



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

A BELGIAN CASE STUDY

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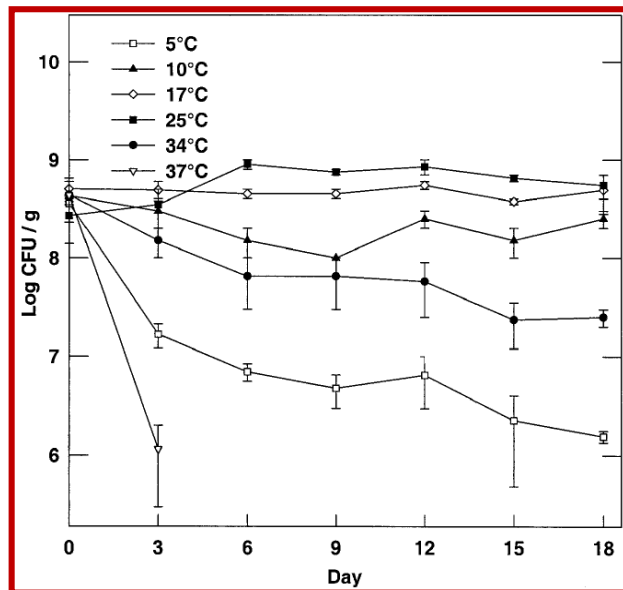
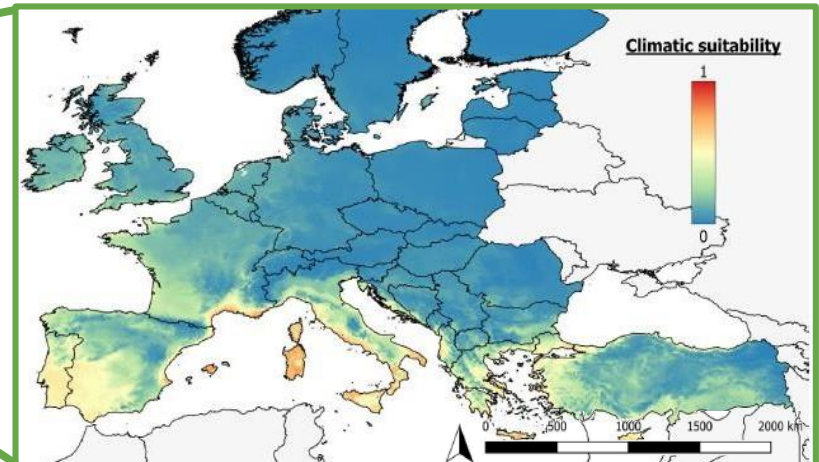
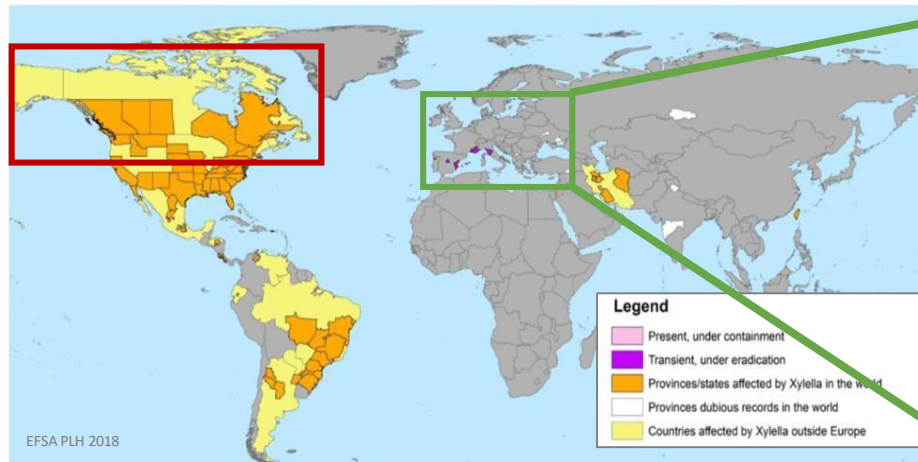
- (1) UCLouvain, Louvain-la-Neuve, BELGIUM;
- (2) Université Libre de Bruxelles, Bruxelles, BELGIUM;
- (3) Universitat de les Illes Balears, Palma, SPAIN



