NEPPO
منظمة وقاية النباتات للشرق الأدنى
Near East Plant Protection Organization

Food and Agriculture Organization of the United Nations

BEXYL

efsa

ورشة عمل خطط الطوارئ كتمرين محاكاة عملي

Contingency Exercise Workshop

Xylella fastidiosa

Hammamet, Tunisia, 26 – 28 May 2025

The BeXyl Project

Juan A. Navas-Cortés

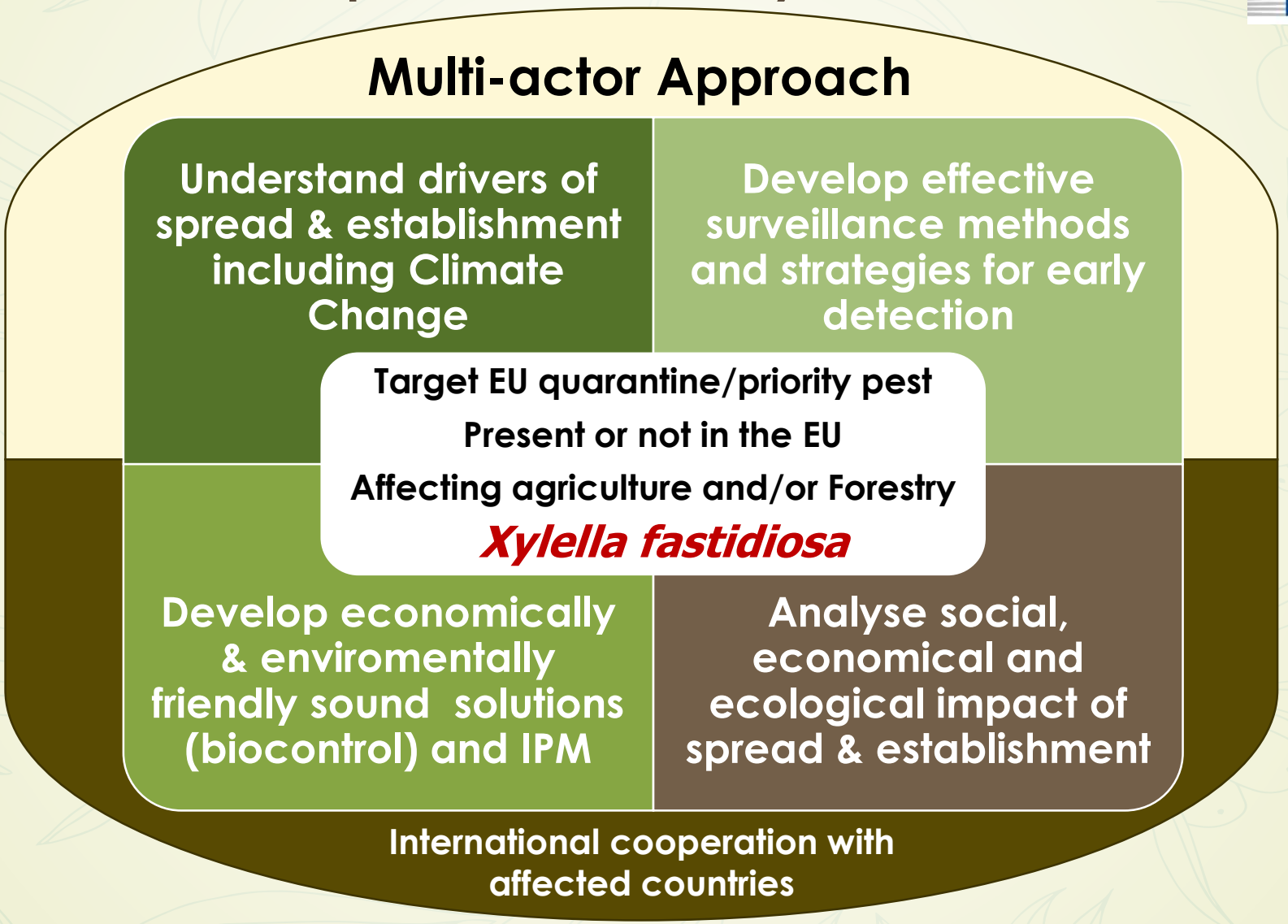
BEXYL
BEYOND XYLELLA

An EU funded research project to move Beyond the *Xylella* emergency in Europe

Funded by the European Union

HORIZON-CL6-2021-FARM2FORK-01-04: Tackling outbreaks of plant pests (2021)

Scope of the call: key elements



Beyond *Xylella*, integrated strategies for mitigating *Xylella fastidiosa* impact in Europe (BeXyl)

Who we are?

31 partners from 14 countries

CSIC – Consejo Superior de Investigaciones Científicas

IVIA – Instituto Valenciano de Investigaciones Agrarias
https://ivia.gva.es

UCO – Universidad de Córdoba
https://www.uco.es

UdG – Universidad de Girona
https://www.udg.edu/ca/

CNR – Consiglio Nazionale delle Ricerche
https://www.cnr.it/

UNITO – Università di Torino
https://www.unito.it/

UNIBS – Università degli Studi di Brescia
https://agrofood.unibs.it/

INRAE – Institute National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement
https://www.inrae.fr/

AU – Auburn University
https://auburn.edu/about/

UC – University of California
berkeley.edu

ARO VOL – Agricultural Research Organization Volcani Institute
https://www.volcaniinstitute.info

LMU-Ludwig Maximilian Universitat München
https://www.lmu.de

AIT Austrian Institute of Technology
https://www.ait.ac.at

NIB – Nacionalni Institut za biologijo
https://www.nib.si/

APTA IAC – Agência Paulista de Tecnologia dos Agronegócios-Instituto Agronômico
http://www.apta.sp.gov.br/

UCR – Universidad de Costa Rica – Center for Research in Tropical Diseases
https://www.ucr.ac.cr/

CRSFA – Centro Ricerca Sperimentazione e Formazione in Agricoltura
https://www.crsfa.it/

IFAPA – Instituto de investigacion y formacion agraria
https://www.juntadeandalucia.es/agriculturaypesca/ifapa/web/en

ENA – European Nurserystock Association
https://www.enaplants.eu/

EPPO – European and Mediterranean Plant Protection Organization
https://www.eppo.int/

IRFAP – Institut de recerca i formació agrària i pesquera
https://irfap.es/

ACIES BIO
https://www.aciesbio.com/

RG Projects
https://www.rg-projects.es/en/

UNAPROL
https://www.unaprol.it/

AIBE
https://www.agromillora.com/

SMS – Surrender Media Solutions
http://www.surrendermediasolutions.com/

INTA – Instituto Nacional de Tecnología Agropecuaria
https://www.argentina.gob.ar/inta

JRC – Joint Research Centre – European Commission
https://joint-research-centre.ec.europa.eu

UOM – University of Melbourne
https://www.unimelb.edu.au/

FCRA – Forest Research
https://www.forestresearch.gov.uk/

BGCI – Botanic Gardens Conservation International
bgci.org

Beyond *Xylella*, integrated strategies for mitigating *Xylella fastidiosa* impact in Europe (BeXyl)

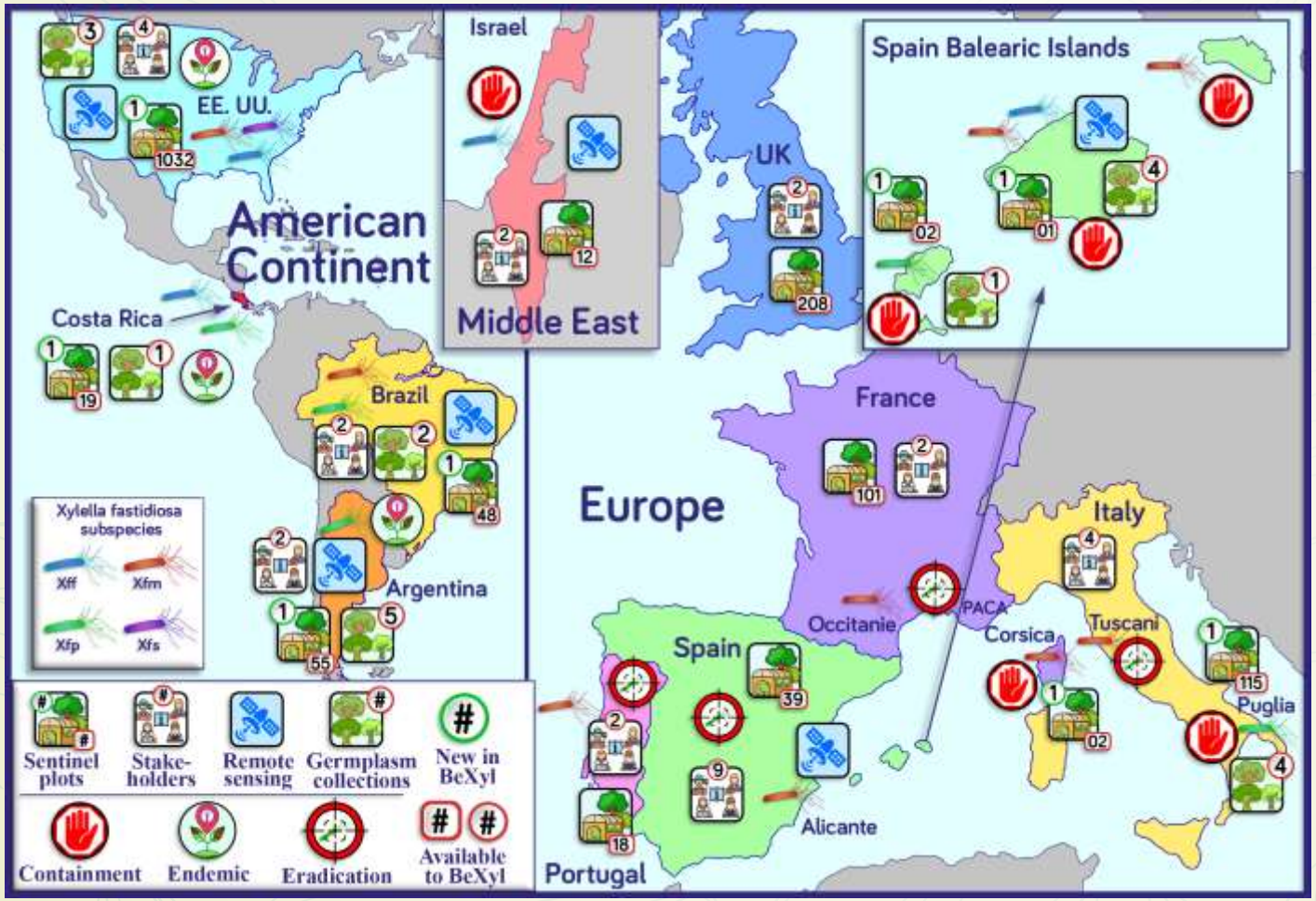
28 Beneficiaries from 142 countries:

