Euphresco

efsa EUROPEAN FOOD SAFETY AUTHORITY

4th European Conference on Xylella fastidiosa

WHAT IS THE RISK FOR *XYLELLA FASTIDIOSA* TO ESTABLISH IN TEMPERATE EUROPEAN REGIONS

A BELGIAN CASE STUDY

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UCLouvain

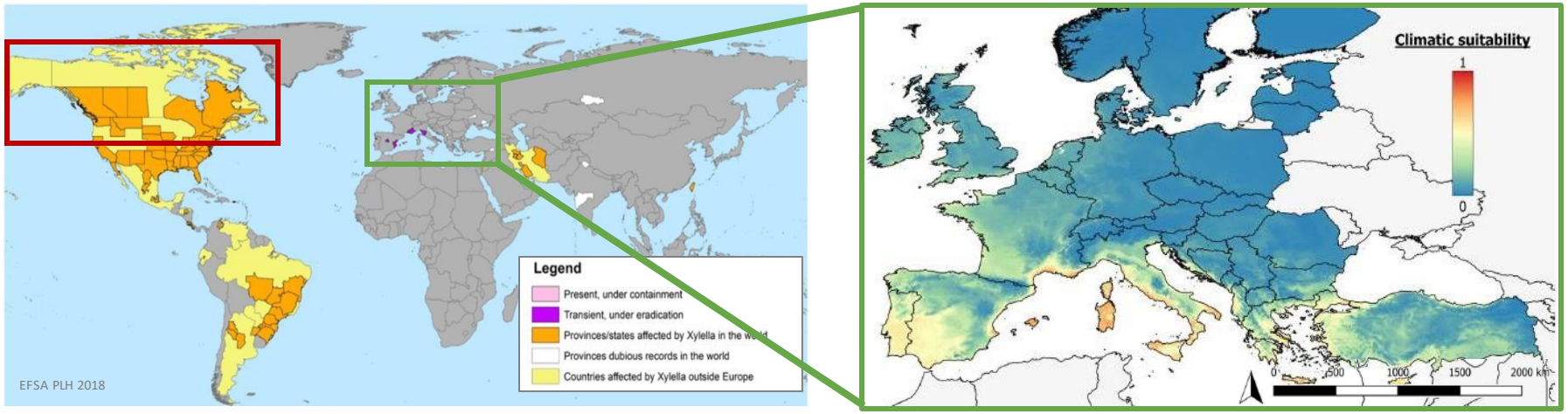
EARTH & LIFE INSTITUTE

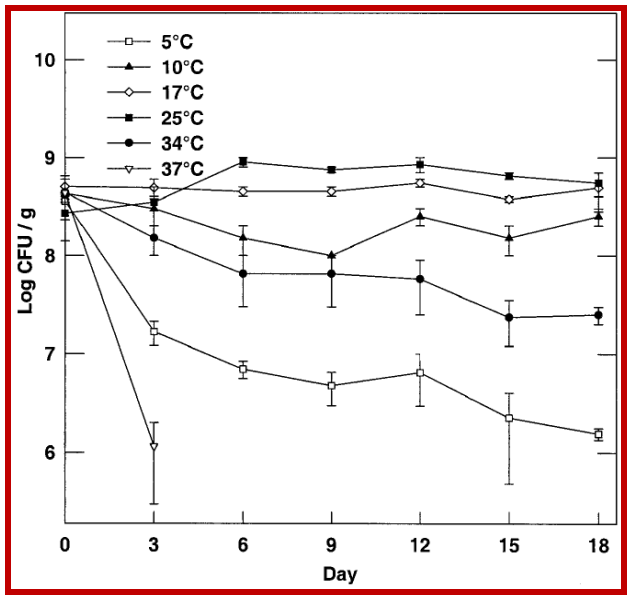
fnrs LA LIBERTÉ DE CHERCHER

Introduction –

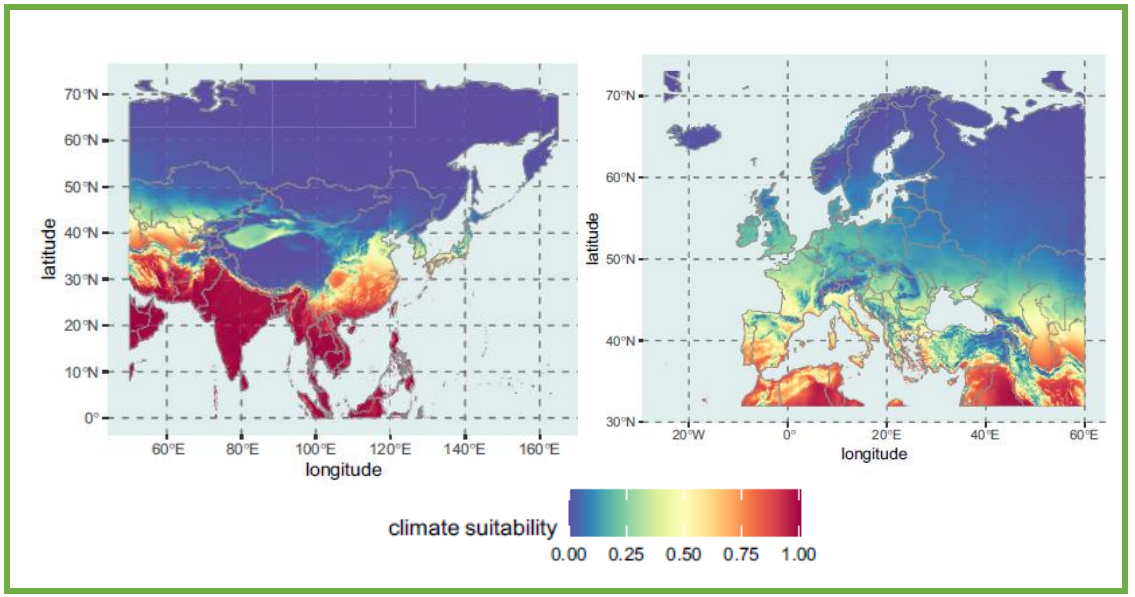
Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated

(EFSA PLH, 2019)



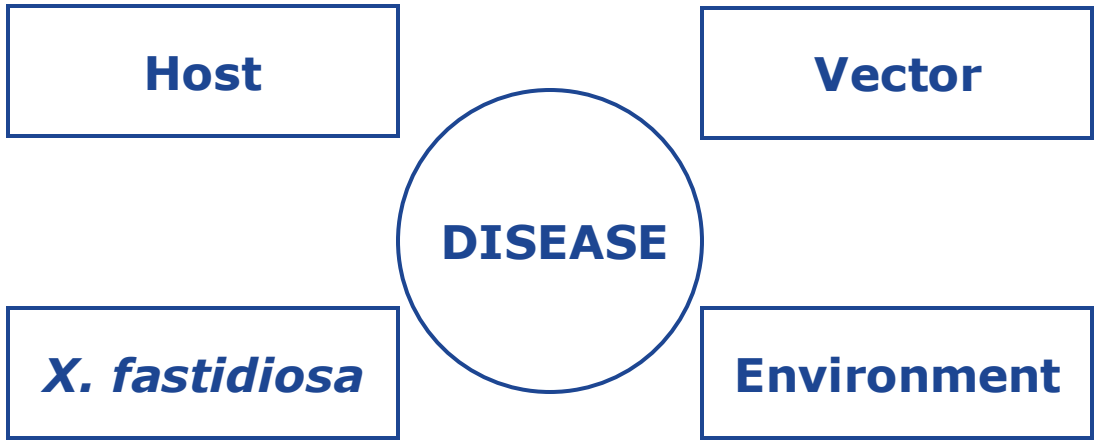


(Feil & Purcell, 2001)



(Godefroid et al., 2022)

Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated



Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated

J. Clark - University of California, Berkeley USA

Mike Lewis, University of California, Riverside

L. J. Friesen - University of California, Berkeley USA

Grapevine
Vitis vinifera

Graphocephala atropunctata
Homalodisca vitripennis

PIERCE'S DISEASE

***X. fastidiosa* subsp. *fastidiosa* ST1**

California, Florida, etc.

Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated

Grapevine
Vitis vinifera

Graphocephala atropunctata
Homalodisca vitripennis

PIERCE'S DISEASE

A. Purcell
Source: http://www.invasive.org

***X. fastidiosa* subsp. *fastidiosa* ST1**

California, Florida, etc.

Orange tree
Citrus sinensis

E. di Fiori
Source: https://inaturalist.nz/

F. Bernasconi

Acrogonia citrina
Oncometopia facialis
Dilobopterus costalimao

CITRUS VARIEGATED CHLOROSIS

X. fastidiosa* subsp. *pauca
ST11, ST12, ST13

Brazil, South America

Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated

PIERCE'S DISEASE

Grapevine
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Brazil, South America