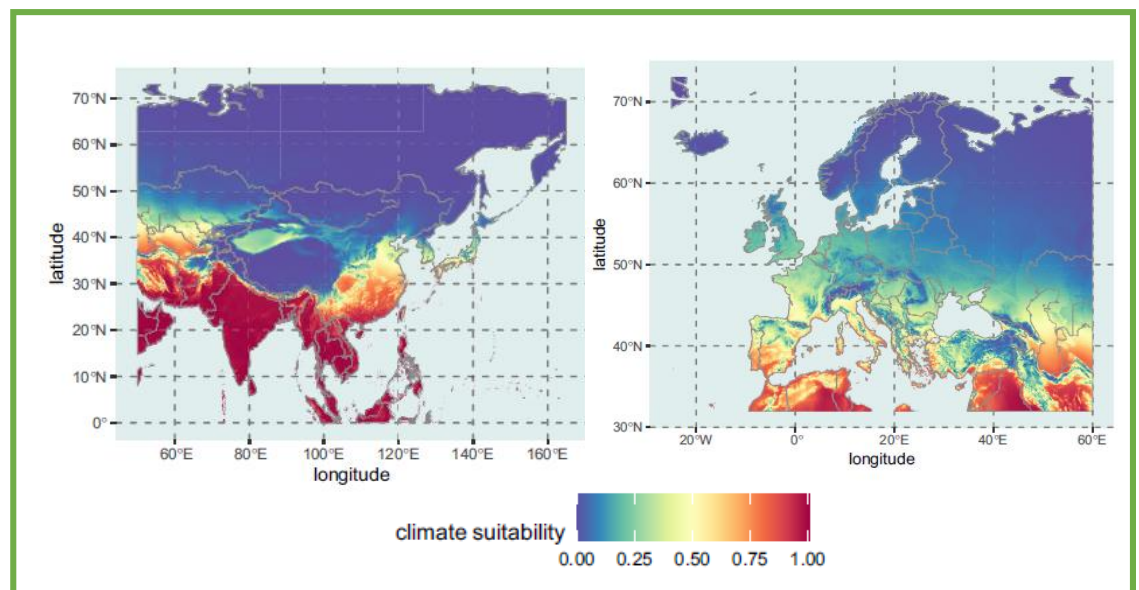
Introduction –



Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated (EFSA PLH, 2019)



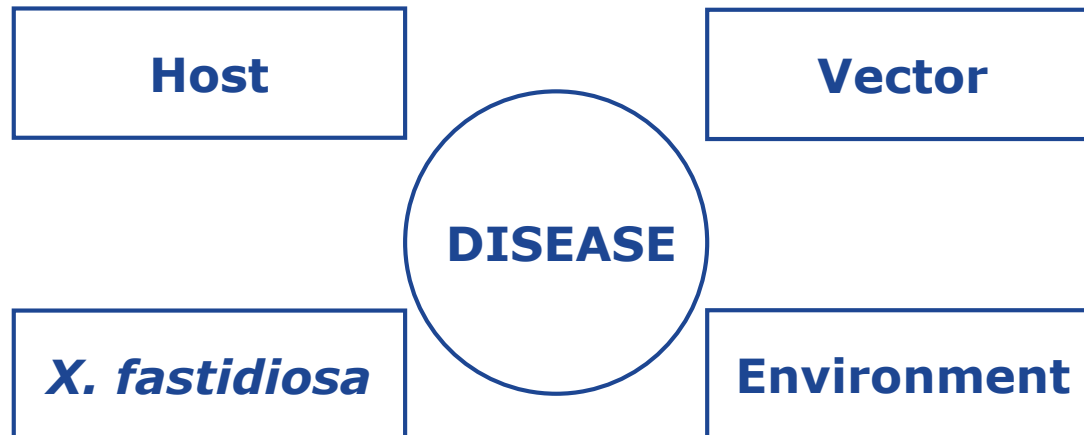
(Feil & Purcell, 2001)



