



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817819



# SoildiverAgro

Soil biodiversity enhancement in European agroecosystems to promote their stability and resilience by external inputs reduction and crop performance increase

## D8.6- FINAL PLAN OF EXPLOITATION AND DISSEMINATION OF RESULTS

Universidade de Vigo



## D8.6 Final Plan of Exploitation and Dissemination of Results

### Summary

This deliverable D8.6 is the final exploitation and dissemination plan for the SoildiverAgro project funded by the European Union under Grant Agreement n° 817819. This report set the structure and pathway to follow in the construction of the exploitation plan that guides the project to its completion and provide the consortium with the tools to exploit the results of SoildiverAgro. This deliverable aims at presenting the project's results, the exploitation methodology developed, the Intellectual Protection overviewed and the next steps for the exploitation activities at M72.

|                                  |                                     |   |   |
|----------------------------------|-------------------------------------|---|---|
| <b>Deliverable Number</b>        | <b>Work Package</b>                 |   |   |
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| <b>Lead Beneficiary</b>          | <b>Deliverable Author(s)</b>        |   |   |
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|                                  | DEC                                 | Websites, patents filing, press & media actions, videos |   |
|                                  | E                                   | Ethyics   |   |
| <b>Dissemination Level</b>       | PU                                  | Public  | X |
|                                  | CO                                  | Confidential, only for members of the consortium        |   |



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## Acronyms and Abbreviations

| ACRONYM | DESCRIPTION                                   |
|---------|---|
| CA      | Consortium Agreement                          |
| D       | Deliverable                                   |
| EU      | European Union                                |
| EC      | European Commission                           |
| GA      | Grant Agreement                               |
| HE      | Horizon Europe                                |
| IEB     | Innovation Exploitation Board                 |
| IPR     | Intellectual Property Rights                  |
| KER     | Key Exploitable Result                        |
| LCA     | Life Cycle Assessment                         |
| T       | Task  |
| WP      | Work Package                                  |
| ESS     | Exploitation Strategy Seminar                 |
| CAPEX   | Capital Expenditure                           |
| OPEX    | Operational Expenditure                       |
| SWOT    | Strengths, Weaknesses, Opportunities, Threats |



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## Executive Summary

Within the scope of the European Commission funded projects (FP7, H2020, HE), the concept of exploitation has been introduced as part of the road to market installed for the completion of funded projects. Those projects are supported in order to develop innovative technologies and novel knowledge under the range of sustainability and produce results. Exploiting said projects means using those results in a business mindset to bring the world of investigation closer to the market.

According to the provisions of the Horizon Europe program (REGULATION (EU) 2021/695), all **SoildiverAgro** partners must—up to four years after the end of the action—use their best efforts to exploit their results directly or to have them exploited indirectly by another entity, especially through transfer or licensing.

To present concisely how the project consortium and each partner plan to exploit the project results, T8.6 is dedicated to Exploitation and Dissemination activities. The aim of the task is to produce a final document summarising the project's exploitation and dissemination strategy. The deliverable D8.6 aims to present the project's results, the exploitation methodology developed, the Intellectual Protection overview and the next steps for the exploitation activities at M72.

## Definition

The exploitation strategy is carried out transversally in the project and is related to all tasks. At the end of the project, what is sought with these strategies and plans is that all partners and the consortium as a whole find the best practices to exploit the results and generate a greater impact on the industry, society and the economy.

Partners have been advised and guided to begin outlining their path to exploitation and have previously participated in the second reporting period in order to pre-identify their Key Exploitable Results.

This document establishes the strategies for commercial, non-commercial, and knowledge exploitation, considering the paths employed by the consortium partners, identifying WHAT those results are, WHO will exploit them, and in WHICH WAY they will be exploited. Using the information provided by involved partners and CONT's support, a strategy for each of the KER is developed. This deliverable also encapsulates the realised strategies and outcomes.

This document is the **SoildiverAgro** project's exploitation and dissemination plan. The consortium lays down the basis of the exploitation and dissemination methodology that is followed within the Work Package 8.

D8.6 PEDR has the following purposes:

- Present the Key Exploitable Results that the different partners have defined and started developing during the project length, together with a SWOT analysis and an evaluation of the CAPEX/OPEX for commercial KERs.
- Prepare the following steps that **SoildiverAgro** will undertake regarding exploitation and IP protection during and after the project's completion.
- Draft adequate marketing strategies for the innovative processing technologies and products containing information on the segmentation strategy (target users).
- Prepare the communication and dissemination strategy following the project's end.

Exploiting the results within Horizon Europe projects depends on the work of other packages and the technical advances of the project in general. D8.6 PEDR is a final version that gathers each final product or service's financial evaluations and marketing strategies. The finalised exploitation plan allows the **SoildiverAgro** consortium to exploit, protect, and benefit from its results.



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## Ambitions of the project

### State-of-the-art

Agriculture represents one third of land space in the world and plays a crucial role in humanity. Currently facing growing challenges of climate change, human health, resource needs and population growth, our agricultural systems lack sustainable solutions.

Traditional agriculture in Europe relies heavily on external inputs, such as synthetic fertilizers, chemical pesticides, and intensive tillage. While increasing productivity, these practices also led to significant environmental degradation, including soil erosion, biodiversity loss, reduced soil fertility, contamination, and greenhouse gas (GHG) emissions.

Soil biodiversity, or the variety of life within the soil including bacteria, fungi, fauna, and their functions, has been severely impacted by conventional agricultural methods.

Recent studies in agroecology, soil microbiology and sustainable farming have underlined the potential of soil biodiversity to be a key driver for soil health and ecosystem services.

Despite scientific evidence, there is still a lack of comprehensive, field-based and regionally adapted research to integrate new practices at scale within Europe's diverse agricultural systems. Moreover, the current policy framework lacks specific operational tools and targets to support the transition toward more biologically based soil management approaches.

**SoilDiverAgro** intends to address the degradation of soil health and biodiversity caused by conventional agricultural practices, that threaten sustainable agriculture.

### Objectives

**SoilDiverAgro** is a European research initiative aimed at promoting sustainable agricultural practices by enhancing soil biodiversity across diverse cropping systems. The project addresses the urgent need to understand and protect the vital communities of microorganisms and macro-organisms living in soil, which are increasingly threatened by intensive farming. By closely involving stakeholders—such as farmers, advisors, researchers, and policymakers—the project ensures its work remains grounded in the realities of agricultural production. It investigates how different soil organisms contribute to essential ecosystem functions, such as improving plant health, boosting crop yields, reducing the need for external inputs, and supporting long-term soil fertility.

The project involves analyzing 90 farm systems across 9 European pedoclimatic regions and implementing 15 field case studies. Key practices include the use of beneficial soil microorganisms (like mycorrhizae and plant growth-promoting bacteria), optimized crop rotations, intercropping, pest alert systems, and the use of by-products as soil amendments.

The project also supports the development of standardized tools and protocols for assessing soil biodiversity, enabling consistent monitoring and comparison.



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Ultimately, **SoilDiverAgro** aims to guide a shift toward more resilient and biodiverse farming systems by proposing science-based, cost-effective management practices. It also contributes to policy development by defining biodiversity targets and engaging in knowledge transfer strategies that bridge science, practice, and policy across the agricultural value chain.

### **Roles and responsibilities**

The consortium is composed of 22 partners and led by the University of Vigo. It includes a large majority of Universities and Research Organizations, along with partners in the agricultural sector and foundations. The consortium is designed to integrate multidisciplinary expertise, ensuring the successful achievement of the project's scientific and technological goals.

The University of Vigo (UVI) in Spain coordinates the project, managing different research groups to align expertise with project objectives.

Key project activities (Work Packages - WPs) include:

|  |
|--|
| <b>WP1 - Consortium coordination and project management</b>  |
| <b>WP2 - Identification of main challenges in European agricultural cropping systems and data mining</b> |
| <b>WP3 - Soil biodiversity assessment in European cropping systems</b>                                   |
| <b>WP4 - Best Tools for soil biodiversity evaluation</b>   |
| <b>WP5 - Impacts of soil biodiversity on crop production and other ecosystem services</b>                |
| <b>WP6 - Environmental and socioeconomic assessment of soil biodiversity management and conservation</b> |
| <b>WP7 - Development of strategies and tools for sustainable crop management</b>                         |
| <b>WP8 - Communication, dissemination, exploitation and stakeholders engagement</b>                      |
| <b>WP9 - Ethics requirements</b>   |



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UVIGO  
UPCT  
UCPH  
EV-ILVO  
PSKW  
LUKE  
INORDE  
TI-BD  
EULS  
INAGRO



RODRIGUEZ GOMEZ RUBEN  
JOONA JUUSO  
MATTILA TUOMAS  
ADEA ASAJA  
MTÜPK  
POMONA



SYMBIOM  
FYNECO



contactica innovation  
FlächenAgentur Rheinland GmbH  
feuga fundación empresa ambiental getega

CTA  
FAR  
FEUGA



Figure 1. SoildiverAgro's partners map

## Exploitation

### Exploitation methodology

To organize the creation of the exploitation plan, an ex-post facto methodology was followed according to the methods developed by C. R. Kothari (KOTHARI, 1990).

This construction of the exploitation pathway was followed by descriptive research: survey methods of all kinds, including comparative and correlational methods.

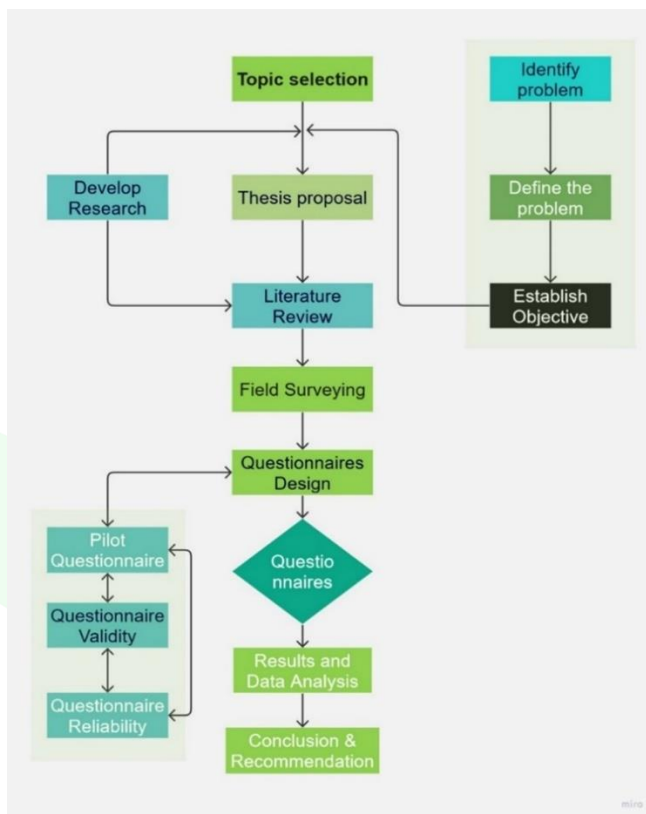


Figure 2. Diagram of the ex-post facto methodology (Kothari)

Based on this method, CONT has developed a methodology for exploitation, linking all the tasks together to provide the best overview of LABPLAS results.

The complete methodology is presented in the figure below:

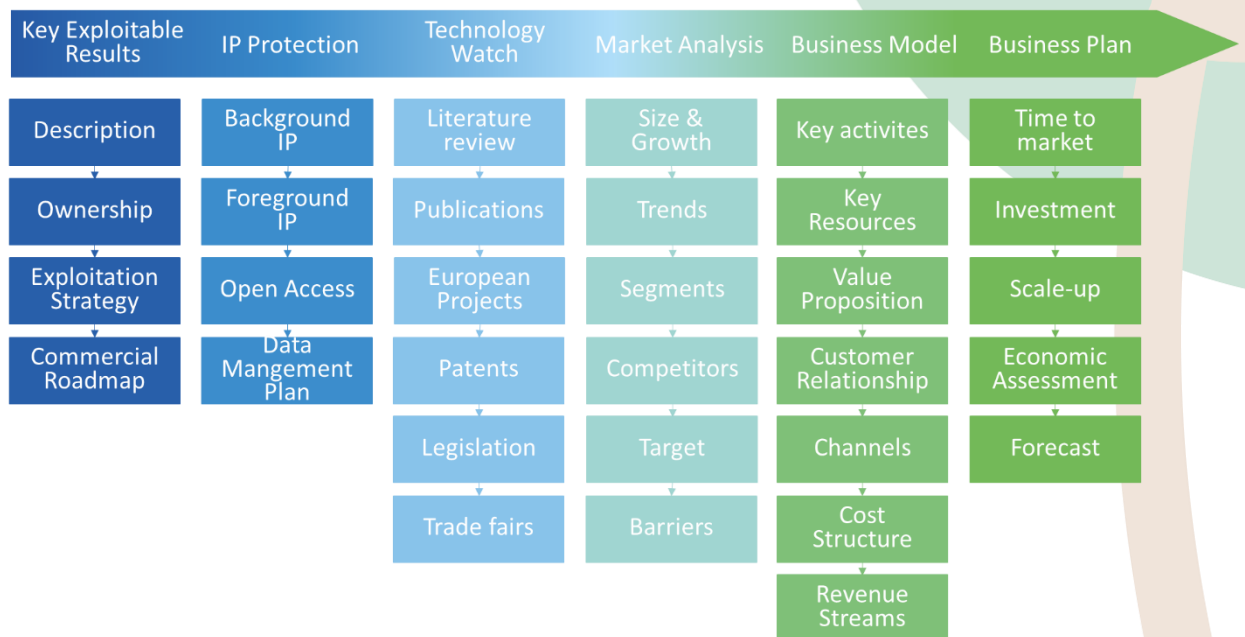


Figure 3. Exploitation Methodology - Source: CONT

Each component of this methodology comes with a set of tools tailored to prepare each segment of exploitation strategies.

**The process starts with the identification and definition of the Key Exploitable Results.** This involves determining ownership and planning the potential exploitation strategy. Understanding the potential and impact of the results as expected by the partners is crucial.

Subsequently, the protection of Intellectual Property (IP) is addressed. Foreground refers to any project output, whether tangible or intangible, such as data, knowledge, or information generated within the project, as well as any associated rights, including IP rights.

Moreover, the Profit and loss statement and financial projections include estimates of costs and benefits, sales forecasts, and other sources of financing. It must be evoked that exploitation may require investment, resources, additional testing, or scaling up of the project results

Crafting a business plan is another pivotal aspect when strategizing the exploitation of commercial outcomes. The Business Model Canvas stands out as one of the most utilised tools, known for its effectiveness in facilitating the exploitation of such results. This model scrutinises key variables, positioning the value proposition and stakeholder relationships crucial for developing a marketable service or product at the core. Additionally, it conducts an initial examination of costs and revenues, providing a foundation for subsequent financial projections. As part of the exploitation strategy led by CONT, IPR trainings are delivered during meetings in order to familiarize all partners with IP protection and collect additional information on the project's progress.