ALMOND LEAF SCORCH

L. Milliron

Almond tree

X. fastidiosa* subsp. *fastidiosa ST1* ; subsp. *multiplex ST81

K. Schneider

Philaenus spumarius

Majorca

Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated

Grapevine *Vitis vinifera*	*Graphocephala atropunctata* *Homalodisca vitripennis*	Orange tree *Citrus sinensis*	*Acrogonia citrina* *Oncometopia facialis* *Dilobopterus costalimao*
PIERCE'S DISEASE		CITRUS VARIEGATED CHLOROSIS	
X. fastidiosa subsp. *fastidiosa ST1*	California, Florida, etc.	*X. fastidiosa* subsp. *pauca* ST11, ST12, ST13	Brazil, South America
Almond tree	*Philaenus spumarius*		
X. fastidiosa subsp. *fastidiosa ST1 ;* subsp. *multiplex ST81*	orca		

agriculture.gouv.fr

K. Schneider

Olive tree ***Olea europaea***

Philaenus spumarius

OLIVE QUICK DECLINE SYNDROME

X. fastidiosa **subsp. *pauca*** **ST53**

Apulia, Italy

Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated

Van den Berk nurseries

T. Murray

K. Schneider

Salicaceae

Philaenus spumarius
Aphrophora salicina

DISEASE

***X. fastidiosa* subsp. *fastidiosa ST1* KLN59.3**

Riparian areas

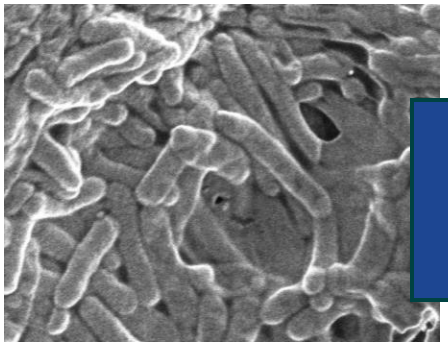
Objectives -

Objectives – Investigating the potential host plants and vectors

- Sentinel plantation
- Transmission test experiments and dispersion capacity
- Mechanical inoculations

Salicaceae

Aphrophoridae

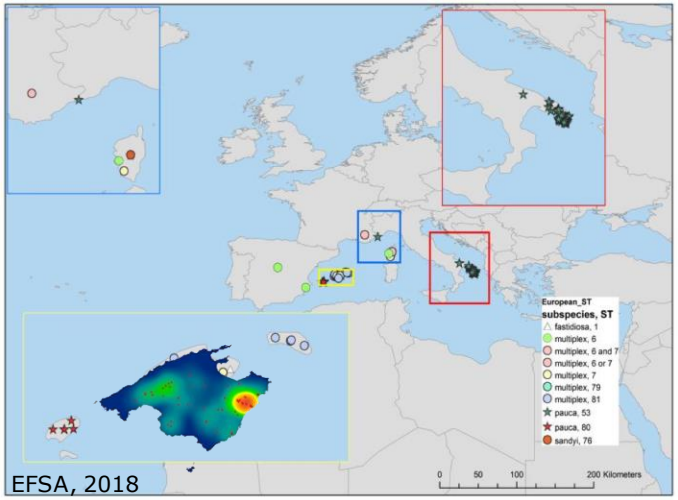


subsp. *fastidiosa* ST1

Riparian areas Salicaceae corridors

Methods and results – Sentinel plantation

Methods and results – Sentinel plantation



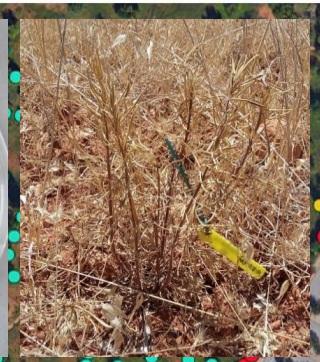
EFSA, 2018

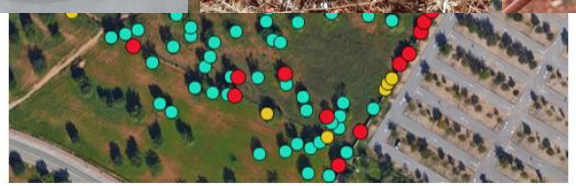
Casarin et al., 2023
NeoBiota

27 Salix alba
27 Quercus petraea
27 *Prunus domestica* cv. Opal
from Belgium

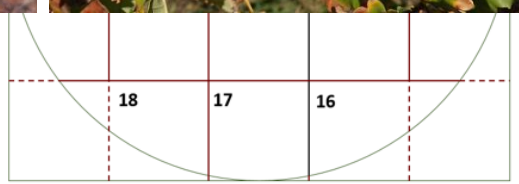
To the campus of UIB
(Palma de Mallorca)

