Biology and pathogenicity of *Xylella fastidiosa* associated to olive quick decline syndrome

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Investigation on the host range and pathogenicity

- 1st step – determine the subspecies and ST
  MLST on DNA from infected plants

  subsp. *pauca* - ST53 consistently associated to the infections

- 2nd step – isolation and culturing
  extensive MLST analysis + NGS (Illumina+PacBio)

  More data - isolates associated to the infections in the different foci harbor the same ST53 – single & recent introduction?

  «De Donno « selected as reference strain

Studies focusing on *Xylella fastidiosa* in Apulia

Understanding the pathogenicity and host range

Olive – new host (*Xylella* – subsp. *pauca)*

Olive quick decline syndrome – one of the most severe disease

Strain – ST53 unknown biological properties

- **1st artificial inoculations (confined greenhouse)**

- **2nd vector-mediated transmission (demarcated area under field/semi-field conditions)**

ARTIFICIAL INOCULATIONS:

1) Determine the pathogenicity and the role of *Xylella* in the olive disease
2) Determine the host range of the strain recovered in Apulia

- **1) Inoculation of potted plants «Cellina di Nardò»**

3 P.I. – 1 round

Multiple shoots inoculated

ARTIFICIAL INOCULATIONS:

- Host colonization: it took 3 months to detect the bacterium in the majority of the replicates 5-7cm above the IP

- It took 1y to detect sytemic infections (45-60cm) = roots colonization

- Symptoms started to appear 14months post inoculation, with similar path as observed in the field

SYMPTOMS REPRODUCED ON INOCULATED PLANTS

Situation after >2y

efsa
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GRAFTIN INFECTED SCIONS ON XF-FREE ROOTSTOCKS

6-12months

Bacterium detected in the rootstocks and in the roots

Artificial inoculation as a tool to determine the cultivar susceptibility

< [Bacterium]

< nr. plants sistemically infected

< lower symptom severity

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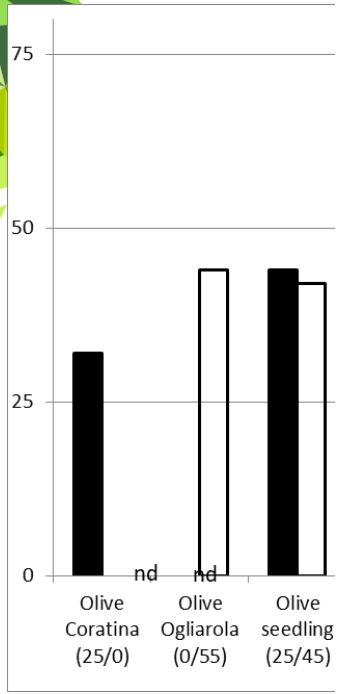
Situation after >2y

VECTOR-MEDIATED TRANSMISSION (PHILAENUS SPUMARIUS)



Cornara et al.,
J. Appl. Entomol. 2017

CELLINA DI NARDO' – EXPOSED TO VECTORS (15/PLANTS)

