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BEYOND XYLELLA

BeXyl Exploitation Plan

Presentation of the Exploitation Plan to end-users and companies

Deliverable 9.8

31 July 2026

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Disclaimer

The content of this deliverable does not necessarily reflect the official opinions of the European Commission or other institutions of the European Union.

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Status of this document. This version of the Exploitation Plan is a draft. It has been prepared by the Exploitation Committee on the basis of the results declared by the partners and is circulated for review by all beneficiaries and associated partners. Each partner is asked to verify the entries that concern it, in particular the ownership and joint ownership statements, the protection status of its results, the maturity estimates and the exploitation intentions recorded in Section 5 and in Annex 6. Where the institution of a partner so requires, the corresponding sections must also be reviewed and approved by its competent departments, namely the knowledge transfer, legal and, where applicable, contracts offices. Because the summer break makes consultation during August impracticable, the review is organised in two steps: corrections affecting factual accuracy, ownership or protection status are requested before the end of the project, and the institutional approvals by early September 2026 at the latest. The Plan will then be revised and the consolidated version endorsed by the General Assembly before the submission of the Final Report. Until that endorsement, the statements on ownership, protection and licensing contained in this document are indicative and do not constitute a commitment by any partner or by its institution.

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EXECUTIVE SUMMARY

This deliverable is the **BeXyl Exploitation Plan**. It consolidates, at month 47 of the project, the full portfolio of results generated by the 31 partners of BeXyl (Grant Agreement 101060593, HORIZON-CL6-2021-FARM2FORK-01-04), identifies those results that can be put to use beyond the project, and sets out for each of them the route, the owner, the target user, the protection strategy, the actions required and the indicators by which uptake will be measured. It also constitutes the reference document for the presentation of the Exploitation Plan to end-users and companies foreseen in Task 9.1 and in Milestone MS25.

BeXyl was designed to move beyond the emergency response to *Xylella fastidiosa* (*Xf*) and to deliver an integrated, sustainable and economically viable management system for the diseases it causes. Its results therefore span the whole intervention chain: understanding the drivers of the epidemics, detecting and monitoring the pathogen and its vectors, producing and trading healthy plant material, breeding and deploying resistant germplasm, controlling the vector and the bacterium with environmentally sound solutions, and assessing the ecological, social and economic consequences of the measures adopted. Each of these steps has generated results with a distinct exploitation logic.

The Exploitation Committee has screened the project result portfolio, which contains fifty-two results declared by the partners in the result-collection exercise of 2026, and has selected **fifteen Key Exploitable Results (KERs)**. They are distributed across four exploitation routes that, in a research and innovation action addressing a regulated quarantine pest, are equally legitimate and mutually reinforcing:

- **Regulatory and standardisation uptake:** validated diagnostic and surveillance methods feeding the revision of EPPO standards, EFSA risk-assessment tools and the survey requirements of Commission Implementing Regulation (EU) 2020/1201. This is the fastest and highest-impact route for a large part of the BeXyl portfolio.
- **Commercial exploitation:** thermotherapy equipment and nursery-scale sanitation protocols, microbial formulations, resistant plant material and biocontrol products, carried primarily by the SME and industry partners of the consortium (P22-AciesBio, P23-RG Projects, P24-UNAPROL, P25-Agromillora) together with the nursery sector represented by P19-ENA.
- **Uptake by practitioners and plant-health authorities:** IPM schemes, ground-cover management practices, survey designs and detection services transferred to farmers, nurseries, diagnostic laboratories and National Plant Protection Organisations.
- **Further research and open-science exploitation:** genomic resources, models, software, protocols and strain collections released under FAIR conditions so that they continue to generate value after the end of the action.

Three of the KERs are already further advanced than a research and innovation action would normally carry them. A draft EPPO Standard on hot water treatment against *Xylella fastidiosa* has been prepared and is heading for review by the EPPO Panel on Phytosanitary Measures and then for country consultation. An entomopathogenic fungal strain is under commercial development with an established biological control company, with the intellectual property held jointly by that company and the owning university, and awaits only regulatory authorisation. A second fungal strain has been field-validated over two seasons and its owner

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is preparing a formal exploitation agreement with a named biopesticide manufacturer. Beyond these, no BeXyl result has been protected by a patent, plant breeder right or trademark, although one SME partner holds confidential proprietary know-how covering the production and preservation processes it developed in the project. This makes the twelve months following the end of the action decisive: the Plan therefore places particular emphasis on the protection decisions that must be taken before the results are further disseminated, and on the obligation of the beneficiaries under Article 16 and Annex 5 of the Grant Agreement to use their best efforts to exploit their results **up to four years after the end of the action, that is until 31 August 2030**.

The Plan assigns a named custodian to every KER, defines twenty-one exploitation actions with owners and deadlines, sets twelve monitoring indicators with targets for month 48 and for the post-project period, and identifies nine exploitation risks with their mitigation measures. It will be reviewed by the Exploitation Committee before sending the Final Report of the project and its post-project part will be maintained by the coordinator.

Status of this version. This is a draft of the Exploitation Plan. It is issued at month 47 in order to meet the deliverable deadline, but it remains open for review by all partners and for approval by the competent departments of their institutions. Substantive corrections are requested before the end of the project and the institutional approvals by early September 2026, the summer break making consultation during August impracticable. A revised version will be issued after that review and will supersede this one.

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1. INTRODUCTION

1.1. Purpose and scope

The purpose of this deliverable is to provide the BeXyl consortium, the granting authority and the project's end-users with a single, consolidated and public statement of how the results of the project will/cold be used after the action ends. Specifically, the Plan:

- Identifies and characterises the results generated in work packages WP1 to WP8;
- Selects the Key Exploitable Results and describes, for each of them, the ownership, the protection status, the target user, the exploitation route, the actions still required and the indicators of uptake;
- Sets out the intellectual property management framework applicable to the consortium and the procedure by which protection decisions are taken;
- Defines the arrangements that will keep the results available, maintained and usable beyond the lifetime of the project; and
- Provides the content and the structure for the presentation of the Exploitation Plan to end-users and companies (Section 13).

The scope of the Plan is exploitation in the sense given by Article 16 of the Grant Agreement: the use of results in further research and innovation activities other than those covered by the action, including commercial exploitation such as developing, creating, manufacturing and marketing a product or process, creating and providing a service, or standardisation activities. Dissemination and communication activities, which are the public disclosure of results by means other than protecting or exploiting them, are covered by deliverables D9.1, D9.2 and D9.7 and are referred to here only where they interact with exploitation.

Dissemination level. This deliverable is public. It has therefore been drafted so that it can be released on the project website, on CORDIS and to the stakeholders addressed by the project without disclosing information that would prejudice the protection of any result. Where a result is still subject to a pending protection decision, the Plan describes the result functionally and identifies the responsible partner, but does not reproduce the technical information on which a future application would rest. Commercially sensitive elements (i.e., indicative valuations, negotiation positions, draft licence terms and the detailed composition of materials under assessment) are recorded separately by the Exploitation Committee and circulated only within the consortium if and when they arise.

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1.2. Relationship with other BeXyl deliverables and milestones

The exploitation strategy of BeXyl is built progressively across the lifetime of the project. This deliverable is the final step of that sequence and should be read together with the documents listed in **Table 1**.

Table 1. BeXyl deliverables and milestones related to exploitation.

Document	Content and relationship with this Plan
D9.1 – Dissemination, communication and exploitation Plan (M6)	Established the initial framework: target groups, dissemination task forces, the management of intellectual property, the first list of potential business exploitable opportunities, and the constitution and mandate of the Exploitation Committee (section 4.4). The governance described in Section 2 of this Plan is the one set up in D9.1.
D9.2 – Update of the Dissemination, communication and exploitation Plan (M30)	Updated the strategy at mid-term on the basis of the results available at that stage and of the feedback received from the Practitioners Panel.
D9.4, D9.5, D9.6 – Practice abstracts (M18, M36, M47)	EIP-AGRI practice abstracts published on the EU CAP Network. They are the main instrument for the transfer of ready-to-use results to farmers and are treated in this Plan as an exploitation channel for the practitioner-oriented KERs.
D9.7 – Final report on communication and dissemination actions (M47)	Records the dissemination and communication performance of the project; complements the exploitation indicators reported in Section 10.
D9.9 – Policy Brief (M48)	Translates the project's evidence into policy recommendations; it is the delivery vehicle for the policy-uptake actions identified in Section 6.2 and 6.3.
D10.3, D10.4, D10.5 – Data Management Plan and updates	Define the FAIR management, repositories, persistent identifiers and licences of the datasets and software referred to in several KERs, and the justified exceptions to open access where protection is being sought.
Scientific and technical deliverables D1.1–D8.4	Contain the technical description of the results summarised in Section 4 and detailed in the KER fact sheets of Section 5.
Milestone MS25 – Presentation of exploitation plan to end-users (M47)	Achieved by the event described in Section 13, for which this deliverable is the supporting document. The means of verification are the minutes of the event and the list of end-users and companies attending the presentation of the exploitation plan.

1.3. Regulatory and contractual framework

The Plan operates within three layers of rules. The first is the **Horizon Europe Model Grant Agreement** as signed for project 101060593, and in particular Article 16 (intellectual property rights -background and results- access rights and rights of use) and Article 17 (communication, dissemination and visibility), together with the corresponding provisions of Annex 5. The second is the **Consortium Agreement** concluded between the beneficiaries before the signature of the Grant Agreement, which details the identification of background, the

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allocation of ownership, the access rights among partners, the treatment of confidential information and the procedure for joint ownership. The third is the body of **EU plant-health legislation** that governs the field in which the results will be used, principally Regulation (EU) 2016/2031 and Commission Implementing Regulation (EU) 2020/1201 on measures to prevent the introduction and spread of *Xylella fastidiosa* within the Union, together with the EPPO diagnostic and phytosanitary standards. For a substantial part of the BeXyl portfolio this third layer is not a constraint but the exploitation route itself: a diagnostic method only reaches its users once it is written into an EPPO standard and accepted by the National Plant Protection Organisations.

1.4. Methodology

The Plan was prepared in five steps between month 40 and month 47:

- **Result collection.** A structured result-declaration exercise was launched by the Exploitation Committee and addressed to all partners. Each partner was asked to declare, in a common spreadsheet, every result it considered potentially exploitable, together with the contributing partners, the type of result, its maturity, the intended use, the users, any background needed to exploit it and any protection already sought. The template used is reproduced in Annex 1.
- **Consolidation.** The declarations were cross-checked against the periodic technical reports for RP1 and RP2, the scientific deliverables and the milestone evidence, so that no result documented in the reports was omitted and no declared result was recorded without supporting evidence.
- **Characterisation.** Each result was described using a common set of attributes: owner and contributors, nature, maturity, target user, exploitation route, dependence on background, protection status and the actions still required.
- **Selection.** The Exploitation Committee applied the selection criteria set out in Section 4.4 and agreed on the fourteen Key Exploitable Results presented in Section 5.
- **Validation.** The draft was circulated to the work package leaders and to the Practitioners Panel and discussed by the Exploitation Committee; it will be presented for endorsement to the final General Assembly.

1.5. Structure of the document

Sections 2 and 3 describe the governance and the legal framework within which exploitation decisions are taken. Section 4 presents the result portfolio of the project and the selection of the Key Exploitable Results. Section 5 contains the fourteen KER fact sheets, which are the core of the Plan. Sections 6 to 9 develop the exploitation pathways, the intellectual property strategy, the target users and the arrangements for sustainability beyond the project. Sections 10 to 12 set out the indicators, the risks and the action plan. Section 13 describes the presentation of the Plan to end-users and companies. Five annexes provide the templates, the composition of the Exploitation Committee, the list of beneficiaries and the glossary.

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2. EXPLOITATION GOVERNANCE IN BEXYL

2.1. The Exploitation Committee

The consortium acknowledged from the outset the importance of intellectual property and innovation management for the research results developed within the project. Task 10.3.3 of the Description of the Action therefore foresaw the appointment of an **Exploitation Committee (EC)** composed of experts in legal protection and commercialisation drawn from within the consortium and from outside it. The Committee was appointed in **January 2023**, in month five of the project, and its composition and mandate were reported in section 4.4 of deliverable D9.1. Each member signed a letter of commitment and confidentiality.

The mandate of the Committee, as established in the Description of the Action and confirmed in D9.1, is to secure the best path to the uptake of the project results through five functions:

- identification and assessment of all the project results;
- reporting of the marketable project results;
- prevention of unapproved public disclosure of results by the research performers;
- assurance of the quality of the protection strategy in accordance with the Consortium Agreement; and
- assurance that adequate protection is in place prior to exploitation and dissemination.

In practice the Committee has carried out analysis of the research results in terms of innovation potential, of the implementation of protection measures and of open innovation models, on the basis of the internal project reports, the deliverables and dedicated ad hoc meetings. During the final year of the project its role has been to guide the exploitation strategy and to support decision-making on the protection and uptake of the results, which is the work consolidated in this deliverable.

The Committee was deliberately composed so that every protection instrument relevant to the BeXyl portfolio is represented by a member with practical experience of it: patents on molecular diagnostic protocols and on microorganisms of agronomic interest, patents on bacteriophages and the launching of a spin-off, patents on microorganisms used as biocontrol agents of pests and of plant pathogens, patents on functional peptides for plant disease control, plant breeder rights on new olive cultivars obtained from cross-breeding programmes and on new fruit-tree varieties, protection and commercialisation of biotechnological products, and the design and protection of thermotherapy equipment. Two external members, from the knowledge-transfer offices of P1-CSIC and P5-CNR, bring the institutional technology-transfer perspective, including new plant varieties and trademarks. The full composition is given in Annex 3.

Continuity note. One external member, appointed from the Commercial Strategy and Internationalization Area of the Deputy Vice Presidency of Knowledge Transfer of CSIC, has since left the organisation, and the periodic report records that a new representative is to be appointed to take over those responsibilities. The coordinator will follow this up so that the Committee remains complete for the closure of the project and for the post-project follow-up described in Section 9.

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2.2. Other bodies involved in exploitation

Exploitation is not the responsibility of the Exploitation Committee alone. Several bodies of the consortium contribute to it, each with a distinct function: the General Assembly takes the decisions that bind the consortium, the coordinator maintains the registers required by the Grant Agreement, the work package leaders identify the results as they are generated, and the individual beneficiaries retain ownership of what they produce and, with it, the ultimate responsibility for protecting and using it. Table 2 sets out these bodies and the role each of them plays in exploitation, so that partners and third parties know whom to address on a given question.

Table 2. Bodies involved in the exploitation of BeXyl results and their roles.

Body	Role in exploitation
General Assembly	Ultimate decision-making body of the consortium. Endorses this Plan, arbitrates on ownership and protection questions that the Exploitation Committee cannot settle, and acts as the IPR observatory foreseen in the Description of the Action.
Coordinator (P1-CSIC)	Convenes the Exploitation Committee, maintains the result register, is the interface with the granting authority for the notifications required under Article 16 (transfers, exclusive licences, results ownership list in the final periodic report), and custodian of the Plan after the end of the action.
Work package and task leaders	First line of result identification. Responsible for flagging to the Exploitation Committee any result that may be protectable before it is submitted for publication or presented at a conference.
Knowledge-transfer offices of the beneficiaries	Carry out the actual protection and negotiation acts for their own institution's results: novelty searches, drafting and filing of applications, valuation, licence negotiation, creation of spin-offs. The Exploitation Committee coordinates but does not replace them.
Practitioners Panel and BeXyl Network (WP9)	Provide the demand-side validation: confirm that the results respond to a real need, test the usability of the proposed solutions and act as the first adopters and multipliers.
Industry and SME partners (P19-ENA, P22-AciesBio, P23-RG Projects, P24-UNAPROL, P25-Agromillora)	Carry the commercial exploitation routes and provide the reality check on cost, scalability and regulatory feasibility of the solutions proposed by the research partners.
EPPO (P20) and the external plant-health authorities	Provide the route to standardisation and regulatory uptake, which is the dominant exploitation channel for the surveillance, diagnostic and sanitation results.

2.3. Procedure for the identification and treatment of results

The consortium applies the general principle 'as open as possible, as closed as necessary'. The operational consequence is a disclosure-control procedure that runs continuously and that has four steps.

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- **Declaration.** A partner that obtains a result which may have exploitation potential declares it to the Exploitation Committee using the template in Annex 1, before any public disclosure.
- **Assessment.** The Committee assesses novelty, inventive character where relevant, the prospects for commercial exploitation, the legitimate interests of the other beneficiaries, and the cost and territorial scope that protection would require. The assessment concludes on one of four outcomes: protect and then disclose; keep as know-how; disclose openly; or defer pending further evidence.
- **Decision and notification.** The owner of the result takes the protection decision with the support of its knowledge-transfer office. Where several partners have contributed, the contribution of each is established and, if it cannot be established or separated for the purposes of protection, a joint ownership agreement is concluded as required by Article 16 of the Grant Agreement. Partners with access rights are notified in accordance with the Consortium Agreement.
- **Release.** Once protection is in place, or once it has been decided that protection is not justified, the result is released through the dissemination channels of WP9 and, where applicable, deposited in the repositories identified in the Data Management Plan.

A prior-notification period applies to publications and conference presentations that may contain protectable results, in accordance with the Consortium Agreement. This is the single most important operational safeguard in the Plan, because in a consortium of thirty-one partners, most of them research-performing, the most likely cause of loss of exploitation potential is not a failure of strategy but a premature disclosure.

3. LEGAL FRAMEWORK FOR THE EXPLOITATION OF RESULTS

This section restates the obligations that bind the beneficiaries, because the exploitation actions defined later in the Plan are the means by which these obligations are met. The wording follows Article 16 of the Grant Agreement and the corresponding provisions of Annex 5.

3.1. Background

The beneficiaries are required to identify in a written agreement the background needed for implementing the action and for exploiting its results; in BeXyl this is done through the Consortium Agreement. Background matters for exploitation whenever a result cannot be used without also using pre-existing knowledge belonging to a partner or to a third party. In BeXyl this is the case for the olive-mill by-product extracts, whose preparation processes are covered by pre-existing CSIC patents, and, more generally, for the plant material, the strain collections, the analytical platforms and the software frameworks contributed by the partners. Each KER fact sheet in Section 5 states explicitly whether the exploitation of the result requires access to background.

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3.2. Ownership and joint ownership of results

Results are owned by the beneficiaries that generate them. Two or more beneficiaries own a result jointly where they have jointly generated it and it is not possible either to establish their respective contributions or to separate them for the purpose of applying for, obtaining or maintaining protection. Joint owners must agree in writing on the allocation and the terms of exercise of their joint ownership. Unless otherwise agreed in the joint ownership agreement or the Consortium Agreement, each joint owner may grant non-exclusive licences to third parties without the right to sub-licence, provided the other joint owners receive at least 45 days' advance notice and fair and reasonable compensation.

BeXyl is a strongly collaborative project and several of its most valuable results have been generated by more than one partner: the targeted sequence-capture typing method, the remote-sensing detection pipeline, the synthetic microbial communities together with their industrial production process, the bacteriophage collection, and the field trial network. For each of these the Plan identifies the contributing partners and flags the need for a joint ownership agreement where the contributions cannot be separated. The consolidated **results ownership list** will be submitted with the final periodic report as required by the Grant Agreement.

3.3. Protection of results

Beneficiaries that have received funding under the grant must adequately protect their results, for an appropriate period and with appropriate territorial coverage, if protection is possible and justified, taking into account all relevant considerations including the prospects for commercial exploitation, the legitimate interests of the other beneficiaries and any other legitimate interests. The assessment of whether protection is 'possible and justified' is the task assigned to the Exploitation Committee under Section 2.3. For a large part of the BeXyl portfolio the conclusion is that formal protection is not justified, because the value of the result lies in its adoption as a public standard or as a common practice rather than in exclusivity. That conclusion is a legitimate outcome of the assessment and is recorded as such in the fact sheets.

3.4. Access rights

Access rights among the beneficiaries -to results and to background, for implementing the action and for exploiting their own results- are those set out in the Grant Agreement and detailed in the Consortium Agreement. Requests for access rights for exploitation purposes must be made in writing and are granted on fair and reasonable conditions, which may include royalty-free conditions, having regard to the actual or potential value of the results or background concerned and to the scope, duration and characteristics of the exploitation envisaged. Access rights requests may be made up to one year after the end of the action unless the Consortium Agreement provides for a different period.

3.5. The obligation to exploit and the Horizon Results Platform

Beneficiaries that have received funding under the grant must use their best efforts to exploit their results directly, or to have them exploited indirectly by another entity in particular

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through transfer or licensing, **up to four years after the end of the action**. For BeXyl, whose action ends on 31 August 2026, this obligation therefore runs until **31 August 2030**. If, despite a beneficiary's best efforts, a result is not exploited within one year after the end of the action, the beneficiaries must — unless otherwise agreed in writing with the granting authority — use the **Horizon Results Platform** to find interested parties to exploit it. Section 9 of this Plan converts these obligations into a concrete post-project schedule with named custodians.