Floristic inventory





Insect vector sampling
25 blocks



Plantation of 32 « Spy plants »
Rosmarinus officinalis

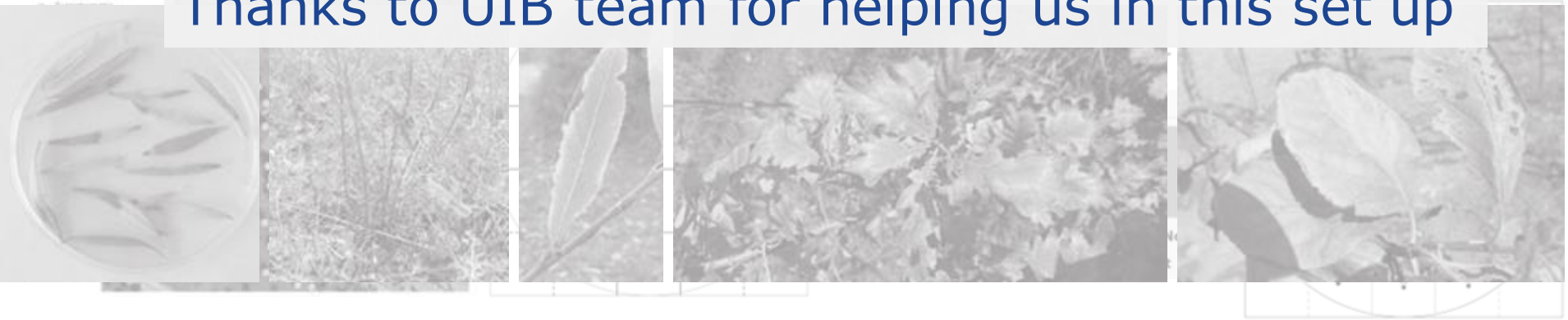
Methods and results – Sentinel plantation

Casarin et al., 2023
NeoBiota

Useful informations on how to set up a sentinel plantation

Interesting knowledge to add sentinel plantation in surveillance routine

Thanks to UIB team for helping us in this set up



Symptoms but no bacterial detection by PCR

Methods and results – Dispersion capacity and transmission test

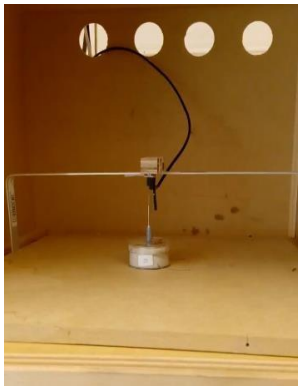
Methods and results – Dispersion capacity

A. salicina > *P. spumarius*

Mark-release-recapture

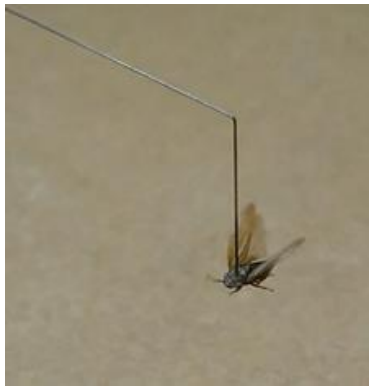
Flight-mill

Collection of wild insects (50-60 ind. for each period) and sex identification



Flight-mill recording for 2h30 FIRST FLIGHT SESSION

Break: 24h feeding & resting on a host plant



Flight-mill recording for 2h30 SECOND FLIGHT SESSION

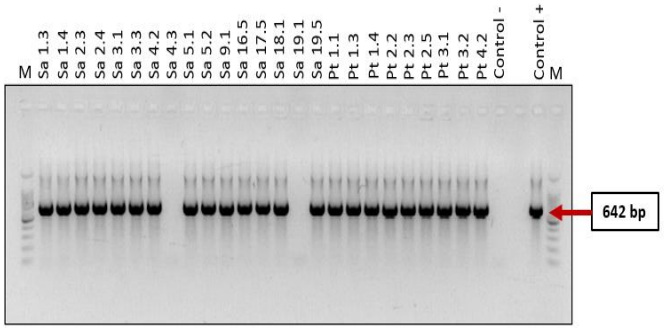
Casarin et al., 2023
Journal of Pest Science

Methods and results – Transmission test

Transmission test

- 20 *S. alba* & 20 *P. tremula*
- 2 branches/tree
- 5-10 *P. spumarius* collected in infected parts of the Islands/branch
- Inoculation period: 4 to 5 days

- Insects tested by qPCR (Harper et al., 2010)
- Prevalence rate of infection: 17%
- MLST performed on positive samples (Yuan et al., 2010)



