

DIVERSIFOOD

Embedding crop diversity and networking for local high quality food systems

Grant agreement n°: 633571

H2020 - Research and Innovation Action

D1.2:

Connecting methods: toolkit of common methods and meta-analysis for field trials, seed networks and food-chain analysis

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Workpackage concerned: WP1

Concerned workpackage leader: Edwin Nuijten

Lead Beneficiary: Estelle Serpolay-Besson (ITAB)

Dissemination level:

- ☒ **PU:** Public (must be available on the website)
- ☐ **CO:** Confidential, only for members of the consortium (including the Commission Services)
- ☐ **CI:** Classified, as referred to in Commission Decision 2001/844/EC

Abstract

This deliverable presents the work done in task 1.2 of the DIVERSIFOOD project. It explains how the work was conducted with the participation of all partners through individual contributions and through collective moments of working, and describes the process from the theoretical basis to the realisation of a booklet ([Booklet#1](#)) which is the tangible toolkit proposed in the title.

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D1.2: Connecting methods: toolkit of common methods and meta-analysis for field trials, seed networks and food-chain analysis

Introduction

The different partners of DIVERSIFOOD project are often working with a participatory and even multi-actor research methodology to diversify organic food systems, from genetic resources to economic systems. However, do they all have the same definition of participatory and multi-actor research? Is there only one definition? What is shared by all, what are the building blocks of such an approach, and how different are the several projects carried out, according to their story and experience to diversify organic food systems? This is how we interpreted the connections to be done to foster multi-actor research for biodiversity from field to plate.

In this deliverable, we will explain the process, the intellectual reasoning that led us (WP1 core workgroup) to the building of the technical booklet#1. Originally, it was titled "Methods and methodological framework for multi-actor approaches and participatory breeding" and was renamed "Toolkit to foster multi-actor research on agrobiodiversity" to embrace the message we wanted to deliver to anybody who would like to start or to improve a multi-actor research project about agrobiodiversity issues.

Through this work, we tried to show and illustrate the connections between methodologies, methods and tools within multi-actor projects that involve seed networks and food chains. We analysed diverse experiences of DIVERSIFOOD to extract key-points for successful participatory and multi-actor research.

Thanks to this work, we also show the great diversity of multi-actor research situations that are developed and put in evidence the logically related diversity in links that exist between actors, methodologies and resources in each experience: diversity is also in the forms of projects.

Before presenting all the process and the results of this work, we would like to stress that all this work, that has led to booklet#1, is connected with the work done within T.1.1, as well as it constitutes the base for developing deliverables 1.3 and 1.4 within T.1.3. Indeed, the partners in charge of the three tasks of WP1 worked in a closely interconnected way.

Methodology and method

In order to reach the objective of connecting methods and methodologies used in multi-actor research, we chose to work from experiences of DIVERSIFOOD project, involving all the partners.

This deliverable was thus realised thanks to their collaboration at different levels and dedicated moments. The work process consisted in alternating stages of WP1 internal reflection with involvement of partners with different configurations:

- WP1 core group (Edwin Nuijten - LBI, Adanella Rossi and Simona D'Amico - UNIPI, Véronique Chable - INRA - and Estelle Serpolay - ITAB) managed the global process of the work, i.e. proposing reflection and developing methodologies and methods to collect individual and collective production of raw material to be analysed, then realising the analysis. The group met regularly by skype to make the work going on.
- Partners were asked individually to explain and develop examples of multi-actor research within seed networks and food chains in the DIVERSIFOOD project.
- All the partners worked together during workshops organised during the different annual meetings of the project, creating collective raw material and analysis, which were used to enrich global reflection about methodologies, methods and tools.

The scheme on the following page describes the different steps of the work done in T1.2. Tasks of the WP1 core workgroup are in blue, in green are the individual contributions of the partners to the working process and collective moments of reflection involving all partners (during annual meetings) are in orange.

WP1 core groupwork

Partners' individual contributions

Collective moments (all partners)

In order to collect raw material from DIVERSIFOOD experiences, we asked each partner to contribute with one or more examples of “sub-project” or experiment developed within DIVERSIFOOD. The process of our work is summarised by the scheme in the following page.

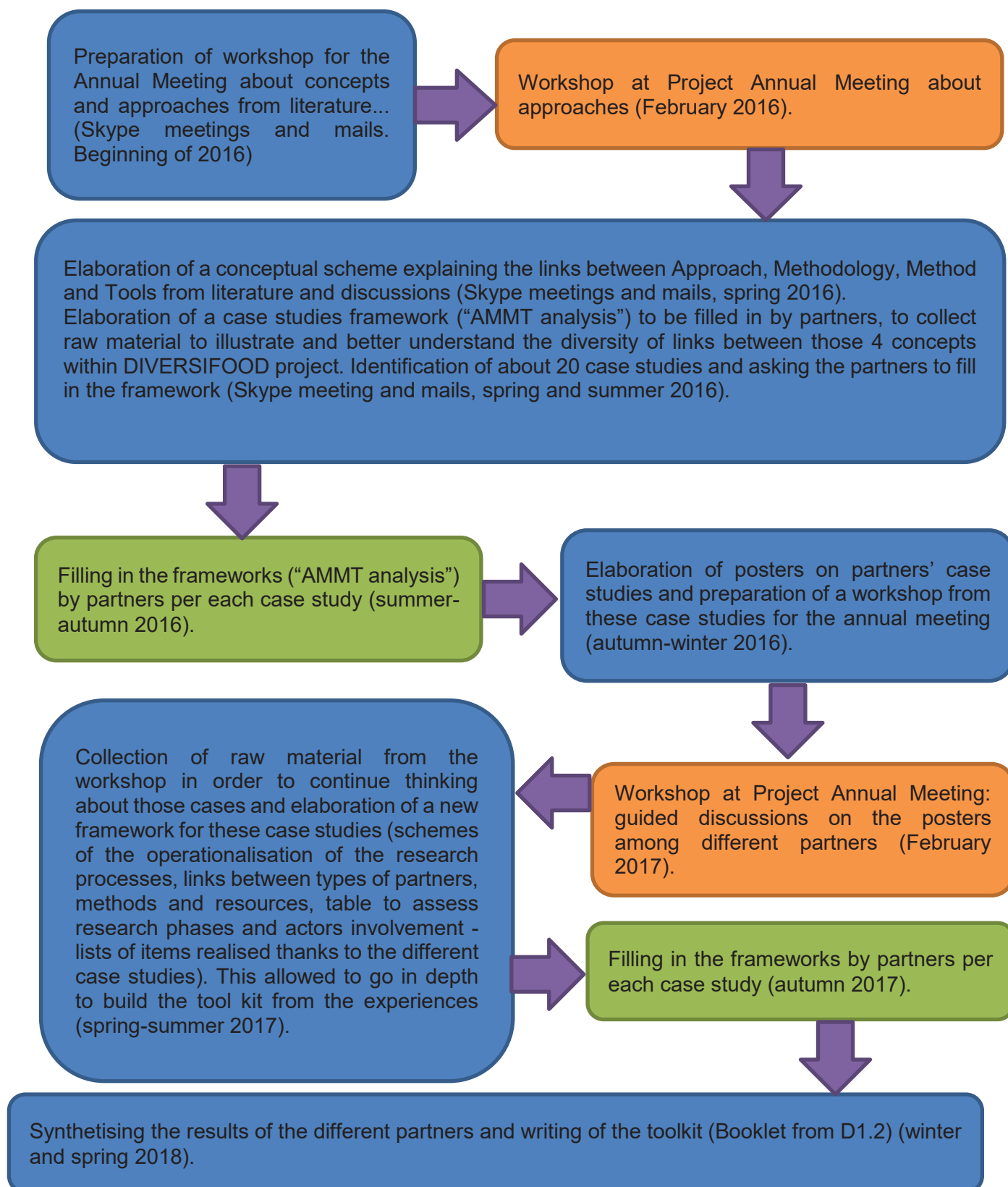


Figure 1: Scheme of the different steps for the elaboration of Booklet#1

Different steps to the booklet

From vision to tools: the "AMMT exercise"

The first step of the work consisted, after having read some literature and debated, in the elaboration of a scheme explaining our understanding of the meanings and links between Vision (defined later as 'Approach'), Methodology, Method and Tools.

The partners were asked to explain how the different items were declined in their own projects. This information was translated into posters by WP1 core workgroup to work on collectively during 2017 annual meeting in Bologna.

Template sent to the partners in 2016

Template to describe your case study

Introduction of definitions

For clarification, here is a list of definitions of the words **Approach, Methodology, Methods and Tools**, and how they are interrelated.

Approach: It explains the aim of the research and the vision that shapes the research, e.g. how the case is dealt with. For example, it may present the purpose to explore in depth the processes underlying variety enhancement or market valorisation of products derived from the diversified genetic resources.

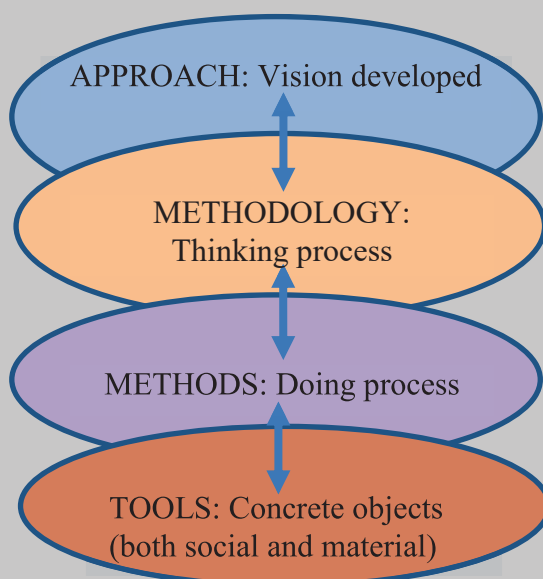
Methodology: It is the thinking process (philosophy) guiding the generation of new knowledge. It refers to the rationale and the philosophical assumptions that underlie any natural, social or human science study, whether articulated or not. The methodology includes the principles that determine how such tools are deployed and interpreted. In short, it relates to how the reality is approached and analysed. It guides the focus and intent of the research, it explains the research questions and justifies the adopted methods.

According to the ways to approach reality, for example, it may present the choice to adopt a positivist, constructivist, descriptivist, post-modernist or subjectivist stand, as well as to use quantitative or qualitative data or to adopt participatory processes.

Methods: Technical procedures applied to conduct the research, according to the methodological choices. Techniques and procedures followed to conduct research, (i.e. data collection, data analysis and results reporting).

Tools: Items used to implement a method including software for analysis and data management.

Relationships among Approach, Methodology, Methods and Tools



Examples of methods for multi-actor / participatory/ collaborative research:

Field demonstration
On farm experiment
Field visits/meetings
Discussion groups

Examples of methods for data collection:

Interviews (different types)
(Participant) Observation,
Focus group,
Desk research (Documents collection)
Systematic literature review
Sensory analysis
Field inventories
System trials
Measuring plant traits (in various ways)
Sampling

Methods of data analysis:

Content analysis
Membership and categorisation analysis
Metaphor analysis
Discourse analysis
Statistical analysis
Meta-analysis

Methods of data collection and analysis:

Laddering Analysis
Q-Method
Domain Analysis
Network analysis

Examples of tools:

Software for statistical analysis
Software for texts analysis
Molecular markers
Tools to measure N-content, etc.
Questionnaires / List of questions

Description of the case study: Template to fill in

The case study

Please, describe the case you are working on and mention in which work package(s) it falls and possible collaboration with other partners/actors in DIVERSIFOOD. (Max 5 lines)

Approach

Here you describe your vision for conducting the case study, the way through which you observe or approach a particular initiative, how you deal with the case you study. (Max 5 lines)

Aim

(Please explain what you want to discover by implementing this case study). (Max 5 lines)

Frame/Context

(Please explain what you look at to get information and insights that may fulfil your curiosity. What are the main sources of information in your cases and which aspects and phases are crucial to derive insights). (Max 5 lines)

Methodology

Here you describe the thinking process for the implementation of the case study.

(Please explain how you interpret the reality you seek to disclose through the case study. In short: What are your assumptions and hypotheses?) (Max 7 lines)

Research questions

(Which questions you seek to answer by implementing your case study?)

Research phases

(Please present the phases of your study, from the conceptualisation, to the collection and analysis of information, until the presentation of results). (Max 10 lines or a scheme).

Methods and tools

Here you describe the methods you use - in different research phases - to generate information and insights to answer your research questions through the case study. This section is meant to present the ways in which you have been combining techniques and tools for data collection and analysis.

Methods and tools for data collection

(Please fill the table below by listing and describing the methods you use to collect data. Indicate the name of the procedure, as it is known in the literature, and describe briefly why and how you use it for the purpose of your study.)

Research phase	Method (name and description)	Use	Linkage with other methods	Tools (name and description)


Methods and tools for data analysis

(Please list and describe the methods you use to analyse data. Indicate the name of the procedure, as it is known in the literature, and describe briefly why and how you use it for the purpose of your study.)


Research phase	Method (name and description)	Use	Linkage with other methods	Tools (Name and description)

Almost all partners answered our request: we received 17 contributions from the partners and translated them into 17 posters.

Here is an example of poster realised from partner's answers to the AMMT exercise:



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ADDING VALUE TO PRODUCTS FROM NEWLY BRED LINES AND PARTICIPATORY BREEDING

Breeding

Problem description

Issue
Determine common factors that can be used in the marketing guidelines for products from newly bred lines and participatory breeding.


Goal
To understand more about the potential for adding value to products derived from newly bred lines or participatory breeding – like the ORC Wakelins population.

Research Operationalisation
The case study is part of ST 5.1.2 of DIVERSIFOOD project and concerns the bread produced from the ORC Wakelins cross composite wheat population. It looks at the attitudes, relationships and forms of communication - both within the initiative and externally - that are likely to influence the success of initiatives to market this product. The case study relies upon each actors' own views and experiences to give an insight into how the relationships within the supply chain function. It builds on the organisation of data gathering, the collection and analysis of data, the validation of the analysis and the reporting.

Methods	Tools
Literature analysis through review of the literature on the initiative and the context where it operates to give an analysis of the initiative background. Analysis of the network within and around the initiative. Semi-structured interviews to understand the perspectives of different stakeholders within the initiative. Focus group to understand what consumers think about the initiative. Domain analysis to analyse the results of interviews and focus group.	Report template. Rich picture. List of questions. Guidelines for workshop implementation. Semantic relations.

Achievements and reflections
15 semi-structured interviews have been carried out with a wide range of stakeholders, including plant breeders, government officials, farmers and bakers. A focus group and bread tasting with 13 bread consumers was also carried out.