It should be considered that exploitation may require investment, resources, additional testing or scaling up the project results.

## Business model

Business Model Canvas is a strategic management template for developing new or documenting existing business models. It is a visual chart with elements describing a firm's or product's value proposition, infrastructure, customers, and finances. It assists firms in aligning their activities by illustrating potential trade-offs.

The Business model of **SoildiverAgro** project was based on the Canvas model. The Canvas model has been updated throughout the project's life, till having its final version. At the proposal stage, a draft version of the CANVAS model was prepared.

Table 1. SoildiverAgro Canvas model

|  |   |   |   |   |
|--|---|---|---|---|
| <b>Key Partners</b><br>UVIGO<br>UPCT<br>EV-ILVO<br>TI<br>LUKE<br>EULS<br>FYNECO<br>SYMBIOM           | <b>Key Activities</b><br>- Identification of farmers' threats and needs.<br>- Identification and development of management practices and cropping systems.<br>- Assessment of soil genetic and functional biodiversity.<br>- Identification of key beneficial organisms.<br>- Identification of key plant-organisms interactions. | <b>Value Proposition</b><br>- Enhance soil micro- & macro-organisms genetic and functional diversity<br>- Improvement in crop health, growth and development, crop productivity, quality and value, delivery of other ecosystem services<br>- Reduction of pest/diseases incidence<br>- Reduction of inputs (fertilizers, pesticides, water, fuel)<br>- Reduction of soil and water contamination<br>- Reduction in GHG emissions | <b>Customer Relationships</b><br>- Trade fairs to show the positive incomes of the process.<br>- Being involved with the entire value chain through clusters participation. | <b>Customer Segments</b><br>- Farmers<br>- Agribusiness<br>- Land managers<br>- Farmers associations<br>- Government institutions<br>- Non-profit organizations |
|  | <b>Key resources</b><br>- Farm sampling and Case studies.<br>- Cost-benefit analysis (CBA).<br>- LCA.   |   | <b>Channels</b><br>- Workshops<br>- Fairs and trade exhibitions.<br>- Decision Support Tool and Toolbox Kit<br>- Communities of Practitioners                               |   |
| <b>Cost Structure</b><br>R&D and product development<br>Commercial and marketing<br>Customer service |   | <b>Revenue Streams</b><br>- Agricultural revenue: cost reductions and increases in crop value<br>- Mycorrhiza and plant growth promoting bacteria (PGPB) new products (SYMBIOM and FYNECO )   |   |   |
| <b>Social &amp; environmental cost</b><br>Management costs<br>Programmatic costs                     |   | <b>Social &amp; environmental benefit</b><br>- Improvement of the socioeconomic and environmental sustainability<br>- Circular economy reducing agricultural inputs and raw materials importations, reusing by-product and contributing to lower GHG emissions<br>- Contribution to climate change mitigation and environment conservation  |   |   |

At the proposal stage, it was proposed that the project's outcomes will be open and free of charge to the society, except those under IPR protection, which will be products by SYMBIOM and FYNECO. The exploitation of new products developed by SYMBIOM or FYNECO will be managed with the support of CONT.

### Key Exploitable Results

To give a thorough image of **SoildiverAgro's** results and update the KERs, CONT used a series of tools dedicated to discovering the project's potential and its results. A questionnaire including both non-commercial and commercial elements has been developed to collect the most appropriate information for each type of result. Thus, the partners have provided their contributions according to whether their KERs had the potential for exploitation in the market or whether their exploitation strategy is oriented towards further research, publications, open-source dissemination, etc.

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### 3 Key Exploitable Results

| Add KER name                 |   |
|------------------------------|---|
| Lead Partners                |   |
| WP                           |   |
| TRL                          | Initial:<br>Expected at the end of the project.   |
| IPR Management               |   |
| Problem                      | Describe the problem you are addressing (the problem your potential users have). Potential users are the people, companies, organizations, etc. that you expect will use the result (and generate an impact). They are your "Customers"   |
| Alternative solution         | Describe how your "customer" has solved the problem so far.   |
| Unique Value Proposition UVP | Describe the competitive advantages, the innovative aspects. What does your solution do better, what are the benefits considering what your user/customer wants, how does your solution solve his/her problem better than alternative solutions, what distinguishes the KER from the competition/current solutions?   |
| Description                  | Describe in a few lines your result and/or solution (i.e., product, service, process, standard, course, policy recommendation, publication, etc.). Use simple wording, avoid acronyms, make sure you explain how your UVP is delivered.   |
| Target market                | Describe the market in which your product/service will be used/can "compete", answering the following questions: - What is the target market? - Who are the customer segments?  |
| Early Adopters               | Early adopters are the "customers" you are willing to address first. They are usually the ones that feel the problem harder than all the others (they are not the project partners).  |
| Competitors                  | Who are your "competitors" (note: they are the ones offering "alternative solutions")? What are their strengths and weaknesses comparing to you?  |
| Go to Market - Use model     | Choose what your "use model" is, how the KER will be put in use (mode available to "customers" or stakeholders to generate an impact) <ul style="list-style-type: none"> <li><input type="checkbox"/> Manufacturing of a new product</li> <li><input type="checkbox"/> Provision of a service (example: training)</li> <li><input type="checkbox"/> Direct industrial use</li> <li><input type="checkbox"/> Technology transfer</li> <li><input type="checkbox"/> License agreement</li> <li><input type="checkbox"/> Contract research</li> <li><input type="checkbox"/> Publications</li> <li><input type="checkbox"/> Standards</li> <li><input type="checkbox"/> Use for further research</li> <li><input type="checkbox"/> Other. Please explain:</li> </ul> |

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|                               |   |
|-------------------------------|---|
| Go to Market - Timing         | What is the time to market?   |
| Go to Market - IPR Background | Background refers to IPR existing before the start of the project (Know-how, patent etc.). Make sure that this is agreed before the end of the project.   |
| Go to Market - IPR Foreground | <input type="checkbox"/> Trade secret<br><input type="checkbox"/> Copyright<br><input type="checkbox"/> Trademark<br><input type="checkbox"/> Patent<br><input type="checkbox"/> Utility model<br><input type="checkbox"/> Industrial design<br><input type="checkbox"/> No protection is foreseen. If so, please explain below how your results will be put in open access |

Figure 4. Exploitation Questionnaire

Using the Exploitation Questionnaire and Exploitation Workshop, the partners' results are included in the project's results individual tables.

Throughout the project, significant progress has been made in defining and advancing the exploitation of **SoildiverAgro** results. An online training session on Exploitation and

Intellectual Property Rights (IPR) provided partners with essential knowledge on managing and protecting project outcomes. Key Exploitable Results (KERs) were identified, updated, and refined through structured questionnaires and consortium feedback.

In addition, CONT worked with the partners to develop a SWOT analysis. A SWOT is a strategic management technique used to identify Strengths, Weaknesses, Opportunities, and Threats to establish the internal and external factors that are favourable and unfavourable to achieving the objectives of the venture or project.

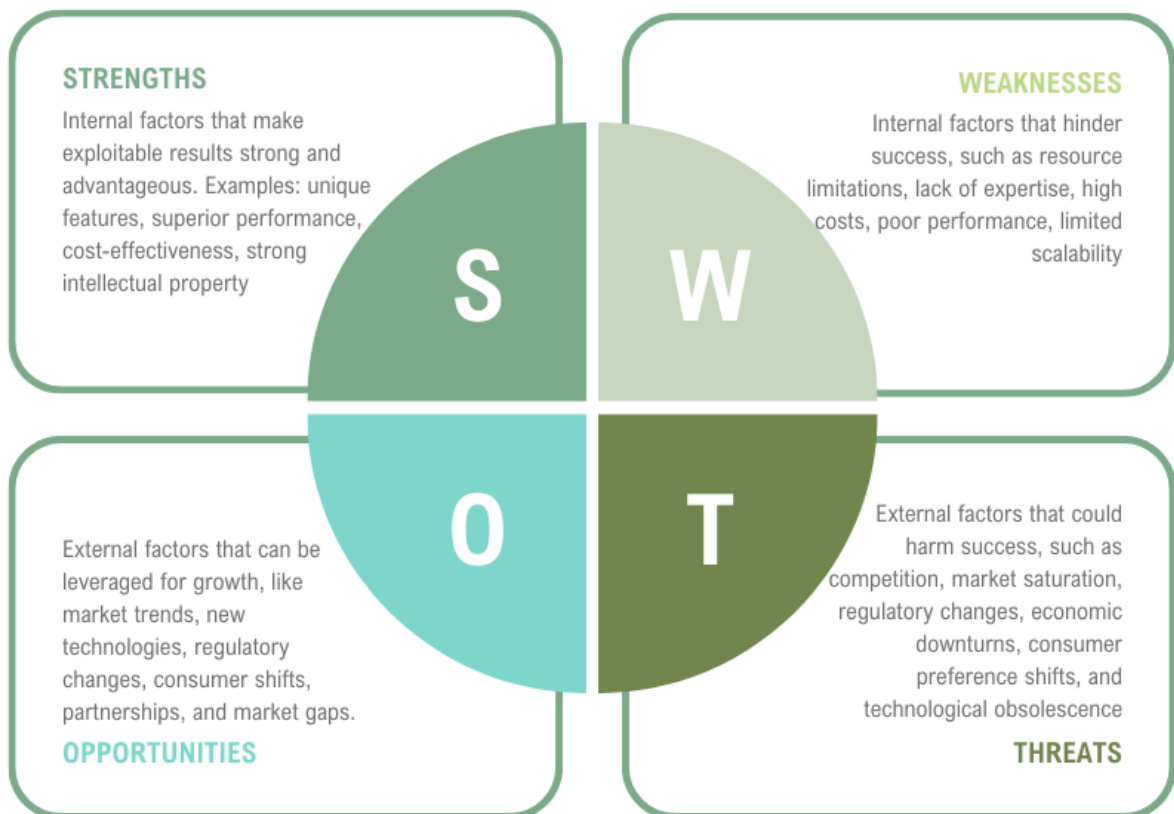


Figure 5. SWOT Analysis. Source CTA

This SWOT analysis helps to identify and describe internal factors that either positively or negatively impact the results and external factors that could enhance or hinder the impact or acceptance of the scientific results. It also helps **SoildiverAgro** partners identify areas of improvement. We collaborated with each partner so that they could define their Strengths and Weaknesses and the context of their results, thus making more conscious and effective decisions when exploiting their solutions.

Table 2. KER table from PSC

| Results  | Ownership   | IP Type   | Will it be protected? | Exploitation Strategy   |
|--|---|-----------|-----------------------|---|
| Assessment of wheat quality in European agricultural wheat field (conventional versus organic farming)   | UVIGO   | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Current situation of (functional) biodiversity in European agricultural wheat fields (conventional and organic farming) based on nematode communities (18S rDNA metabarcoding) | EV-ILVO   | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Assessment of (functional) biodiversity in European agricultural wheat fields (conventional and organic farming) based on earthworm communities                                | TI (EV-ILVO, LUKE, EULS, UVIGO)                   | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Assessment of bacterial and archaeal (genetic) biodiversity in European agricultural wheat fields (conventional and organic farming, 18S rDNA metabarcoding)                   | UCPH  | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Assessment of fungal and mycorrhizal (genetic) biodiversity in European agricultural wheat fields (conventional and organic farming, ITS rDNA metabarcoding)                   | LUKE  | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Assessment of microbial (functional) biodiversity in European agricultural wheat fields (conventional and organic farming, PLFA-NLFA, transcriptomics of key genes)            | UVIGO and UPCT                                    | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Assessment of the physicochemical condition in European agricultural wheat fields (conventional and organic farming)   | UVIGO   | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Relationships between soil characteristics, climate condition and soil biodiversity  | EV-ILVO, UVIGO, UPCT, UCPH, LUKE, TI, EULS)       | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Protocols for sampling, sampling procedure and analysis  | UCPH,UVIGO,UPCT,ILVO, TI, LUKE and EULS           | Protocol  | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Biodiversity of soil micro- and macro-organisms in the different case studies in terms of cropping system, management practices and pedoclimatic region                        | UPCT ,UVIGO, UCPH, ILVO, TI, LUKE and EULS        | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Relationship between soil biodiversity, crop yield and quality and delivery of ecosystem services  | UPCT ,UVIGO, UCPH, ILVO, LUKE, TI and EULS        | knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Best cropping systems and management practices that enhance soil biodiversity and the associated delivery of ecosystem services  | TI, UPCT ,UVIGO, UCPH, ILVO, LUKE and EULS        | Know-how  | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Products based on soil microorganisms formulation tested on lab and field tests  | FYNCO, UPCT, UCPH, UVIGO, ILVO, LUKE, TI and EULS | Products  | yes                   | Sales   |
| Integrated framework, research methodology and protocol for socio-economic research  | LUKE, UVIGO, UPCT, EV-ILVO, TI, EULS, CONT;       | Method    | yes                   | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Environmental impacts of soil diversity enhancing management practices   | CONT, LUKE, UVIGO, UPCT, EV-ILVO, TI, EULS        | Know-how  | yes                   | New service   |
| Economic analysis of soil biodiversity enhancement at farm, national and EU level  | UPCT, TI, LUKE, UVIGO, EV-ILVO, TI, EULS          | Knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Social, cultural and institutional aspects of adapting soil biodiversity management  | LUKE, EV-ILVO, UVIGO, UPCT, TI, EULS              | Knowledge | no                    | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |
| Cross-case study comparative analysis  | UPCT, TI, EV-ILVO, LUKE, UVIGO, EULS,             | Knowledge |                       | New knowledge generation and dissemination to the scientific community and society, Increase in their publication rate indexes and scientific impact. |

The mid-term report allowed the partners to highlight their first Key Exploitable Results and provide titles as well as the IP protection expected.

The following Individual KERs are the final projection of each contributor's work and how **SoildiverAgro** will be exploited in the near future.