***Xf* present:**
Argentina, Brazil, Costa Rica, USA, France, Italy, Spain /// Israel

***Xf* absent:**
Slovenia, Austria, Belgium, Germany

3 Associated Partners:

***Xf* absent:**
UK, Australia



Coordinator

CSIC
Consejo Superior de Investigaciones Científicas

Instituto de Agricultura Sostenible IAS

4 years
(September 2022-August2026)
7 million €

Beyond *Xylella*, integrated strategies for mitigating *Xylella fastidiosa* impact in Europe (BeXyl)

Project WorkPlan *vs* Expected Impact/Outcome

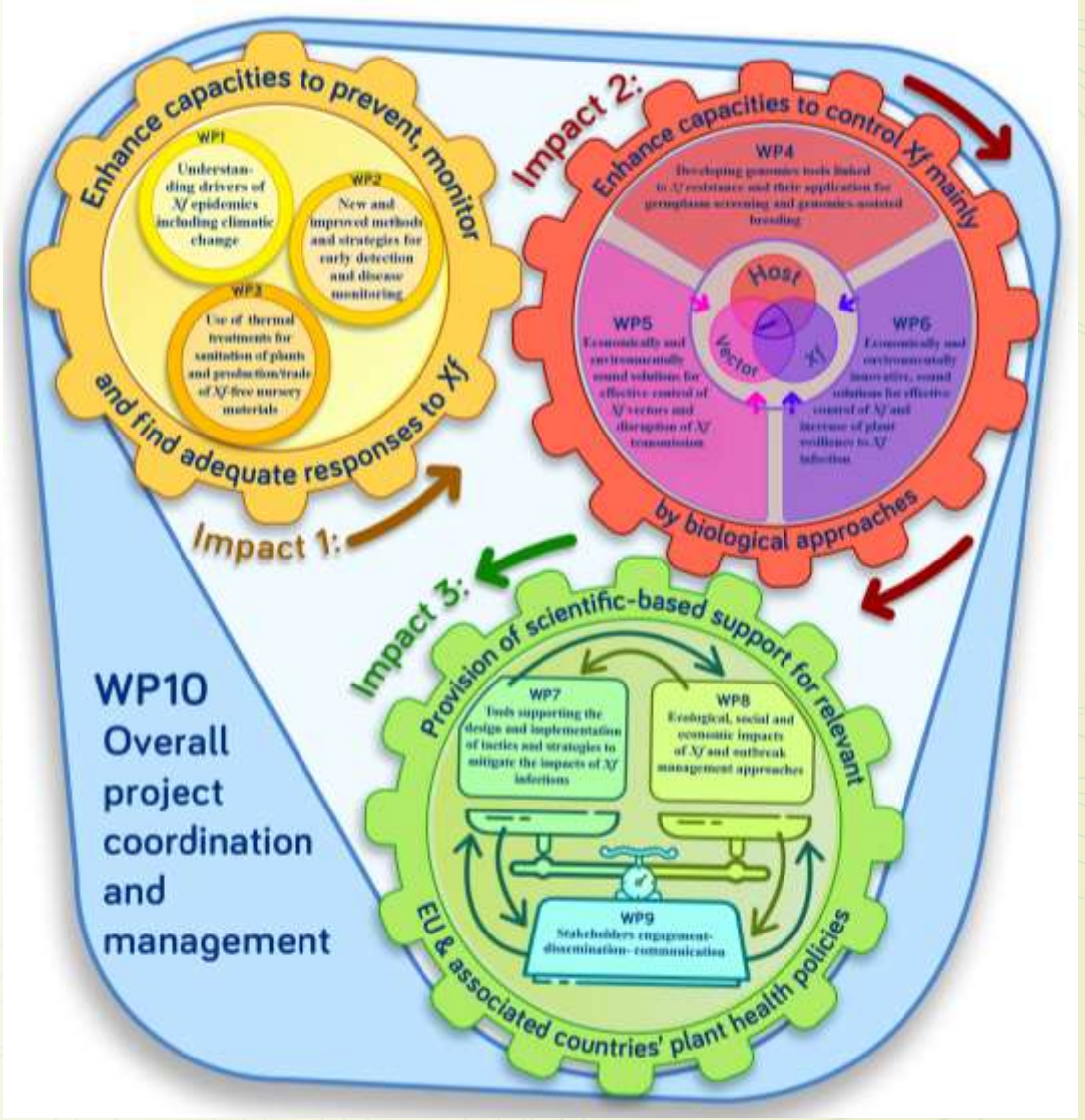
BeXyl final aim is to better tackle new *X. fastidiosa* introductions in Europe and to develop and implement tailored Integrated Pest Management (IPM) strategies to mitigate the impacts of current outbreaks, helping the agricultural and forestry sectors to remain productive and sustainable at long-term

Olive Quick Decline a priority

....

Other crops, ornamental and forestry plants

https://bexylproject.org/



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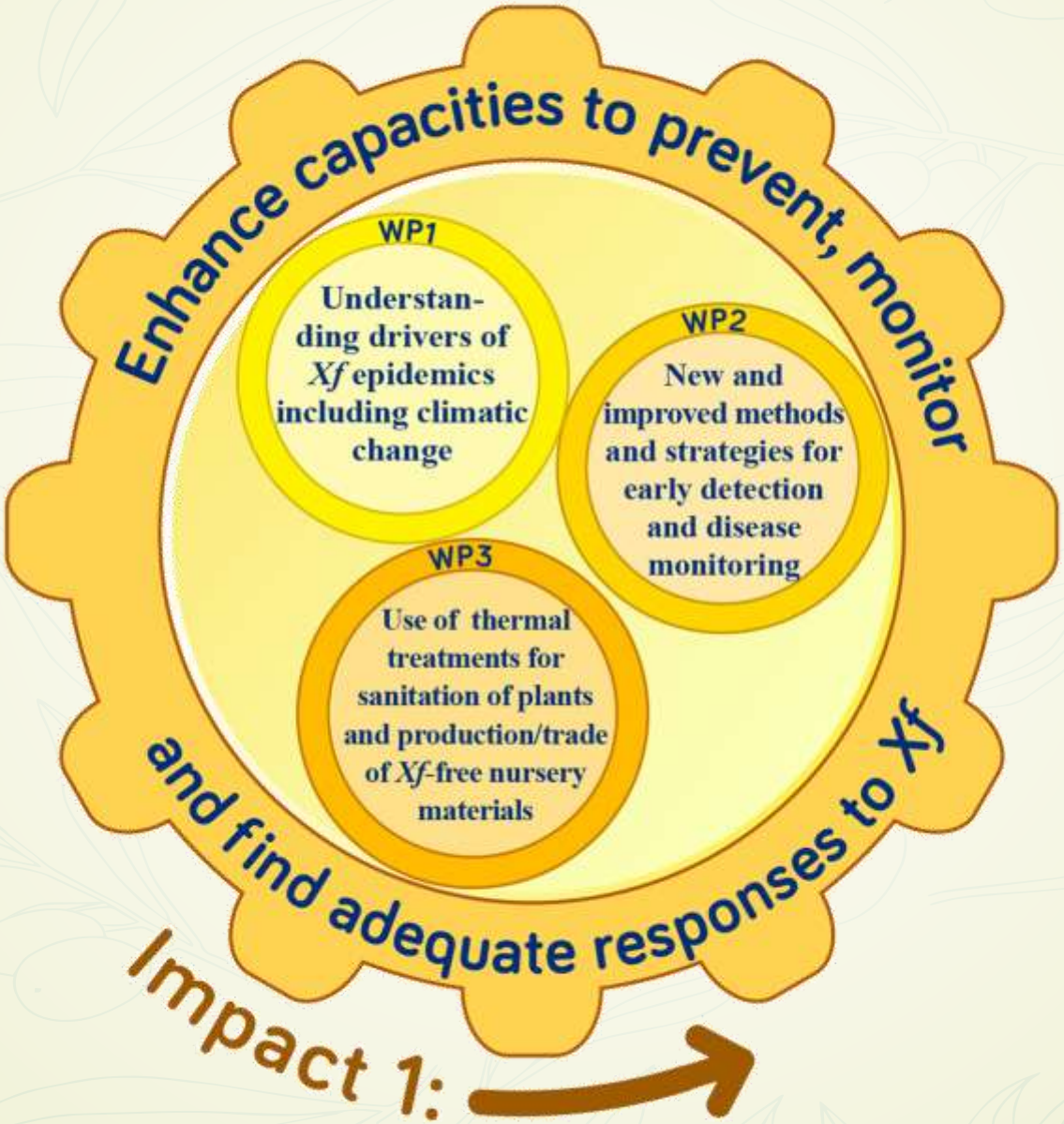