(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



Grapevine
Vitis vinifera

Mike Lewis, University of California, Riverside



Graphocephala
atropunctata
Homalodisca
vitripennis

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

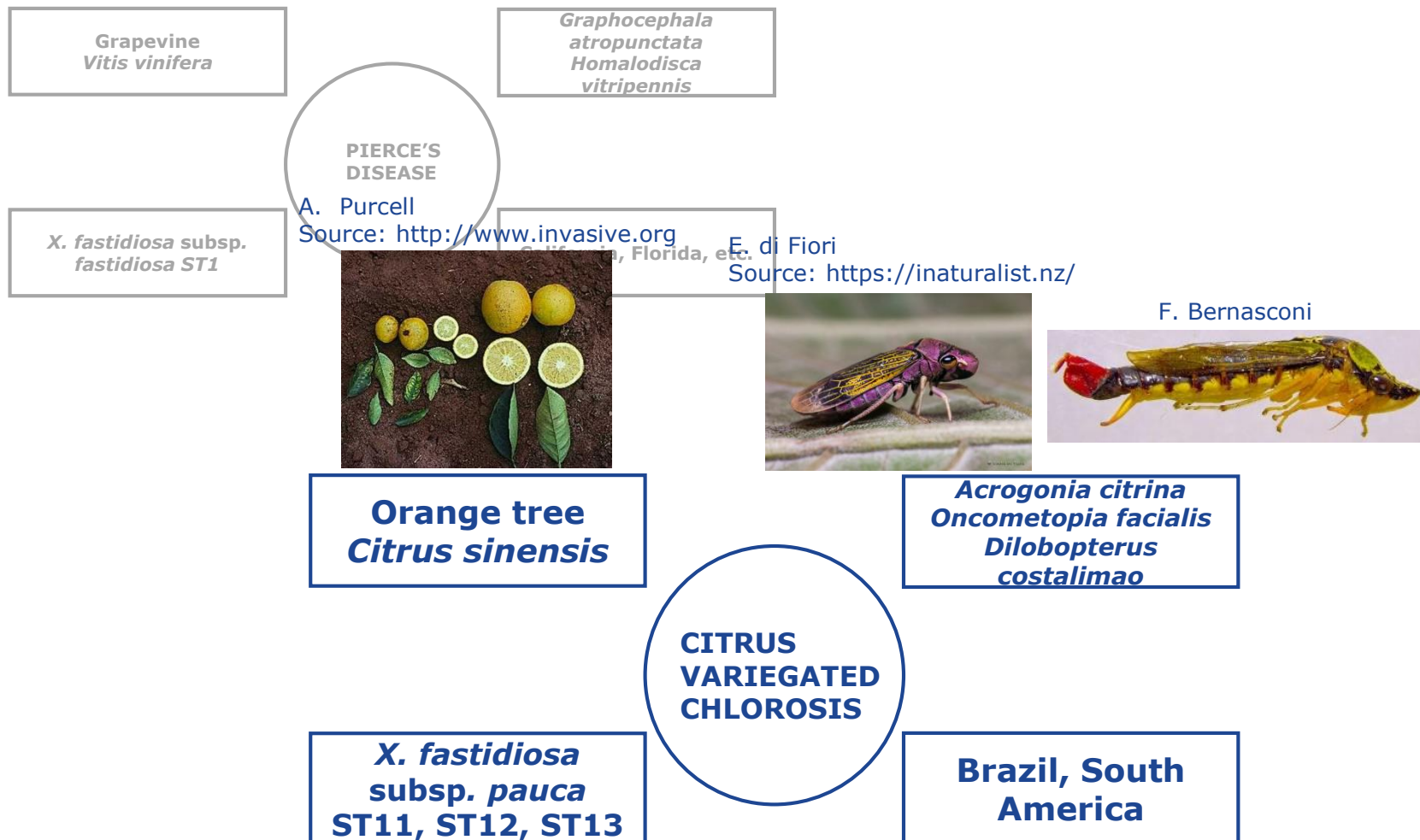


**PIERCE'S
DISEASE**

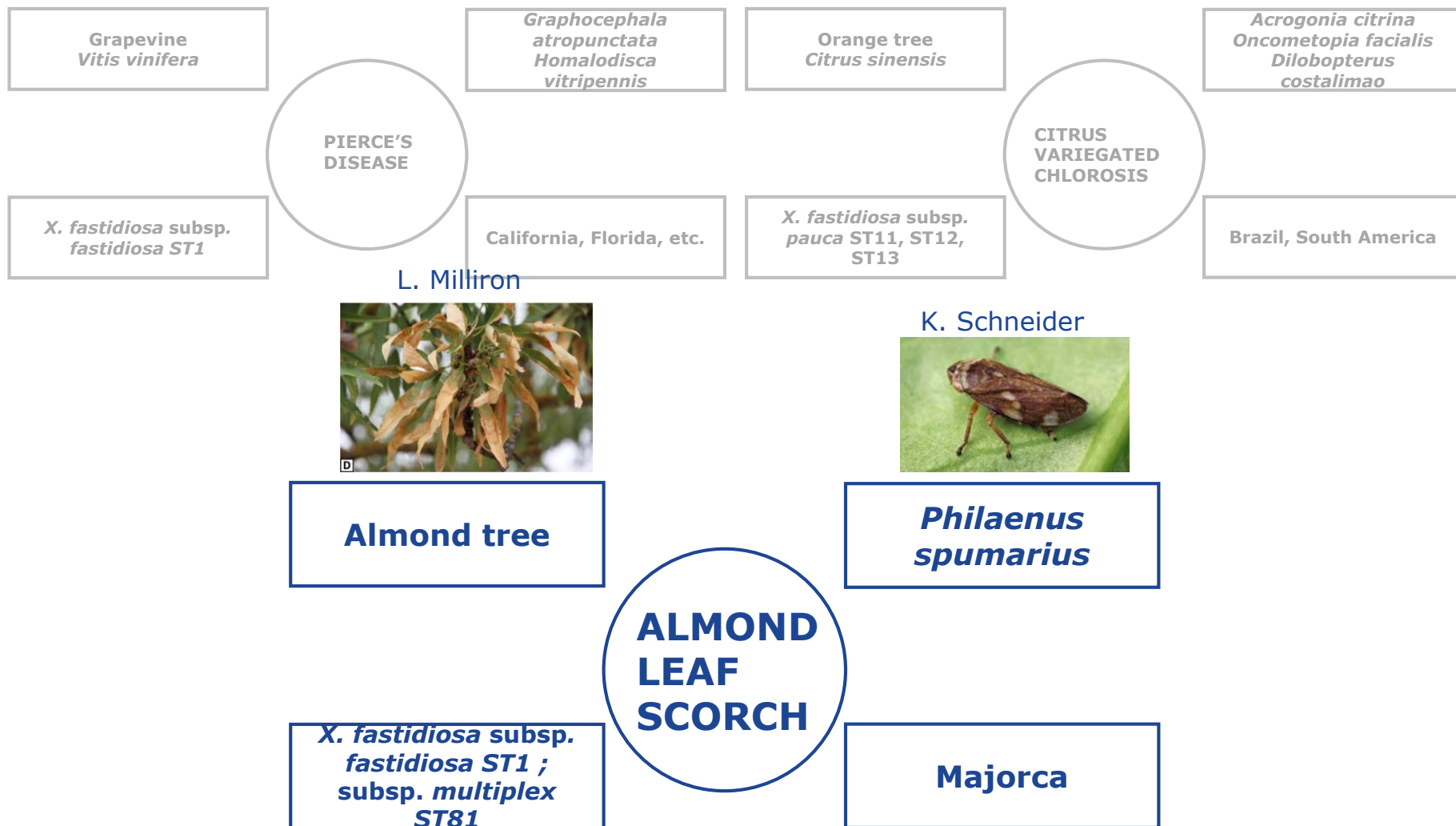
X. fastidiosa
subsp. *fastidiosa*
ST1

**California,
Florida, etc.**

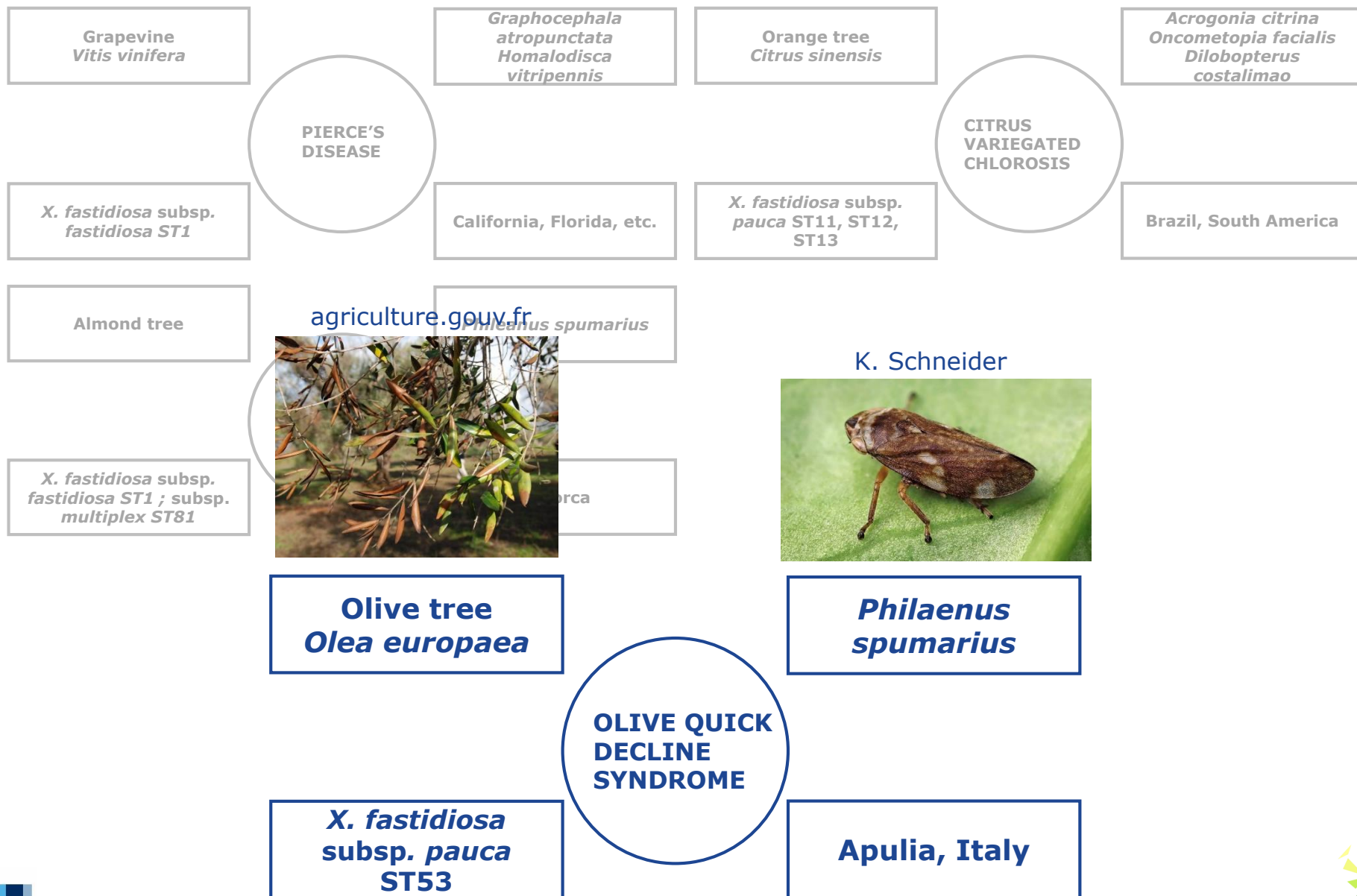