## Individual Key Exploitable Results

### 1.1 UVIGO

**A comparative study about soil physicochemical properties and functions in wheat fields under different farming systems and climatic conditions along a European south-east to north-west gradient**

|                               |  |
|-------------------------------|--|
| Lead Partner                  | UVIGO  |
| WP                            | 3  |
| TRL                           | Initial: Not applicable<br>Expected at the end of the project: Not applicable  |
| Problem                       | The quality of wheat may be affected according to the management practices applied to soils.   |
| Alternative solution          | To practice organic or conventional farming  |
| Unique Value Proposition UVP  | This KER will provide science-backed comparative data about the quality of wheat from agricultural soils with different farming systems.   |
| Description                   | Assessment of wheat quality under conventional farming systems compared to organic farming systems.  |
| Target market                 | Scientific community, farmers, farm managers, agri-food companies  |
| Early Adopters                | Farmers  |
| Competitors                   | Farmers from extensive fields, large producers.  |
| Go to Market - Use model      | <input checked="" type="checkbox"/> Publications   |
| Go to Market - Timing         | Not applicable   |
| Go to Market - IPR Background | Know how and expertise on analytical methodologies for soil physicochemical properties   |
| Go to Market - IPR Foreground | <input checked="" type="checkbox"/> No protection is foreseen : The results will be published in a scientific journal in Open Access. Data and metadata will also be available in a public and Open Access repository. |

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|----------------------|--|
| <b>STRENGTHS</b>     | It provides a wide range of samples across Europe from different pedoclimatic regions and a wide range of soils.<br>It analyses a huge number of physicochemical parameters. |
| <b>WEAKNESSES</b>    | It is only one sampling time in fields with long time farming practices.   |
| <b>OPPORTUNITIES</b> | Other research areas might come up, such as the effect of the practices in carbon sequestration.   |
| <b>THREATS</b>       | Huge number of studies about the implementation of organic farming practices.  |

### 1.2 UVIGO

**Occurrence, persistence and risk assessment of pesticide residues in European wheat fields: a continental scale approach**

|              |       |
|--------------|-------|
| Lead Partner | UVIGO |
|--------------|-------|

|                               |   |
|-------------------------------|---|
| WP                            | 3   |
| TRL                           | <u>Initial:</u> Not applicable<br><u>Expected at the end of the project:</u> Not applicable   |
| Problem                       | Wheat may lead to a high occurrence of pesticides in soils according to the farming system applied.   |
| Alternative solution          | To practice organic or conventional farming   |
| Unique Value Proposition UVP  | This KER provides field-based data on pesticide residues in soils from different wheat farming systems.   |
| Description                   | Detailed information about the presence of highly used pesticides and their residues in European wheat fields managed under conventional and organic farming systems. By profiling the most commonly used pesticides and their environmental residues across diverse European regions, the objective is to uncover how different soil and crop management strategies influence the persistence and accumulation of agrochemicals. |
| Target market                 | Scientific community, farmers, farm managers.   |
| Early Adopters                | Farmers   |
| Competitors                   | Farmers from extensive fields, large producers.   |
| Go to Market - Use model      | <input checked="" type="checkbox"/> Publications  |
| Go to Market - Timing         | Not applicable  |
| Go to Market - IPR Background | Know how and expertise on risk assessment of pesticide residues.  |
| Go to Market - IPR Foreground | <input checked="" type="checkbox"/> No protection is foreseen.<br>The results will be published in a scientific journal of Open Access. Data and metadata will also be available in a public and Open Access repository.  |

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| <b>STRENGTHS</b>     | It provides a wide range of samples across Europe from different pedoclimatic regions and a wide range of soils.<br>It analyses a huge number of parameters. |
| <b>WEAKNESSES</b>    | It is only one sampling time in fields with long time farming practices.   |
| <b>OPPORTUNITIES</b> | Other research areas might come up.  |
| <b>THREATS</b>       | Huge number of studies about the presence of pesticides in soils under different farming systems.  |

### 1.3 UVIGO

|   |       |
|---|-------|
| <b>Impact of conventional and organic farming systems on soil nutrients: a macro study for wheat growth across nine European pedoclimatic zones</b> |       |
| Lead Partner  | UVIGO |
| WP  | 3     |

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|--------------------------------------|---|
| <b>TRL</b>                           | <u>Initial:</u> Not applicable<br><u>Expected at the end of the project:</u> Not applicable   |
| <b>Problem</b>                       | Soil nutrient content as well as soil nutrient ratios in wheat fields might be affected according to the management practices applied to soils.   |
| <b>Alternative solution</b>          | To practice organic or conventional farming   |
| <b>Unique Value Proposition UVP</b>  | This KER provides data on soil nutrient content and nutrient ratios in wheat fields managed under conventional and organic farming systems. The results will help stakeholders understand how farming choices affect nutrient cycling and soil sustainability, providing a scientific basis for improving soil management strategies.                   |
| <b>Description</b>                   | Assessment of soil fertility in wheat fields managed under conventional and organic farming systems. By assessing key indicators of soil fertility such as nitrogen, phosphorus, potassium, and micronutrient level, this KER reveals how different soil management practices influence nutrient availability, soil health, and long-term productivity. |
| <b>Target market</b>                 | Scientific community, farmers, farm managers.   |
| <b>Early Adopters</b>                | Farmers   |
| <b>Competitors</b>                   | Farmers from extensive fields, large producers.   |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Publications  |
| <b>Go to Market - Timing</b>         | What is the time to market? Not applicable  |
| <b>Go to Market - IPR Background</b> | Know how and expertise on conventional and organic farming systems  |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen.<br>The results will be published in a scientific journal in open Access. Data and metadata will also be available in a public and Open Access repository.  |

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| <b>STRENGTHS</b>     | It provides a wide range of samples across Europe from different pedoclimatic regions and a wide range of soils.<br>It analyses a huge number of nutrients and nutrient ratios. |
| <b>WEAKNESSES</b>    | It is only one sampling time in fields with long time farming practices.  |
| <b>OPPORTUNITIES</b> | Other research areas might come up.   |
| <b>THREATS</b>       | Huge number of studies about the implementation of organic farming practices.   |

#### 1.4 UVIGO

|  |                |
|--|----------------|
| <b>Assessment of (functional) biodiversity in European agricultural wheat fields (conventional and organic farming) based on earthworm communities</b> |                |
| <b>Lead Partner</b>  | UVIGO and UPCT |
| <b>WP</b>  | 3              |

|                                      |   |
|--------------------------------------|---|
| <b>TRL</b>                           | <u>Initial</u> : Not applicable<br><u>Expected at the end of the project</u> : Not applicable   |
| <b>Problem</b>                       | Microbial functional biodiversity of wheat soils may differ according to the management practices applied to soils.   |
| <b>Alternative solution</b>          | To practice organic or conventional farming.  |
| <b>Unique Value Proposition UVP</b>  | Study about the microbial biodiversity functionality of wheat soils with different farming systems. It will provide insights into microbial and earthworm biodiversity allowing stakeholders to monitor soil health, promote biological function, and support nature-based agricultural strategies. |
| <b>Description</b>                   | Further research about the status of earthworm communities and their functional biodiversity in agricultural wheat fields managed under conventional and organic farming systems.   |
| <b>Target market</b>                 | Scientific community, farmers, farm managers.   |
| <b>Early Adopters</b>                | Farmers   |
| <b>Competitors</b>                   | Farmers from extensive fields, large producers.   |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Publications  |
| <b>Go to Market - Timing</b>         | Not applicable  |
| <b>Go to Market - IPR Background</b> | Know how and expertise in Soil Fauna Assessment. Field methodologies.   |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen.<br>The results will be published in a scientific journal of Open Access. Data and metadata will also be available in a public and Open Access repository.  |

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| <b>STRENGTHS</b>     | It provides a wide range of samples across Europe from different pedoclimatic regions and a wide range of soils. |
| <b>WEAKNESSES</b>    | It is only one sampling time in fields with long time farming practices.   |
| <b>OPPORTUNITIES</b> | Other research areas might come up.  |
| <b>THREATS</b>       | Huge number of studies about the implementation of organic farming practices.                                    |

## 1.5 UVIGO

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|--|---|
| <b>Operational soil biodiversity targets</b> |   |
| <b>Lead Partner</b>                          | UVIGO and UPCT  |
| <b>WP</b>                                    | 3   |
| <b>TRL</b>                                   | <u>Initial</u> : Not applicable<br><u>Expected at the end of the project</u> : Not applicable |
| <b>Problem</b>                               | Biodiversity monitoring is not easy to perform  |

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| <b>Alternative solution</b>          | To provide a protocol about biodiversity targets   |
| <b>Unique Value Proposition UVP</b>  | This KER provides information about the operational soil biodiversity target for soil biodiversity monitoring, proposing a standardized protocol for setting and monitoring operational soil biodiversity targets. This directly enables policymakers, land managers, and certifiers to integrate biodiversity goals into agricultural practices and reporting frameworks. |
| <b>Description</b>                   | Information about operational targets to assess and monitor soil biodiversity. The data will be part of a protocol that supports the assessment and long-term monitoring of soil biodiversity by establishing measurable indicators, threshold values, and standardized procedures tailored to different management practices  |
| <b>Target market</b>                 | Scientific community, farmers, farm managers.  |
| <b>Early Adopters</b>                | Farmers  |
| <b>Competitors</b>                   | Farmers from extensive fields, large producers.  |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Publications   |
| <b>Go to Market - Timing</b>         | Not applicable   |
| <b>Go to Market - IPR Background</b> | Field methodologies.   |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen.<br>The results will be published in a scientific journal of Open Access. Data and metadata will also be available in a public and Open Access repository.   |

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| <b>STRENGTHS</b>     | It provides a protocol for optimally monitoring soil biodiversity. |
| <b>WEAKNESSES</b>    | Not detected yet.  |
| <b>OPPORTUNITIES</b> | Other research areas might come up.                                |
| <b>THREATS</b>       | Difficulties in the implementation of daily farmer's life.         |

## 1.6 UVIGO

| <b>Management Practices Guidelines Manual</b> |   |
|---|---|
| <b>Lead Partner</b>                           | UVIGO and UPCT  |
| <b>WP</b>                                     | 3   |
| <b>TRL</b>                                    | <u>Initial</u> : Not applicable<br><u>Expected at the end of the project</u> : Not applicable   |
| <b>Problem</b>                                | This addresses a major gap in knowledge transfer: the lack of accessible, easy-to-understand materials that help farmers apply best management practices for improving soil biodiversity. |

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| <b>Alternative solution</b>          | To follow traditional recommendations   |
| <b>Unique Value Proposition UVP</b>  | Science-to-field activity that provides easy to understand field management practices to boost soil biodiversity.   |
| <b>Description</b>                   | This KER translates complex scientific recommendations into practical, field-ready guidance written in colloquial, farmer-friendly language, tailored to real-world challenges and traditional knowledge systems. This will help farmers to adopt good practices that enhance soil life, improve fertility, and support sustainable production, all without needing to interpret dense technical documents. |
| <b>Target market</b>                 | Farmers, farm' managers, scientific community,  |
| <b>Early Adopters</b>                | Farmers   |
| <b>Competitors</b>                   | Farmers from extensive fields, large producers.   |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Publications  |
| <b>Go to Market - Timing</b>         | Not applicable  |
| <b>Go to Market - IPR Background</b> | Know how and expertise in soil management. Training.  |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen. The results will be published in a scientific journal of Open Access. Data and metadata will also be available in a public and Open Access repository.   |

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| <b>STRENGTHS</b>     | It provides a wide range of management practices in an easy language to get farmers involved. |
| <b>WEAKNESSES</b>    | Loss of interest from farmers if readability is not attractive enough.                        |
| <b>OPPORTUNITIES</b> | Other research areas might come up.   |
| <b>THREATS</b>       | Long extensions of the document could result a disadvantage.                                  |

## 1.7 UVIGO

| <b>SoildiverAgro Decision Support Tool</b> |  |
|--|--|
| <b>Lead Partner</b>                        | UVIGO and UPCT   |
| <b>WP</b>                                  | 3  |
| <b>TRL</b>                                 | <u>Initial</u> : Not applicable<br><u>Expected at the end of the project</u> : Not applicable  |
| <b>Problem</b>                             | Farmers lack practical, science-based tools to help them choose agricultural management strategies tailored to their specific local conditions that enhance soil biodiversity, improve agroecosystem resilience, and reduce dependence on external inputs—while maintaining profitability. |
| <b>Alternative solution</b>                | Participatory approaches and multi-actor systems are a collaborative method involving various stakeholders to address soil biodiversity challenges. Applied to rural communities, the multi-actor approach   |

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|                                      | recognizes the diverse range of individuals, organizations, and institutions that play a role in agricultural development.   |
| <b>Unique Value Proposition UVP</b>  | Our KER will provide information about when is the best moment to make decisions to whether implement or not management practices  |
| <b>Description</b>                   | This application easy-to-use for farmers enables users to assess the status of their soil biodiversity by inputting basic soil data. Based on that, the tool provides tailored, context-specific recommendations on when and whether to adopt specific management practices to enhance soil life and overall sustainability. |
| <b>Target market</b>                 | Scientific community, farmers, farm managers.  |
| <b>Early Adopters</b>                | Farmers  |
| <b>Competitors</b>                   | Farmers from extensive fields, large producers.  |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Provision of a service (example: training)   |
| <b>Go to Market - Timing</b>         | The tool is available online in free access.   |
| <b>Go to Market - IPR Background</b> | Soil biodiversity datasets and management practice benchmarks compiled prior to the project  |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen. The decision support tool is intended to be open access, and published online.  |

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| <b>STRENGTHS</b>     | The DST delivers science-based, multi-criteria guidance to help farmers make sustainable soil management decisions tailored to their local conditions                                   |
| <b>WEAKNESSES</b>    | It aligns with EU Green Deal and CAP goals, offering great potential for integration into digital farming tools and future policy frameworks.   |
| <b>OPPORTUNITIES</b> | Its effectiveness relies on high-quality input data and may be difficult to use without digital skills or adequate training. It may result in an attractive app for daily farmers' use. |
| <b>THREATS</b>       | Low digital access, changing policies, and competition from private sector tools could limit its adoption and long-term impact  |

## 2.1 EV-ILVO

### Current situation of (functional) biodiversity in European agricultural wheat fields (conventional and organic farming) based on nematode communities (18S rDNA metabarcoding) in relation to soil characteristics and climate conditions.

