



# Policy brief

## Successful Ecosystem Restoration through Biosecure Nursery Production

European goals for nature restoration and tree planting driven by the EU Nature Restoration Regulation (NRR)<sup>1</sup> are at **risk of being seriously undermined** by the current lack of harmonised phytosanitary standards. Nurseries have become the primary pathway for the introduction and spread of invasive *Phytophthora* species (and many other plant pathogens) into natural ecosystems across Europe. Without a **harmonised regulatory framework** and standardised biosecurity protocols guaranteeing the production of pathogen-free nursery plants, restoration efforts **could inadvertently accelerate ecosystem degradation, in particular against the background of planting 3 billion additional trees across Europe**, as requested by the Article 13 of the NRR. **Mandatory accreditation of nurseries**, based on robust biosecurity and phytosanitary protocols, is an urgent, cost-effective, and internationally proven measure.

### Key policy recommendations

- Introduce establishment of a nursery accreditation system into National Restoration Plans.
- Such accreditation systems should include prevention and hygiene, monitoring and detection, organisation and traceability, and training and continuous improvement to ensure success.
- At European level, accreditations should be legally binding, be explicitly integrated when implementing the NRR and be supported by financial support mechanisms.
- Already existing accreditation schemes from non EU countries (Australia, USA, UK) could provide technical and strategic basis to get inspiration from.

1. Footnotes can be found in the information sheet.

## Context

### A Systemic Risk to the Restoration of European Ecosystems

For over 30 years, scientific research has demonstrated that **numerous forest diebacks** in Europe (riparian alder groves, beech forests, oak forests, chestnut groves, heaths, and scrubland), Australia (eucalypt forests and heaths) and North America (chestnut, oak and conifer forests, and heathlands) are primarily caused by invasive soilborne pathogens of **the genus *Phytophthora***<sup>2-7</sup>. These microorganisms destroy root systems, infect bark tissues, and interact strongly with climatic stress such as drought and heat, leading to massive declines and prolonged mortality of a wide range of plant species, including ferns, conifers and both herbaceous and woody angiosperms.

Extensive surveys conducted in more than 2,500 nurseries and a similar number of restoration and planting sites across Europe have revealed near-universal contamination: over 120 *Phytophthora* species, mostly exotic, have been detected<sup>8-13</sup>. It is estimated that between 1990 and 2010, planting activities contributed to the spread of *Phytophthora* across **more than 20 million hectares** of European forests<sup>9</sup>.



Fig. 1. Cork oak afforestation with high mortality due to root rot caused by *Phytophthora cinnamomi*. Photo: Thomas Jung

Nurseries now constitute the main entry point and distribution hub of these pathogens into European and North American landscapes<sup>4, 7-16</sup>. Two main pathways of *Phytophthora* introduction to nurseries have been clearly identified:

- the purchase and exchange of infected seedlings between nurseries<sup>8-13</sup>;
- the use of untreated irrigation water from rivers, ponds or recirculation systems, often contaminated with *Phytophthora* propagules<sup>7, 11-14, 17-22</sup>.



Fig. 2. Irrigation pond of a nursery infested with numerous *Phytophthora* pathogens. Photo: Thomas Jung

## A Major Regulatory Gap in the Current European Framework

The European Biodiversity Strategy for 2030 and the Nature Restoration Regulation set ambitious targets:

- the planting of at least 3 billion additional trees by 2030;
- reforestation, afforestation, wetland restoration, and urban green space restoration.

On a large scale, restoration activities then become a pathway for the spread of diseases, potentially causing:

- further vegetation dieback,
- irreversible losses of biodiversity,
- lasting degradation of restored landscapes,
- high long-term economic and social costs.

**Concrete examples already exist in Europe** (riparian alder groves, juniper heaths, Mediterranean scrubland) **and internationally**, where restoration projects have triggered *Phytophthora* outbreaks originating from contaminated nurseries<sup>4, 23–27</sup>.

The European plant protection system relies primarily on:

- visual inspections,
- plant passports.

These tools are **not suitable for detecting latent infections**, particularly those caused by soilborne pathogens such as *Phytophthora*, that are difficult to diagnose without molecular analysis as common use of suppressive fungicides hide symptoms. As a result, asymptomatic but infected plants can circulate freely within the internal market and be used in publicly funded restoration projects.

Although the European Union recognises invasive plant pathogens as a major threat to biodiversity, no specific regulatory framework exists to guarantee that plants used in restoration are produced according to strict and verifiable phytosanitary standards. This regulatory gap contradicts the fundamental principle of ecological restoration: **not to cause significant deterioration of ecosystems**.