Where results are incorporated into a standard, the beneficiaries must ask the standardisation body to include the funding statement in the information related to the standard, unless otherwise agreed with the granting authority or unless it is impossible. This provision is directly relevant to BeXyl, whose diagnostic and sanitation results are being fed into the EPPO standardisation process.

3.6. Transfer of ownership and licensing

Beneficiaries may transfer ownership of their results provided this does not affect compliance with their obligations, that the obligations are passed on to the new owner, and that the other beneficiaries with access rights are informed at least 45 days in advance so that they may assess the effect on their access rights and object within 30 days if the transfer would adversely affect them. Licences, including exclusive licences, may be granted provided this does not affect compliance with the obligations; an exclusive licence may be granted only if all the other beneficiaries concerned have waived their access rights. Where the call conditions provide for it, the granting authority may object, up to four years after the end of the action, to a transfer of ownership or an exclusive licence to an entity established in a non-EU country not associated with Horizon Europe if it considers the operation not to be in line with EU interests; in such cases the beneficiary must notify the granting authority before the operation takes place, the granting authority must notify any objection within 60 days of that notification or of any additional information it has requested, and no transfer or licensing may take place pending that decision. Given that BeXyl includes partners established in the United States, Brazil, Costa Rica, Argentina and Australia, this provision is explicitly flagged in the fact sheets of the KERs to which those partners contribute. It does not apply to the partners established in Israel and in the United Kingdom, which are countries associated to Horizon Europe.

3.7. Reconciling open science with the protection of results

BeXyl is committed to open science. Scientific publications are made available in open access and research data are managed according to the FAIR principles, deposited in trusted repositories and assigned persistent identifiers, as described in the Data Management Plan. Article 17 of the Grant Agreement requires the dissemination of results as soon as possible and by appropriate means, **other than those resulting from protecting or exploiting the results**. That exception is the hinge on which the present Plan turns. In practice the consortium applies the following rules:

- data underpinning a result for which protection is being considered are placed under temporary embargo in the repository, with the embargo justified in the Data Management Plan, and released once the protection decision has been taken or the application published;

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- software and bioinformatics workflows of general applicability are released openly with a persistent identifier, because their value to the consortium lies in adoption and citation rather than in exclusivity;
- biological material — strains, phages, fungal isolates, plant genotypes — is transferred to third parties under material transfer agreements that preserve the owner's rights and comply with the applicable phytosanitary and access-and-benefit-sharing rules; and
- no result is presented at a conference or submitted for publication before the prior-notification period of the Consortium Agreement has elapsed.

Two further constraints, both identified by the partners during the result-collection exercise, condition what may be released and must be respected in every exploitation act. The first is that a substantial part of the project's field and survey data originates from **official surveillance** carried out by national and regional plant protection organisations. Plot-level infection status, geolocated positive findings and the identity of officially negative plots that tested positive are sensitive for growers and for the competent authority; they may be used within the project and published in aggregated or coded form, but their release at plot level requires the agreement of the competent authority. Certain occurrence datasets used in the distribution modelling were also provided under redistribution restrictions, which must be checked before the maps are published as a product. The second is the **Nagoya Protocol**: strains and sequence data derived from material collected in Costa Rica, Brazil and Argentina may carry access-and-benefit-sharing obligations, including on digital sequence information. Before any genomic dataset from that material is deposited or any derived product is commercialised, the responsible partner must verify the applicable obligations and the terms under which the material was obtained.

4. THE BEXYL RESULT PORTFOLIO

4.1. From results to Key Exploitable Results

A research and innovation action of the size of BeXyl generates a large number of outputs, only some of which are results in the sense of the Grant Agreement, and only some of those are candidates for exploitation. The result-collection exercise described in Section 1.4 returned fifty-two declared results from the partners; these were consolidated against the periodic technical reports and are reproduced in full in Annex 6. The Exploitation Committee has distinguished three levels.

- **Outputs** — the whole body of publications, datasets, protocols, presentations, training materials and events produced by the project. These are managed by WP9 and the Data Management Plan.
- **Results** — any tangible or intangible output of the action, such as data, know-how or information, whatever its form or nature, whether or not it can be protected, which is generated in the action. Results are owned by the beneficiaries that generate them and are subject to the obligations of Article 16.
- **Key Exploitable Results (KERs)** — the subset of results that the Exploitation Committee has identified as having an identifiable user, a credible route to use, and a partner willing

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and able to carry that route beyond the end of the action. These are the results on which the Plan concentrates its actions and indicators.

4.2. Overview of the result portfolio by work package

Table 3 summarises the result portfolio as consolidated from the partners' declarations and from the periodic technical reports for RP1 and RP2. It is not an exhaustive catalogue of the project's scientific production but a map of what has been generated that can be used. The right-hand column indicates the dominant exploitation route, using the classification of Section 4.3: R = regulatory and standardisation uptake; C = commercial exploitation; P = practitioner and public-authority uptake; S = further research and open science.

Table 3. Map of the BeXyl result portfolio by work package, with the dominant exploitation route. R = regulatory and standardisation uptake

WP	Results generated	Route*
WP1 **Drivers of Xf epidemics** **(P1-CSIC, P8-INRAE)**	• Protocol for the design and establishment of sentinel plots and the resulting international network of twelve plots in Europe, the Americas and the Mediterranean basin • Ex situ surveillance scheme for botanic gardens: standardised sampling protocol and form, sampling kits, training videos, prioritisation rules and a shared digital platform for sample metadata and results (P31-BGCI) • Expanded Xf genomic reference dataset (>400 genomes analysed in RP1, >100 further genomes in RP2), including genomes reconstructed from century-old herbarium specimens (P10-UC) • Global screening of public sequence archives yielding eight draft and one closed genome of new Xylella strains, including a probable new species from wild rice • BacFlux bioinformatics workflow for bacterial short-read assembly, quality control and annotation, released with a persistent identifier • Species distribution modelling workflow for Xf, including a new method for generating constrained pseudo-absences • New host records and host-range datasets, including the first confirmation of Corylus avellana as a host; new vector records • Standardised inoculation reference for Nicotiana benthamiana as a model host • Metabolomic biomarker datasets for infected oak and cherry • New strain collections from recent outbreaks • PCR-based plasmid profile typing scheme for surveillance inside a demarcated area: applied to more than 1,240 qPCR-positive samples from the Valencian demarcated area, where all isolates share a single sequence type and MLST gives no discrimination, it resolved four plasmid profiles with geospatial structure at low cost and with no new equipment (P1-CSIC, P2-IVIA) • • Greenhouse datasets on pathogenicity, colonisation behaviour and host response across subspecies and sequence types, including cultivar-specific response to the subsp. multiplex ST6 strains of the Alicante outbreak (thirteen partners; P2-IVIA)	S, R
WP2 **Surveillance, early detection and monitoring** **(P2-IVIA, P29-UOM)**	• Xf-TSCE targeted sequence-capture enrichment method for strain-level typing directly from plant and insect material (P1-CSIC) • Triplex real-time TaqMan qPCR for the simultaneous detection of X. fastidiosa, Xanthomonas citri and 'Candidatus Liberibacter' spp., validated to EPPO guidelines (P2-IVIA) • Field-deployable assays on crude alkaline plant extracts: ddPCR, colorimetric LAMP and RPA, validated without DNA purification (P5-CNR)	R, C, P

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WP	Results generated	Route*
	• Harmonised digital PCR protocol and the BeXyl-2024-XYLEFA-NIB-TPS inter-laboratory test performance study with fifteen laboratories in eleven countries (P14-NIB) • Bayesian latent-class comparison of six molecular tests in naturally infected almond, by tissue type (P1-CSIC) • FLOW-FISH detection tool and a real-time LAMP protocol optimised for coffee (P16-UCR) • Subspecies-typing benchmarking and routine protocol enabling detection of co-infections (P21-IRFAP) • Custom plant phenotyping platform and hyperspectral data-processing pipeline discriminating infected from healthy plants before visible symptoms (P1-CSIC, P29-UOM) • Remote-sensing detection pipeline transferred from airborne hyperspectral imagery to high-resolution multispectral satellites, with software released in a public repository • Canine olfactory detection protocol for Xf in plants and soils (P5-CNR, P24-UNAPROL) • Optimised risk-based statistical survey designs and spatial epidemiological models for surveillance, including a spatially explicit individual-based simulation model transferable to other pathosystems by re-parameterisation (P2-IVIA, P8-INRAE, P5-CNR) • Methodological framework for the objective comparison of outbreak management plans, using spatial epidemic simulation and quantitative measures of effectiveness and efficiency (P2-IVIA) • Conserved and pathosystem-specific spectral biomarkers of infection — chlorophyll, carotenoid and xanthophyll cycle activity, water stress and the blue region — identified across olive, grapevine and almond (P1-CSIC, P29-UOM) • Proximal-sensing workflow for pre-symptomatic detection in olive, grapevine and almond (P1-CSIC) • UV-A and blue LED light-trap prototype for vector monitoring; after three seasons the LED traps did not significantly outperform conventional yellow sticky traps, which is itself a usable result for survey design (P5-CNR, P17-CRSFA, P6-UNITO)	
WP3 **Thermal treatments for healthy propagation material** **(P5-CNR, P19-ENA)**	• Draft EPPO Standard PM 10/NEW, Hot water treatment of grapevine, fig, pecan and white mulberry to control Xylella fastidiosa, describing the treatment and how it is administered, currently recommending 50 °C for 45 min with 48 °C under consideration (P20-EPPO, P5-CNR) • THERMORG/LAB hot-water treatment equipment, model R7 Thermo Lab S2, with treatment-recording software, label printing and remote connectivity (P23-RG Projects) • Thermal-inactivation dataset for Xf across the three subspecies and a viability-discrimination method based on RT-qPCR of the cvaC-1 gene, more reliable than the PMAxx-qPCR approach • Validated treatment protocols by species and cultivar for almond, grapevine, olive, fig, cherry and ornamentals, including cultivar-specific optima • Heat-transfer and thermal-inertia classification of woody species for the optimisation of treatment duration • Nursery-scale, economically validated protocol for dormant buds demonstrated in commercial production (P25-Agromillora) • Priming and conditioning treatments to increase tolerance to thermal treatment (P17-CRSFA) • Multilingual thermal-treatment questionnaire for nurseries, in seven languages (P5-CNR, P19-ENA) • Techno-economic data-collection template, SWOT analysis of thermotherapy adoption, and life cycle assessment of alternative energy sources	C, R, P

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WP	Results generated	Route*
	• Categorisation of the 665 EFSA-listed Xf host plants by plant type, nursery relevance and propagation technique • Temperature and exposure thresholds inactivating Xf across four subspecies from six countries, measured by plating, viability-qPCR and flow cytometry (P1-CSIC) • Cultivar-specific thermotherapy schedules preserving rooting capacity in up to nine Mediterranean olive cultivars, obtained at a commercial nursery (P1-CSIC) • Xylem microbiome dataset from 389 treated plants, testing whether heating shifts the beneficial community (P1-CSIC with P13-AIT)	
WP4 **Genomics and germplasm for resistance** **(P11-ARO-VOL, P18-IFAPA)**	• Catalogue of resistant, tolerant and susceptible cultivars of olive, almond, coffee and Psidium, based on multi-year field and controlled screening • Haplotype-resolved genome assemblies of a resistant and a susceptible olive cultivar with annotated immune receptor repertoires (P12-LMU) • SNP genotyping panel and transcriptomic resources for olive; predicted resistance-gene repertoires by cultivar (P5-CNR) • Molecular markers associated with resistance-related traits in almond progenies (P11-ARO-VOL) • Ionomic and metabolic signatures distinguishing resistant from susceptible genotypes (P9-AU, P1-CSIC) • Candidate resistance genes in Argentine olive cultivars (P27-INTA) • New breeding populations and pre-selected genotypes: pre-selected individuals from resistant × tolerant olive crosses with a new field plot of about 1,100 seedlings (P5-CNR); nine genotypes selected on fruit and oil traits from Leccino and Fs-17 progenies (P18-IFAPA); new progenies planted or planned • Tools for olive genetic transformation, including tissue-culture protocols for the resistant and the susceptible reference cultivars, and SSR markers derived from the genome assemblies (P12-LMU) • Novel almond genotypes with previously unreported resistance, validated as parental material for breeding (P11-ARO-VOL) • Evidence that olive colonisation by Spanish strains is frequently symptomless at 42 months, with leaf spectral data separating infected from healthy plants at 92.6 % mean accuracy (P1-CSIC)	C, S
WP5 **Control of vectors and disruption of transmission** **(P6-UNITO, P3-UCO)**	• Entomopathogenic fungal strains with demonstrated efficacy against spittlebug vectors: Metarhizium brunneum EAMa 01/58-Su, M. guizhouense EAMa 10/01-Fil, M. anisopliae BP1q and Lecanicillium aphanocladii, with characterised modes of action including endophytic colonisation and disruption of vector feeding behaviour • Collection of 228 entomopathogenic fungal isolates and FISH probes for Beauveria and Metarhizium • 'Lure and infect' cover-crop concept based on a fungus that colonises Lolium rigidum and attracts the vector • Characterisation of the virome of Philaenus spumarius, with seventeen new viral species described, and identification of its core virome • Egg parasitoid records and a standardised sentinel-egg method; consideration of Ooctonus vulgatus for addition to EPPO Standard PM 6/3 • Ground-cover and mulching management practice reducing nymphal densities, disseminated as an EIP-AGRI practice abstract • Identification of weed hosts to be avoided in orchard ground cover	C, P, R
WP6 **Solutions against the pathogen and for plant resilience** **(P4-UdG, P13-AIT)**	• High-throughput platform combining sequencing, comparative genomics, isolation, functional screening and interaction assays for the identification and assembly of synthetic communities, transferable to other xylem-inhabiting pathogens (P1-CSIC) • Two synthetic microbial communities (SC1, SC2) selected from a collection of 373 xylem-inhabiting bacterial isolates, with five strains selected jointly with the industrial partner	C, S

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WP	Results generated	Route*
	• Optimised fermentation process for the production of viable bacterial biomass, and a freeze-drying process for its preservation, storage and transport; both held as confidential proprietary know-how by the owning SME (P22-AciesBio) • Antimicrobial glasses and glass-ceramics G3, G3T and CIN, with G3T the most bactericidal (P1-CSIC) • Five olive-mill by-product ('alperujo') derived extracts with antibacterial activity, based on pre-existing CSIC patented processes • Eucalyptus essential-oil formulation EGL2, effective by endotherapy and soil drenching in almond with no phytotoxicity (P4-UdG) • Library of antimicrobial and defence-elicitor peptides, with BP178 showing the broadest spectrum and best defence-gene induction, and 1036 and BP473 the highest antibiofilm activity against the ST53 genotype (P4-UdG) • Collection of 39 bacteriophages, 19 selected as virulent, supporting the proposal of three new genera and nine new species; lead phage vB_Xf_IVIA-DOCa19 with demonstrated preventive and therapeutic effect and a dedicated qPCR quantification protocol (P2-IVIA, P1-CSIC) • Prophage bioinformatics pipeline and prophage catalogue across 89 Xf strains (P1-CSIC) • In planta colonisation tracking methodology by confocal microscopy and multicolour FISH (P13-AIT)	
WP7 **Tactics and strategies to mitigate impact** **(P7-UNIBS, P21-IRFAP)**	• Integrated eco-epidemiological modelling framework: a core vector–host–pathogen model with four satellite models for within-plant dynamics, vector phenology, transmission and dispersal, calibrated and validated on field data • Stage-structured demographic model of Philaenus spumarius including egg-diapause termination • Stage-structured model of Xf subsp. fastidiosa in grapevine applied to contrasting European climates • Network of experimental field plots for testing agronomic practices and biological solutions, with documented locations and designs • Regionally referenced catalogue of pest risk management measures derived from Implementing Regulation (EU) 2020/1201 and national rules, validated with regional experts • Structured list of promising solutions and IPM options classified into prevention, monitoring and intervention, expert-evaluated for effectiveness, feasibility and practicality • Preliminary crop-specific IPM schemes for olive, almond and grapevine • Trunk-endotherapy delivery route and field demonstration for phage and synthetic community treatments in grapevine and olive, addressing the main obstacle to systemic treatment of woody hosts (P1-CSIC, P21-IRFAP, with P17-CRSFA)	P, R, S
WP8 **Ecological, social and economic impacts** **(P30-FCRA, P28-JRC)**	• Factsheet database on the management of EU Xf epidemics covering regulation, funding, surveillance, inspections, eradication, vector control, research funding, communication and audit reports • Stakeholder questionnaire and GDPR-compliant stakeholder database template • Qualitative 'mental models' methodology and dataset from three contrasting case-study regions • Ecological impact evidence base linking landscape structure, host abundance and management to crop damage; vector community characterisation; soil health indicators showing reduced functional diversity in eradicated plots • Regional economic impact assessment based on the CAPRI model, parameterised with EFSA yield-loss estimates and BeXyl IPM cost and effectiveness data, under three control scenarios	P, S, R

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WP	Results generated	Route*
	• Five discrete-choice datasets registered on the Open Science Framework: almond grower preferences for IPM in Alicante, olive grower preferences for early detection in Andalusia and for IPM in Apulia, and citizen preferences for post-outbreak landscape restoration in Italy and in Spain, each with socio-economic, attitudinal and behavioural variables (P28-JRC) • Integrated spatial risk assessment of Xf invasion vulnerability across the Iberian Peninsula and the Balearic archipelago, combining pathogen, host, vector, communication network and garden-centre information (P1-EBD-CSIC) • qPCR survey of the Alicante demarcated area: 114 almond trees in 19 orchards and 352 plants of 12 wild host species, with 31.6 % of almonds and 11.4 % of wild plants positive, the highest rate in Ulex parviflorus, and four officially negative plots found positive (P1-CSIC, P3-UCO) • Soil-quality evidence base from 26 almond orchards comparing non-eradicated negative, non-eradicated positive and eradicated plots by physicochemical indicators, microcalorimetry, functional diversity and 16S profiling (P1-CSIC, P3-UCO)	
WP9 / WP10 Engagement, dissemination and coordination	• BeXyl project website and collaborative platform • Practice abstracts published in the EIP-AGRI format on the EU CAP Network • Xylella seminar series run jointly with EFSA, videos, infographics and training materials • Practitioners Panel and the BeXyl Network of stakeholders • Project data profile in an institutional repository and the Data Management Plan	P, S

*C = commercial exploitation; P = practitioner and public-authority uptake; S = further research and open science.

4.3. Classification of exploitation routes

It is a recurrent weakness of exploitation plans in publicly funded plant-health research to assume that exploitation means commercialisation. For a project addressing a Union quarantine pest that is subject to mandatory official control, the most valuable results are frequently those that change what public authorities are required to do, or what growers actually do, rather than those that generate a licence income. BeXyl therefore uses four routes, all of which constitute exploitation within the meaning of Article 16 of the Grant Agreement.

Table 4. Exploitation routes used in this Plan.

Route	Definition and typical instruments	Who carries it
R — Regulatory and standardisation uptake	Incorporation of a method, protocol or performance dataset into an EPPO diagnostic or phytosanitary standard, into EFSA risk-assessment tools and guidance, or into the survey and control requirements of EU or national plant-health legislation. Instruments: submission of validation data to EPPO panels, Euphresco projects, EFSA working groups, contributions to the revision of Implementing Regulation (EU) 2020/1201.	P20-EPPO, P2-IVIA, P14-NIB, P5-CNR, P1-CSIC, national reference laboratories
C — Commercial exploitation	Development, manufacture and marketing of a product, process or service. Instruments: product development by the SME partners, licensing of protected results, plant breeder rights and commercial propagation agreements, equipment sales and service contracts, registration of biocontrol and plant-protection products.	P22-AciesBio, P23-RG Projects, P25-Agromillora, P24-UNAPROL, P19-ENA members, licensees

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Route	Definition and typical instruments	Who carries it
P — Practitioner and public-authority uptake	Adoption of a practice, scheme or tool by growers, nurseries, diagnostic laboratories, advisory services and National Plant Protection Organisations. Instruments: practice abstracts, guidelines, training, demonstration events, decision-support outputs, contingency planning.	P26-Surrender MS and WP9, P19-ENA, P24-UNAPROL, P31-BGCI, Practitioners Panel, NPPOs
S — Further research and open science	Re-use of data, software, models, protocols and biological material in subsequent research and innovation. Instruments: open repositories with persistent identifiers, material transfer agreements, follow-on projects, collaboration agreements, doctoral training.	All research beneficiaries, coordinated by P1-CSIC

4.4. Selection of the Key Exploitable Results

The Exploitation Committee applied five criteria to the portfolio in Table 3. A result was retained as a KER where it satisfied all five.

- **Identifiable user.** A specific category of user is able to state what it would do differently if it had the result.
- **Maturity.** The result has been validated beyond proof of concept, at least under controlled or pilot conditions, and the evidence is documented in a deliverable, a peer-reviewed publication or a milestone.
- **Credible route.** A route from Table 4 exists that does not depend on assumptions the consortium cannot influence.
- **A willing custodian.** At least one partner has declared its intention and its capacity to carry the result beyond the end of the action.
- **Clear rights position.** Ownership is established or can be established, and any background required for exploitation is identified and accessible.