Introduction – Risk of *Xylella* in northern European temperate regions should not be underestimated



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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



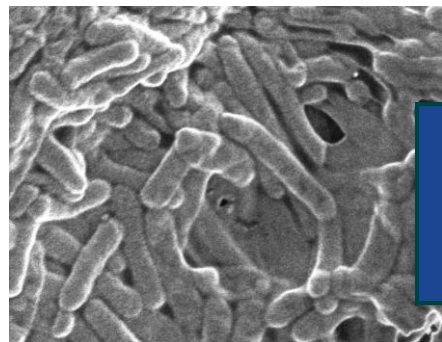
Salicaceae

Aphrophoridae



**subsp.
fastidiosa ST1**

**Riparian areas
Salicaceae
corridors**





Methods and results – Sentinel plantation

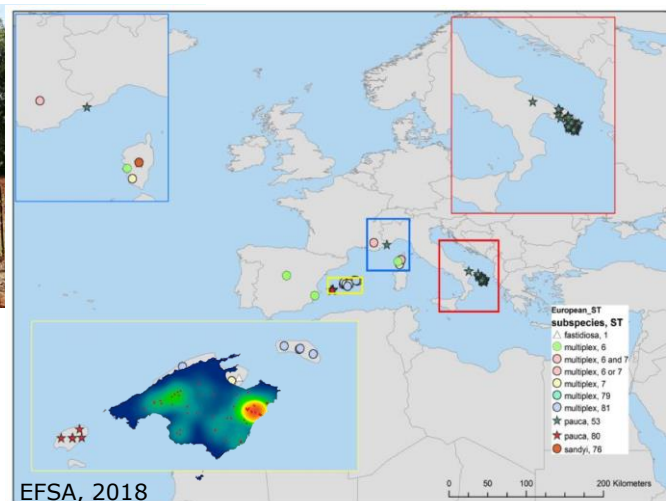
Methods and results – Sentinel plantation