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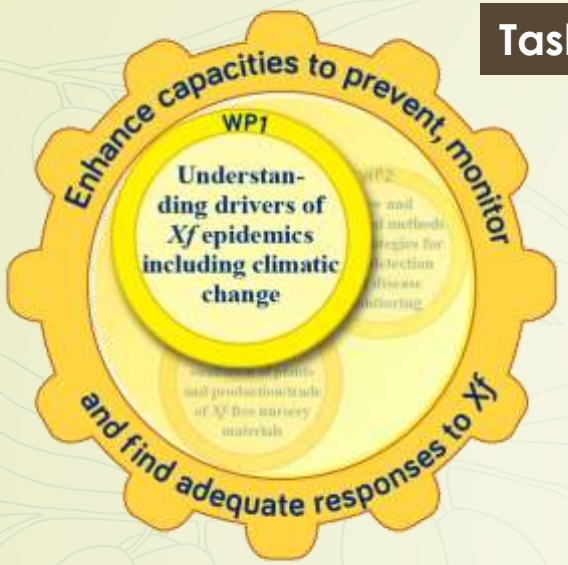
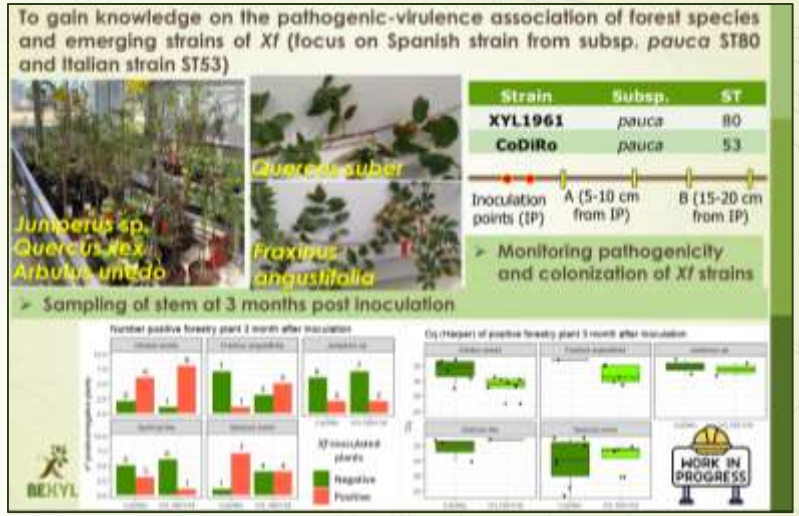
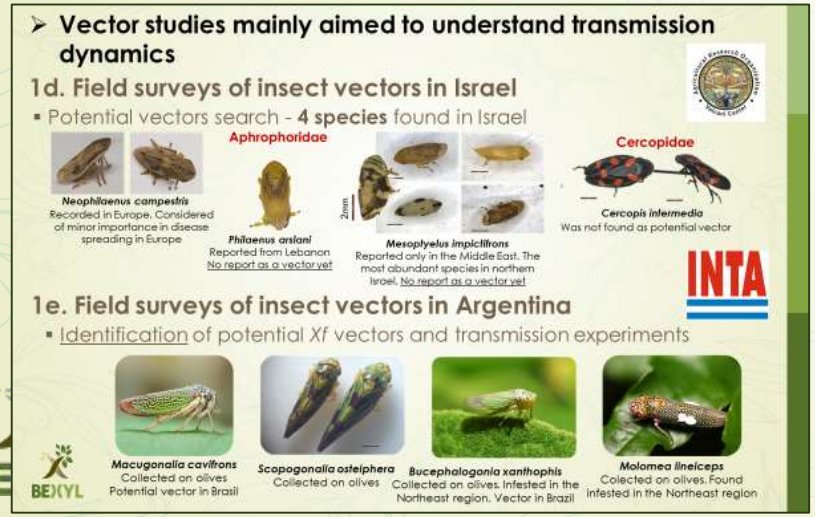
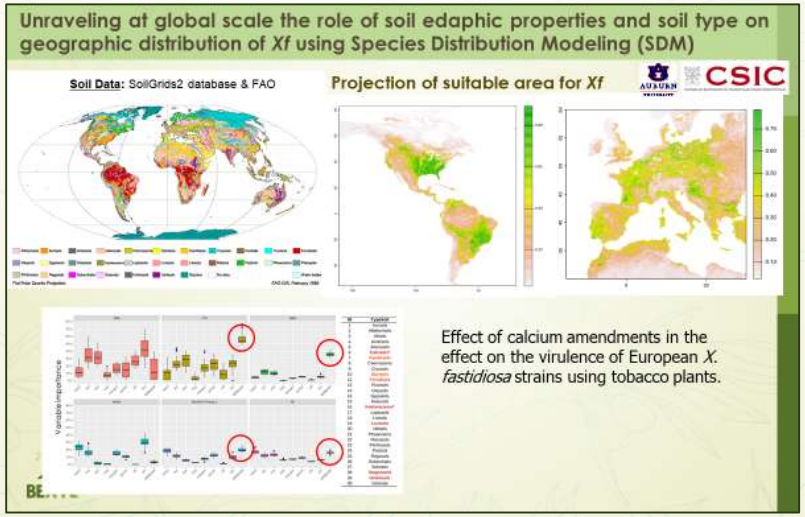


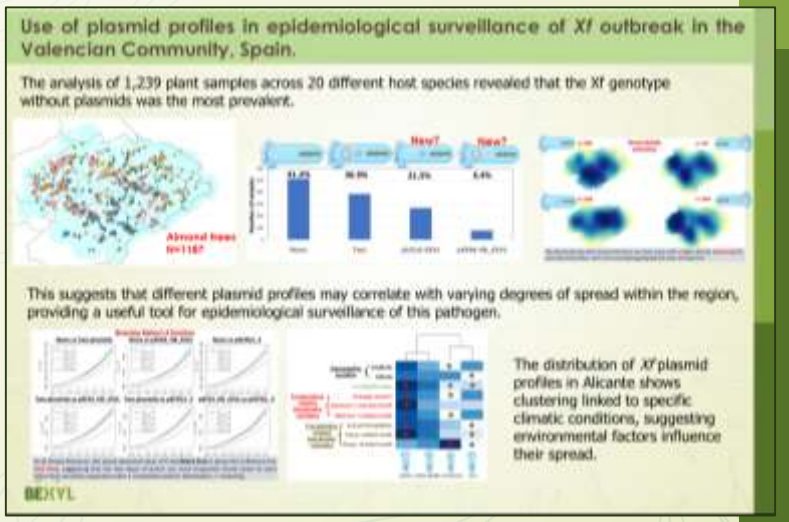
Task 1.1. Host range and pathogenicity of *Xf* strains relevant for the EU and the Mediterranean



Task 1.2. Biotic and abiotic factors driving *Xf* epidemics







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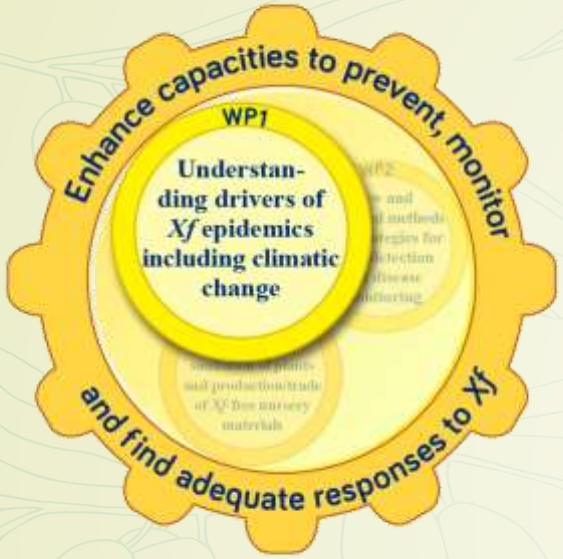
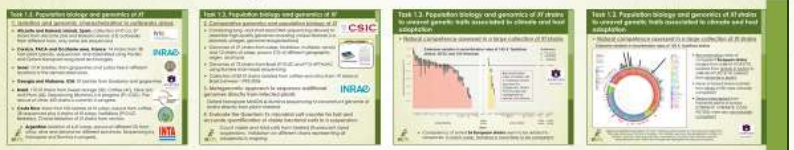


Task 1.3. Population biology and genomics of *Xf*: Traits and host adaptation

- **Genome sequencing activities:** Isolation of new strains from diverse hosts in Israel, USA, Costa Rica, Argentina and Spain. Using both long- and short-read DNA sequencing allowed obtaining about 400 *Xf* genomes.

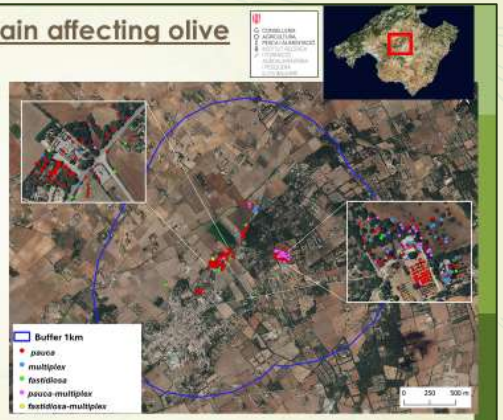
  Studies on natural competence involved the use of 200 *Xf* strains.



- **Population biology studies:** Focused on identifying traits linked to climate and host adaptation, by analyzing the genetic diversity of *Xf* across South, Central and North America.

New *Xf* outbreak in Spain affecting olive

- January 2024. Sencelles, Mallorca island, identified by MLST as *X. fastidiosa* subsp. *pauca* ST53
- Detected in olive and wild olive, oleander, lavender and *Rhamnus alaternus*
- Limited distribution
- At to December 2024: 264 positives (60% pauca)
- 10% coinfection pauca/multiplex
- 0,4% coinfection pauca/fastidiosa



Task 1.4. Host-pathogen-vector interaction of relevant *Xf* strains under current & future changing climate

Task 1.4.1. Unraveling host-pathogen interactions of relevant *Xf* strains and host species under changing temperature, CO_2 and water regimes

To study the response of an artificial *Xf* infection (*Xf* subsp. *fastidi* ST1) in grapevine to two climate change scenarios

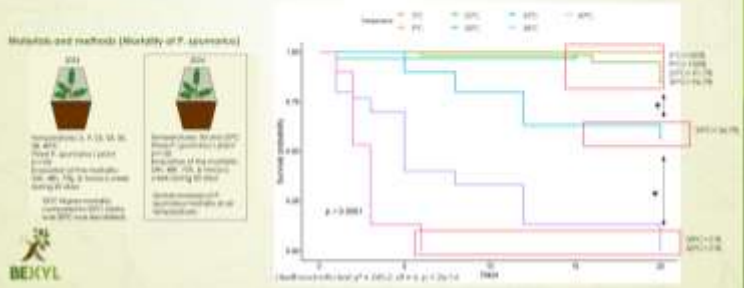
- 3 levels of CO_2: 400,550,750ppm
- 3 Temperature: 24, 28, 32 °C
- 2 level of irrigation → Field capacity and half
- qPCR to detect the bacteria
  - Leaves at 2 months after inoculation

Task 1.4.2. The impact of temperature changes on vector-tranamission and spread of *Xf*

Impact of different temperatures on survival of *Philaenus spumarius*

Temperature significantly impacts the survival of *P. spumarius*:

- **Survival drops sharply as temperatures increase.**
- Cooler temperatures (5°C–30°C) maintain high survival rates
- Survival is reduced to 57% at 35°C and no survival at 38°C and 40°C



Task 1.4.2. The impact of temperature changes on vector-transmission and spread of *Xf*

To determine how varying low temperatures affect *Xylella fastidiosa* acquisition and transmission in olives by examining bacterial multiplication, gene expression, and potential molecular adaptations, with plans to extend testing to additional species or olive cultivars.

