CORE Organic Cofund

"SCOOP: Developing intercropping systems with camelina to increase the yield and quality parameters of local underutilized crops"

Deliverable report
D 1.3. Final report on achievements of the LL

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Introduction

Organic farming is a key component of sustainable development, addressing challenges related to environmental degradation, climate change and food security. To meet these challenges, it is necessary to implement innovative solutions that can increase production efficiency while preserving the principles of environmental care and biodiversity protection. One method supporting the development of innovation in organic farming is the Living Lab concept. The Living Lab method integrates various stakeholder groups – farmers, processors, input suppliers, scientists, entrepreneurs and consumers – in the process of jointly creating, testing and improving new technologies and practices.

The Living Lab method plays an important role in the transformation, including that of organic farming, by providing a participatory approach that enhances the effectiveness of innovation implementation. Therefore, within the framework of the SCOOP project (Developing intercropping systems with camelina to increase the yield and quality parameters of local underutilized crops), the Living Lab method was applied.

The Living Lab was implemented in accordance with the principles of Living Lab deployment:

1. **Continuity**, which refers to the need to ensure ongoing processes. This requirement was met through the concept of regular meetings with Living Lab participants. These meetings were organised cyclically by all project partners. Additionally, partners exchanged experiences and outcomes of national Living Labs during project meetings and B2B events held via correspondence, online and in person.
2. **Openness**. This requirement involves the need to consider multiple perspectives and to take into account user needs as fully as possible, from the standpoint of the innovations being developed. This principle was implemented by inviting and including in the Living Lab structure a wide range of participants connected to the cultivation of camelina and its companion crops, as well as the production and utilisation of the final product. In several countries, students were also invited to take part, so that the perspective of the younger, educated generation could also be considered.
3. **Realism**. The need to bring planned concepts into real-world conditions was a key element of the Living Lab implementation in the project. The requirement for realism relates to the expected outcome – a product or service that can be applied in real-life use. Participants in the Living Lab must represent the environment that will use the results of the developed innovative ideas. These conditions distinguish the Living Lab method from other approaches to developing, testing or validating innovations and provide the best conditions for implementing their outcomes. This condition was met by conducting field experiments of selected configurations at various scales, including commercial scale. This scale of experimentation drew the attention of all Living Lab participants, engaged the resources and efforts of its members, and enabled the validation of previous assumptions, verification of results obtained at smaller scale, and identification of barriers and risks related to large-scale production.
4. **Engagement**. The involvement of Living Lab participants is essential for steering the innovation process in the intended direction – one that is based on people's needs. Ongoing contact with

Living Lab participants in all countries, regular consultations and discussions, and the relevant and interesting topic of organic intercropping with camelina meant that this concept was supported by the creativity of the user community. As a result of discussions, shared experiences and the expectations of the stakeholder communities represented by the Living Lab participants, different plants were tested in intercropping systems, and the most profitable and promising production configurations were explored.

5. **Spontaneity**. Spontaneous action is part of the innovation cycle and involves the need to register, collect and analyse users' spontaneous reactions at every stage of the innovation process. It is not enough to involve users at only one stage of the innovation process. In the project, this aspect was achieved through the regularity of meetings and ongoing contact with individual Living Lab participants in the periods between meetings.

The scope of D1.3. Final report on achievements of the LL

The scope of D1.3. Final report on achievements of the LL was describing all the activities and achievements carried out in the LL.

The first stage of work within the Living Lab framework was the development of the *Guidelines on Living Lab methodology. Living labs was defined as: "Living labs are known as user-centred approach with involvement of multiple actors to co-create, explore and evaluate the innovations together in a real-life condition. A living lab is comparable to an ecosystem with different living organisms (different actors) and abiotic components (LL criteria) that are linked together (co-creation, co-development) to fulfil the specific function (outcomes: e.g. solutions or products). Ecosystems are dynamic entities that are responding to environmental changes (interactions and networks within and between the systems) and therefore sustainability and resilience are considered as two important features of any living system including an agroecosystem and a LL".

Based on the executive report of international agroecosystem living laboratories (MACS 2019) three general components of agroecosystem living lab were defined:

1) transdisciplinary approaches,
2) co-design and co-development with participants,
3) monitoring, evaluation and research in real landscapes.

SCOOP LLs where the sites for preliminary assessment and collection of experiences, interests and potential bottlenecks to forge the following WPs activities in the first year of the project. In the second and third year the LLs where the places where scientific and field experiments were planned, assessed and discussed in order to fine tune the research activities to the interests and requests of involved actors. Finally, the potential value chains structuring was debated and hindering factors identified.

Benefits of the Living Lab approach in the implementation of organic Intercropping practices

In mentioned report benefits of the Living Lab approach in the implementation of organic Intercropping practices and the introduction of new crops was identified:

1 Actors engagement: by involving farmers and local communities in the research process, living labs ensure that the intercropping systems developed are practical and tailored to local conditions (Leminen et al., 2012). This participatory approach fosters ownership and encourages the adoption of innovative practices. In SCOOP each LL had the participation of diverse actors, bringing into the LL diverse points of view of the whole value chain, from farm inputs till the final market of products obtained.

Difficulties faced in SCOOP: few categories of actors were difficult to involve but they are essential for the implementation of intercropping practices and the use and valorization of new/minor/neglected crops. Namely, the difficult to involve categories were: machine builders/distributors, processors of camelina and other crops, market actors for the final camelina products.

Positive SCOOP experiences: interest of farmers and advisers for agronomic practices, like intercropping, that can allow to manage several aspects of production at once and reduce soil labour.