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| <b>Lead Partner</b> | EV-ILVO  |
| <b>WP</b>           | 3  |
| <b>TRL</b>          | <u>Initial: 2</u> , because the DNA-metabarcoding technique for nematodes still needed to be optimized (in WP4)<br><u>Expected at the end of the project: 3</u> , because the nematode 18S rDNA metabarcoding tool was used on samples from real agricultural fields and have initial results linking biodiversity with soil/climate variables |

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| <b>Problem</b>                      | There is a critical knowledge gap regarding how soil biodiversity responds to farming systems, soil characteristics, and climatic conditions – limiting our ability to design evidence-based strategies for sustainable agriculture and biodiversity conservation.   |
| <b>Alternative solution</b>         | Researchers have made several targeted attempts to explore soil biodiversity (including nematodes) in agricultural systems, often at smaller scales or with more limited scopes.   |
| <b>Unique Value Proposition UVP</b> | By analyzing nematode communities in relation to soil characteristics and climate conditions, we offer unique insights into the connections between farming practices, soil health, and ecosystem function concerning wheat production, one of the main crops in Europe. This data can support farmers, policymakers, and researchers aiming to improve soil management, enhancing biodiversity, and informing sustainable farming practices for wheat production and beyond. Unlike existing studies, which are often limited in scope, our dataset offers a holistic view enabling informed decision-making at the European level. It directly addresses the knowledge gap in how farming systems impact soil biodiversity, driving more effective actions for sustainability and agricultural productivity. |
| <b>Description</b>                  | Our solution provides a comprehensive, up-to-date understanding of the current state of biodiversity in European agricultural wheat fields, specifically comparing conventional and organic farming systems.   |
| <b>Target market</b>                | The target market includes mainly two key stakeholders: the academic community and European policy. The dataset and approach could be foundational for future studies, offering new avenues for sustainability research, soil health, and agroecology. The European Commission is increasingly focused on environmental sustainability, biodiversity conservation, and climate resilience. The data can directly inform policy decisions related to agricultural practices, soil health monitoring, and sustainable farming regulations.   |
| <b>Early Adopters</b>               | Farmers who are already practicing organic farming or sustainable agriculture are often highly motivated to improve soil health and biodiversity. Agricultural consultants, NGOs and soil health experts (companies) could help these farmers to be the first to adopt data-driven practices that can demonstrate the benefits of their current wheat producing and help optimize soil health management.  |
| <b>Competitors</b>                  | Soil testing companies and agritech startups focus on specific aspects of soil health or offer limited geographical scope. International and national Agricultural Research Institutes and Universities often lead large-scale studies on soil health, biodiversity, and farming systems, producing high-quality, peer-reviewed data. However, still much of the research is theoretical, with less focus on providing practical, actionable recommendations for farmers.  |
| <b>Go to Market - Use model</b>     | <input checked="" type="checkbox"/> Publications<br><input checked="" type="checkbox"/> Use for further research   |
| <b>Go to Market - Timing</b>        | Unknown. Is much depending on time and obtaining financial resources through future projects.  |

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| <b>Go to Market - IPR Background</b> | <i>Not applicable to this KER</i>  |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen. Results will be communicated through events, symposia, and other dissemination platforms. Open-access, peer-reviewed A1 publications are planned, with links to datasets hosted in public repositories. |

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| <b>STRENGTHS</b>     | The dataset provides a comprehensive and high-resolution view of functional biodiversity across European wheat fields, uniquely focusing on nematode communities using 18S rDNA metabarcoding. This enables detailed ecological insights, including functional roles and biodiversity patterns across both organic and conventional farming systems. Its open-access format and strong alignment with EU policy goals (e.g. the Green Deal, Farm to Fork) make it a valuable and credible resource for researchers, policymakers, and sustainable farming initiatives alike. |
| <b>WEAKNESSES</b>    | Despite its richness, the dataset's complexity may limit accessibility for non-specialists. Interpreting high-throughput biodiversity data requires specialized knowledge, which can hinder immediate practical use, especially by farmers. Additionally, the method can be more resource-intensive than traditional soil testing, and as it represents a snapshot in time, it may not capture longer-term biodiversity dynamics unless monitoring is repeated.  |
| <b>OPPORTUNITIES</b> | This dataset holds strong potential to influence policy by supporting evidence-based decisions on agri-environmental measures and biodiversity-related subsidies. It offers practical applications for promoting sustainable soil management and could be integrated into educational programs or farmer advisory services. The methodology can also be replicated or scaled to other crops or regions, creating further research and innovation opportunities, including tools for precision agriculture or soil biodiversity indicators.                                   |
| <b>THREATS</b>       | There's a risk of data misinterpretation if used without adequate context or training. Additionally, some stakeholders may face technological or knowledge barriers in accessing or applying the insights. Finally, commercial competitors might offer simplified alternatives that, while less detailed, are easier and faster to adopt, especially in practice-driven agricultural settings.   |

## 2.2 EV-ILVO

| <b>Protocol for analysing soil nematode communities</b> |   |
|---|---|
| <b>Lead Partner</b>                                     | EV-ILVO   |
| <b>WP</b>   | 4   |
| <b>TRL</b>  | <p><u>Initial</u>: 2, because the DNA-metabarcoding technique for nematodes still needed to be optimized</p> <p><u>Expected at the end of the project</u>: 3, because the nematode 18S rDNA metabarcoding tool was optimized and more than ever ready for</p> |

|                                      |  |
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|                                      | analyzing samples from real agricultural fields with results linking biodiversity with soil/climate variables  |
| <b>Problem</b>                       | Traditional morphological identification of soil nematodes is highly time-consuming, requires expert-level taxonomic knowledge, and relies on specialists who are increasingly scarce. This limits the scalability, reproducibility, and speed of nematode population analysis, especially for ecological, agricultural, and environmental monitoring purposes.  |
| <b>Alternative solution</b>          | Keep on using the traditional method which has been the standard for decades. It involves manually extracting nematodes from soil, preparing specimens, and identifying them based on subtle morphological features (such as body shape, stylet structure, tail morphology), often down to genus or family level, rarely species level.  |
| <b>Unique Value Proposition UVP</b>  | This optimised 18S DNA metabarcoding technique enables fast, cost-effective, and specialist-independent characterisation of soil nematode communities (till genus-level). By overcoming the need for time-consuming morphological identification by rare experts, it allows large-scale, standardised, and reproducible assessing soil biodiversity. This innovation supports sustainable soil management, enhances agricultural resilience, contributes to biodiversity conservation goals, and enables broader uptake of molecular monitoring tools across Europe. |
| <b>Description</b>                   | Development and optimisation of a DNA metabarcoding (18S rRNA amplicon sequencing) technique to rapidly and accurately characterise soil nematode populations, replacing traditional, time-consuming morphological identification.   |
| <b>Target market</b>                 | The primary target users are researchers and research institutions working in soil ecology, nematology, biodiversity assessments, agriculture, and environmental science. Secondary markets include agricultural advisory services, environmental consulting companies, and governmental or EU agencies involved in soil health and biodiversity assessment, and sustainable land management initiatives.  |
| <b>Early Adopters</b>                | Early adopters could be research groups and institutes specialised in soil biodiversity, nematology, agroecology, and environmental genomics; research partners in EU-funded soil health projects and biodiversity monitoring initiatives (e.g., EU Soil Mission, Biodiversa+ projects); and universities and research labs seeking faster, scalable methods for ecological surveys.   |
| <b>Competitors</b>                   | Academic labs that have published alternative metabarcoding protocols for soil nematodes (e.g., using alternative 18S sequence regions, COI); eDNA analysis companies (even though many focus more on bacteria, fungi, or general biodiversity); specialist research groups already offering soil eDNA analysis for biodiversity projects in Europe.   |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Provision of a service (example: training)<br><input checked="" type="checkbox"/> Publications<br><input checked="" type="checkbox"/> Use for further research   |
| <b>Go to Market - Timing</b>         | Unknown. Is much depending on time and obtaining financial resources trough future projects.   |
| <b>Go to Market - IPR Background</b> | <i>Not applicable to this KER</i>  |



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817819

Go to Market - Foreground IPR

No protection is foreseen. Results will be communicated through events, symposia, and other dissemination platforms. Open-access, peer-reviewed A1 publications are planned, with links to datasets hosted in public repositories.

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| <b>STRENGTHS</b>     | The optimised 18S DNA metabarcoding technique enables rapid, scalable, and reproducible characterisation of soil nematode populations. It significantly reduces dependency on morphological identification by rare taxonomic specialists, making nematode analysis more accessible to a wider group of researchers and practitioners, offering a cost-effective solution particularly suited for large-scale ecological and agricultural research projects.  |
| <b>WEAKNESSES</b>    | The method requires access to molecular biology laboratories, sequencing facilities, and expertise in bioinformatics for sequence analysis and data interpretation, which may limit immediate uptake among users without technical infrastructure and scientific know-how. Standardisation of protocols and data outputs across different laboratories remains a challenge, and careful attention is needed to ensure consistent DNA extraction, amplification, and sequencing quality. Additionally, traditional taxonomists and some regulatory bodies may be cautious in accepting DNA-based techniques for official monitoring until further validation and cross-referencing studies are available. One big issue is the fact that relative amounts are obtained in stead of absolute numbers of nematode taxa making this technique suitable for experiments in which results are compared but less for assessing biodiversity itself in separate samples. |
| <b>OPPORTUNITIES</b> | Significant opportunity for molecular techniques like DNA metabarcoding to become standard practice in both research and applied soil health assessments. The method could also be integrated into agricultural advisory services, certification schemes for sustainable farming, and land restoration efforts. Consultancy services and collaborations with environmental monitoring agencies would allow EV-ILVO to expand their network.  |
| <b>THREATS</b>       | The market for molecular soil biodiversity assessment is becoming increasingly competitive, with large eDNA service providers and genomics companies entering the space. Rapid technological developments, such as nanopore sequencing or metagenomics approaches, could shift standards towards even more comprehensive (but possibly more expensive) methods. There is also a risk that regulatory frameworks for soil health monitoring may favour established morphological methods until DNA-based techniques are fully validated and standardised.   |

### 3. UCPH

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| <b>Microbial insights for sustainable agriculture: Functional Soil Biodiversity Assessment Using 16S rRNA and QMEC Chip Technologies</b> |      |
| Lead Partner   | UCPH |

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| <p><b>WP</b></p>                           | <p>Soil microbiome data generated for WP3, WP4 and WP5 using 16S rRNA gene amplicon sequence analyses and QMEC high-throughput qPCR chip for functional genes involved in microbial cycling of C, N, P and S.</p> <p>WP3 and WP4 data have been used to generate scientific manuscripts to be submitted to peer-reviewed journals during summer 2025. WP5 data has been used for WP5 deliverables (15 WP5 case studies) and will hopefully be used by case study scientific leaders to generate scientific manuscripts to be submitted to peer-reviewed journals.</p> <p>WP3 and WP5 data have also been used by other SoildiverAgro participants for specific WP4 and WP7 deliverables.</p> |
| <p><b>TRL</b></p>                          | <p><u>Initial: Not relevant</u><br/><u>Expected at the end of the project: Not relevant</u></p>  |
| <p><b>Problem</b></p>                      | <p>Limited understanding of the status and functional role of soil biodiversity across diverse European farmlands, especially in relation to different agricultural practices such as conventional and organic farming.</p> <p>This knowledge gap hinders the development of sustainable soil management strategies. There is a need for advanced tools to accurately quantify microbial functional genes involved in key biogeochemical cycles (carbon, nitrogen, phosphorus, and sulfur). Without such tools and large-scale assessments, efforts to preserve or enhance soil biodiversity and ecosystem services in agricultural systems remain constrained.</p>                          |
| <p><b>Alternative solution</b></p>         | <p>The studies done by us have not been previously performed. Metagenomic shotgun sequencing may potentially offer even deeper insights into the soil microbiome, but it remains far too costly and labor intensive for projects, such as SoildiverAgro, involving very large numbers of soil samples; especially if full coverage of the soil microbiome including genes from rare taxa is to be achieved.</p>  |
| <p><b>Unique Value Proposition UVP</b></p> | <p>Our soil microbiome approach offers state-of-the-art assessment of soil microbial diversity for prokaryotes (i.e. bacteria and archaea). The microbiome technologies used are now in the open domain and can be performed by many laboratories. This enables robust, reproducible comparisons across diverse farming systems (e.g., organic vs conventional) and pedoclimatic conditions, delivering actionable insights for sustainable land management. Our strength lies not only in the technical execution but in the added value of contextualization, integration, and stakeholder relevance—making this a transferable asset within the project and beyond.</p>                   |
| <p><b>Description</b></p>                  | <p>The provision of soil microbial diversity data for scientific publication (conference presentations and manuscripts to be submitted summer 2025). Data has already been used by other SoildiverAgro partners for optimization of IR spectroscopy method for the chemometrical analysis of soil samples to predict soil biological groups and biodiversity (Task 4.3) and for the generation of a decision support tool for farmers and other stakeholders (Task 7.4).</p>   |

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|--------------------------------------|--|
| <b>Target market</b>                 | Scientific community   |
| <b>Early Adopters</b>                | Other scientists using biodiversity data to generate decision support tools for farmers and agricultural extension workers.  |
| <b>Competitors</b>                   | Other microbial ecologists working with soil microbiomes.  |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Publications<br><input checked="" type="checkbox"/> Use for further research   |
| <b>Go to Market - Timing</b>         | Some of our soil microbiome data has already been disseminated at conferences and meetings, but two scientific manuscripts will be submitted in 2025 and we expect them to be published before summer 2026.  |
| <b>Go to Market - IPR Background</b> | <p>16S rRNA gene amplicon sequencing is a standard technique in soil microbial ecology and several companies deliver it as a commercial service. IPR for the QMEC chip are owned by our collaborator group at the Chinese Academy of Sciences in China, but we had privileged access to the technology even before its publication in peer-reviewed literature. The know-how for 16S rRNA gene amplicon sequencing was widely available within the scientific community already at the start of the project, whereas the QMEC HT-qPCR chip for functional genes became published in late 2018; i.e. after submission of our proposal and just before the SoildiverAgro project started.</p> <p>QMEC chip analyses is not a standard technique and can presently only be performed in a few labs in China. However, some companies including ResistoMap in Finland have already a business model in place for HT-qPCR analyses of other functional genes, but they presently do not routinely offer the QMEC chip service to their customers.</p> |
| <b>Go to Market - Foreground</b>     | <input checked="" type="checkbox"/> No protection is foreseen.<br>Scientific data and knowledge to be published open access in peer-reviewed journals. The obtained soil microbiome data will be made freely available to the scientific community following publication. Data has already been used by other SoildiverAgro participants to build decision support tools for farmers and other stakeholders.   |

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| <b>STRENGTHS</b>     | Comprehensive, cost-effective, high-throughput soil microbiome data and new knowledge for the scientific community. Data will be freely available for use by others, and this may potentially lead to new products (see opportunities).   |
| <b>WEAKNESSES</b>    | No direct avenues for commercialization for UCPH  |
| <b>OPPORTUNITIES</b> | Data may be freely used for other purposes, such as optimization of IR spectroscopy method for the chemometrical analysis of soil samples to predict soil biological groups and biodiversity (Task 4.3) and for the generation of a decision support tool for farmers and other stakeholders (Task 7.4). QMEC HT-qPCR chip analysis is presently not done in Europe, but companies offering HT-qPCR chip analyses of other gene targets based on the same instrument technology platform already exist in Europe (e.g. ResistoMap; <a href="https://www.resistomap.com/">https://www.resistomap.com/</a> ). |

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| <b>THREATS</b> | Technical and logistics complexity for QMEC chip analysis, as it is presently done only in a few specialized labs in China, where the chip was initially developed (long-term collaborator labs of the UCPH group). The scientific data relies on the availability and successful optimization of the QMEC chip. |
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#### 4. UPCT

| Algorithm for Sustainable Agricultural Planning |  |
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| <b>Lead Partner</b>                             | UPCT   |
| <b>WP</b>                                       | WP4  |
| <b>TRL</b>                                      | Initial: TRL4<br>Expected at the end of the project: TRL6  |
| <b>Problem</b>                                  | The measure of soil biological indicators is highly expensive for farmers, so these indicators are not generally included in soil monitoring programs.   |
| <b>Alternative solution</b>                     | No soil biological indicators measured as a routinary basis  |
| <b>Unique Value Proposition UVP</b>             | Non-destructive methodology to estimate soil biological indicators by only obtaining soil infrared spectra and analyzing a few soil physicochemical indicators such as organic matter, organic carbon, texture, pH, and acquisition of weather data such as precipitation and temperature. |
| <b>Description</b>                              | Mathematical algorithm used to predict soil biological properties based on soil IR spectra   |
| <b>Target market</b>                            | Laboratories for soil analyses   |
| <b>Early Adopters</b>                           | Laboratories for soil analyses with farmers as customers   |
| <b>Competitors</b>                              | Companies that directly measure soil biological indicators by DNA extraction and sequencing.   |
| <b>Go to Market - Use model</b>                 | <input checked="" type="checkbox"/> License agreement  |
| <b>Go to Market - Timing</b>                    | Not applicable.  |
| <b>Go to Market - IPR Background</b>            | Know how on standard procedures for determining soil physicochemical indicators. Equipment and protocols for infrared spectroscopy.  |
| <b>Go to Market - IPR Foreground</b>            | <input checked="" type="checkbox"/> Copyright  |