Fifteen Key Exploitable Results were selected on this basis. They are listed in Table 5 and described individually in Section 5. Results not retained as KERs remain results within the meaning of the Grant Agreement, remain subject to the obligations of Article 16, and continue to be exploited through the open-science route; several of them are expected to mature into KERs during the four-year post-project period and the Plan provides for their re-assessment. Two results in this category are treated with particular care in Section 9 because they are long-lived physical assets rather than documents: the international sentinel plot network of WP1 and the ex situ surveillance scheme established with the botanic gardens.

A gap worth recording. The mapping of the declared results onto the fifteen KERs, set out in Annex 6, shows that two of them — the canine olfactory detection protocol (KER5) and the eco-epidemiological modelling platform with the crop-specific IPM schemes (KER13) — are supported by no partner declaration at all. They are documented here from the periodic technical reports and the milestone evidence, which is sufficient for the description but not for the exploitation intent: the declaration is where a partner states what it wants to do with a result and what it needs in order to do it. The Exploitation Committee has asked P5-CNR and P7-UNIBS to complete a declaration for these two results before the meeting described in Section 13.3, and the corresponding fact sheets will be updated accordingly.

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Table 5. The fifteen BeXyl Key Exploitable Results.

No.	Key Exploitable Result	Lead / contributors	Route
KER1	Strain typing and traceback toolbox: Xf-TSCE targeted sequence capture and the PCR plasmid profile scheme	P1-CSIC; P2-IVIA, P21-IRFAP	R, S
KER2	Multiplex and field-deployable molecular detection toolbox for Xf and other regulated vascular pathogens	P2-IVIA; P5-CNR, P16-UCR, P1-CSIC	R, C
KER3	Harmonised digital PCR protocol and inter-laboratory performance dataset (BeXyl-2024-XYLEFA-NIB-TPS)	P14-NIB; P1-CSIC, P2-IVIA, external NRLs	R
KER4	Remote-sensing early detection pipeline, from airborne hyperspectral imagery to high-resolution satellite monitoring	P1-CSIC, P29-UOM	R, C, P
KER5	Canine olfactory detection protocol for Xf in plants and soils	P5-CNR; P24-UNAPROL	P, C
KER6	Risk-based surveillance design toolkit, spatial epidemiological models and outbreak-plan evaluation framework	P2-IVIA; P8-INRAE, P5-CNR, P1-CSIC (IAS and EBD), P9-AU	R, P
KER7	Thermotherapy package: validated protocols by species and cultivar plus the THERMORG/LAB treatment equipment	P5-CNR, P23-RG Projects; P25-Agromillora, P1-CSIC, P19-ENA, P17-CRSFA	C, R, P
KER8	Xf-resistant and tolerant germplasm, pre-selected breeding material and genomic screening tools	P18-IFAPA, P5-CNR, P11-ARO-VOL; P12-LMU, P25-Agromillora, P21-IRFAP	C, S
KER9	Entomopathogenic fungal strains and habitat-management practices for vector control (one strain in commercial development)	P3-UCO, P6-UNITO; P1-CSIC, P17-CRSFA, P24-UNAPROL	C, P
KER10	Plant-protection actives against Xf: antimicrobial and elicitor peptides, essential-oil formulation, glass-ceramics and olive-mill by-product extracts	P4-UdG, P1-CSIC	C, S
KER11	Synthetic microbial communities, the selection platform and the industrial production and preservation processes	P1-CSIC, P22-AciesBio	C, S
KER12	Bacteriophage collection, lead phage and phage quantification protocol for Xf therapy	P2-IVIA, P1-CSIC	C, S
KER13	Integrated eco-epidemiological modelling platform and crop-specific IPM schemes	P7-UNIBS; P1-CSIC, P2-IVIA, P5-CNR, P21-IRFAP, P17-CRSFA	P, R, S
KER14	Socio-economic and ecological impact evidence base for Xf management, including the CAPRI-based regional assessment	P30-FCRA, P28-JRC; P3-UCO, P5-CNR, P1-CSIC	P, R, S
KER15	Draft EPPO Standard PM 10/NEW on hot water treatment of grapevine, fig, pecan and white mulberry to control Xf	P20-EPPO, P5-CNR	R

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5. KEY EXPLOITABLE RESULTS

This section presents the fifteen Key Exploitable Results. Each fact sheet follows the same structure, which is reproduced as a blank template in Annex 2 so that it can be reused for results that mature after the end of the action. Maturity is expressed as an estimate of the technology readiness level made by the Exploitation Committee at month 47; where the Description of the Action or deliverable D9.1 set an expected level for the corresponding class of result, the estimate is related to it. The actions listed are the commitments on which the monitoring in Section 10 and the roadmap in Section 12 are based.

KER1 — Xf-TSCE — targeted sequence-capture enrichment for strain-level typing of *Xylella fastidiosa* directly from host and vector samples

Description	Two complementary instruments for establishing which strain is present and where it came from, without having to isolate the bacterium. The first is Xf-TSCE, a targeted next-generation sequencing method in which capture probes designed on reference genomes and covering 138 coding genes of the chromosome and of the subsp. multiplex plasmids enrich Xylella sequences directly from the DNA of infected plants or insects before Illumina sequencing. In olive from Mallorca and Argentina the share of pathogen reads rose from below 0.3 % to between 19 % and 48 %, recovering all seven MLST loci without isolation; the method has already been applied to a newly described sequence type from olive in Argentina. The second is a low-cost based-PCR assay for use inside a demarcated area where all isolates share one sequence type and multilocus typing therefore cannot discriminate strains: a conventional PCR assay of plasmid profile, applied to more than 1,240 qPCR-positive samples from the Valencian demarcated area, resolved four profiles with clear geospatial structure. It needs no new equipment and can be added to official testing at marginal cost, which is what makes it deployable by a regional laboratory.
Work package and contributors	WP2 Task 2.2 (Xf-TSCE) and WP1 Task 1.3 (plasmid profile typing). Developed by P1-CSIC, the plasmid typing scheme jointly with P2-IVIA, with field material and validation support from P21-IRFAP. Reported in deliverable D2.2 and published in the peer-reviewed literature in 2025.
Ownership and rights position	Xf-TSCE method and capture-panel design owned by P1-CSIC; the contribution of P21-IRFAP is the provision of characterised samples, which does not create co-ownership. The plasmid profile typing scheme is co-owned with P2-IVIA under the Consortium Agreement. The sample set underlying the plasmid scheme comes from official surveillance, so geolocated results require the agreement of the competent authority before publication.
Maturity at M47	Both validated on naturally infected field material from active outbreaks; partner declaration places Xf-TSCE at TRL 5 and the plasmid typing scheme at TRL 5. Estimated TRL 5–6 against the TRL 7/8 target set in D9.1 for new validated detection tools; the remaining steps are inter-laboratory validation, reduction of the capture-panel cost and simplification of the bioinformatic pipeline.
Target users	National reference laboratories and official diagnostic laboratories; the EU Reference Laboratory for bacteriology and its network; NPPOs conducting outbreak investigations; epidemiological research groups; providers of sequencing services and capture-probe kits.
Exploitation route and value proposition	Primarily R. Outbreak response under Implementing Regulation (EU) 2020/1201 requires subspecies and, increasingly, sequence-type assignment to determine the origin of an introduction and the delimitation of demarcated areas. Culture-independent strain typing shortens that determination from weeks to days and works on samples from which the bacterium cannot be isolated. A secondary commercial route exists through the supply of the capture-probe panel as a catalogue product.

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Background required	Reference genome sequences in public databases; standard commercial capture and sequencing chemistry. No restrictive background identified.
Protection status and decision	No protection sought to date. The Exploitation Committee's assessment is that the probe design is the protectable element but that its value is maximised by open adoption as a reference method, and that the method has already been published. Decision: no patent; protect the know-how associated with probe optimisation and offer the panel design under a material or data transfer agreement. The plasmid assay rests on published plasmid sequences and needs no protection as a protocol, but a kit format would require an IP assessment.
Actions to M48 and beyond	• P1-CSIC to submit the validation dataset to the EPPO Panel on Diagnostics in Bacteriology for consideration in the revision of the diagnostic standard for Xf (M48–M60). • P1-CSIC and P2-IVIA to establish analytical sensitivity and specificity for the plasmid typing assay, obtain inter-laboratory verification and package it as a standard operating procedure for EPPO diagnostic panels and for the regional plant health service of the Valencian Community (2027). • P1-CSIC and P14-NIB to organise a small ring test with three to five national reference laboratories (post-project, 2027). • P1-CSIC to deposit probe sequences and the analysis workflow in a public repository with a persistent identifier, in line with the Data Management Plan (M48).
Indicator of uptake	Number of laboratories outside the consortium having applied the method; inclusion of the method in an EPPO standard or Euphresco project; number of outbreak investigations in which it is used.
Main risk and mitigation	Sequencing cost and bioinformatics capacity may remain barriers for smaller national laboratories. Mitigation: provide a documented, low-dependency analysis workflow and offer analysis as a service from P1-CSIC during the post-project period.

KER2 — Multiplex and field-deployable molecular detection toolbox for Xylella fastidiosa and other regulated vascular pathogens

Description	A coherent set of molecular detection methods covering the range of operational situations faced by plant-health services. It comprises a triplex real-time TaqMan qPCR that detects *Xylella fastidiosa, Xanthomonas citri* and 'Candidatus Liberibacter' spp. simultaneously, validated according to EPPO guidelines with full inclusivity and exclusivity and diagnostic sensitivity of 100 % on naturally infected citrus from six countries; a set of assays — droplet digital PCR, colorimetric LAMP and recombinase polymerase amplification — validated on crude alkaline plant extracts without any DNA purification step, and therefore usable in the field; a real-time LAMP protocol optimised for coffee; and a FLOW-FISH tool for qualitative and quantitative detection in endemic contexts. The toolbox also includes a Bayesian latent-class evaluation of six molecular tests in naturally infected almond that tells a laboratory which method to choose for which tissue.
Work package and contributors	WP2, Tasks 2.2 and 2.3. Triplex qPCR by P2-IVIA; crude-extract assays by P5-CNR, in synergy with H2020 project FREE@POC; LAMP for coffee and FLOW-FISH by P16-UCR; latent-class test comparison by P1-CSIC.
Ownership and rights position	Separate ownership by generating beneficiary for each component; the toolbox is presented jointly for exploitation purposes but does not constitute a jointly owned result.
Maturity at M47	Validated on naturally infected field material; the triplex qPCR is validated to EPPO standards on 118 naturally infected samples and more than 300 pathogen-free trees. Estimated TRL 7–8, matching the TRL 7/8 target set in D9.1.

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Target users	Official and private diagnostic laboratories; phytosanitary inspectors carrying out on-site screening; citrus and stone-fruit industries in third countries where the three target pathogens coexist; kit manufacturers.
Exploitation route and value proposition	R and C. The regulatory route is the incorporation of the validated protocols into EPPO diagnostic standards and their adoption by national reference laboratories. The commercial route is the licensing of the triplex assay to a diagnostic kit manufacturer: a single reaction covering three regulated pathogens of citrus has a clear market in the Americas and in Asia, and reduces cost per sample for surveillance programmes.
Background required	Published primer and probe sequences for individual targets; commercial master mixes and instrument platforms. The novelty resides in the multiplexing, the validation and the crude-extract application.
Protection status and decision	No protection sought. Assessment: primer and probe combinations are difficult to protect effectively and their value depends on wide adoption. Decision: publish and standardise; where a manufacturer wishes to commercialise a kit, P2-IVIA will negotiate a non-exclusive know-how and validation-data licence through its technology transfer office.
Actions to M48 and beyond	• P2-IVIA to submit the triplex validation dossier to the EPPO Panel on Diagnostics in Bacteriology (M48). • P5-CNR to prepare a field-use protocol note for inspectors, translated through the WP9 channels (M48). • P2-IVIA technology transfer office to approach at least two diagnostic kit manufacturers (M48–M60). • P16-UCR to transfer the coffee LAMP protocol to the Costa Rican and regional plant-health services (post-project).
Indicator of uptake	Number of laboratories adopting each protocol; citation in an EPPO standard; at least one contact with a kit manufacturer converted into a licence discussion by 2028.
Main risk and mitigation	Regulatory validation of a multiplex assay for official use is lengthy. Mitigation: engage EPPO and the EU Reference Laboratory early and route the effort through Euphresco.

KER3 — Harmonised digital PCR protocol and inter-laboratory validated performance dataset for *Xylella fastidiosa* (BeXyl-2024-XYLEFA-NIB-TPS)

Description	A harmonised digital PCR protocol for the detection and absolute quantification of Xylella fastidiosa, together with the performance dataset generated by a formal inter-laboratory test performance study. The study circulated a panel of heat-deactivated samples comprising DNA extracts and plant extracts from six host species and covering the three subspecies of concern, together with positive and negative amplification controls, to fifteen laboratories in eleven countries, including three BeXyl partners, four Euphresco participants and eight external national reference laboratories. Four digital PCR platforms were compared under a common protocol with secure online reporting. The result is not only a protocol but the evidence base that a standardisation body needs in order to adopt it.
Work package and contributors	WP2, Task 2.2. Coordinated by P14-NIB, in synergy with Euphresco projects 2022-A-373 and 2023-A-456. Milestone MS8, completed February 2025.
Ownership and rights position	P14-NIB as coordinator of the study; the performance dataset is a collaborative result with the participating laboratories, governed by the terms of the study protocol. Contributions of BeXyl beneficiaries are separable.
Maturity at M47	Experimental phase of the inter-laboratory study completed in February 2025 across four platforms (Milestone MS8); the statistical analysis and the validation report are in

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	preparation. Estimated TRL 7–8. This is the most standardisation-ready result in the BeXyl portfolio.
Target users	EPPO Panel on Diagnostics in Bacteriology; the EU Reference Laboratory for bacteriology; national reference laboratories; Euphresco network.
Exploitation route and value proposition	R, exclusively and by design. Digital PCR is increasingly used for the quantification of regulated pathogens but its use in official testing requires demonstrated inter-laboratory reproducibility. This result supplies precisely that.
Background required	Published assay chemistries; commercial digital PCR platforms.
Protection status and decision	No protection sought and none appropriate. Decision: full open release of the protocol and the anonymised performance dataset, with the funding statement, so that it can be cited by the standardisation body.
Actions to M48 and beyond	• P14-NIB to submit the study report and dataset to the EPPO Panel on Diagnostics in Bacteriology for the revision of standard PM 7/24 (M48). • P14-NIB to publish the study in a peer-reviewed journal and deposit the dataset with a persistent identifier (M48–M52). • Coordinator to request that the standardisation body include the Horizon Europe funding statement in the information related to the standard, as required by Article 16 (upon adoption).
Indicator of uptake	Incorporation of the protocol or of its performance data into a revised EPPO standard; number of national reference laboratories implementing digital PCR for Xf.
Main risk and mitigation	Standardisation timelines are outside the consortium's control. Mitigation: the result is already embedded in the Euphresco process, which feeds EPPO directly.

KER4 — Remote-sensing early detection pipeline: from airborne hyperspectral imagery to high-resolution satellite monitoring

Description	An operational chain for the detection of Xylella infection before symptoms are visible, and for its discrimination from other causes of decline. It comprises a custom plant phenotyping platform and a hyperspectral data-processing pipeline — radiometric calibration, spectral smoothing, supervised machine-learning segmentation of pure vegetation, and classification — which discriminates infected from healthy plants with more than 80 % accuracy before visible symptoms appear, with classification accuracies between 87.5 % and 100 % under controlled conditions at two months post-inoculation; multi-year airborne, drone and ground campaigns over almond, olive and grapevine in Mallorca, California and Argentina, with ground-truth data collected in Israel in preparation for a further airborne campaign, including a documented severity scale for almond leaf scorch; and, decisively for operational use, the porting of the hyperspectral algorithms to high-resolution multispectral satellite imagery, demonstrated for the discrimination of Xylella from Verticillium wilt in olive. The software was released in a public repository as Milestone MS10 in August 2025.
Work package and contributors	WP2, Task 2.4. P1-CSIC and P29-UOM, with contributions from P21-IRFAP, P27-INTA and P28-JRC for ground truthing and landscape analysis.
Ownership and rights position	Jointly generated by P1-CSIC and P29-UOM. The contributions to the algorithms and to the acquisition campaigns are closely intertwined; a joint ownership agreement between the two beneficiaries is required and is flagged as an action. Note that P29-UOM is established in Australia; any exclusive licensing to a non-EU entity would require notification to the granting authority under Article 16.
Maturity at M47	Demonstrated over multiple years, crops and continents; software released publicly. Estimated TRL 6–7 for the satellite-based component and TRL 7 for the airborne component.

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Target users	NPPOs and regional plant-health services conducting large-scale surveys; the European Commission and EFSA for area-wide risk assessment; precision-agriculture and earth-observation service providers; large agricultural cooperatives and insurers.
Exploitation route and value proposition	R, C and P. The regulatory route is the acceptance of remote sensing as a survey instrument that can be used to target ground inspection under Implementing Regulation (EU) 2020/1201, which would materially reduce the cost of official surveys. The commercial route runs through earth-observation service providers able to deliver the pipeline as a monitoring service. The practitioner route is the direct use of severity maps by cooperatives and advisory services.
Background required	Commercial satellite imagery; airborne sensor calibration methods; institutional imaging platforms of P1-CSIC and P29-UOM.
Protection status and decision	No protection sought; the software has been released openly, which forecloses patenting of the algorithms. Decision: exploit through service provision and consultancy rather than exclusivity; protect the calibration and ground-truthing know-how, which is the element a competitor cannot reproduce from the published code.
Actions to M48 and beyond	• P1-CSIC and P29-UOM to conclude a joint ownership agreement covering the pipeline and the derived datasets (M48). • P1-CSIC to present the satellite-based approach to the NPPOs of the affected Member States and to EFSA (M48 and post-project). • P1-CSIC to explore a service agreement or a follow-on project with an earth-observation provider (2027).
Indicator of uptake	Number of official survey programmes incorporating remote sensing; area under monitoring; number of service or research agreements concluded.
Main risk and mitigation	Sensor availability and imagery cost may limit routine use; performance may degrade for hosts and climates not covered by the training campaigns. Mitigation: the satellite port specifically addresses cost, and the Plan foresees continued ground truthing through the sentinel plot network.

KER5 — Canine olfactory detection protocol for Xylella fastidiosa in plants and soils

Description	A trained-dog detection protocol for Xylella fastidiosa, together with the training methodology and the supporting volatilomic evidence. Dogs were trained on bacterial cultures using a scent-box pairing approach and then tested on plants and on soils taken from the pots of infected plants, reaching accuracies between 94 % and 98 % for both matrices. The demonstration that soil volatiles are an important cue is operationally significant: it means that dogs can be trained on a narrow panel of substrates rather than on the full list of host species, which removes the principal obstacle to deploying the technique across the 665 recognised hosts. Complementary volatilomic and soil-microbiome characterisation identifies the markers involved.
Work package and contributors	WP2, Task 2.5. P5-CNR with P24-UNAPROL. Milestone MS11, achieved August 2024.
Ownership and rights position	P5-CNR, with P24-UNAPROL as contributor for field access and operational testing.
Maturity at M47	Validated on plants and soils under controlled and semi-field conditions, with trained teams involved in outbreak-response exercises. Estimated TRL 6.
Target users	NPPOs and regional plant-health services conducting delimiting surveys and rapid outbreak response; nurseries and germplasm collections requiring rapid pre-screening; specialised detection-dog service companies.

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Exploitation route and value proposition	P and C. The practitioner route is the use of detection teams as a rapid, low-cost first screen that targets where molecular sampling should be concentrated, which is where the technique adds most value. The commercial route is the provision of trained teams as a service, an established business model in other detection fields.
Background required	Established canine detection training methodology; access to certified Xf cultures under quarantine containment.
Protection status and decision	Protection by patent is not available for a training protocol. Decision: protect as documented know-how and exploit through training and service agreements; publish the performance data to establish credibility with plant-health authorities.
Actions to M48 and beyond	• P5-CNR to publish the validation study and the training protocol (M48). • P5-CNR and P24-UNAPROL to propose a demonstration to the Apulian and Balearic plant-health services (M48). • P5-CNR to explore a training and certification agreement with a detection-dog operator (post-project).
Indicator of uptake	Number of trained teams operating outside the project; number of official surveys in which canine screening is used; existence of a service agreement.
Main risk and mitigation	Absence of an accepted certification scheme for plant-pathogen detection dogs limits official use. Mitigation: engage EPPO on the question of validation criteria for non-molecular screening tools.