Casarin et al., 2023
NeoBiota



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

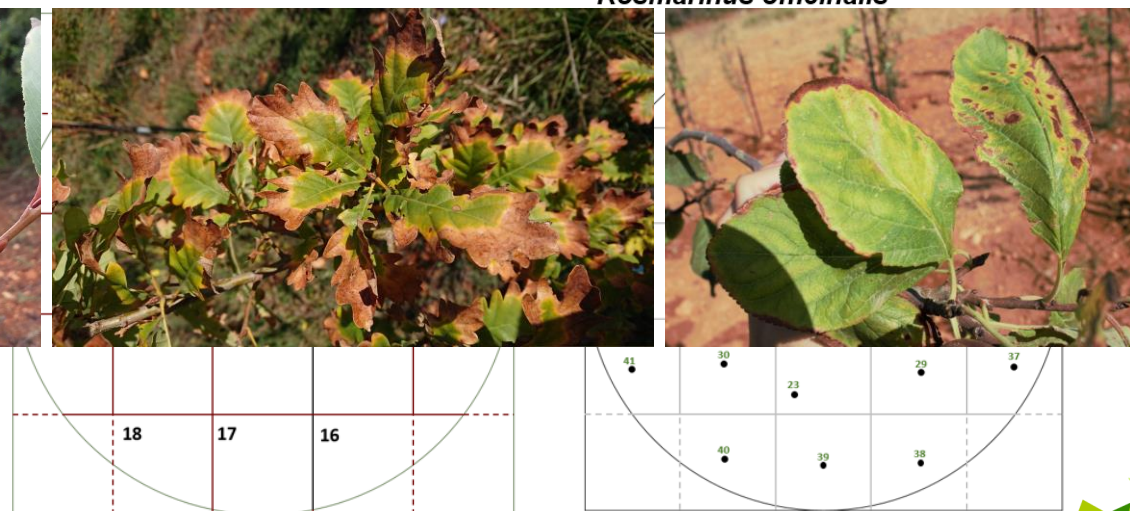
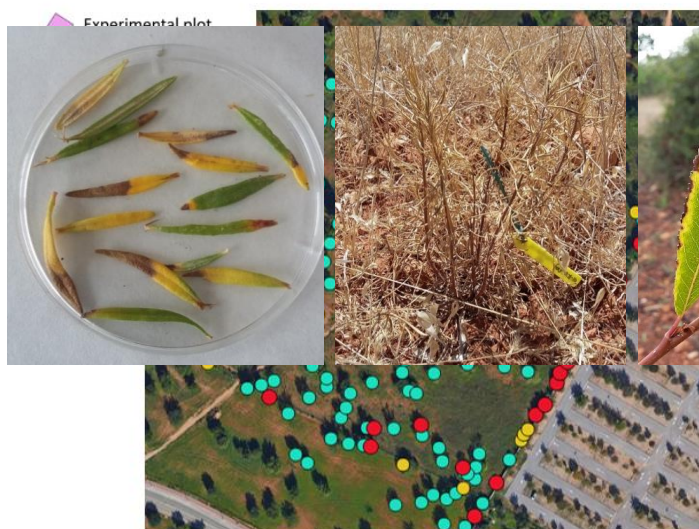


To the campus of UIB
(Palma de Mallorca)

Floristic inventory

Insect vector sampling 25 blocks

Plantation of 32 « Spy plants » *Rosmarinus officinalis*





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

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



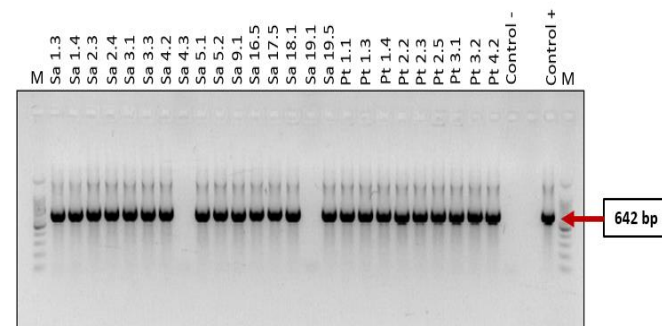


Transmission test

- 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)



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

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

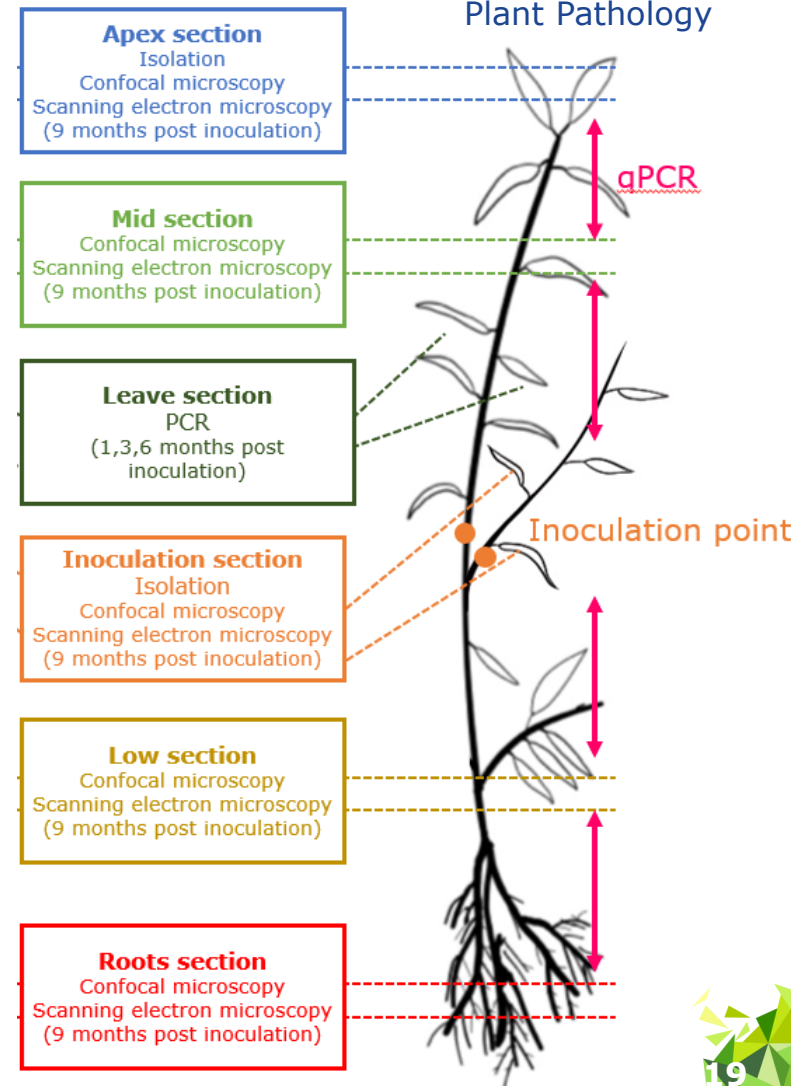


Pinprick inoculation (Hill & Purcell, 1995; Almeida *et al.*, 2001)
in biosafety greenhouse