Generally there is a good level of interest, but for many people interviewed, their involvement with the initiative was several years ago – in some cases up to 10 years ago - and they are relying on their memory to answer the questions. Apart from this, the semi-structured interviews have obtained a fascinating insight and have helped us consider how we will develop this initiative in the future.



ORC, UK

ORC Wakelins
cross composite wheat population

Poster analysis

During the annual meeting of the project held in Bologna in 2017, WP1 core workgroup organised a workshop aimed at involving partners in collectively analysing the posters and generating outputs for participatory and multi-actor research from the different experiences. The participants were organised in groups of about 7 people and had 3 to 4 posters to comment and work on. They were invited, first, to evaluate the methodological choices of each case, and, second, to evaluate the multi-actor approach in a synthetic way (generalisation from the study of the cases).

Here is the guide for discussion we proposed to the partners for the analysis of the posters:



DIVERSIFOOD Annual meeting - Bologna - 2017 - WP1 workshop
Group X

Evaluation of the methodological choices

	Goals	Methods	Tools	Achievements
Case 1 (poster 1)				
Case 2 (poster 2)				
Case 3 (poster 3)				
Others (eventually: participant in the group presenting another case)				

Evaluation of the multi-actor approach

“Summary” of the group discussions:

	Goals	Methods	Tools	Achievements
Decision making				
Doing				
Further thoughts on transdisciplinarity				

We got really interesting material from this collaborative work. Important insights emerged for a successful multi-actor research that were afterwards valorised and developed in the booklet: the "building blocks" (trust, facilitation, transparency, resources, and appropriate distribution of the tasks) and other important specificities of multi-actor research (specificity of the results, diversity of actors, continuous and iterative process, points of attention).

Scheme of actors' roles and links

Following-up the work of Bologna, we proposed to the partners of the project to visualise the different partners and their roles in their project. The objective of this new exercise was to describe the diversity of ways to do multi-actor research, in terms of types of actors involved and associated methods, knowledge fields and resources on one hand, and in terms of organisation of the research process in another hand (the "research operationalisation" part of the poster was asked to be put into scheme instead of words).

Here is the template sent to the partners (pptx) in order to have a better understanding of their projects:

Diversifood WP1

Visualisation of the actors' role of the projects

The exercise proposed in the following pages is a follow-up to the exercise with the posters used at the Bologna Annual Meeting. Based on those information, included in a more detailed form in the Excel table, its specific objective is to visualise the actors' role in each project, in terms of presence, material and immaterial resources mobilized (knowledge and other resources) and access to methods adopted in the research phases.

Together with the descriptions of the projects through the posters and the derived table, this representation will be the basis of a tool-kit for multi-actor research. Indeed, we want to show the diversity of ways to conduct multi-actor research, in order to show the large possibilities that exist to develop it, as well as to highlight the important common aspects, which we can consider as fundamentals for multi-actor methods. At the same time, this will help to identify the disadvantages and deficiencies that emerge in implementing this research approach.

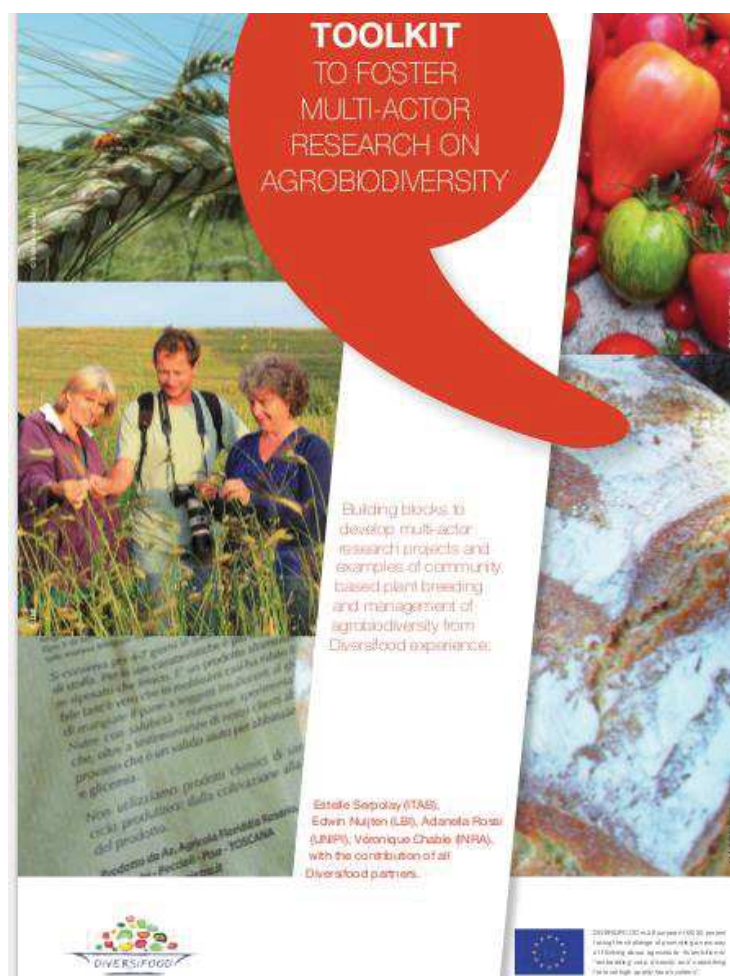
Instructions to build the linkages scheme

- For each category, the categories concerned by the project (actors, types of knowledge...) are **selected** by putting them in **bold font**
- Each selected actor is connected with knowledge fields, other resources and methods as follows:
 - which actor has/uses which knowledge in the project
 - which actor has/uses which resources in the project
 - which actor is involved in which method
- Colors of connections:
 - the actor color is used also for the connections which involve him/her
- Types of connections: if possible (and suitable) estimate the intensity of the connection by the type of line of the connection: Solid line for intense connection
 - Semi solid line for medium intense connection
 - Dotted line for scarce or small connection

DIVERSIFOOD partner	Result AMMT exercise and poster	Result scheme of research operationalization	Choice for Booklet case studies
Arch Noah	X	X	X
ARI/Fibl	X		
CSIC	X	X	
INRA	X	X	
ITAB/RSP	X	X	
ITQB	X	X	X
IPC	X		
LBI	X		
LUKE	X		
OIKOS			
OMKI	X	X	X
ORC WP2	X	X	
ORC WP5	X	X	
PSR	X	X	
RAS	X	X	
RSP	X	X	X
RSR			
UNIBO	X	X	
UNIPI	X	X	

Writing of the booklet

From the end of 2017 and during spring 2018, WP1 core workgroup developed its analysis and wrote the Booklet#1 thanks to the different materials collected during the working process and the collective work and individual contributions from all partners. It is available on the [project website](#) and was distributed to all participants to the final DIVERSIFOOD conference (Rennes, 10-12 December 2018).



Conclusion

We noticed that most examples used in our research had a broad comprehensive and transdisciplinary approach. However, many examples chosen were mainly from WP2 and WP3 and only a few from WP4 and WP5. Indeed, most DIVERSIFOOD partners have a background in genetics and/or agronomic sciences. This fact shows a critical point to take into account in future multi-actor research projects: increasing the diversity of types of sciences. However the work realised in WP4 and 5 have brought important elements to build the booklet and the raw material collected will feed T1.3 and the associated deliverables (D1.3 and D1.4).

As far as the content is concerned, we highlighted some key-elements of multi-actor research:

- there is not a recipe for participatory and multi-actor research, but rather a set of important ingredients to start with, and a specific state of mind/approach to have: wanting to involve any actor interested in working with a collective approach.
- multi-actor research depends on the complexity of the context. The research process is not necessarily more complex with a lot of actors.
- the involvement of partners can be limited at the beginning but evolves along time (depending on the kind of knowledge resource mobilised).
- facilitation plays a key-role in multi-actor projects

The specificity of this work is to have involved all the partners of the project and to have developed a collective reflexive work in which building blocks for multi-actor research emerged. The resulting booklet, achieved from the diverse experiences of partners is thus grounded on the reality of multi-actor research developed in DIVERSIFOOD.

Appendix

a. Partners' posters



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ARCHE NOAH

FARMERS' TOMATOES

Description

Issue

To build a collective work between farmers and other stakeholders to develop tomato varieties that combine outstanding fruit quality with good adaptation to organic production systems and further satisfy our claims on seed sovereignty and farmers rights.

Goal

To develop tomato varieties that show significantly higher levels of partial leaf mould resistance through participatory on-farm trials (in a network of small-scale farms).

Research Operationalisation

Planning phase:

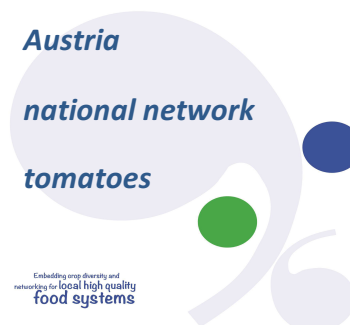
- > Discussing and documenting previous experiences
- > Finding a common approach for the on-farm research and participatory breeding together with the farmers and the other participants of the working group

Implementation phase:

- > Identifying resistant varieties
- > Carrying out a preliminary farmer led selection program

Documentation phase:

- > Presentation and discussion at the meetings of the working group
- > Publication of the results on the ARCHE NOAH homepage and in an article
- > DIVERSIFOOD reports



Methods	Tools
Interviews with farmers (to collect previous experiences and identifying potentially resistant cultivars) Agronomical trials on-farm , with replicates or not (to get a better overview by quick screenings of generally grown cultivars in the network, to identify potentially resistant varieties and to test potentially resistant varieties in on-farm trials) On-farm selection programs Statistical analysis	Rating scheme for leaf mould infestation and other traits (single plants) R (to analyse the on-farm screenings and the selection program)

Achievements and reflections

First results and ongoing trials => Variety recommendations for farmers (list of leaf mould resistant cultivars).

First experiences in on-farm research and breeding.

Populations developed to start on-farm breeding activities focused on partial leaf mould resistance.



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TRIALS OF OPEN POLLINATED BROCCOLI

M. Omirou¹, D. Fasoula¹, I.M. Ioannides¹, M. Koller²

Problem Description

Issue

Balance consumers' concern for high nutrient contents in crop products with the agro-ecological performances of the crops.

Goal

Determine and assess the glucosinolates (GSLs) concentration of different broccoli open pollinated lines.

Research Operationalisation

1. Contents of GSLs will be checked with respect to different genotypes and agro-ecological environments.
2. Florets will be gathered from the partners and a preliminary analysis will be done.
3. The final analysis will be done on the GSLs contents and results will be delivered to partners

Methods

- Simple extraction method to sample intact floret of 2 different open pollinated lines to check the variability within each genotype.
- Preliminary LC-MS analysis of GSLs content of broccoli florets to secure that there is minimal GSLs degradation during sampling and estimate maximum storing time.
- Multivariate statistics for data analysis.

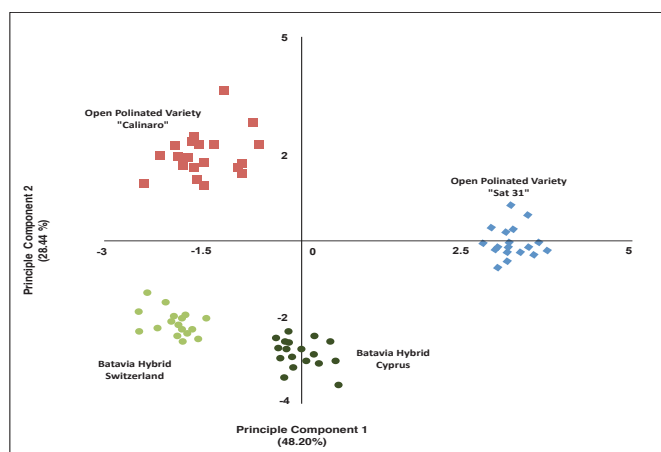
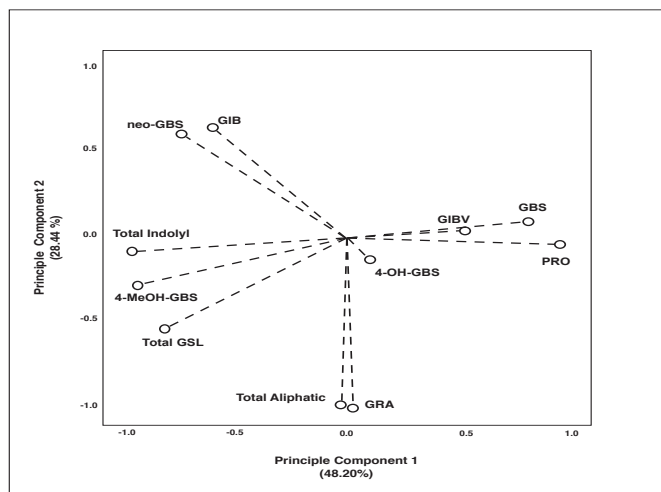
Achievement and reflection of preliminary data

1. There is no significant variation of GSLs content within open pollinated varieties compared to F1-varieties
2. There is a significant variation among the different varieties regarding GSLs profiles.
3. Preliminary data are suggesting that climatic conditions as a crucial factor controlling GSLs content

¹ ARI, CYPRUS

² FIBL, SWITZERLAND

Embedding crop diversity and
networking for local high quality
food systems





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CSIC



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CREATION OF FABA BEAN POPULATIONS FOR BI-CROPPING SYSTEMS BY OPTIMIZING THE MANAGEMENT OF THE CROP-POLLINATOR INTER-PLAY

Problem Description

Issue

Legumes may facilitate the diversification on the agroecosystem both directly, e.g. via growing legumes in association with cereals, and indirectly by enhancing associated diversity of wild fauna, such as bee-pollinators. Local bees could be managed by the farmers with the aim of creating new diversity and intra crop variation.

Goal

To gain understanding on the nested architecture of the crop-bee pollinator-farmer-breeder network. The analysis of this network could help to increase crop resilience and yield potential, on the one side, and to mitigate pollinator decline, on the other side.

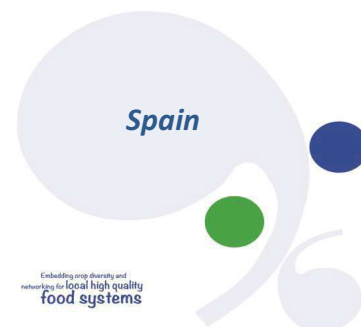
Research Operationalisation

We create a bi-crop system, faba bean-spelt, to compare two cropping systems (intercropping vs. monoculture) and different faba bean genepools derived from two breeding schemes. Genepools highly homozygous and homogeneous, derived from selfing vs. highly heterozygous and heterogeneous, derived from open-pollination.