- **Exposure of Xfp-ST53-infected olives to different range of temperatures to assess the impact on**:
  - → Bacterial multiplication and molecular patways
  - → Acquisition/transmission efficiency
- **Experiments will focus on** low temp → influence on acquisition/transmisison
- **Extend** the trial to at **least one more species** or olive cultivar (to be defined (based on infected sources available)
- Investigate the **molecular changes** occuring on the **bacterial side**: changes in the expression of key genes involved in its multiplication and transmission (cell adhesion/attachment: i.e. csp1; *pil, fim, hsf, xad, but also cvac)*

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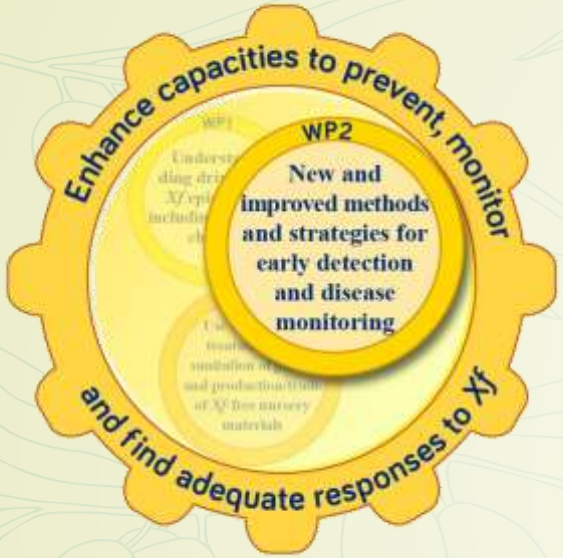
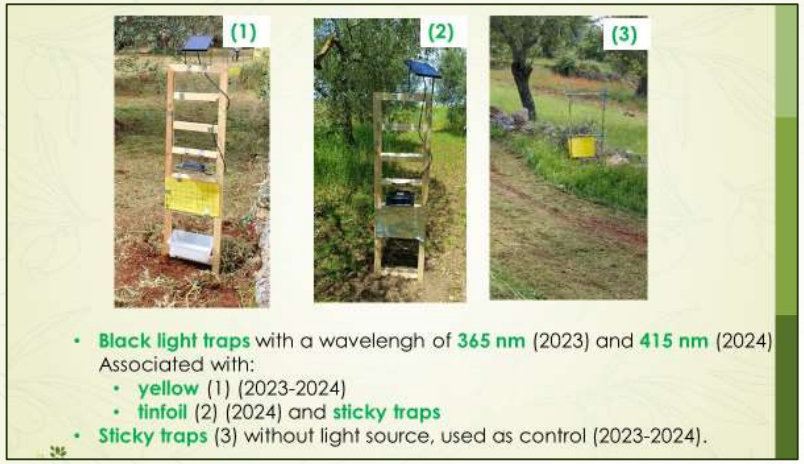
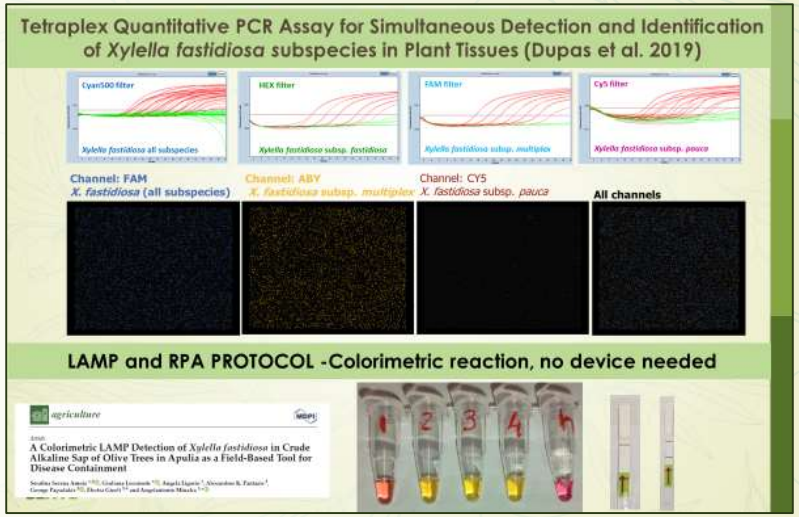


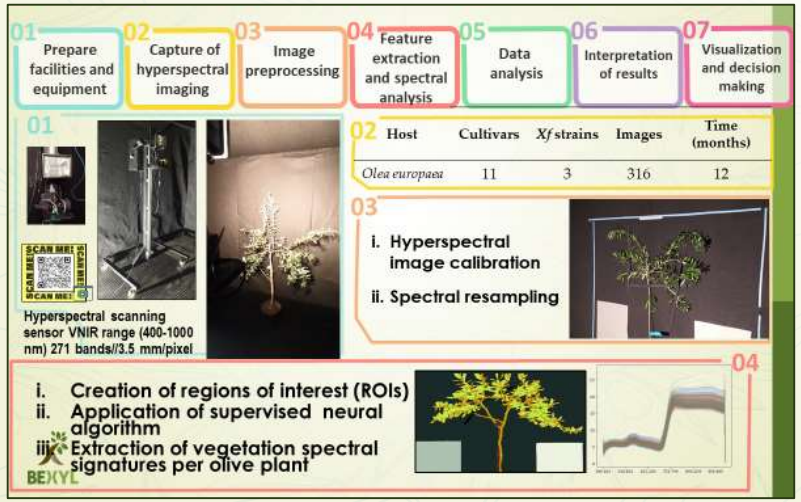
Task 2.1. Black light traps to collect adults of *P. spumarius* and estimate *Xf* infection status

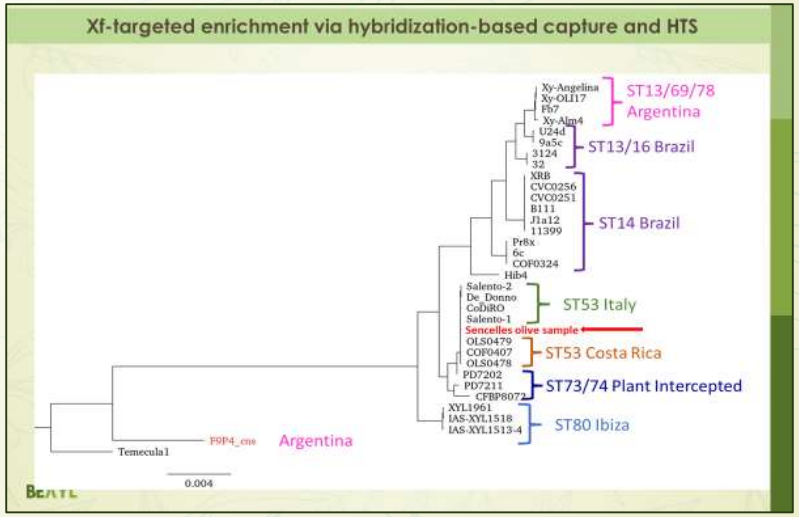


Task 2.2. Molecular approaches for quantification, typing and in situ detection of *Xf*



Task 2.4. Early-stage plant phenotyping of asymptomatic *Xf* infections





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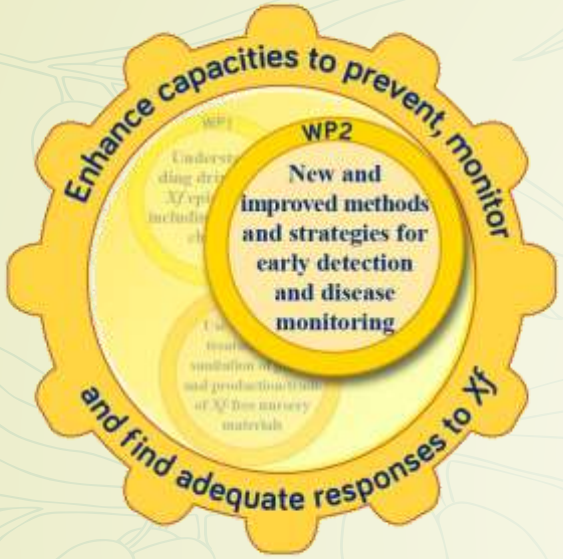
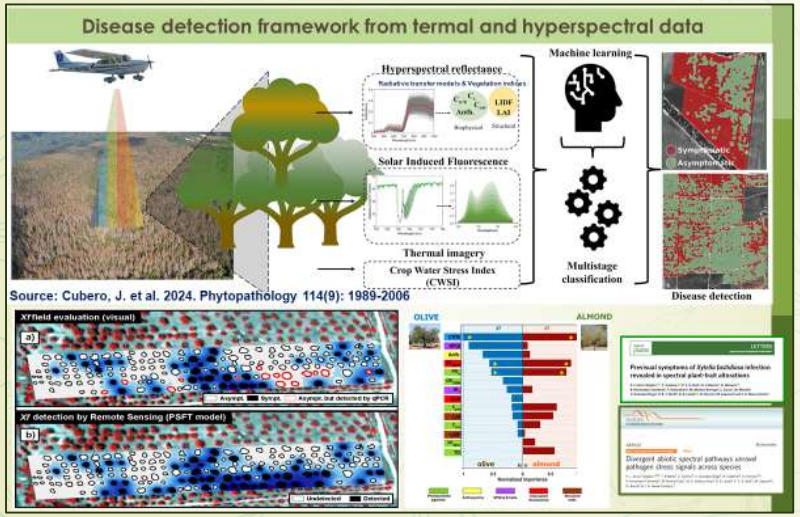
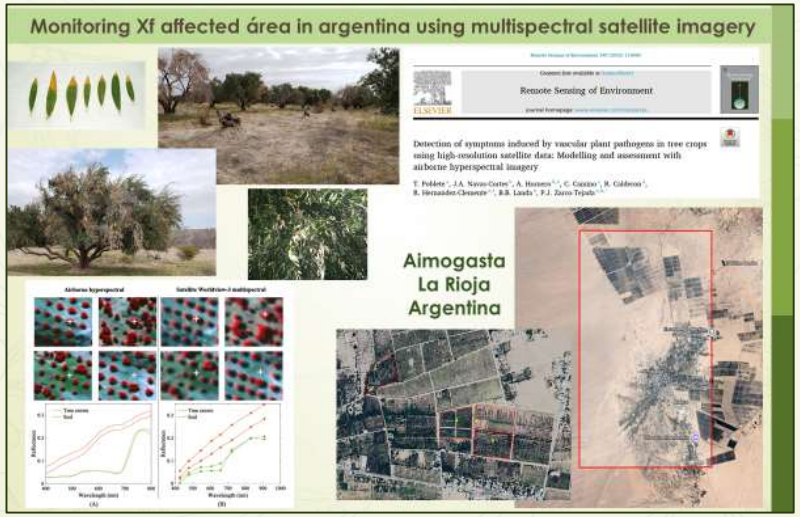