Casarin *et al.*, 2022
European Journal of
Plant Pathology

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

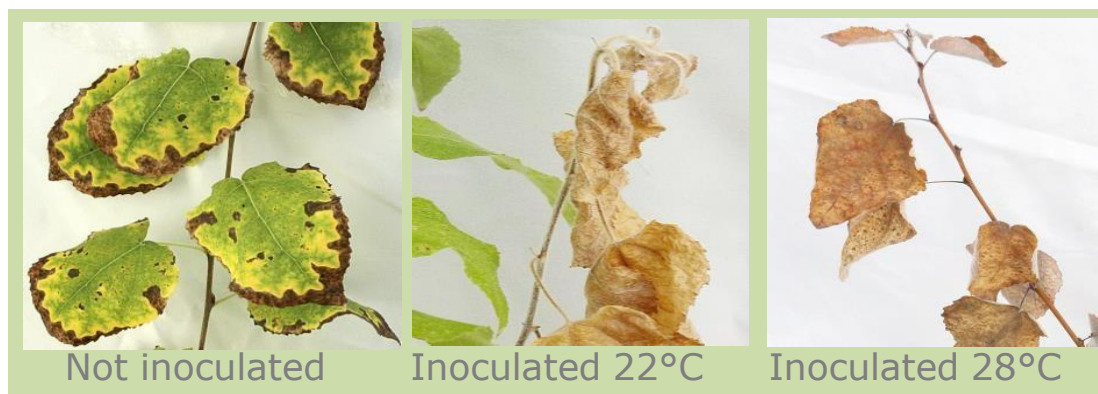
- 2 branches/plant,
- 22° C and 28°C



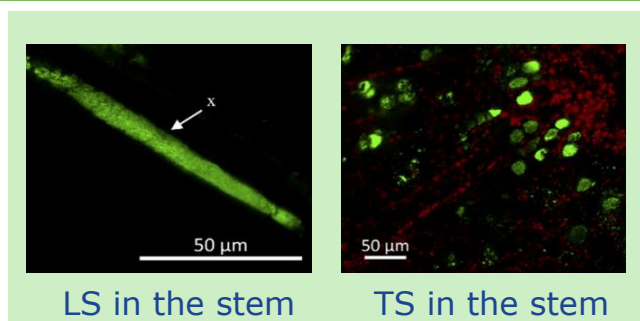
Results – Symptoms, propagation, and confocal microscopy for a look inside



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	<i>Populus tremula</i>		<i>Salix alba</i>		<i>Populus canescens</i>	
	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



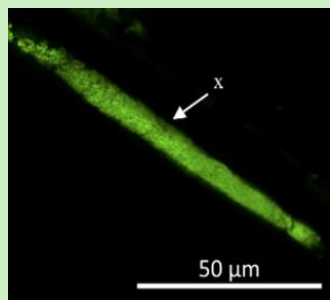
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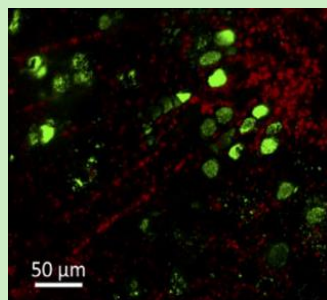
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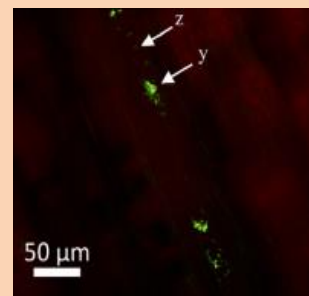
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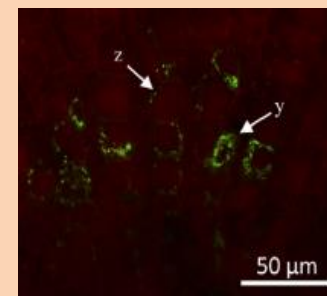
LS in the stem



