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BEYOND XYLELLA

Update 2 of Data Management Plan (DMP)

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ABSTRACT

Data management plans (DMPs) are a cornerstone for responsible management of research outputs, notably of data used, obtained or developed by a research project, and which are mandatory in Horizon Europe for projects generating and/or reusing data.

DMPs are formal documents that outline from the start of the project all aspects of the research data lifecycle, which includes its organisation and curation, and adequate provisions for its access, preservation, sharing, and eventual deletion, both during and after a project. Writing a DMP is part of the methodology of the project, since good data management makes the work more efficient, saves time, contributes to safeguarding information and to increasing the value of the data among the beneficiaries themselves and others, during and after the research is finished. DMPs are thus a key means of support when planning and conducting a research project.

DMPs play a key role in helping researchers to adequately manage research outputs other than reports and publications, also in line with the guidelines on FAIR (Findable, Accessible, Interoperable and Reusable) Data Management principles from the European Commission. Such research outputs may be physical or digital, and include original software created during the project, workflows, protocols, new materials such as samples, host plants and vectors, DNA sequences, among many others. DMPs should reflect an adequate management strategy for such outputs as well.

This deliverable presents the second and final update of the Data Management Plan (DMP) for the BeXyl project, originally developed in month 6 (M6) and updated in month 24 (M24). This version records the final status of the main research outputs generated or reused by the project, the repositories used for preservation and dissemination, and the access conditions applied to open, restricted or confidential data.

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1. INTRODUCTION

Research data management is mandatory in Horizon Europe for projects generating or reusing data. BeXyl has generated and reused data and other research outputs across experimental, molecular, epidemiological, modelling, remote-sensing, socioeconomic and dissemination activities. This document provides the second and final update of the DMP developed in M6 and updated in M24. The main purpose of this final update is to document the data deposited or prepared for deposition, the repositories used, the access conditions applied, and the procedures followed by the consortium during the project.

The DMP is the formal document describing the research data lifecycle, including data organisation, curation, access, preservation, sharing and, where relevant, deletion during and after the project.

Successive updates allow to point out which data handling systems and data locations have been most used throughout the project and to add new procedures if necessary.

2. DATA SUMMARY

As practices in relation to data management, storage, and sharing differ widely across disciplines, the DMP should reflect common disciplinary practices. In addition to domain specificities, DMP across the board should address an overarching set of data-related requirements including those aspects related to making the data FAIR (Findable, Accessible, Interoperable and Reusable), following the principles of Horizon Europe Annotated Grant Agreement (AGA) in Annex 5 HE IPR RULES.

For this reason, this final DMP summarises the following elements for the data generated or reused during the project:

- Purpose of the data collection/generation.
- Relation to the objectives of the project.
- Types and formats of data generated/collected.
- Specification of the reuse of existing data (if any).
- Specification the origin of the data.
- Expected size of the data (if known).
- Data utility: to whom it is useful.

2.1. Purpose of the data collection/generation and its relation to the objectives of the project

BeXyl has been built mainly on the foundations of the knowledge generated by the H2020 project XF-ACTORS to strengthen the EU research network tackling *Xylella fastidiosa* outbreaks, to ensure the best use and exploitation of the research outputs gained so far. For this reason, many data is being collected and new data is being generated to develop and implement tailored Integrated Pest Management (IPM) strategies to mitigate the impacts of current *X. fastidiosa* outbreaks.

The use of open science practices in the BeXyl project (foreseen in the Horizon Europe programme) increases the impact of research and accelerates progress in relation to

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improving capacity building for the prevention of new *X. fastidiosa* introductions and the management of current outbreak areas in Europe.

2.2. Types and formats of data generated/collected

Public access to BeXyl research data and published material is organised according to the following categories:

- **Training materials and publications:** lists of host plants and vectors, photo descriptions of symptoms, scientific and extension publications, etc. For the project life cycle up to the date of submission of this deliverable: 60 scientific publications.
- **Molecular and genetic data:** DNA sequences and genomes, RNA, MLST, HTS, barcoding, microsatellites, etc. For the project life cycle up to the date of submission of this deliverable: 20 SRA (Sequence Read Archive) at NCBI.
- **Protocols, code and raw data:** geospatial datasets, airborne image data, modelling codes, maps, eco-physiological and meteorological data, protocols for pathogenicity tests are being described in all scientific publications. In addition, protocols, program code and raw data are being included in institutional repositories**.**
  The software code for a mathematical model adapted to evolving *X. fastidiosa* genotypes and multiple introductions have been release (Milestone 9). The software code of the release of hyperspectral algorithms to high-resolution multispectral satellites for detecting *X. fastidiosa* infections it is also published in a repository (Milestone 10).
  For the project life cycle up to the date of submission of this deliverable: Approximately 1,5 Tb in total.
- **Physical access to biological materials:** Access to insect specimens, bacterial strains, etc. are being granted by depositing representative materials in public culture collections or the own partner collections, observing the pertinent biosecurity provisions.
  For the project life cycle up to the date of submission of this deliverable: 142 exchanges of *X. fastidiosa* strains and Xf-infected material have been recorded among BeXyl partners: 87 during the first reporting period and 55 during the second reporting period. These exchanges were appropriately documented in Deliverables D11.2 and D11.3. The dataset will be updated in D11.4, due at the end of August, to include the most recent exchanges.

Access conditions depend on the data type, repository requirements, intellectual-property status, biosecurity considerations and any applicable ethical or confidentiality restrictions.

2.3. Existing data re-use and data utility

The data and datasets collected or generated in the context of BeXyl are made available to external users under specified licence terms and subject to ethical, legal, confidentiality, intellectual-property and biosecurity considerations. A full description of the available licences is provided in section 3.4.1.

The potential users considered for BeXyl research data are broad and include both specialist research communities and stakeholder groups involved in plant health, crop management, policy, nursery production and outbreak response:

- Farmers/foresters and Nurserymen

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- Agronomy/forestry consultants and technical staff
- Farmers' organizations and associations
- Diagnostic laboratories and phytosanitary inspectors
- Official agencies, plant health services and policy makers
- Research community (including the Advisory Board)
- Agri-food industry
- Scientific and daily press

An updated list with the confirmed contributors is shown in **Table 1**.

A distinction can be made between research datasets supporting peer reviewed academic publications and datasets forming the basis on which the project deliverables are elaborated. The research data underlying project deliverables requires a big investment in terms of human resources, therefore the main aim of making this data public is for others to use and build on this data, preventing duplication of work and improving efficiency, quality and speed of research. This also holds true for scientific publications, but for these validation and reproducibility are key considerations as well.

2.4. Origin of the data

The origin of the data is coming from a wide variety of sources:

- Training materials as lists of host and vectors, descriptions of symptoms, plots sampled.

  Examples: Milestone 23. Document containing the GPS coordinates with locations of the experimental plots used for ecological analysis: https://saco.csic.es/s/5z3xRy2Dtn8jYLr

  Graphic material produced by Brigit project that have been shared with BeXyl to be updated and reused.

- The results obtained by the project partners in different types of experiments.
  Example: Milestone 16. Document including a list of available tools to be tested by EPG and transmission experiments: https://saco.csic.es/s/EZdCSsp5sGcXfn6
- Maps and images acquired or processed and developed by project partners.
  Example: Deliverable 1.1. The document contains the links to the maps developed during the project: https://saco.csic.es/s/4PzgWCw6cW7ERrH
- Field and greenhouse data on *X. fastidiosa* response of diverse crops and cultivars, collected in previous projects (e.g., POnTE and XF-ACTORS) and during BeXyl development.
  Example: Milestone 21. Report containing the dataset collected in the EU *X. fastidiosa* epidemic management project: https://saco.csic.es/index.php/s/qJXt7PaSqj5B882
- Airborne hyperspectral imagery from the aircrafts used in XF-ACTORS and new ones obtained in BeXyl and commercial satellite systems.
  Example: Deliverable 2.4. the deliverable contains the links to the images obtained in BeXyl: https://saco.csic.es/s/XK754EDXnTCraGP
- Modelling codes, program code and raw data from previous research or produced by BeXyl Project.

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Example: Software code for a mathematical model mathematical adapted to evolving *X. fastidiosa* genotypes and multiple introductions have been release (Milestone 9).

Table 1. Confirmed contributors including agricultural associations, forestry, nurserymen, plant producers, national PPOs, government agencies and Operational Groups for research data management.

