

## Advanced Course

# PLANT DISEASES CAUSED BY *Xylella fastidiosa*: DETECTION, IDENTIFICATION, MONITORING AND CONTROL

Zaragoza (Spain), 12-16 November 2018

### 1. Objective of the course

The vector-borne bacterial pathogen *Xylella fastidiosa*, widely distributed in America, has re-emerged as global threat for agricultural crops, the natural environment and landscape after its recent introduction in Asia and Europe. When entering a new area with adequate ecological conditions, including suitable plant hosts (hundreds of plant species), climate, and native vectors, this pathogen can rapidly become entrenched in the territory, causing severe socio-economic damages and loss of biodiversity.

To date there are no efficacious means to cure infected host plants, therefore efficient monitoring programmes for early detection are necessary to prevent the establishment in new areas. Knowledge of the different components of the pathosystems (the specific interactions strain(s)-host(s)-vector(s)-environment) is relevant for designing containment and management strategies in the areas where the bacterium established itself.

The main objective of the course is to improve capacity building and raise awareness by providing advanced knowledge on the biology and ecology of *X. fastidiosa* and its vectors, epidemiology of the diseases it causes, the status of the current situation in Europe and worldwide, as well as to discuss new approaches to investigate host-pathogen-vector interactions, and recent developments in sustainable disease management and legislative measures. The course will include an overview of the ongoing EU research on *X. fastidiosa*.

At the end of the course participants will:

- Have sound knowledge on the biology and ecology of the bacterium and its interactions with host plants and vectors.
- Understand vector life cycle and mechanisms of bacterial transmission and have gained expertise on sampling and identification of insect vectors.
- Have learned theoretical and practical knowledge and developed skills on sampling and advanced diagnostic procedures, including molecular, on-site and remote sensing approaches for the early detection of the infections and subspecies assignation.
- Have improved competence in plant health: principles of the current EU legislation on *X. fastidiosa*, official protocols and guidelines for monitoring and diagnosis of the bacterium.
- Have acquired knowledge on the different aspects driving the epidemics and competence in performing pest risk assessment and developing management tools adapted to different scenarios.

### 2. Organization

The course is jointly organized by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through

the Mediterranean Agronomic Institute of Zaragoza (IAMZ), the Ministry of Agriculture and Fisheries, Food and the Environment (MAPAMA), through the General Directorate of Agricultural Production Health, the EU H2020 funded projects XF-ACTORS “*Xylella Fastidiosa* Active Containment Through a multidisciplinary-Oriented Research Strategy” and PONTE “Pests Organisms Threatening Europe”, and the EU H2020 MSCA-RISE project CURE-XF “Capacity Building and Raising Awareness in Europe and in Third Countries to Cope with *Xylella fastidiosa*”.

The course will take place at the Mediterranean Agronomic Institute of Zaragoza and will be given by well-qualified lecturers from the organizing institutions, as well as from research centres, other international organizations, administration services, companies and universities in different countries.

The course will be held over a period of 1 week, from 12 to 16 November 2018, in morning and afternoon sessions.

### 3. Admission

The course is designed for 30 participants with a university degree and is aimed at professionals from plant protection services or competent authorities in plant health certification and inspection, technical advisors and experts from R&D institutions involved or concerned in the development and implementation of prevention and management plans against *Xylella fastidiosa* and its vectors.

Participation will also be open to candidates with the same professional background who wish to attend all or part of the lectures (excluding practical work sessions).

Given the diverse nationalities of the lecturers, knowledge of English, French or Spanish will be valued in the selection of candidates, since they will be the working languages of the course. IAMZ will provide simultaneous interpretation of the lectures in these three languages.

### 4. Registration

Candidates wishing to participate in the full course programme must apply online at the following address:  
<http://www.admission.iamz.ciheam.org/en/>

For candidates **needing a visa and/or intending to apply for a grant**, the deadline for submission of applications is **4 September 2018**. For other candidates the deadline is **15 October 2018**. Applications must include the *curriculum vitae* and copy of the supporting documents most related to the subject of the course. Registration fees for the course amount to 500 euro. This sum covers tuition fees only.



Those interested in partial participation must apply online at the following address: <http://intranet.iamz.ciheam.org/forms/Xylella/en/>

Deadline for submission is 15 October 2018. Part attendance fees will range between 60 and 90 euro per day, depending on session selected.

## 5. Scholarships

Candidates from CIHEAM member countries (Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey) may apply for a limited number of full or partial scholarships offered by the organizing institutions covering registration fees, travel and accommodation.

Candidates from the partner institutions of the Consortium of H2020 MSCA-RISE CURE-XF Project from Egypt, Iran, Lebanon, Morocco, Palestine and Tunisia can apply for full scholarships to participate in the course in the framework of their secondment activity in Spain.

Candidates from other countries who require financial support should apply directly to other national or international institutions.

## 6. Insurance

It is compulsory for participants to have medical insurance valid for Spain. Proof of insurance cover must be given at the beginning of the course. Those who so wish may participate in a collective insurance policy taken out by the Organization, upon payment of the stipulated sum.