## Key observations

### Nursery Accreditation: A Proven and Proportionate Solution

**Nursery Accreditation Systems** have been operating successfully for several years in Australia, the United States (California), and the United Kingdom. These schemes demonstrate that **the spread of invasive *Phytophthora* and other plant pathogens can be drastically reduced through systematic biosecurity standards** while maintaining the economic viability of the nursery sector.

#### Objectives of an Accreditation System

- Guarantee the production of pathogen-free plants.
- Secure supply chains for the horticultural and forestry industry.
- Protect natural ecosystems and public restoration investments.
- Recognise producers who adhere to high biosecurity standards.

#### Governance and Implementation

Member States should designate or establish a competent accreditation body responsible for:

- Inspecting participating nurseries.
- Verifying compliance with harmonised biosecurity protocols.
- Delivering and renewing accreditation status.



Fig. 3: Healthy *Myrtus communis* seedlings with healthy root systems. Photo: Bruno Scanu.

## Key Elements of an Effective Accreditation System

### 1. Prevention and Hygiene

- Use of thermosterilised substrates and sterilised containers placed on elevated benches, never directly on the ground. This is very important to avoid contamination and pathogen spread.
- Improve hygiene and cultivation methods to reduce risk of infection or infestation.
- Establish strict disinfection protocols for equipment, vehicles, tools and footwear to prevent the spreading of pathogens to new plants or new areas free of the disease.
- Implement filtration or sterilisation systems for irrigation water to ensure it is free of pathogens.
- Minimise or eliminate the use of fungicides and fungistatic chemicals that may mask infections and hinder early detection.



Fig. 4. Healthy *Myrtus communis* seedlings with healthy root systems in containers on tables lifted more than 80 cm from the ground and irrigated with non-infested filtered water. Photo: Bruno Scanu

### 2. Monitoring and Detection

- Regular inspections to ensure compliance with accreditation schemes promoting accountability and continuous improvements.
- Routine testing of plants, soil and water for plant pathogens combining visual inspections and molecular diagnostics. Early detection is key for containment and eradication, thereby minimising losses.

### 3. Organisation and Traceability

- Maintain robust record-keeping systems to improve the traceability. This will help to locate infected plants in case of an outbreak allowing rapid action to contain and eradicate the disease.
- Establish quarantine zones for newly arrived plants to verify that no new pests or pathogens are introduced into the premises. This will avoid the contamination of the plants already growing at the nursery.
- Control movement of plants and/or soil within the premises to avoid cross contamination between sites.

#### 4. Training and Continuous Improvement

- Regular training of nursery managers, staff and gardeners in biosecurity best practices. Well trained personnel are the first line of defence for early detection.
- Raise awareness among public-body personnel working in plant health services and in the implementation of Nature Restoration Plans.
- Facilitate knowledge exchange amongst accredited nurseries which could help and encourage other growers to join the scheme.
- Revise and update the standards of the accreditation implementing all the measures that have worked successfully and improve those that have not been effective. Also adapt to new scientific knowledge or technologies that can facilitate the early detection of pathogens.

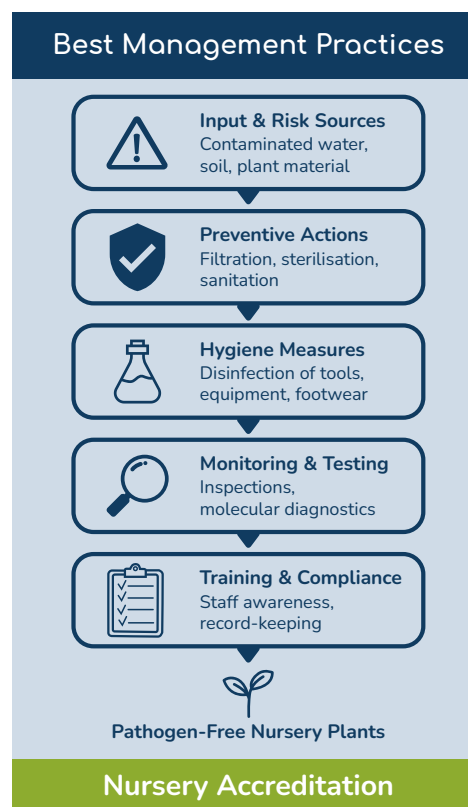


Fig. 5. Best Management Practices for pathogen-free plant production as basis for an EU Nursery Accreditation scheme.



## Policy Recommendations : Conditions for Success at the European Level

To ensure rapid, harmonised and coordinated adoption:

- Accreditation should be legally binding for plants intended for EU-funded projects;
- Accreditation must be explicitly integrated into the implementation framework of the Nature Restoration Regulation;
- Financial support mechanisms must accompany the transition, particularly for small and medium-sized nurseries, to ensure fair access and sector-wide participation.