Methods	Tools
On farm experiment	The design of intercropping systems should be a case-by-case work
Field visits	Measuring traits (yield determinants and crop-pollinator related traits) Software for statistical analysis: Descriptors, Anovas (to compare cropping management and breeding schemes), Multivariate Analysis (PCA, MRA and DFA, to address the issue of the natural selection acting on many traits simultaneously)

Achievements and reflections

Bi-crop adapted open-pollinated faba bean populations available for future breeding programs. Efficient breeding methodologies for generating variability and for insect-aided cross-pollination.





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RSP, ITAB, INRA, ORC, UNIBO

RENEWING RIVET WHEAT CULTIVATION AND USE IN FRANCE AND IN EUROPE

France, UK and Italy

Embedding crop diversity and
networking to local high quality
food systems

Description

Issue

Before the project, farmers and pasta makers had already launched experimentations and pasta making in several areas in France; DIVERSIFOOD will help to connect the actors and will provide means to share their questions and first experiences so as to boost the renewal of the species

Goal

To organise the networks of peasants and pasta makers interested in the species, to manage first trials to rediscover the diversity within the species and to proceed to the first evaluation of qualities for pasta making

Research Operationalisation

Contacting/visiting all actors involved or interested in the species:

- 1 - qualities recognized and cultural uses in the past that could be recovered nowadays
- 2 - current limits and benefits of rivet wheat (in field and transformation) according to producers and processors

Choosing and trying of methods/tools to investigate diversity and the qualities of genetic resources:

- 3 - most interesting nutrients and technological aspects to be analyzed
- 4 - organoleptic quality compared to bread and durum wheat on final transformed products

Finding new sources of diversity for next experimentations

- 5 - origin of rivet wheat and its evolution
- 6 - availability of rivet genetic resources samples in Germplasm Banks
- 7 - available landraces already multiplied by farmers ready to be exchanged in the network



Methods	Tools
Visits on farm	Interviews with farmers to collect previous experiences and needs
Desk studies	Literature analysis: synthesis of knowledge on genetic diversity and former uses; Looking for available genetic resources and research centres involved in Rivet wheat conservation
On farm experiment to identify agronomical and quality potentialities of landraces to initiate on-farm breeding programs	Root colorations and AMF observation; nutrients analysis and "napping" for organoleptic quality evaluation

Achievements and reflections

New products and new landraces identified in the framework of on farm breeding



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MAIZE FROM PPB IN PORTUGAL

Problem description

Issue

Enhancement and market valorisation of Portuguese maize landraces through multi-actors, participatory and integrated approaches.

Goal

Establishing a value chain for landraces of maize (used for maize bread) based on a multi-actor approach, in which landraces of high quality and yield are maintained by farmers and valorised in local production-consumption systems, so embedding diversity in the food supply chain and ensuring their reproduction through economic acknowledgment. The idea is providing an alternative model to productivist model, based on local knowledge, development of the traditional systems and local landraces, and farmers empowerment ('integrant philosophy concept').

Research Operationalisation

Studied initiatives: field trials on farms and local production-consumption systems to improve knowledge of landraces to use in a certain location (local agronomic aspects, farming systems, knowledge, bakery traditions, consumer preferences)

Approach: improving landraces under PPB to expand our knowledge on breeding, agronomic, molecular, organoleptic and technological (processing) aspects. In parallel, exploring the chain value and expectations of its actors

Specific research questions: what landraces perform better in different locations? What landraces respond better to farming-processing local/traditional techniques? What landraces meet better maize bread preferences of local consumption? How can a value chain with a multi-actor approach and embedding diversity generate an adequate income?



Methods	Tools
<p>Multi-actor and integrated approach to merge the information from field trials selection, from molecular, technological and organoleptic tests, on actors' needs and preferences.</p> <ul style="list-style-type: none"> On farm experiments, field demonstrations Field visits/meetings to exchange information Sampling and collecting of germoplasm performance data (various measures of plant traits) Collecting data for molecular, technological and organoleptic analysis Analysis of trials and test results Collecting information on actors' preferences (farmers, bakers, consumers) Discussion groups/meetings to evaluate the results 	<ul style="list-style-type: none"> Documents collection and systematic literature review Develop statistical methods to help farmers in the selection procedures Protocols for agronomic, molecular, technological and organoleptic data collection and analyses Database for data management and software for data (including statistical) analysis Questionnaires/lists of questions to collect information from the various actors Pre-tasting of several maize variety breads and willing to pay test SWOT analyses Guidelines to preparing, implementing and finalising the field visits, discussion groups and meetings

Achievements and reflections

General protocol collaborations between IPC and [ADER-Sousa](#) (represents 30 associates of Sousa Valley) an agenda would be needed.

Based on the present and future results, guidelines to improve multi-actor approach of the value chain will be needed.



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DIVERSE TOMATO VARIETIES FROM FIELDS TO FORK

Problem description

Issue

Finding out more satisfactory tomato varieties adapted to organic and small scale farming; creating a new seed management

Goal

Studying diverse tomato varieties from soil to fork to identify varieties that are locally adapted and valid from an organoleptic point of view. Creating new varieties by farmers. Developing a specific organisation of seed management.

Research Operationalisation

Studied initiative: a national collaborative research project on tomato in France, conducted by RSP and ITAB and Les Croqueurs de Carottes (group of small scale breeders).

Studied aspects: development of tomato varieties adapted to specific contexts of organic farming (gardeners and farmers), through multi-local and organoleptic evaluations of existing traditional varieties bred by small scale breeders and creation of new farmers varieties. Designing a specific organization of this breeding program.

Approach: collaboration from conception to dissemination of results: elaboration of experimentations, evaluations, actions and the rules for working together; implementation of the specific tasks (trials, tasting, crosses, analyses of results).

Research questions: differences between hybrids and traditional varieties for “Coeur de Boeuf” types; GxE interactions for traditional varieties; comparison of different breeding strategies (creation of diversity or exploitation of spontaneous diversity)

Research stages: networking; agronomic breeding/evaluation; organoleptic breeding/evaluation; rallying and mixing diversity, trainings.



Methods	Tools
Collaborative and multidisciplinary approach: a consortium of different actors (breeders, animators, researchers), involving other actors (consumers, gardeners, experimental platforms); assessment from agronomic and organoleptic points of view. 1. Networking: regular meetings, discussion groups and field demonstrations 2. Agronomic breeding/evaluation: field observations in multi-local trials 3. Organoleptic breeding/evaluation: organoleptic analyses 4. Rallying and mixing diversity to know what each people has done (crosses or observation of natural crosses)	1. Phone and physical meetings (collaborative software to take notes, collective charter) 2. Statistical analyses for field observations and for organoleptic breeding/evaluation (R software, Excel) 3. Napping; hedonic tests; nutritional analyses 4. Interviews (questionnaires; Word and Excel)

Achievements and reflections

Difficulties: in the relationships between certain partners during participatory process; to get data from gardeners despite their interest in the project; of management due to the large spreading of participants (national level). Need to clarify the objectives for all the participants (different levels of commitment).

The work to do takes much more time and energy than planned, so need to adjust to objectives.

Adjustments will be done in the project according the first results = adaptability of participatory methodology.



This project has received funding from the European Union's H2020 Programme under grant agreement no 633571



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IN SITU DEVELOPMENT OF DROUGHT AND FUNGI RESISTANT MAIZE POPULATIONS

Problem description

Issue

In situ participatory development of new diverse maize populations suitable for bread production and more resistant to drought and fungal diseases.

Goal

To develop/optimize rapid screening tools for stress resistance selection on participatory maize populations field trials as well as integrative statistical analysis to select the most molecular diverse and phenotypically interesting maize parental lines for new populations.

Research Operationalisation

Participatory field trials will be conducted to study different aspects of Portuguese, traditional and composite, open pollinated populations of maize by IPC. ITQB will focus on their resistance to fungi and drought evaluation.

Rapid screening tools will be developed for drought and mycotoxin producing fungi resistance. In parallel, parental selection for new crosses will be optimized through data analysis integration.

New maize crosses (higher molecular diversity, best quality, and more resistant) will be evaluated in field trials and a sensorial analysis of the bread obtained from them will be conducted.



Methods	Tools
<ul style="list-style-type: none">•Drought resistance maize populations evaluation (growth chamber)<ul style="list-style-type: none">-Leaf temperature measurement by remote sensing (Thermal Imaging), validated by-Photosynthetic performance, stomatal conductance and transpiration evaluation by leaf gas exchange (Infra Red Gas Analyser - IRGA)•Disease resistance maize populations evaluation (growth chamber)<ul style="list-style-type: none">-Isolation of local mycotoxin producing fungi diversity.-Maize grains controlled inoculation and fungal growth quantification.•Data Integration- Molecular diversity and cluster analysis (PCA) based on molecular and quality data (previous projects) + collected resistance evaluation data to:<ul style="list-style-type: none">-select the most molecularly different populations, group similar populations, and select outstanding parental accessions for new crosses•New populations evaluation (from field trials)- Sensorial analysis of maize bread	<p>ThermaCAM, FlirSystems (Thermal Imaging instrument)</p> <p>LCpro+, ADC BioScientific (IRGA instrument)</p> <p>ITS fungal DNA region sequencing for fungi species confirmation, LC-MS mycotoxin production confirmation</p> <p>Software for statistical analysis: FSTAT, GENEPOP, ARLEQUIN, PHYLIP, SAS.</p> <p>Consumer panel evaluation.</p>

Achievements and reflections

So far we characterized regional mycotoxin producing fungal diversity and isolate representative strains for initiating maize population disease resistance screening. Field drought resistance screening will take longer to implement since Thermal Imaging validation by IRGA is still ongoing.



This project has received funding from the European Union's H2020 Programme under grant agreement no 633571

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LBI: UNDERUTILIZED CEREAL SPECIES

Description

Using and improving a participatory and multi-actor approach for testing and developing adapted varieties of underutilized cereal species from field to bread (involving farmers, bakers and consumers).

Goal

To involve all chain actors to select good varieties of einkorn, emmer and rivet suitable for use in the Netherlands (not only cultivation, but also processing and baking), in order to broaden the diversity in cereals cultivated.

Research Operationalisation

- Field trials are conducted and simultaneously information is collected from stakeholders;
- Information from field trials and interviews is combined (hard and soft data);
- Each year, field trials are improved on basis of field trials and selection criteria;
- Meetings with stakeholders for building a stronger network;
- In the field, the first two years are dedicated to selection of promising varieties for each species;
- From the third year, the selected varieties will be used for multiplication.

The Netherlands

National level

Emmer, eikorn and rivet wheat

Embedding crop diversity and networking for local high quality food systems



Stakeholder meeting at field trial, July 2016

Methods	Tools
Field trials on-farm	Completely randomized block design
Quantitative and qualitative data collection	Measure plants traits, field walks with stakeholders, interviews for additional information
Statistical analysis	Software to analyse data (quantitative analysis)
Integrated approach	Combine agronomic plant traits, with processing opportunities and nutritional quality to select most promising accessions

Achievements and reflections

New varieties for underutilized cereal species, adapted to cultivation and processing are expected, as well as input to improve participatory and multi-actor research.



This project has received funding from the European Union's H2020 Programme under grant agreement no 633571



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LOOKING FOR SOLUTIONS TO LOW YIELDS OF BUCKWHEAT IN CENTRAL FINLAND



Problem description

Issue

Decrease of yields of buckwheat in Pirkanmaa region

Goal

Knowing the biological or social factors behind this problem. Finding out a new way to produce buckwheat sowing seeds.

Research Operationalisation

Studied initiatives: buckwheat produces in two regions, located in South-Finland (Uusimaa) and Central-Finland (Pirkanmaa), at 200 km of distance. They use the same seeds, but during the last 5 years Pirkanmaa crops had low yields.

Observed aspects: social and biological factors behind the decrease of buckwheat yields in Pirkanmaa region.

Research questions: what are the biological or social factors behind this problem? do the origin of sowing seed and the harvest time have any influence?

Research stages: literature survey; field survey: on the crops (yield potential of two sowing seed lots), the soils of both locations, the farmers' attitudes and farming practices (e.g. harvest time); comparison of the results.

Methods	Tools
<ul style="list-style-type: none">• Information of the seriousness of the problem obtained from farmers• Literature survey, literature from Northern Europe• Participatory thinking process, together with farmers, to identify the possible methods to study the problem• Sampling and analysis by Luke (on soils, plants, quality of seeds)• Interviews with farmers to know their attitudes and practices• Discussion of results together with farmers	<ul style="list-style-type: none">• databases, published information• questionnaires, lists of questions• randomised field experiments• field parcel data• nutrient and other analysis in the laboratory

Achievements and reflections

Participatory discussions on the research methods were done with the farmers before the growing season. Twenty farmers were interviewed, and soil and plant samples were taken from their fields located in two main production areas. Randomised field experiments with sowing seeds originated from different locations of Finland were carried out and the analysis of the results are underway. Literature survey on buckwheat production in Finland was started.



This project has received funding from the European Union's H2020 Programme under grant agreement no 633571



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OMKI

EMMER LANDRACES

Description

Issue

Developing new emmer products from suitable old landraces or new varieties adapted to Hungarian organic production conditions. This work is done in association with other European partners of the Diversifood project.

Goal

To describe the emmer varieties and landraces regarding their suitability for organic production in Hungary. Testing of the same varieties are done by different partners in order to share information about their specificities under different management practices. From this description, new cultivars or adapted old landraces are expected to be in production.

Research Operationalisation

On-station trials are set up in order to assess the agronomic parameters of the accessions according to a protocol sent by ORC. Plant measurements are realized, as well as yield and seed quality. The seeds are multiplied and amplified during the investigation process.

Research phases:

Seed acquisition and sharing seeds with partners.

On-station trials to evaluate the varieties (winter and summer emmer) and amplification of seeds to realize on-farm trials then.

Sharing with the other partners of the project in order to improve the method of testing.

Presenting and sharing the results after 2 years of observation.

Hungary

national level

emmer

Embedding crop diversity and
networking for local high quality
food systems

Methods	Tools
Seed mutl iplication On-station tr ials	S mall p lots at different places (partners) R andomized b lock t rials and p lant m easurements.
S tatistical a nalysis	S oftware to analyse the data (SPSS software)

Achievements and reflections

The objective is to select most suitable landraces or cultivars for each test region. Then, they will be tested for new products and try to foster their reintroduction to production and market.



This project has received funding from the European Union's H2020 Programme under grant agreement no 633571



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LOOKING FOR ALTERNATIVES FOR UK ORGANIC FARMERS

Problem description

Issue

On-farm participatory agronomic screening of ancient wheat varieties, intercropping and novel grain crops suited to organic/low input agriculture

Goal

Discovering new crops suited to UK organic agriculture and also exploring new markets. The idea is to increase on-farm crop diversity as well as to provide consumers with greater food diversity.

