Beyond *Xylella*, Integrated Management Strategies for Mitigating *Xylella fastidiosa* impact in Europe

Practice abstract 8

Innovative Bacteriophage-Based Strategies to Control *Xylella fastidiosa*

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The **BeXyl project** advances innovative and sustainable strategies to mitigate the impact of ***Xylella fastidiosa* (*Xf*),** a devastating plant pathogen that severely affects olive, almond and grapevine crops, among many others. Current control measures mainly rely on vector management and containment, underlining the urgent need for environmentally friendly solutions that directly target the bacterium.



A Nature-Based Biocontrol Approach

BeXyl explores the use of bacteriophages, naturally occurring viruses that specifically infect and kill bacteria, as a biocontrol tool against ***Xf***. Thanks to their high specificity, bacteriophages do not harm beneficial microorganisms, insects, animals or humans, offering a safe alternative to broad-spectrum chemical treatments.

An extensive collection of phages active against ***Xf*** has been isolated and characterised. Selected phages were fully sequenced, revealing high genetic diversity and a strictly lytic life cycle, meaning they destroy bacterial cells without integrating into the bacterial host genome. No genes linked to virulence or antibiotic resistance were detected, confirming their biosafety for agricultural use.

From Laboratory to Field Application: Several phages demonstrated strong activity against multiple ***Xf*** strains, particularly subsp. ***fastidiosa***, associated with Pierce's disease in grapevine. In plant trials with tobacco and periwinkle, phage treatments significantly reduced bacterial populations and disease symptoms. A pilot field trial in grapevines further showed that preventive applications protected healthy plants, while therapeutic treatments slowed disease progression in infected vines. Overall, **BeXyl** demonstrates that bacteriophages are a safe, highly specific and environmentally sustainable tool that can be integrated into Integrated Pest Management strategies, supporting the long-term protection of European agriculture and natural ecosystems.

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