## 7. Teaching organization

The course requires personal work and interaction among participants and with lecturers. The international characteristics of the course favour the exchange of experiences and points of view.

The programme has an applied approach, combining lectures, debates and practical work to detect and identify *Xylella fastidiosa* infections and its vectors, using non-infectious material, at field level and through innovative on-site diagnostic techniques. Furthermore, participants will work in groups on a practical exercise to develop a pest risk assessment and design strategies to avoid the introduction and establishment of *X. fastidiosa* or to control its spread under different scenarios.

Participants will be asked to prepare a brief summary before the beginning of the course indicating, if any, the surveillance programmes and action plans against *X. fastidiosa* in their countries. These documents will be shared with lecturers and participants.

## 8. Programme

### 1. Introduction (1 hour)

- 1.1. The genus *Xylella* and the species *X. fastidiosa*: taxonomy and identification
- 1.2. Distribution
- 1.3. Host range and symptomatology
- 1.4. Vectors

### 2. Main ongoing research programmes in the EU (1 hour)

### 3. Biology and ecology of *X. fastidiosa* in the host plants (2 hours)

- 3.1. Host-bacteria interactions

- 3.1.1. Colonization
- 3.1.2. Plant defence
- 3.2. *X. fastidiosa* genome analyses
- 3.3. Virulence factors

### 4. Biology and ecology of insect vectors and *X. fastidiosa* transmission (6 hours)

- 4.1. Known vectors of *X. fastidiosa*: USA, Brazil, Europe
- 4.2. Vector identification
- 4.3. Life cycle of main vectors
- 4.4. Insect-bacteria interactions: transmission mechanisms
- 4.5. Practical work on vector sampling and identification

### 5. Current situation of *X. fastidiosa* worldwide: main diseases and socioeconomic impact (3 hours)

- 5.1. The Americas
  - 5.1.1. PD – Pierce's disease of grapevine
  - 5.1.2. CVC – citrus variegated chlorosis
  - 5.1.3. ALS – almond leaf scorch
  - 5.1.4. Other leaf scorchs of fruit and landscape trees
- 5.2. Europe
  - 5.2.1. Italy: OQDS – olive quick decline syndrome
  - 5.2.2. Corsica and PACA region, France
  - 5.2.3. Balearic Islands and Alicante, Spain
- 5.3. Interceptions

### 6. Methods of inspection, sampling and monitoring of *X. fastidiosa* (5 hours)

- 6.1. Survey methodology: statistical basis, planning and implementation
  - 6.1.1. IPPC standards: ISPM6 and ISPM31; EU Guidelines; EPPC protocols for inspection
  - 6.1.2. Practical example
- 6.2. Guidelines for sampling and sample preparation
- 6.3. Demonstrative field practicals for plant sampling

### 7. Methods for detection and identification of *X. fastidiosa* in plants and vectors (8 hours)

- 7.1. EPPC protocol for *X. fastidiosa* diagnosis
- 7.2. Subspecies and sequence-type identification
- 7.3. Molecular methods for on-site detection
- 7.4. Proximal and remote sensing
- 7.5. Practical work
  - 7.5.1. Proximal sensing
  - 7.5.2. On-site detection
  - 7.5.3. Demonstration on MLST and NCBI database consultation

### 8. Epidemiology of *X. fastidiosa* (2 hours)

- 8.1. Modelling
- 8.2. Pest risk assessment

### 9. Strategies for *X. fastidiosa* control (3 hours)

- 9.1. Quarantine, prevention and eradication
- 9.2. Containment
  - 9.2.1. Sources and search of resistance in host plants
  - 9.2.2. Agronomical and chemical tools for controlling vector populations
  - 9.2.3. Managing bacterial population in the plant

### 10. Legislation on *X. fastidiosa* in Europe (2 hours)

- 10.1. EU Decision 2015/789 and its amendments
- 10.2. Implementation in the affected countries
- 10.3. Example of a Contingency Plan: Spain

### 11. Practical group work based on case studies (4 hours)

### 12. Final discussion and closure (2 hours)

## GUEST LECTURERS

D. BOSCIA, IPSP-CNR, Bari (Italy)  
D. CORNARA, ICA-CSIC, Madrid (Spain)  
L. DE LA FUENTE, Univ. Auburn, Alabama (USA)  
P. DI RUBBO, EC, Brussels (Belgium)  
K. DJELOUAH, IAMB-CIHEAM, Bari (Italy)  
A. FERERES, ICA-CSIC, Madrid (Spain)  
M.A. JACQUES, IRHS-INRA, Beaucozéz (France)  
B. LANDA, IAS-CSIC, Córdoba (Spain)  
E. MARCO, IVIA, Valencia (Spain)

B. MARTÍNEZ MARTÍNEZ, MAPAMA, Madrid (Spain)  
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Demonstration sessions by Agdia EMEA and Enbiotech