Country	Acronim	Organization
International	IOC	Internacional Olive Council
Spain	AEMO	Asociación Española de Municipios del Olivo
Spain	ASAJA	Asociación Agraria - Jóvenes Agricultores
Spain	La Unió de Llauradors	La Unió de Llauradors i Ramaders
Spain	Camp Mallorquí	Camp Mallorquí
Spain	GTA FS	Grup de treball autonòmica de fruits secs
United Kingdom	Westonbirt-The National Arboretum	Westonbirt-The National Arboretum
France	SIDOC	Syndicat Interprofessionnel des Oleiculteurs de Corse
Argentina	CIOLAR	Cámara Industrial La Rioja
Unites States	Agromillora California	Agromillora California
Unites States	Agromillora Florida	Agromillora Florida
Unites States	Georgia Berry Exchange	Georgia Berry Exchange
Israel	Israeli Almod Board	Israeli Almod Board
Brazil	Agromillora Produçao	Agromillora Produçao
Australia	Wine Australia	Wine Australia for Australian Wine
Argentina	Cámara Olivícola Riojana COR	Olive producers
Italy	Consorzio Terra DOP Otranto	Consorzio Terra DOP Otranto
Italy	COLDIRETTI	COLDIRETTI
Spain	Plantas Continental	Plantas Continental
Spain	Viveros Villanueva	Viveros Villanueva
Spain	Lainco	Lainco
Spain	OIAOE	Interprofesional del Aceite de Oliva
Spain	APROVE	Asociancion Empresarial Andaluza de Proteccion Vegetal
Spain	OLEOPALMA	Oleopalma-Coare
Spain	Luque ecologico	Luque ecologico
Spain	Fertinyect	Fertinyect
Spain	MAPA	Ministry of Agriculture
Spain	Plant Health services of Valencia	Plant Health services of Valencia
Spain	Plant Health services of Cataluña	Plant Health services of Cataluña
Australia	DAWE	Department of Agriculture Water and the Environment
Argentina	SENASA	Servicio Nacional de Sanidad y Calidad Agroalimentaria
Brazil	CODEAGRO	Coordenadoria de Desenvolvimento dos Agronegócios
The Netherlands	NPPO The Netherlands	National Plant Protection Organization. The Netherlands
Portugal	NPPO Portugal	National Plant Protection Organization. Portugal
Spain	BIOLIVAR	BIOLIVAR
Slovenia	Automation & economic viability in Olive Growing	Automation & economic viability in Olive Growing

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2.5. The expected size of the data

The data collected/generated by BeXyl is very heterogeneous in size ranging from few megabytes per item (e.g. rates of disease data) to many gigabytes (e.g. satellite images or genome sequences).

The size of the data generated so far in the project has gone according to the expectations made at the beginning of the project, whose estimates were:

- *Experiment data*: An estimation is difficult to forecast, because each partner uses different data and procedures, but we were expected around 1 Gb per partner, no more than 30 Gb in total. We have confirmed that this prediction has come true.
- *Models*: The sum of all datafiles containing alphanumeric data have not exceed 200Gb.
- *Satellite and remote sensing imagery*: 300 Mb per location of study and year including hyper, thermal and satellite imagery have been used (2 location in Mallorca, 1 in California and 1 in Argentina). Around 1,5 Tb in total.
- *Publications, dissemination material and additional data*: We expected around 0,5 Gb per partner, no more than 15 Gb in total. Currently, the dissemination data at partner cloud takes up 3,5 Gb.
- *Molecular and genetic data*: We were expected around 1Gb per *X. fastidiosa* genome including raw Illumina and Oxford Nanopore reads, and assembled genomes. RNASeq data from genome expression experiments will represent around 1-2 Gb per experiment, representing less than 40 Gb in total.

The project cloud is currently 47,7 Gb containing all official documents and dissemination material shared with the whole consortium.

Before final submission, the size estimates should be checked against the final repository and cloud-storage records. Where exact values are not available, the DMP should report approximate ranges and indicate the data category to which each estimate applies.

2.6. Data Utility

Although the future use of each specific dataset cannot be predicted with certainty, BeXyl data are expected to remain useful to the following groups:

- Researchers working in prevention and practical solutions for disease control.
- Agronomy experts to prevent, monitor, and find adequate responses to EU plant pests.
- Researchers and policy experts evaluating the socioeconomic implications for farmers affected by the plant pest.
- Researchers and policy experts interested in relevant information on resistant/immune or more resilient host plants used to restore current *X. fastidiosa* outbreak areas and facilitate sustainable disease management.
- Companies commercialising resistant cultivars to *Xf.*
- Undergraduate and graduate students in crop protection.
- Farmers and technical staff in farms.
- Botanical gardens and arboreta.
- General public.

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In the first two years of the project, several actors are using the data obtained or collected, such as Policy expert or nurserymen, to assess and manage the *X. fastidiosa* outbreaks. An example concerns to the provision of several images and videos of *X. fastidiosa* cultures and cells and plant symptoms in olive, almond, grapes to the Ministry of Agriculture, Fisheries and Food (MAPA) of Spain, that have produced a video in collaboration with EFSA to alert about the risk of introducing exotic pests into a country and can be watch at this link:

https://x.com/mapagob/status/1823692361970360645?s=08

During the third year of the project, genomic and surveillance and risk analysis **results** are already being operationally used by NPPOs for earlier outbreak detection and delimitation (e.g., new outbreaks in Mallorca and Apulia), and are being shared with EFSA to support updates of the *X. fastidiosa* quantitative PRA and related risk-assessment processes.

3. FAIR DATA

The purpose of this final DMP is to document how the BeXyl consortium has managed data that can be made public, and how these data have been made findable, accessible, interoperable and reusable (FAIR) for search engines, repositories, stakeholders and individual users.

For this purpose, the DMP identifies the main data categories, storage locations, repositories, access conditions, metadata practices, quality-control procedures and responsibilities applied during the project.

3.1. Making data findable, including provisions for metadata

This section documents how BeXyl data and related outputs are made findable, including metadata provision, persistent identifiers, naming conventions, versioning, keywords and metadata standards:

- Outline the discoverability of data (metadata provision)
- Outline the identifiability of data and refer to standard identification mechanism.
- Outline naming conventions used.
- Outline the approach for clear versioning.
- Outline the approach towards search keyword.
- Outline the approach for clear versioning.
- Specify standards for metadata creation.

3.1.1. The discoverability of data

BeXyl has made project datasets, documents, articles, technical reports, protocols, videos, technical bulletins, Newsletters, software, etc. discoverable by depositing them, when possible, in institutional, subject-specific or general-purpose repositories that require metadata and provide persistent identifiers, such as Digital Object Identifiers (DOIs), repository handles or stable accession numbers.

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Training material and publications

In line with Horizon Europe open-science requirements, BeXyl research outputs are published, whenever possible, through open-access routes or deposited in repositories that allow open access to the accepted manuscript or associated dataset.

Although the project initially considered the use of Open Research Europe (ORE) for relevant articles, most publications have followed alternative open-access routes selected by the authors according to journal scope, disciplinary visibility and publication strategy.

In addition, preprint versions of a manuscripts have been either submitted to a recognized preprint repository (e.g., bioRxiv or agriRxiv) or make accessible through other public repositories. Table 2 is showing the publications deposited in preprint repositories.

Table 2. Articles deposited in preprint repositories.

Partner	Title	DOI
UNITO	Activity of natural occurring entomopathogenic fungi on nymphal and adult stage of *Philaenus spumarius*	biorxiv.org\content\10.1101\2023.07.14.548874
IRFAP	Linking intercontinental biogeographic events to decipher how European vineyards escaped Pierce's disease	biorxiv.org/content/10.1101/2024.05.04.592514
CSIC	Thermal Dynamics of Xylem and Soil-Root Temperatures in Olive and Almond Trees and Their Relationship with Air Temperature	preprints.org/manuscript/202511.1504
INRAE	The hidden life of *Xylella*: Mining the NCBI Sequence Read Archive reveals potential new species, host plants and infected areas for this elusive bacterial plant pathogen	biorxiv.org/content/10.1101/2025.04.18.649540v1
CSIC	A metabolic model based on a pangenome core unveils new biochemical features of the phytopathogen *Xylella fastidiosa*	https://www.biorxiv.org/content/10.64898/2026.03.23.713690v1

Nevertheless, as a default all documents generated in the BeXyl project have been uploaded to the DIGITAL.CSIC repository, as this is the coordinating institution of the project. This has been the case for many of the articles when the publishing institution did not have an institutional repository.

The authors have informed to the Coordinator Team (CT) to include the publication's DOI in the list of project results at the project's website (https://www.bexylproject.org).

Table 3 shows the published articles (60 until July 2026) and their inclusion in an institutional repository. A final updated list will be produced for the final report.

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Table 3. Peer-reviewed articles funded by the European Commission through the BeXyl project, published up to M46, and deposited in open-access or institutional repositories.