Casarin et al., 2023
Journal of Pest Science

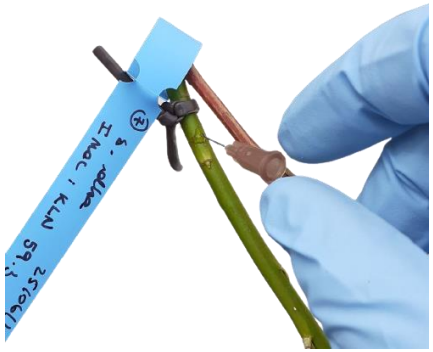
Methods – Mechanical inoculations reveal the potential of *Salicaceae* as host plants

Methods – Mechanical inoculations reveal the potential of *Salicaceae* as host plants

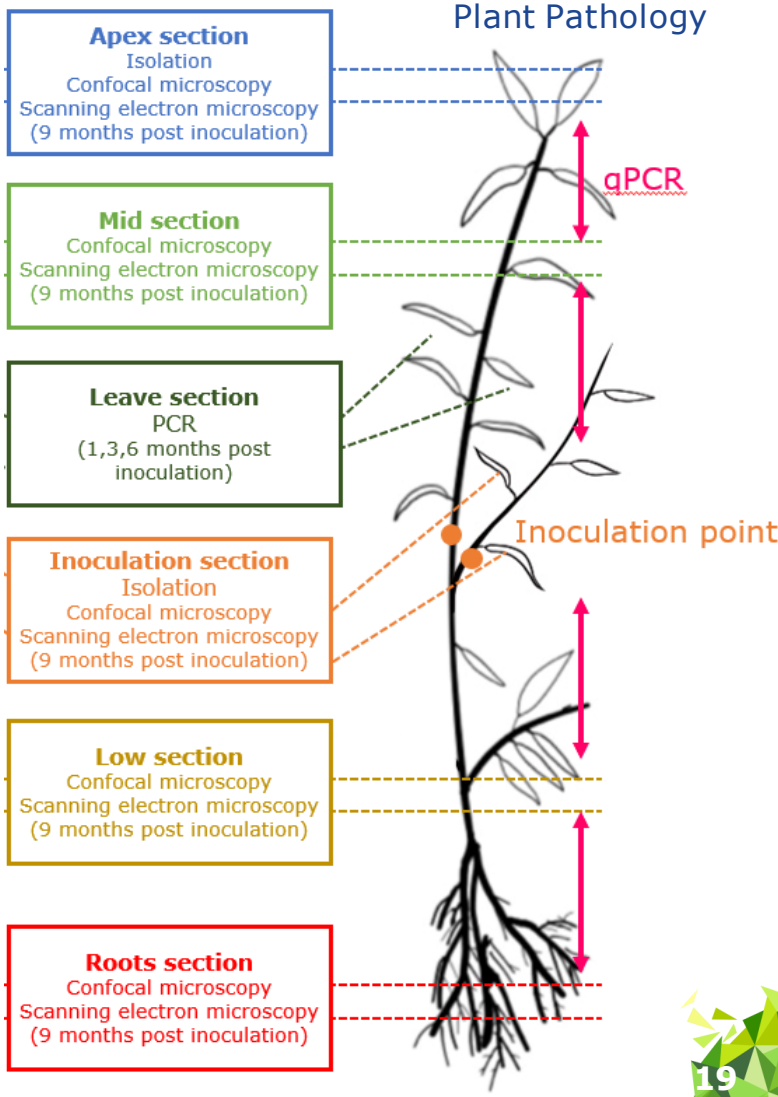
Pinprick inoculation (Hill & Purcell, 1995; Almeida *et al*., 2001) in biosafety greenhouse

Casarin et al., 2022 European Journal of Plant Pathology

- *P. canescens, P. tremula, S. alba*



- 2 branches/plant,
- 22° C and 28°C



Results – Symptoms, propagation, and confocal microscopy for a look inside

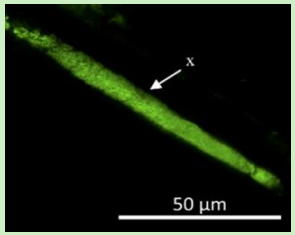
Not inoculated

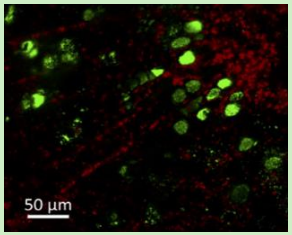
Inoculated 22°C

Inoculated 28°C

Casarin et al., 2022
European Journal of Plant Pathology

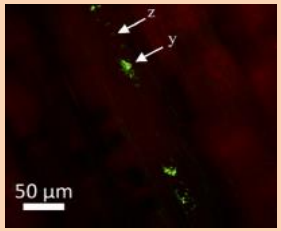
	Populus tremula		*Salix alba*		*Populus canescens*	
	22°C	28°C	22°C	28°C	22°C	28°C
Inoculation point (IP) detection	3/3	4/4	3/3	3/3	1/3	2/3
Apex detection	3/3	3/4	0/3	0/3	0/3	0/3
Root detection	1/1	3/3	0/1	1/1	NA	NA
Maximum spread from the IP	**29 cm** above the IP (stem) **53 cm** below the IP (roots)	**65 cm** above the IP (stem) **70 cm** below the IP (roots)	**93 cm** above the IP (stem) **15 cm** below the IP (stem)	**82 cm** above the IP (stem) **23 cm** below the IP (roots)	no spread	no spread