Research Operationalisation

Studied initiatives: simple agronomic screening trials aimed at finding out best practice in terms of field management with the help of the host farmer

Observed aspects: agronomic performance of wheat and other crops (and related rotations).

Research questions: do ancient wheat species offer a valuable/useful alternative to modern wheat varieties? do chickpeas offer UK farmers an alternative pulse for inclusion in their rotation? can buckwheat be successfully grown and harvested as a grain crop in the UK? does Quinoa offer a new opportunity to UK farmers looking to diversify their rotation?

Research stages: design and planning phase (trial design in consultation with the farmer); empirical phase (data collection); analytic phase (data analysis); dissemination phase (project promotion)



Methods	Tools
<u>Field trials</u> : <ol style="list-style-type: none">measuring plant traits (in various ways) to assess agronomic characteristics in order to establish suitable varietiessampling to assess agronomic characteristics in order to establish suitable varietiesmanagement practice to define crop management <u>Data analysis</u> : <ol style="list-style-type: none">statistical analysis to establish significant varietal performance	<ol style="list-style-type: none">phenology/establishment counts/winter hardiness/weed competitiveness/disease resistance/canopy cover and architecture/crop height/ear density/grain yieldgrain yield/quality/Harvest Indexdrilling/weeding/harvesting/rotational planningAnova/Regression using R

Achievements and reflections

Research so far has not really been participatory. However we are now in the position to involve more and more people. Key accessions will be showcased in national organic field days this year. Our ambition is to trigger participatory processes by the third year of trials.



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ADDING VALUE TO PRODUCTS FROM NEWLY BRED LINES AND PARTICIPATORY

BREEDING

Problem description

Issue

Determine common factors that can be used in the marketing guidelines for products from newly bred lines and participatory breeding.

Goal

To understand more about the potential for adding value to products derived from newly bred lines or participatory breeding – like the ORC Wakelyns population.

Research Operationalisation

The case study is part of ST 5.1.2 of DIVERSIFOOD project and concerns the bread produced from the ORC Wakelyns cross composite wheat population.

It looks at the attitudes, relationships and forms of communication - both within the initiative and externally - that are likely to influence the success of initiatives to market this product.

The case study relies upon each actors' own views and experiences to give an insight into how the relationships within the supply chain function.

It consists of the organisation of data gathering, the collection and analysis of data, the validation of the analysis and the reporting.



Methods	Tools
Literature analysis through review of the literature on the initiative and the context where it operates to give an analysis of the initiative background. Analysis of the network within and around the initiative. Semi-structured interviews to understand the perspectives of different stakeholders within the initiative. Focus group to understand what consumers think about the initiative. Domain analysis to analyse the results of interviews and focus group.	Report template. Rich picture. List of questions. Guidelines for workshop implementation. Semantic relations.

Achievements and reflections

15 semi-structured interviews have been carried out with a wide range of stakeholders, including plant breeders, government officials, farmers and bakers. A focus group and bread tasting with 13 bread consumers was also carried out.

Generally there is a good level of interest, but for many people interviewed, their involvement with the initiative was several years ago – in some cases up to 10 years ago - and they are relying on their memory to answer the questions. Apart from this, the semi-structured interviews have obtained a fascinating insight and have helped us consider how we will develop this initiative in the future.



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COMMUNICATION TOOLS FOR FOOD DIVERSITY

Problem description

Issue

How to communicate product's values to consumers in respect to different contexts and consumer preferences.

Goal

To develop a set of recommended practices for the promotion of food diversity starting from identifying existing labels and their communication tools

Research Operationalisation

2014-2015 Case study conceptualised within the frame of DIVERSIFOOD project.

2016 ProSpecieRara (PSR) identifies and maps existing labels and their communication.

2016 In-depth analysis of the most successful labels.

2017-2018 In collaboration with FiBL, ÖMKI, INRA, ITAB, RAS, FiBL, ÖMKI, UNIPI, RSR some model best practice label concepts shall be proposed. These will be tested by FiBL/ÖMKI concerning consumer preferences. Other STs in WP 5 are working on studying the context where the labels are developed and used.



Methods	Tools
Labels mapping. Case study: analyses of labels and their experiences. Descriptive Statistical analysis to identify stand out labels and determinant for success. Contents analysis to give a portrait of the label and to contextualise reasons for success and failure. Consumer preferences analyses (Market research) for willingness to pay.	Online surveys (semi-structured and qualitative) for overview of the labels' stories. Interview with selected labels' responsible (semi-structured and qualitative) for in depth analysis of the labels. Partner workshop to propose some concept model best practice label concepts. Excel to visualise the quantitative results.

Achievements and reflections

The online survey provided an overview about products, contexts and problems in general. Specific context-related topics are currently collected in case studies. The choice of labels for the in-depth analysis took more than only success into account, as we deemed a range of several countries and different approaches more important to respect.



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RAS

DESCRIBING AND MIXING LOCAL VARIETIES OF WHEAT AND TOMATO THROUGH PARTICIPATORY METHODOLOGIES WITH FARMERS



Problem Description

Issue

RAS is building a participatory plant breeding and variety recovery and assessing system for professional organic family farming systems (and artisanal processors) in Spain (where these kind of experiences are not very developed).

Goal

Evaluation of local varieties in order to improve their use in organic family farming systems (and artisanal processing), to involve farmers in the research processes and to develop appropriate tools and methods to carry out participatory variety research

Research Operationalisation

In the current stage of the research the phases RAS has gone through are:

- Selection of farmers and farms where trials will be developed.
- Choice of tomato and bread and durum wheat varieties to be tested. The priority has been to choose those used by farmers collaborating in the project but RAS has also chosen varieties coming from: public gene banks, farmers participating in the meetings of farmers-researchers and RAS community seed bank.
- Elaboration of a protocol for testing and description and validation of the methods.
- Implementation and monitoring of the trials.
- Data collection.
- Systematization of information and preparation of data sheets and reports.

Methods	Tools
Systematic literature review - desk research Focus group with farmers On farm experiment - Observation and measurement of the characteristics of the varieties.	Validation of protocol Measuring traits - Questionnaires / List of questions (records) Software R or statistical analysis:

Achievements and reflections

to build a participatory plant breeding and variety recovery and assessing system in Spain



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RSP

EINKORN

Description

Issue

Developing new einkorn diversified varieties locally adapted to organic agriculture through a national participatory breeding program (PPB, or collaborative organisation) that enhance autonomy and empowerment of collectives of farmers.

Goal

This program aims at adapting and enlarging the already existing program (wheat) with einkorn by creating methods, tools and training sessions. Specific attention is given to the collaboration of different actors (research team (researchers, technicians, students), facilitators of farmers' organisations, farmers), to settle rules of organisation in this PPB project.

Research Operationalisation

The assumption is that it is possible to create a collective organisation to manage cultivated biodiversity and breed new varieties, with people from different fields (research and farmers' organisation). Hypotheses are that a great diversity (genetic as well as human) is the basis of the success: this diversity will cope with all the situation and the needs.

A specific experimental design in the network of farms has been created with this view, associated with a specific management of statistical analysis through a data base. All this work takes place in a collaborative process that has already allowed to settle internal rules to work together.

The phases repeat every year, coordinated by RSP in relation with INRA. Local coordination is done by the facilitators of farmers' organisations.

- meeting in September for all the participants of the group to have an overview of the past year in the field and in the lab (research results) and agree of the next steps
- sending by post the results of the trials network to all farmers following statistical analysis
- Coordinating seed exchanges between farmers' organisations
- sowing according to experimental design on farm
- Measuring plant traits during the cultivation. Every thing is uploaded in the data base.
- meeting in February to update internal rules
- several meetings on farms at the regional level and a big meeting at the national level
- each farm sends spikes to INRA
- INRA measures the spikes and uploads the results in a data base
- INRA and RSP do the analysis and prepare the September meeting

Methods	Tools
Experimental design with regional farm (2 or more blocks with replicates) and satellite farms (no blocks and one entry replicated twice). The farmers chose the varieties to observe in their farms, apart from the "control"; the number of entries may vary between farms.	Plants measurements , 4 spread sheets to note observation at each season.
Statistical analysis of the results. All the data being in the data base.	Data base (SHiNeMaS)
Co-construction of the project	R software and data base
	Internal Regulations and charter

Achievements and reflections

The program on einkorn adapts tools and methods developed through wheat, to this species. A broad diversity is under evaluation and first selection arises. A key point now is to go deeper in the settlement of the internal rules of the group. All this work is based on trust between parties. Nevertheless, further efforts are needed to provide a legal framework in project where farmers' organisations and research laboratory work together.





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EVALUATION OF INNOVATIVE INTERCROPPING SYSTEMS

Problem description

Issue

Exploring alternative methods of cultivation of wheat and legumes (intercropping) to promote the cultivation of old varieties of wheat, improving their performances and to promote the cultivation of underutilized legumes.

Goal

Evaluating performances and robustness of intercropping systems including underutilized legumes (such as chickpea) and old varieties of durum and soft wheat, assessing in particular if the legume determines an improvement of wheat quality and agronomic performance.

The idea is to extend the proposed intercropping system to other farmers, in different agronomic contexts, using also different wheat varieties (considering the area of cultivation).

Research Operationalisation

Studied initiative: at present only one farmer is involved in the experimentation for the necessity to define the correct protocol of cultivation

Approach: considering the innovation of the kind of trial, it is important the active participation of the farmers, together with researchers, students and experts in innovative intercropping systems

Present goal: to define the correct protocol of cultivation to extend the study to other contexts/wheat varieties

Specific research questions: how to check the quality of the products? how can the farmer check correct applications of agricultural practices? how is it the correct way to analyse data? the protocol used can be applied to other legumes and wheat varieties?



Methods	Tools
<p>As new experimentation, methods and tools are under development. It is crucial to this end the collaboration between farmers, researchers and technicians in order to identify problems and positive aspects of the agronomic trials.</p> <ul style="list-style-type: none">• On farm experimentation• Field visits/meetings to exchange information and observation in order to set up and to check the field trial• Sampling and collecting of agronomic performances data• Analysis of agronomic performances data and of quality analyses results• Discussion groups/meetings to evaluate the trial results	<ul style="list-style-type: none">• Protocols for cultivation and quality analyses• Database for data management and software for data analysis.• Guidelines to preparing, implementing and finalising the field visits, discussion groups and meetings

Achievements and reflections

The interaction among farmers, researchers and technicians is crucial to identify the critical points of the experimentation, in order to obtain a simple and practicable agronomical protocol. E.g. sowing time of the two species involved proved to be a very important phase in the intercropping system in order that the harvest can take place simultaneously, it does not get damaged and the protocol is as simple as possible to apply for the farmer.



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VALORISATION STRATEGIES FOR BREAD PRODUCED FROM OLD WHEAT VARIETIES

Problem description

Issue

Identify the main processes and practices in the valorisation strategies for products derived from diversified genetic resource.

Goal

To explore in depth the processes underlying strategies of enhancement and market valorisation of bread produced from old wheat varieties.

Research Operationalisation

Studied initiatives: 3 bread chains - in Italy, France and United Kingdom respectively –, as examples of initiatives of marketing and valorisation of products from old wheat varieties.

Observed aspects: technic-technological, organisational, institutional-juridical, economic, social and cultural.

Studied stages: perception and mobilization of local genetic resources, definition of the specific quality, marketing and communication, enhancement of the network, effectiveness and sustainability assessment.

Analysis: to disclose the dynamics (learning processes) that underlie the creation of understanding around the values of biodiverse products, and how these values inform the practices through which products are produced and promoted.



Methods	Tools
<ul style="list-style-type: none">• Document analysis, to understand the background of the initiative.• Analysis of the network within and around the initiative.• Semi-structured interviews to understand the personal understanding of the initiative by the involved actors.• Domain analysis, based on semantic relationships, to analyse the data resulting from the interviews• Workshop to validate the results from the interviews.	<ul style="list-style-type: none">• Database for data management and software for data analysis.• Rich picture to visualise the network and the connections among the involved actors.• Questionnaires based on lists of open questions• Semantic relationships and related summaries• Guidelines to preparing, implementing and finalising the workshop

Achievements and reflections

The interviews made it possible to bring out the attitudes of the involved actors and the relationships existing among them, as well as the role played by the various aspects. All these elements provided insights on the process of development of the initiatives of enhancement and market valorization of the specific product analysed.

b. Actors' roles and links, and research operationalisation

Arche Noah

Farmers' tomatoes

Species concerned: tomato

DIVERSIFOOD partners involved: Arche Noah

Level of implementation (Country(ies), national, regional, else): Austria, national network

Issue and goals

Issue: To build a collective work between farmers and other stakeholders to develop tomato varieties that combine outstanding fruit quality with good adaptation to organic production systems and further satisfy our claims on seed sovereignty and farmers rights.

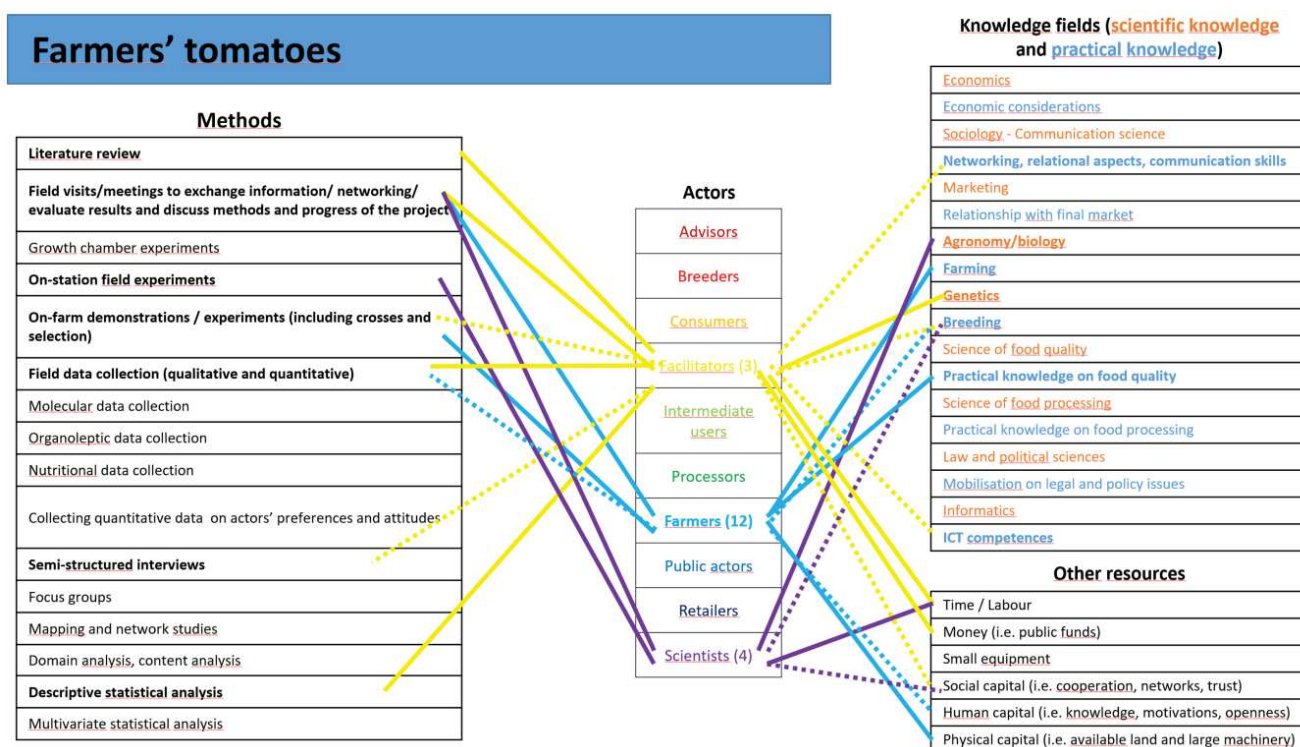
Goal: To develop tomato varieties that show significantly higher levels of partial leaf mould resistance through participatory on-farm trials (in a network of small-scale farms).