Partner	OA	Repository	Title	DOI
UNITO	GOLD	DigitalCSIC	Bioecological traits of spittlebugs and their implications on the epidemiology and control of *Xylella fastidiosa* epidemic in Apulia	doi.org/10.1094/PHYTO-12-22-0460-IA
CSIC	GOLD	DigitalCSIC	Complete circularized genome resources of seven strains of *Xylella fastidiosa* subsp. fastidiosa using hybrid assembly reveals unknown plasmids	doi.org/10.1094/PHYTO-10-22-0396-A
UC	GOLD	DigitalCSIC	Parallel host shifts in a bacterial plant pathogen suggest independent genetic solutions	doi.org/10.1111/mpp.13316
CNR	GOLD	DigitalCSIC	Detection of *Xylella fastidiosa* in Host Plants and Insect Vectors by Droplet Digital PCR	doi.org/10.3390/agriculture13030716
UdG	GOLD	Digital CSIC	Bactericidal and plant defense elicitation activities of Eucalyptus oil decrease the severity of infections by *Xylella fastidiosa* on almond plants	doi.org/10.3389/fpls.2023.1122218
UdG	GOLD	DUGiDoc	*Nicotiana benthamiana* as a model plant host for *Xylella fastidiosa*: Control of infections by transient expression and endotherapy with a bifunctional peptide	doi.org/10.3389/fpls.2022.1061463
UdG	GOLD	Digital CSIC	Induction of Defense Responses and Protection of Almond Plants Against *Xylella fastidiosa* by Endotherapy with a Bifunctional Peptide	doi.org/10.1094/PHYTO-12-21-0525-R
CSIC	GOLD	DigitalCSIC/ RedIVIA	Recent research accomplishments on early detection of *Xylella fastidiosa* outbreaks in the Mediterranean Basin	doi.org/10.36253/phyto-14171
IVIA	GOLD	RedIVIA	An individual-based spatial epidemiological model for the spread of plant diseases	doi.org/10.1007/s13253-024-00604-2
UNITO	GOLD	DigitalCSIC	Activity of natural occurring entomopathogenic fungi on nymphal and adult stage of *Philaenus spumarius*	doi.org/10.1016/j.jip.2024.108078
INRAE	GOLD	DigitalCSIC	Forecasting Pathogen Dynamics with Bayesian Model-Averaging: Application to *Xylella fastidiosa*	doi.org/10.1007/s11538-023-01169-w
UdG	GOLD	DigitalCSIC	Functional Peptides for Plant Disease Control	doi.org/10.1146/annurev-phyto-021722-034312
UCO	GOLD	DigitalCSIC	Direct and indirect effects of two endophytic entomopathogenic fungi on survival and feeding behaviour of meadow spittlebug *Philaenus spumarius*	doi.org/10.1016/j.biocontrol.2023.105348
APTA	GOLD	NERCOpen/ DigitalCSIC	A high-throughput analysis of high-resolution X-ray CT images of stems of olive and citrus plants resistant and susceptible to *Xylella fastidiosa*	doi.org/10.1111/ppa.13835
CNR	GOLD	DigitalCSIC	Genealogical tracing of *Olea europaea* species and pedigree relationships of var. europaea using chloroplast and nuclear markers	doi.org/10.1186/s12870-023-04440-3
CSIC	GOLD	DigitalCSIC	Complete genome assemblies of several *Xylella fastidiosa* subspecies multiplex strains reveals high phage content and novel plasmids	doi.org/10.36253/phyto-14931
CISC	GOLD	DigitalCSIC	Complete circularized genome resources for *Xylella fastidiosa* subsp. sandyi strains CO33 and CFBP8478	doi.org/10.1094/PHYTOFR-01-24-0004-A

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Partner	OA	Repository	Title	DOI
AU	GREEN	DigitalCSIC	Ten Challenges to Understanding and Managing the Insect-Transmitted, Xylem-Limited Bacterial Pathogen *Xylella fastidiosa*	doi.org/10.1094/PHYTO-12-23-0476-KC
UNIBS	GOLD	IRIS UNIBS	A model for predicting the phenology of *Philaenus spumarius*	doi.org/10.1038/s41598-024-58798-x
IVIA	GREEN	RedIVIA	Performance of outbreak management plans for emerging plant diseases: the case of almond leaf scorch caused by *Xylella fastidiosa* in mainland Spain	doi.org/10.1094/PHYTO-12-23-0465-R
AU	GREEN	DigitalCSIC	European *Xylella fastidiosa* strains can cause symptoms in blueberry	doi.org/10.1094/PDIS-12-23-2640-SC
UdG	GOLD	DUGiDoc	*Prunus dulcis* response to novel defense elicitor peptides and control of *Xylella fastidiosa* infections	doi.org/10.1007/s00299-024-03276-x
IVIA	GOLD	RedIVIA	Performance of outbreak management plans for emerging plant diseases: the case of almond leaf scorch caused by *Xylella fastidiosa* in mainland Spain	doi.org/10.1094/PHYTO-12-23-0465-R
APTA	GOLD	CSICDigital	Species composition and prevalence of sharpshooters and spittlebugs potential vectors of *Xylella fastidiosa* in olive orchards of southeastern Brazil	doi.org/10.1590/1806-9665-RBENT-2024-0017
AU	GREEN	CSICDigital	European *Xylella fastidiosa* strains can cause symptoms in blueberry	doi.org/10.1094/PDIS-12-23-2640-SC
CNR	GOLD	CSICDigital	An integrated strategy for pathogen surveillance unveiled *Xylella fastidiosa* ST1 outbreak in hidden agricultural compartments in the Apulia region (Southern Italy)	doi.org/10.1007/s10658-024-02945-7
CSIC	GREEN	CSICDigital	New Approaches to Plant Pathogen Detection and Disease Diagnosis	doi.org/10.1094/PHYTO-10-23-0366-IA
UNITO	GOLD	CSICDigital	A survey in natural olive resources exposed to high inoculum pressure indicates the presence of traits of resistance to *Xylella fastidiosa* in *Leccino* offspring	doi.org/10.3389/fpls.2024.1457831
IRFAP	GOLD	CSICDigital	Linking intercontinental biogeographic events to decipher how European vineyards escaped Pierce's disease	doi/10.5281/zenodo.10251506
UC	GREEN	CSICDigital	Multiple genotypes of a quarantine plant pathogen detected in New Zealand indigenous plants located in a botanical garden overseas	doi.org/10.1111/ppa.14026
ARO	GREEN	CSICDigital	A New Vector of *Xylella fastidiosa*: The Role of *Mesoptyelus impictifrons* as a Vector in Israel	doi.org/10.1094/PHYTO-04-24-0111-SC
IRFAP	GOLD	CSICDigital	Outbreak of *Xylella fastidiosa* subsp. *pauca* ST53 affecting wild and cultivated olive trees on the island of Mallorca, Spain	doi.org/10.36253/phyto-15891
UC	GREEN	CSICDigital	Century-old herbarium specimen provides insights into Pierce's disease of grapevines emergence in the Americas	doi.org/10.1016/j.cub.2024.11.029
CNR	GOLD	CSICDigital	Naked-Eye Molecular Testing for the Detection of *Xylella fastidiosa* in Mallorca (Balearic Island) Almond Orchards by Colorimetric LAMP	doi.org/10.3390/app15020739
UdG	GOLD	DUGiDoc	Mitigation of Almond Leaf Scorch by a Peptide that Inhibits the Motility of *Xylella fastidiosa*	doi.org/10.1094/PDIS-07-24-1414-RE
CSIC	GREEN	CSICDigital	Modeling the accuracy of *Xylella fastidiosa* molecular diagnostic tests in naturally-infected almond tree samples	doi.org/10.1094/PDIS-12-24-2568-RE

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Partner	OA	Repository	Title	DOI
UCO	GOLD	HELVIA	Targeting the *Xylella fastidiosa* spittlebug vector *Neophilaenus campestris* in the olive cover crops with the entomopathogenic fungus *Metarhizium brunneum*	doi.org/10.3389/finsc.2025.1579244
CNR	GOLD	CSICDigital	Complete genome assembly of *Xylella fastidiosa* subsp. *fastidiosa* (ST1) strains "BA_GR31" and "BA_AL21" associated with a new outbreak in Apulia, Italy	doi.org/10.1007/s42161-025-01915-0
AU	GOLD	CSICDigital	Pseudogenes and host specialization in the emergent bacterial plant pathogen *Xylella fastidiosa*	doi.org/10.1128/aem.02070-24
UC	GREEN	CSICDigital	Isolation, Phylogenetic Inferences, and Early Diversification of *Xylella fastidiosa* subsp. *fastidiosa* in Cova da Beira Region, Portugal	doi.org/10.1094/PHYTO-01-25-0009-R
UC	GOLD	CSICDigital	A pathogen of good taste: genetics of a bacterial host jump of the plant pathogen *Xylella fastidiosa* from coffee to wine grapes	doi.org/10.1099/mgen.0.001447
UdG	GOLD	DUGiDoc	Synthetic lipopeptides that interact with lipopolysaccharides are potent bactericidal compounds against *Xylella fastidiosa*	doi.org/10.1128/aem.00734-25
INRAE	GOLD	CSICDigital	A marked sequential point process for disease surveillance: Modeling and optimization	doi.org/10.1016/j.spasta.2025.100913
INTA	GOLD	CSICDigital	Phylogenomic analysis of *Xylella fastidiosa* subsp. *pauca* strains from olive and almond trees in Argentina	doi.org/10.1007/s10658-024-02969-z
INRAE	GOLD	CSICDigital	The hidden life of *Xylella*: Mining the NCBI Sequence Read Archive reveals potential new species, host plants and infected areas for this elusive bacterial plant pathogen	doi.org/10.1128/aem.00913-25
CSIC	GREEN	CSICDigital	Extent of stem colonization of Spanish *Xylella fastidiosa* strains in olive: A proximal sensing approach for early detection of infection	doi.org/10.1094/PDIS-11-24-2327-RE
CSIC	GOLD	CSICDigital	Thermal Dynamics of Xylem and Soil-Root Temperatures in Olive and Almond Trees and Their Relationship with Air Temperature	doi.org/10.3390/agronomy16010102
UNITO	GOLD	CSICDigital	Natural occurrence of infections of the spittlebug *Philaenus spumarius* by the entomopathogenic fungi *Zoophthora* radicans and *Batkoa* major in Northwest Italy	doi.org/10.3897/mycokeys.128.181516
CNR	GOLD	CSICDigital	Complete Genome Sequence Data of Two *Xylella fastidiosa* subsp. *multiplex* Strains (ST26) Isolated from Infected Almond and Cherry in Southern Italy	doi.org/10.1094/PHYTOFR-11-25-0130-A
CSIC	GOLD	CSICDigital	Endophytic colonization and epiphytic presence of *Metarhizium brunneum* alter the feeding behavior of the *Xylella fastidiosa* vector *Philaenus spumarius*	doi.org/10.1007/s10340-026-02015-3
UC	GOLD	CSICDigital	First Report of *Xylella fastidiosa* Infection and Pierce's Disease in Resistant Grape Cultivars in Texas, United States	doi.org/10.1094/PDIS-01-26-0060-PDN
UdG	GREEN	CSICDigital	Aggressiveness of Subspecies and STs of *Xylella fastidiosa* and Plant Response in *Nicotiana benthamiana*	10.1094/PHYTO-11-25-0366-R
UNIBS	GOLD	IRIS UNIBS	Physiologically-based eco-epidemiological model of *Xylella fastidiosa* infection in olive groves	doi.org/10.1016/j.ecolmodel.2026.111546
AU	GOLD		A genomic locus uniquely encoded by blueberry-infecting *Xylella fastidiosa* strains	doi.org/10.1371/journal.pone.0346230

