COST Action CA20132
Safeguarding European urban trees and forests through improved biosecurity

Policy Brief

FUTURE-PROOFING URBAN TREE HEALTH: Emerging and Innovative Technologies and Tools for Urban Tree Biosecurity

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The problem

Urban tree health is increasingly threatened by invasive pests and pathogens, yet current biosecurity approaches to protect treescapes remain reactive and insufficient. Without proactive investment in innovation, cities risk escalating economic and ecological losses. This policy brief of European network COST Action *Urban Tree Guard* (CA20132) presents key findings from expert analysis of scientific literature and horizon-scanning exercises scanning innovative, emerging technologies.

The network mapped existing biosecurity tools and methods, assessed their applicability for urban environments, and used a systematic review of 20 priority pests (EPPO A1 and A2 lists) to identify knowledge gaps and research biases. The biosecurity methods were evaluated against 25 general and urban-specific constraints, and analysed trends across pests and method types. In parallel, we conducted a horizon scan through workshops and a survey to gather and refine novel technology ideas. This process produced 18 promising future methods, which experts evaluated for Technology Readiness Level and urban applicability.

Policy recommendations

Actions

Establish National Urban Biosecurity Frameworks

- Urban tree health is not fully integrated into existing plant health legislation.

Embed urban surveillance, rapid-response protocols, and risk pathways into national plant health strategies and EU Regulation 2016/2031 implementation.

Invest in Early Detection and Digital Diagnostics

- Urban tree biosecurity needs portable and digital tools that enable rapid, onsite, low-cost detection of pests and pathogens.

Fund national roll-out pilots of high-ranked technologies (biosensors, AI tools, field diagnostics, eDNA stations)

Strengthen Municipal Capacity

- Cities are on the frontline of detection but lack dedicated resources.

Establish municipal biosecurity units, training programs, and emergency action plans.

Modernize Regulatory and Data Frameworks

- Legal systems must adapt to robotics, drones, IoT, and citizen-based surveillance.

Update legislation to support rapid deployment of new tools, ensure data sharing, and require mandatory reporting from arborists, nurseries, and contractors.

Engage Citizens as a Surveillance Force Multiplier

- Citizen science with AI ranked among the most applicable methods.

Deploy national and international apps for pest reporting and support “sentinel urban forests” as community monitoring hubs.

Fund Strategic Research to Close Critical Gaps

- Urban-specific testing of detection methods and pathogen-focused research are lacking.

Prioritize Horizon Europe, national R&D, and climate funds for interdisciplinary research that combines ecology, robotics, AI, and urban planning.

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