2. Real-World testing: Living labs facilitate on-site experiments where intercropping techniques can be tested under actual farming conditions. This real-world testing helps identify the challenges and benefits of different crop combinations, pest management strategies, and soil health practices, leading to more robust and applicable findings.

Difficulties faced in SCOOP: only 1 or 2 seasons are not sufficient to give a real idea of the cropping system and of the development and management needs of crops. Besides, 2023 and 2024 seasons registered meteorological extremes that increased the challenges of crop management and did not allow to obtain “representative” outcomes in terms of production quantity, quality and difficulties.

Positive SCOOP experiences: the field activities that involved the 4 LLs, but also other interested actors, were an efficient tool to empower the LL participants and strengthen their sense of ownership of the innovation. Besides, to see the crops and the intercropping technique applied in a “colleague’s” farm, strengthened the reliability of proposed innovations.

3. Diverse Knowledge Integration: the living lab approach encourages the integration of diverse knowledge systems, including traditional agricultural practices and scientific research. This holistic perspective can lead to innovative intercropping solutions that enhance productivity and sustainability.

Difficulties faced in SCOOP: in the LLs’ areas there were not many processors (for the camelina and for the other crops), so the knowledge on how to process and on the kind of markets for the obtained products was limited. But in general, in EU, the processors (organic or conventional) working on speciality oils and on small scale are few. Besides, as there is limited or no experience among farmers and advisers on camelina production, their input in terms of experience was limited.

Positive SCOOP experiences: a good social dynamic was observed in the LLs with no cases of unwillingness to share knowledge among farmers or advisers or other actors. Good hints were shared and led to a positive co-creation process.

4. Adaptive learning and flexibility: Intercropping practices can vary widely based on environmental conditions, crop types, and market demands. The iterative nature of living labs allows for continuous learning and adaptation, enabling farmers to refine their intercropping strategies based on ongoing feedback and changing circumstances.

Difficulties faced in SCOOP: none, a part the too short time of the project framework. More years and growing seasons would be needed for proper adaptation.

Positive SCOOP experiences: several additional ideas were proposed for additional companion crops. They will be taken into account in the LLs that decide to go on beyond the project time-frame.

5. Promotion of biodiversity: Living labs can facilitate the exploration of diverse crop combinations that enhance biodiversity. This is crucial in organic farming, where biodiversity contributes to ecosystem resilience, pest control, and soil health.

Difficulties faced in SCOOP: none.

Positive SCOOP experiences: the project offered the opportunity to stress the relevance of biodiversity within organic farming systems. It was a good opportunity to give practical examples of crops mutual services and, in general, of ecosystem services.

6. Policy and knowledge dissemination: The insights gained from living labs can inform policy-making and agricultural extension services. By demonstrating the effectiveness of intercropping in organic systems, living labs can influence broader adoption and support for sustainable farming practices.

Difficulties faced in SCOOP: to formulate policy proposals (i.e. for eco-schemes or Rural Development Program measures) longer activity and more on-farm research is needed.

Positive SCOOP experiences: the benefit of LL approach came out clearly, also in terms of policy engagement or recommendations. To show how a practice or a crop can "work" in real local conditions and, at the same time, the interest of the agriculture community for a practice or a crop is a powerful tool to push political actions.

Living Labs features specifically adapted to deal with intercropping

According to the methodology and requirements of intercropping system following features was implemented:

1. Agronomic fine-tuning
Crop selection and compatibility: selecting compatible crops is crucial for maximizing resource use efficiency and minimizing competition.

2. Post-harvest management

Harvest timing and techniques - In SCOOP the topic was discussed in the LLs and some practical alternative tested at farm level.

Storage and processing: Within SCOOP LLs the topic was discussed but no practical testing was possible due to resources constrains. Nevertheless, this is a point to be considered, it can be managed with broad involvement of local processors.

Market strategies: In SCOOP LLs the topic was only discussed but no specific activity was planned.

Guidelines to set up and run a LL on intercropping and the introduction of a new (rediscovered) crop in organic farming systems

The SCOOP experience allowed to draft the following guidelines for the setting up and running of LLs on the specific project topics:

1. Understand the Living Lab concept

In SCOOP a training activity to partners on the concept, methodology, advantages, potential difficulties and time requirements of the LL methodology was done.

2. Identify the actors that need to be part of the LL

In SCOOP we found essential to engage farmers (organic and some conventional if interested), extension services and advisers related to organic farming systems and to conventional arable systems if interested, researchers of different disciplines (arable crop management, soil management, mechanization), processors engaged (or potentially engageable if the they have the plants and facilities) in oil pressing and/or protein extrusion, as well as in processing of the specific companion plants, representatives or experts of market of plant based oils and proteins and of the specific companion crops, local policy makers (the ones deciding on local development plans, RDP measures, ecoschemes etc).

3. Set Clear Objectives

In the case of SCOOP, the time available for field on-farm testing was too limited to allow a real experience to consolidate.

4. Design the experimental activity

The first steps of the LL were to get to know the new crop (camelina in the case of SCOOP); and to select the companion crops considering their compatibility with the first crop in terms of growth patterns, nutrient needs, sowing and harvesting times and potential benefits between the crops. Besides, the market potentials was considered and the existence or potential setting up of a local value chain to use and give value to all obtained crops.

5. Facilitate the co-creation process

LL is not a series of workshops but a long term co-creation process that needs pro-active, engaged and interacting participants.

6. Implement Trials

The experimental activity in experimental stations (at plot scale) and/or at field scale within a on farm approach started with small test in the first year(s) and to make use of the knowledge obtained to progressively enlarge the scale and reach the on farm test.

7. Share findings

The outcomes were shared through several means: press releases, web page, social media, mailing list and field days or demo days.