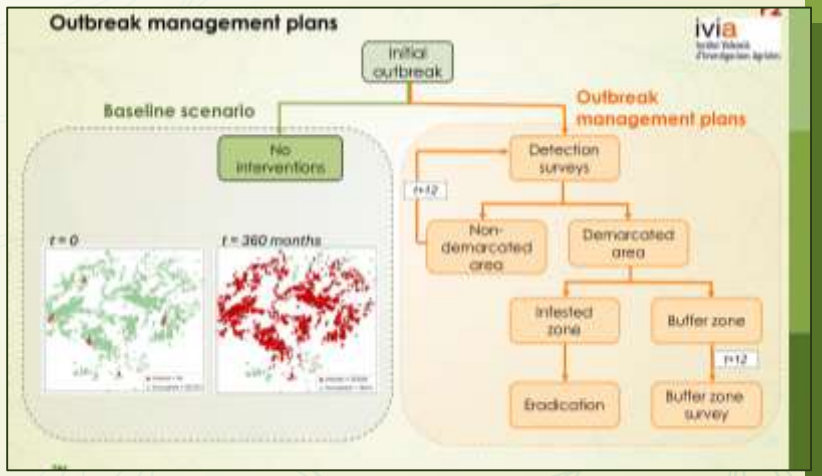
Task 2.6. Use of canine olfactory detection of *Xf* at inspection ports, nursery and field scale

Task 2.5. Global model for *Xf* detection and monitoring using remote sensing





Task 2.7. Development of optimized statistical designs for surveillance of *Xf* and its vectors



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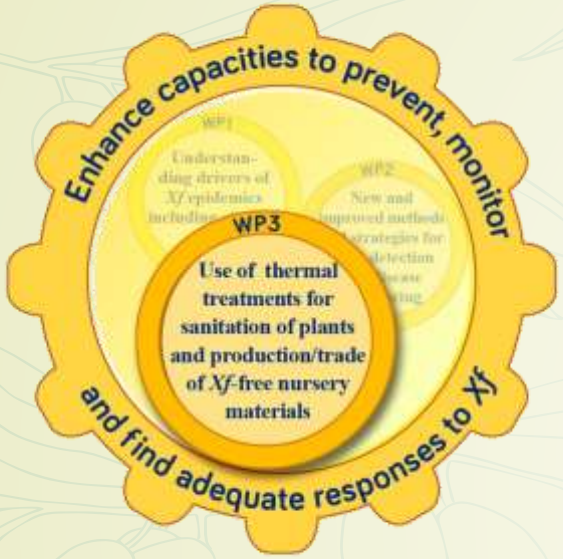
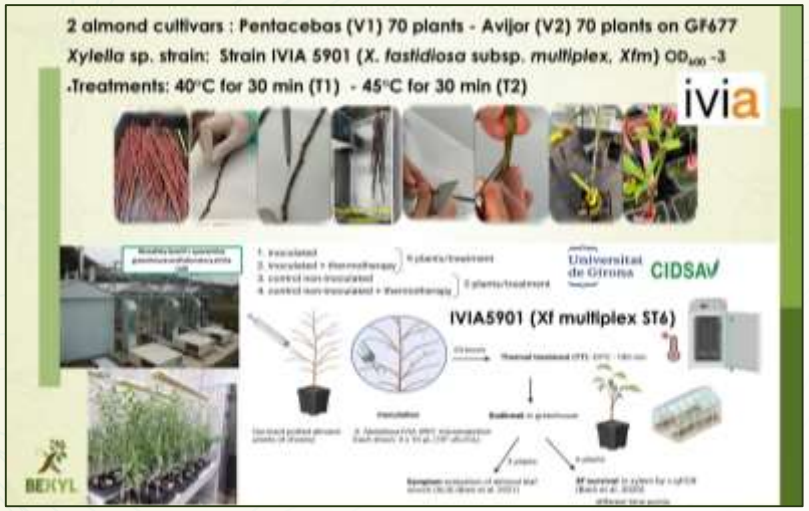
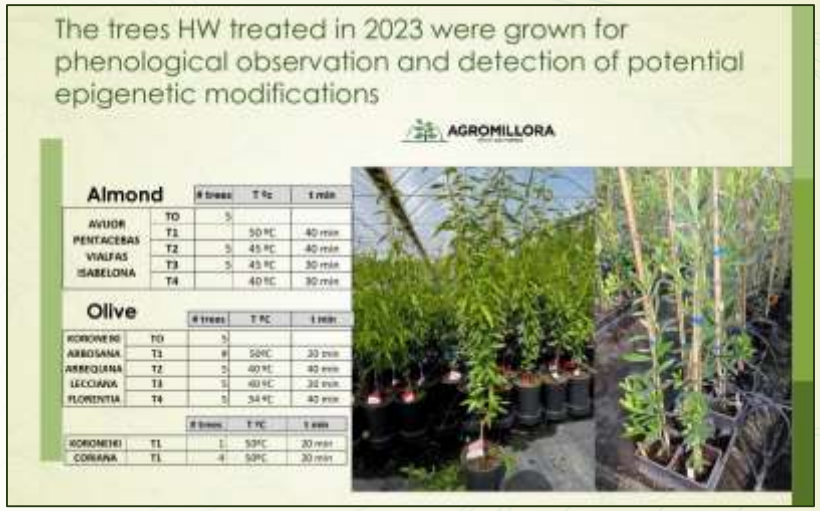
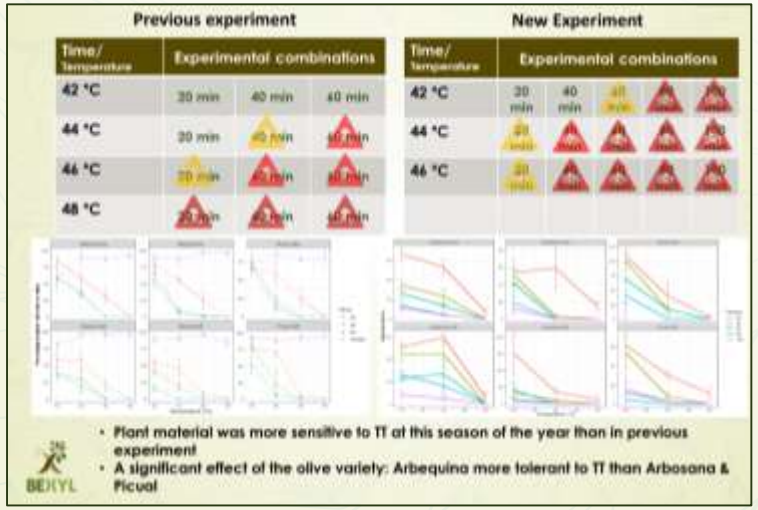


Task 3.1. Efficacy of different TT protocols on the viability of Xf in vitro and in planta

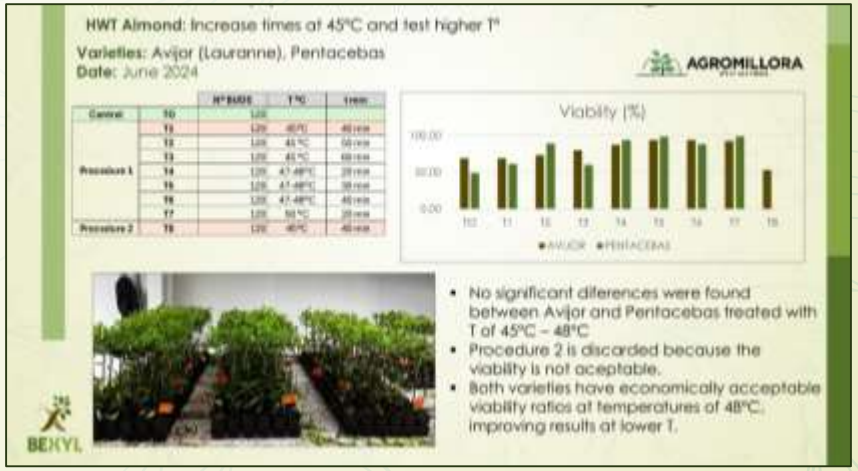




Task 3.2. Evaluation of TTs on the viability of olive propagating planting materials



Task 3.3. Large-scale use of sustainable-TT at nursery/quarantine level and drafting of official standards