AFTER 14 MONTHS POST TRANSMISSION ONLY 1 PLANT STARTED TO SHOW SYMPTOMS

LARGE PROGRAM OF INOCULATIONS STARTED LAST MARCH, WITH OVER 60 SELECTIONS FROOM THE INTENATIONAL COLLECTION IN CORDOBA

CRITICAL POINT STUDYING THE CULTIVAR RESPONSE

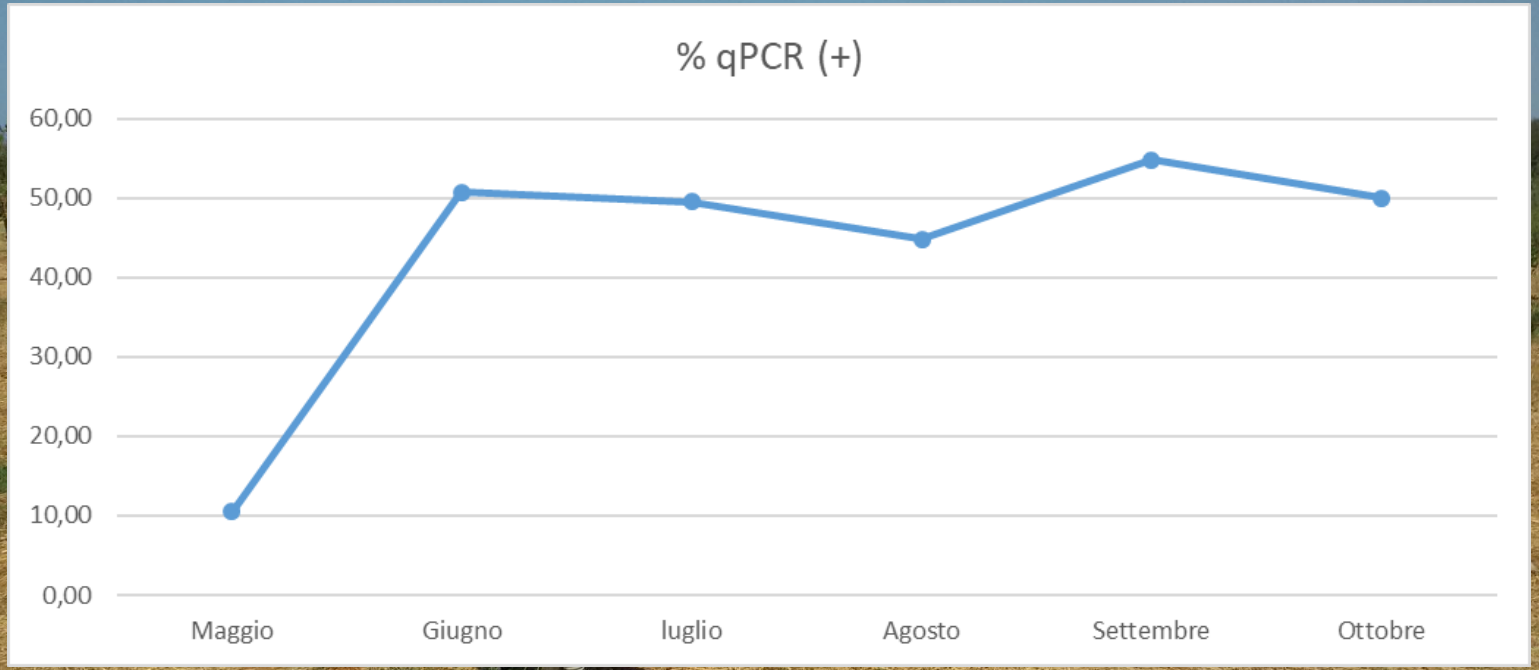
- Because the results are expected after more than 1year, we are not only using control plants (periwinkle or oleander) but plants of the cv Cellina di Nardò are always included to ensure robusteness of the results – successfull colonization of cv Cellina as a means to validate the assay

PLANTS INFECTED UPON CAGING INFECTED *P. SPUMARIUS*

- 20 – 24 replicates/cultivar
- no vector control program

Olive cultivar	2015 % (+)	2016 % (+)
Coratina	44	69,6
Leccino	8,3	33,3
Arbosana	58,3	85,7
Arbequina	69,5	85
Koroneiki	75	90
Cellina di Nardò	62,5	95
Cima di Melfi	50	75
Frantoio	45,8	61,9

QPCR (+) *P. SPUMARIUS*



2-3 YEARS AFTER PLANTING

2-3 YEARS AFTER PLANTING – ANOTHER EXPERIMENTAL PLOT

Study of the host range: grapes (started in 2015)

Cabernet
Primitivo
Negramaro

No infections detected up to 2years

30 DIFFERENT VARIETIES AND ROOTSTOCK

Varietà portainnesto	Michele palieri n.	Falanghina b.	Sangiovese n.
Vitis rupestris Du Lot	Sultanina bianca b.	Fiano b.	Sauvignon b.
Vitis riparia	Regina b.	Glera b.	Susumaniello n.
Vitis berlandieri	Victoria b.	Lambrusco maestri n.	Syrah n.
1103 Paulsen	**Varietà ad uva da vino**	Malvasia bianca lunga b.	Trebbiano toscano b.
Varietà ad uva da tavola	Aglianico n.	Merlot n.	Uva di troia n.
Cardinal n.	Chardonnay b.	Montepulciano n.	Vermentino b.
Italia b.	Ciliegiolo n.	Pinot grigio g.	

Supported by the regional governement of Apulia

GRAPES

- No detection in the field plants exposed to vectors
- Detection in the inoculated plants only at point of inoculation

CITRUS

- Field exposed plants
- Caged potted plants with the vector
- Artificial inoculations

Madam Vinous
Duncan grapefruit
Carrizo
Citrange troyer
C35
Mandarin

CITRUS

- No detection in the field
- Detection on the leaves exposed to vectors – but no movement
- Detection at the inoculation point (few exception 1 node above/below)
- NO sistemic colonization

STONE FRUITS

- GF677 (Prunus amygdalus x P. persica,)
- Prunus avium cv. Ferrovia , cv. Bigarreau Moreau
- Prunus cerasus cv. Visciola
- Prunus armeniaca cv. Monaco Bello , cv. Errani
- Prunus persica cv. Laure , cv. Caldesi , v. Baby Gold 6
- Prunus salicina cv. Santa Rosa, cv. Friar
- Prunus dulcis cv. Tuono, Genco
- Prunus domestica cv. President

- Field exposed plants (almond and cherry)
- Caged potted plants with the vector (GF677)
- Artificial inoculations

STONE FRUIT

- Artificial inoculations resulted in no detection for the different species except in few plants of cherry and almond, no symptoms so far
- Caged potted plants (detection only in the leaves exposed to the vector)
- Field exposed plants: detection occured on cherry (3/12) but in none of them tested positive this year (?)
- All the plum, apricon, peach potted plants moved in the field (2017) for additional exposure to vectors, results to be collected next summer

Symptoms on cherries – winter season? On the same tree:

THANK YOU

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IPSP

UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

CRSFA
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