8. Foster Networking

The Network was foster by active consolidation with LL members and others as Community of Practice and local value chains.

9. Feedback, reflection and adaptation

Living Labs It is an iterative process where there is space and time not only to “do” things but also to reflect on them collectively, include feed-backs and adapt the following activities according to the group requests and considerations. All comments and proposals were taken into consideration, discussed and, in case of agreement lead to a change in work path example as changing in accompanying crops.

10. Policy engagement

An important role of Living Labs was to start the dialogue with local policy makers, who can create an enabling environment for new practices (intercropping) and crops, for example within the measures of the Rural Development Plan or other regulatory schemes.

Besides, the LL try to continue its activities beyond a specific funded project and also on that local policy to demonstrate project results and its benefits and impacts on the practice.

SCOOP: Catalogue of Living Labs

One of the most important Implementation of Living Lab methodology was mainly Living Labs meetings

In all Living Lab meetings, 865 participants from the four countries involved in the project took part. The highest number of participants was recorded in Turkey (Fig. 1), followed by Bulgaria, Italy and Poland.

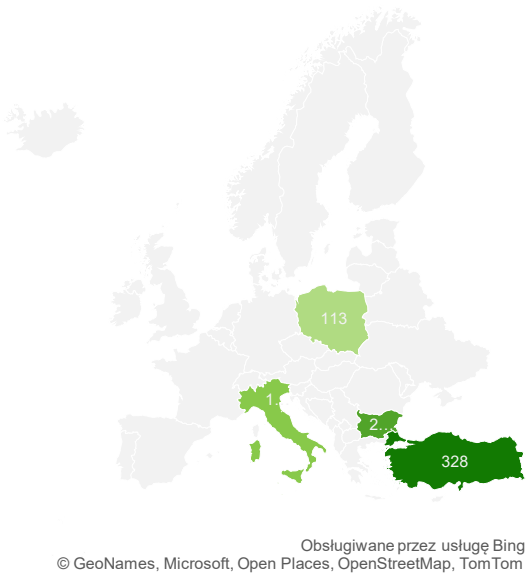


Fig 1. Total number of participants in Living Labs.

The largest group represented were farmers, accounting for 43% of all participants (Fig. 2). This is a significant achievement, as this group was particularly important in terms of implementing the results of the SCOOP project and building local value chains. The second-largest group were scientists, who made up 21%, while the share of advisors was 11%. The share of other groups was below 10%. An important achievement was the interest shown in the project's subject and results by all groups identified at the beginning of the project as crucial for the implementation of its outcomes and the development of new value chains for organically grown camelina intercropped with other companion crops.

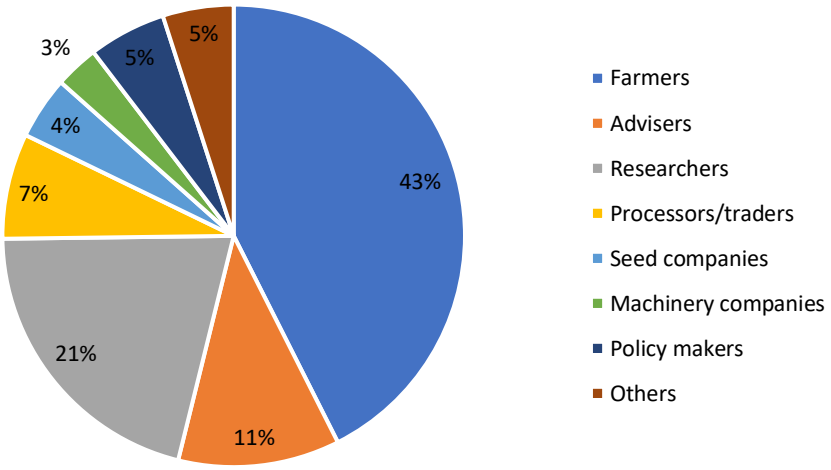


Fig. 2. Structure of participants of Living Labs.

A detailed analysis showed that the highest number of farmers participated in Bulgaria (121 participants), although they accounted for 49% of participants (Fig. 3, Fig. 13). In Italy, 103 farmers took part, making up the largest group in that country – 58% of participants (Fig. 3, Fig. 12). In Turkey, 112 farmers participated, but they accounted for only 34% of participants (Fig. 3, Fig. 14). In Poland, 39 farmers participated, making up 35% of the total (Fig. 3, Fig. 13).

The highest number of advisors (33) participated in Bulgaria (Fig. 4, Fig. 13), accounting for 13%, while the largest share of advisors was observed in Poland at 16% (Fig. 4, Fig. 11). In Italy and Turkey, advisors participated more than 20 times (Fig. 4). Scientists also actively took part in the Living Lab, especially in Turkey (76), but also in Bulgaria (42), Poland (37) and Italy (21) (Fig. 5).

Another group involved in the Living Labs were processors and traders. They most frequently participated in Turkey (29) (Fig. 6, Fig. 14). In Poland, processors and traders accounted for 11% (Fig. 11), while in Italy and Bulgaria their shares were 7% and 5%, respectively (Fig. 12, Fig. 13).

Seed companies in Turkey showed particular interest in the Living Lab, with as many as 29 participants attending the meetings (Fig. 7). In Bulgaria and Italy, seed companies were represented by 5 and 4 participants, respectively.

The greatest interest from machinery companies was recorded in Bulgaria (Fig. 8), while the highest engagement from policy makers was noted in Turkey (Fig. 9).

In each country, the project also attracted interest from individuals not classified into any of the above groups, including, for example, members of the press and students (Fig. 10).