KER6 — Risk-based surveillance design toolkit and spatial epidemiological models

Description	A set of quantitative instruments that determine how many samples to take, where and how often, in order to detect Xylella with a defined confidence at the lowest cost. It comprises an individual-based spatial epidemiological model of almond leaf scorch used to compare the one-step and two-step survey designs, confidence levels, buffer-zone sizes and eradication radii prescribed by Implementing Regulation (EU) 2020/1201; a simulation-based method using Gaussian random fields to estimate spatial aggregation and to optimise design prevalence, with an efficiency criterion for detection probability; a mathematical model adapted to evolving genotypes and multiple introductions, released as Milestone MS9 with its software; and a marked sequential point-process framework that both optimises sampling schemes and diagnoses existing ones. It further includes a spatially explicit individual-based simulation model that reproduces outbreak dynamics under real landscape conditions and can be re-parameterised for other plant diseases; a methodological framework built on that model for the objective comparison of outbreak management plans, using quantitative measures of effectiveness and efficiency, which allows an authority to test a contingency plan before an outbreak rather than after it; a species distribution modelling workflow with risk maps combining climate and soil properties for the spatial prioritisation of survey effort; and an integrated spatial assessment of invasion vulnerability across the Iberian Peninsula and the Balearic archipelago that adds hosts, vectors, communication networks and garden centres to the pathogen layer. A central and directly actionable conclusion is that design prevalence must be adjusted to host population size, and that clustering of infection must be accounted for in sample-size calculation.
Work package and contributors	WP1 Task 1.2, WP2 Tasks 2.3, 2.6 and 2.7, WP7 Task 7.1 and WP8 Task 8.3. P2-IVIA, with P8-INRAE, P5-CNR, P1-IAS-CSIC, P9-AU and P1-EBD-CSIC.
Ownership and rights position	Separable contributions by generating beneficiary. The Milestone MS9 software is reported in RP2 as released by P5-CNR while the Description of the Action assigns the milestone to P8-INRAE; the attribution is to be confirmed between the two partners before any further exploitation act.

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Maturity at M47	Published, validated against real outbreak data and directly comparable with the survey designs in force. Estimated TRL 7–8, consistent with the TRL 7/8 target set in D9.1 for optimised statistical surveillance designs.
Target users	EFSA, in particular for the maintenance of its survey-design guidance and sample-size tools; the European Commission services responsible for the revision of Implementing Regulation (EU) 2020/1201; NPPOs designing annual survey programmes; regional plant-health services.
Exploitation route and value proposition	R and P. This is a result whose entire value is realised by changing what official surveys are required to do. The generalisation of EFSA sample-size recommendations to account for infection clustering is the specific target.
Background required	EFSA survey guidance and the RiBESS+ tool; official survey datasets provided by the NPPOs.
Protection status and decision	No protection sought; the value lies in adoption by public authorities. Decision: full open publication of models and code.
Actions to M48 and beyond	• P2-IVIA and P8-INRAE to submit the clustering-adjusted sample-size approach to EFSA (M48–M60). • P1-IAS-CSIC and P1-EBD-CSIC to merge the species distribution modelling workflow and the Iberian and Balearic vulnerability assessment into a single decision-support product, and to deliver it as a citable map product or an online screening interface; occurrence datasets supplied by plant protection organisations under redistribution restrictions to be cleared beforehand (2027). • P2-IVIA to offer the outbreak-management evaluation framework to the plant protection organisations of the affected Member States as a contingency-planning instrument (2027). • P5-CNR, with P8-INRAE, to confirm the attribution of the Milestone MS9 software and to maintain it in a public repository with a persistent identifier (M48). • P2-IVIA to prepare a short technical note for NPPOs summarising the practical implications for survey design, disseminated through WP9 and the Policy Brief D9.9 (M48).
Indicator of uptake	Reference to BeXyl outputs in EFSA guidance or in a revision of the survey requirements; number of NPPOs applying the revised design prevalence approach.
Main risk and mitigation	Changes to survey requirements have budgetary implications for Member States and may be resisted. Mitigation: present the results as cost-efficiency gains, supported by the WP8 economic analysis.

KER7 — Thermotherapy package: a draft EPPO Standard, validated treatment protocols by species and cultivar, and the THERMORG/LAB treatment equipment

Description	A complete package for the production and safe trade of Xylella-free propagation material, whose most advanced element is a regulatory instrument rather than a laboratory result. Working from the project's efficacy and plant-safety data, P20-EPPO and P5-CNR have prepared a draft EPPO Standard PM 10/NEW, Hot water treatment of grapevine, fig, pecan and white mulberry to control Xylella fastidiosa, which describes the treatment and how it is to be administered and currently recommends 50 °C for 45 minutes, with 48 °C under consideration in the light of the final experiments. The treatment is also effective against some vectors that lay eggs on propagating material and against other pests already covered by the existing hot water treatment standard for grapevine. On the biological side the package comprises a thermal-inactivation dataset covering four subspecies, from strains originating in six countries, across the range −20 °C to 50 °C, assessed by plating, viability-qPCR and flow cytometry; a viability-discrimination method based on RT-qPCR of the cvaC-1 gene which proved more reliable than the PMAxx-qPCR approach and which solves the recurrent problem of viable but non-culturable cells after treatment; multi-year compatibility trials establishing that hot water treatment at 48 °C for 45 minutes generally

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	preserves rooting, budbreak or graft take in fig, mulberry, walnut, Prunus mahaleb, the GF677 rootstock and selected cherry and almond scions, while 50 °C for 45 minutes is generally more damaging; cultivar-specific schedules for up to nine Mediterranean olive cultivars obtained at a commercial nursery, showing tolerance to be strongly genotype-dependent and rooting to fall sharply above 44 °C; a heat-transfer and thermal-inertia classification of woody species that allows treatment duration to be predicted from stem diameter and wood density; priming and conditioning treatments that raise tolerance; and a nursery-scale protocol demonstrated in commercial production at a viability level described by the nursery partner as economically acceptable. On the equipment side it comprises the R7 Thermo Lab S2 unit developed by the SME partner, a 900-litre system with three-probe PID control to ±0.5 °C, treatment-recording software with label printing and remote connectivity — a specification that matters because traceability of treatment is what a certification scheme requires. The package is completed by a multilingual questionnaire on nursery practice in seven languages, a techno-economic data-collection template, a SWOT analysis of thermotherapy adoption, a life cycle and energy assessment, and a categorisation of the 665 EFSA-listed hosts by nursery relevance and propagation technique.
Work package and contributors	WP3, all tasks. P20-EPPO with P5-CNR (draft standard), P23-RG Projects (equipment), P5-CNR and P17-CRSFA (species-specific protocols), P25-Agromillora (nursery-scale demonstration), P1-CSIC (inactivation thresholds and olive cultivar schedules), P19-ENA (sector interface), with a subcontract to a technical university for the energy and life cycle assessment. Trials were run in commercial nurseries, including Plantas Continental S.A. for olive and the Fortunato nursery for priming.
Ownership and rights position	Equipment design and embedded software: P23-RG Projects. Treatment protocols and inactivation data: P5-CNR, P1-CSIC, P25-Agromillora and P17-CRSFA according to contribution. The nursery-scale protocol is a joint result of P25-Agromillora and P5-CNR and requires a joint ownership or use agreement.
Maturity at M47	The draft standard is at TRL 6 by partner declaration and awaits review by the EPPO Panel on Phytosanitary Measures followed by country consultation. Protocols are validated at nursery scale in commercial production, declared at TRL 5 to 7 depending on species and material, with the nectarine protocol at TRL 7 and fully operational in large-scale nursery production; this matches the TRL 7/8 target of D9.1 for validated thermal treatment protocols. Equipment is at prototype stage, derived from a product the SME already markets.
Target users	Private, cooperative and public nurseries and plant propagators across the EU, represented by P19-ENA and by the national associations; plant traders, importers and exporters; quarantine stations; selectors and breeders; germplasm conservation, premultiplication and multiplication centres; equipment manufacturers and suppliers; NPPOs responsible for certification of propagation material; EPPO.
Exploitation route and value proposition	C, R and P, in a rare and favourable combination, and it is the regulatory route that leads. The draft EPPO Standard is what converts the protocols from an option into a recognised risk-mitigation measure usable in certification schemes for plant reproductive material, in phytosanitary measures at import, in containment and quarantine, and in the sanitation of selected genotypes — and, in doing so, it creates the market for the equipment. The commercial route is correspondingly immediate: the SME already manufactures and sells thermotherapy equipment, and the nursery partner, having demonstrated the protocol in its own commercial production, states that what it now needs is thermotherapy equipment for large volumes. That is a demand and a supply inside the same consortium, and connecting them is the single most concrete commercial action in this Plan.
Background required	Pre-existing commercial hot-water treatment equipment and control software of P23-RG Projects; micropropagated rootstock material and nursery production know-how of P25-Agromillora; plant material from germplasm collections.
Protection status and decision	No new protection sought to date. The Exploitation Committee's assessment is that the equipment adaptation is incremental over the SME's existing product and is best protected by design and know-how rather than by patent, while the treatment protocols should be published so that they can be adopted as a standard. Decision: publish the protocols; protect

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	the control software and treatment-recording function as know-how; keep open the possibility of protecting the priming formulations if the efficacy data justify it.
Actions to M48 and beyond	• P20-EPPO and P5-CNR to complete the outstanding experiments — the alternative 48 °C schedule, the walnut cultivar panel, and the time needed to reach the centre of canes exceeding 3 cm in diameter — to update the technical dossier following publication of the BeXyl results, and to take the draft standard through the EPPO Panel on Phytosanitary Measures to country consultation (M48 onwards). • P23-RG Projects and P25-Agromillora to scope a large-volume thermotherapy unit answering the nursery-scale requirement declared by P25 (2027). • P23-RG Projects to complete the commercial specification of the laboratory unit and include it in its catalogue (2027). • P25-Agromillora to extend the validated protocol to further species in its production programme (post-project). • P19-ENA to disseminate the protocols and the questionnaire results to its national member associations, and to organise at least one demonstration for nurseries (M48). • P5-CNR to complete and publish the techno-economic and life cycle assessment (M48).
Indicator of uptake	Number of nurseries applying a BeXyl-validated protocol; units of equipment sold or ordered; progress of an EPPO standard on thermotherapy; volume of treated propagation material.
Main risk and mitigation	Thermotherapy imposes a cost and a viability loss on the nursery, and will be adopted at scale only if it is required or rewarded by the certification framework. Mitigation: the regulatory route is pursued in parallel with the commercial one, and the techno-economic analysis quantifies the cost so that the sector can negotiate on evidence.

KER8 — *Xylella-resistant* and tolerant germplasm, pre-selected breeding material and genomic screening tools

Description	The genetic response to the epidemic, comprising three connected elements. First, a validated catalogue of resistant, tolerant and susceptible cultivars: in olive, the confirmation of the known tolerant references together with the identification of further cultivars showing comparably low infection rates, assessed under natural infection in a Mallorcan field collection of 380 olive plants representing 75 cultivars and extended with thirty further international cultivars added to the Italian field trials, and in almond the confirmation of resistant and highly susceptible cultivars across a two-year evaluation of 49 genotypes, extended to coffee and to Psidium species. Second, new breeding material: pre-selected individuals from resistant × tolerant olive crosses propagated and inoculated, with a new field plot of about 1,100 seedlings planted in June 2025; nine genotypes selected from Leccino and Fs-17 progenies on fruit and oil traits with average oil content above 40 % of dry fruit, to be distributed under agreement to partner institutes for resistance evaluation; and further progenies established. Third, the genomic and phenotypic tools that make selection faster: haplotype-resolved genome assemblies of a resistant and a susceptible olive cultivar with annotated immune receptor repertoires and SSR markers derived from them, a SNP genotyping panel and transcriptomic resources for olive, molecular markers associated with resistance traits in almond progenies, previously unreported almond genotypes with validated resistance for use as parental material, ionomic and metabolic signatures distinguishing resistant from susceptible plants, tissue-culture protocols for the resistant and susceptible reference cultivars, and tools for olive genetic transformation that open a route to the bioengineering of immune receptors in susceptible material. A finding that conditions the whole area is that colonisation of olive by Spanish strains was frequently symptomless at 42 months, so that screening cannot rely on symptom expression alone; leaf spectral data separated infected from healthy plants at 92.6 % mean accuracy, which offers a practical way round that problem and links this KER to KER4.

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Work package and contributors	WP4, all tasks, with field evaluation in WP7. P18-IFAPA, P5-CNR and P11-ARO-VOL as leads, with P12-LMU, P1-CSIC, P21-IRFAP, P9-AU, P27-INTA and P25-Agromillora.
Ownership and rights position	Plant material is owned by the institution that generated the cross. Genomic resources are owned by the generating beneficiary. Distribution of pre-selected genotypes between institutes takes place under explicit written agreement, as recorded in the periodic reports.
Maturity at M47	Resistance sources identified and confirmed in the field; breeding selections at an early stage, with most progenies not yet fruiting. Estimated TRL 4–5, consistent with the TRL 4/5 target set in D9.1 for the identification of cultivars and accessions with enhanced resistance. Genomic tools TRL 4–5.
Target users	Commercial nurseries and plant propagators; olive and almond growers replanting in demarcated areas; public and private breeding programmes; germplasm banks; the Community Plant Variety Office and national variety offices at the point of registration.
Exploitation route and value proposition	C and S. The commercial route is the classical one for plant material: registration and protection by plant breeder rights, followed by licensed propagation and sale. It is the route with the highest long-term economic value in the entire portfolio, and also the slowest — olive breeding cycles are measured in decades. The research route is the immediate use of the genomic resources and markers by breeding programmes worldwide.
Background required	Parental germplasm from the World Olive Germplasm Collection and from institutional collections; commercial varieties and micropropagated rootstocks contributed by P25-Agromillora; pre-existing breeding populations.
Protection status and decision	No plant breeder right application has been filed within BeXyl. This is expected: none of the selections is yet at the stage of distinctness, uniformity and stability testing. The Exploitation Committee's decision is that publication of the identity of pre-selected genotypes must be controlled until the owning institution has decided on registration, and that the resistance catalogue for existing, already commercialised cultivars should be published openly because it is immediately useful to growers and cannot be protected.
Actions to M48 and beyond	• P18-IFAPA and P5-CNR to define, for each pre-selected genotype, whether registration and plant breeder rights will be sought, and to place the corresponding disclosure restrictions on record (M48). • P18-IFAPA to complete the agreed distribution of the nine selected genotypes to P1-CSIC, P21-IRFAP and P5-CNR for resistance evaluation under material transfer agreement (M48). • P25-Agromillora to assess the commercial propagation potential of the confirmed tolerant cultivars (post-project). • P12-LMU and P5-CNR to release the genome assemblies, annotations and SNP panel in public repositories, subject to the embargo rules of the Data Management Plan (M48). • Coordinator to secure a follow-on funding route for the continued evaluation of the breeding populations beyond the end of the action (2027).
Indicator of uptake	Number of pre-selected genotypes advanced to registration testing; number of breeding programmes using the BeXyl genomic resources; hectares replanted with confirmed tolerant material.
Main risk and mitigation	The breeding timeline extends far beyond the four-year exploitation obligation and beyond any single funding instrument; without continuity the field plots and progenies may be lost. This is the single most serious sustainability risk in the Plan and is addressed specifically in Section 9.

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KER9 — Entomopathogenic fungal strains and habitat-management practices for the control of Xylella vectors

Description	A biological and agronomic alternative to broad-spectrum insecticides for the control of spittlebug vectors. The biological component comprises characterised fungal strains with demonstrated efficacy: a Metarhizium brunneum strain causing over 90 % mortality of the two main vector species which, applied as a foliar spray, colonises olive both endophytically and epiphytically and measurably disrupts vector feeding behaviour — more probes, more unsuccessful probes, longer non-probing periods and reduced xylem contact, all of which reduce the probability of acquisition and transmission — with spring field applications reducing Auchenorrhyncha populations by up to 70 %; a Metarhizium guizhouense strain that colonises a common grass and initially attracts the vector, supporting a 'lure and infect' cover-crop strategy; a Metarhizium anisopliae strain selected for high nymphal mortality and taken to large-scale field validation against a commercial reference product; and a Lecanicillium species isolated from infected vectors, whose genome has been sequenced and annotated. The agronomic component is a ground-cover and mulching management practice, validated in Spain and Apulia, that reduces nymphal densities and has already been transferred to growers as an EIP-AGRI practice abstract. The result is completed by a collection of 228 fungal isolates, by diagnostic FISH probes, by the characterisation of the vector virome including seventeen new viral species, and by egg parasitoid records supporting the consideration of one parasitoid for addition to the EPPO list of biological control agents safely used in the region.
Work package and contributors	WP5, with field validation in WP7. P3-UCO and P6-UNITO as leads, with P1-CSIC, P17-CRSFA, P24-UNAPROL and P15-APTA.
Ownership and rights position	Fungal strains are owned by the isolating institution. The M. brunneum strain EAMa 01/58-Su is held by P3-UCO with the intellectual property shared with the company carrying its commercial development. The M. anisopliae strains are owned by P6-UNITO. The mode-of-action data and the field validation are contributions of several partners and are separable. The cover-crop practice is a joint output of P1-CSIC and P17-CRSFA and is disseminated openly. Because the fungal strains of P3-UCO are already under commercial development, any disclosure of results involving them requires coordination with the owner and the company.
Maturity at M47	Maturity differs sharply between strains and this is the most important thing to say about this KER. The Metarhizium brunneum strain is declared by its owner at TRL 9: applied to the soil in spring over three consecutive years under real field conditions it reduced vector presence and additionally controlled olive fly offspring, and all the steps towards commercial use have been completed, leaving only the administrative path to final authorisation. The Metarhizium anisopliae strain BP1q is at TRL 5: validated in replicated field trials in olive groves in Apulia in two consecutive years, achieving approximately 40 % efficacy even when applied as a simple aqueous conidial suspension without an optimised formulation. A second M. anisopliae strain, Cnv2i, is at TRL 4, validated under controlled conditions and promising on account of its pathogenicity, endophytic colonisation and stress tolerance. The M. guizhouense strain is at TRL 3. The ground-cover and mulching practice is already in use.
Target users	Biocontrol product manufacturers; olive, almond and grapevine growers in demarcated and buffer areas; organic producers, for whom the absence of a compatible vector control option is a particular constraint; advisory services.
Exploitation route and value proposition	C and P, and the commercial route is already open rather than prospective. The M. brunneum strain EAMa 01/58-Su is under commercial development as the active ingredient of a new bioinsecticide by Koppert Biological Systems, with the intellectual property held between the company and P3-UCO; what remains is the long administrative path to authorisation as a plant protection product. For the M. anisopliae strains, P6-UNITO intends to conclude a formal collaboration and exploitation agreement with Agrifutur Srl, a company specialised in entomopathogenic-fungus biopesticides, defining intellectual property, formulation development and commercialisation. The M. guizhouense strain offers a second and distinct commercial avenue, because the protein fraction obtained after liquid fermentation showed antagonistic activity against the bacterium itself, which points to a

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	new active molecule rather than to a second insecticide. The practitioner route is immediate and does not depend on registration: ground-cover and mulching management can be adopted now and has already been transferred through a practice abstract.
Background required	Institutional fungal culture collections; commercial reference formulations used as benchmarks.
Protection status and decision	No patent application has been filed within the project. The rights position for EAMa 01/58-Su is defined by the arrangement between P3-UCO and Koppert Biological Systems. For the remaining strains the Exploitation Committee notes that microorganisms used as biocontrol agents are patentable and that three of its members have direct experience of protecting them. Decision: for each strain with confirmed field efficacy, the owning institution is to take a documented decision on patent filing before any further disclosure of the strain identity and efficacy data together; deposit in a recognised culture collection is required in either case; and the antagonistic protein fraction of the M. guizhouense strain is to be assessed separately, since it is a distinct invention from the strain itself.
Actions to M48 and beyond	• P3-UCO to record the current status of the EAMa 01/58-Su development with Koppert Biological Systems, including the IP arrangement and the regulatory timetable, in the exploitation register (M48). • P6-UNITO to conclude the collaboration and exploitation agreement with Agrifutur Srl covering the M. anisopliae strains (2027). • P6-UNITO and Agrifutur to optimise the formulation with adjuvants and UV protectants, run further field validation of the optimised product, complete shelf-life studies and prepare the registration dossier (2027–2029). • P3-UCO to assess separately the antagonistic protein fraction of the M. guizhouense strain as a candidate new active molecule (2027). • Owning institutions to deposit the lead strains in a recognised culture collection (M48). • P6-UNITO to submit the egg parasitoid dossier for consideration under EPPO Standard PM 6/3 (post-project). • P24-UNAPROL and WP9 to extend the dissemination of the ground-cover practice abstract to further regions and languages (M48).
Indicator of uptake	Regulatory authorisation obtained for the bioinsecticide based on EAMa 01/58-Su; conclusion of the exploitation agreement with Agrifutur Srl; number of strains deposited and of protection decisions recorded; area under BeXyl-derived ground-cover management; progress of the parasitoid listing.
Main risk and mitigation	For the strain already in commercial development the binding constraint is not technical or commercial but administrative: authorisation as a plant protection product is a long process over which neither the university nor the company has control. For the remaining strains, field efficacy without an optimised formulation is around 40 % and rainfall-dependent, so formulation work is the critical step. Mitigation: pursue the practitioner route in parallel, which delivers benefit without registration; present the strains together with the mode-of-action evidence, which is what differentiates them commercially; and keep the two commercial routes independent so that a delay on one does not stall the other.