Process of the research operationalisation (different steps, if it is linear or circular or a combination...)

Through a scheme if possible.

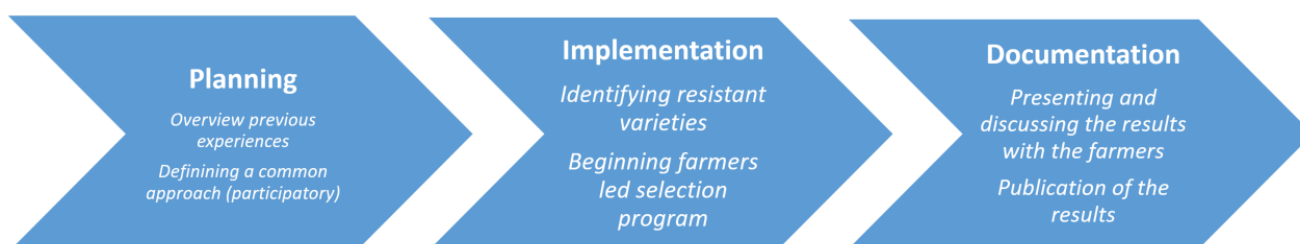
Evaluation of the project

Point out the strengths, achievements, things to improve, failures... at the different phases of the research (question definition, data collection, results...).



Process of the research operationalisation (different steps, if it is linear or circular or a combination...).

Through a scheme if possible



Evaluation of the project

Point out the strengths, achievements, things to improve, failures... at the different phases of the research (question definition, data collection, results...).

Question definition:

The issue and the goal were primary defined by farmers. In the next step, scientists and facilitators concretized the research questions and the trials were planned together with the farmers. From our point of view the collaborative approach at the beginning of the research process is definitively a strength of the “Farmers’ tomatoes” working group.

Data collection:

The on-farm trials showed that field data collection is very time-consuming and needs a lot of attention. In many cases, farmers cannot accomplish this alone, because breeding is never the main objective on a farm and there are thousands of other things to do all the time. For this reasons it is very important to find a good way of distributing data collection work between farmers and external persons (researchers, students, facilitators...).

Additionally, there is no monetary support from DIVERSIFOOD for breeding and research working hours at the farms. Therefore, these activities have to be done by external persons, whose working time is funded by the project or other public funds. This hinder a real collaborative process! It takes more than motivation to make a new variety! Therefore, we tried to organize a kind of crowdfunding to get additional money from private persons directly to the farmers to support their on-farm work.

The data collection needs more time as planned (or as the project period has allowed)! There are many risks that harm results from on-farm trials. Especially if working on a disease issue, it can easily happen that you have to repeat a trial in the next season due to a lack of clear results.

Name of the project: Creation of faba bean populations for bi-cropping systems

Species concerned: Faba bean

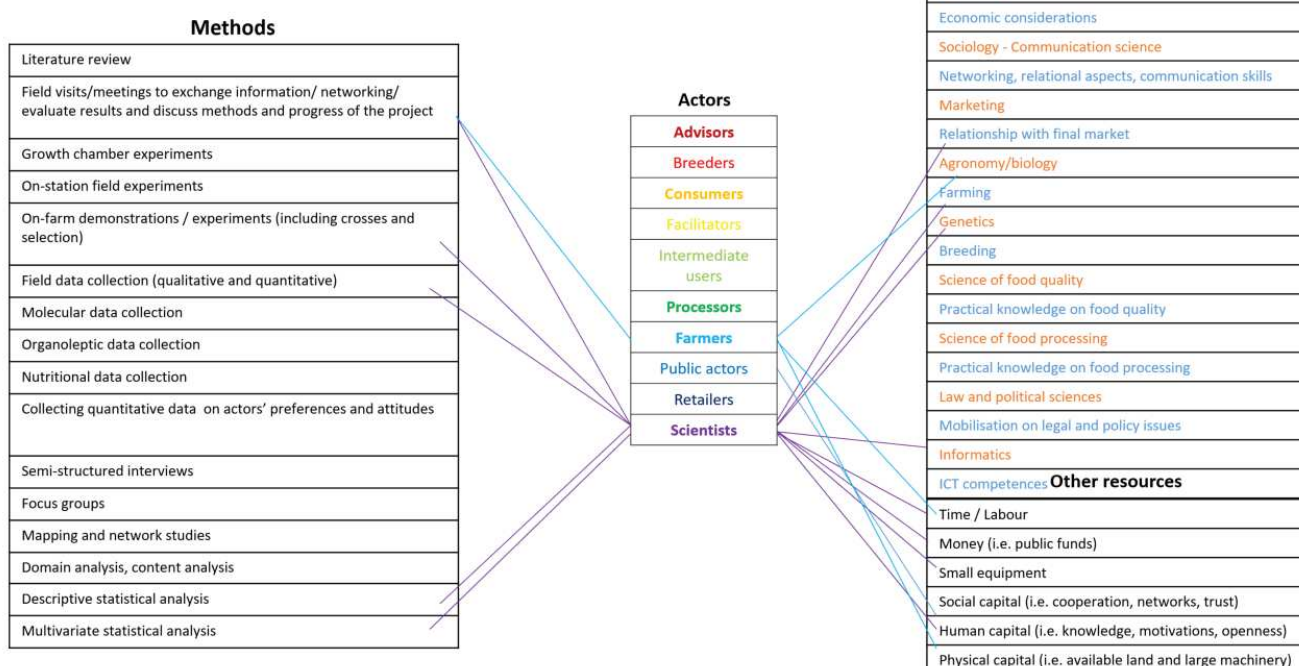
DIVERSIFOOD partners involved: CSIC

Level of implementation (Country(ies), national, regional, else): Spain

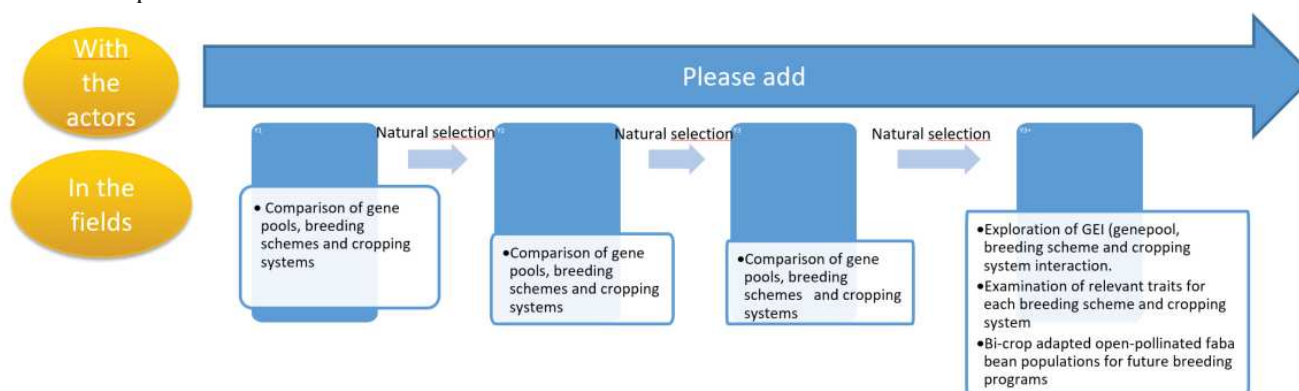
Issue and goals

Legumes may facilitate the diversification on the agroecosystem both directly, e.g. via growing legumes in association with cereals, and indirectly by enhancing associated diversity of wild fauna, such as bee-pollinators. Local bees could be managed by the farmers with the aim of creating new diversity and intra crop variation. To gain understanding on the nested architecture of the crop-bee pollinator-farmer-breeder network. The analysis of this network could help to increase crop resilience and yield potential, on the one side, and to mitigate pollinator decline, on the other side.

Creation of faba bean populations for bi-cropping systems



Process of the research operationalisation (different steps, if it is linear or circular or a combination...). Through a scheme if possible.



Evaluation of the project

Point out the strengths, achievements, things to improve, failures... at the different phases of the research (question definition, data collection, results...).

Bi-crop adapted open-pollinated faba bean populations available for future breeding programs. Efficient breeding methodologies for generating variability and for insect-aided cross-pollination



Farmer input took the form of an active participation in the implementation of the research process itself, such as setting, action plans and trial management. Farmer-managed trials served as an entry point for informal and detailed discussions and observations. Farmer involvement resulted in information transfer concerning the DIVERSIFOOD concepts regarding breeding strategies and role of bee-pollinators and cropping systems. The collaborator-farmer has high credibility among their peers and can easily communicate with other farmers, consumers and NGOs. Thus, scientific knowledge and concepts arising from the field trials have been transmitted orally and through common agricultural and cultural actions (field educational activities, building proposals at local level to connect people to the agrobiodiversity benefits, informal training sessions....).

Name of the project

Species concerned: **Einkorn and Emmer**

DIVERSIFOOD partners involved: OMKI

Level of implementation (Country(ies), national, regional, else): Hungary, in link with other DIVERSIFOOD partners.

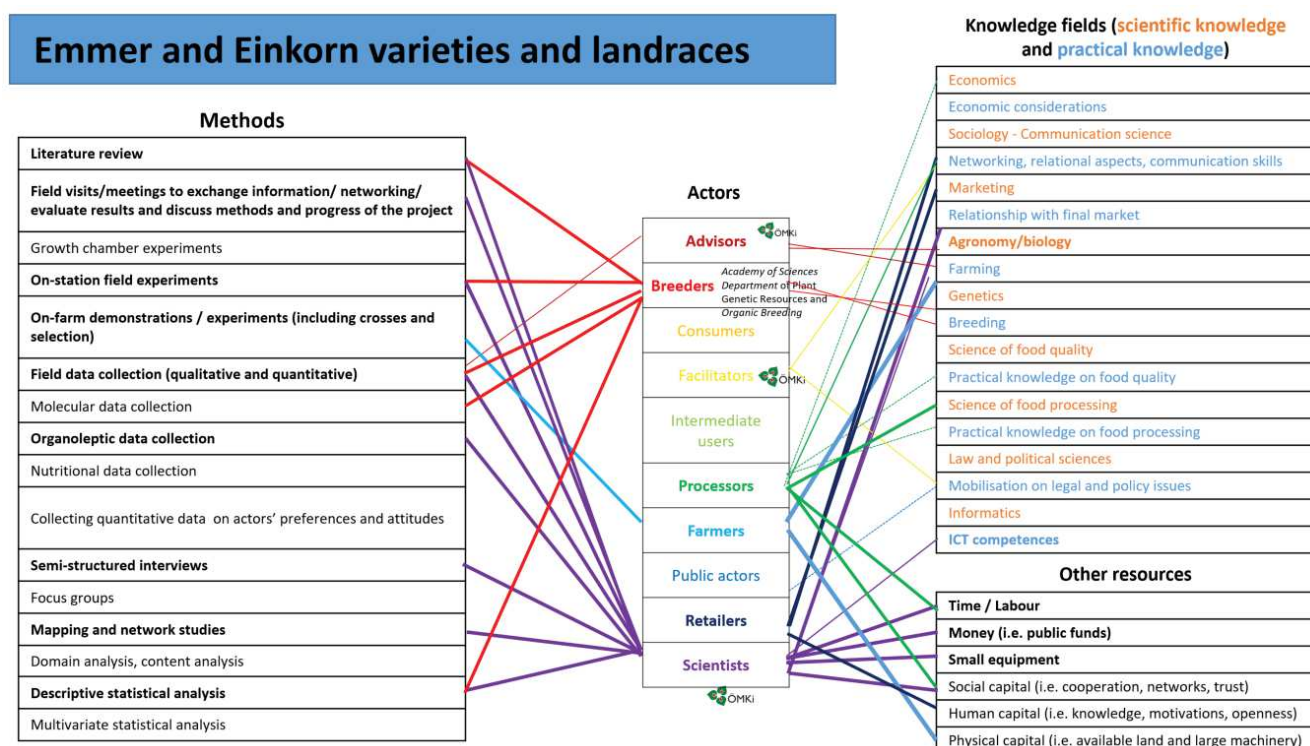
Issue and goals

Developing new emmer products from suitable old landraces or new varieties adapted to Hungarian organic production conditions. This work is done in association with other European partners of DIVERSIFOOD project.

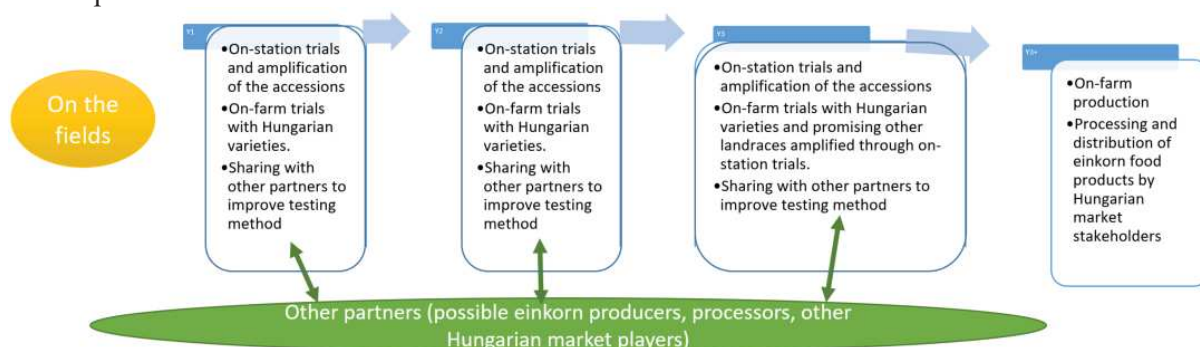
Goal

To describe the emmer varieties and landraces regarding their suitability for organic production in Hungary. Testing of the same varieties are done by different partners in order to share information about their specificities under different management practices. From this description, new cultivars or adapted old landraces are expected to be in production.