TS in the stem



LS in the stem



TS in the stem

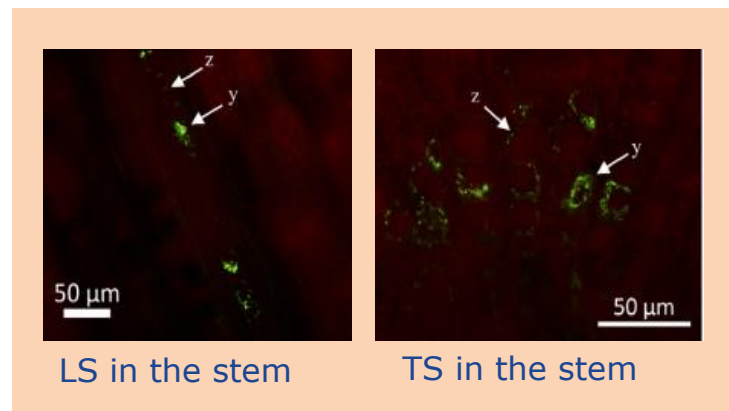
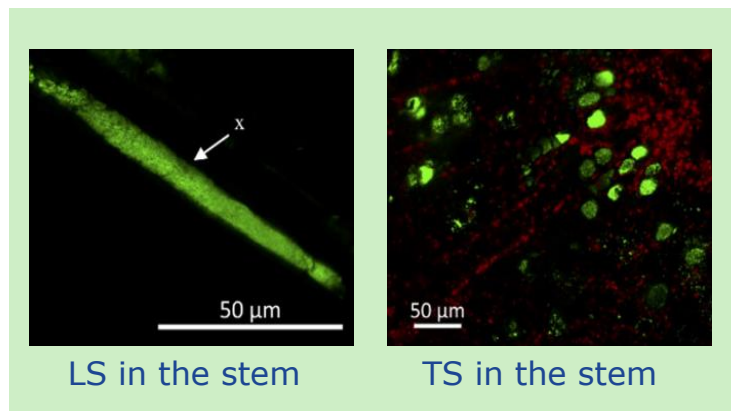
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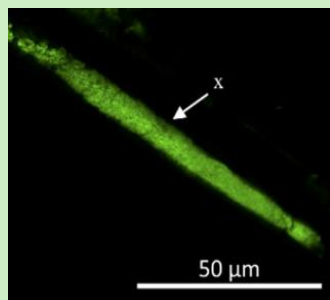
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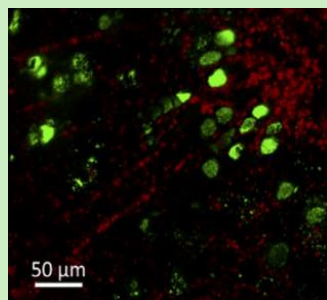
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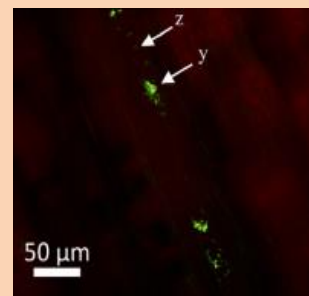
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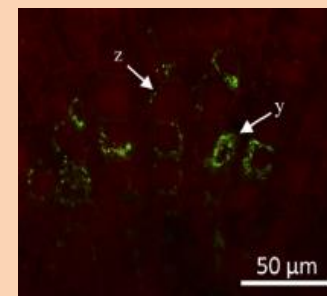
LS in the stem



TS in the stem



LS in the stem

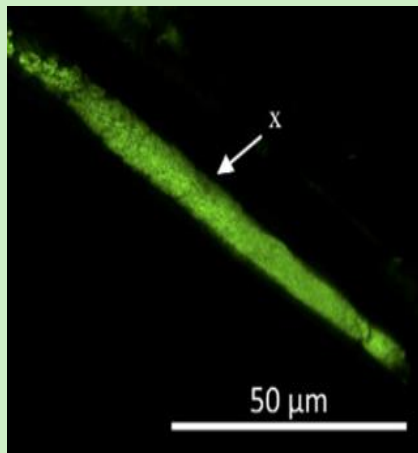


TS in the stem

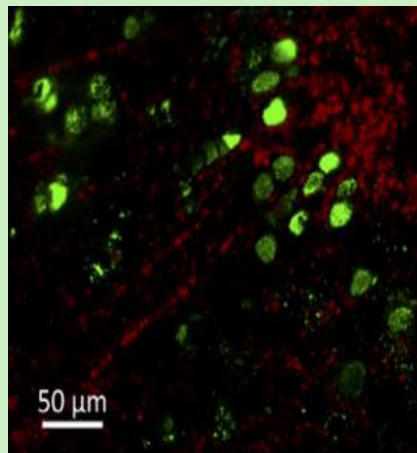
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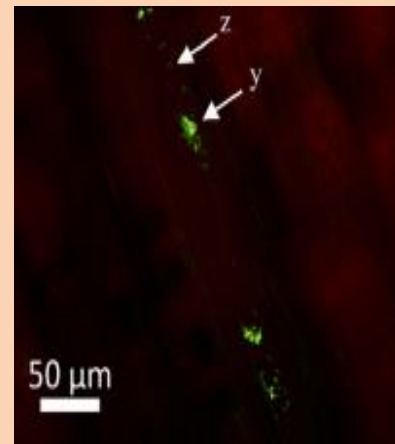