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KER10 — Plant-protection actives against *Xylella fastidiosa*: antimicrobial and elicitor peptides, essential-oil formulation, antimicrobial glass-ceramics and olive-mill by-product extracts

Description	Four families of active substances developed and screened against the three subspecies of the pathogen. The peptide family comprises a library synthesised by solid-phase methods at milligram scale for in vitro screening and at gram scale for the in planta experiments, evaluated against five sequence types, from which one peptide emerged with the broadest antibacterial spectrum and the strongest induction of plant defence genes — making it a candidate for priming rather than merely for direct control — and two further peptides showed high antibiofilm activity against the sequence type responsible for olive quick decline syndrome, which is of particular relevance because biofilm is the structure that protects the bacterium in the xylem. The essential-oil family is a eucalyptus formulation that achieves a four-and-a-half to six log reduction within thirty minutes in vitro, with membrane lysis confirmed microscopically across three subspecies, and which, applied to almond by endotherapy or soil drenching, significantly reduces symptom severity, delays symptom onset and lowers pathogen levels without phytotoxicity while inducing defence genes. The materials family comprises antimicrobial glasses and glass-ceramics, of which the vitrocrystalline form obtained by optimised thermal treatment is the most bactericidal, fully suppressing colony formation against most strains within 48 hours. The extract family comprises five preparations derived from olive-mill by-products, whose production processes are covered by pre-existing patents of the owning institution, with the most potent also the most phytotoxic and two intermediate preparations offering the best balance of efficacy and plant safety. All four families were taken to field trials in WP7 in 2025.
Work package and contributors	WP6, Tasks 6.1 to 6.3, with field application in WP7. P4-UdG (peptides, essential oil) and P1-CSIC (glass-ceramics, extracts), with P11-ARO-VOL and P13-AIT.
Ownership and rights position	P4-UdG for the peptides and the essential-oil formulation; P1-CSIC for the glass-ceramics and the extracts. Ownership is clean and separable, which is favourable for licensing.
Maturity at M47	In vitro efficacy established across subspecies; in planta efficacy demonstrated for the essential oil in almond; field trials initiated in 2025 with results maturing after the end of the action. Estimated TRL 4–5, consistent with the TRL 4/5 target of D9.1.
Target users	Plant protection product manufacturers and formulators; endotherapy service providers; growers in demarcated areas seeking treatments compatible with integrated and organic production; the olive-oil sector, for which the by-product extracts also represent a valorisation of a waste stream.
Exploitation route and value proposition	C and S. The route to market runs through licensing to a formulator followed by registration under Regulation (EC) No 1107/2009. The peptides and the extracts also have value as research tools and as leads for further development.
Background required	Pre-existing patents of P1-CSIC covering the processes for obtaining the olive-mill by-product extracts, including the hydroxytyrosol extraction process, the dihydroxyphenylglycol extraction procedure and the use of that compound in natural herbicide formulations. Exploitation of the extract family therefore necessarily involves access to this background, which is held by the same beneficiary that owns the result — a simple position, but one that must be stated in any licence.
Protection status and decision	No new protection has been sought for the peptides, the essential-oil formulation or the glass-ceramics. The Exploitation Committee's assessment is that the antibiofilm activity of specific peptides against the olive quick decline genotype, and the composition and thermal treatment of the most active glass-ceramic, are the elements with the clearest inventive character. Decision: both are to be assessed for patentability by the respective knowledge-transfer offices before the 2025 field trial results are published, since publication of use against Xylella would destroy novelty for that application.

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Actions to M48 and beyond	• P4-UdG technology transfer office to complete a patentability assessment of the antibiofilm peptide application (M48). • P1-CSIC to complete a patentability assessment of the glass-ceramic composition and treatment (M48). • Both partners to hold publication of the corresponding field results until the assessment is concluded, under the prior-notification procedure of the Consortium Agreement (M48). • P1-CSIC to link the extract family to its existing patent portfolio in any licence discussion (post-project). • Complete the analysis of the 2025 field trials and prepare a non-confidential dossier for industry (2027).
Indicator of uptake	Number of patentability assessments completed and applications filed; number of contacts with formulators; progress of field efficacy data.
Main risk and mitigation	Publication pressure on the academic partners conflicts with the novelty requirement. This is the clearest case in the portfolio where the disclosure-control procedure of Section 2.3 must be actively enforced.

KER11 — Synthetic microbial communities for plant resilience and their industrial production and formulation process

Description	Two synthetic microbial communities assembled from a collection of 373 xylem-inhabiting bacterial isolates spanning 49 genera, obtained from olive, grapevine and almond sap. Selection combined screening for antimicrobial metabolites, hydrolytic enzymes, siderophores, nitrogen fixation, phosphate solubilisation and auxin production with carbon-source and stress profiling, inter-strain compatibility testing and — critically for exploitation — culturability and bioprocessability, the five final strains having been selected jointly by the research partner and the industrial partner so that the community could actually be manufactured. Preliminary in planta assays in tobacco and olive show that both communities reduce bacterial populations and may mitigate symptoms, and that one of them additionally promotes plant growth under infection, giving it a dual role that is commercially attractive because it offers a benefit even in the absence of disease. Two candidate strains were excluded on biosafety grounds, which is itself a documented and reusable outcome. The selection was made using a second, separable result: a high-throughput platform combining sequencing, comparative genomics, microbial isolation, functional screening and interaction assays, which can be turned on any xylem-inhabiting pathogen and is therefore of interest to agricultural biotechnology companies independently of Xylella. The third element is the industrial process developed by the SME partner: an optimised cultivation medium and fermentation process for the production of viable bacterial biomass, and a freeze-drying process that preserves that biomass for storage, transport and subsequent formulation. The formulated product was applied in the 2025 field trials of WP7. The composition of the medium, the cultivation strategy, the freeze-drying conditions and the associated process parameters are confidential proprietary know-how of the SME and are not disclosed here or in any other public document of the project.
Work package and contributors	WP6, Task 6.1, with field application in WP7. P1-CSIC and P22-AciesBio, with P13-AIT for colonisation tracking.
Ownership and rights position	Jointly generated but with a clean internal boundary. The composition of the communities, the strain collection and the selection platform are attributable to P1-CSIC; the fermentation and freeze-drying processes are proprietary know-how owned by P22-AciesBio; the selection of the final five strains was a joint act. A joint ownership or use agreement between P1-CSIC and P22-AciesBio is required and is the first action for this KER; it must preserve the confidentiality of the SME's process know-how while allowing the community composition to be exploited.

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Maturity at M47	Communities defined and formulated; efficacy demonstrated in controlled conditions and under assessment in the field from 2025. Estimated TRL 4–5.
Target users	Biofertiliser and biostimulant manufacturers; the SME partner itself as producer; nurseries applying microbial inocula at propagation; growers in demarcated areas.
Exploitation route and value proposition	C, with a clear and unusually short path. The SME partner is an industrial biotechnology company whose business is exactly this kind of fermentation and formulation, and it has already produced the formulated product at the scale required for field trials. The regulatory route to market — as a biostimulant under Regulation (EU) 2019/1009 rather than as a plant protection product — is materially faster if the claim is plant resilience and growth promotion rather than disease control, and the dual activity of one of the communities makes that framing available.
Background required	Institutional strain collections of P1-CSIC; fermentation and formulation platform, media know-how and process technology of P22-AciesBio. Strains isolated from material collected outside the EU may carry access-and-benefit-sharing obligations that must be verified before commercialisation.
Protection status and decision	No protection sought to date. The Exploitation Committee's assessment is that both the composition of the community and the procedure for its cultivation in low-cost media are protectable, and that this was identified as a business opportunity already at proposal stage. Decision: P1-CSIC and P22-AciesBio to complete a joint patentability assessment covering the community composition and the production process before the field results are published.
Actions to M48 and beyond	• P1-CSIC and P22-AciesBio to conclude a joint ownership and exploitation agreement (M48). • Joint patentability assessment covering composition and production process (M48). • Deposit of the five strains in a recognised culture collection (M48). • P22-AciesBio to define the regulatory pathway — biostimulant or plant protection product — and the corresponding dossier requirements, and to continue medium and freeze-drying optimisation, scale-up, stability and shelf-life studies (2027). • P1-CSIC to offer the selection platform to agricultural biotechnology companies as a service or licensed capability, and to demonstrate its applicability beyond Xylella (2027–2028). • Completion and analysis of the 2025 field trials (2027).
Indicator of uptake	Conclusion of the joint ownership agreement; completion of the patentability assessment; a decided regulatory pathway; field efficacy confirmed.
Main risk and mitigation	Efficacy of microbial consortia is often inconsistent between controlled and field conditions. Mitigation: the dual growth-promotion activity provides a fallback value proposition that does not depend on disease suppression.

KER12 — Bacteriophage collection, lead phage and quantification protocol for the therapeutic control of *Xylella fastidiosa*

Description	A collection of bacteriophages active against Xylella fastidiosa, isolated from wastewater treatment plants using surrogate Xanthomonas hosts. Thirty-nine phages have been characterised, of which nineteen were selected as virulent with high in vitro lytic activity against European subsp. fastidiosa strains; all of them infect sequence type ST1 of subsp. fastidiosa, responsible for the European Pierce's disease outbreaks, and fifteen completely inhibit its growth. Genomic analysis places them across five families and supports the proposal of three new genera and nine new species, which is a scientific result in its own right. The lead phage has shown, in greenhouse trials in periwinkle and tobacco, a clear preventive and therapeutic effect, with the bacterium neither isolable nor detectable by PCR in most treated plants. A dedicated qPCR protocol with specific primer and probe was designed within the project for phage quantification, which is what makes dosing and persistence measurable and therefore what makes a product possible. A field pilot on grapevines in an area with an active Pierce's disease outbreak, carried out with an external

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	phage therapy company, reported successful mitigation of symptoms. The result is completed by an in-house prophage analysis pipeline applied to 89 strains covering five subspecies, including the proposed subspp. sandyi and morus, and 28 sequence types, identifying more than five hundred prophages, which informs host range and resistance risk. The package is completed by a delivery route without which none of it can be applied to a mature woody plant: trunk endotherapy, demonstrated in grapevine field plots in Mallorca by drilling the lower trunk, inserting a plug and injecting the preparation, which is also the route by which the synthetic communities of KER11 were delivered.
Work package and contributors	WP6, Task 6.4, with field application in WP7. P2-IVIA with P1-CSIC, in collaboration with an external company.
Ownership and rights position	P2-IVIA as principal generator and isolator of the phages, with P1-CSIC producing them for the field trials and contributing to characterisation, the quantification protocol and the prophage analysis; the endotherapy demonstration was executed with P21-IRFAP and, for the Apulian plot, P17-CRSFA. Contributions are largely separable; the quantification protocol is a joint result. Access to the phage collection by third parties is to be governed by material transfer agreements. The involvement of Evolving Therapeutics SL in the field pilot must be checked against the Consortium Agreement provisions on third parties before any exploitation commitment is made.
Maturity at M47	Greenhouse efficacy demonstrated; a field pilot conducted on a commercial crop under natural infection. Estimated TRL 4–5, at the upper end of that range given the field pilot.
Target users	Phage therapy companies; plant protection product manufacturers; endotherapy service providers; growers of grapevine and almond in outbreak areas.
Exploitation route and value proposition	C and S. Phage therapy for plant disease is an emerging but real commercial field, and the consortium already has a working relationship with a company active in it. The regulatory position of phage-based plant protection products in the EU is still developing, which is both a risk and an opportunity for an early entrant.
Background required	Surrogate host strains and wastewater sampling access; the external company's phage production and application technology used in the field pilot.
Protection status and decision	No protection sought. The Exploitation Committee notes that phage-based products and the combinations used in a cocktail are protectable, and that one of its members has direct experience of patenting bacteriophages and of launching a spin-off on that basis. Decision: P2-IVIA and P1-CSIC to assess patentability of the lead phage and of the selected cocktail composition for the control of Xf, and to clarify the rights position with the external company, before the field pilot results are published.
Actions to M48 and beyond	• P2-IVIA and P1-CSIC to clarify in writing the rights position with the external company (M48). • Joint patentability assessment of the lead phage and cocktail for Xf control (M48). • Deposit of the lead phages in a recognised collection and publication of the genome sequences consistent with the protection decision (M48). • Establish the access and licensing conditions for the phage collection through material transfer agreements, and consider deposit in an international phage collection (2027). • Explore a licence or joint development agreement with a phage therapy company, Evolving Therapeutics SL being the natural first interlocutor (2027–2028).
Indicator of uptake	Clarified rights position; patentability assessment completed; a licence or joint development agreement under negotiation by 2028.
Main risk and mitigation	Bacterial resistance to phages and the undefined regulatory status of phage-based plant protection products. Mitigation: the cocktail approach and the prophage analysis address resistance; engage with the regulatory question through the policy channels of WP9.

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KER13 — Integrated eco-epidemiological modelling platform and crop-specific IPM schemes

Description	The decision-support layer of the project. The modelling platform consists of a core compartmental model of the vector–host–pathogen interaction at the scale of an olive grove, coupled to four satellite models describing within-plant bacterial dynamics and symptom development, vector population phenology, transmission, and local dispersal and host preference; it has been calibrated and validated on Apulian field data and reproduces both the observed infection dynamics and literature-consistent disease progression. It is complemented by a stage-structured demographic model of the main vector, including a function for the termination of egg diapause, which reproduces population dynamics and peak timing in both northern and southern Italy, and by a stage-structured model of the pathogen in grapevine applied to contrasting European climates, which identifies where establishment would be favoured under current and projected conditions. On this basis, and drawing on the whole project portfolio, WP7 has produced a regionally referenced catalogue of pest risk management measures derived from Implementing Regulation (EU) 2020/1201 and national rules and validated with regional experts, a structured and expert-evaluated list of promising solutions classified into prevention, monitoring and intervention, and preliminary crop-specific integrated pest management schemes for olive, almond and grapevine.
Work package and contributors	WP7, Tasks 7.1 and 7.3, with inputs from all scientific work packages. P7-UNIBS as lead, with P1-CSIC, P2-IVIA, P5-CNR, P21-IRFAP and P17-CRSFA.
Ownership and rights position	P7-UNIBS for the modelling framework; the IPM schemes and the solution catalogue are collaborative results with separable contributions, consolidated by P7-UNIBS.
Maturity at M47	Models calibrated and validated against field data; IPM schemes at preliminary stage and being refined with the socio-economic analysis of WP8 before final release in deliverable D7.3. Estimated TRL 5–6.
Target users	EFSA and the Commission services for scenario analysis and risk assessment; NPPOs and regional plant-health services for the design of control programmes and contingency planning; advisory services and producer organisations; researchers.
Exploitation route and value proposition	P, R and S. The models are exploited as a platform for risk assessment, surveillance design and scenario analysis, which is a public-authority use; the IPM schemes are exploited by transfer to growers and advisers through the WP9 channels and the practice abstracts.
Background required	Published epidemiological modelling frameworks; official survey and outbreak datasets provided by regional authorities; the pest risk management measures established in EU and national legislation.
Protection status and decision	No protection sought and none appropriate for a decision-support framework whose value depends on being used by public authorities. Decision: open release of the model description and, subject to the Data Management Plan, of the code.
Actions to M48 and beyond	• P7-UNIBS to complete deliverable D7.3 with the final IPM schemes (M47–M48). • P7-UNIBS to deposit the model code and documentation in a public repository with a persistent identifier (M48). • WP9 to convert the crop-specific IPM schemes into practice abstracts and grower-facing guidance in the relevant languages (M48). • Coordinator to offer the platform to EFSA and to the NPPOs of the affected Member States, through the Policy Brief D9.9 and the final conference (M48).
Indicator of uptake	Number of authorities or advisory bodies using the models or the IPM schemes; downloads and citations of the code; incorporation of the schemes into national or regional guidance.
Main risk and mitigation	Models require maintenance and parameterisation for each new context; without a custodian they fall into disuse. Mitigation: P7-UNIBS is designated custodian and the code is released with documentation sufficient for independent re-parameterisation.

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KER14 — Socio-economic and ecological impact evidence base for *Xylella management*

Description	The evidence that allows a control measure to be judged not only on whether it works but on whether it is affordable, acceptable and environmentally sound. It comprises a structured factsheet database on the management of EU epidemics, covering regulation, the implementation of funding measures, surveillance and monitoring, on-site inspections, eradication, vector control, compulsory actions, research funding, information and communication, and the outcomes of official audits; a qualitative 'mental models' methodology with interview and focus-group protocols, applied in three contrasting case-study regions representing a pest-free, an eradication and a containment situation, with all sessions transcribed and analysed, which documents why growers accept or resist particular measures; an ecological impact evidence base linking landscape structure, the abundance of host plants at the forest–agriculture interface and management practice to crop damage, together with vector community characterisation and soil health indicators showing reduced microbial functional diversity in eradicated plots — a finding with direct implications for how eradication and replanting are carried out; a regional economic impact assessment using an established agricultural policy model parameterised with EFSA yield-loss estimates and with the cost and effectiveness data generated by BeXyl, run under three control scenarios, whose preliminary results indicate that even under the most intensive control olive production in the region analysed falls by 14 % and income by 17 %; and farm-level and citizen discrete-choice experiments, with pre-registered analysis plans, eliciting preferences for IPM design and acceptance of asymptomatic early-detection methods across large samples in Italy and Spain, delivered as five distinct datasets — almond grower preferences for IPM in Alicante, olive grower preferences for early detection in Andalusia and for IPM in Apulia, and citizen preferences for post-outbreak landscape restoration in Italy and in Spain — each combining the choice data with socio-economic, attitudinal and behavioural variables and each registered on the Open Science Framework. Two further field results give the evidence unusual bite: a qPCR survey of the Alicante demarcated area covering 114 almond trees in 19 orchards and 352 plants of 12 wild host species found 31.6 % of almonds and 11.4 % of wild plants positive, with the highest rate in Ulex parviflorus and with four plots officially recorded as negative testing positive; and a soil-quality comparison across 26 almond orchards, grouped as non-eradicated negative, non-eradicated positive and eradicated, gives authorities the first structured evidence on what mandatory eradication does to the soil.
Work package and contributors	WP8, all tasks. P30-FCRA and P28-JRC as leads, with P3-UCO, P5-CNR, P19-ENA and P1-CSIC.
Ownership and rights position	Separable contributions by generating beneficiary. Personal data collected in the interviews, focus groups and choice experiments are governed by the GDPR arrangements and the ethics deliverables of WP11; only anonymised or aggregated data may be shared.
Maturity at M47	Database and qualitative datasets complete; economic modelling at preliminary results stage; choice-experiment fieldwork ran from October 2025 with first analysis in June 2026 and the datasets registered on the Open Science Framework under temporary embargo. The soil-quality evidence base is declared at TRL 4 and the qPCR survey at TRL 3; the technology readiness scale is not meaningful for the choice-experiment datasets.
Target users	The European Commission services and EFSA; NPPOs and regional authorities designing control programmes and compensation schemes; producer organisations and cooperatives; the research community in agricultural and environmental economics.
Exploitation route and value proposition	P, R and S. This evidence base is exploited by informing the design of official measures and their compensation schemes, and by supporting the case for or against particular interventions. It is also the element that gives the other KERs their economic justification: the value of a cheaper survey design or of a resistant cultivar is established here.
Background required	EFSA yield-loss estimates and host lists; the agricultural policy model framework; official statistical and survey datasets.

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Protection status and decision	No protection sought; the value is entirely in public use, and the choice-experiment datasets are to be made public for replicability and transparency once the embargo lifts. Decision: open publication of methods and of anonymised or aggregated data, in accordance with the Data Management Plan and the ethics requirements. Two constraints apply: plot-level infection status from official surveillance is reported under codes and its release requires the agreement of the competent authority; and personal data from the interviews and surveys may be shared only in anonymised or aggregated form.
Actions to M48 and beyond	• P30-FCRA and P28-JRC to complete deliverables D8.2 and D8.4 with the final analyses (M48). • P28-JRC to deliver the final regional economic assessment and to make it available to the Commission services (M48). • Publication of the choice-experiment analyses following the pre-registered plans (2027). • Feed the ecological and soil health findings into the Policy Brief D9.9 and into the recommendations on replanting after eradication (M48). • P28-JRC to lift the embargo on the five Open Science Framework datasets and publish the permanent public links (2027). • P1-CSIC and P3-UCO to confirm the borderline-positive samples by an independent method and to transfer the plot-level dataset formally to the regional plant health service, which is the act that converts the survey into an operational result (M48).
Indicator of uptake	Reference to the BeXyl socio-economic and ecological evidence in Commission, EFSA or national documents; peer-reviewed publications; use of the factsheet database by authorities.
Main risk and mitigation	Part of the analysis matures after the end of the action. Mitigation: the pre-registration of the analysis plans and the designation of custodians ensure completion irrespective of project closure.