This graphic represents the overlaps/relations between the different scopes of einkorn related activities in Hungary.



Process of the research operationalisation (different steps, if it is linear or circular or a combination...). Through a scheme if possible.



Evaluation of the project

Point out the strengths, achievements, things to improve, failures... at the different phases of the research (question definition, data collection, results...).

The project we are describing can be called the ***Einkorn and Emmer Marketing Project in Hungary***.

It is not existing as a project well identified in Hungary, we can name all the stakeholders and their activities in relation to einkorn/emmer production and distribution in the country as the Einkorn Marketing Project. Diversifood and the role of ÖMKi is one part of the activities running related with einkorn.

The major market players have been started to deal with einkorn/emmer independently from ÖMKi and the Diversifood project within the last 15 years. First actor was the Organic Breeding Department started to crossbreed einkorn landraces in the early 2000's. Nowadays several market players are involved in einkorn/emmer. Currently there are three groups of stakeholders within the einkorn value chain in Hungary. Within the groups, there is partial overlap and interrelatedness. (1. Naturgold Farms Ltd., 2. Körös-Maros Biofarm Ltd., 3. Bözödi Einkorn Association)

From the entire einkorn value chain perspective the major weak point is that the einkorn/emmer market segment is fragmented in Hungary. The main market player (wholesaler - distributor) does not have interest to enhance farmers and their self-organization. Individual farmers mostly do not have access to information on production and marketing opportunities only in a case they contract-sell their product to the wholesaler who also owns the rights of the most popular einkorn variety. On the other hand einkorn/emmer endproducts are very expensive and unknown for most Hungarian consumers. Major efforts needed to significantly increase market interest.

From the perspective of ÖMKi hulled grain research program (in which Diversifood taking part) considered to be successful since through online communication, written reports and dissemination events many interested entities (farmers, advisors, market players) have learn about einkorn and the opportunities behind it. On-station and farm variety/variety landrace trials have been running since 2012 coordinated by ÖMKi with insightful results.

Name of the project: Valorisation strategies for bread produced from old wheat varieties

Species concerned: Bread wheat

DIVERSIFOOD partners involved: UNIFI

Level of implementation: regional

Issue and goals

Identify the main processes and practices in the valorisation strategies for products derived from diversified genetic resource.

To explore in depth the processes underlying strategies of enhancement and market valorisation of bread produced from old wheat varieties.

Process of the research operationalisation (different steps, if it is linear or circular or a combination...).
Through a scheme if possible

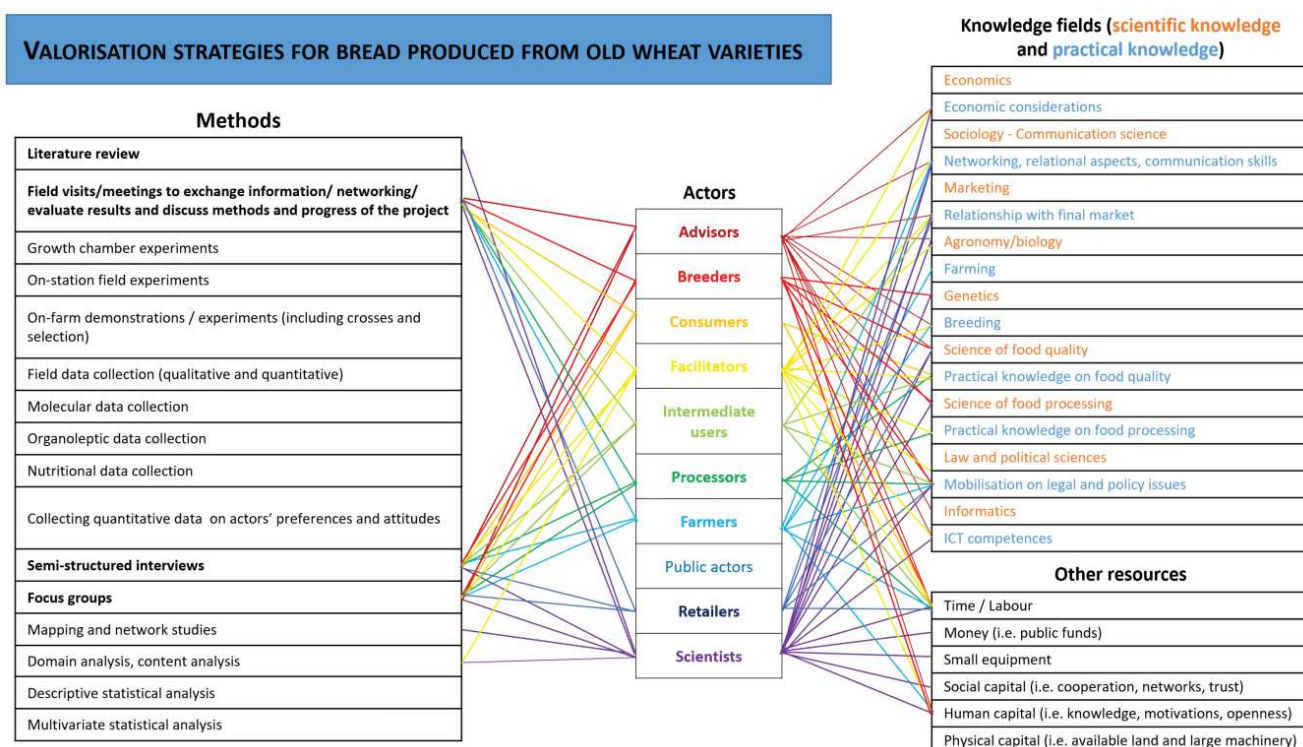
Involvement of all the actors that take part in the initiatives analysed.

Observed aspects: technic-technological, organisational, institutional-juridical, economic, social and cultural.

Studied stages: perception and mobilization of local genetic resources, definition of the specific quality, marketing and communication, enhancement of the network, effectiveness and sustainability assessment.

Evaluation of the project

The interviews made it possible to bring out the attitudes of the involved actors and the relationships existing among them, as well as the role played by the various aspects. All these elements provided insights on the process of development of the initiatives of enhancement and market valorisation of the specific product analysed.



Name of the project: Intercropping trial in Italy

Species concerned: Wheat and legumes

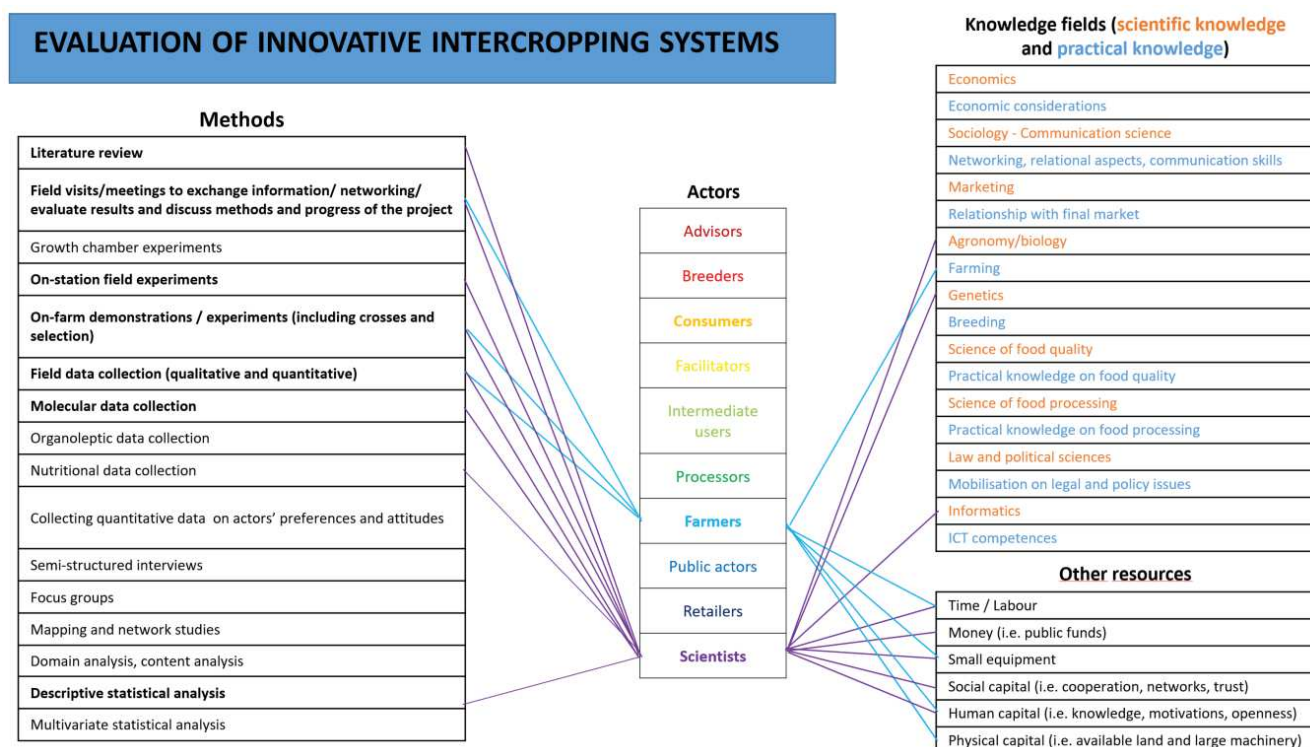
DIVERSIFOOD partners involved: UNIBO

Level of implementation: currently a single farm => to be extended to other farms at regional level

Issue and goals

Exploring benefits of alternative methods of cultivation of wheat and legumes (intercropping) to promote the cultivation of old varieties of wheat, improving their performances and to promote the cultivation of underutilized legumes. Currently: to define the correct protocol of cultivation to extend the study to other contexts/wheat varieties.

Process of the research operationalisation (different steps, if it is linear or circular or a combination...). Through a scheme if possible



Participatory Plant Breeding of einkorn

Species concerned: einkorn

DIVERSIFOOD partners involved: RSP and INRA

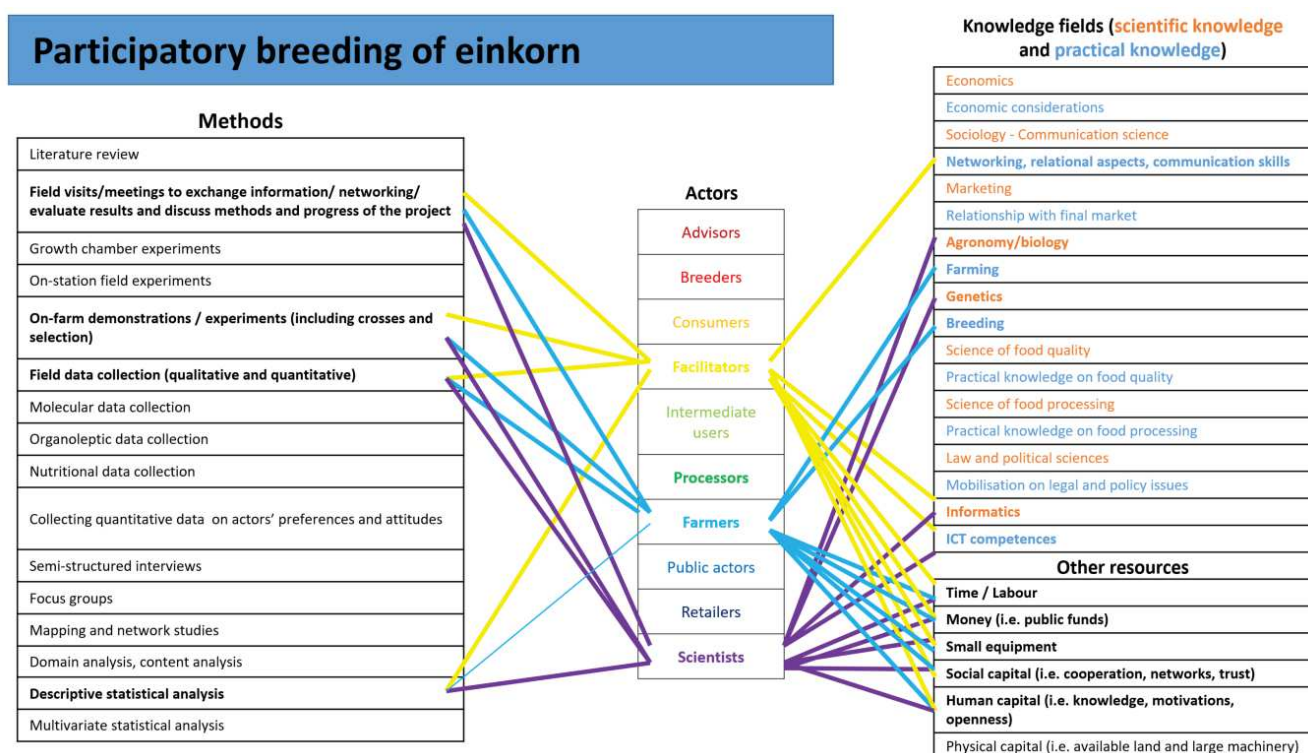
Level of implementation (Country(ies), national, regional, else): France, national level (different regional groups connected in a national initiative)

Issue

Developing new einkorn diversified varieties locally adapted to organic agriculture through a national participatory breeding program (PPB, or collaborative organisation) that enhance autonomy and empowerment of collectives of farmers.

Goal

This program aims at adapting and enlarging the already existing program (wheat) with einkorn by creating methods, tools and training sessions. Specific attention is given to the collaboration of different actors (research team (researchers, technicians, students), facilitators of farmers' organisations, farmers), to settle rules of organisation in this PPB project.



Process of the research operationalisation (different steps, if it is linear or circular or a combination...).

The assumption is that it is possible to create a collective organisation to manage cultivated biodiversity and breed new varieties, with people from different fields (research and farmers' organisations). This collective organisation has developed specific tools adapted to its needs. A specific experimental design in the network of farms has been created (with specific plants measurement sheets), associated with a specific management of statistical analysis (R package) through a dedicated data base (called SHiNeMaS). All this work takes place in a collaborative process that has already allow to settle internal rules to work together.