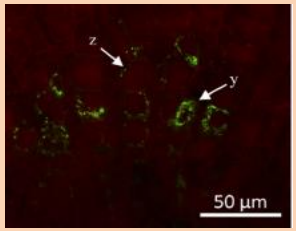




LS in the stem

TS in the stem





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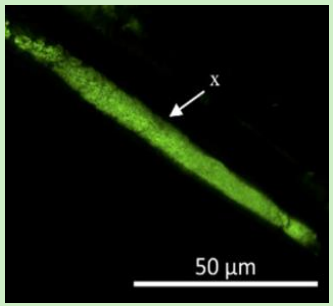
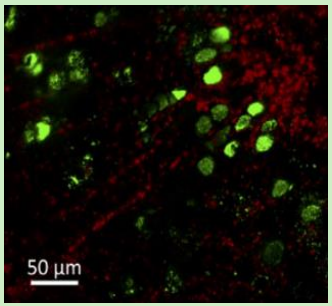


LS in the stem



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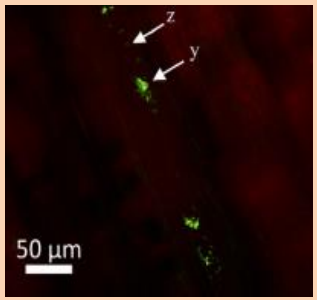

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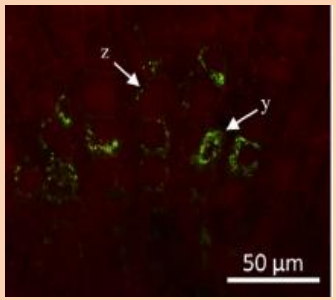

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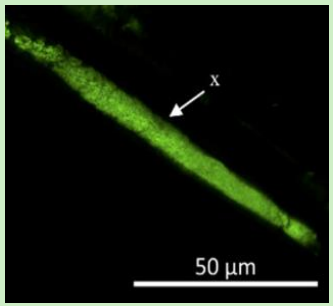
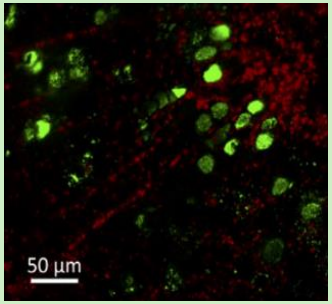
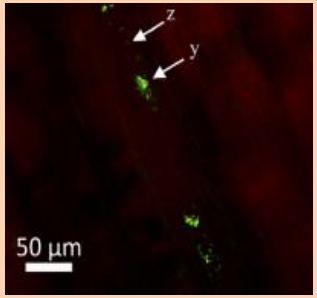
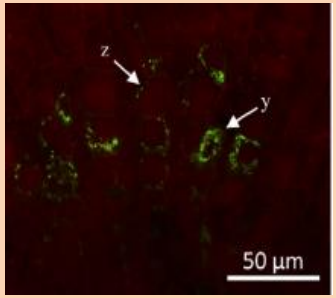




LS in the stem

TS in the stem





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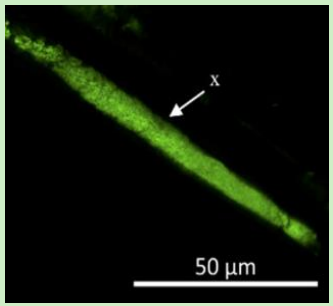

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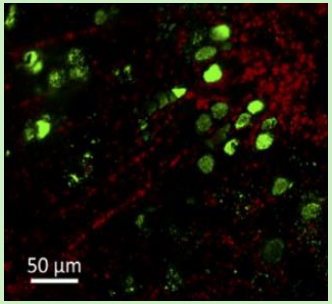
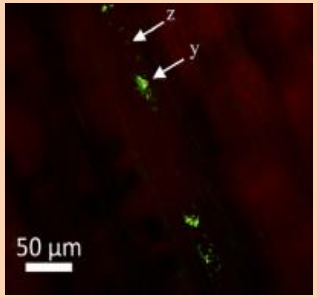