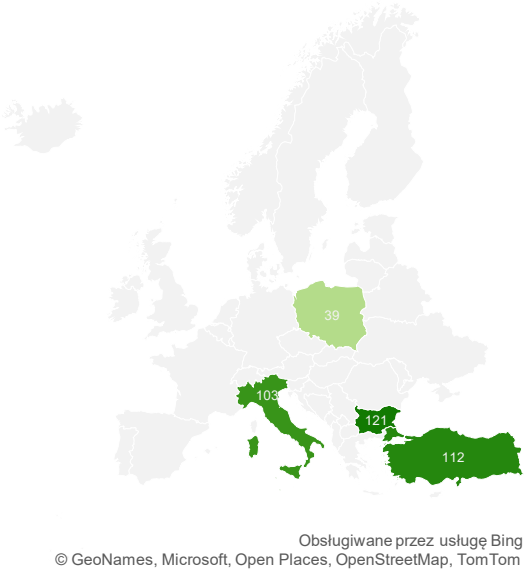


Fig. 3 Farmers' partipiation in analised LL

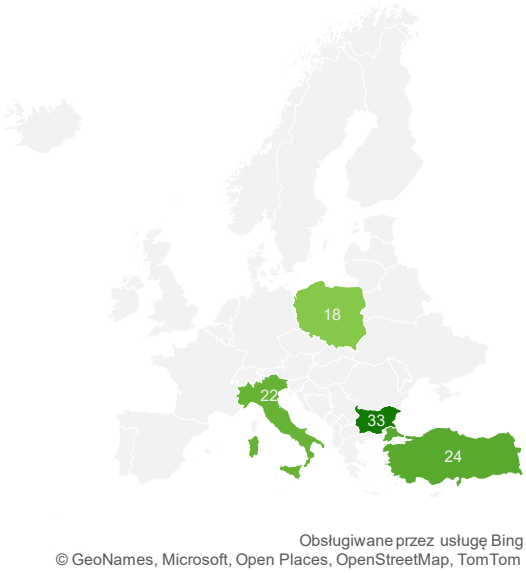


Fig.4 Advisors' partipiation in analised LL

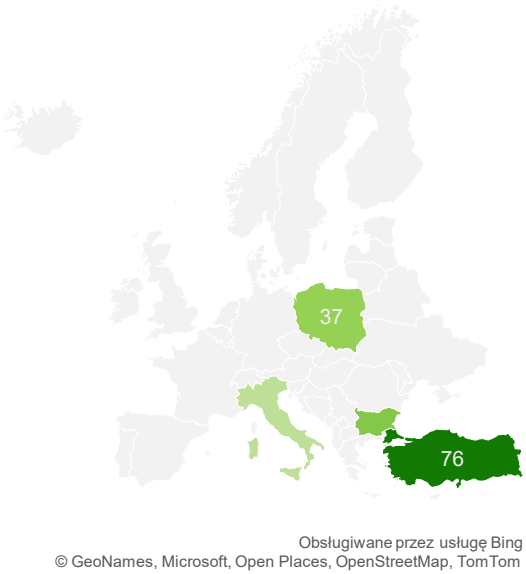


Fig. 5. Researchers' partipiation in LL

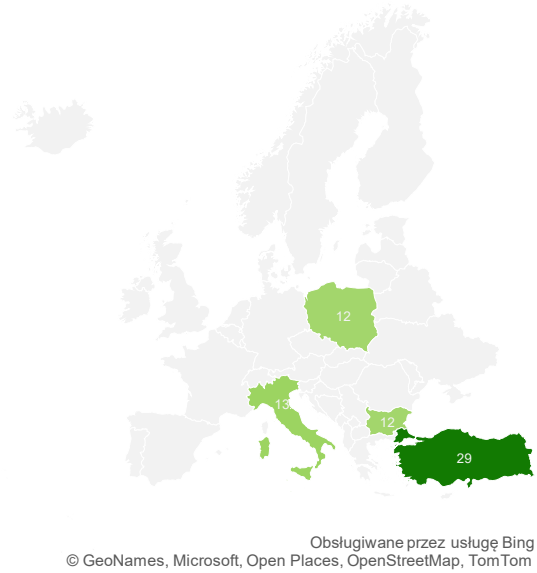


Fig 6. Processors/traders' partipiation in LL

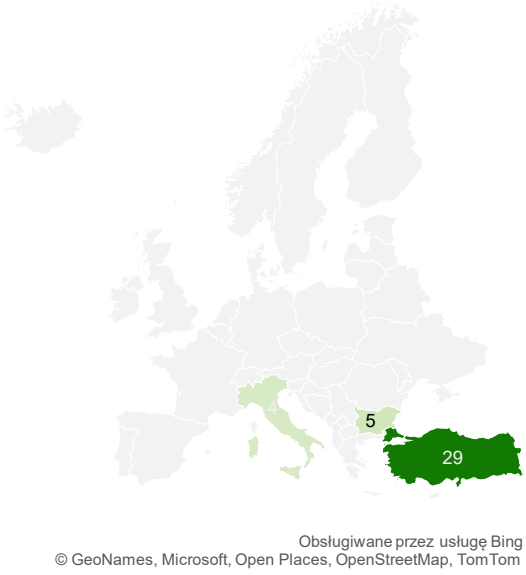


Fig. 7. Seed companies' partipiation in LL

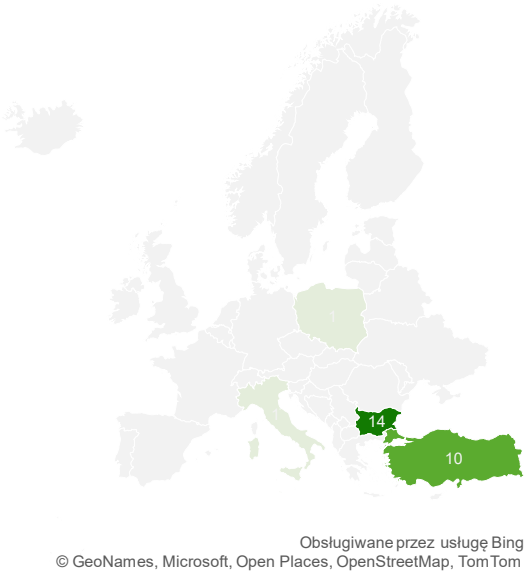