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Partner	OA	Repository	Title	DOI
			affects motility and biofilm formation in vitro, and virulence in planta	
IVIA/CSIC	GREEN		Diversity and lytic potential of novel phages targeting *Xylella fastidiosa* subsp. *fastidiosa*	doi.org/10.1094/PDIS-09-25-1903-RE
IVIA/CSIC	GREEN		Genomic Analysis of Prophage Distribution in *Xylella fastidiosa* Reveals Extensive Diversity and Horizontal Gene Transfer	doi.org/10.1094/PHYTO-04-25-0141-R
IRFAP	GOLD		Emerging risk of *Xylella fastidiosa* in Europe under global change	https://link.springer.com/article/10.1007/s10530-026-03869-5
CSIC	GOLD		A metabolic model based on a pangenome core unveils new biochemical features of the phytopathogen *Xylella fastidiosa*	https://doi.org/10.1016/j.micres.2026.128616
UCR	GOLD		Confirmation *of Xylella fastidiosa* (Lysobacterales: Lysobacteraceae) transmission by 8 leafhopper species present in coffee plantations in Costa Rica	https://doi.org/10.1093/jisesa/ieag068
UNITO	GOLD		The susceptibility of olive cultivars to *Xylella fastidiosa* subsp. *pauca* ST53 affects transmission efficiency of the insect vector Philaenus spumarius (Hemiptera: Aphrophoridae)	https://doi.org/10.1002/ps.71055

The datasets associated with many of these articles have been deposited in open access associated with the corresponding publication. Links to these datasets are shown in **Table 4**. A final updated list will be produced for the final report.

Table 4. Selected examples of datasets deposited in public repositories in association with selected articles listed in Table 3.

PARTNER	Title	DOI	Dataset
UdG	Bactericidal and plant defense elicitation activities of Eucalyptus oil decrease the severity of infections by *Xylella fastidiosa* on almond plants	doi.org/10.3389/fpls.2023.1122218	frontiersin.org/articles/10.3389/fpls.2023.1122218/full#supplementary-material
UdG	Nicotiana benthamiana as a model plant host for *Xylella fastidiosa*: Control of infections by transient expression and endotherapy with a bifunctional peptide	doi.org/10.3389/fpls.2022.1061463	frontiersin.org/articles/10.3389/fpls.2022.1061463/full#supplementary-material
IVIA	An individual-based spatial epidemiological model for the spread of plant diseases	doi.org/10.1007/s13253-024-00604-2	spatial-ibm.shinyapps.io/spread_results_app/
INRAE	Forecasting Pathogen Dynamics with Bayesian Model-Averaging: Application to *Xylella fastidiosa*	doi.org/10.1007/s11538-023-01169-w	doi:10.15454/RWBIWD
APTA	A high-throughput analysis of high-resolution X-ray CT images of stems of olive and citrus plants resistant and susceptible to *Xylella fastidiosa*	doi.org/10.1111/ppa.13835	doi:10.5258/SOTON/D2709
UNIBS	A model for predicting the phenology of *Philaenus spumarius*	doi.org/10.1038/s41598-024-58798-x	static-content.springer.com/esm/art%3A10.1038%2Fs41598-024-58798-x/MediaObjects/41598_2024_58798_MOESM1_ESM.pdf
IVIA	Performance of outbreak management plans for emerging plant diseases: the case of	doi.org/10.1094/PHYTO-12-23-0465-R	zenodo.org/doi/10.5281/zenodo.10251506

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	almond leaf scorch caused by *Xylella fastidiosa* in mainland Spain		
APTA	Species composition and prevalence of sharpshooters and spittlebugs potential vectors of *Xylella fastidiosa* in olive orchards of south-eastern Brazil	doi.org/10.1590/1806-9665-RBENT-2024-0017	doi.org/10.1590/1806-9665-RBENT-2024-0017 (link in the article)
IRFAP	Linking intercontinental biogeographic events to decipher how European vineyards escaped Pierce's disease	doi.org/10.1098/rspb.2024.1130	doi.org/10.5061/dryad.s4mw6m9fz
CNR	Naked-Eye Molecular Testing for the Detection of *Xylella fastidiosa* in Mallorca (Balearic Island) Almond Orchards by Colorimetric LAMP	doi.org/10.3390/app15020739	mdpi.com/article/10.3390/app15020739/s1
UCO	Targeting the *Xylella fastidiosa* spittlebug vector *Neophilaenus campestris* in the olive cover crops with the entomopathogenic fungus *Metarhizium brunneum*	doi.org/10.3389/finsc.2025.1579244	hdl.handle.net/10396/32832
AU	Pseudogenes and host specialization in the emergent bacterial plant pathogen *Xylella fastidiosa*	doi.org/10.1128/aem.02070-24	github.com/dlf-xyl/Pseudogenes
UC	Isolation, Phylogenetic Inferences, and Early Diversification of *Xylella fastidiosa* subsp. *fastidiosa* in Cova da Beira Region, Portugal	doi.org/10.1094/PHYTO-01-25-0009-R	apsjournals.apsnet.org/doi/suppl/10.1094/PHYTO-01-25-0009-R
UC	A pathogen of good taste: genetics of a bacterial host jump of the plant pathogen *Xylella fastidiosa* from coffee to wine grapes	doi.org/10.1099/mgen.0.001447	microbiologyresearch.org/content/journal/mgen/10.1099/mgen.0.001447#supplementary_data
CSIC	Thermal Dynamics of Xylem and Soil-Root Temperatures in Olive and Almond Trees and Their Relationship with Air Temperature	doi.org/10.3390/agronomy16010102	mdpi.com/article/10.3390/agronomy16010102/s1
CSIC	Endophytic colonization and epiphytic presence of *Metarhizium brunneum* alter the feeding behavior of the *Xylella fastidiosa* vector *Philaenus spumarius*	doi.org/10.1007/s10340-026-02015-3	link.springer.com/article/10.1007/s10340-026-02015-3#Sec18
AU	A genomic locus uniquely encoded by blueberry-infecting *Xylella fastidiosa* strains affects motility and biofilm formation in vitro, and virulence in planta	doi.org/10.1371/journal.pone.0346230	journals.plos.org/plosone/article?id=10.1371/journal.pone.0346230#sec022
IVIA/CSIC	Diversity and lytic potential of novel phages targeting *Xylella fastidiosa* subsp. fastidiosa	doi.org/10.1094/PDIS-09-25-1903-RE	hdl.handle.net/10261/438075
IVIA/CSIC	Genomic Analysis of Prophage Distribution in *Xylella fastidiosa* Reveals Extensive Diversity and Horizontal Gene Transfer	doi.org/10.1094/PHYTO-04-25-0141-R	hdl.handle.net/10261/438079
CSIC	A metabolic model based on a pangenome core unveils new biochemical features of the phytopathogen *Xylella fastidiosa*	doi.org/10.1016/j.micres.2026.128616	https://doi.org/10.5281/zenodo.17307291
UCR	Confirmation of *Xylella fastidiosa* (Lysobacterales: Lysobacteraceae) transmission by 8 leafhopper species present in coffee plantations in Costa Rica	https://doi.org/10.1093/jisesa/ieag068	https://doi.org/10.1093/jisesa/ieag068 (link in the article)

Molecular and genetic data

Molecular and genetic data have/are being deposited in NCBI/GenBank/SRA and/or ZENODO, whenever needed. Accessions to these data is conveniently included in all published material (e.g., scientific and technical articles, etc.).

Table 5 shows the list of genetic data deposited at NCBI. A final updated list will be produced for the final report.

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Table 5. Selected examples of genetic datasets generated through the BeXyl project and deposited in NCBI public repositories.