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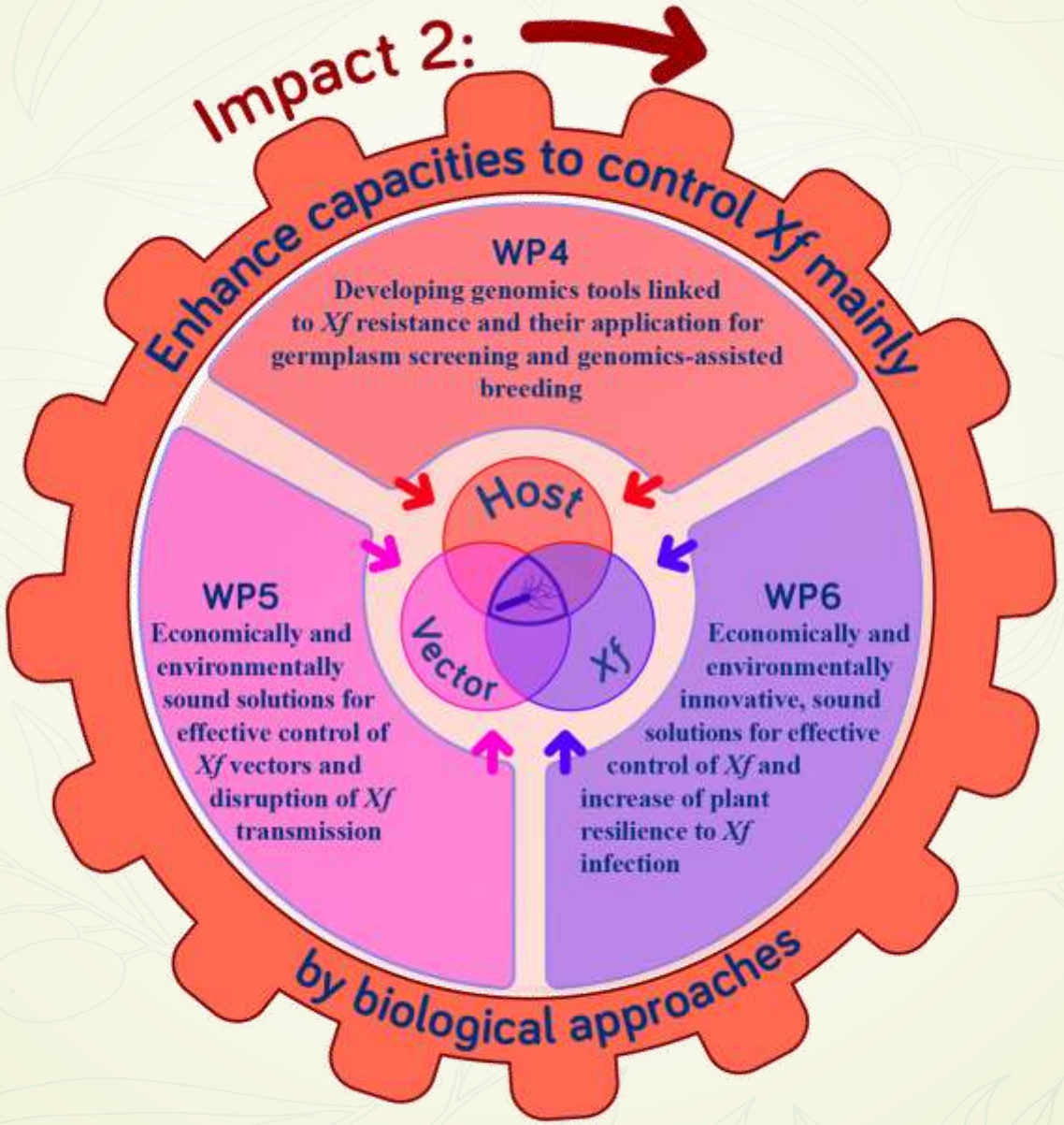
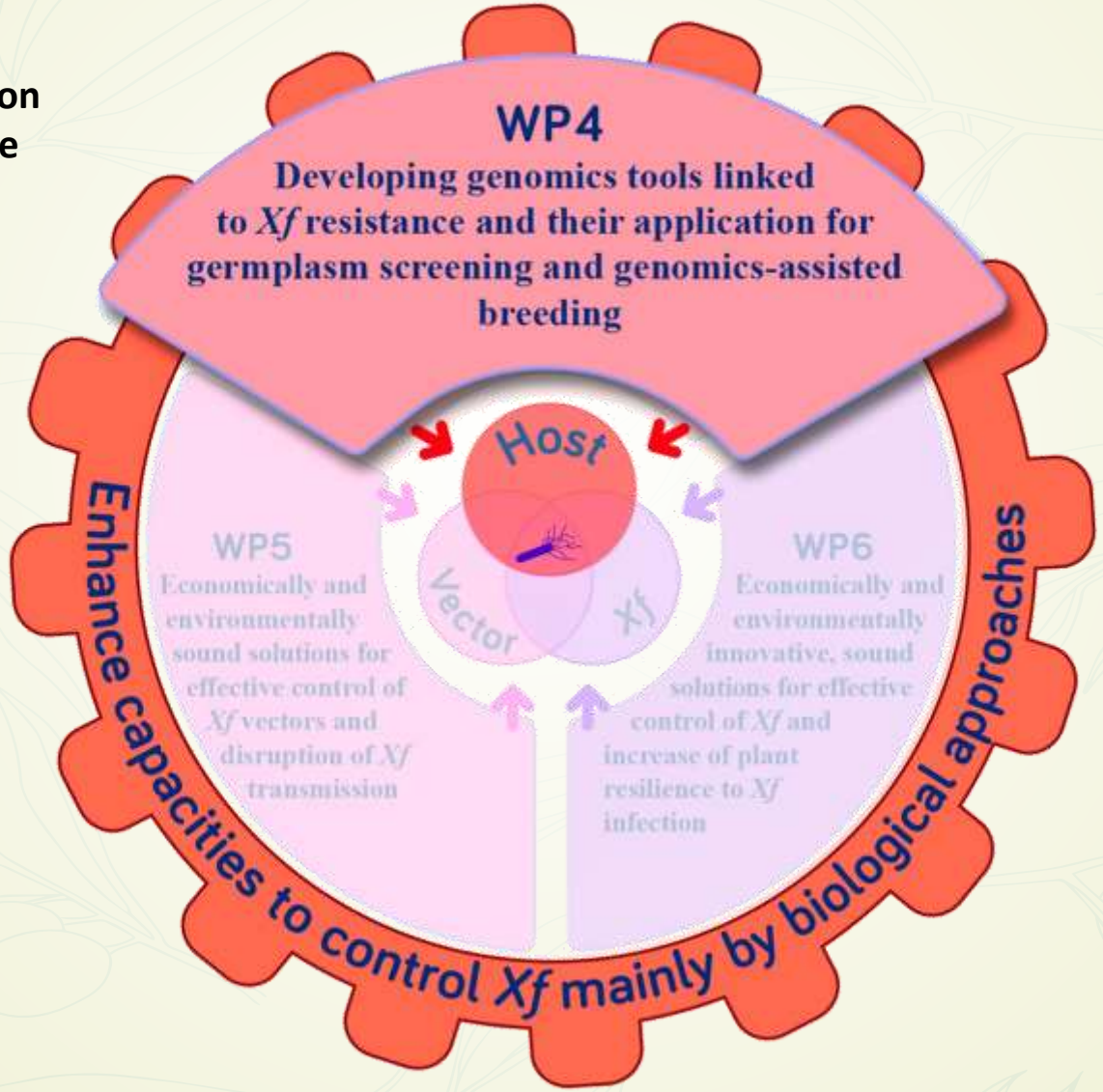


Beyond *Xylella*, integrated strategies for mitigating *Xylella fastidiosa* impact in Europe (BeXyl)

- **Large-scale testing of genotypes field/greenhouse**
- **Molecular plant responses to infection**
- **Mapping genes and QTL to resistance**
- **Breeding for new varieties**



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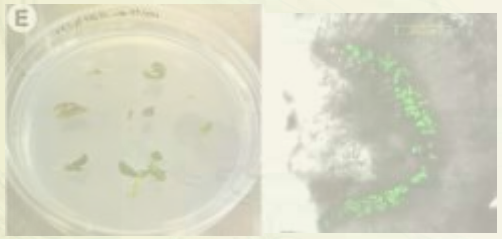

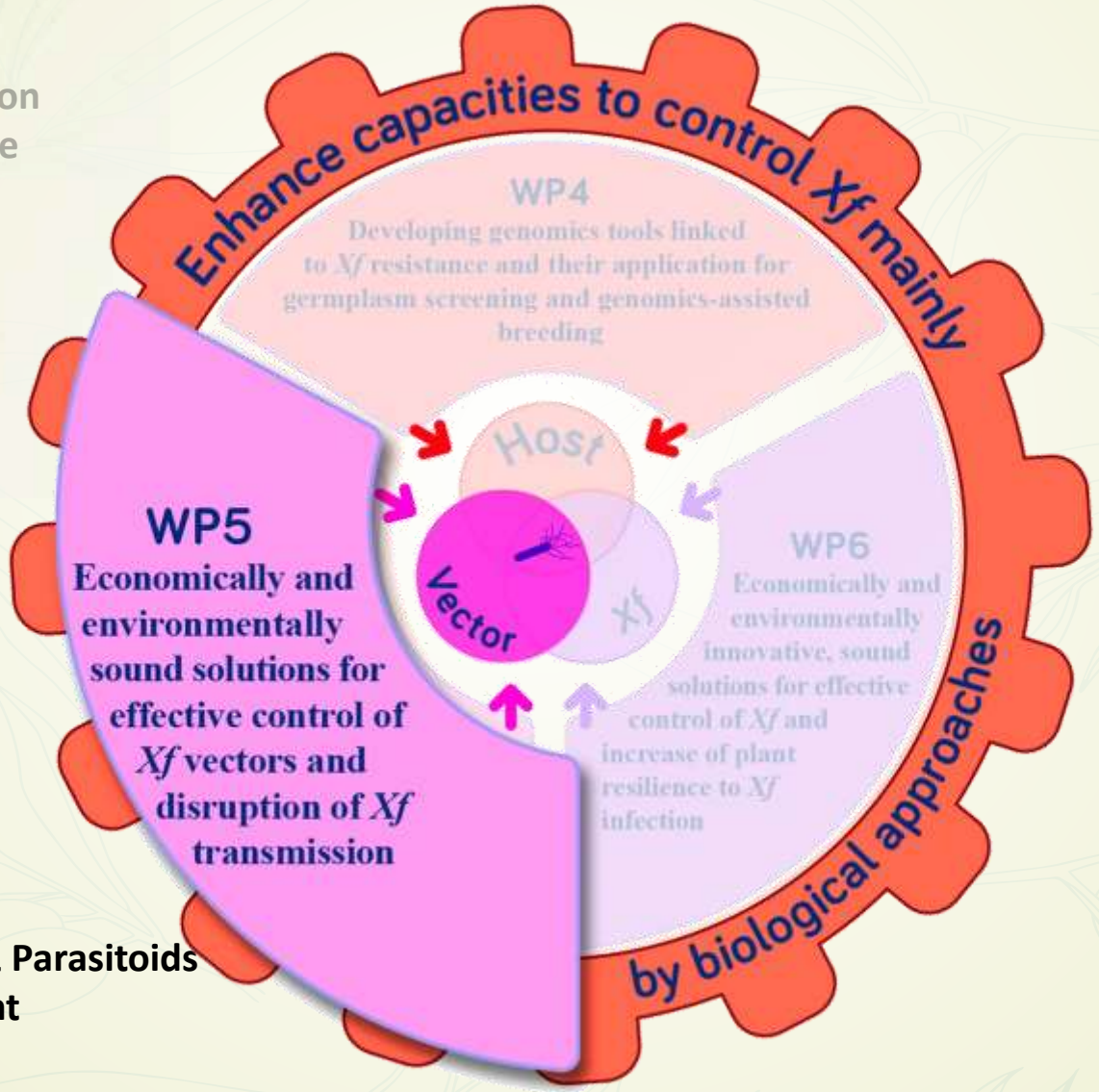

- **Entomopathogenic fungi**
- **Virome of insect vectors & Parasitoids**
- **Ground cover management**
- **Tools to interfere vector acquisition/transmission**