Fig. 8. Machinery companies' partipiation in LL

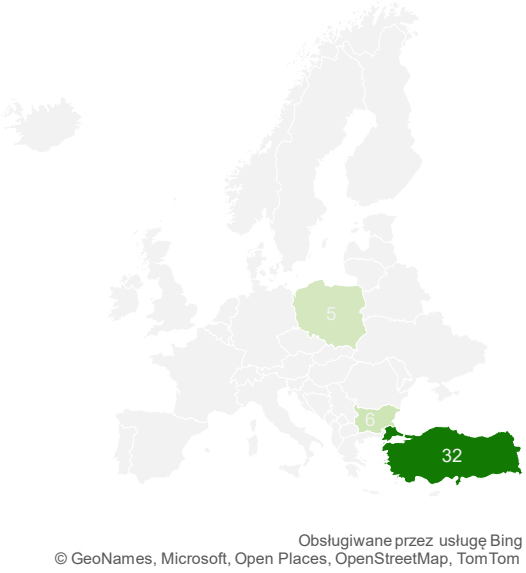


Fig. 9. Policy makers' partipiation in LL

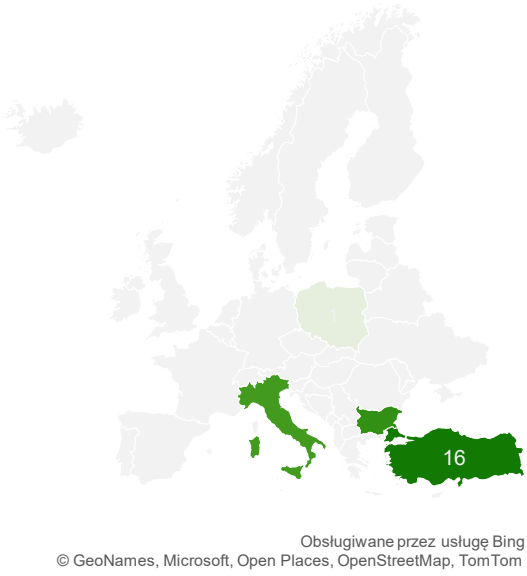
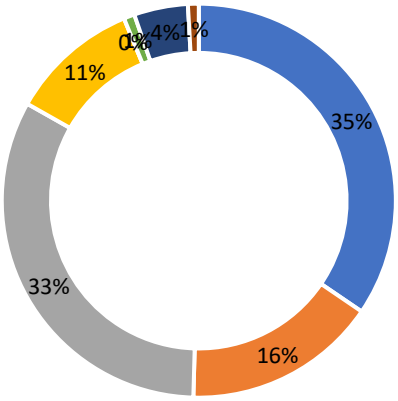


Fig. 10 Others' (incl. press) partipiation in LL



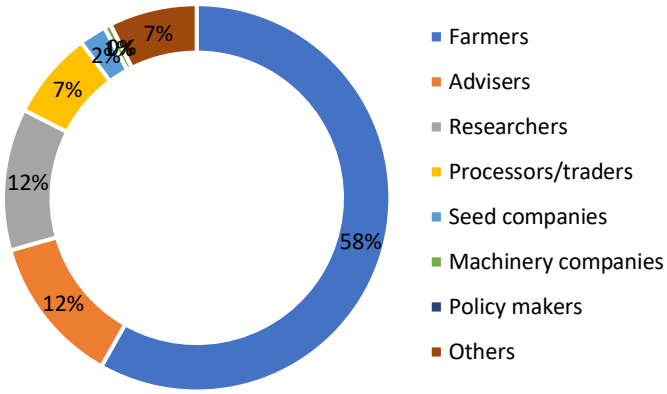
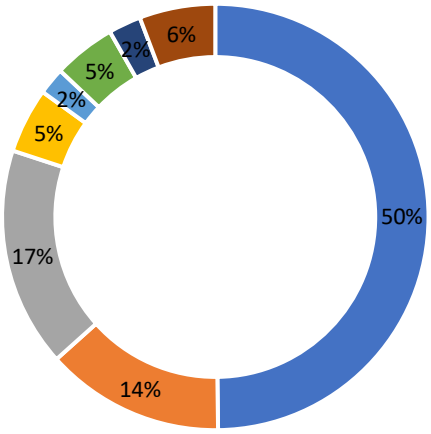


Fig. 11. Structure of LL participants in Poland Fig. 12. Structure of LL participants in Italy