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| <b>STRENGTHS</b>     | Robust models to predict soil biological properties with just obtaining a few easy soil physicochemical properties and IR spectra               |
| <b>WEAKNESSES</b>    | Models calibrated and validated for soils used in SoildiverAgro project. Soils from other regions and land uses may not be accurately predicted |
| <b>OPPORTUNITIES</b> | Need to measure soil biological properties in croplands, with high costs of conventional analyses   |

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| <b>THREATS</b> | No trust in the models obtained<br>Lack of IR spectrometer in laboratories for soil analyses |
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## 5. MTUPK

| <b>Real-time Fungal Spore Monitoring</b> |  |
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| <b>Lead Partner</b>                      | This specific KER was done in the cooperation of EULS and MTUPK.   |
| <b>WP</b>                                | WP5  |
| <b>TRL</b>                               | <u>Initial: TRL 5</u><br><u>Expected at the end of the project: TRL 5</u>  |
| <b>Problem</b>                           | Farmers applying fungicides based on the manufacturer recommendations but not based on actual data which plant disease fungal spores spread in the air. This leads to inefficiencies in disease control, increased production costs, environmental harm, and contributes to the development of fungicide resistance.   |
| <b>Alternative solution</b>              | Farmers apply fungicides based on the fungicide manufacturer recommendations.  |
| <b>Unique Value Proposition UVP</b>      | Piloting of real-time airborne fungal one-spore detection system in Estonia to give farmers disease alerts based on actual pathogen presence – enabling smarter, more targeted fungicide use that reduces costs, environmental impact, and resistance risks.   |
| <b>Description</b>                       | The KER aims to provide farmers with timely information on elevated fungal spore concentrations in the air, enabling data-driven decisions on when fungicide applications are truly necessary. During the pilot testing, real-time alerts were not yet operational; instead, spore concentration data collected from the sampler was retrospectively compared with the actual timing of fungicide treatments in winter wheat fields. This comparison helped assess the potential alignment and effectiveness of the proposed decision-support system.. |
| <b>Target market</b>                     | Farmers and Agricultural ministries who wish to developing regional model and alert system about fungal plant disease spores' concentrations in the air.   |
| <b>Early Adopters</b>                    | Some farmers and some regional authorities.  |
| <b>Competitors</b>                       | Fungicide manufacturers who recommend treatments based on their models. Weakness: not based on real time data. Strength: access to a lot of farmers. Advisors who recommend fungicide treatments based on visual symptoms on the plant. Weakness: plant disease has already colonised the plant. Some plant diseases are not distinguishable by eye and recommendations can be wrong. Strength: already established relationships with farmers.  |
| <b>Go to Market - Use model</b>          | <input checked="" type="checkbox"/> Use for further research   |
| <b>Go to Market - Timing</b>             | Since there was only one pilot study there is not foreseen getting to the market in the following years.   |



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817819

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| <b>Go to Market - IPR Background</b> | Background was knowledge that this methodology was being developed in the world. First pilot study with one spore sampler was done in Estonia during the SoildiverAgro project. |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen. There is published case study in the SoildiverAgro webpage.  |

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| <b>STRENGTHS</b>     | Reduces unnecessary fungicide use, costs and resistance risks. In line with sustainable practices.  |
| <b>WEAKNESSES</b>    | Only one pilot study, not validated at scale. System not fully operational in real-time yet.  |
| <b>OPPORTUNITIES</b> | Expand into regional alert systems, use the data for model calibration and integration into broader DSS tools. Influence to reduce pesticide use. |
| <b>THREATS</b>       | Farmers may keep on relying on manufacturer's advice. Limited resources for broader implementation or further research.                           |

## 6. Luke

| <b>Agricultural management practices that would benefit soil health and biodiversity</b> |  |
|--|--|
| <b>Lead Partner</b>  | Luke (Natural Resources Institute Finland)   |
| <b>WP</b>  | 5, 6   |
| <b>TRL</b>   | Initial: 3<br>Expected at the end of the project: TRL5   |
| <b>Problem</b>   | <p>Early potato farmers often face challenges such as declining soil and plant health and reduced yields due to soil erosion and nutrient and carbon leaching. These issues are exacerbated by long periods of bare soil exposure following early harvests and the crop's short growing season.</p> <p>Organic cereal farmers might have problems with weed control or unbalanced phosphorus loads in their fields and therefore use deep moldboard tillage to overcome the problems. However, deep tillage can be detrimental to soil organisms, especially to fungi and larger animals (earthworms).</p> |
| <b>Alternative solution</b>  | <p>With conventional management practices: deep tillage (ploughing) and mineral fertilization.</p> <p>Or by avoiding deep ploughing as long as possible and using only minimum tillage with or without direct sowing .</p>   |
| <b>Unique Value Proposition UVP</b>  | The knowledge gained in the Luke throughout the project will increase a understanding when the tested management practices would be applicable in practice. Therefore, the main UVP would be knowledge obtained that make the difference in relation to the expected results.  |
| <b>Description</b>   | <p>Field experiments showed that neither catch crops or soil organic amendments do not harm or change soil biology and are not socioeconomically profitable at least for short-term.</p> <p>Potential to use Phacelia as catch crop to promote soil nitrogen cycle and disease and pest control should be investigated more. Long-term</p>   |

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|                                      | <p>investigations are needed with different soil types to verify, the effectiveness of these management practices on soil biology. Deep ploughing tillage could be proposed as infrequent management practice for the organic cereal farm to control weeds and balance phosphorus loads since it is not too harmful to soil organisms. Springtime ploughing are recommended instead of autumn. In economically perspective, ploughing is not profitable. This KER offers recommendations on agricultural management practices to reach more sustainable and profitable farming systems.</p>  |
| <b>Target market</b>                 | <p>The target market includes the academic and research community and potato and cereal farmers as well as their representative agricultural advisors.</p> <p>The research community is focused on advancing knowledge and developing new methodologies for sustainable agricultural practices. For this reason, results of this KER can be of great interest for academic practitioners, and promote further investigations.</p> <p>On the other hand, this KER can also provide practical guidance for potato and cereal farmers as well as their representative agricultural advisors to evaluate the tested practices in certain conditions and how biologically and economically feasible they are.</p> |
| <b>Early Adopters</b>                | Early adopters are potato and cereal farmers.  |
| <b>Competitors</b>                   | USDA-ARS research station is doing trials on potato crop soil management.  |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Provision of a service (example: training)<br><input checked="" type="checkbox"/> Publications<br><input checked="" type="checkbox"/> Use for further research   |
| <b>Go to Market - Timing</b>         | Not applicable   |
| <b>Go to Market - IPR Background</b> | Prior published know-how (scientific results) exists about the effect of organic amendments on soil biology..  |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen. Scientific data and knowledge to be published open access in peer-reviewed journals. The obtained soil biodiversity related and socioeconomical data will be made freely available to the scientific community following publication.   |

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| <b>STRENGTHS</b>     | Robust experimental design for case study field experiments. Highly experienced professionals/experts engaged in the project. Farmer partners with scientific background.  |
| <b>WEAKNESSES</b>    | Three-year monitoring time was probably too short to obtain reliable and generalized results from the case studies. Course soil type and initially challenging conditions for soil biology might have weakened the interpretation of the outcomes. |
| <b>OPPORTUNITIES</b> | By utilizing more collaboration with other projects, one could gain more visibility and dissemination opportunities.   |

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| <b>THREATS</b> | <p>Finland is a small country and only a limited amount of people can be engaged to attend training and dissemination events (webinars, workshops, field days).</p> <p>Farmers may think that common agricultural policy (CAP) do not include tools that would promote to test novel agricultural management practices to support soil health and biological diversity.</p> |
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## 7. PSKW

### Extensified soil management for an improved soil structure and health intensive vegetable cropping

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| <b>Lead Partner</b>                 | PSKW  |
| <b>WP</b>                           | 5   |
| <b>TRL</b>                          | Initial: 4-5<br>Expected at the end of the project: 6   |
| <b>Problem</b>                      | Intensive vegetable production is characterized by intensive vegetable rotation, high fertilization and irrigation need and, as well, intensive soil tillage, and so, soil disturbance. This increases efficiency on the short term, but has adverse effects in the long term. Potential users are (intensive) vegetable growers.   |
| <b>Alternative solution</b>         | To increase the soil fertility and health, growers are yet stimulated to use compost as soil health enhancer. This increases the organic matter content and soil structure.   |
| <b>Unique Value Proposition UVP</b> | The proposed solution is an integration of different measures to provide a systemic approach to enhance soil health. Not only there is more (stable) organic fertilizer added, we worked as well with adapted soil tillage (reduced tillage). This decreases soil disturbance which benefits the soil life and soil structure, especially in poor circumstances.          |
| <b>Description</b>                  | The result is the know-how to apply an extensive soil management in intensive vegetable cropping and what the result on the soil and crop performance is. The management is build up by adding compost, (more) usage of cover crops and reduced tillage where spading is replaced by a fixed tooth cultivator combined with a shallow rotary tiller for soil preparation. |
| <b>Target market</b>                | The users of the technique are the growers of intensive vegetables. In the first place in the region of Flanders. The technique is optimised for bed cultivation and tested in this setting.  |
| <b>Early Adopters</b>               | Vegetable growers with special attention for soil management and soil health. Can be organic growers, as well as conventional growers.  |
| <b>Competitors</b>                  | Not relevant for this result. (but could be other research centers, advisors, machine manufacturer, as they are rather seen as supportive than competition).  |
| <b>Go to Market - Use model</b>     | <input checked="" type="checkbox"/> Publications<br><input checked="" type="checkbox"/> Use for further research  |
| <b>Go to Market - Timing</b>        | Can be directly applied   |

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| <b>Go to Market - IPR Background</b> | Know-how  |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen. If so, please explain below how your results will be put in open access: |

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| <b>STRENGTHS</b>     | <p>Good results obtained with the set of measures on short term: e.g. higher earthworm activity, decreased crop disease severity, better accessibility of the land (in terms of machine activity).</p> <p>Good experience with the measures in growers' circumstances with multiple crops</p>   |
| <b>WEAKNESSES</b>    | <p>More time is needed to apply the organic matter</p> <p>Higher chance of high annual weed pressure and soil bound pests (e.g. bean seed fly)</p>  |
| <b>OPPORTUNITIES</b> | <p>As well as in conventional as in organic culture, soil protection is more and more important. Farmers are stimulated to care more for their soil. There is more attention to this topic.</p> <p>More machinery becomes available for reduced soil tillage.</p>   |
| <b>THREATS</b>       | <p>Many farmers in Flanders rent their fields from other owners. In this way, each year the soil is managed by other farmers. In this system, farmers often do not take a lot of time and care to work on soil health, because this is a long-term commitment where they can't profit from when not applied by the other farmers in the rotation.</p> |

## 8. TI-B / FAR

| <b>Promotion of self-regulation processes in soil by extensification and diversification</b> |   |
|--|---|
| <b>Lead Partner</b>  | TI-B - FAR  |
| <b>WP</b>  | 5   |
| <b>TRL</b>   | <p><u>Initial: 3-4</u><br/> <u>Expected at the end of the project: 6</u><br/>           Further development of management practices based on laboratory and microcosm experiments through initial applications in the field and proposals for optimizing measures to compensate for pesticide reduction.</p>  |
| <b>Problem</b>   | <p>Conventional wheat monocultures with narrow seed row spacing and intensive pesticide regimes contribute to low levels of soil biological diversity and limited natural disease suppression. These farming practices create simplified, uniform environments that do not support diverse soil biota communities, reducing the system's ability to regulate harmful fungi like Fusarium. Furthermore, inappropriate selection of cover crops (such as red and white clover) can unintentionally foster phytopathogenic fungi, exacerbating soil health problems.</p> |
| <b>Alternative solution</b>  | <p>Farmers use pesticides to combat phytopathogenic fungi like Fusarium without considering self-regulation process in soil. However, this</p>  |

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|                                     | practice requests high external input with detrimental consequences to soil health.   |
| <b>Unique Value Proposition UVP</b> | <p>From an <u>agro-ecological perspective</u>, extensification (wide seed rows and reduced application rates of plant protection products) and diversification (clover undersowing) in conventional wheat production promote soil biodiversity and the ecosystem services it provides.</p> <p>From an <u>agro-economic perspective</u>, extensification (wide seed rows and reduced application rates of plant protection products) and diversification (clover undersowing) in conventional wheat production have a very positive legacy effect on crop revenue and profitability.</p>   |
| <b>Description</b>                  | To address existing challenges, the adoption of wider seed row spacing (20 cm) combined with the strategic undersowing of non-host clover species, such as yellow clover and birdsfoot trefoil, is recommended. These practices promote greater diversity in soil faunal and microbial communities, enhance soil structure, and improve the natural regulation of soil pathogens. Under optimal conditions, both measures can help to compensate for a reduction in the use of pesticides. Selecting appropriate undersown species that do not host harmful Fusarium strains is crucial to maximizing soil health benefits and maintaining or even improving crop yields over time.   |
| <b>Target market</b>                | <p>The target market mainly comprises three main stakeholders: the scientific community, farmers and crop protection service advisors.</p> <p>The <u>scientific community</u> is focused on increasing knowledge and developing new methods to promote soil health and soil life as well as sustainable food production. For this reason, the results of this KER, which provide new insights into the interactions between management measures, soil life, plant health and yield levels, can be of great interest to the scientific community.</p> <p>For <u>farmers</u>, the KER can provide incentives to adapt management measures to improve the soil health of their fields and make their production more sustainable. It can help to identify ways of reducing plant protection products while maintaining yield quality and thus comply with potential respective legal requirements.</p> <p>For the <u>advisors</u> of the plant protection services, the KERs provide incentives to be open to new sustainable cultivation methods in the context of cereal cultivation. They can include corresponding measures in their recommendations and thus propose a broader range of measures.</p> |
| <b>Early Adopters</b>               | Farmers, scientific community, advisors   |
| <b>Competitors</b>                  | Colleagues from other scientific projects might find other solutions based on their own scientific results. Competition also comes from the chemical industry, whose influence is often great and which supports the large-scale and comprehensive use of plant protection products for economic reasons.   |
| <b>Go to Market - Use model</b>     | <input checked="" type="checkbox"/> Provision of a service (example: training)<br><input checked="" type="checkbox"/> Publications<br><input checked="" type="checkbox"/> Use for further research  |
| <b>Go to Market - Timing</b>        | Adaptations to site conditions and few optimizations would still be beneficial. In principle, the application can be used immediately,  |

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|                                      | possibly also to check the effectiveness of some recommended adjustments.   |
| <b>Go to Market - IPR Background</b> | Scientific know-how on soil health indicators. Lab and field trial frameworks.  |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> No protection is foreseen.<br>The results and recommendations are made public through publications and presentations, as part of lectures for students and information events for farmers. Since a broad application and possibly also further development is desirable, no patent rights are applicable. |

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| <b>STRENGTHS</b>     | The implementation of the Case Study was planned precisely according to data-based agreements between scientists and farmers. State-of-the-art agricultural equipment was used so that, for instance, yield data could be accurately determined for each plot. The analyses were carried out according to the most up-to-date scientific standards (partly in accredited and specialized analytical laboratories) so that the results are highly reliable.  |
| <b>WEAKNESSES</b>    | The investigations were only carried out under one crop (winter wheat) and at one location. Deviations in the results for other crops, weather conditions or soil conditions can therefore not be ruled out.  |
| <b>OPPORTUNITIES</b> | An increased impact of the results on the future application of the proposed cultivation measures is to be expected primarily through their addressee-oriented preparation and dissemination to users (farmers). It is to be expected that the know-how of interested farmers will lead to further development of the measures and that communication within the community will contribute to a broader implementation in the long term.  |
| <b>THREATS</b>       | The application of new agricultural cultivation measures aimed at reducing external inputs requires a certain openness on the part of farmers to deviate from known practices and apply unknown new measures. This openness is not universal, especially when it is accompanied by the fear of potential yield losses. An additional complicating factor is that federal research measures are often viewed particularly critically by farmers, as they are frequently confronted with restrictions or limitations in this context. Moreover, new methods based on bioregulation are viewed critically by the plant protection product industry. Their influence counteracts the acceptance of alternative methods. |

### Commercial KERs and financial projections

Two commercially promising innovations developed within the project show strong alignment with EU policy objectives on sustainable agriculture, soil health, and reduced dependency on synthetic inputs.