Given the urgency of implementing biosecurity measures across Europe, a dual-track approach is recommended:

#### 1. Immediate Action: EU Voluntary Code of Conduct

- Introduce, as soon as possible, an official EU voluntary code of conduct for nurseries focused on biosecurity and pathogen-free plant production.
- Promote its rapid adoption at national level through guidance, awareness campaigns, and incentives.

#### 2. Structural Action: Development of a Binding Certification System

- Develop a robust EU-wide certification protocol for nursery accreditation.
- Work progressively toward granting it formal legal recognition.

Make certification mandatory through appropriate EU and national regulatory instruments, particularly for plants used in publicly funded restoration projects.

Integrating pathogen-free plant production into European restoration legislation constitutes:

- A cost-efficient measure preventing waste of public investments,
- A process building trust in restoration activities
- An essential condition for the sustainable restoration of ecosystems.

By placing nursery accreditation at the heart of restoration policies, the European Union can strengthen biodiversity, instead of exposing it to new invisible threats.

### Contribution of Biosecure Nurseries to NRR Restoration Targets and Obligations

The EU Nature Restoration Regulation places trees and other plants at the core of multiple restoration objectives:

- Restoration of terrestrial, coastal and freshwater ecosystems (Article 4)
- Greening of urban ecosystems (Article 8)
- Restoration of agricultural ecosystems, including hedgerow (re)creation (Article 11)
- Forest ecosystems restoration (Article 12)
- Planting of three billion additional trees (Article 13)

These targets imply the large-scale and long-term mobilisation of planting material (trees, shrubs and perennial plants) across Europe. Their success depends not only on quantities, but on the availability of healthy, traceable and ecologically suitable plants.

In this context, safe nurseries constitute a critical infrastructure by:

- Securing a reliable supply of planting material,
- Reducing sanitary and biosecurity risks,
- Ensuring the ecological suitability of plants used in restoration,
- Preventing restoration efforts from being undermined by infected or maladapted material.



## Case Studies of Accreditation Schemes in non EU Countries

Several international examples demonstrate that voluntary, audit-based accreditation systems can successfully raise biosecurity and environmental standards in nursery production. These include:

- Nursery Industry Accreditation Scheme Australia (NIASA), Australia;
- Avocado Nursery Voluntary Accreditation Scheme (ANVAS), Australia;
- Accreditation to Improve Restoration (AIR), California;
- California Nursery Stock Registration & Certification Program;
- Plant Healthy Certification Scheme, UK.

The Australian nursery industry, in partnership with Horticulture Australia Limited (HAL), has developed environmental guidelines titled **EcoHort** as a tool to assist production nurseries. **EcoHort** is an independently audited program underpinned by the **Nursery Industry Accreditation Scheme Australia (NIASA)** Best Management Practice program and part of the Australian Plant Production Standard (APPS).

**Accreditation to improve restoration (AIR)** is a Californian voluntary, audit-based accreditation program designed by the University of California Davis to increase the confidence in the cleanliness of restoration and native plant nursery stock. Nurseries and greenhouses participating in the AIR program conduct a self-assessment to confirm that they are producing plants with the Best Management Practices for restoration nursery stock. The review covers propagation, irrigation, seed collection and storage, layout, etc. An auditor visits the facility, checks the nursery's self-assessment and samples for *Phytophthora* species. Depending on the results of the lab tests and auditor findings, modifications are recommended so nurseries can become AIR compliant. If the nursery does not have major recommendations after audit, it is deemed "AIR compliant" for two years. There is no fee for a nursery to participate.

**California Nursery Stock Registration & Certification Program:** The Californian Department of Food and Agriculture also created a nursery services program whose roles are to license sellers of nursery stock in California, to coordinate the nursery regulatory and inspection activities performed by the county agricultural commissioners and to provide the agricultural industry with registration and certification services for plant materials.

The UK established the **Plant Healthy Certification Scheme** where nurseries can apply for membership to. Two Certification Bodies providing auditing and certification services have been appointed to deliver these Certifications.

### Link to sources

#### [BiodivRestore Knowledge Hub](#)

The scientific publications used in this policy brief can be found in the information sheet of this briefing, downloadable from:

[www.biodiversa.eu/policy-briefs/](http://www.biodiversa.eu/policy-briefs/)

Photos: Unsplash

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### About this Policy brief

This Policy Brief is part of a series aiming to inform policymakers involved in the implementation of the *Nature Restoration Regulation* with policy recommendations based on the expertise of the BiodivRestore Knowledge Hub experts.

The series of Biodiversa+ Policy Briefs can be found at <https://www.biodiversa.eu/policy-briefs/>

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