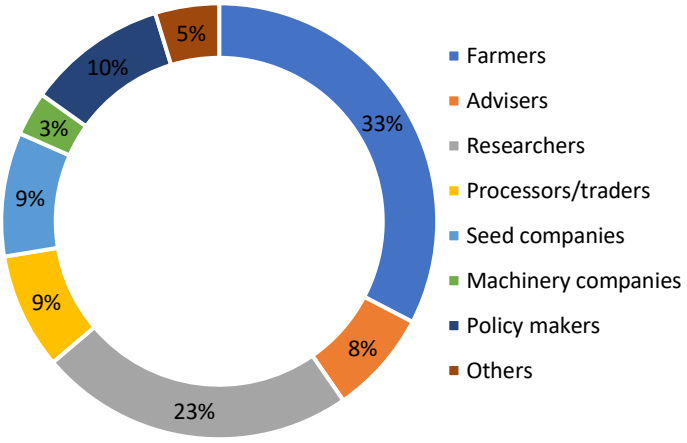


Fig. 13. Structure of LL participants in Bulgaria Fig. 14. Structure of LL participants in Turkey

Living labs meetings in Poland

As part of the SCOOP project, UWM together with BIO organised an Innovation Laboratory – Living Lab (LL), within which five workshops were held, including two combined with DEMODAY (Photo 1-3). BIO was responsible for organising the workshops and engaging practitioners across the entire value chain, while UWM was in charge of coordinating the Living Lab, conducting the workshops, and preparing informational materials.

During the first workshop on 23 March 2022, Living Lab of the SCOOP project was established. Participants were introduced to the purpose and working method of the Living Lab, and this form of collaboration was met with approval and interest from the invited attendees.

The first LL workshop made it possible to assess the current level of knowledge and interest in camelina cultivation. LL participants were familiar with camelina as a crop, but mostly based on information from the media; only a few individuals had actual experience with its cultivation. Agricultural advisors

had more experience with camelina, but mainly in the context of sole cropping, whereas intercropping camelina with companion plants was largely unfamiliar.

The workshop topics covered issues related to camelina cultivation, mainly in the context of its production technology and potential yields, and consequently potential income, cultivation conditions, fertilisation, seed yield, seed moisture and harvest time. The main focus of the first workshop was a discussion on the choice of a companion crop for intercropping with camelina in the following year's field trials.
Initial plans assumed that the field experiments would include camelina and companion crops such as spelt wheat and pea. After discussions during the LL, the decision to sow camelina with spelt wheat was maintained. However, instead of pea, red lentil was selected due to the potentially greater interest among farmers in this species and the availability of subsidies for it. Additionally, it was decided to grow flax, with the potential for pressing oil from its seeds.

The second Living Lab workshop was held on 7 December 2022. This meeting was also attended by farmers who had previously grown and/or were currently growing camelina as a sole crop. After presenting the research results from the first year of the project – both from the organisers and other project partners – a discussion was held, focusing mainly on seed sowing rates, sowing and harvest dates, sowing methods for camelina, and mechanical weeding.
Another discussion topic was camelina intercropping with other companion crops, including grasses, vetch, lupin and pea, and the possibility of obtaining subsidies for their intercropped cultivation was addressed. Ultimately, instead of flax – which was suppressed when intercropped with camelina – pea was selected for further research. Red lentil and spelt wheat remained as companion crops in the experiments.

The third Living Lab workshop took place on 27 June 2023 at the large-scale trial site in Butryny. The discussion began with a presentation of camelina, including the origin of the species and the historical context of its cultivation in Poland. Participants then reviewed the results from the experimental field – the best outcomes were obtained from intercropping spring camelina with spelt wheat, which is why these species were selected for commercial-scale production.
The scope of the workshop covered several topics. The first was the form, diversity and production potential of camelina under Polish conditions. The second focused on sowing dates for both winter and spring forms, sowing rates and dates, and their impact on camelina yield. Results from earlier experiments with both winter and spring camelina supported the selection of the spring form for further trials, which included, among other things, the possibility of delaying the harvest of camelina until the companion plant also reached maturity.
Other factors influencing camelina cultivation were also discussed, such as field preparation, procedures accompanying sowing, and weed control. Additional requirements for camelina cultivation were presented, including sowing rates, water demand, and resistance to diseases and pests.
The second important topic of the LL was a discussion on the main product – oil. Camelina oil contains omega-3 and omega-6 fatty acids, which are valuable due to their positive effects on human health. The oil also contains vitamins A and E, which reduce the risk of cardiovascular diseases, have anti-atherosclerotic effects, and lower levels of bad cholesterol and blood sugar.

Another topic of discussion was the companion plant in the intercropping system – spelt wheat. The factors that determined the choice of the Wirtas variety were discussed, including its low nitrogen requirements and low production inputs, high resistance to diseases, and good technological grain quality.

The fourth LL meeting, which also served as a DEMODAY, was organised on 30 July 2024 at the commercial fields in Butryny. The Living Lab and DEMODAY focused on the topic of camelina harvesting. The harvest event attracted particular interest from farmers. The discussion centred mainly on two thematic areas.
The first concerned technical aspects, including settings, possibilities and limitations related to one-stage combine harvesting. Participants discussed different types of combines, technical adjustments required for the small size of camelina seeds, and the specifics of intercropping. The disscussion focused on ways to minimise seed losses during harvest.
The second area covered issues related to seed cleaning, as harvested camelina seeds are sometimes significantly contaminated with seeds of other plants, and their small size makes effective separation challenging. In this context, the importance of maintaining high-quality organic fields (weed-free) was also emphasised.
It was concluded that separating small camelina seeds may require the use of optical separators, which considerably increases costs and introduces a risk to the profitability of seed production. This issue was especially important because there is demand on the Polish market for camelina oil for food purposes, but it requires a high seed purity level of at least 95%.

