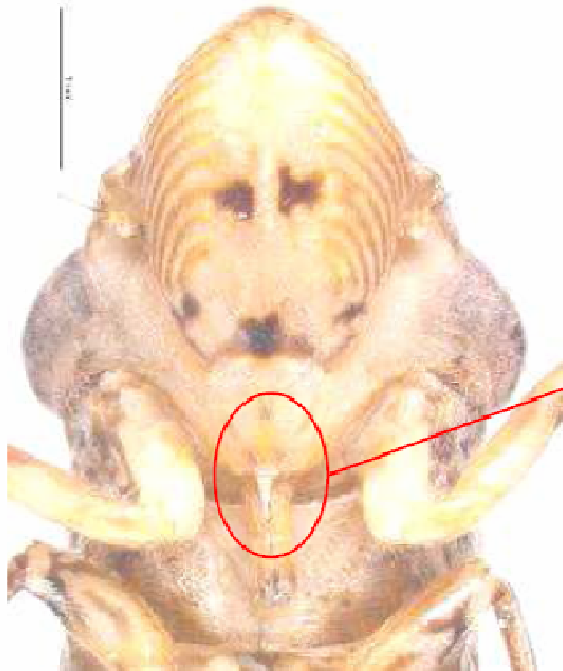


Heterogenic distributed in both symptomatic (encircled) and symptomless parts of the canopy

(Boscia et al., 2014)



the players



Killiny & Almeida. 2009. Appl. Environ. Microbiol
Almeida & Purcell 2006 Ann. Entomol. Soc. Am.



Philaenus spumarius



(Cornara and Porcelli, 2014)



Boscia et al., 2014

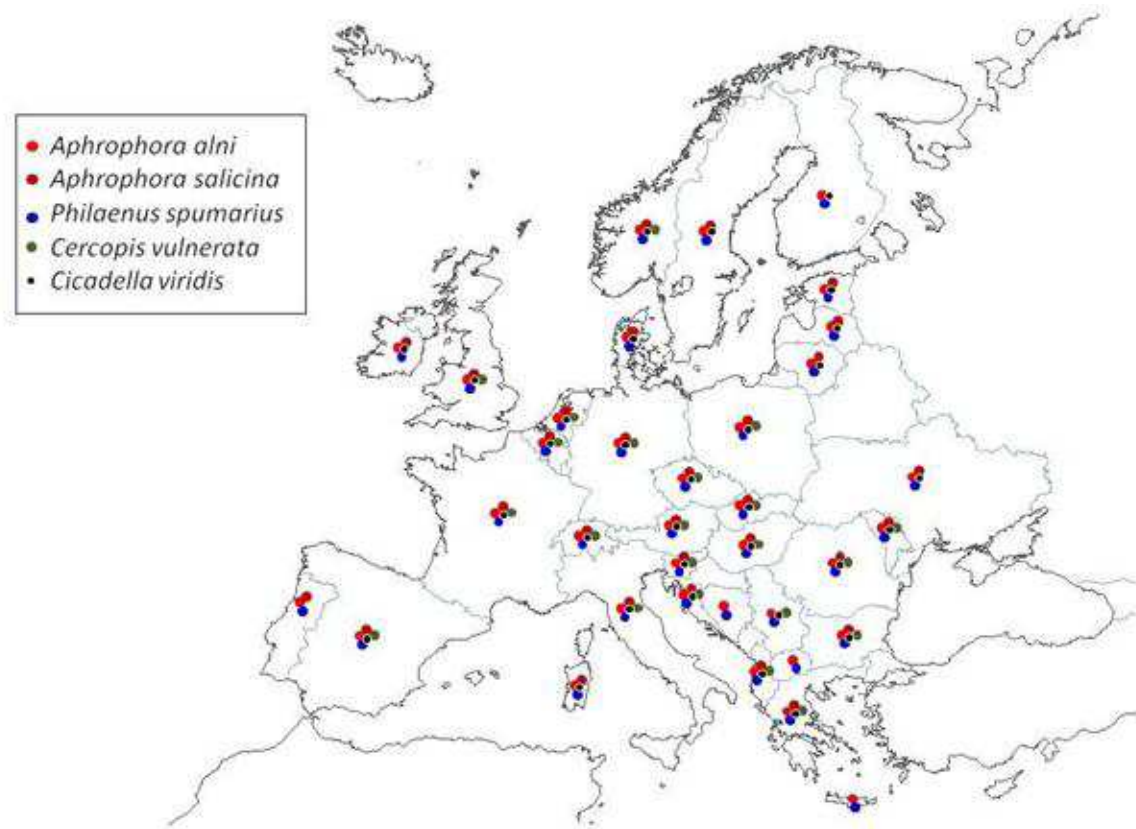


Nymphs of *Philaenus*



(Cornara and Porcelli, 2014)

Distribution of the most common potential vectors in Europe



Philaenus spumarius



Cercopis vulnerata

(EFSA Journal 2015; 13(1) 3989)