PARTNER	Title	DOI	NCBI link
CSIC	Complete circularized genome resources of seven strains of *Xylella fastidiosa* subsp. *fastidiosa* using hybrid assembly reveals unknown plasmids	doi.org/10.1094/PHYTO-10-22-0396-A	ncbi.nlm.nih.gov/bioproject/?term=PRJNA891297
UC	Parallel host shifts in a bacterial plant pathogen suggest independent genetic solutions	doi.org/10.1111/mpp.13316	ncbi.nlm.nih.gov/bioproject/PRJNA715523
UdG	Induction of Defense Responses and Protection of Almond Plants Against *Xylella fastidiosa* by Endotherapy with a Bifunctional Peptide	doi.org/10.1094/PHYTO-12-21-0525-R	ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE198089
CNR	Genealogical tracing of *Olea europaea* species and pedigree relationships of var. europaea using chloroplast and nuclear markers	doi.org/10.1186/s12870-023-04440-3	ncbi.nlm.nih.gov/bioproject/?term=PRJEB27972
CSIC	Complete genome assemblies of several *Xylella fastidiosa* subspecies *multiplex* strains reveals high phage content and novel plasmids	doi.org/10.36253/phyto-14931	ncbi.nlm.nih.gov/bioproject/?term=PRJNA1026562
CSIC	Complete circularized genome resources for *Xylella fastidiosa* subsp. *sandyi* strains CO33 and CFBP8478	doi.org/10.1094/PHYTOFR-01-24-0004-A	ncbi.nlm.nih.gov/bioproject/?term=PRJNA1017803
UdG	*Prunus dulcis* response to novel defense elicitor peptides and control of *Xylella fastidiosa* infections	doi.org/10.1007/s00299-024-03276-x	ncbi.nlm.nih.gov/bioproject/?term=GSE259385
UNITO	A survey in natural olive resources exposed to high inoculum pressure indicates the presence of traits of resistance to *Xylella fastidiosa* in Leccino offspring	doi.org/10.3389/fpls.2024.1457831	ncbi.nlm.nih.gov/bioproject/?term=PRJNA993167
CNR	Complete genome assembly of *Xylella fastidiosa* subsp. *Fastidiosa* (ST1) strains “BA_GR31” and “BA_AL21” associated with a new outbreak in Apulia, Italy	https://doi.org/10.1007/s42161-025-01915-0	ncbi.nlm.nih.gov/bioproject/?term=PRJNA1169343
INTA	Phylogenomic analysis of *Xylella fastidiosa* subsp. *pauca* strains from olive and almond trees in Argentina	https://doi.org/10.1007/s10658-024-02969-z	ncbi.nlm.nih.gov/bioproject/?linkname=biosample_bioproject&from_uid=31526616 ncbi.nlm.nih.gov/search/all/?term=SAMN31526614%20 ncbi.nlm.nih.gov/search/all/?term=SAMN31526615
INRAE	The hidden life of *Xylella*: Mining the NCBI Sequence Read Archive reveals potential new species, host plants and infected areas for this elusive bacterial plant pathogen	https://doi.org/10.1128/aem.00913-25	ncbi.nlm.nih.gov/bioproject/PRJNA1241491/
UNITO	Natural occurrence of infections of the spittlebug *Philaenus spumarius* by the entomopathogenic fungi *Zoophthora radicans* and *Batkoa major* in Northwest Italy	https://doi.org/10.3897/mycokeys.128.181516	ncbi.nlm.nih.gov/nuccore/PX415466 ncbi.nlm.nih.gov/nuccore/PX415467
CNR	Complete Genome Sequence Data of Two *Xylella fastidiosa* subsp. *multiplex* Strains (ST26) Isolated from Infected Almond and Cherry in Southern Italy	https://doi.org/10.3897/mycokeys.128.181516	ncbi.nlm.nih.gov/search/all/?term=JBSIOX000000000 ncbi.nlm.nih.gov/search/all/?term=JBSIOW000000000

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Protocols, code and raw data

Protocols, program code and raw data are being included in ZENODO, GitHub or Bitbucket repositories. For statistical analyses, open-source statistical software such as R and Python is being used. For relevant studies, model code is externally checked for reproducibility using the code-check platform. Upon finalization code and scripts have been deposited at GitHub or ZENODO (See **Table 6**). In the meantime, the organization of the information and the list of authorised users have been defined according the project's policies.

Table 6. Selected examples of BeXyl protocols, software code and raw datasets deposited in public repositories

Partner	Title	Type of data	Repository link
INRAE	Release of a mathematical model adapted to evolving *Xylella fastidiosa* genotypes and multiple introductions	R statistical software and Python programming language	zenodo.org/doi/10.5281/zenodo.13375339
CSIC/UOM	Release of hyperspectral algorithms to high-resolution multispectral satellites for detecting *X. fastidiosa* infections	R statistical software	github.com/bexyl/Hyperspectral-and-satellite-algorithms-for-XF-detection
IVIA/INRAE	Individual-based spatial epidemiological model	R statistical software and Python programming language	https://zenodo.org/records/10683923
IVIA/INRAE	Coupled demographic and genetic propagation model, with surveillance submodel and estimation method	R statistical software and Python programming language	https://doi.org/10.5281/zenodo.20693696
IVIA/INRAE	Outbreak management plan assessment	R statistical software and Python programming language	https://doi.org/10.5281/zenodo.10251507

3.1.2. Naming conventions used and clear versioning

Naming conventions are useful when there is the need to manage a large number of documents on similar topics, as in BeXyl. The naming conventions used for BeXyl Project are the following (defined as codification in D10.2 BeXyl Operational Manual):

- Identification: BeXyl
- Filename: Description of data (Minutes, Report etc.).
- Version: 01 to 99.
- Extension: File extension.

Example: BeXyl_DX.X_01.doc

All official documents of the project are uploaded to the BeXyl project cloud (https://saco.csic.es/s/mA8DCYLFQ8D5cJw) and have used the naming conventions defined.

3.1.3. Research keywords provision

As a rule, the keywords provide the necessary information on the document subject, but it is recommended to use one or two that make a clear link to BeXyl. If possible, it is recommended to used one or several of these: @bexylproject, #BeyondXylella, #BeXylinfo, #Xylellafastidiosa.

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Where keywords are finding the most use is in the project's social media networks and it is therefore where their use has become widespread. The accounts defined for the different networks are (activity up to July 2026):

- X (@BexylP): 517 posts
- Facebook (@bexylproject): 25 reels, 10 videos, 209 posts
- Instagram (@bexylproject): 27 reels, 112 posts, 50 stories
- Linkedin (bexyl-project): 57 posts, 3 videos

During the 1st Periodic Report, European Commission recommended to increase the visibility of the project on social media by tagging @REA_research. The actions carried out by the project are:

- **Tagging @REA_research:** All social media posts from BeXyl's official accounts are tagging @REA_research. This includes updates, announcements, and any other relevant content shared on platforms such as Twitter, LinkedIn, and Facebook.
- **Content Strategy:** Our social media strategy has been revised to include regular updates highlighting project milestones, research findings, and partner activities. Tagging @REA_research will be an integral part of this strategy to amplify our reach and engagement.
- **Visual and Interactive Content:** We have increased the use of visual content such as infographics, videos, and interactive posts to make our social media presence more engaging and informative.
- **EU-wide open source online platform:** We have submitted all practice-oriented materials (e.g., reports, videos, brochures, user manuals, infographics, etc.) presenting R&I results generated by BeXyl project to the *EU-wide open source online platform*. The list of the materials updated in the platform is shown at this platform (Figure 1).

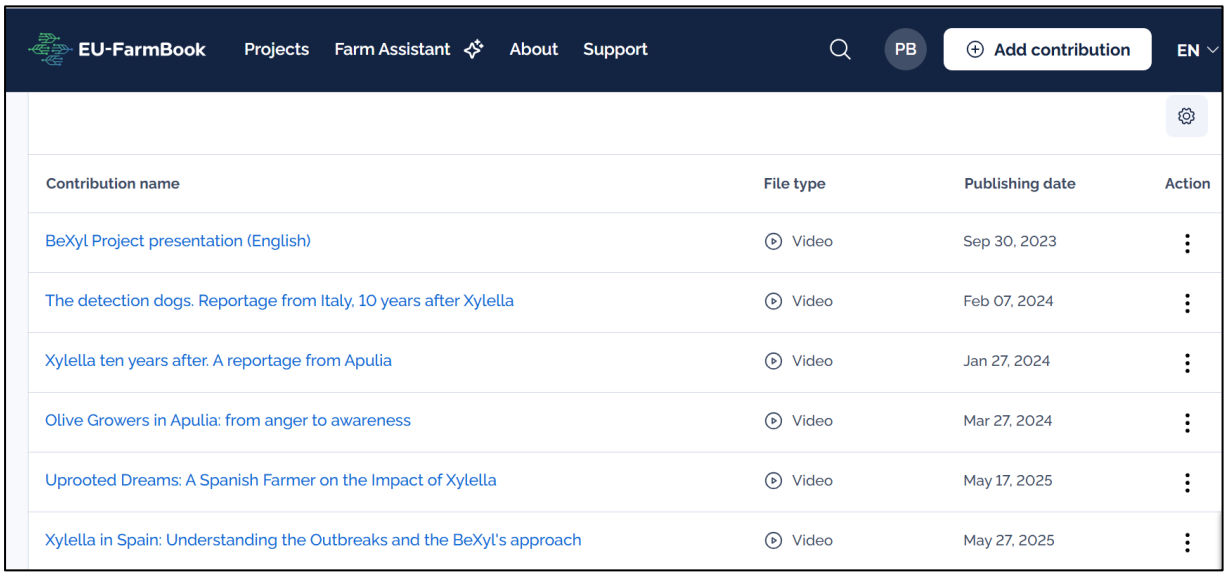


Figure 1: Screenshot showing selected BeXyl materials available on the EU-FarmBook platform.

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- **Practice Abstracts:** All practice abstracts (PA) produced within the project are available on the EU CAP Network website. The EU CAP Network provides a platform for National CAP Networks, organisations, public administrations, researchers, entrepreneurs and practitioners to exchange knowledge and information on agriculture and rural policy. By the end of July 2026, BeXyl had uploaded 20 PAs to this platform.