The fifth and final Living Lab meeting took place on 14 November 2024 in Olsztyn.
During the final LL meeting, the results of the project were presented, including outcomes from small-scale and commercial-scale field trials. The findings of biodiversity studies in intercropping systems were also shared. Another topic discussed was the concentration of macro- and micronutrients in the seeds and grain of the four crop species grown as part of the SCOOP trials. The genetic diversity of camelina was also presented. The final topic of the presentations – which also opened the discussion – was the cost of camelina production. Participants shared their experiences related to camelina cultivation and the possibilities of selling camelina under favourable market conditions. Among the LL participants were farmers growing camelina, as well as a representative of a company that purchases camelina and presses oil from it.
Thanks to the SCOOP project's Living Lab, a local value chain was successfully established based on the cultivation, processing and local sale of oil from organically grown camelina.
Camelina oil is a marketable product and is available on the market, although it remains niche. According to Living Lab participants, the oil market in Poland is not very diversified. Commercially, rapeseed and sunflower oils dominate. The organic products market – especially organic oils – is more varied. Flaxseed oil is the most prevalent in this segment, but camelina oil is gaining increasing interest. Due to the growing demand for camelina oil, its seeds – including those from organic cultivation – are in demand.
The discussion also focused on the cultivation of spelt wheat, the companion crop used in the commercial-scale trials. It is a valuable cereal crop, but interest in spelt products has been declining recently, along with prices, leading to reduced enthusiasm for its cultivation. Spelt is used to produce flour, which is most commonly used for making bread and pasta.

Due to the still relatively low interest in camelina products and the weakening demand for spelt products, it was concluded that an informational campaign highlighting the health benefits of products from both crops could increase consumer interest and, in turn, strengthen farmer engagement with these species.

Photo 1. Living Lab meeting in Poland


Photo 2. Living Lab meeting in Poland

Photo 3. Living Lab meeting in Poland

Living Labs meetings in Italy

As part of the SCOOP project, AIAB together with UNIBO organised an Innovation Laboratory – Living Lab (LL), within which eight workshops were held (Photo 4-5).

The first meeting was held online on 6 April 2022. During the meeting, a presentation of the project was delivered. This meeting also served as an introduction of camelina as a new crop. As the project focused on the organic cultivation of camelina in an intercropping system, the meeting was an excellent opportunity to begin the discussion on companion crops to be chosen for further research at both experimental and commercial scale.

The second meeting took place online on 4 October 2022. The main topic of discussion was the assessment of several companion plants and the decision on what to select for plot and field trials. The following species were analysed: peas, chickpeas and lentils.

The third meeting was held on 15 May 2023 at the UNIBO experimental farm. The main topic of the meeting was camelina cultivation. It was the first occasion to meet in person and see the camelina crop. Several participants in the Living Lab had never seen camelina in the field before.

The fourth meeting was held on 21 June 2023 at Agriturismo ai Colonos, Villacaccia di Lestizza (UD). The meeting was an opportunity to share the first project outcomes, assess value chain possibilities for camelina, evaluate farmers' acceptability of intercropping practices, and highlight mechanisation constraints.

The fifth Living Lab meeting took place on 20 November 2023 at Az. Agr. Euroagricola, Rivignano-Teor (UD). The aim of the meeting was a visit to the field trial where camelina was cultivated in an intercropping system with chickpea. Another objective was the assessment of the best sowing moment for companion plants, as well as a review and selection of the type of sowing machinery.

The sixth meeting was held on 12 March 2024 at the Museo di Storia Naturale in Udine. The main topic of the meeting was the assessment of pulse companion plant choices and the potential for value chain development.

The seventh meeting took place on 5 June 2024 at Az. Agr. Euroagricola, Rivignano-Teor (UD). Since the meeting was held at the experimental fields, the main topic of discussion was the evaluation of field trials. Another important issue was the discussion on camelina oil production potentials.

The final, eighth meeting was held online on 12 November 2024. It served as an opportunity for the final presentation of field trial outcomes and discussions on organic camelina, intercropping strategy and organic pulse production.

Photo 4. Living Lab meeting in Italy

Photo 5. Living Lab meeting in Italy

Living Labs meetings in Bulgaria

The first LL took place on 23 February 2022 at AUP. During the meeting, the project's assumptions were presented. The second topic of discussion focused on on-farm problems related to climate and its changes, biodiversity, and the camelina market in Bulgaria. Other topics included a discussion on camelina, intercropping, associated problems and opportunities. The final topic was the choice of trial methodology and variants; fodder pea and vetch were discussed as companion crops.

The second meeting was held on 11 May 2022 at the bio-certified field small plots trial at AEC AUP. The discussion centred mainly on the growth and development of camelina and companion crops in small plots. A presentation of the project was also delivered on site.

The third meeting took place on 14 July 2022, also at the bio-certified field small plots trial at AEC AUP. During the meeting, a demonstration of the harvest of intercropped and sole-cropped camelina was carried out.

The fourth meeting was held on 17 March 2023 at AUP. The results of the previous year's small plot trial were presented, and a decision was made on the choice of companion crop for large-scale trials.

The fifth meeting was held on 5 May 2023 at the bio-certified field small plots trial at AEC AUP. This time, the main topic of discussion was the vegetation of the intercropping system, as well as insect pests, weeds and pathogens associated with camelina cultivation.

The sixth meeting took place on 21 June 2023, also at the bio-certified field small plots trial at AEC AUP. A demonstration was held of different combinations of camelina, pea and vetch varieties. The discussion also addressed problems related to harvesting and separating seeds from different cultivation combinations.

The seventh meeting, held on 5 October 2023 at AUP, focused on the results from the large-scale trial, cultivation problems and possible solutions.

The eighth meeting took place on 21 May 2024 at AUP, both as a indoor meeting and at the bio-certified field small plots trial at AEC AUP. Another meeting at the experimental fields was devoted to discussion on cultivation, uses and best practices.