TS in the stem



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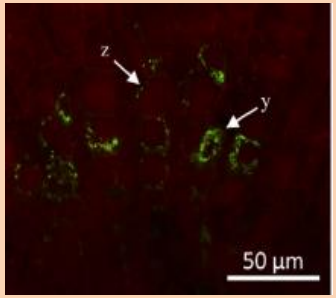

TS in the stem

Results – Symptoms, propagation, and confocal microscopy for a look inside

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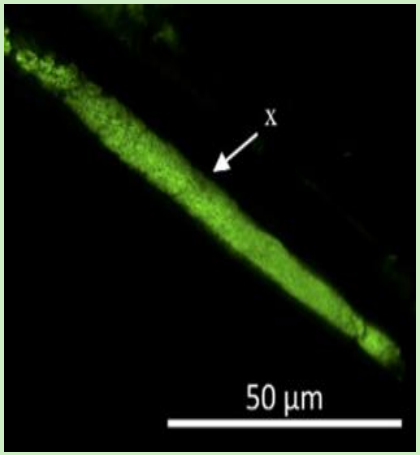
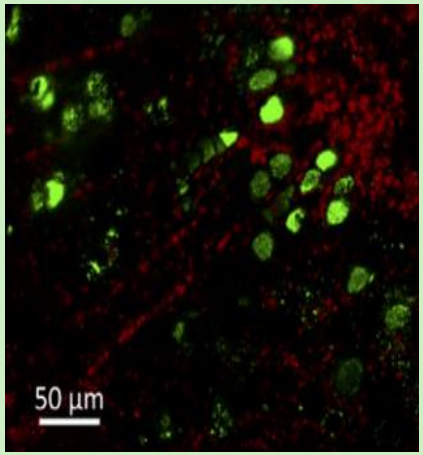
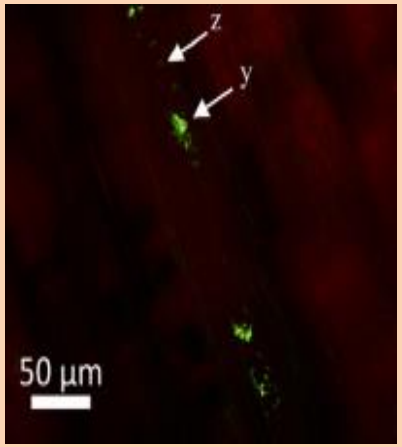