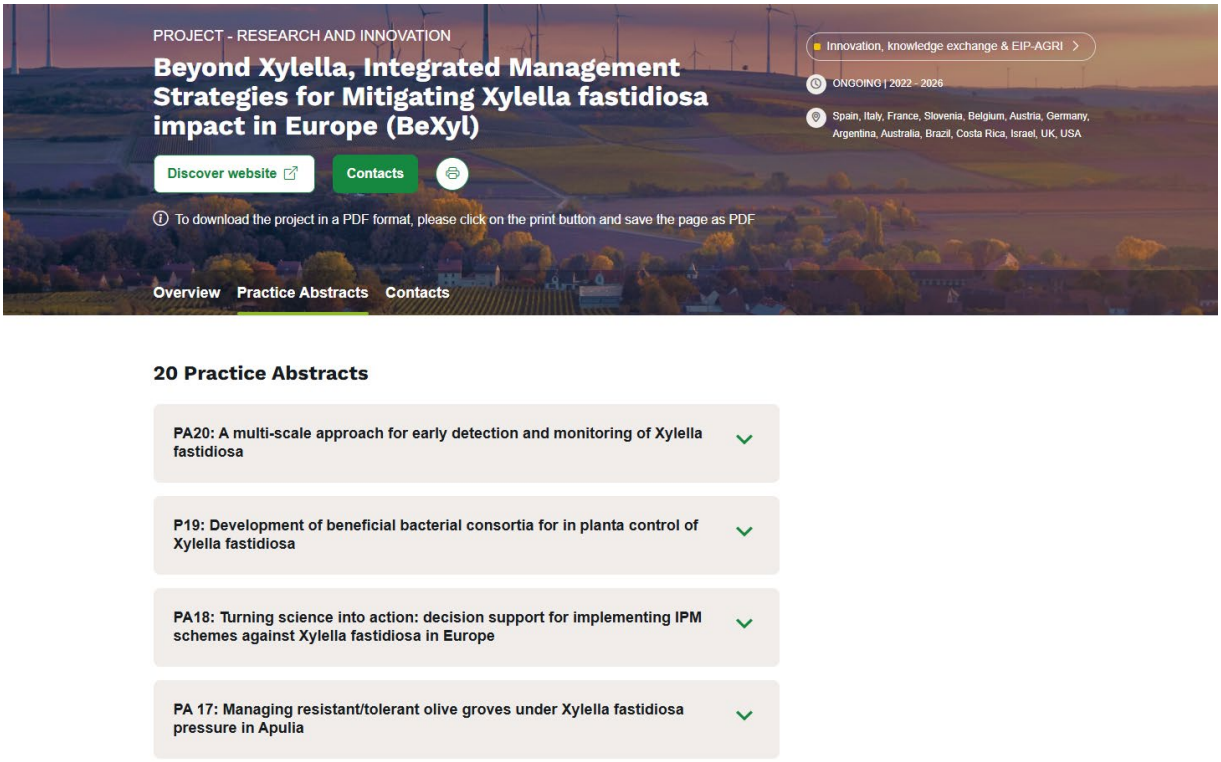


Figure 2. Screenshot of a BeXyl practice abstract available on the EU CAP Network website.

3.1.4. Type of metadata to create

Meta data are extremely important to ensure that our results and findable in the WWW for search machines or individuals. To consolidate this the Research Data Alliance (https://rd-alliance.org/) offers a Directory of Metadata Standards. Data repositories may also provide guidance about appropriate metadata standards. In this case we have followed DIGITAL.CSIC repository to define the fields.

It is always useful to consider what other documentation is needed to enable reuse. This may include information on the methodology used to collect the data, analytical and procedural information, definitions of variables, units of measurement, any assumptions made, the format and file type of the data and software used to collect and/or process the data.

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To ensure a traceable route for quality control and high visibility, all datasets and documents submitted to the database or a repository from BeXyl must contain the information defined in this metadata template as a minimum (**Table 7**).

Table 7. Standard metadata template for dataset description and documentation.

Dataset/Document Content, Use and Provenance	
Authors	Who generated the data
Title	Description of the dataset
Date	Publication date
Publisher	if applicable
Citation	Refers institutional publication
Reference	Refers papers (if applicable)
ISSN	From paper
Document Type	Xls, jpg…
Spatial situation data	For datasets
Temporal situation data	For datasets
Matadata format and standards characteristics	
Key words	#...
Summary	Summary of the document/dataset
Sponsors	If applicable
Funding Agency	EC in this case
Description	Description of the information uploaded
URI	Link to the URI
DOI	Link to the DOI
Grant Agreement	BeXyl GA nº 101060593
Data access and Sharing	
Data access policy	Open/restricted/embargo
Licenses	Link to license
Embargo date	If applicable
version	Preprint/Postprint
peer revised	YES/NO
Dissemination/reuse procedure	Link to repository
Responsible	Responsible for uploads

During the 2nd General Assembly of the project, a workshop on 'Open access to data' was held, where the data produced in the framework of the project were analysed and emphasis will be put on the harmonisation of datasets through the use of metadata.

The template prepared for data collection follows this format: https://saco.csic.es/s/zrHt8jKGdT5XyBn and it has been used for all data collected for DROP portal publications.

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3.2. Making data openly accessible

This section documents which BeXyl data are openly available, how access is provided, which tools are needed to access the data, where data and metadata are deposited, and how restricted access is handled when full openness is not possible.

According to the Guidelines on FAIR Data Management of European Commission this section of a Data and Publication Management Plan gives answers to the following issues:

- Specify which data will be made openly available. If some data is kept closed provide rationale for doing so.
- Specify how the data will be made available.
- Specify what methods or software tools are needed to access the data. Is documentation about the software needed to access the data included? Is it possible to include the relevant software (e.g. in open-source code).
- Specify where the data and associated metadata, documentation and code are deposited.
- Specify how access will be provided in case there are any restrictions.

3.2.1. Openly available data

Open Research Data (ORD) does not mean opening all research data without restriction. BeXyl follows the principle "as open as possible, as closed as necessary", with restrictions applied only when justified by confidentiality, personal-data protection, intellectual-property constraints, biosecurity considerations, sensitive location information, third-party rights or consortium agreements.

As *Xylella fastidiosa* is a priority quarantine pathogen in the EU, BeXyl adopts open-science practices while also considering phytosanitary sensitivity and biosecurity. These practices include:

- Early and open sharing, the project complies with the FAIR (Findable, Accessible, Interoperable, and Reusable) principles and data policy;
- Open access and reproducibility of research outputs;
- Open peer review: using Open Research Europe (ORE);
- Citizen, civil society and end-user engagement:
    - Co-design activities involving workshops and focus groups with stakeholders, NPPOs and EPPO participating in outbreak response programs for *X. fastidiosa* as well as farmers implementing crop restoration and IPM programs in current outbreak areas in the EU.
    - Co-creation activities in BeXyl are fully implemented through involving citizen science, that is also considered to improve early detection of *X. fastidiosa* with passive surveillance by citizens.
    - Co-assessment activities will be implemented through the Advisory and Stakeholder boards, to monitor and evaluate activities progress and check that proper interactions with the civil society are made.

Tables 2 to **5** list the publications, datasets and other digital outputs that have been made openly available by the project up to July 2026, together with repository links or access information where available.

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3.2.2. Accessibility of the data

BeXyl data are accessible through institutional, subject-specific or general-purpose repositories, depending on data type and partner availability. Organisations with their own repositories use them where appropriate; otherwise, documents and datasets are deposited through co-author repositories, DIGITAL.CSIC or other suitable repositories. As an alternative BeXyl considers the ZENODO repository in the community OpenAIRE (European Commission Funded Research) and the Euphresco Digital Research Object Portal (Euphresco DROP) that is managed by P20-EPPO.

To facilitate the search for publications and data related to the BeXyl project within the Digital.CSIC repository, a project profile was created:

https://digital.csic.es/cris/project/pj00270.

A publication field has been associated to this profile to facilitate the search for all the publications of the project. In this way, indicating the acronym of the project (BeXyl) or its identification number (101060593), all the publications stored in the repository are displayed.

Up to July 2026, Digital CSIC contains 60 publications, which have been downloaded 1.284 times around the world. The geographical situation of the downloads is available in Figure 3.



Figure 3: Map showing the geographical distribution of downloads of BeXyl publications.

The Digital Research Object Portal (DROP) is a public portal that references digital research objects in the field of plant health, currently curated by EUPHRESCO and P20-EPPO. The online publicly accessible Digital Research Object Portal (DROP) works as a node, a unique entry point that facilitates retrieval of digital research objects (data and documents) on *Xf*. Priority was given to open data and open access documents produced in the framework of the XF-ACTORS project and now BeXyl, but digital objects from other sources are also referenced, when relevant. The complete information on the DROP portal is included in the BeXyl 'Dissemination and Communication/ shared folder 'DROP' subfolder at SACO.CSIC.ES portal: https://saco.csic.es/index.php/s/73ftcj9x4WJcwWr.

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To make a useful use of the opening data and documents produced in the framework of the BeXyl project, P20-EPPO proposed a workshop that was organized during the 2nd annual meeting for the WP leaders to present the digital objects that are being produced within their work-package, agree on the ones that are important to open and establish procedures for referencing them in DROP.

On December 2024, this procedure was stablished where the main digital objects were defined and some of them uploaded.

Since then, approximately 50 digital research objects were made open and referenced in the Euphresco DROP. They are available from the URL https://drop.euphresco.net/ by selecting 'advanced search', 'funding', and entering 'BeXyl' in the cell.