The ninth meeting, held on 21 July 2024, took place together with a demo trial on a 1 ha bio-certified field in Toshevo, North Bulgaria. It focused on topics related to the cultivation, uses and best practices of camelina cultivation.

The final, tenth meeting was held on 27 March 2025 at AUP headquarters. The meeting was dedicated to the results of the project and best on-farm practices.

Living Labs meetings in Turkey

As part of the SCOOP project, CRIFIC organised a LL, within which eight workshops were held (Photo 6-8). One more meeting had been planned, but due to the earthquake, most of the early spring meetings in 2023 were officially cancelled.

The first Living Lab meeting in Turkey took place on 26 April 2022 at the Ikızce Research and Production Farm, Haymana. During the meeting, participants explored the following questions: What is intercropping? What can be the benefits of intercropping? How to choose the companion plants? In addition, a demo sowing was carried out using an intercropping seeder.

The second meeting took place on 31 May 2022, also at the Ikızce Research and Production Farm, Haymana. During the meeting, the intercropping plots were visited. Participants also had the opportunity to investigate the differences between autumn and spring sowings of camelina.

The following two meetings were held on 22 June 2022 and 29 June 2022 at the Ikızce Research and Production Farm, Haymana, as part of Farmer Days. Living Lab participants had another opportunity to visit the SCOOP experimental fields and observe the organic cultivation of camelina in an intercropping system with buckwheat, coriander and fenugreek.

The fifth and sixth meetings were held on 6 July 2023 and 7 July 2023 at the Ikızce Research and Production Farm, Haymana. During these meetings, the harvest of intercropping fields and post-harvest practices were demonstrated and discussed.

The seventh meeting took place on 13 May 2024 at the Ikızce Research and Production Farm, Haymana. The main topic of the meeting was the benefits of intercropping systems during drought or extreme weather seasons. Living Lab participants visited large scale trials of camelina and fenugreek.

The final, eighth meeting took place on 17 July 2024, also at the Ikızce Research and Production Farm, Haymana. The main topic of the last meeting was the harvest of intercropping fields and post-harvest practices, which were demonstrated and discussed.

Photo 6. Living Lab meeting in Turkey

Photo 7. Living Lab meeting in Turkey

Photo 8. Living Lab meeting in Turkey

Achievements of the Living Lab in the SCOOP Project

1. **Development of innovative technologies in organic farming**

Within the Living Lab framework, new technologies for intercropping camelina with companion plants were developed and tested across different countries and climatic conditions, supporting the advancement of organic farming.

2. **Co-creation of innovation with end users**

One of the key achievements of the Living Lab was the direct involvement of end users – in this case, organic farmers – in the process of designing and testing innovations. In the project, LL also included advisers, researchers, processors/traders, seed companies, machinery companies and policy makers. Traditional methods of introducing new technologies often suffer from a lack of alignment with the real needs of users. The Living Lab addressed this issue, as the design of the intercropping experiments with camelina was continuously consulted with farmers and agricultural advisers, which increased their practical relevance and acceptance. The design of cropping systems, including the selection of companion crops, was consulted not only with farmers but also with advisers, machinery and input suppliers to ensure practical aspects were taken into account. Additionally, other elements – such as the environmental impact of camelina cultivation, profitability, consumer interest and product value – were considered and analysed individually in each country.

3. **Testing innovations in real-world conditions**

The innovations developed within the Living Lab were tested not only under controlled experimental conditions but also in real-life commercial farming systems. This approach enabled the verification of new solutions in natural agro-ecosystems, taking into account changing climate conditions, soil types and other factors affecting organic production. As a result, innovations could be quickly adjusted to meet real-world challenges faced by farmers.

4. **Shortening the innovation implementation process**

In traditional innovation models, the implementation of new agricultural technologies and methods can take many years. The Living Lab allows for faster iterations and refinement of solutions, significantly reducing the time from idea to practical application on farms. Farmers were able to test new technologies in real time and provide feedback, allowing for dynamic adaptation based on actual results and needs – for example, in selecting companion crops, adjusting agronomic practices, or planning the harvest.

5. **Interdisciplinary collaboration**

The Living Lab promoted collaboration among various stakeholder groups. The project included farmers, advisers, researchers, processors/traders, seed companies, machinery companies, policy makers and others. Through broader discussions held within the Living Lab, available knowledge and resources were used more effectively, which should accelerate the implementation of new technologies and cultivation methods.

6. **Integration of local communities into the innovation process**

The Living Lab also contributed to strengthening local farming communities. One example is the development of short supply chains, where organic farmers cooperate with consumers and local businesses, creating more sustainable systems for food production and distribution. The Polish Living Lab was a prime example of this. A new value chain was developed, from organic camelina cultivation to the production of camelina oil in a small local oil processing company.

7. Promoting sustainable development

The Living Lab supports the development of technologies and practices that have a positive impact on the environment. Operating in line with the principles of sustainable agriculture, Living Lab participants learned about intercropping, meaning that the Living Lab contributed to the growth of organic farming in an environmentally friendly way, consistent with circular economy principles. Biodiversity assessments, particularly the identification of beneficial and harmful insects, pathogens introduced to Living Lab participants, also enhanced their knowledge, awareness and sensitivity to these issues.

Conclusion

The Living Lab proved to be an effective tool for implementing innovation in organic agriculture. By engaging diverse stakeholder groups, testing solutions under real conditions, and promoting interdisciplinary collaboration, the Living Lab contributes to the dynamic development of the organic farming sector. The achievements of this method show that innovative technologies can support organic production while maintaining ecosystem balance and improving the quality of life for both farmers and consumers.