LS in the stem

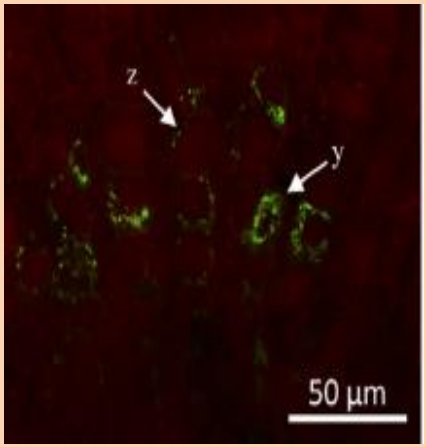


TS in the stem

Populus tremula



LS in the stem



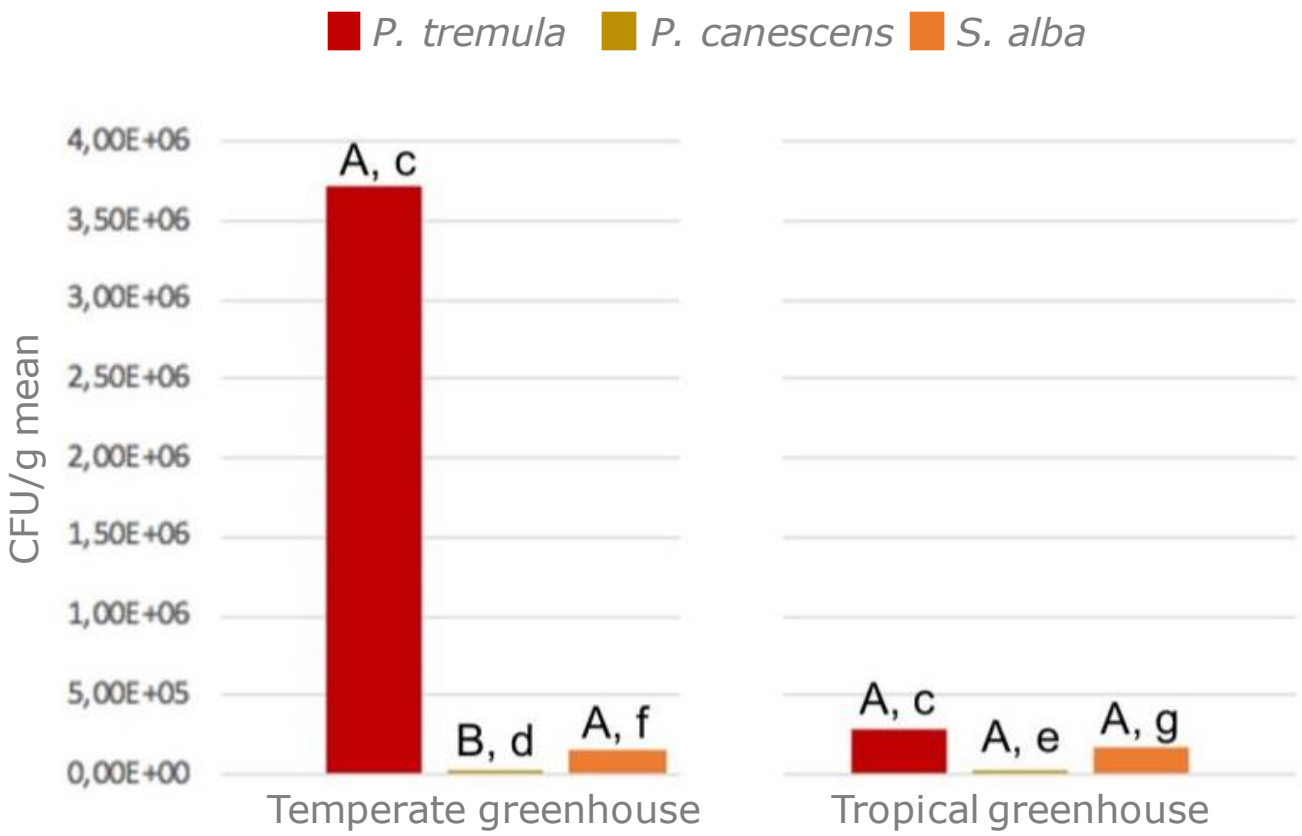
TS in the stem

Salix alba

Results – Symptoms, propagation, and confocal microscopy for a look inside

CFU/g	*P. tremula*	*P. canescens*	*S. alba*	Total
Temperate	$3,72*10^6$	$2,23*10^3$	$1,53*10^5$	$1,29*10^6$
Tropical	$2,60*10^5$	$1,76*10^4$	$1,62*10^5$	$1,4710^5$
Total	$1,99*10^6$	$9,90*10^3$	$1,58*10^5$	

Casarin et al., 2022
European Journal of Plant Pathology

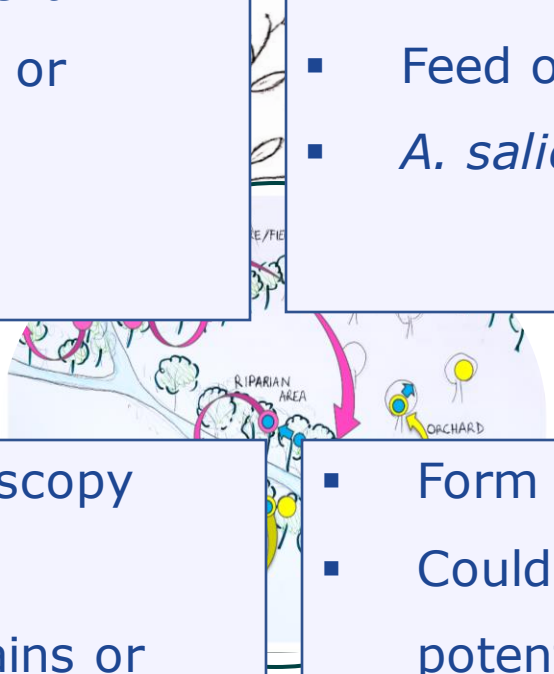


Take home message – *Salicaceae* – potential host for *Xylella fastidiosa* in Northern Europe

Take home message – *Salicaceae* – potential host for *Xylella fastidiosa* in Northern Europe

- Form a closed-mesh network of potential hosts for *Xylella*
- Could be symptomatic or asymptomatic
- Could act as reservoir

- Are found in riparian areas
- Feed on potential host plants
- *A. salicina* > *P. spumarius*



- Allows confocal microscopy visualization
- What about other strains or ST?

- Form *Salicaceae* corridors
- Could act as reservoir for potential host plants and insect vectors

Contributions

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Sentinel plantatio
Júl
Mi
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And thank you for your attention !

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Distribution of potential vectors:
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Poster n°21

DECIPHERING XYLELLA POTENTIAL PATHOSYSTEMS IN THE BELGIAN FLORA:
A study on northern European temperate regions with emphasis on riparian areas

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