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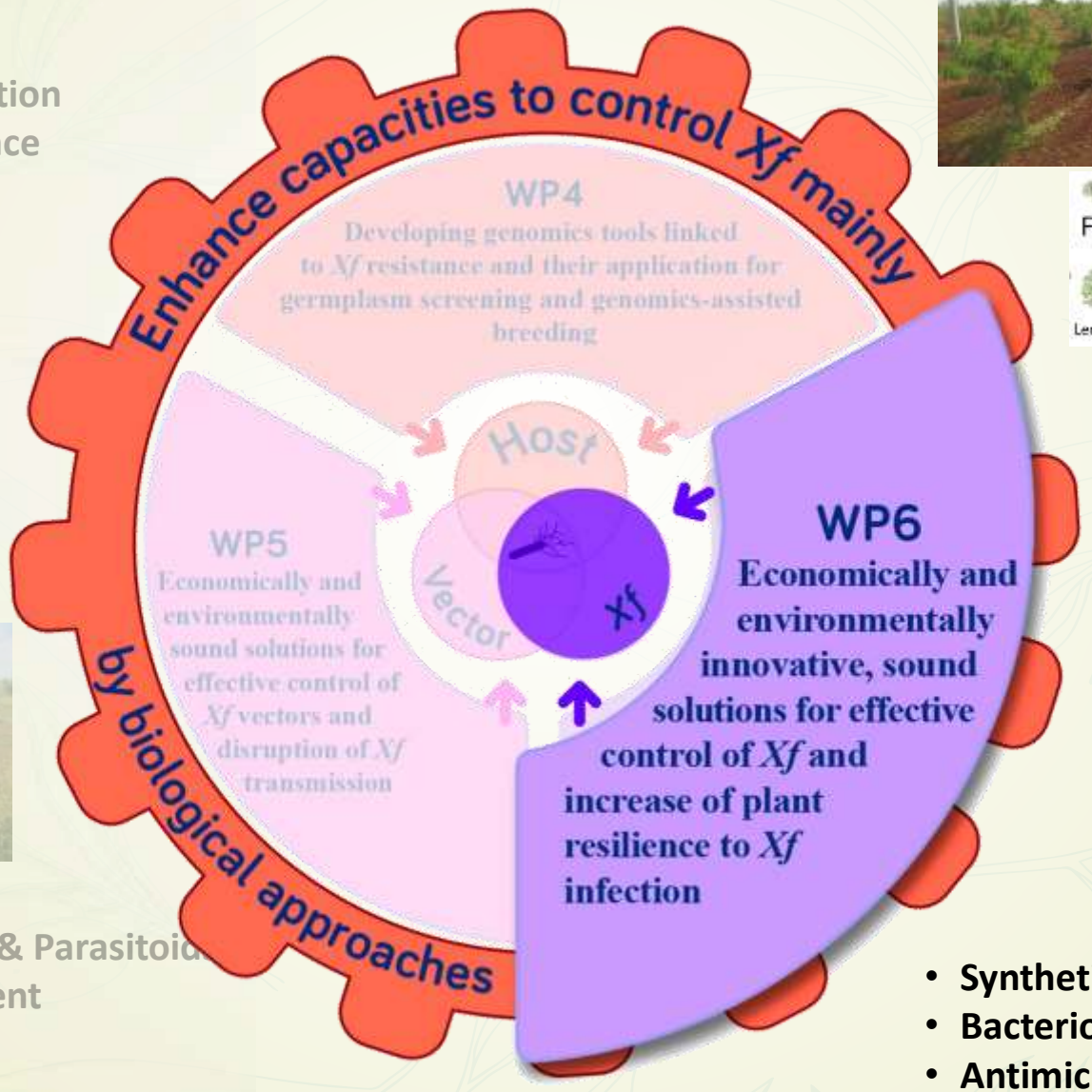

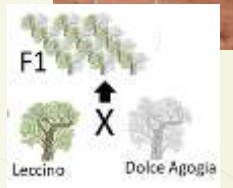

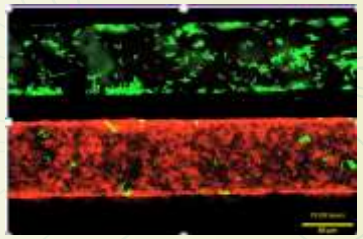

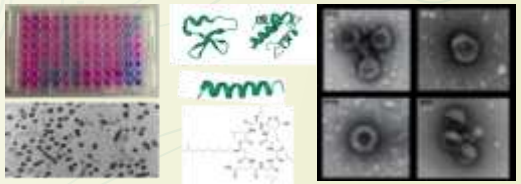

- Entomopathogenic fungi
- Virome of insect vectors & Parasitoid
- Ground cover management
- Tools to interfere vector acquisition/transmission

- **Synthetic communities of xylem-bacteria**
- **Bacteriophages**
- **Antimicrobials (peptides, plant extracts…)**

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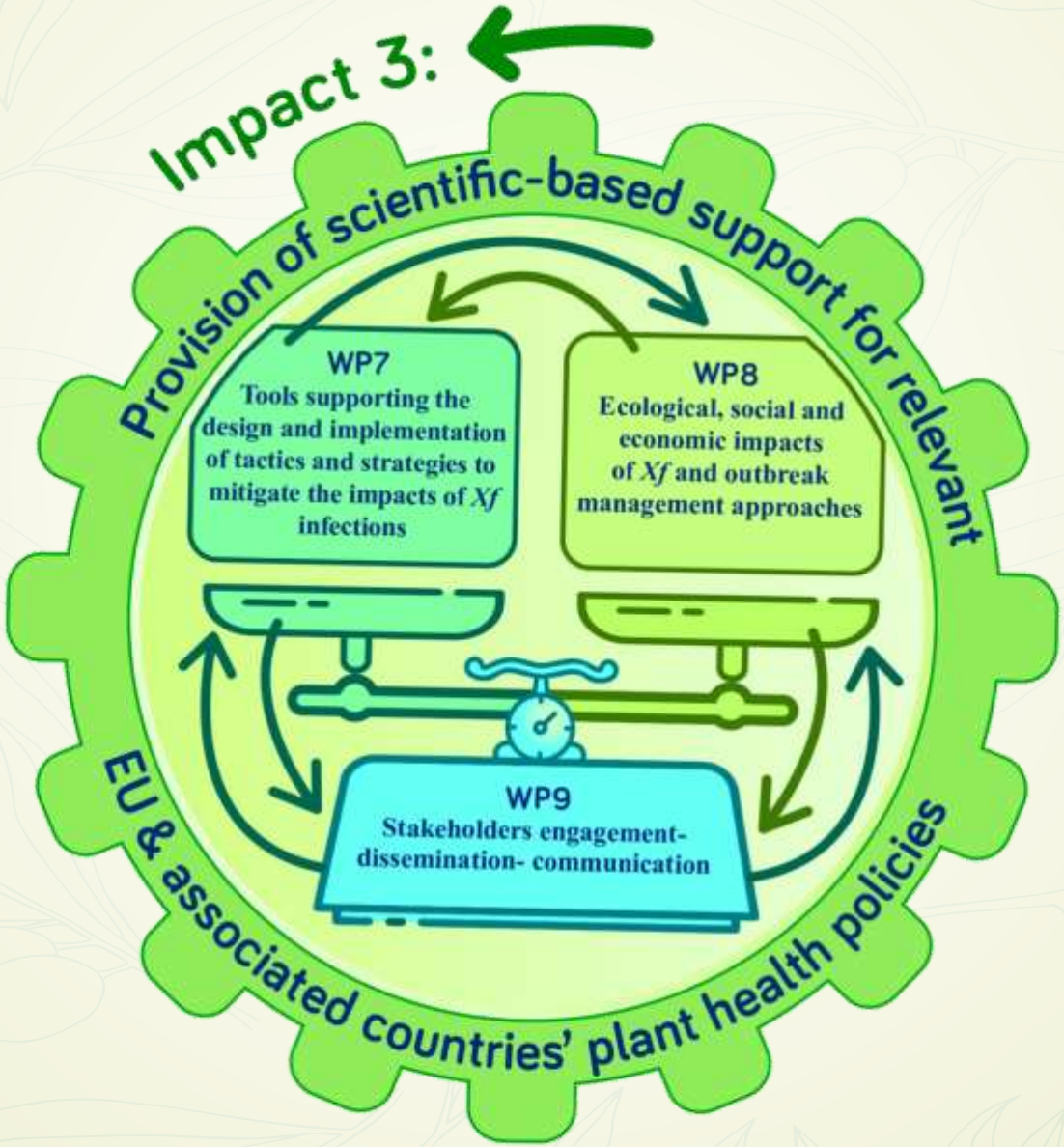