The phases repeat each year, coordinated by RSP in relation with INRA. Local coordination is done by the facilitators of farmers' organisations.



Evaluation of the project

The program on einkorn adapts tools and methods developed through wheat (about 10 years of experience). A broad diversity is under evaluation and first selection arises. A key point now is to go deeper in the settlement of the internal rules of the group. All this work is based on trust between parties. Nevertheless, further efforts are needed to provide a legal framework in project where farmers' organisations and research laboratory work together.

The collective meetings of September seem not to be adapted anymore to the functioning of the group (no farmers come anymore). There is a challenge in finding new ways of organisation for the collective aspects of this project. Future of the project: this project on einkorn is young and the objective is to enlarge it to consumers and processors in the future (and so new tests will be developed on processing aspects).

A crucial point is the articulation between local groups and national dynamic. There are facilitators at the regional level and also at the national level, this specificity is part of the reflection about articulation between the different levels. The national dynamics leans on the local groups but need their commitment, and this is not always easy. 2017 was a year during which a need of changing the organization was pointed out.

Wheat and Tomato participatory breeding in Spain

Species concerned: wheat and tomato

DIVERSIFOOD partners involved: RAS

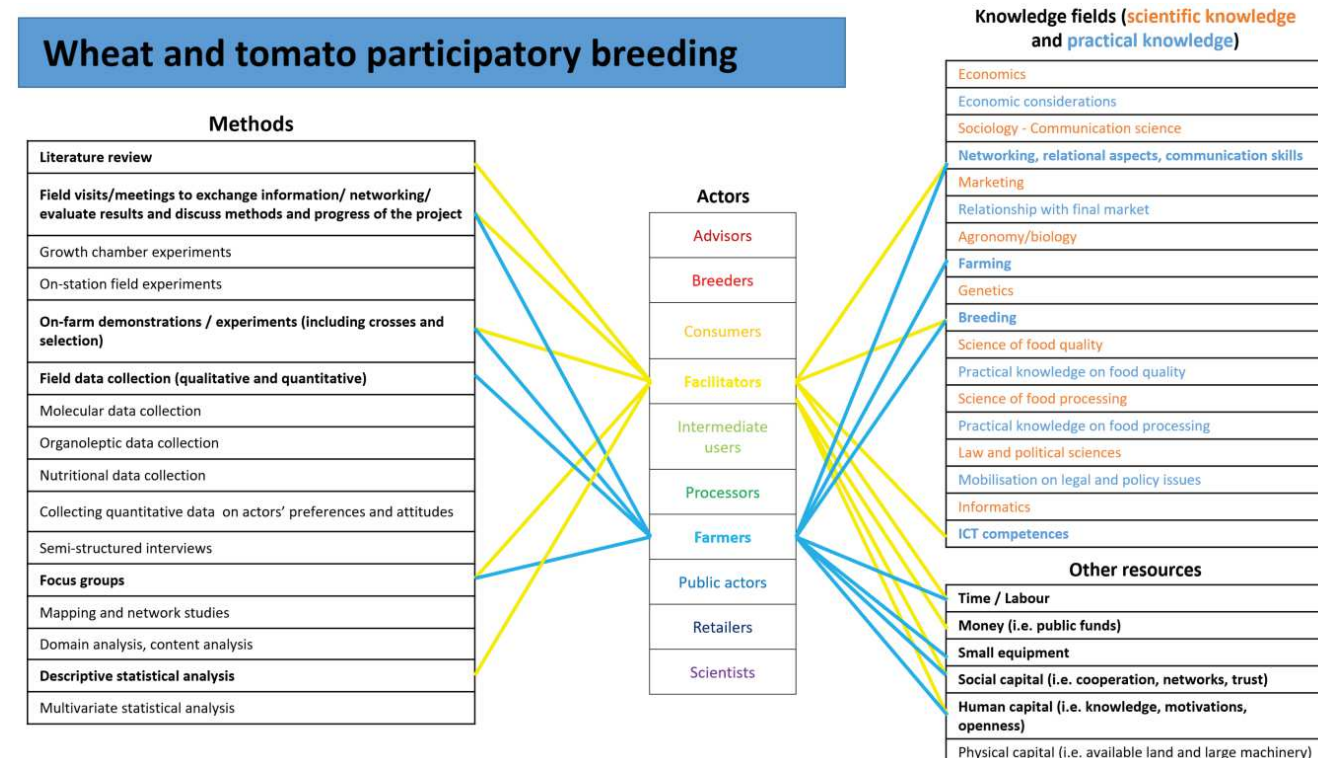
Level of implementation (Country(ies), national, regional, else): Spain, national

Issue

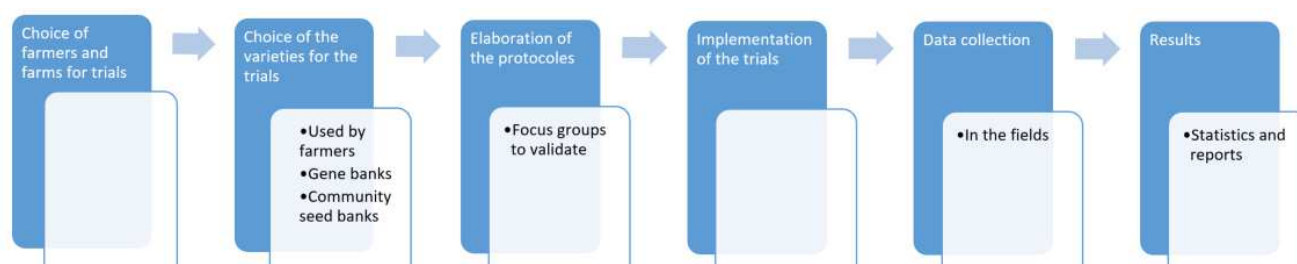
RAS is building a participatory plant breeding and variety recovery and assessing organisation for professional organic family farming systems (and artisanal processors) in Spain (where these kind of experiences are not very developed).

Goal

Evaluation of local varieties in order to improve their use in organic family farming systems (and artisanal processing), to involve farmers in the research processes and to develop appropriate tools and methods to carry out participatory variety research.



Process of the research operationalisation (different steps, if it is linear or circular or a combination...)



PSR

Communication tool for food diversity

PSR leading, all partners contributing

Country(ies): Switzerland leading, all DIVERSIFOOD countries contributing

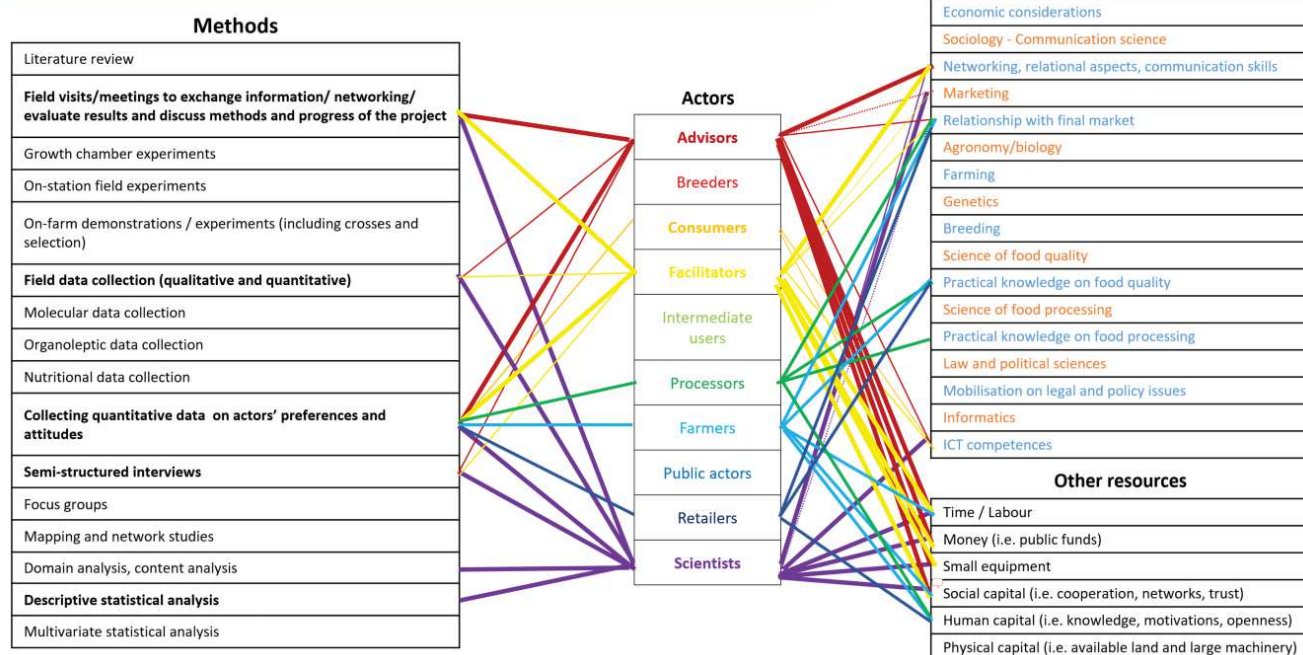
Issue

How to communicate product's values to consumers in respect to different contexts and consumer preferences.

Goal

To develop a set of recommended practices for the promotion of food diversity starting from identifying existing labels and their communication tools

Communication tools for food diversity



Process of the research operationalisation (different steps, if it is linear or circular or a combination...) (scheme beside).

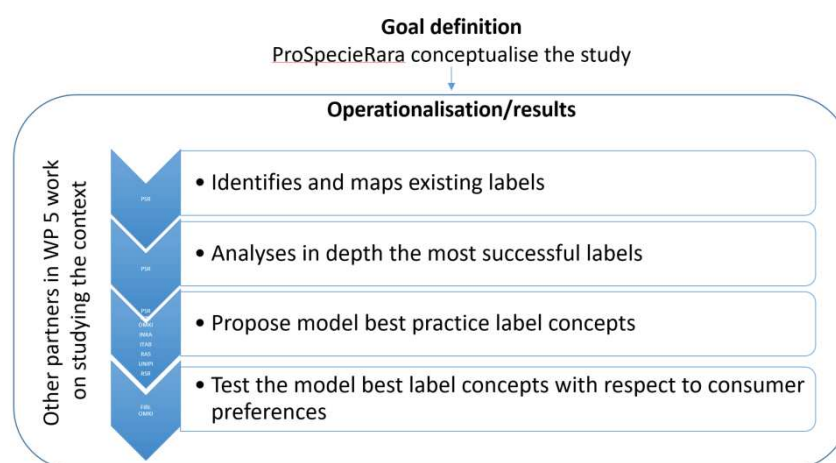
Evaluation

The scope of the project has been set up bottom – up and resulted to be unappropriated for the context where the project was conducted. Especially the labels initially mapped did not cover all possible communication tools used for diverse food. Cultural differences between countries determine all this diversity and it was not taken into consideration.

Successive integration of the initial map contributed to enrich it. However, they arrived later compared to what initially planned.

The tools used to survey resulted inadequate: to be used by the interviewees, to provide the right kind of data for a both quantitative and qualitative research.

Integration of the methodology (e.g. extra interviews) have been performed to gather extra information and deliver the planned results.



ORC - WP5

Adding value to products from newly bred lines and participatory breeding

UNIPI, methodology definition, ORC, research implementation
(Country(ies), United Kingdom)

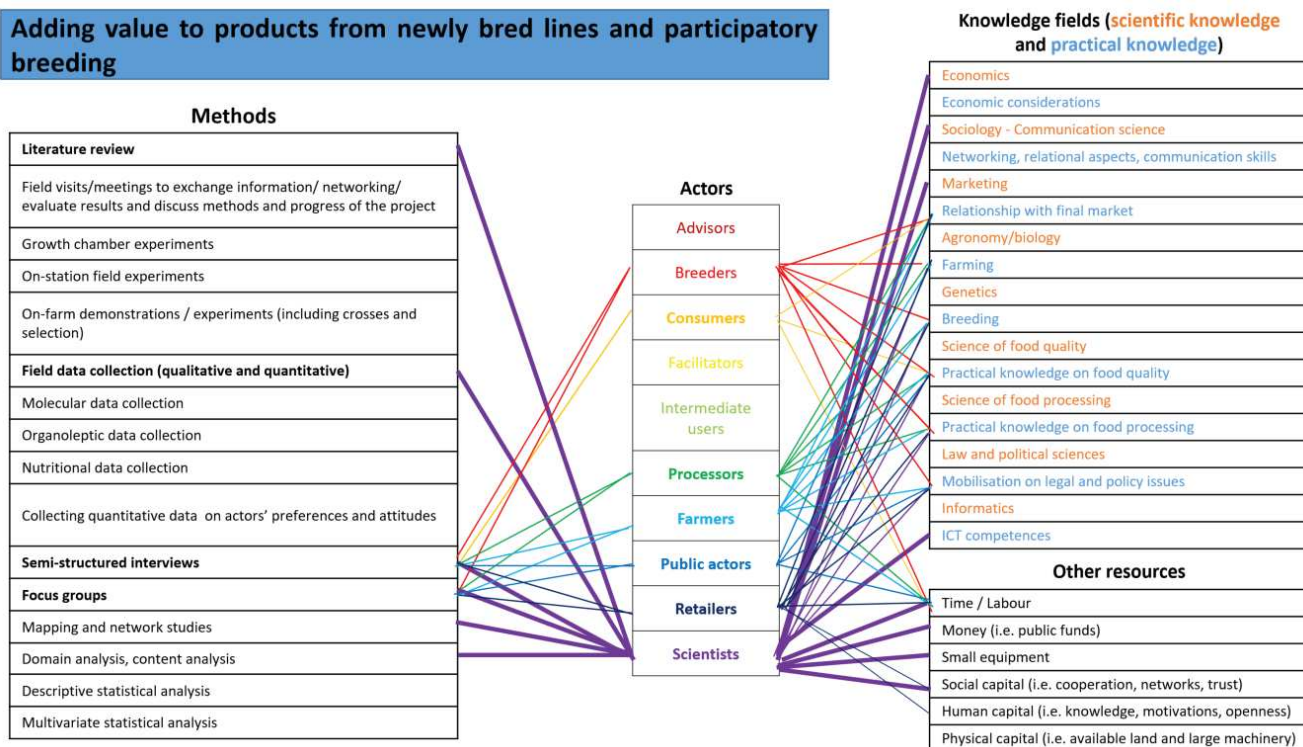
Issue

Determine common factors that can be used in the marketing guidelines for products from newly bred lines and participatory breeding.

Goals

To understand more about the potential for adding value to products derived from newly bred lines or participatory breeding – like the ORC Wakelyns population.