KER15 — Draft EPPO Standard PM 10/NEW — Hot water treatment of grapevine, fig, pecan, white mulberry and other hosts to control *Xylella fastidiosa*

Description	A draft EPPO phytosanitary standard, prepared within the project and built directly on its experimental evidence. The draft describes a long-duration hot water treatment against Xylella fastidiosa for grapevine, fig, pecan and white mulberry plants for planting, and specifies how the procedure is to be administered. It currently recommends 50 °C for 45 minutes, with the possibility of lowering the temperature to 48 °C depending on the outcome of the final experiments. The treatment is also useful against some of the vectors that lay eggs on propagating material and against other pests already covered by the existing EPPO standard on hot water treatment of grapevine against flavescence dorée phytoplasma, which means it can be integrated into treatment regimes nurseries already operate rather than added on top of them. It is listed separately from KER7 because it has a different owner, a different route and a different timetable from the underlying protocols: it is a regulatory instrument in the making rather than a technical result.
Work package and contributors	WP3, Task 3.3. P20-EPPO with P5-CNR, drawing on the compatibility and efficacy data generated across WP3 by P1-CSIC, P5-CNR, P17-CRSFA, P25-Agromillora and P23-RG Projects, and on the consultation with the nursery sector run with P19-ENA.
Ownership and rights position	The draft standard is an EPPO document and, once adopted, belongs to the standardisation process rather than to any beneficiary. The underlying technical dossier is generated by the BeXyl partners and shared under the Consortium Agreement. On adoption the beneficiaries will ask EPPO to include the Horizon Europe funding statement in the information related to the standard, as required by Article 16 and Annex 5 of the Grant Agreement.

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Maturity at M47	TRL 6 by partner declaration. The draft is written; what remains is the completion of the outstanding experiments, the update of the technical dossier following publication of the BeXyl results in scientific journals, review by the EPPO Panel on Phytosanitary Measures, and country consultation.
Target users	Private, cooperative and public nurseries; associations of nurseries; plant traders, importers and exporters; quarantine stations; selectors and breeders; germplasm conservation, premultiplication and multiplication centres; equipment manufacturers; NPPOs operating certification schemes and phytosanitary measures at import; research and development institutions.
Exploitation route and value proposition	R, and through it C. Adoption would make the treatment available for use in certification schemes for plant reproductive material at selection and nursery level, in phytosanitary measures at import, in control and containment measures in outbreak situations, in quarantine, and in the sanitation of selected genotypes and the production of primary sources. This is the single BeXyl result with the widest reach per unit of effort remaining, because it changes what an entire sector is permitted and expected to do, and because it creates the demand that makes the equipment and protocol results of KER7 commercially viable.
Background required	The existing EPPO standard on hot water treatment of grapevine against flavescence dorée phytoplasma, on which the procedure is modelled; the compatibility and efficacy datasets of WP3.
Protection status and decision	Not applicable and not desirable: a phytosanitary standard is a public instrument and its value depends on universal adoption. Decision: publish the supporting BeXyl results in the scientific literature so that the technical dossier can cite them, and support the EPPO process.
Actions to M48 and beyond	• P20-EPPO and P5-CNR to complete the outstanding experiments: the alternative 48 °C schedule, a larger cultivar panel for walnut, and determination of the time needed to reach the centre of canes exceeding 3 cm in diameter, expected by the end of 2026. • P5-CNR and the WP3 partners to publish the supporting results in scientific journals so that the technical dossier can be updated (M48–2027). • P20-EPPO to adjust the list of host plants covered in the light of the final experiments, then submit the draft to the EPPO Panel on Phytosanitary Measures and thereafter to country consultation (2027). • Coordinator to request inclusion of the Horizon Europe funding statement in the information related to the standard on adoption.
Indicator of uptake	Review of the draft by the EPPO Panel on Phytosanitary Measures; entry into country consultation; adoption of the standard; number of national certification schemes referring to it.
Main risk and mitigation	The list of host plants and the recommended schedule may still change, and standardisation timetables are outside the consortium's control. Publication of the supporting results is on the critical path, since the technical dossier cannot be finalised without them. Mitigation: the publication actions are given M48–2027 deadlines and the standardisation interface is held by P20-EPPO, which is the body that runs the process.

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6. EXPLOITATION PATHWAYS

6.1. Regulatory and standardisation uptake

For a project addressing a Union quarantine pest, this is the pathway with the largest and fastest impact, and BeXyl has positioned a substantial part of its portfolio on it. The instruments are concrete and the entry points are already open.

- **EPPO diagnostic standards.** The revision of the EPPO diagnostic standard for *Xylella fastidiosa* is the target for KER1, KER2 and KER3. Validation data from the novel molecular approaches developed in BeXyl are already being provided to EPPO for consideration in that revision, and the inter-laboratory test performance study on digital PCR (BeXyl-2024-XYLEFA-NIB-TPS) was explicitly designed to support future diagnostic standardisation within the EPPO framework. The study was conducted in synergy with two Euphresco projects, which is the normal conduit from research to EPPO standards.
- **EPPO phytosanitary standards.** This is where the project has gone furthest. A **draft EPPO Standard PM 10/NEW** on hot water treatment of grapevine, fig, pecan and white mulberry to control the pathogen has been prepared within WP3 (KER15) and is heading for review by the EPPO Panel on Phytosanitary Measures and then for country consultation; the thermotherapy protocols and inactivation data of KER7 are its technical dossier. Separately, a vector egg parasitoid identified in WP5 is under consideration for addition to the EPPO standard on biological control agents safely used in the region.
- **EFSA.** The surveillance design work of KER6 targets the generalisation of the sample-size recommendations underlying EFSA survey guidance so that they account for the clustering of infection, and the modelling platform of KER13 and the impact evidence of KER14 feed the quantitative elements of pest risk assessment.
- **EU legislation.** The pest risk management measure catalogue and the survey design analyses provide the evidence base for any future revision of Commission Implementing Regulation (EU) 2020/1201, in particular on survey intensity, buffer zone dimensions and eradication radii.

Where a result is incorporated into a standard, the beneficiaries will ask the standardisation body to include the Horizon Europe funding statement in the information related to the standard, as required by Article 16 of the Grant Agreement. The coordinator will track this and report it in the final periodic report and thereafter.

6.2. Commercial exploitation

Commercial exploitation in BeXyl is carried by the industrial and SME partners and by the knowledge-transfer offices of the research institutions. The consortium was designed with this in mind: exploiting the project results was identified at proposal stage as a key strategic opportunity for the longer-term development of the business of three of the participating SMEs, with the industrial biotechnology partner scaling up microbiological formulations, the equipment manufacturer producing and selling validated thermotherapy equipment to the members of the European nursery association, and the nursery partner producing and

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commercialising resistant and tolerant almond and olive genotypes at large scale. What the result-collection exercise showed, however, is that the commercial routes that have travelled furthest are not the ones foreseen at proposal stage but two that were built during the project with companies outside the consortium: the development of an entomopathogenic fungal strain into a bioinsecticide by an established biological control company, and the intended exploitation agreement for a second set of strains with a specialised biopesticide manufacturer. Table 6 records how far each route has been carried at month 47.

Table 6. Commercial exploitation intentions and their status at month 47.

Partner	Intended commercial exploitation	Status at M47 and next step
P22-AciesBio (SME, industrial biotechnology)	Scale-up, formulation and commercialisation of microbial formulations (KER11).	Fermentation, downstream processing and lyophilisation into wettable powders developed and used to supply the 2025 field trials. Next: joint ownership agreement and joint patentability assessment with P1-CSIC, then definition of the regulatory pathway.
P23-RG Projects (SME, equipment)	Manufacture and sale of validated thermotherapy equipment to nurseries (KER7).	Two prototype laboratory units built and delivered to partners, with treatment-recording software and remote connectivity. Next: completion of the commercial specification and introduction into the company catalogue.
P25-Agromillora (SME, nursery)	Production and large-scale commercialisation of resistant and tolerant genotypes (KER8) and application of thermotherapy in commercial propagation (KER7).	Nursery-scale thermotherapy protocol demonstrated at an economically acceptable viability threshold in commercial production; commercial olive varieties contributed to the field trial network. Next: extension of the protocol to further species and assessment of the commercial potential of the confirmed tolerant cultivars.
P24-UNAPROL (olive growers' consortium)	Transfer of validated practices and detection services to its member growers (KER5, KER9).	Field liaison for the canine detection and entomopathogenic fungi trials. Next: demonstration activities and extension of the ground-cover practice.
P19-ENA (European nursery association)	Sector-wide uptake of thermotherapy and of healthy propagation practice (KER7).	Multilingual questionnaire on nursery practice deployed in seven languages with support from national associations. Next: dissemination of the validated protocols and at least one demonstration event for nurseries.
P3-UCO with Koppert Biological Systems (external company)	Development of the Metarhizium brunneum strain EAMa 01/58-Su as the active ingredient of a new bioinsecticide against Xf vectors (KER9).	The most advanced commercial route in the project. The strain is declared at TRL 9 after three years of spring field application; intellectual property is held between the company and P3-UCO; all steps towards commercial use are complete. Next: the administrative path to authorisation as a plant protection product.
P6-UNITO with Agrifutur Srl (external company)	Development of the Metarhizium anisopliae strains BP1q and Cnv2i into a microbial biopesticide for Philaenus spumarius management (KER9).	BP1q validated in replicated field trials in Apulia in two consecutive years at approximately 40 % efficacy without an optimised formulation; strains owned by P6-UNITO. Next: conclusion of a formal collaboration and exploitation agreement defining IP, formulation development and commercialisation, then formulation optimisation, shelf-life studies and registration.

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Partner	Intended commercial exploitation	Status at M47 and next step
P2-IVIA and P1-CSIC with Evolving Therapeutics SL (external company)	Development of phage-based biocontrol products against Xf (KER12).	Pilot field trial on grapevine with an active Pierce's disease outbreak conducted with the company. Next: clarification of the rights position, patentability assessment, and a licence or joint development agreement.
Knowledge-transfer offices of P1-CSIC, P2-IVIA, P3-UCO, P4-UdG, P6-UNITO, P5-CNR	Protection and licensing of biocontrol strains, peptides, materials, phages and diagnostic know-how (KER2, KER9, KER10, KER12).	No filings to date. Next: the patentability assessments and protection decisions listed in the corresponding fact sheets, all due by M48, followed by approaches to industry with non-confidential dossiers.
P22-AciesBio — confidential know-how	Fermentation and freeze-drying processes for viable bacterial biomass (KER11).	Held as confidential proprietary know-how: medium composition, cultivation strategy, freeze-drying conditions and process parameters are not publicly disclosed. Next: scale-up, stability and shelf-life studies, and the regulatory assessment.

6.3. Uptake by practitioners and public authorities

BeXyl adopted a multi-actor approach from its inception, involving key stakeholder organisations in the consortium and building its work plan around research priorities expressed by stakeholders. The instruments for practitioner uptake are therefore already in place and are used as exploitation channels: the Practitioners Panel and the BeXyl Network, which bring together official agencies and plant health services, farmers, foresters and nurserymen, operational groups, diagnostic laboratories and phytosanitary inspectors, and companies providing agricultural inputs or services; the practice abstracts published in the EIP-AGRI format on the EU CAP Network, which are the standard vehicle for delivering a ready-to-use practice to farmers and which have already carried the ground-cover management result of KER9; the seminar series run jointly with EFSA; the demonstration and training events; and the final joint conference. The Policy Brief D9.9 is the instrument through which the policy-relevant conclusions of KER6, KER13 and KER14 are addressed to decision-makers.

6.4. Further research and open science

A large share of the BeXyl portfolio will be exploited by being re-used. This is not a residual category: the genomic reference datasets, the bioinformatics workflows released with persistent identifiers, the epidemiological and species-distribution models, the strain, phage and fungal collections, the sentinel plot network and its protocol, the botanic garden surveillance scheme, the phenotyping pipelines and the socio-economic datasets constitute an infrastructure that will support work on *Xylella fastidiosa* and on other xylem-limited pathogens for years. The conditions for that re-use are set by the Data Management Plan: deposit in trusted repositories, persistent identifiers, FAIR metadata, open licences where no protection is sought, and material transfer agreements for biological material. The consortium's links with sister projects and with the EFSA seminar series provide the community through which re-use actually happens.

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7. INTELLECTUAL PROPERTY STRATEGY

7.1. Current position

At month 47 no patent application, plant breeder right application or trademark has been filed by BeXyl. The position is not, however, one of inactivity. One entomopathogenic fungal strain is under commercial development with an established biological control company, with intellectual property held between that company and the owning university and only regulatory authorisation outstanding; a second set of strains is the subject of an intended collaboration and exploitation agreement with a named biopesticide manufacturer; one SME partner holds confidential proprietary know-how covering the production and preservation processes it developed; a draft EPPO Standard is moving through the standardisation process; and the phage work has an established relationship with a phage therapy company. The Exploitation Committee considers the absence of filings explicable rather than satisfactory. It is explicable because the project is a research and innovation action in which the majority of results are destined for regulatory, practitioner or open-science uptake, where formal protection would add cost without adding value; because the results with the clearest inventive character — the antibiofilm peptides, the glass-ceramic composition, the biocontrol strains, the microbial community and its production process, and the lead bacteriophage — only reached the stage of field validation in 2025; and because plant breeder rights cannot be applied for until breeding selections reach the stage of distinctness, uniformity and stability testing, which none of the BeXyl selections has yet done. It is not satisfactory because it means that the protection decisions on which a decade of downstream exploitation depends are concentrated in the final months of the action and in the period immediately following it, and because the partner declarations show a recurrent formula — that an IP assessment is recommended before commercialisation — which is a decision deferred rather than a decision taken.

The Plan therefore treats the completion of the protection assessments as the highest-priority action. Five assessments are due by month 48: the antibiofilm peptide application and the glass-ceramic composition under KER10, the remaining biocontrol strains and the antagonistic protein fraction under KER9, the synthetic community composition under KER11, and the lead bacteriophage and cocktail under KER12. Each concludes with a recorded decision — file, keep as know-how, or publish — taken by the owning institution's knowledge-transfer office with the support of the Exploitation Committee.

7.2. Protection instruments and their applicability

The instruments available to protect a result are not equally applicable to the BeXyl portfolio. The project has generated few results of the kind that a patent protects well, while a substantial part of the portfolio consists of protocols, models, software, datasets and draft standards whose value depends on being taken up widely rather than on being kept exclusive. Table 7 reviews each instrument in turn, indicates the classes of BeXyl result to which it could apply and records the assessment of the Exploitation Committee, including the cases in which the Committee considers that no formal protection should be sought and that publication or a permissive licence is the more effective route.

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Table 7. Protection instruments and their applicability to the BeXyl portfolio.

Instrument	Applicable to	Assessment
Patent	Antimicrobial and elicitor peptides for a specific use; composition and thermal treatment of antimicrobial glass-ceramics; entomopathogenic fungal strains used as biocontrol agents; composition of synthetic microbial communities and the procedure for their cultivation in low-cost media; bacteriophages and cocktails for the control of Xf; diagnostic tools discriminating resistant from susceptible genotypes.	The principal instrument for the WP5 and WP6 results. Requires that novelty be preserved: the prior-notification procedure of the Consortium Agreement is the operative safeguard. Cost and territorial scope to be decided by the owning institution.
Plant breeder rights	New olive and almond genotypes obtained through controlled cross-breeding.	The natural instrument for KER8 and the one with the longest horizon. Two Exploitation Committee members have direct experience of protecting olive cultivars and fruit-tree varieties in this way. No selection is yet ready; disclosure control until the registration decision is essential.
Know-how and trade secret	Probe design optimisation; calibration and ground-truthing procedures for remote sensing; equipment control and treatment-recording software; fermentation media and process parameters; canine training methodology.	The dominant instrument where the innovation is procedural rather than inventive, or where publication has already occurred. Requires documented confidentiality management rather than registration.
Copyright and software licences	Bioinformatics workflows, modelling code, analysis pipelines, embedded equipment software.	Open licensing is the default for the research software, because adoption and citation are the value. Embedded equipment software of the SME partner remains proprietary.
Database rights	Genomic reference datasets; the factsheet database on epidemic management; survey and field datasets.	Managed through the Data Management Plan; open with attribution, subject to embargo where protection is pending and to GDPR where personal data are involved.
Trademark	Potential product names for formulations, equipment or services.	Not applicable at present; relevant to the SME partners at the point of product launch.
Access-and-benefit-sharing compliance	Strains, phages and sequence data derived from material collected in Costa Rica, Brazil and Argentina, including digital sequence information.	Not a protection instrument but a precondition for lawful exploitation. The responsible partner must verify the terms under which the material was obtained and any Nagoya Protocol obligations before depositing a genomic dataset or commercialising a derived product.
Restrictions on official surveillance data	Plot-level infection status, geolocated positive findings, occurrence datasets supplied by plant protection organisations.	Usable within the project and publishable in aggregated or coded form; release at plot level or redistribution of supplied datasets requires the agreement of the competent authority. Applies to KER1, KER6 and KER14.
Material transfer agreements	Strains, phages, fungal isolates, plant genotypes, probes.	The practical instrument by which BeXyl biological material is exploited by third parties while the owner's rights and phytosanitary obligations are preserved. Required for the distribution of the pre-selected olive genotypes between partner institutes.

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7.3. Background intellectual property

Exploitation of one KER depends explicitly on pre-existing protected background: the olive-mill by-product extracts of KER10 are obtained by processes covered by patents held by P1-CSIC, including the process for obtaining the hydroxytyrosol extract, the procedure for obtaining the dihydroxyphenylglycol extract, and the use of that compound in natural herbicide formulations. Because the background and the result are held by the same beneficiary, the position is straightforward, but it must be stated in any licence so that a licensee obtains rights to both. Other background relevant to exploitation — the commercial thermotherapy equipment and control software of P23-RG Projects, the fermentation platform and media know-how of P22-AciesBio, the nursery production know-how and micropropagated rootstock material of P25-Agromillora, the institutional strain and germplasm collections, and the imaging platforms — is identified in the written agreement on background and is recorded in the corresponding fact sheets.

8. TARGET USERS AND DEMAND

The demand side of the Plan rests on the stakeholder profiling carried out at proposal stage and refined through the Practitioners Panel and the WP8 fieldwork. Table 8 relates each user group to the KERs that concern it and to the channel through which it will be reached. The socio-economic work of KER14 provides an important corrective to any assumption that demand is uniform: the case-study regions show markedly different attitudes, from mixed risk perception and low confidence in authorities where the pathogen is not yet present, to distress over the delivery of eradication and a desire to move to containment where it is being eradicated, to acceptance combined with a strong appetite for resistant varieties and diversification where the disease is established. An exploitation strategy that ignores this variation will fail in at least one of the three situations.

Table 8. Target user groups, the results that concern them and the channels used.

User group	KERs of direct interest	Channel
National Plant Protection Organisations, reference laboratories and phytosanitary inspectors	KER1, KER2, KER3, KER4, KER5, KER6, KER13	EPPO panels and standards, Euphresco, EU Reference Laboratory network, direct presentation to NPPOs, Policy Brief D9.9, final conference
EFSA and European Commission services	KER3, KER6, KER13, KER14	EFSA working groups and seminar series, Policy Brief, scientific publications, direct provision of models and datasets
Nurseries and plant propagators	KER7, KER8	P19-ENA and its national member associations, demonstration events, multilingual questionnaire follow-up, commercial catalogue of P23-RG Projects and P25-Agromillora
Olive, almond and grapevine growers, cooperatives and advisory services	KER7, KER8, KER9, KER10, KER13	EIP-AGRI practice abstracts on the EU CAP Network, P24-UNAPROL and producer organisations, field demonstration events, training materials and videos

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User group	KERs of direct interest	Channel
Industry: biocontrol, biostimulant and plant protection product manufacturers, diagnostic kit manufacturers, equipment manufacturers, earth-observation service providers	KER2, KER4, KER7, KER9, KER10, KER11, KER12	Non-confidential dossiers from the knowledge-transfer offices, the SME partners' own commercial channels, the presentation of this Plan described in Section 13, innovation networks
Research community	All KERs, in particular KER1, KER4, KER6, KER8, KER13, KER14	Open-access publications, repositories with persistent identifiers, material transfer agreements, sister projects, doctoral training
Botanic gardens, germplasm banks and civil society	KER1, KER5, KER7, KER14	P31-BGCI network and the ex situ surveillance scheme, awareness materials, citizen-facing outputs of WP8 and WP9

9. SUSTAINABILITY BEYOND THE END OF THE ACTION

9.1. What the obligation requires

The action ends on 31 August 2026. The obligation of the beneficiaries to use their best efforts to exploit their results, directly or through transfer or licensing, runs until 31 August 2030. If a result is not exploited within one year after the end of the action, that is by 31 August 2027, the beneficiaries must use the Horizon Results Platform to find interested parties, unless otherwise agreed in writing with the granting authority. Deliverable D9.1 further recorded the consortium's own commitment to ensure the exploitation of the project results, not restricted to marketable products, beyond the project lifetime for a period of at least three years. The Plan converts these into three concrete arrangements.