3.2.3. Methods or software tools that need to access the data

No specific software tool is needed to access BeXyl data. The data in the repositories are accessible at least individually through a set of Application Programming Interfaces (APIs). This means that a user can query datasets one by one and/or request several datasets if they have been published together (e.g. in a .zip file).

3.2.4. Data and associated metadata, documentation and code deposit

Some of the different institutional repositories where data were planned to be deposited based on the partners availability have already been used:

- Preprint repository:
  - bioRxiv: https://www.biorxiv.org/ (Detailed in **Table 2**)
  - Preprint: https://www.preprints.org/
- Post print repository: (Detailed in **Table 3**)
  - CSIC, DIGITAL CSIC: https://digital.csic.es/
  - IVIA, ReDivia: https://redivia.gva.es/
  - UNITO: IRIS: https://iris.unito.it/
  - ZENODO repository: https://zenodo.org
  - Euphresco DROP: https://drop.euphresco.net/
- Program code and raw data:
  - GitHub: https://github.com/
  - o ZENODO repository: https://zenodo.org
  -

Additionally, the BeXyl website (https://www.bexylproject.org/) contains some key documents and a comprehensive and clear list of the project data and result with the link to the repositories from which they can be accessed and downloaded.

Among the contents of the website, a distinction must be made between public and private content. Public content is defined as deliverables defined as public, articles, practice abstracts and dissemination content. Within a section for members of the project, there are confidential deliverables and the official documents defining the project.

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3.2.5. Provision of data access in case of restrictions

As far as possible, final verified datasets produced by the project are being made available as open access via institutional repositories. Initial versions of the datasets could have restricted access to consortium partners for specified periods as indicated in deliverable descriptions. In the interests of personal data protection, restrictions are being considered for certain datasets (e.g. socioeconomic analysis), in which case anonymised and/or summarised findings will be made available via an openly-accessible report. For dataset that for any reason could not be made open at the end of the project for any reason (e.g. used within the project but coming from private companies or project that restrict their availability) contact to the owner of the data will be provided to allow individual requests for permission to use the data.

3.3. Making data interoperable

According to the Guidelines on FAIR Data Management of European Commission this section of a Data and Publication Management Plan is giving answers to the following issues:

- Assess the interoperability of your data. Specify what data and metadata vocabularies, standards or methodologies you are following to facilitate interoperability.
- Specify whether you are using standard vocabulary for all data types present in your data set, to allow inter-disciplinary interoperability? If not, will you provide mapping to more commonly used ontologies?

3.3.1. Interoperability of data in order data to be exchanged and re-used

BeXyl supports interoperability through standardised templates, common variable descriptions and the use of widely accepted file formats and metadata fields, as described in section 3.1.4.

3.3.2. Specification of data and metadata vocabularies, standards or methodologies

To support FAIR reuse, the consortium strives to reuse existing standards, controlled vocabularies and community practices whenever possible. For plant-health terminology, BeXyl uses AGROVOC (Caracciolo et al. 2013) developed for FAO and available in https://agrovoc.fao.org/browse/agrovoc/es/ and other relevant domain vocabularies where appropriate; when project-specific terms are necessary, their meaning should be documented in the dataset metadata.

3.4. Increase data re-use

According to the Guidelines on FAIR Data Management of European Commission this section of a Data and Publication Management Plan is giving answers to the following issues:

- Specify how the data is licenced to permit the widest re-use possible.
- Specify when the data is made available for re-use.

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- Specify whether the data produced and/or used in the project is useable by third parties, in particular after the end of the project. If the re-use of some data is restricted, explain why.
- Describe data quality assurance processes.
- Specify the length of time for which the data remains re-usable.

3.4.1. Data license to permit the widest re-use possible

To ensure that the data gathered in the BeXyl project can be made available for re-use, the datasets are released under a license that allows datasets to be re-used and new work to be derived from them. Partners are being advised about appropriate licensing schemes and license attributions to facilitate data re-use and ability to derive new work from the data and make these works open access.

Scientific publications

Creative Commons licences (https://creativecommons.org/licenses/) are used for every published result. The default licence is Attribution (CC BY), and this will be the encouraged by BeXyl, however the level of restriction will need to be determined on a case-by-case basis. The chosen licence needs to be recorded in the metadata information before to upload the publication.

Possible Creative Commons licences:

- Attribution (CC BY)

  This license lets others distribute, remix, tweak, and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licenses offered. Recommended for maximum dissemination and use of licensed materials.

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  This license, which is BeXyl´s encouraged license, lets others remix, tweak, and build upon your work even for commercial purposes, as long as they credit you and license their new creations under the identical terms. This license is often compared to “copyright” free and open-source software licenses. All new works based on yours will carry the same license, so any derivatives will also allow commercial use. This is the license used by Wikipedia, and is recommended for materials that would benefit from incorporating content from Wikipedia and similarly licensed projects.

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  This license allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to you.

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  This license lets others remix, tweak, and build upon your work non-commercially, and although their new works must also acknowledge you and be non-commercial, they don’t have to license their derivative works on the same terms.

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  This license lets others remix, tweak, and build upon your work non-commercially, as long as they credit you and license their new creations under the identical terms.

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  This license is the most restrictive of the six main Creative Commons licenses, only allowing others to download your works and share them with others as long as they credit you, but they cannot change them in any way or use them commercially.

- Public Domain Dedication (CC 0)

  This license is a public dedication tool, which allows creators to give up their copyright and put their works into the worldwide public domain. CC0 allows reusers to distribute, remix, adapt, and build upon the material in any medium or format, with no conditions.

As a summary of the published articles, the licences used are mainly CC BY (35 articles) without restriction if the author is cited, in order to have maximum dissemination and reuse of the data. CC-BY-NC is also used (3 articles) and the most restrictive CC licence (CC-BY-NC-ND) is used in 7 articles, due to research needs**.**

Metadata

Metadata of deposited publications must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent, in line with the FAIR principles and provide information about the information as described in section 3.1.4. Where applicable, the metadata must include persistent identifiers for any research output or any other tools and instruments needed to validate the conclusions of the publication.

The datasets published so far are licensed under the same license as their corresponding articles, all of them being Creative Common licenses.

3.4.2. Data availability for re-use.

The main requirement essentially calls for researchers to provide free-of-charge scientific information (unless it is protected; e.g. patenting) in the form of peer-reviewed scientific publications (Article 29.2 of the Model Grant Agreement) and Research data (Article 29.3), and to ensure continuous online access to it. The full instructions are available in the official Horizon Europe Open Access document.

Peer-reviewed scientific publications

This type of information usually refers to articles and final manuscripts that were assessed by other scholars, typically organized by the journal or the publisher.

These are subjected to Open Access following two steps:

Step one: Deposition in Institutional, subject-based or centralized repositories as described in section 3.2.4.

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Step two: Ensuring Open Access to the publications through one of the available options: "Green" or "Gold". Choosing the right option for you largely depends on your overall dissemination, communication, & exploitation strategy, and availability of resources.

- Green OA → an avenue referring to self-archiving, depending on an embargo period (if any). This option generally consists of providing access to scientific data through one of the following: The Horizon Europe research project's direct website, the author's website, the host institution's website or an independent central open repository.
- Gold OA → refers to paid archiving and the process of depositing scientific publications on websites and platforms that are not your own. Here the Open Access is immediate upon publication. Since the main premise of Open Access is that it is free, the payment is therefore handled by the author and not the reader. Within the execution phase of any Horizon Europe project, the associated costs of such publications are eligible for reimbursement as part of the Horizon Europe grant.

Choosing the right option for you largely depends on your overall dissemination, communication, & exploitation strategy.

The difference between the two types of Open Access uncovers several pros and cons for choosing one type over the other:

1. Namely, self-archiving can potentially require a lot more resources and management on the author's end. But, if you already have a website for your Horizon Europe project, this then seems like a logical step to take. Since a project website can receive less exposure and traffic than a professional publisher, it is important to have a strategic marketing strategy for the website to ensure the scientific data and information extends and reaches its target audience.
2. That being said, depositing information in dedicated professional publishing platforms can help ensure the information is better circulated and reaches a wider audience. Clearly, this option requires setting aside budget for these types of activities, and forming your information to the style and expectations of such platforms.

While scientific articles are the most widely accepted forms of sharing research results, there is a strong urge to also provide Open Access in Horizon Europe to other forms of scientific publications such as books, conference proceedings, and more.

During the BeXyl project life both procedures have been used, depositing all articles both on the project website and in institutional repositories from where to reach a wider audience. The articles published within the framework of the project are listed in **Table 3**, under section 3.1.1.

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Research data

Research data include numerical, textual, visual, geospatial, molecular, modelling and software outputs collected or generated during the project. Dissemination of these data follows the ORD mandate, while recognising that not all data can be made fully open.

Similar to scientific publications, Open Access to research data is satisfied through two steps:

Step one: Deposition in designated research data online archives. (When choosing an archive, you may refer to the following listings of optional repositories: Registry of Research Data Repositories and Databib)

Step two: Promoting availability and free of charge usage of the data first by granting copyright permissions (as Creative Commons Licenses). And then, enable access to this data via your Horizon Europe project's website or any other website that you use. This data sharing activity will be part of BeXyl dissemination strategy.

