

## Online Advanced Course

# MEDITERRANEAN FOREST HEALTH IN THE CONTEXT OF GLOBAL CHANGE

22 November - 1 December 2021

### 1. Objective of the course

Mediterranean forests are complex social-ecological systems characterized by wide biodiversity, a high level of spatial and environmental heterogeneity, and a long history of profound interlinking with human populations. They ensure a variety of regulating, supporting, provisioning and cultural services.

Mediterranean forests are considered as a hotspot of global change impacts and risks (loss of habitats, air pollution, drought, fires, insect and disease outbreaks, etc.). Promoting forest adaptation to global change is particularly challenging because of considerable uncertainty in future socio-economic and climatic scenarios, ecosystem responses, and impacts of forest management practices, among other factors.

Forest health is an essential part of sustainable forest management. A shifting pattern in the incidence of the traditional, endemic threats to the Mediterranean forest is foreseen and this will increase the vulnerability of forests and the communities involved in ecosystem processes. Furthermore, new threats are emerging for forest health, either from trade globalization, environmental pollution or climate change.

The objective of the course is to present the current knowledge, concepts, criteria and methods concerning forest health assessment, monitoring and management in a context of global change.

Upon completion of the course the participants will have gained:

- An overview of global change trends in Mediterranean forests.
- Better understanding of the impact of global change on forest health.
- A perspective of the most important climate change drivers threatening forest health in the Mediterranean.
- Insight into the risk of emerging health issues caused by different invasive plant species and forest pests and pathogens.
- A view of the use of available models and tools to support informed decision making.
- Knowledge on methods and tools for an improved assessment, monitoring and surveillance of forest health.
- Approaches of integrated forest health management strategies to cope with global change.

### 2. Organization

The course is jointly organized by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through the Mediterranean Agronomic Institute of Zaragoza (CIHEAM Zaragoza), and the European Forest Institute (EFI), through the EFI's Mediterranean Facility (EFIMED), with the collaboration of the International Union of Forest Research Organizations (IUFRO), through the Working Party 7.03.14.

The course will be held online, with lectures and practical work delivered in live sessions by highly qualified lecturers from international organizations and from research centres and universities in different countries.

The course will be held from 22 November to 1 December 2021. The 8 sessions will be held from 22 to 26 November and 29 November to 1 December, from 09:15h to 13:45h (Central European Time).

### 3. Admission

The course is designed for 30 participants with a university degree and is aimed at professionals from health services, environmentalists, technical advisors and experts from R&D institutions involved in forest health management.

The number of admissions can be increased to attend lectures only, excluding practical work.

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. The Organization will provide simultaneous interpretation of the lectures in these three languages.

### 4. Registration

Candidates must apply online at the following address:  
<http://www.admission.iamz.ciheam.org/en/>

Applications must include the *curriculum vitae* and copy of the supporting documents most related to the subject of the course.

The deadline for the submission of applications is 4 October 2021.



Applications from those candidates requiring authorization to attend the course, may be accepted provisionally.

Registration fees for the course amount to 400 euro.

## 5. Scholarships

Candidates from Mediterranean countries may apply for scholarships awarded by the organizing institutions covering registration fees.

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

## 6. 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, and will be taught with a combination of lectures, case studies, demonstration sessions and a debate.

Practical demonstrations will familiarize participants with the use of: (i) models to predict species distribution and biological invasions in a context of climate change uncertainty; (ii) assessment methods; (iii) online tools and databases for forest health surveillance; and (iv) simulations of effectiveness of biological control.

## 7. Programme

### 1. Mediterranean forest and global change (1 hour)

- 1.1. Forest and society: products and other ecosystem services, public health
- 1.2. Forest sector role in bioeconomy
- 1.3. The concept of forest health
- 1.4. History of Mediterranean forests and forest health
- 1.5. Global change and Mediterranean forest
  - 1.5.1. Climate change in the Mediterranean basin
  - 1.5.2. Interactions with native pests/diseases
  - 1.5.3. Invasive species
  - 1.5.4. Land use change and habitat loss

### 2. Direct and indirect effects of climate change on forest health (11 hours)

- 2.1. Climate change scenarios for Mediterranean forests
- 2.2. Abiotic drivers
  - 2.2.1. Increasing temperature and heat waves
  - 2.2.2. Rainfall variation regimes and drought
  - 2.2.3. Fire
  - 2.2.4. Air pollution
  - 2.2.5. Phenological shift
- 2.3. Biotic drivers
  - 2.3.1. Climate envelope/expansion/regression
    - 2.3.1.1. Prediction based on species distribution models (SDM) – The case of *Phytophthora cinnamomi*
    - 2.3.1.2. Mechanistic models – The case of *Thaumetopoea pityocampa*

2.3.1.3. Demonstration exercise using SDM and degree-days

### 2.3.2. Drought/parasites interaction

- 2.3.2.1. The case of *Diplodia sapinea*
- 2.3.2.2. The case of wood borers and bark beetles
- 2.3.2.3. Phenological shifts – The case of gypsy moth in Sardinia

### 2.3.3. Response of natural enemies

### 2.4. Tree decline – The case of oaks

## 3. Non-native pests (7 hours)

- 3.1. History and pathways
- 3.2. Detailed case studies of invasive pests and diseases in the Mediterranean region
  - 3.2.1. Insects: *Leptoglossus* seed bugs, *Xylosandrus* spp. ambrosia beetles, recent changes in eucalypt insect invaders
  - 3.2.2. Nematodes – The case of pine wood nematodes
  - 3.2.3. Pathogens: *Phytophthora cinnamomi*, *Cryphonectria parasitica*, *Fusarium circinatum*
  - 3.2.4. Invasive plant species
- 3.3. Methods for predicting new invaders
  - 3.3.1. Tools presentation
  - 3.3.2. Demonstration exercise on horizon scanning for predicting biological invasions
- 3.4. Regulation and management of invasive species

## 4. Forest health surveillance (7 hours)

- 4.1. Principles and methods of existing monitoring and surveillance programmes
  - 4.1.1. Survey methods
  - 4.1.2. Tree and forest health indicators (visual and non-visual); assessing forest health status and trends
  - 4.1.3. The case of the ICP Forests
  - 4.1.4. Practical work
    - 4.1.4.1. Tree defoliation
    - 4.1.4.2. Visible foliar symptoms due to ozone
- 4.2. Need for improved surveillance and methods
  - 4.2.1. Diagnosis of invasive species
  - 4.2.2. Surveillance of nurseries and pathways
  - 4.2.3. New tools for surveillance: remote sensing, GIS, smart traps, etc.
- 4.3. Demonstration exercise on the use of online tools and databases

## 5. Management strategies to cope with the effects of global change on forest health (5 hours)

- 5.1. Introduction to management strategies
  - 5.1.1. Forest health as key criterion of Sustainable Forest Management
  - 5.1.2. Prevention measures
  - 5.1.3. Quarantine and legal restrictions of movement
  - 5.1.4. Sylvicultural practices
  - 5.1.5. Biological control
  - 5.1.6. Breeding for tolerance and resistance
- 5.2. The case of pine wood nematode in Portugal
- 5.3. The case of evergreen oak decline in Spain
- 5.4. The case of chestnut gall wasp in Turkey. Demonstration on biological control effectiveness simulations
- 5.5. Debate on current issues in forest health strategies

## GUEST LECTURERS

A. BATTISTI, Univ. Padova (Italy)  
M. R. BRANCO, Univ. Lisboa, ISA, Lisboa (Portugal)  
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