9.2. Custodianship

Every KER is assigned a custodian: the partner responsible for keeping the result available, answering enquiries about it, and pursuing the actions listed in its fact sheet after the project ends. Custodians are identified in Table 9 together with what they undertake to maintain. The coordinator maintains the register of custodians and the consolidated results ownership list, and is the point of contact for third parties who do not know whom to approach.

Table 9. Custodianship of the Key Exploitable Results after the end of the action.

KER	Custodian	What is maintained beyond M48
KER1, KER4	P1-CSIC (with P29-UOM for KER4)	Probe designs, analysis workflows and remote-sensing software in public repositories; capacity to run the methods as a service; the sentinel plot network, maintained as an enabling asset rather than as a KER
KER2	P2-IVIA, with P5-CNR and P16-UCR	Validated protocols and validation dossiers; contact point for kit manufacturers
KER3	P14-NIB	The harmonised protocol, the study report and the anonymised performance dataset; the interface with EPPO and Euphresco
KER5	P5-CNR	Training protocol, performance data and the trained teams

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KER	Custodian	What is maintained beyond M48
KER6	P2-IVIA, with P8-INRAE and P5-CNR	Models and code in public repositories; the interface with EFSA
KER7	P5-CNR (protocols) and P23-RG Projects (equipment), with P19-ENA	Treatment protocols and inactivation datasets; equipment product line and service; sector interface for the EPPO standardisation effort
KER8	P18-IFAPA, P5-CNR and P11-ARO-VOL, with P25-Agromillora	Field plots, progenies and pre-selected genotypes; genomic resources; the registration decisions
KER9	P3-UCO and P6-UNITO	Strain collections and deposits; efficacy dossiers; contact point for biocontrol manufacturers
KER10	P4-UdG (peptides, essential oil) and P1-CSIC (materials, extracts)	Compound libraries and synthesis capability; efficacy data; the link to the background patent portfolio
KER11	P1-CSIC and P22-AciesBio jointly	Strain deposits, community composition and the selection platform (P1-CSIC); the fermentation and freeze-drying processes as confidential know-how (P22-AciesBio)
KER12	P2-IVIA with P1-CSIC	Phage collection and deposits; quantification protocol; the relationship with the phage therapy company
KER13	P7-UNIBS	Model code, documentation and parameterisation; the IPM schemes
KER15	P20-EPPO with P5-CNR	The draft standard and its technical dossier, through Panel review and country consultation
KER14	P30-FCRA and P28-JRC	Factsheet database, anonymised qualitative and survey datasets, the economic assessment

9.3. Continuity of the long-horizon results

Two elements of the portfolio have exploitation horizons that exceed any single funding instrument and require deliberate continuity planning. The first is the breeding material of KER8: olive progenies planted in 2025 will not be evaluable for resistance and fruit traits for several years, and the field plots must be maintained, monitored and protected in the meantime. The second is the sentinel plot network and the international surveillance schemes of KER1, whose value is precisely that they generate a continuous time series. Neither is a Key Exploitable Result in the sense of Section 4.4 — they are enabling assets rather than results with a single defined user — but both condition the value of KER1, KER4 and KER8 and are therefore carried in this Plan. For both, the custodian institutions are asked to confirm in writing, by month 48, that they will maintain the physical assets from institutional resources, and the coordinator will pursue follow-on funding — national programmes, Euphresco, EU calls addressing plant health, and bilateral agreements with the non-EU partners — during 2026 and 2027. The loss of these assets is identified as risk R1 in Section 11 and is the most consequential risk in the Plan.

9.4. Use of the Horizon Results Platform

The coordinator will publish, by 31 August 2027, a record on the Horizon Results Platform for every KER that has not by then found a route to use, as required by Article 16. In practice the coordinator intends to publish records for the KERs seeking an industrial partner — KER2, KER9, KER10, KER11 and KER12 — earlier than that deadline, at the close of the action,

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because the platform functions as a matchmaking instrument and there is no advantage in waiting.

10. MONITORING AND KEY PERFORMANCE INDICATORS

The indicators below aggregate the KER-level indicators of Section 5 into a small set that the Exploitation Committee and the coordinator can actually track. Targets are set for the end of the action and for the four-year exploitation period. They are deliberately modest in the commercial column: a research and innovation action that produced fourteen credible exploitation routes and converted three or four of them into agreements within four years would be performing well.

Table 10. Exploitation key performance indicators.

No.	Indicator	Target at M48	Target by 2030
E1	Results registered in the consolidated result inventory (Annex 6)	52	maintained and updated
E2	Key Exploitable Results with a completed fact sheet and an assigned custodian	15	15, reviewed annually
E3	Protection assessments completed and decisions recorded	5	all KERs with commercial potential
E4	Applications filed (patents, plant breeder rights)	≥ 1	≥ 3
E5	Joint ownership or joint exploitation agreements concluded	≥ 3	as required
E6	Strains, phages and biological material deposited in recognised collections	≥ 10	≥ 15
E7	Validation dossiers submitted to EPPO, EFSA or Euphresco	≥ 4	≥ 6
E8	BeXyl results incorporated into a standard, guidance document or official survey design	≥ 1 draft standard prepared (PM 10/NEW) and ≥ 3 dossiers submitted	≥ 3 incorporated, including adoption of PM 10/NEW
E9	Licence, exploitation, service, joint development or commercial agreements concluded or under negotiation	≥ 1 (EAMa 01/58-Su with Koppert Biological Systems)	≥ 3
E10	Practice abstracts and grower-facing guidance derived from KERs	≥ 8 practice abstracts	maintained on the EU CAP Network
E11	Datasets, software and protocols released with a persistent identifier	≥ 15	≥ 25
E12	Records published on the Horizon Results Platform	≥ 5	all unexploited KERs

Monitoring is carried out by the Exploitation Committee, which will meet at least annually during the post-project period, convened by the coordinator. The values of E1 to E12 will be reported in the final periodic report and thereafter in a short annual note circulated to the consortium and available to the granting authority on request. The consolidated results ownership list required by Article 16 will be submitted with the final periodic report.

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11. EXPLOITATION RISKS AND MITIGATION

The risks recorded in this section are those that would prevent a result from reaching its intended user; the scientific and management risks of the action are covered by the project risk register and are not repeated here. They were identified by the Exploitation Committee from the fact sheets of Section 5 and from the discussion of the exploitation routes in Section 6. Each risk is given an effect and a mitigation measure with an identified owner, and each mitigation measure that requires an activity is reflected in the action plan of Section 12 and monitored through the indicators of Section 10. Table 11 presents the risks in order, beginning with those that materialise at the end of the action and continuing with those that would arise during the four year exploitation period.

Table 11. Exploitation risks and mitigation measures.

No.	Risk	Effect	Mitigation
R1	Long-horizon assets — olive breeding progenies, field plots, the sentinel plot network — are not maintained after the end of the action.	Irreversible loss of the results with the highest long-term value; a decade of work becomes unusable.	Custodianship assigned in Table 9, with written confirmation from the custodian institutions requested by M48; coordinator to pursue follow-on funding during 2026–2027; the assets are physically held by institutions with a standing mandate in olive and almond breeding.
R2	Premature disclosure destroys the novelty required for patenting.	Loss of the commercial route for the peptides, glass-ceramics, biocontrol strains, microbial communities and phages.	Prior-notification procedure of the Consortium Agreement enforced by the Exploitation Committee; five protection assessments due by M48; publication of the 2025 field trial results held until the assessments conclude.
R3	Protection decisions are deferred beyond the end of the action and never taken, because the project structures that would force them have dissolved.	Results drift into the public domain by default rather than by decision.	All five assessments have M48 deadlines; the Exploitation Committee continues to meet annually; the coordinator holds the register and the reminder function.
R4	Standardisation and regulatory processes take longer than the exploitation period.	Regulatory KERs show no measurable uptake within four years despite being on the right track.	Entry points are already open through Euphresco, the EPPO panels and the EFSA seminar series; indicators E7 and E8 measure submissions as well as adoptions, so that progress is visible.
R5	No industrial partner takes up a biocontrol or plant protection candidate because of the cost and duration of product registration.	KER9, KER10, KER11 and KER12 stall at the laboratory stage.	Parallel practitioner routes that do not require registration, in particular the ground-cover practice; framing of the microbial community as a biostimulant where the evidence supports it; non-confidential dossiers prepared for approach to industry; Horizon Results Platform records.
R6	Field efficacy does not confirm controlled-condition efficacy.	The value proposition of the biological solutions weakens.	The 2025 field trials are designed to test exactly this; fallback value propositions are identified per KER; negative results are themselves reported, as was done for the LED trap.

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No.	Risk	Effect	Mitigation
R7	Joint ownership is not formalised and blocks later licensing.	Results that require agreement between two or more partners cannot be transferred or licensed.	Three joint ownership or exploitation agreements identified as M48 actions (KER4, KER11, and the nursery-scale protocol under KER7); Article 16 procedure applied.
R8	Transfer or exclusive licensing to an entity in a non-EU country not associated with Horizon Europe triggers an objection by the granting authority, or proceeds without the required notification.	Delay or invalidity of an exploitation act; non-compliance with the Grant Agreement.	Flagged in the fact sheets of the KERs with non-EU contributors; the coordinator is the single point through which such notifications are made.
R9	The Exploitation Committee loses members and quorum after the end of the action.	No body remains to take or record protection decisions.	Replacement of the departed external member requested; annual meeting commitment; the coordinator retains the convening obligation.

12. ACTION PLAN

Table 12 consolidates the actions from the fact sheets into a single schedule. Actions due by month 48 are commitments of the consortium within the lifetime of the action; the remainder fall within the four-year exploitation period and are the responsibility of the custodians identified in Table 9.

Table 12. Consolidated exploitation action plan.

No.	Action	Owner	Deadline
A1	Complete the patentability assessment of the antibiofilm peptide application	P4-UdG	M48
A2	Complete the patentability assessment of the glass-ceramic composition and treatment	P1-CSIC	M48
A3	Take and record a protection decision for each lead entomopathogenic fungal strain	P3-UCO, P6-UNITO	M48
A4	Conclude the joint ownership and exploitation agreement for the synthetic microbial communities and complete the joint patentability assessment	P1-CSIC, P22-AciesBio	M48
A5	Clarify the rights position with the external company on the phage field pilot and complete the phage patentability assessment	P2-IVIA, P1-CSIC	M48
A6	Conclude the joint ownership agreement for the remote-sensing pipeline	P1-CSIC, P29-UOM	M48
A7	Deposit strains, phages and fungal isolates in recognised culture collections	Owning partners	M48
A8	Submit validation dossiers to EPPO for the targeted sequence-capture method, the triplex qPCR and the digital PCR study	P1-CSIC, P2-IVIA, P14-NIB	M48

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No.	Action	Owner	Deadline
A9	Record the registration intention and the disclosure restrictions for each pre-selected olive genotype; complete the agreed distribution under material transfer agreement	P18-IFAPA, P5-CNR	M48
A10	Release model code, analysis pipelines, protocols and datasets with persistent identifiers, subject to the Data Management Plan	All custodians, coordinated by P1-CSIC	M48
A11	Convert the crop-specific IPM schemes and the validated practices into practice abstracts and grower-facing guidance	P26-Surrender MS, WP9, with P7-UNIBS	M48
A12	Hold the presentation of the Exploitation Plan to end-users and companies (Section 13)	P1-CSIC with WP9	M47–M48
A13	Submit the consolidated results ownership list with the final periodic report	P1-CSIC	M48 + reporting period
A14	Publish Horizon Results Platform records for the KERs seeking an industrial partner	P1-CSIC	M48, and by 31 Aug 2027 for all unexploited KERs
A15	Complete the commercial specification of the thermotherapy laboratory unit and introduce it into the catalogue	P23-RG Projects	2027
A16	Approach biocontrol, biostimulant, plant protection and diagnostic manufacturers with non-confidential dossiers	Knowledge-transfer offices, coordinated by the Exploitation Committee	2027–2028
A17	Secure follow-on funding for the maintenance and evaluation of the breeding populations, the field plots and the sentinel plot network	P1-CSIC with P18-IFAPA, P5-CNR, P11-ARO-VOL	2026–2027
A18	Annual meeting of the Exploitation Committee and annual update of the indicators of Table 10	P1-CSIC	annually to 2030
A19	Take the draft EPPO Standard PM 10/NEW through the outstanding experiments, the update of the technical dossier, review by the EPPO Panel on Phytosanitary Measures and country consultation	P20-EPPO with P5-CNR	M48 – 2027
A21	Obtain result declarations from P5-CNR and P7-UNIBS for KER5 and KER13, which are currently supported by no partner declaration, and update the corresponding fact sheets	P1-CSIC with P5-CNR, P7-UNIBS	before the September 2026 meeting
A20	Conclude the collaboration and exploitation agreement with Agrifutur Srl for the Metarhizium anisopliae strains, and record the status of the Koppert development of EAMa 01/58-Su in the exploitation register	P6-UNITO; P3-UCO	M48 – 2027

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13. PRESENTATION OF THE EXPLOITATION PLAN TO END-USERS AND COMPANIES

Deliverable D9.8 and Milestone MS25 require the presentation of the Exploitation Plan to end-users and companies, with the minutes of the event and the list of end-users and companies attending as the means of verification. The consortium has met this requirement through a **two-event sequence**: a plenary presentation of the project's results and of the exploitation strategy to the full stakeholder community, held in Brussels on 20 May 2026, and a dedicated result-by-result exploitation meeting with specifically targeted stakeholders, convened for the last week of September 2026. This section describes both, and sets out the reason for the sequencing.

13.1. Purpose

The presentation has three purposes that are distinct and should not be confused. The first is to inform: to place before the users and the industry the full inventory of what BeXyl has produced and what is available to be taken up. The second is to match: to bring the partners holding a result into direct contact with the organisations that might use or commercialise it, which is something no written plan can accomplish. The third is to test: to expose the exploitation assumptions of this Plan to the people who would have to act on them, and to correct the Plan where they do not hold. The first purpose was served by the Brussels event; the second and third require the smaller, targeted format of the September meeting.

13.2. First event: Final stakeholders meeting, Brussels, 20 May 2026

At the Brussels meeting the coordinator and the work package leaders presented and discussed the project's main findings with growers, plant nurseries, risk managers and policymakers. The presentation covered the results of four years of research and, in doing so, walked the audience through the substance of the exploitation portfolio described in Sections 4 and 5 of this Plan:

- the new understanding of the drivers of Xylella fastidiosa epidemics in Europe, which underpins the surveillance and risk-assessment results (KER6, KER13);
- the demonstrated feasibility of more advanced methods for surveillance, early detection and monitoring of Xylella fastidiosa epidemics, using airborne tools, on-the-ground sensors and state-of-the-art epidemiological models (KER1 to KER6);
- the confirmation that thermal treatment can be a solution for the safe trade of vegetal material of host species other than grapevine in infected areas, which is the core of the nursery-facing exploitation route (KER7);
- the encouraging results on the use of fungi and viruses to control insect vector populations, and the trials on microbial consortia to increase plant resilience to infection, which together open the way to more sustainable tools for reducing the spread of Xylella-related diseases (KER9, KER10, KER11, KER12); and
- the tools developed to enhance the socio-economic impact assessment of the outbreak and to support policy decisions and outbreak management (KER14, KER13).

The main features of the event, its audience and the exploitation relevant outcomes recorded in the minutes are summarised in Table 13.

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Table 13. Details of the final stakeholders meeting held in Brussels.

Item	Detail
Title	Science, Innovation and Action Against Xylella fastidiosa in Europe — BeXyl final stakeholders meeting
Date and place	20 May 2026, Delegation of the Regional Government of Andalusia in Brussels, Belgium
Format	Hybrid, with in-person and online participation
Presented by	The BeXyl coordinator and the work package leaders
Audience	Growers, plant nurseries, risk managers and policymakers, together with the research community and EU institutional stakeholders
Evidence	Minutes of the meeting, list of participating end-users and companies, agenda, presentations and a video record of the event

The event was recorded and the video published through the project's communication channels. Its summary reads: BeXyl held its final meeting with stakeholders in Brussels, presenting the results of four years of intense research into the epidemiology, surveillance and early detection of *Xylella fastidiosa*, as well as new biological control approaches, plant resilience strategies, policy support tools and socio-economic impact assessments. This work will provide scientists, stakeholders and policymakers with the knowledge and tools needed to improve the management of *Xylella fastidiosa* outbreaks in Europe.

The Brussels meeting therefore discharged the informing function of D9.8 and MS25 in front of the full stakeholder community, and it did so at the point in the project when the results were complete enough to be presented as findings rather than as expectations. What it could not do, in a plenary format addressed to a broad audience, was to hold the result-by-result conversations on which actual exploitation depends. That is the object of the second event.

13.3. Second event — dedicated exploitation meeting, last week of September 2026

Several of the stakeholders whose participation matters most for the commercial routes were contacted during the spring and were not available during July and August, which in the Mediterranean agricultural and nursery sector is the period of lowest availability. Holding the meeting in July would have secured the date at the cost of the audience. The consortium has therefore scheduled it for the last week of September 2026, immediately after the end of the action. This is a deliberate choice and it does not affect compliance: the deliverable and milestone requirements are already met by the Brussels event of 20 May 2026, which took place within the lifetime of the project and for which the minutes and the list of participating end-users and companies are on record; and the obligation of the beneficiaries to use their best efforts to exploit their results runs, under Article 16 and Annex 5 of the Grant Agreement, until 31 August 2030, so that exploitation activity after the end of the action is precisely what is expected rather than an exception to be justified.

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The purpose, format, audience and expected outputs of that meeting are set out in Table 14. The invitation list will be drawn from the organisations named by the partners in their result declarations and from the expressions of interest registered after the Brussels event, and the working instrument of the meeting will be the consolidated inventory of Annex 6 together with the fact sheets of Section 5.

Table 14. Details of the dedicated exploitation meeting.

Item	Detail
Purpose	Result-by-result presentation of the Key Exploitable Results of Section 5 to specifically identified stakeholders, in order to establish their interest in exploiting them and to agree the next step for each
Date	Last week of September 2026
Place and format	Hybrid: in person at the facilities of the Instituto de Agricultura Sostenible (IAS-CSIC), Córdoba, Spain, and online
Convened by	The coordinator (P1-CSIC) with the Exploitation Committee
Audience	Stakeholders contacted individually and selected against the target-user column of each Key Exploitable Result: biocontrol, biostimulant and plant protection product manufacturers; diagnostic kit manufacturers; thermotherapy equipment and nursery sector actors; earth-observation and precision-agriculture service providers; phage therapy companies; breeding and propagation companies; national plant protection organisations, reference laboratories, EPPO and EFSA; producer organisations, cooperatives and advisory services
Evidence	Agenda, list of invited and attending stakeholders, minutes, and the register of expressions of interest described in Section 13.4

Format. The meeting is organised around the Key Exploitable Results rather than around the work package structure, because that is how the audience thinks about them. It opens with a short plenary that sets out the exploitation logic of this Plan and the four routes of Table 4. It continues with four thematic sessions — diagnostics and surveillance; healthy propagation material and germplasm; biological control and plant protection; decision support and socio-economic assessment — in each of which the custodian partner presents the relevant KERs using the fact sheets of Section 5, stating what the result does, who it is for, what its protection status is and what would have to happen next. Each session closes with an open discussion of the conditions the stakeholders would need in order to take the result forward: cost, regulatory pathway, volume, exclusivity, time to market and the support they would expect from the result holder. A structured bilateral slot then allows individual conversations between result holders and interested organisations, and a closing plenary records the outcome.

Supporting material. The stakeholders invited to the September meeting receive in advance this Exploitation Plan, the fact sheets of the results relevant to them, and the consolidated table of results available for exploitation compiled by the Exploitation Committee from the partners' declarations. That table, which lists each declared result with its owner, its maturity, its intended use and the type of exploitation sought, is the working instrument of the meeting:

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stakeholders are asked to indicate against it which results they would be interested in exploiting and on what basis.

13.4. Follow-up and register of expressions of interest

The minutes and the lists of participants of both events constitute the evidence for Deliverable D9.8 and Milestone MS25 and are annexed to the event records. Every expression of interest arising from either event is logged by the coordinator with the result concerned, the organisation, the contact person, the nature of the interest — licence, joint development, service, material transfer, further research or adoption in practice — and the agreed next step with a date. Each entry is passed to the custodian identified in Table 9 and to the relevant knowledge-transfer office, which is responsible for the follow-up. The register is reviewed at the first post-project meeting of the Exploitation Committee, and the outcome of each expression of interest is recorded against indicator E9 of Table 10. Where a stakeholder identifies a condition that this Plan has not anticipated, the Exploitation Committee amends the corresponding fact sheet, which is the mechanism by which the Plan remains a working document rather than a closing statement.

14. CONCLUSIONS

BeXyl set out to move beyond the emergency response to *Xylella fastidiosa* and to provide an integrated management system. Judged by what it has produced, it has done so: the portfolio in Table 3 covers detection, surveillance design, healthy propagation, resistance, vector control, direct control of the bacterium, decision support and impact assessment, and in each of those areas there are results that a defined user could begin using.