At the workshop on 'Open access to data' hold after the Second General Assembly, it was proposed to create a new section on the website to allow access to the repositories of publications stored by the project. This section is:

http://bexylproject.org/category/outcomes/publications/

3.4.3. Data utility by third parties, in particular after the end of the project

As described in section 2.6, BeXyl data are relevant to a broad range of users, including researchers, farmers, plant-health authorities, nurseries, companies and the general public. The DMP is designed to support access and reuse beyond the end of the project.

Beneficiaries should provide repository addresses, persistent identifiers and basic access instructions in publications, deliverables, dissemination materials and any public communication related to the datasets.

Many of the datasets are related to the scientist articles and they are traceable from the articles, all of them available through the institutional repositories.

3.4.4. Data quality assurance processes

Final dataset quality checks should include verification of file completeness, consistency of variable names and units, removal or flagging of duplicates, validation of metadata, confirmation of repository links or accession numbers, and internal review by the responsible partner before deposition.

Quality control of the data and information included in the ORD for BeXyl is based in these principles:

1- The experimental data are being subjected to the fundamental principle of research integrity as set out in the European Code of Conduct for Research Integrity. This implies compliance with reliability of research quality, reflected in the design, the methodology, the analysis and the use of resources.

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2- The scientific papers generated by BeXyl are be subjected to an external peer-review as part of their editorial process. All BeXyl publications have been published in high-impact journals, where the quality is guaranteed.
3- The technical materials and key summary documents (such as policy briefs) and dissemination materials of high interest have been subjected to an internal peer-review within BeXyl before been made openly available.

3.4.5. The length of time for which the data will remain re-useable

Data deposited in institutional or subject-specific repositories are expected to remain reusable for as long as those repositories remain operational. Where long-term reuse depends on partner-maintained storage or biological collections, the responsible partner should indicate the expected preservation period and access conditions.

4. ALLOCATION OF RESOURCES

According to the Guidelines on FAIR Data Management of European Commission, this section of a Data and Publication Management Plan is giving answers to the following issues:

- Estimate the costs for making your data FAIR. Describing how you intend to cover these costs.
- Clearly identifying responsibilities for data management in your project.
- Describing costs and potential value of long-term preservation.

4.1. The costs for making data fair

The BeXyl consortium has the knowledge and tools to develop an ORD based on FAIR principles. This is one of the project objectives and appropriate resources were allocated by each partner to cover costs for data harmonisation, integration and publication. The costs for making the data accessible is mostly due to time required to provide the standard procedures for providing them with a common language for metadata in this DMP, the additional information for metadata and to deposit the documents or data in the repositories.

Public project deliverables and datasets are published on the BeXyl website and several institutional repositories. For this reason, there is no additional cost for publication on the website because this is included in the cost of operating the website as a whole, included the public and private parts. In addition, ZENODO and other institutional repositories are free of charge for Horizon Europe projects. No financial resources for storage, cloud, hosting, IT infrastructures etc. are then required from the project regarding the provision of data in the public domain.

Open access publications in peer-reviewed journals are part of BeXyl dissemination activities. In line with the BeXyl Communication and Dissemination Strategy, part of the project funding is being made available for gold access – particularly for any major results or breakthroughs– , which is preferable as they avoid embargo periods, enabling faster dissemination and subsequently increased visibility of the research. Along with gold access, green access is being used for disseminating projects' outcomes, which, though relevant, are not considered major results or breakthroughs.

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The costs of Open access publications through Gold access could be an eligible cost in Horizon Europe and it is also possible to use Open Research Europe, the European Commission open access publishing platform. For these reasons, Open Access publications do not increase the costs for making data FAIR.

4.2. Responsibilities for data management in your project

Data-management responsibilities are shared between data producers, task leaders, work-package leaders and the Coordinator Team. Data producers are responsible for the accuracy, completeness and documentation of their datasets; task and WP leaders oversee consistency with project objectives; and the Coordinator Team maintains the final overview of repositories, links and persistent identifiers.

The leaders of the tasks generating each dataset have ultimate responsibility for implementing the provisions of the DMP, including deposition, access conditions, metadata completeness and any justified restrictions.

4.3. Cost and potential value of long-term preservation

Given the variety and dynamicity of the datasets generated by the BeXyl project, at present it is difficult to determine to what extent data will be accessed in the long term, and therefore calculate the value of long-term preservation. Nevertheless, the strategy pursued by this DMP, which minimizes cost of preparation and preservation of data using public, high volume and general-purpose repositories (e.g. DIGITAL.CSIC) while maximizing its openness and long-term availability, optimizes the return of the investment in scientific and technical knowledge generated by BeXyl.

5. DATA SECURITY

Data and documents included in this DMP benefit from the standard integrity, recovery and unauthorised-access protections provided by the institutional or subject-specific repositories in which they are deposited.

Privacy and sensitive-data management activities are implemented in accordance with applicable national rules, EU data-protection requirements and Horizon Europe provisions.

It should be stated that the protection of the privacy of participants is a responsibility of all persons involved in research with human participants. Privacy means, that the participant can control the access to personal information and is able to decide who has access to the collected data in the future. Due to the principle of autonomy, the participants will be asked for their agreement before private and personal information is collected. It will be ensured that all persons involved in the project activities understand and respect the requirement for confidentiality. The participants will be informed about the confidentiality policy that is used in this research project.

For final datasets, personal or sensitive information should be anonymised, pseudonymised or excluded before open release, unless a lawful basis and appropriate safeguards have been documented.

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6. ETHICAL ASPECTS

Participation in Horizon Europe requires compliance with the highest standards of research ethics and integrity, and with EU, national and international law. Horizon Europe regulation 2021/695 (Articles 18 and 19) & Grant Agreement (Art 14, Annex 5): guiding principles and general obligations.

Regarded to ethics requirements, three specific deliverables (D11.1, D11.2 and D11.3) have been developed in BeXyl project considering the following dimensions:

- In the specific case of Personal Data:

  The social scientists have mapped stakeholder networks and explore the attitudes, experiences, values and behaviours of different stakeholders regarding existing/future IPM technologies, their deployment and barriers to uptake. We are learning an understanding of barriers, opportunities and costs for *X. fastidiosa* preparedness and management through interviews, surveys and focus groups.

  As is standard in social research, data is being recorded in a manner which prevents identification of the participants and, except for case studies, research sites. This involves avoiding the use of names on Dictaphone recordings and anonymity in transcriptions.

- About Data Protection:

  Data collection are being done in compliance with the General Data Protection Regulation (GDPR). In addition, the collection of data is being conducted in compliance with data protection acts, legislation, and directives, both at the European and the national level. The coordinator as a data Controller, is ensuring that data is stored securely during the period of the project, and provisions is made to ensure that the data is secured safely beyond the lifetime of this project. Confidential information is being securely stored to prevent breaches of confidentiality.

- About Use of Animals:

  BeXyl has explored the use of canine olfactory for *X. fastidiosa* detection. The experiments and research programs are considering the Directives 2010/63/UE which aims to improve the welfare of animals used in scientific procedures.

  The Italian National Canine Association (ENCI) is being in charge of training the dogs to recognize *X. fastidiosa* infected plants of olives and other plant species. Training activities are being performed in a selected location in the southern part of the Apulia (Italy) where the pathogen is endemic, and then in nurseries and in sites where plants lots for markets are located.

- About Non-EU Countries:

  The consortium BeXyl has foreseen the active involvement of research centers located in non-EU Countries affected by *Xf*, as they can represent an important added value to the research activities.

  Unless it will be considered extremely necessary during the project implementation, no exchange of infectious materials (living bacterial cells in axenic cultures or *X. fastidiosa*

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infected plant materials, or living insect specimens) from non-EU Countries to EU, or viceversa, has been foreseen in BeXyl and it has been the situation until now. As alternative, the exchange of non-viable (non-infectious) DNA-preparations and insect vectors stored in alcohol is be done, as such these samples (not containing living bacterial cells) are not covered by the EU regulations on the possession and handling quarantine plant pathogens (Regulation (EU) 2016/2031 and Commission Delegated Regulation (EU) 2019/829).

- About Plant Health Rules:

  All the activities foreseen in the project with viable stages of *X. fastidiosa* are following the provisions of Regulation (EU) 2016/2031 on protective measures against plant pests. Particularly, those specified in Article 8 on Union quarantine pests used for official testing, scientific or educational purposes, trials, varietal selections or breeding. An official authorisation is being mandatory in each case where viable stages of *X. fastidiosa* will be used, to ensure that the activities will be properly recorded and carried out in a quarantine station or a confinement facility designated by the competent authority. Likewise, activities are being conducted only by authorized personnel with appropriate scientific and technical competence. Furthermore, specific measures against *X. fastidiosa* laid down by Commission Implementing Regulation (EU) 2020/1201 are being observed in demarcated (outbreak) areas.

The procedures used in the project to comply with the premises defined by the European Commission for ethical issues have been carried out correctly. These procedures are reflected and evaluated by both the Ethic Advisor and the Ethics Mentor in the report prepared for the first reporting period in month 18 and can be consulted in the project cloud (https://saco.csic.es/s/mA8DCYLFQ8D5cJw) in the deliverables D11.1, D11.2 and D11.3.

Of particular relevance is the documentation associated with the exchange of *X. fastidiosa* strains and host plant cultivars autochthonous from Non-EU countries and other exchanges between EU countries requiring a Plant Phytosanitary Passport. All the exchanges of infectious or non-infectious material among BeXyl partners and within this reporting period have been properly documented, the correspondence and files are kept in a dedicated directory of the BeXyl shared folder, and available for any verification by the competent Plant Health Authority.

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7. REFERENCES

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