FYNECO has developed **NUVE** and **BACTONECO**, two microbial-based soil amendment products designed to improve nutrient availability and soil health in intensive vegetable production systems. The products are currently undergoing regulatory registration in accordance with Spanish (Royal Decree 506/2013) and EU legislation (Regulation (EU) 2019/1009). They offer a viable alternative to traditional fertilizers, by minimizing leaching.



SYMBIOM has developed **MycoPotato**, a targeted line of mycorrhizal inoculants (granular, powder, and liquid forms) registered as plant biostimulants in the Czech Republic. Derived from region-specific arbuscular mycorrhizal fungi (AMF), these products enhance root nutrient uptake, improve soil structure, and build resilience against drought and stress in potato crops.

Figure 6. Illustration products from fyneco.es and symbiom.cz

## 9. FYNECO

### Practical solutions and products for sustainable soil management in intensive vegetable farming

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| <b>Lead Partner</b>                 | FYNECO  |
| <b>WP</b>                           | 5   |
| <b>TRL</b>                          | <u>Initial: 4-5</u><br><u>Expected at the end of the project: 6</u>   |
| <b>Problem</b>                      | Intensive vegetable farming leads to degraded soil health and overreliance on synthetic inputs, while current regulations create barriers for market entry of microbial biostimulants. The regulation applicable to products based on microorganisms requires documentation and agronomic trials that support the presence of these microorganisms in the products. In the context of Spanish legislation (Royal Decree 506/2013), the microorganisms must be fully characterized and supported by agronomic trials conducted specifically on the crops where their application is intended. These trials must be carried out by a research center, university, or company accredited for agronomic trials. Regarding European regulations (Regulation 2019/1009), to obtain classification as a microbial biostimulant, the microorganisms must belong to the genera <i>Azotobacter</i> spp., mycorrhizal fungi, <i>Rhizobium</i> spp., or <i>Azospirillum</i> spp. Of these, only <i>Azospirillum</i> could be classified individually, without being combined with other microorganisms present in NUVE and BACTONECO. |
| <b>Alternative solution</b>         | Traditional soil management with the use of non-organic fertilizers.  |
| <b>Unique Value Proposition UVP</b> | The KER of the NUVE and BACTONECO products will benefit crops in both organic and conventional agriculture, leading to increased  |

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|                                 | <p>sustainability in the use of inputs as well as cost savings and improved competitiveness.</p> <p>Agronomic trials are planned to be carried out by certified Institutions to fit the products within the Spanish regulation Royal Decree 506/2013. Regarding the classification as a microbial biostimulant from Regulation (EU) 2019/1009, we will await the expansion of suitable microorganisms to meet the requirements.</p>   |
| <b>Description</b>              | <p>The KER delivers know-how to apply an extensive soil management in intensive vegetable cropping and what the result on the soil and crop performance is. The management is build up by adding compost, (more) usage of cover crops and reduced tillage where spading is replaced by a fixed tooth cultivator combined with a shallow rotary tiller for soil preparation.</p>   |
| <b>Target market</b>            | <p>The target market is primarily <u>agricultural producers</u> in sensitive areas, such as the Campo de Cartagena region, a heavily cultivated area whose leachates flow into the Mar Menor, the largest saltwater lagoon in Europe and a zone specially protected by the UN.</p> <p>It also targets <u>producers of ecological agricultural systems</u>, where the input of inorganic inputs, especially nitrogen, is very limited, and a product that enhances the bioavailability of these nutrients to plants without risking nutrient loss and impacts on other ecosystems is crucial.</p>  |
| <b>Early Adopters</b>           | <p>Farmers in regulated areas and Ecological Agriculture producers.</p>   |
| <b>Competitors</b>              | <p>SYMBORG, with VitaSoil, a product based in rizospheric microorganism that aim to increase Nitrogen fixation in addition with Phosphorus and potassium solubilization.</p> <p>CERES BIOTIC, with MESSOR. This soil amendment uses <i>Bacillus megaterium</i> and organic compounds to regenerate soil health by promoting plant growth and enhancing beneficial microbial activity.</p> <p>SYNGENTA with Cepacet a biological fertilizer containing beneficial microorganisms to improve soil health and nutrient availability: <i>Bacillus megaterium</i>, <i>Azotobacter salinestris</i> and Mycorrhizal fungi</p> <p>EIBOL with BODEN, based in <i>Azotobacter chroococcum</i> y <i>Bacillus megaterium</i></p> <p>PLYMAG with UBUNTU, that contains a mix of the bacteria <i>Bacillus velezensis</i>, <i>Bacillus megaterium</i>, <i>Azotobacter chroococcum</i>, and <i>Azospirillum brasilense</i>, along with probiotic and prebiotic substances, seaweed, and amino acids</p> |
| <b>Go to Market - Use model</b> | <p><input checked="" type="checkbox"/> Manufacturing of a new product</p>   |
| <b>Go to Market - Timing</b>    | <p>Our products are currently undergoing legal registration to be fully commercialized. Compliance with Spanish legislation (Royal Decree 506/2013) or European legislation (Regulation (EU) 2019/1009) involves deadlines and requirements that we must meet. The projection shown is for the next 5 years, with this being the first of the 5 years in which the aim is to register the product, the brand, and certify it as a UNE input (suitable for organic farming).</p>   |

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| <b>Go to Market - IPR Background</b> | Proprietary formulations of organic fertilizers, manufacturing processes and protocols. Infrastructure and field-tested knowledge.  |
| <b>Go to Market - IPR Foreground</b> | Trademark application ongoing. Currently, we are in the process of trademark registration for NUVE and BACTONECO. Regarding patents, patenting it is not planned in the short term, so the product will be put on the market without one.   |
| <b>COSTS (OPEX)</b>                  | Raw material costs, microbiological and nutritional analyses, sanitization processes, personnel, registration and official trials according to RD 506/2013, marketing, trademark registration and ecological agricultural inputs certification.<br>Total OPEX for the next five years: <b>42257.80€</b> |
| <b>CAPITAL EXPENDITURES (CAPEX)</b>  | <b>Total Units to market BACTONECO: 240L</b><br><b>Total Units to market NUVE: 21000L</b><br>Total CAPEX for the next five years: <b>16100 €</b>  |
| <b>Benefits</b>                      | It is estimated that there will be increased demand for these more sustainable products due to the rising cost and availability issues of traditional inorganic nutrient sources, as well as the evolution of European legislation towards more sustainable agricultural techniques.                    |

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|----------------------|---|
| <b>STRENGTHS</b>     | The product formulation addresses multiple agricultural needs simultaneously, offering both plant nutrition and protection capabilities. The product has high potential and is well-suited for use in certified ecological agriculture systems, tapping into a growing market segment.  |
| <b>WEAKNESSES</b>    | The certification and registration process for this type of microbial product is inherently lengthy, complex, and incurs significant costs. Developing stable liquid formulations is technically difficult due to the complex interactions between the microorganisms and the liquid carrier/medium, requiring precise formulation to ensure microbial viability and long-term shelf life. Fyneco's current manufacturing capacity is limited, relying on a production process based on extracting exudates from roots and soil, which is difficult to scale efficiently. The exudate extraction process, based on heterogeneous soil samples, is likely to result in variations in the microbial strain composition of different production batches, complicating consistent product quality and regulatory compliance (e.g., under Royal Decree 506/2013). The BACTONECO formulation exhibits low stability at room temperature, necessitating strict cold chain storage requirements which significantly limit its distribution channels and accessibility for farmers |
| <b>OPPORTUNITIES</b> | The technology presents a valuable opportunity to utilize plant waste streams as a sustainable and potentially cost-effective source of beneficial microorganisms. There is a significant and expanding market demand for agricultural inputs that are compatible with ecological and sustainable farming practices.  |
| <b>THREATS</b>       | Regulation (EU) 2019/1009, governing microbial biostimulants, currently has a very limited list of permitted microorganisms, posing a significant regulatory barrier to the marketing of the product formulations developed, especially as it replaces national regulations like RD 506/2013. Facing  |

competition from chemically-based or other biologically-based products that may have simpler registration processes, better stability, or established market presence. (Implicit threat, could be added based on market context).

Table 3. FYNECO - 5 years financial projection

| Sales of NUVE and BACTONECO NPK |  |              |            |            |            |            |            |            |                 |
|---------------------------------|--|--------------|------------|------------|------------|------------|------------|------------|-----------------|
| Category                        | Description of Investment  | Year 0       | Year 1     | Year 2     | Year 3     | Year 4     | Year 5     | Total      |                 |
| <b>CAPEX</b>                    | UNE 142500 standard certification of input suitable in organic production.   | 1000         | 300        | 300        | 300        | 300        | 300        | 300        | <b>2500.00</b>  |
|                                 | Genetic identification reports of strains and agronomic efficacy trials according to Royal Decree 506/2013 of June 28th. | 15000        | 0          | 0          | 0          | 0          | 0          | 0          | <b>15000.00</b> |
|                                 | Quality analysis for legal compliance with Royal Decree 506/2013 of June 28th.   | 600          | 600        | 600        | 600        | 600        | 600        | 600        | <b>3600.00</b>  |
|                                 | <b>TOTAL CAPEX</b>   | <b>16600</b> | <b>900</b> | <b>900</b> | <b>900</b> | <b>900</b> | <b>900</b> | <b>900</b> | <b>21100.00</b> |
| <b>P&amp;L</b>                  |  |              |            |            |            |            |            |            |                 |
| <b>Income</b>                   | <i>Production</i>  |              |            |            |            |            |            |            |                 |
|                                 | Total Units (liters) to market   |              |            | 0          | 0          | 0          | 0          | 0          | 0.00            |
|                                 | Total Units to market NUVE   | 20120        | 20000      | 22000      | 25000      | 27500      | 30000      |            | 144620.00       |
|                                 | Total Units to market BACTONECO N  | 0            | 0          | 0          | 0          | 0          | 0          | 0          | 0.00            |

|                         |                                   |                  |                |                |                |                |                  |                  |
|-------------------------|-----------------------------------|------------------|----------------|----------------|----------------|----------------|------------------|------------------|
|                         | Total Units to market BACTONECO P | 0                | 0              | 0              | 0              | 0              | 0                | 0.00             |
|                         | Total Units to market BACTONECO K | 0                | 0              | 0              | 0              | 0              | 0                | 0.00             |
|                         | <b>Total tons to market</b>       | <b>20120</b>     | <b>20000</b>   | <b>22000</b>   | <b>25000</b>   | <b>27500</b>   | <b>30000</b>     | 144620.00        |
|                         | <i>Pricing</i>                    |                  |                |                |                |                |                  |                  |
|                         | Exworks (€/L) NUVE                | 3.5              | 3.5            | 3.5            | 3.5            | 3.5            | 3.5              |                  |
|                         | Exworks (€/L) BACTONECO N         | 9                | 9              | 9              | 9              | 9              | 9                |                  |
|                         | Exworks (€/L) BACTONECO P         | 9                | 9              | 9              | 9              | 9              | 9                |                  |
|                         | Exworks (€/L) BACTONECO K         | 0                | 0              | 0              | 0              | 0              | 0                |                  |
|                         | <b>Total income</b>               | <b>70420</b>     | <b>70000</b>   | <b>77000</b>   | <b>87500</b>   | <b>96250</b>   | <b>105000</b>    | <b>506170.00</b> |
| <b>Costing</b>          | Depreciation                      | 0                | 100            | 200            | 200            | 200            | 300              | 1000.00          |
|                         | Raw material                      | 8048             | 8000           | 8800           | 10000          | 11000          | 12000            | 57848.00         |
|                         | FTES                              | 9456.4           | 9400           | 10340          | 11750          | 12925          | 14100            | 67971.40         |
|                         | Energy                            | 603.6            | 600            | 660            | 750            | 825            | 900              | 4338.60          |
|                         | Consumables & maintenance costs   | 2012             | 2000           | 2200           | 2500           | 2750           | 3000             | 14462.00         |
|                         | Quality/lab Costs                 | 1000             | 1000           | 1000           | 1500           | 1500           | 1500             | 7500.00          |
|                         | Packaging                         | 3657.8           | 3636.0         | 3999.6         | 4545.0         | 4999.5         | 5454.0           | 26291.92         |
|                         | Commercialization costs           | 1000             | 1000           | 1000           | 1000           | 1000           | 1000             | 6000.00          |
|                         | Overheads                         | 0                | 0              | 0              | 0              | 0              | 0                | 0.00             |
|                         | R&D investment                    | 2816.8           | 2800           | 3080           | 3500           | 3850           | 4200             | 20246.80         |
|                         | <b>Total OPEX</b>                 | <b>28594.616</b> | <b>28536</b>   | <b>31279.6</b> | <b>35745</b>   | <b>39049.5</b> | <b>42454</b>     | <b>205658.72</b> |
| <b>Operating Margin</b> | <b>25225.384</b>                  | <b>40564</b>     | <b>44820.4</b> | <b>50855</b>   | <b>56300.5</b> | <b>61646</b>   | <b>279411.28</b> |                  |