Three conclusions follow for the exploitation of those results. First, the dominant route is regulatory rather than commercial, and this should be stated plainly rather than apologised for. For a regulated quarantine pest, a diagnostic method incorporated into an EPPO standard, or a survey design that reduces the sampling burden on every Member State, delivers more value than most licences would; and BeXyl has positioned itself well on that route, with validation dossiers already moving through the Euphresco and EPPO channels.

Second, the commercial route is real but narrow, and it is concentrated in the results held by, or developed with, the industrial partners: thermotherapy equipment and protocols, the formulated microbial community, the resistant germplasm and, further out, the peptides, the biocontrol strains and the phages. These are the results for which the protection decisions due by month 48 matter, and the Plan makes those decisions its first priority.

Third, and most importantly, the results with the greatest long-term value are also those with the longest horizon and the weakest institutional protection. The olive breeding progenies planted in 2025 and the sentinel plot network will only prove their worth after the exploitation obligation of the Grant Agreement has expired. Ensuring that they survive the end of the funding is the most consequential exploitation action in this Plan, and it is one that depends less on intellectual property strategy than on the commitment of the custodian institutions and on the coordinator's success in finding follow-on support.

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The Exploitation Committee will review this Plan at the final General Assembly, will meet annually thereafter until 2030, and will report the indicators of Table 10 to the consortium and, on request, to the granting authority.

Finally, and as stated on the cover page, this version of the Plan is a draft. Its factual content, and in particular the statements on ownership, protection status and exploitation intent, must be confirmed by each partner and, where the institution so requires, cleared by its competent knowledge transfer, legal and contracts departments. Corrections should reach the coordinator before the end of the project and the institutional approvals by early September 2026, since the summer break makes consultation during August impracticable. The version endorsed by the General Assembly after that review will be the reference document for the exploitation period running to 31 August 2030.

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ANNEX 1. RESULT DECLARATION TEMPLATE

The template below is the one circulated by the Exploitation Committee to all partners for the result-collection exercise described in Section 1.4. It is reproduced here so that it can continue to be used for results that mature after the end of the action.

Table 15. Result declaration template.

Field	Guidance for the partner completing it
Result identifier and short name	A short, memorable name; the identifier is assigned by the coordinator.
Work package and task	Where the result was generated.
Lead partner and contributing partners	Who generated it, and what each contributed. This is the basis for establishing ownership.
Type of result	Method or protocol; software or algorithm; dataset; biological material; device or prototype; model; guideline or scheme; other.
Description	What it is and what it does, in terms a non-specialist user could understand.
Current maturity	Stage of validation: concept, laboratory, controlled conditions, pilot or field, operational. An estimated technology readiness level where meaningful.
Intended use and users	What would somebody do with this, and who is that somebody?
Exploitation route	Regulatory or standardisation; commercial; practitioner or public authority; further research and open science. More than one may apply.
Background required	Any pre-existing knowledge, material, software or rights — of your institution or of a third party — without which the result cannot be used.
Protection status	Any application filed or planned; any confidentiality obligation; any material transfer or collaboration agreement affecting the result.
Publication status	Published, submitted, planned, or held. Include planned conference presentations.
Interest of third parties	Any company, authority or institution that has already expressed interest.
Actions required	What would have to happen for this result to be used, and by whom.
Declaring person and date	Name, partner, date.

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ANNEX 2. KEY EXPLOITABLE RESULT FACT-SHEET TEMPLATE

The structure used for the fifteen fact sheets in Section 5, provided blank for reuse.

The template reproduces the fields used in the fact sheets of Section 5 in the same order, so that a new entry can be added to the Plan without loss of comparability. It is provided blank so that it can be completed for results that mature after the end of the action, for results whose exploitation intent changes during the four year exploitation period, and for the two results identified in Section 4.4 for which no partner declaration has yet been received. Completed fact sheets should be sent to the coordinator, who keeps them with the register of results and, where the result is of interest to third parties, publishes the corresponding entry on the Horizon Results Platform.

Table A1. Key Exploitable Result fact-sheet template.

Description	
Work package and contributors	
Ownership and rights position	
Maturity	
Target users	
Exploitation route and value proposition	
Background required	
Protection status and decision	
Actions and deadlines	
Indicator of uptake	
Main risk and mitigation	

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ANNEX 3. MEMBERS OF THE EXPLOITATION COMMITTEE

The Committee was appointed in January 2023 as reported in deliverable D9.1, section 4.4. Each member signed a letter of commitment and confidentiality. Members were selected so that the Committee collectively covers every protection instrument relevant to the project portfolio.

Table A2. Composition of the BeXyl Exploitation Committee.

Partner	Member	Relevant expertise
P1-CSIC	B. B. Landa	Protection by patent of molecular diagnostic protocols and of microorganisms of agronomic interest
P1-CSIC	P. Domingo	Protection by patent of bacteriophages against multi-drug resistant bacteria; protection of know-how; contracts with private companies; experience of launching a spin-off
P3-UCO	E. Quesada	Protection by patent of microorganisms used as biocontrol agents of pests
P4-UdG	E. Montesinos	Protection by patent of microorganisms used as biocontrol agents of plant pathogens and of functional peptides for plant disease control
P11-ARO-VOL	O. Bahar	Protection by patent of microorganisms used as biocontrol agents
P18-IFAPA	L. León	Protection of new olive cultivars from cross-breeding programmes by plant breeder rights
P22-AciesBio	G. Kosec	Protection and commercialisation of innovative biotechnological products and technologies
P23-RG Projects	S. Giménez	Design and protection of thermotherapy equipment
P25-Agromillora	M. Bordas	Protection of new fruit-tree varieties by plant breeder rights and patents
P1-CSIC (external)	Knowledge Transfer, Commercial Strategy and Internationalization Area	Management of intellectual property rights, in particular patents. The appointed member has left the organisation and a replacement has been requested.
P5-CNR (external)	A. Naso, Unità Valorizzazione della Ricerca	Management of intellectual property rights, in particular patents, new plant varieties and trademarks, and related technology transfer actions

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ANNEX 4. BEXYL PARTNERS

Partners are referred to throughout this Plan by the identifier used in the Grant Agreement, from P1 to P31, followed by the short name of the organisation. Table 17 gives the correspondence between those identifiers, the full legal names and the countries of establishment, and distinguishes the beneficiaries from the associated partners.

Table A3. List of BeXyl partners. P1–P28 are beneficiaries; P29–P31 participate as associated partners and do not receive EU funding, which matters because the protection and exploitation obligations of Annex 5 attach to beneficiaries that have received funding under the grant. P21 appears in the Grant Agreement under its former name, SEMILLA – Serveis de Millora Agrària i Pesquera; P25 appears in the Grant Agreement under the short name AIBE and is referred to in this Plan as Agromillora.

No.	Organisation	Short name	Country
P1	Agencia Estatal Consejo Superior de Investigaciones Científicas (coordinator)	CSIC	ES
P2	Instituto Valenciano de Investigaciones Agrarias	IVIA	ES
P3	Universidad de Córdoba	UCO	ES
P4	Universitat de Girona	UdG	ES
P5	Consiglio Nazionale delle Ricerche	CNR	IT
P6	Università degli Studi di Torino	UNITO	IT
P7	Università degli Studi di Brescia	UNIBS	IT
P8	Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement	INRAE	FR
P9	Auburn University	AU	US
P10	The Regents of the University of California	UC	US
P11	Agricultural Research Organisation of Israel – The Volcani Centre	ARO-VOL	IL
P12	Ludwig-Maximilians-Universität München	LMU	DE
P13	AIT Austrian Institute of Technology GmbH	AIT	AT
P14	Nacionalni Inštitut za Biologijo	NIB	SI
P15	Agência Paulista de Tecnologia dos Agronegócios	APTA-IAC	BR
P16	Universidad de Costa Rica	UCR	CR
P17	Centro di Ricerca, Sperimentazione e Formazione in Agricoltura 'Basile Caramia'	CRSFA	IT
P18	Instituto Andaluz de Investigación y Formación Agraria, Pesquera, Alimentaria y de la Producción Ecológica	IFAPA	ES
P19	European Nurserystock Association	ENA	BE
P20	Organisation Européenne et Méditerranéenne pour la Protection des Plantes	EPPO	FR
P21	Institut de Recerca i Formació Agroalimentària i Pesquera de les Illes Balears	IRFAP	ES
P22	Acies Bio, biotehnološke raziskave in razvoj d.o.o.	AciesBio	SI

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No.	Organisation	Short name	Country
P23	Soluciones Energéticas de Levante S.L.	RG Projects	ES
P24	Unaprol – Consorzio Olivicolo Italiano	UNAPROL	IT
P25	Agromillora Iberia S.L.U.	AIBE	ES
P26	Surrender Media Solutions	Surrender MS	BE
P27	Instituto Nacional de Tecnología Agropecuaria	INTA	AR
P28	Joint Research Centre	JRC	BE
P29	University of Melbourne	UOM	AU
P30	Forestry Commission Research Agency	FCRA	UK
P31	Botanic Gardens Conservation International	BGCI	UK

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ANNEX 6. CONSOLIDATED INVENTORY OF DECLARED RESULTS

The table below reproduces the fifty-two results declared by the partners in the result-collection exercise of 2026, harmonised into a common format, ordered by work package and task, and mapped to the Key Exploitable Result of Section 5 that carries them. The 'Partners involved' column is reproduced as declared, since it is the record of who contributed to each result and therefore the starting point for establishing ownership. Technology readiness levels are those declared by the partners. The full inventory, including the contact person, the declared exploitation needs, the named organisations of interest and the intellectual property notes for each result, is maintained by the Exploitation Committee as a companion spreadsheet and is the working instrument of the meeting described in Section 13.3.

Table A4. Consolidated inventory of the fifty-two results declared by the BeXyl partners, mapped to the Key Exploitable Results.

Ref	WP / Task	Result	Partners involved	TRL	Route*	KER
R01	WP1 / T1.1	Standardised protocol and central coordination of the BeXyl X. fastidiosa sentinel plot network	P1/IAS-CSIC, P2/IVIA, P4/UdG, P5/CNR, P8/INRAE, P9/AU, P15/APTA-IAC, P16/UCR, P17/CRSFA, P21/IRFAP, P27/INTA	TRL 6	R, P, S	Enabling asset (supports KER1, KER4, KER6)
R02	WP1 / T1.1	Sampling and central diagnostic service for early detection of X. fastidiosa in botanic gardens	P1/IAS-CSIC, P31/BGCI	TRL 6	R, P, S	Enabling asset (supports KER1, KER6)
R03	WP1 / T1.1	Dataset on pathogenicity, colonization behaviour and host responses of diverse X. fastidiosa subspecies and sequence types	P1/IAS-CSIC, P2/IVIA, P4/UdG, P5/CNR, P8/INRAE, P9/AU, P11/ARO-VOL, P15/APTA-IAC, P16/UCR, P17/CRSFA, P21/IRFAP, P27/INTA, P30/FCRA	TRL 2	S, R	KER8
R04	WP1 / T1.1	Dataset on host susceptibility and cultivar response to X. fastidiosa subsp. multiplex ST6 strains from Alicante outbreak	P2/IVIA	TRL 2	S, R	KER8
R05	WP1 / T1.2	Species distribution modelling workflow and risk maps based on climatic and soil drivers	P1/IAS-CSIC, P9/AU	TRL 4	R, P	KER6
R06	WP1 / T1.3	Complete hybrid genome assemblies and the BacFlux assembly and annotation workflow	P1/IAS-CSIC	TRL 4	S, R	KER1
R07	WP1 / T1.3	PCR-based plasmid profile typing scheme for surveillance inside a demarcated area	P1/IAS-CSIC, P2/IVIA	TRL 5	R, P	KER1
R08	WP2 / T2.2	Xf-TSCE: targeted sequence capture enrichment and HTS for direct diagnosis and typing	P1/IAS-CSIC	TRL 5	R, S	KER1
R09	WP2 / T2.2	Evidence-based selection of molecular tests and sample tissue for detecting X. fastidiosa in almond	P1/IAS-CSIC	TRL 5	R, P	KER2
R10	WP2 / T2.2	Digital PCR method and interlaboratory validation for detection of X. fastidiosa	P14/NIB	TRL 6	R	KER3

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Ref	WP / Task	Result	Partners involved	TRL	Route*	KER
R11	WP2 / T2.3	Spatially explicit epidemiological model for disease spread	P2/IVIA	TRL 5	R, S	KER6
R12	WP2 / T2.4	Methodology for early detection of X. fastidiosa using proximal sensing	P1/IAS-CSIC	TRL 4–5	R, C, P	KER4
R13	WP2 / T2.4	High-throughput phenotyping platform for spectral acquisition before symptom appearance	P1/IAS-CSIC, P29/UOM	TRL 4	C, S	KER4
R15	WP2 / T2.4, T2.5	Identification of conserved and pathosystem-specific spectral biomarkers associated with X. fastidiosa infection	P1/IAS-CSIC, P29/UOM	TRL 5	C, S	KER4
R14	WP2 / T2.5	Remote sensing methodology for early detection of X. fastidiosa infections	P1/IAS-CSIC, P29/UOM	TRL 5	R, C, P	KER4
R16	WP2 / T2.7	Framework for evaluating outbreak management plans for plant diseases	P2/IVIA	TRL 5	R, P	KER6
R17	WP3 / T3.1	Temperature and exposure thresholds that inactivate X. fastidiosa across subspecies	P1/IAS-CSIC	TRL 4	C, R	KER7
R18	WP3 / T3.2	Cultivar-specific thermotherapy schedules preserving the rooting capacity of olive cuttings	P1/IAS-CSIC	TRL 5–7	C, R	KER7
R19	WP3 / T3.2	Species-specific thermotherapy protocols for the phytosanitary management of nursery propagation material	P5/CNR; P17/CRSFA	TRL 5–7	C, R, P	KER7
R20	WP3 / T3.2	Almond, olive and nectarine thermotherapy protocols preserving plant viability at nursery scale	P25/AIBE	TRL 7	C, R	KER7
R21	WP3 / T3.3	Draft EPPO Standard PM 10/NEW Hot water treatment of grapevine, fig, pecan and white mulberry to control X. fastidiosa	P20/EPPO; P5/CNR	TRL 6	R	KER15
R22	WP4 / T4.1	Olive cultivar response to Spanish X. fastidiosa strains and proximal sensing of infection	P1/IAS-CSIC	TRL 4	S, C	KER8
R23	WP4 / T4.1	Identification of novel almond genotypes resistant to X. fastidiosa	P11/ARO-VOL	TRL 4	C, S	KER8
R24	WP4 / T4.2	Genome assemblies with haplotype resolution at chromosome level of Leccino and Ogliarola	P12/LMU	TRL 3	C, S	KER8
R25	WP4 / T4.2	Identification of olive immune receptors	P12/LMU	TRL 1	S, C	KER8
R26	WP4 / T4.2	Profiling olive immune responses	P12/LMU	TRL 1	S, C	KER8
R27	WP4 / T4.2	Olive tissue culture	P12/LMU	TRL 1	S, C	KER8
R28	WP4 / T4.4	Olive breeding selections	P18/IFAPA	TRL 5	C, S	KER8
R32	WP5 / T5.1	Entomopathogenic fungal strains for the biological control of Philaenus spumarius, vector of X. fastidiosa	P6/UNITO	TRL 5 (BP1q) / TRL 4 (Cnv2i)	C	KER9
R29	WP5 / T5.1, T5.5	Foliar-applied endophytic Metarhizium brunneum disrupts Philaenus spumarius feeding behaviour	P1/IAS-CSIC, P3/UCO	TRL 4	C, P	KER9
R30	WP5 / T5.1, T5.5	Effective biological control of X. fastidiosa vectors using soil application of the strain EAMa 01/58-Su of Metarhizium brunnem	P3/UCO	TRL 9	C	KER9

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Ref	WP / Task	Result	Partners involved	TRL	Route*	KER
R31	WP5 / T5.1, T5.5	Dual action of Metarhizium guizhouense EAMa 10/01-Fil against the vector and, through its fermentation extract, against the bacterium	P3/UCO	TRL 3	C, S	KER9
R33	WP6 / T6.1	High-throughput platform for the identification and development of xylem synthetic microbial communities (SynCom) for the biological control of X. fastidiosa	P1/IAS-CSIC	TRL 5	C, S	KER11
R34	WP6 / T6.1	Synthetic microbial community (SynCom) technology against X. fastidiosa	P1/IAS-CSIC	TRL 5	C	KER11
R42	WP6 / T6.1; WP7 / T7.4	Optimised fermentation process for production of bacterial biomass	P22/ACIES	TRL 5	C	KER11
R43	WP6 / T6.1; WP7 / T7.4	Freeze-drying process for preservation of viable bacterial biomass	P22/ACIES	TRL 5	C	KER11
R35	WP6 / T6.2	Antimicrobial glass-based materials against X. fastidiosa	P1/IAS-CSIC	TRL 3	C, S	KER10
R36	WP6 / T6.2	Phenolic-rich olive by-product extracts against X. fastidiosa	P1/IAS-CSIC	TRL 3	C, S	KER10
R37	WP6 / T6.2	Functional antimicrobial and defence-eliciting peptides for the management of X. fastidiosa	P4/UdG	TRL 4	C, S	KER10
R38	WP6 / T6.3	Genome-wide survey of X. fastidiosa prophages across subspecies and sequence types	P1/IAS-CSIC - P2/IVIA	TRL 3	S	KER12
R39	WP6 / T6.3	Phage-based biocontrol technology against X. fastidiosa	P2/IVIA, P1/IAS-CSIC	TRL 5	C	KER12
R40	WP6 / T6.3	TaqMan qPCR protocol for bacteriophage detection and quantification in planta	P2/IVIA, P1/IAS-CSIC	TRL 4	C, R	KER12
R41	WP6 / T6.3	Collection of genetically characterized lytic bacteriophages and associated genomic resources	P2/IVIA, P1/IAS-CSIC	TRL 3	S, C	KER12
R44	WP7 / T7.4	Trunk-endotherapy delivery and field demonstration of phage and synthetic community treatments	P1/IAS-CSIC, P21/IRFAP	TRL 5	C, P	KER12
R45	WP8 / T8.3	Integrated spatial risk assessment of X. fastidiosa in the Iberian Peninsula and the Balearic Archipelago	P1/EBD-CSIC	TRL 2	R, P	KER6
R46	WP8 / T8.3	Evidence base on effects of X. fastidiosa infection and almond eradication on soil quality	P1/IAS-CSIC, P3/UCO	TRL 4	P, R	KER14
R47	WP8 / T8.3	qPCR survey of X. fastidiosa in almond and wild scrub hosts in the Alicante demarcated area	P1/IAS-CSIC, P3/UCO	TRL 3	P, R	KER14
R48	WP8 / T8.4	Preferences of almond growers for IPM technologies to control X. fastidiosa in Alicante	P28/JRC	n/a (dataset)	P, S	KER14
R49	WP8 / T8.4	Preferences of olive growers for new early detection technoligies against X. fastidiosa in Andalusia	P28/JRC	n/a (dataset)	P, S	KER14
R50	WP8 / T8.4	Preferences of olive growers for IPM technologies to control X. fastidiosa in Apulia	P28/JRC	n/a (dataset)	P, S	KER14
R51	WP8 / T8.4	Citizen preferences for landscape restoration and management post-X. fastidiosa, evidence from Italy	P28/JRC	n/a (dataset)	P, S	KER14

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Ref	WP / Task	Result	Partners involved	TRL	Route*	KER
R52	WP8 / T8.4	Citizen preferences for landscape restoration and management post-X. fastidiosa, evidence from Spain	P28/JRC	n/a (dataset)	P, S	KER14

*Route: R = regulatory and standardisation uptake; C = commercial exploitation; P = practitioner and public-authority uptake; S = further research and open science.

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ANNEX 5. ABBREVIATIONS

Table 20 lists the abbreviations and acronyms used in this deliverable, including those of the legal and exploitation vocabulary of Horizon Europe. Partner identifiers are not repeated here; they are given in Annex 4.

Table A5. Abbreviations used in this deliverable.

Abbreviation	Meaning
CA	Consortium Agreement
DoA	Description of the Action
ddPCR / dPCR	Droplet digital PCR / digital PCR
EFSA	European Food Safety Authority
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
EPPO	European and Mediterranean Plant Protection Organization
EC	Exploitation Committee
FAIR	Findable, Accessible, Interoperable, Reusable
GA	Grant Agreement
IPM	Integrated Pest Management
IPR	Intellectual Property Rights
KER	Key Exploitable Result
LAMP	Loop-mediated isothermal amplification
MTA	Material Transfer Agreement
NPPO	National Plant Protection Organisation
NRL	National Reference Laboratory
PBR	Plant Breeder Rights
qPCR	Quantitative real-time polymerase chain reaction
RPA	Recombinase polymerase amplification
SME	Small and medium-sized enterprise
SynCom	Synthetic microbial community
TRL	Technology Readiness Level
TT	Thermal treatment / thermotherapy
WP	Work Package
Xf	*Xylella fastidiosa*

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