LS in the stem

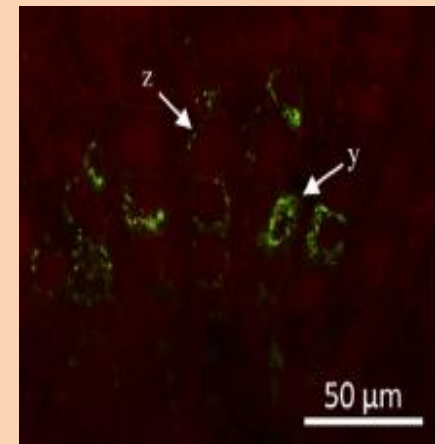


TS in the stem

Populus tremula



LS in the stem



TS in the stem

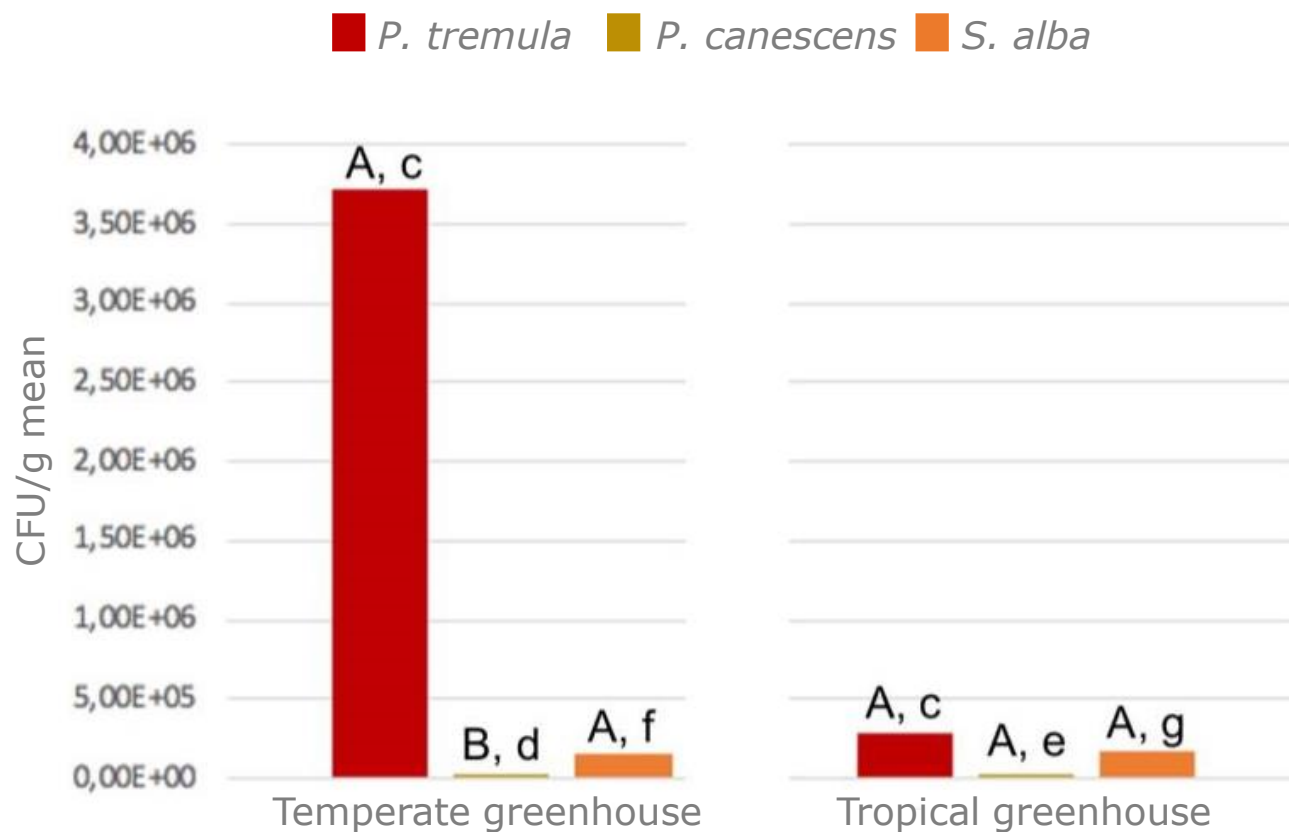
Salix alba

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



Casarin et al., 2022
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CFU/g	<i>P. tremula</i>	<i>P. canescens</i>	<i>S. alba</i>	Total
Temperate	$3,72 \times 10^6$	$2,23 \times 10^3$	$1,53 \times 10^5$	$1,29 \times 10^6$
Tropical	$2,60 \times 10^5$	$1,76 \times 10^4$	$1,62 \times 10^5$	$1,47 \times 10^5$
Total	$1,99 \times 10^6$	$9,90 \times 10^3$	$1,58 \times 10^5$	





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





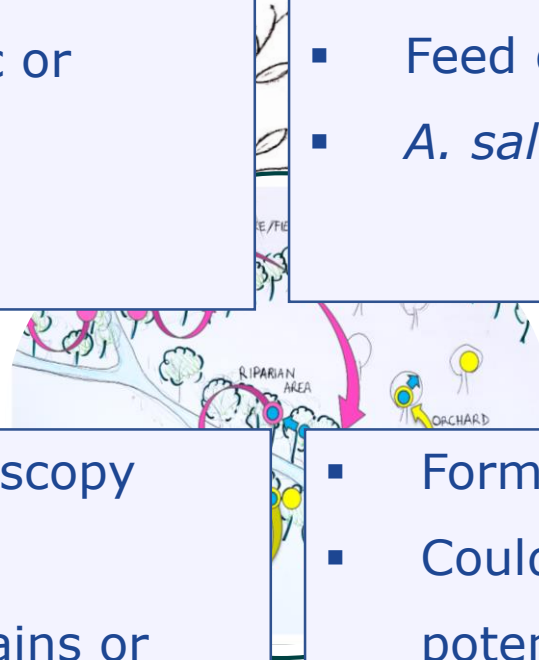
Take home message – *Salicaceae* – potential host for *Xylella fastidiosa* in Northern Europe

- 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

All: Noemi Casarin (UCLouvain)
Séverine Hasbroucq (ULB)

Supervisors: Claude Bragard (UCLouvain)
Jean-Claude Grégoire (ULB)

Mechanical inoculations:
Lena Pesenti (UCLouvain)
Amandine Gérardin (UCLouvain)
Amélie Emond (UCLouvain)

Sentinel plantations:
Júlia
Miguel
Allison

And thank you for your
attention !

Dispersion tests:
Audrey Glibert (UCLouvain)
Gabriel Carestia (UCLouvain)

Distribution of potential vectors:
Ewelina Czwieniczek (UCLouvain, EFSA)

And thank you to all who provided material :
Dr. S. Lindow for KLN59.3 strain
BCCM LMG collection
ILVO team



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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