## 10. SYMBIOM

| Development of new products based on arbuscular mycorrhizal fungi |   |
|---|---|
| <b>Lead Partner</b>   | SYMBIOM   |
| <b>WP</b>   | WP5   |
| <b>TRL</b>  | Initial: TRL4-5<br>Expected at the end of the project: TRL6   |
| <b>Problem</b>  | The loss of genetic and functional soil biodiversity, which threatens the stability, yield and sustainability of agricultural production, in an effort to create a sustainable mycorrhizal agricultural product that benefits the environment, farmers' economies and society.  |
| <b>Alternative solution</b>                                       | Commercial Biofertilizer & Mycorrhizal Companies worldwide<br>Conservation /Regenerative/Organic Agriculture<br>Precision Agriculture   |
| <b>Unique Value Proposition UVP</b>                               | Symbiom tackles agricultural challenges by enhancing mycorrhizal symbiosis (the interaction between plant roots and fungi), improving nutrient uptake, soil structure, and crop resilience.<br>This allows customers to require less synthetic fertilizers and obtain healthier plants, and more stable yields.<br>Unlike conventional short-term solutions (like the repeated application of mineral fertilizers), mycorrhiza promotes long-term soil vitality and resilience by developing stable underground networks and enhancing nutrient and water cycles.<br>Crops become more resilient to drought, pests, and climate stress.   |
| <b>Description</b>  | A specialized line of mycorrhizal products called MYCOPOTATO was developed and designed specifically for potato cultivation in these three forms: <ul style="list-style-type: none"> <li>• MYCOPOTATO Granular – granular, based on zeolite carrier</li> <li>• MYCOPOTATO Powder – powder, based on diatomite earth carrier</li> <li>• MYCOPOTATO Liquid – liquid</li> </ul> All variants are already registered as plant biostimulants in the Czech Rep.: reg. no. 5731 (Mycopotato Powder), reg. no. 5732 (Mycopotato Granular), and reg. no. 5733 (Mycopotato Liquid), and are intended for agricultural use.<br>It is suitable for both conventional and organic farmers looking for effective and sustainable methods for growing potatoes.<br>The MYCOPOTATO product line and the associated arbuscular mycorrhizal fungi (AMF) strains were isolated from potato fields in Spain. This region was specifically chosen due to its diverse and rich mycorrhizal communities that thrive in agricultural soils, making it an ideal environment for cultivating mycorrhizal fungi that enhance plant growth and soil health. |
| <b>Target market</b>  | Conventional and organic farmers, cooperatives and producer groups.<br>Research institutions and Universities, policy makers and agri-tech companies  |
| <b>Early Adopters</b>   | Farmers and stakeholders who are highly aware of the risks associated with soil degradation and are actively seeking sustainable, biologically based solutions, often out of necessity.   |

|                                      |   |
|--------------------------------------|---|
|                                      | They feel the problem more urgently than others and are typically more open to innovation and experimentation.  |
| <b>Competitors</b>                   | Commercial Biofertilizer & Mycorrhizal Inoculant Companies such as Symborg (Spain), Mycorrhizal Applications (US), Novozymes (Denmark), Groundwork BioAg (Israel), Premier Tec (Canada) etc.  |
| <b>Go to Market - Use model</b>      | <input checked="" type="checkbox"/> Manufacturing of a new product  |
| <b>Go to Market - Timing</b>         | <p>Phase 1 has been completed in 2024 to finalize product development and validation and register the product in the Czech republic.</p> <p>Phase 2: Commercial preparation and awareness building (Q3-Q4 2025) with product presentations at trade fairs, and online, initiation of marketing campaigns (mainly online presentation), recruitment and onboarding of partners, logistics setup: packaging, warehousing, and delivery chain</p> <p>Phase 3: Soft launch and distribution start (early 2026): The product will be available via direct sales and partner distribution channels and early adopters and reference customers engaged.</p> <p>Phase 4 (2026): Official commercial launch ahead of the main potato planting season: Promotional offers, farmer training. Field support for optimal use and product performance monitoring</p> <p>Phase 5: Monitoring, feedback and scale-up, through compilation of success stories, user testimonials, and case studies. Strategic adjustments and planning for international expansion (if applicable)</p> |
| <b>Go to Market - IPR Background</b> | Isolation, cultivation identification and mass production technologies for mycorrhizal fungi under <i>in vivo</i> and <i>in vitro</i> scheme.   |
| <b>Go to Market - IPR Foreground</b> | <input checked="" type="checkbox"/> Trademark<br><input checked="" type="checkbox"/> Utility model  |

#### STRENGTHS

MYCOPOTATO has demonstrated strong potential in enhancing potato yield and soil health using mycorrhizal fungi. The product promotes sustainable farming by reducing dependency on chemical fertilizers and improving soil health, aligning with global trends towards organic and climate-resilient agriculture.

MYCOPOTATO leverages advanced agricultural biostimulants, which enhance plant growth, drought resistance, and nutrient uptake, making it a cutting-edge solution in modern farming practices.

|            |  |
|------------|--|
| WEAKNESSES | <p>Farmers may face reluctance to change from conventional practices, and the product's high initial cost could be a barrier for smaller or economically constrained farmers.</p> <p>MYCOPOTATO's effectiveness may be influenced by environmental factors such as extreme weather conditions (e.g., drought, floods) or soil variability, potentially limiting its performance in some regions.</p>   |
|            | <p>There is significant potential to extend MYCOPOTATO's use beyond potatoes to other crops, such as cereals and vegetables, broadening the product's market reach. MYCOPOTATO could be integrated with precision agriculture technologies, enabling farmers to apply it more efficiently based on real-time data, optimizing results.</p> <p>Increasing demand for sustainable, organic, and low-chemical-input farming provides an opportunity for MYCOPOTATO to capture a growing market focused on environmental sustainability.</p> |
| THREATS    | <p>Other mycorrhizal products and biological solutions may emerge, offering better or more cost-effective alternatives, threatening MYCOPOTATO's market share.</p> <p>Variations in agricultural regulations across different countries could slow down product approval and market entry.</p> <p>Smallholder farmers may struggle with affordability and funding constraints, limiting the product's adoption in low-income regions.</p>  |

Table 4. SYMBIOM - 5 years financial projection

|                                     |                                     | Y1           | Y2           | Y3           | Y4           | Y5           | TOTAL         |              |
|-------------------------------------|-------------------------------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|
| MYCOPOTATO PRODUCT LINE             | <b>Mycopotato Granular</b>          |              |              |              |              |              |               |              |
|                                     | <b>Total products to the market</b> | kg           | 500          | 1000         | 2000         | 2000         | 2000          | 7500         |
|                                     | Direct costs / pc                   | 2 €          | 1000         | 2000         | 4000         | 4000         | 4000          | 15000        |
|                                     | Overhead costs - excl.mkt           | 4 €          | 1750         | 3500         | 7000         | 7000         | 7000          | 26250        |
|                                     | Marketing overhead costs            | €            | 4000         | 2000         | 2000         | 2000         | 1000          | 11000        |
|                                     | <b>Selling price - exworks</b>      | <b>9 €</b>   | <b>9</b>     | <b>9</b>     | <b>9</b>     | <b>9</b>     | <b>9</b>      |              |
|                                     | <b>TOTAL COSTS</b>                  | <b>€</b>     | <b>6759</b>  | <b>7509</b>  | <b>13009</b> | <b>13009</b> | <b>12009</b>  | <b>52295</b> |
|                                     | <b>TOTAL INCOME</b>                 | <b>€</b>     | <b>4480</b>  | <b>8960</b>  | <b>17920</b> | <b>17920</b> | <b>17920</b>  | <b>67200</b> |
|                                     | <b>TOTAL PROFIT</b>                 | <b>€</b>     | <b>-2279</b> | <b>1451</b>  | <b>4911</b>  | <b>4911</b>  | <b>5911</b>   | <b>14905</b> |
|                                     | <b>Mycopotato Liquid</b>            |              |              |              |              |              |               |              |
|                                     | <b>Total products to the market</b> | L            | 100          | 200          | 300          | 400          | 400           | 1400         |
|                                     | Direct costs / pc                   | 2 €          | 200          | 400          | 600          | 800          | 800           | 2800         |
|                                     | Overhead costs - excl.mkt           | 14 €         | 1400         | 2800         | 4200         | 5600         | 5600          | 19600        |
|                                     | Marketing overhead costs            | €            | 4000         | 2000         | 2000         | 2000         | 1000          | 11000        |
| <b>Selling price</b>                | <b>66 €</b>                         | <b>66</b>    | <b>66</b>    | <b>66</b>    | <b>66</b>    | <b>66</b>    |               |              |
| <b>TOTAL COSTS</b>                  | <b>€</b>                            | <b>5600</b>  | <b>5200</b>  | <b>6800</b>  | <b>8400</b>  | <b>7400</b>  | <b>33400</b>  |              |
| <b>TOTAL INCOME</b>                 | <b>€</b>                            | <b>6600</b>  | <b>13200</b> | <b>19800</b> | <b>26400</b> | <b>26400</b> | <b>92400</b>  |              |
| <b>TOTAL PROFIT</b>                 | <b>€</b>                            | <b>1000</b>  | <b>8000</b>  | <b>13000</b> | <b>18000</b> | <b>19000</b> | <b>59000</b>  |              |
| <b>Mycopotato Powder</b>            |                                     |              |              |              |              |              |               |              |
| <b>Total products to the market</b> | pcs                                 | 100          | 200          | 500          | 600          | 600          | 2000          |              |
| Direct costs / pc                   | 2 €                                 | 200          | 400          | 1000         | 1200         | 1200         | 4000          |              |
| Overhead costs - excl.mkt           | 13 €                                | 1300         | 2600         | 6500         | 7800         | 7800         | 26000         |              |
| Marketing overhead costs            | €                                   | 4000         | 2000         | 2000         | 2000         | 1000         | 11000         |              |
| <b>Selling price</b>                | <b>60 €</b>                         | <b>60</b>    | <b>60</b>    | <b>60</b>    | <b>60</b>    | <b>60</b>    |               |              |
| <b>TOTAL COSTS</b>                  | <b>€</b>                            | <b>5500</b>  | <b>5000</b>  | <b>9500</b>  | <b>11000</b> | <b>10000</b> | <b>41000</b>  |              |
| <b>TOTAL INCOME</b>                 | <b>€</b>                            | <b>6000</b>  | <b>12000</b> | <b>30000</b> | <b>36000</b> | <b>36000</b> | <b>120000</b> |              |
| <b>TOTAL PROFIT</b>                 | <b>€</b>                            | <b>500</b>   | <b>7000</b>  | <b>20500</b> | <b>25000</b> | <b>26000</b> | <b>79000</b>  |              |
| <b>MYCOPOTATO PRODUCT LINE</b>      |                                     |              |              |              |              |              |               |              |
| <b>TOTAL COSTS</b>                  | <b>€</b>                            | <b>17859</b> | <b>17709</b> | <b>29309</b> | <b>32409</b> | <b>29409</b> | <b>126695</b> |              |
| <b>TOTAL INCOME</b>                 | <b>€</b>                            | <b>17080</b> | <b>34160</b> | <b>67720</b> | <b>80320</b> | <b>80320</b> | <b>279600</b> |              |
| <b>TOTAL PROFIT</b>                 | <b>€</b>                            | <b>-779</b>  | <b>16451</b> | <b>38411</b> | <b>47911</b> | <b>50911</b> | <b>152905</b> |              |

## Intellectual Property Rights Management

CONT supports the partners in developing individual strategies as well as a joint strategy in order to ensure to follow the principles of the Horizon 2020 projects regarding Open Access as well as ensuring all information and data are thoroughly protected when necessary to protect the partners' interest and added value.

### Methodology

Before the project started, partners signed the Consortium Agreement (CA) for the management of the knowledge produced, which was developed around the following major points:

- The partners identified their pre-existing know-how, to which they grant access rights to the consortium in the Annex 1 to the Consortium Agreement. Partners were able to define the scope of already existing IPR ("background") to which access rights will be granted to the entire consortium.
- The contractors agreed that the access rights on the knowledge needed for carrying out the project shall be granted on a royalty-free basis.
- All project results (foreground) will be available for use to all partners.
- IP arising from the work carried out collectively will be the joint property of the partners. In this case, the partners will jointly apply to obtain and/or maintain the relevant rights and shall strive to set up amongst themselves appropriate agreements in order to do so. Decision-making procedures are well-defined in the CA. Knowledge/IP generated within the life of the project by individual partners will be owned by the partner generating it.

### Background IP

The partner identifies the Background IP in the Attachment 1 of the CA. No data, know-how or information of any partner shall be needed by another party for implementation of the project or exploitation of that other party's results.

### Foreground IP

During the project, the foreground has been identified per partner, linked to results. The compiled information is available below.

Table 5. SoildiverAgro's Foreground IP

| Partners       | KER  | Type of IP   | Kind of protection | IP |
|----------------|--|--|--------------------|----|
| <b>UVIGO</b>   | A comparative study about soil physicochemical properties and functions in wheat fields under different farming systems and climatic conditions along a European south-east to north-west gradient | Publications   | Open Access        |    |
|                | Occurrence, persistence and risk assessment of pesticide residues in European wheat fields: a continental scale approach   | Publications   | Open Access        |    |
|                | Impact of conventional and organic farming systems on soil nutrients: a macro study for wheat growth across nine European pedoclimatic zones   | Publications   | Open Access        |    |
|                | Assessment of (functional) biodiversity in European agricultural wheat fields (conventional and organic farming) based on earthworm communities  | Publications   | Open Access        |    |
|                | Management Practices Guidelines Manual   | Publications   | Open Access        |    |
|                | SoildiverAgro Decision Support Tool  | Provision of a service   | Open Access        |    |
| <b>EV-ILVO</b> | Operational soil biodiversity targets  | Publications<br>Use for further research                           | Open Access        |    |
|                | Protocol for analysing soil nematode communities   | Provision of a service<br>Publications<br>Use for further research | Open Access        |    |
| <b>UCPH</b>    | Microbial insights for sustainable agriculture: Functional Soil Biodiversity Assessment Using 16S rRNA and QMEC Chip Technologies  | Publications<br>Use for further research                           | Open Access        |    |
| <b>UPCT</b>    | Algorithm for Sustainable Agricultural Planning  | License Agreement  | Copyright          |    |
| <b>MTUPK</b>   | Real-time Fungal Spore Monitoring  | Use for further research   | Open Access        |    |
| <b>Luke</b>    | Agricultural management practices that would benefit soil health and biodiversity  | Provision of a service<br>Publications<br>Use for further research | Open Access        |    |

|                       |  |  |                            |
|-----------------------|--|--|----------------------------|
| <b>PSKW</b>           | Extensified soil management for an improved soil structure and health intensive vegetable cropping | Publications<br>Use for further research                           | Open Access                |
| <b>TI-B &amp; FAR</b> | Promotion of self-regulation processes in soil by extensification and diversification              | Provision of a service<br>Publications<br>Use for further research | Open Access                |
| <b>FYNECO</b>         | Practical solutions and products for sustainable soil management in intensive vegetable farming    | Manufacturing of new product                                       | Trademark                  |
| <b>SYMBIOM</b>        | Development of new products based on arbuscular mycorrhizal fungi                                  | Manufacturing of new product                                       | Trademark or Utility model |

### Open source in Exploitation

Open-source approaches play an important role in enhancing the impact and exploitation of research results. By making project outcomes openly accessible, **SoildiverAgro** ensures that its scientific advancements, data, and methodologies can be widely used by policymakers, researchers, industry stakeholders, and the general public. This strategy fosters innovation, accelerates the development of solutions, and enhances the long-term sustainability of project findings.