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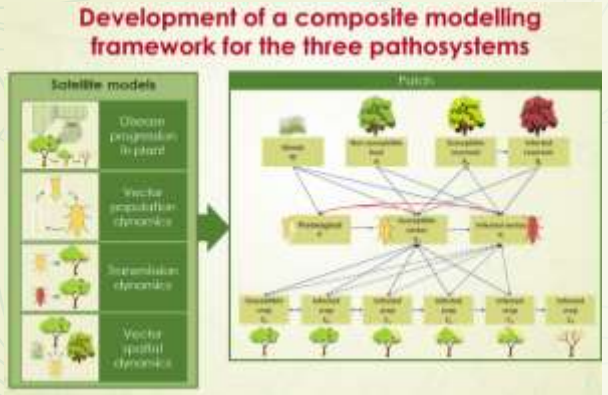
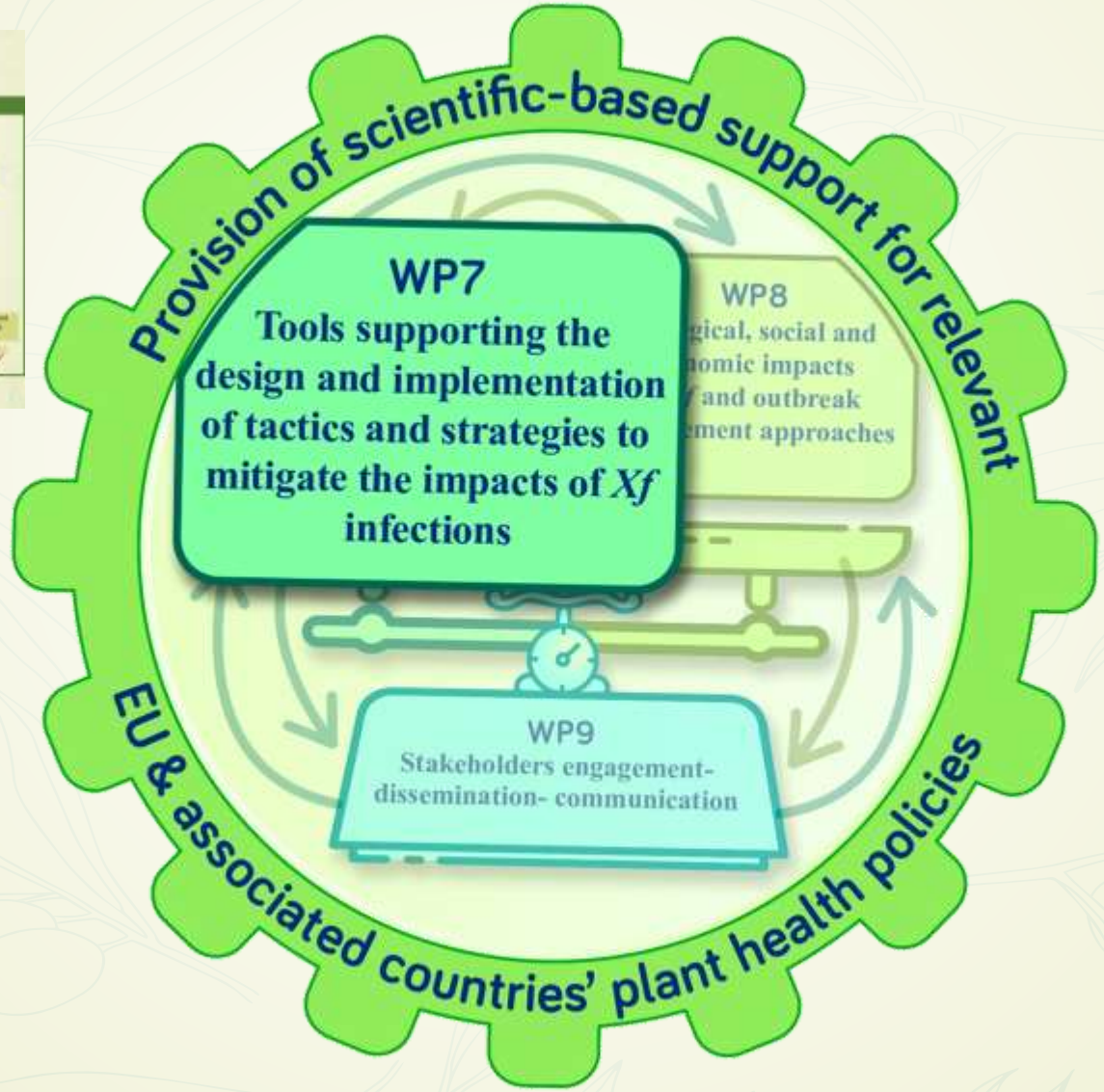
- **Integrated modeling framework**



- **Best agronomic Practices Network of plots for monitoring and demonstration of IPM tools**



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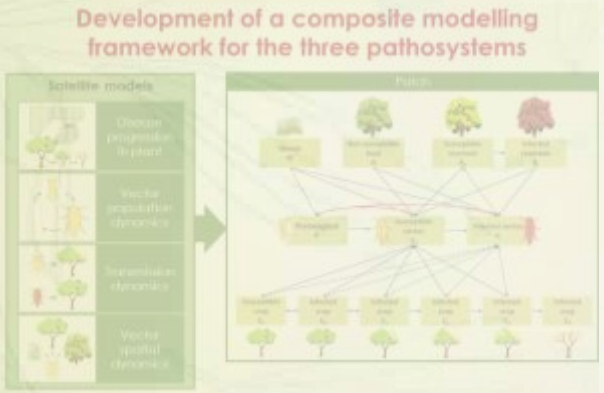
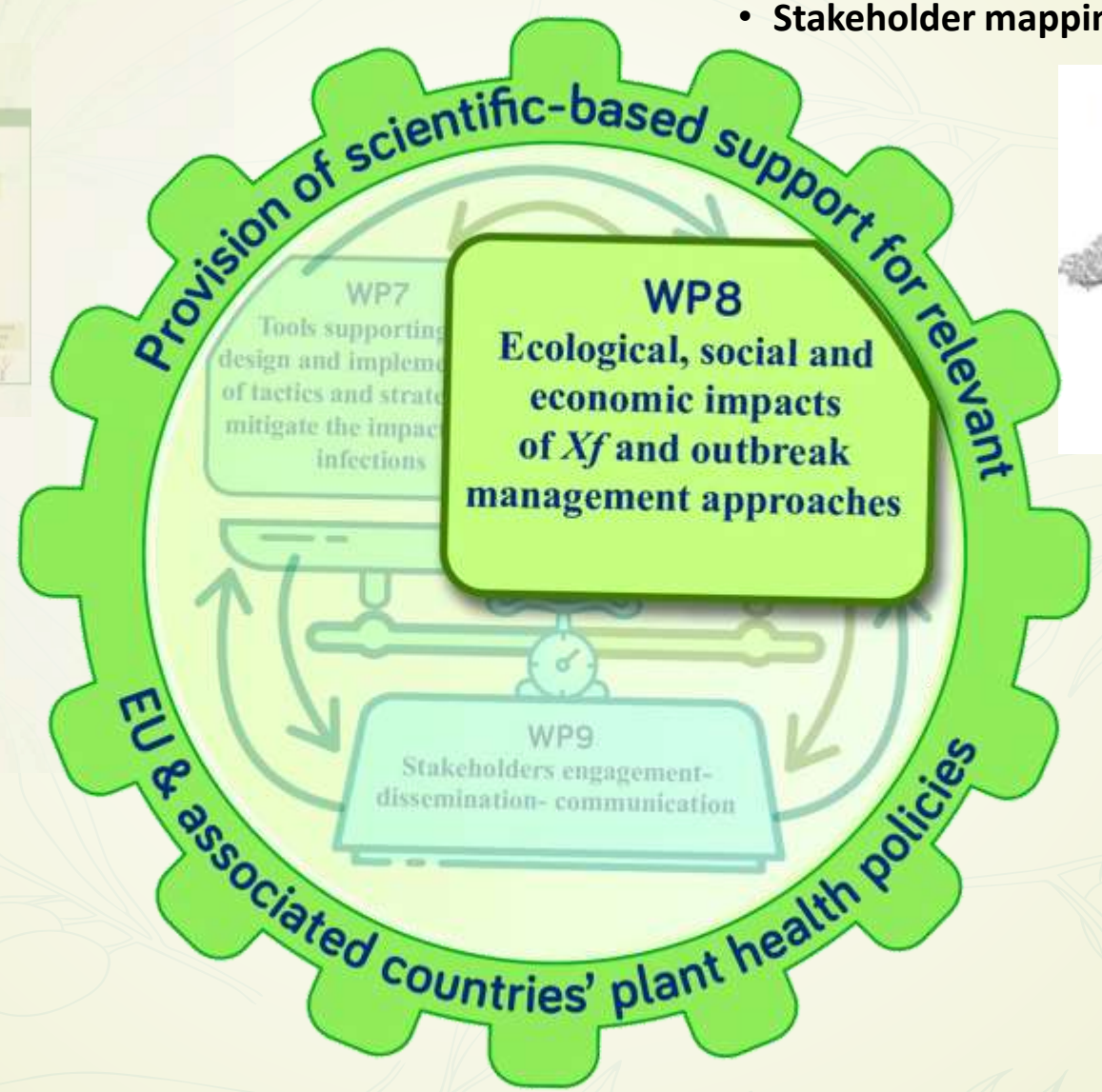
- Integrated modeling framework

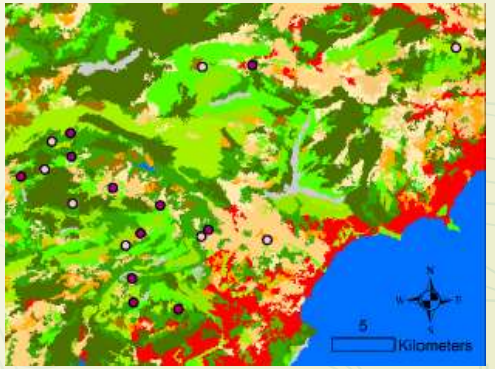


- Best agronomic Practices
  Network of plots for monitoring and demonstration of IPM tools

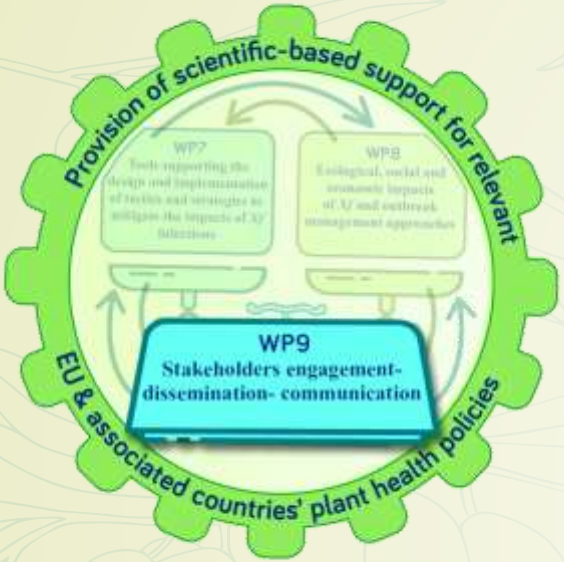


- **Stakeholder mapping and socioeconomic analysis**

Ecological impacts associated with *Xf* outbreaks and disease management strategies



Beyond *Xylella*, integrated strategies for mitigating *Xylella fastidiosa* impact in Europe (BeXyl)



Examples:

- **Website:**
  https://bexylproject.org/
  - Newsletter
  - Public Documents
  - Publications
    - Videos
    - Practice Abstracts
- **Social Media**
- **Xylella Seminars**
- **EU-CAP-Network**

Beyond *Xylella*, integrated strategies for mitigating *Xylella fastidiosa* impact in Europe (BeXyl)

To summarize:

A worldwide project

31 partners from **14 countries** and a stakeholder's board with more than **40 government agencies**, **NGOs**, **nurseries**, and **farmer's associations**

The Goal

creating a **community** of **scientists**, **citizens**, and **end-users**, such as farmers to policymakers, to shorten the distance between research and on-field applications

The methodology

a **multidisciplinary approach** to fill the knowledge gaps on Xf and develop practical solutions to manage the outbreaks

https://bexylproject.org/

Beyond *Xylella*, integrated strategies for mitigating *Xylella fastidiosa* impact in Europe (BeXyl)

Thanks for your attention !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TO management
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