Findings NL 2014

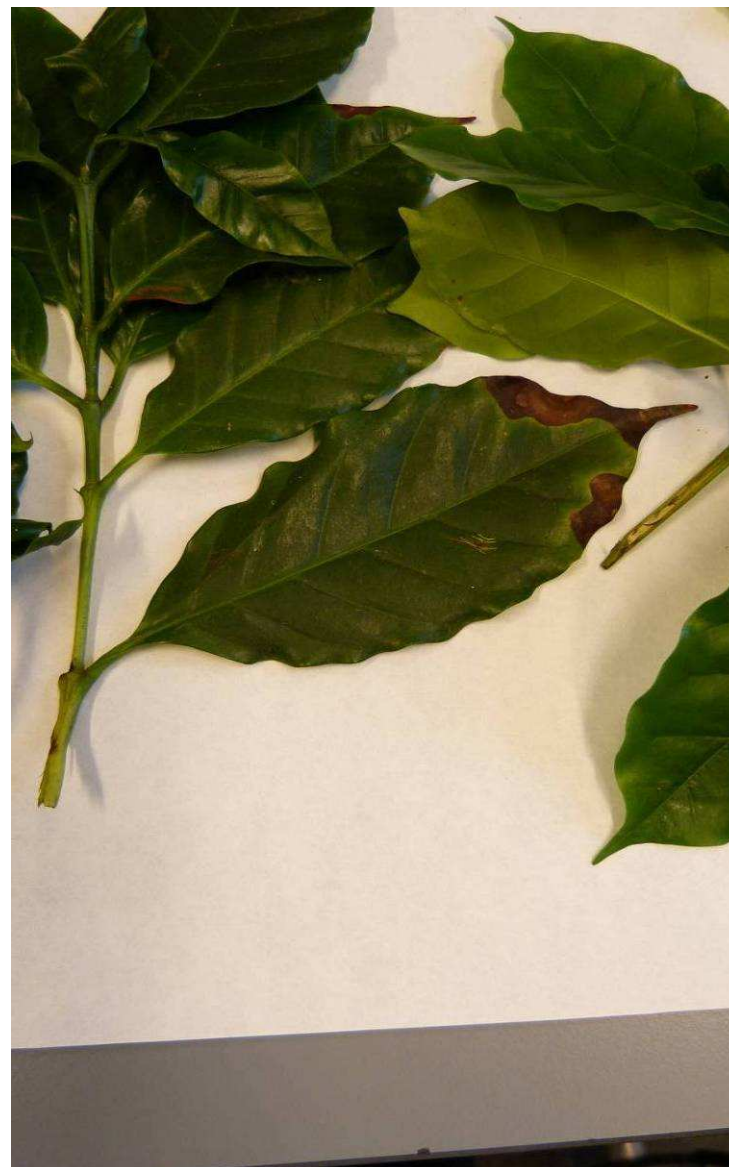
Plants: *Coffea arabica* and *Coffea* sp.
Import: Costa Rica and Honduras.

coffee leaf scorch (CLS) and
"crespera"





no symptom



atypical curling of leaf margins

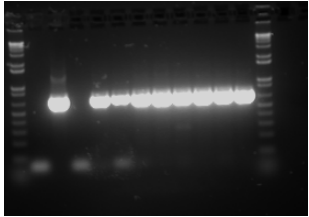


leaf scorch

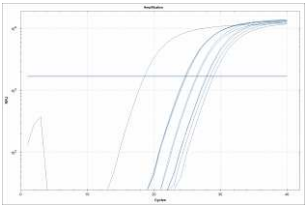


leaf scorch

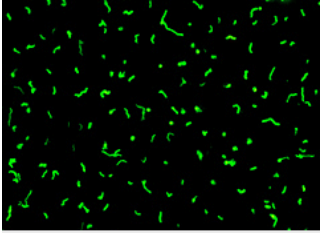
Detection protocol



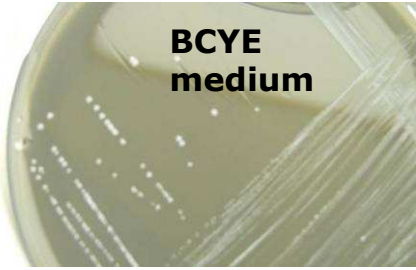
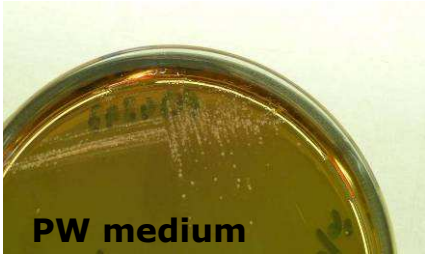
PCR (Minsavage *et al.*, 1994) + sequencing



Real-time PCR (Harper *et al.*, 2010)



IF (Loewe 07319)



Results NL survey 2014

Symptomatic samples			Asymptomatic samples		
List of symptomatic plant species tested	No of samples per species	No of positive samples	List of asymptomatic plant species tested	No of samples per species	No of positive samples
<i>Coffea sp</i>	2	2	<i>Coffea sp</i>	7	2
			<i>Nerium</i>	3	0
			<i>Olea europaea</i>	16	0
			<i>Salvia nemorosa</i>	2	0
			<i>Rubus sp.</i>	3	0

Survey NL 2015

Genus	Aantallen (miljoen)
Dracaena	27,5
Aster	4,8
Ajania	1,8
Impatiens	1,7
Sansevieria	1,6
Eupatorium	1,5
Schefflera	1,3
Phoenix	0,9
Codiaeum	0,7
Phlox	0,7
Solidago	0,5
Lavandula	0,4
Aglaonema	0,3
Spatiphyllum	0,3
Zamioculcas	0,3
Ficus	0,2
Yucca	0,2
Hibiscus	0,1
Overig	1,5
Totaal	46,3

Import volumes Costa Rica 2012