As it has been demonstrated in this deliverable, the Key Exploitable Results of this project have evolved into non-commercial results, in alignment with the project's goals to contribute to policymaking and to make scientific data accessible.

Open access to data, analytical tools, and methodologies allows researchers to build upon existing work, reducing duplication of efforts and enabling continuous improvement. Additionally, open-source frameworks encourage transparency and reproducibility, which are fundamental to scientific credibility and regulatory decision-making. By ensuring that results are publicly available, **SoildiverAgro** contributes to evidence-based policymaking, particularly in the context of EU environmental policies such as the EU Strategy from Farm to Fork et the EU Soil Strategy for 2030.

Providing open access to the results of **SoildiverAgro** significantly enhances the project's exploitation potential by enabling industry stakeholders and technology developers to incorporate its findings into innovative solutions. Agricultural enterprises and farmers seeking sustainable, environmentally respectful soil management practices will have direct access to the consortium's accumulated knowledge and expertise. This accessibility facilitates the adoption of practices that align with EU regulatory frameworks, thereby supporting compliance and fostering sustainable agriculture across the region. **SoildiverAgro** is committed to ensuring that all its results, including datasets, models, methodologies, and key findings, are openly accessible; hence the importance of the following dissemination strategy.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817819



## Dissemination

### Dissemination methodology

The aim of the **SoildiverAgro** Plan for the dissemination and exploitation of results is to use the research results generated during the project to create value within the target stakeholders in the EU by means of exploiting and transferring results.

Dissemination is related to the communication of the project (“raising awareness”) and the exploitation of its results (“achievements”), targeting an external audience, scientific community and potential business users of the products/services developed to whom results are made available.

The project ensures that research results are made accessible to relevant audiences, thus fostering knowledge development within targeted stakeholder groups. The dissemination strategy is comprehensive, employing a mix of online and offline channels and tools, with tailored messaging designed to engage different stakeholder segments effectively.

This multifaceted approach strengthens the overall communication impact and maximizes outreach to key audiences. The dissemination efforts are structured into two main components: (a) internal dissemination, focused on project team members to facilitate knowledge sharing and coordination, and (b) external dissemination, aimed at broader target groups including managing authorities, policymakers, regulatory bodies, the scientific community, professional users such as farmers, fertilizer producers, agricultural networks, and the public.

The dissemination strategy was applied throughout the project and will remain relevant with targeted approaches, as displayed in the table below.

**Table 6. Target audiences and dissemination activities**

| Target Groups                  | Needs  | Dissemination Approach                                  |
|--------------------------------|--|---|
| Scientific community           | Peer-reviewed knowledge, datasets                  | Open access journal articles, conferences, repositories |
| Policy makers (EU/local)       | Evidence for regulation/support programs           | Policy briefs, webinars, stakeholder meetings           |
| Public administrations         | Adapted guidelines at the local and national scale | Case studies and workshops                              |
| Farmers, agricultural networks | Practical tools, management guidelines             | Online tools, factsheets, demonstrations                |
| Public / NGOs                  | Awareness of sustainable solutions                 | Project website, social media, infographics             |



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817819

## Internal Dissemination

Internal dissemination activities have been actively implemented throughout the project to ensure awareness and coordination among consortium partners, facilitating the timely completion of assigned tasks and adherence to deadlines.

Key actions include internal training courses organized by the participating Research and Technology Organizations (RTOs), which serve as workshops to update partners on project progress and address emerging issues related to project execution.

Multiple consortium meetings have been held during the project's lifespan, functioning as essential forums for sharing results and fostering collaborative discussion among partners.

Additionally, the project coordinator established a secure intranet platform acting as a centralized data repository, granting all partners access to documents, data, and information relevant to the project. While this repository supports internal knowledge sharing, the ownership of results remains with the generating partner, ensuring controlled dissemination beyond the consortium with explicit permission.

These structured internal dissemination efforts have contributed to effective communication and cohesion within the project team.

## External Dissemination

External dissemination has been strategically designed to fulfil multiple objectives. Primarily, it aims to raise awareness among key external audiences, including the scientific community, public, policymakers, and regulatory authorities. Beyond awareness, these activities also serve to identify the main users' needs, facilitate the transfer of project-generated knowledge and technologies, and provide opportunities for real-world testing and validation.

Furthermore, external dissemination plays a critical role in building connections with potential commercial stakeholders, supporting the longer-term exploitation and market uptake of project results. This multi-dimensional approach ensures that the project remains relevant, responsive to societal and industry needs, and positioned for broader impact beyond the consortium.

Table 7. Dissemination activities of SoildiverAgro

| Activity                | Description   |
|-------------------------|---|
| Dissemination materials | 107 practice abstracts received (EIP format) : 92 delivered, and more pending to be edited. (See figure 6.) |

|   |  |
|---|--|
|   | Infographics from WP2-WP7 information using Booklets and posters.  |
| <b>Videos and newsletters</b>                         | 3 SoildiverAgro Videos (one already published) and 5 yearly newsletters.   |
| <b>Social media and campaigns</b>                     | Maintained active accounts on Facebook, LinkedIn, YouTube, and Twitter/X, running communication campaigns and growing engagement.  |
| <b>Press releases and non-scientific publications</b> | Shared project results through press articles and layman-friendly content to reach non-scientific audiences.   |
| <b>Policy recommendations and White Paper</b>         | Developed a policy white paper and conducted multilingual surveys (until the 23 <sup>rd</sup> of May 2025) to collect feedback and support decision-making.                    |
| <b>Management practices guidelines</b>                | Compiled a manual with sustainable management practices for practical application by farmers and stakeholders.<br><br>Promoting videos (1 per region)                          |
| <b>Case Study Booklet</b>                             | Produced a comprehensive booklet summarizing regional best practices and policy guidance.  |
| <b>Decision Support Tool</b>                          | Online tool for direct end users to evaluate best practices in soil biodiversity management.   |
| <b>Knowledge transfer Sessions</b>                    | Held on 15 May 2025 to present final results and promote knowledge exchange with stakeholders.   |
| <b>Participation in events</b>                        | 121 events were organized during the project. Thoroughly described in D8.5, the knowledge acquired during the project will be disseminated in future conferences and webinars. |

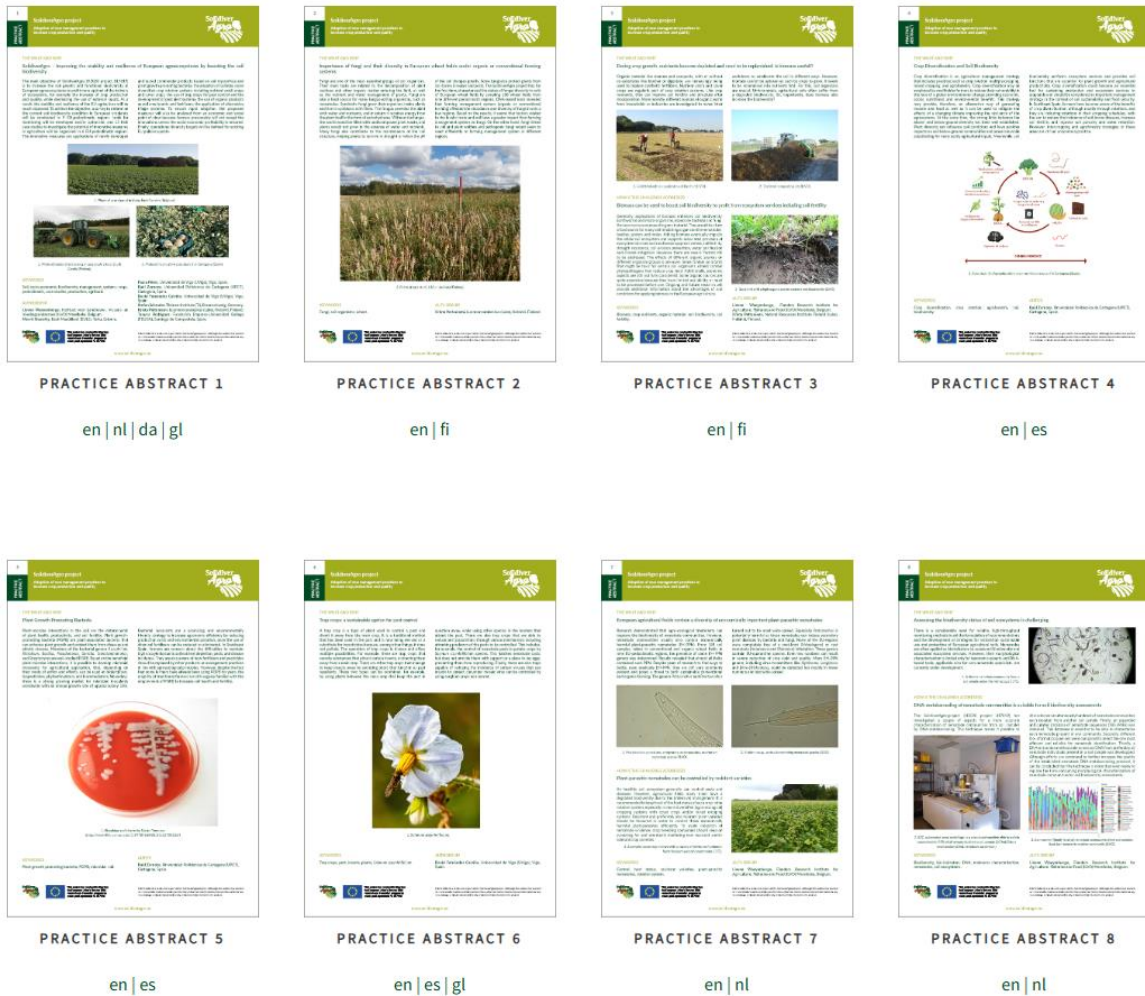


Figure 7. Practice abstracts available on SoildiverAgro's website.

While D8.5 Final report on communication and dissemination activities describes the communication outputs and engagement metrics, D8.6 reflects how these materials will contribute to the long-term exploitation and uptake of project results.

Tools such as the Management Practices Manual, the Decision Support Tool, and the Regional Case Study Booklet were not only shared widely but designed to support continued application in farming systems, research programs, and advisory contexts.

The integration of outputs into national and EU-level soil health initiatives, facilitated by open access on Zenodo and the Toolbox Kit, ensures their relevance beyond the project's timeline.

## Open access and Data management strategy



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817819

## Peer-reviewed publications

All peer-reviewed scientific outputs generated during the project will be made openly accessible by depositing them in reputable open access repositories. These include, but are not limited to:

- Open Access platforms such as Zenodo
- The **SoildiverAgro** website
- Institutional repositories maintained by participating universities and research organizations.

This approach ensures that the project's scientific contributions are freely available to all, including researchers, practitioners, policymakers, and the general public. It also complies with the open science requirements set by the European Commission, thereby promoting the widest possible dissemination and societal impact of the project's findings.

## Research data and FAIR Principles

All research data produced in the project will be managed in accordance with the **FAIR principles**, which ensure data is:

- **Findable** – Metadata and data should be easy to find for both humans and computers.
- **Accessible** – Data will be stored in secure and reliable repositories with open access or clearly defined access conditions where necessary.
- **Interoperable** – Standardized formats and widely adopted ontologies and vocabularies will be used to ensure compatibility and integration with other datasets.
- **Reusable** – All datasets will include comprehensive metadata, clear usage licenses (e.g., Creative Commons), and documentation to support reuse by other researchers or stakeholders.

This strategy facilitates data transparency, reproducibility, and long-term utility, enabling other initiatives to build upon the project's results while supporting responsible and collaborative research practices.

## Sustainability of SoildiverAgro



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The **SoildiverAgro** project was designed with a long-term vision for impact, integrating sustainability not only in its scientific and technical outputs but also in its collaborative structure and dissemination efforts. After the last meeting, several key actions were selected to maintain the legacy of **SoildiverAgro**:

- All peer-reviewed publications, data, and key findings have been or will be made available in open-access repositories. This ensures that the knowledge generated remains freely accessible to researchers, policymakers, farmers, and other stakeholders beyond the project's lifespan.
- The commercial partners (SYMBIOM, FYNECO) are pursuing product registration and market entry for biostimulants and mycorrhizal-based solutions developed during the project. Their activities will extend the project's impact within the agricultural market and support the shift toward sustainable farming systems aligned with EU regulations.
- The multi-actor approach of **SoildiverAgro** bringing together farmers, scientists, SMEs, and policy actors has built a robust network that is expected to continue through future collaborations, follow-up projects, and participation in EU policy conferences and dialogues.
- The maintenance of the project's website until May 2030 to conserve materials and updates.
- The Decision Support Tool (DST), Management Practices Guidelines Manual, and best practice videos, were designed with end-user applicability in mind. These tools will continue to be available and usable by farmers, advisors, and policymakers after project closure, supporting ongoing efforts in soil biodiversity enhancement and agroecological transitions.



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## Concluding remarks

The **SoildiverAgro** project has made significant contributions to the understanding and application of soil biodiversity in European agricultural systems.

By joining scientific research with practical implementation and stakeholder engagement, the project succeeded in demonstrating the potential of biodiversity-enhancing practices to improve soil health, crop performance, and ecosystem resilience.

Through its wide range of outputs (commercial products, management tools, research publications etc.) **SoildiverAgro** leaves a legacy that bridges science, practice, and policy. Its integrated approach, combining robust fieldwork across diverse pedoclimatic regions with cutting-edge molecular, ecological, and socioeconomic analyses, sets a benchmark for future initiatives in agroecology and soil health.

As the project concludes, its results continue to be disseminated, its tools implemented, and its network of actors mobilized toward a shared goal: fostering sustainable, biodiversity-rich agriculture in Europe. The project's influence is expected to grow as its tools, methodologies, and innovations are adopted, improved upon, and embedded in future research, policies, and practices.

The deliverable **D8.6 Final Plan of Exploitation and Dissemination of Results** also highlights the potential for continued research, and policy development. Through strategic dissemination and collaboration with relevant stakeholders, **SoildiverAgro** maximizes its long-term impact in supporting healthy soil management.