Adding value to products from newly bred lines and participatory breeding



Process of the research operationalisation (different steps, if it is linear or circular or a combination...)

Evaluation of the project

Point out the strengths, achievements, things to improve, failures... at the different phases of the research (question definition, data collection, results...)

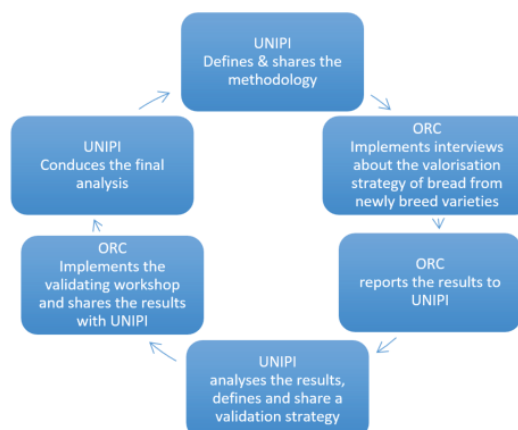
The definition of a standard set of questions, independently from the specific initiative being studied, made them being not completely suitable for the stage of the initiative. Adjustments have been possible though.

The same holds for the pre-definition of actors to be involved in interviews and focus group that were not always available or relevant at the initiative being studied. Adjustments have been possible also in this case.

Results comparable with those derived from other studied initiatives emerged.

Goal setting
UNIPI conceptualise the research

Operationalisation/Results



LBI

Underutilized species

Species concerned: Emmer, einkorn and rivet wheat

DIVERSIFOOD partners involved: LBI

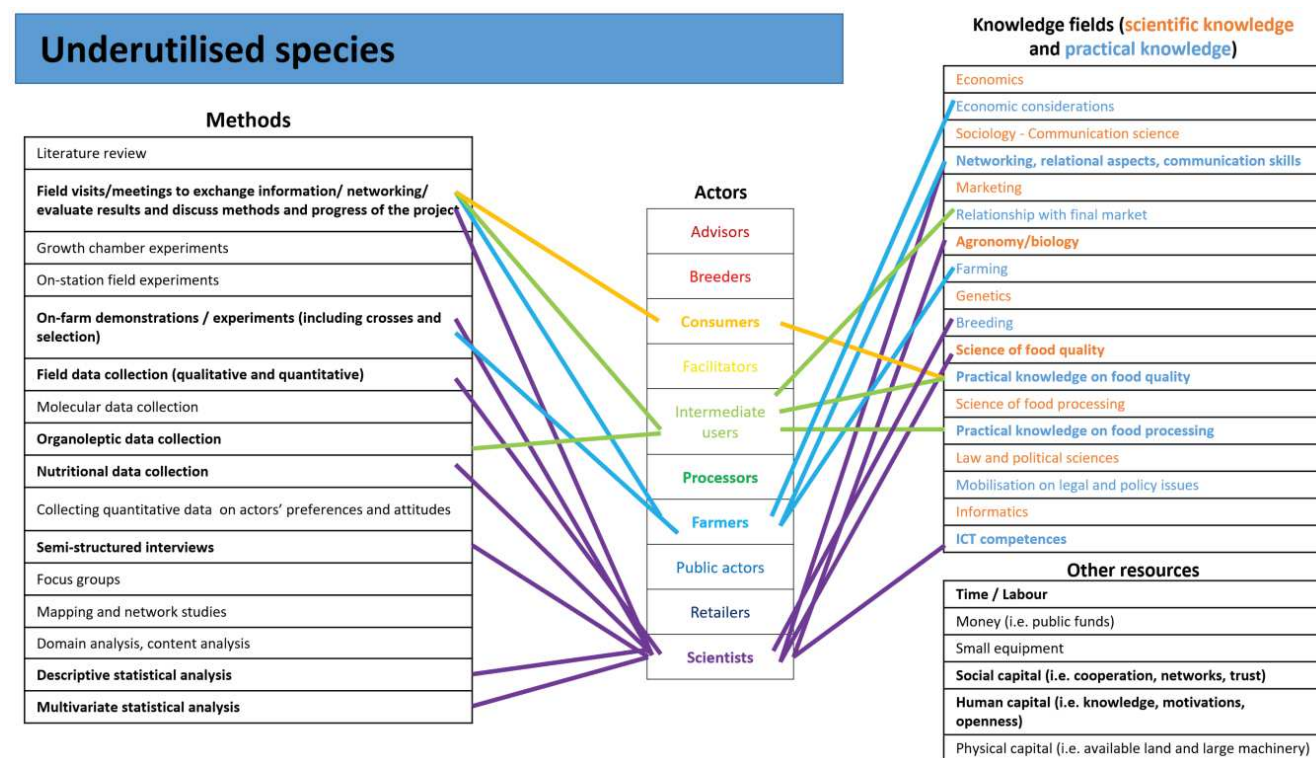
Level of implementation (Country(ies), national, regional, else): The Netherlands, national level

Issue and goals

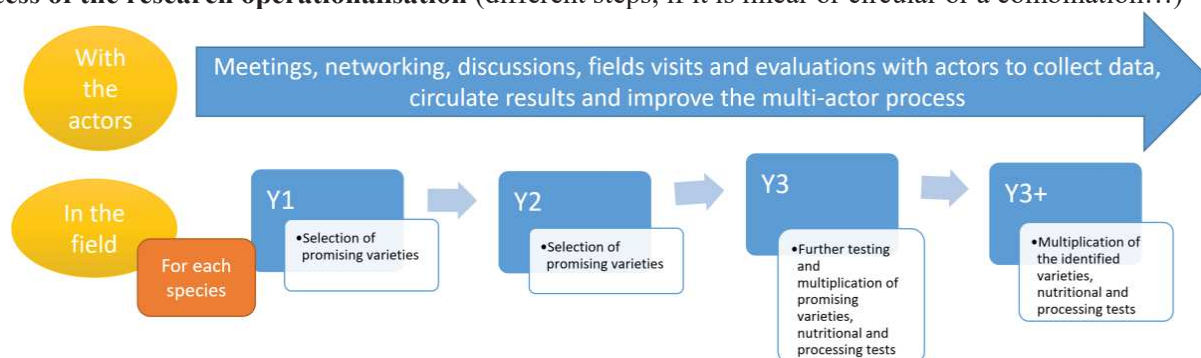
Using and improving a participatory and multi-actor approach for testing and developing adapted varieties of underutilized cereal species from field to bread (involving farmers, bakers and consumers).

Goal

To involve all chain actors to select good varieties of einkorn, emmer and rivet suitable for use in the Netherlands (not only cultivation, but also processing and baking), in order to broaden the diversity in cereals cultivated.



Process of the research operationalisation (different steps, if it is linear or circular or a combination...)



Evaluation of the project

New varieties for underutilized cereal species, adapted to cultivation and processing are expected, as well as input to improve participatory and multi-actor research.

It is easy to get people involved but would like to involve more farmers and bakers for the next steps.

Next question is whether promising varieties have enough yield and good baking quality to make cultivation and baking profitable enough for farmers and bakers?

ORC WP2

Name of the project: Looking for alternatives for UK Organic farmers

Species concerned: wheat and other crops for rotation

DIVERSIFOOD partners involved: ORC

Level of implementation: regional

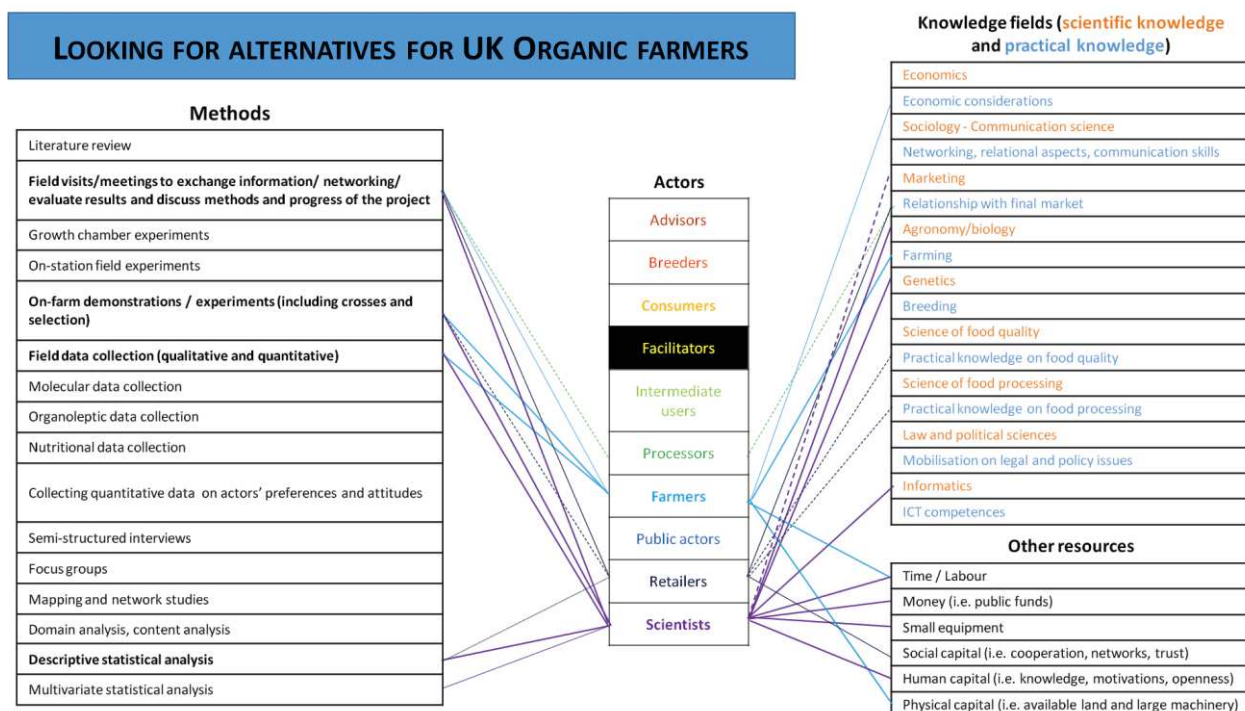
Issue and goals

On-farm participatory agronomic screening of ancient wheat varieties, intercropping and novel grain crops suited to organic/low input agriculture. Discovering new crops suited to UK organic agriculture and also exploring new markets. The idea is to increase on-farm crop diversity as well as to provide consumers with greater food diversity.

Process of the research operationalisation

Design and planning phase (trial design in consultation with the farmer); empirical phase (data collection); analytic phase (data analysis); dissemination phase (project promotion).

Process rather linear (abstract tools and methods).



Evaluation of the project

Research so far has not really been participatory (tools used too abstract for farmers; project at the beginning). Possibility to involve more and more people in the future. Key accessions will be showcased in national organic field days this year. Ambition to trigger participatory processes by the third year of trials.

In situ development of drought and fungi resistant maize populations

Maize / ITQB

Country(ies): Portugal

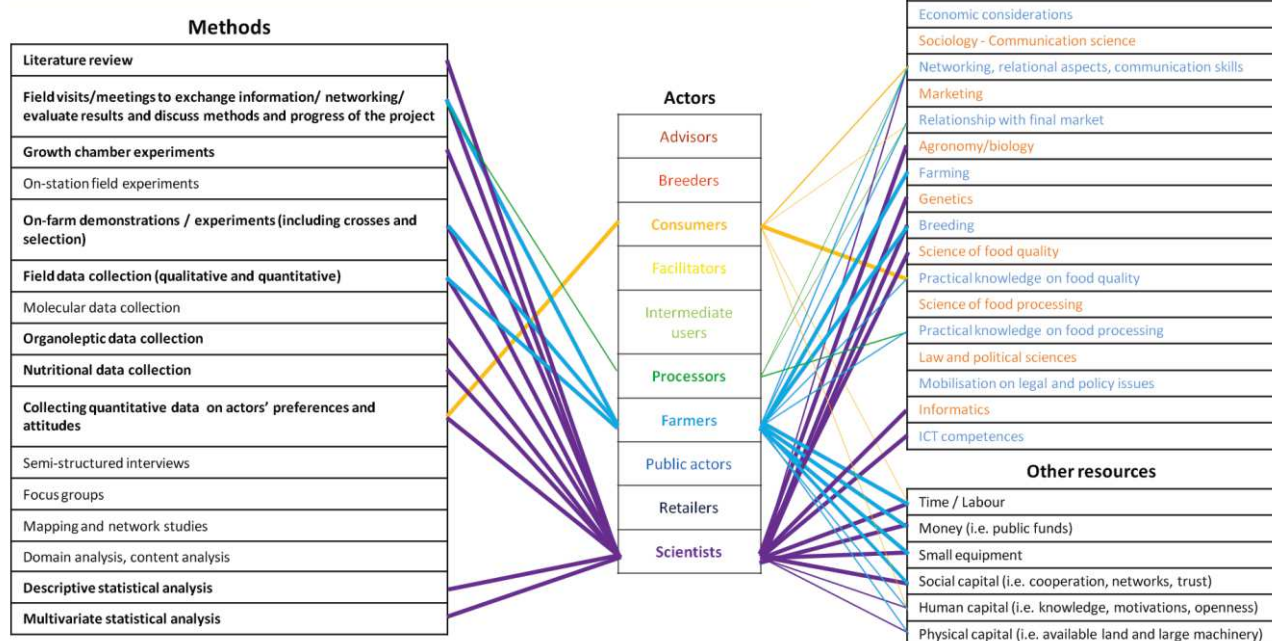
Issue

In situ participatory development of new diverse maize populations suitable for bread production and more resistant to drought and fungal diseases.

Goals

To develop/optimize rapid screening tools for stress resistance selection on participatory maize populations field trials as well as integrative statistical analysis to select the most molecular diverse and phenotypically interesting maize parental lines for new populations.

In situ development of drought and fungi resistant maize population



Evaluation of the project

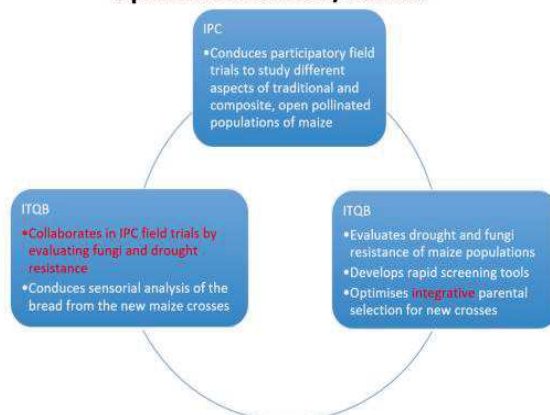
We are now ready (rapid screening tools available) to evaluate maize populations stress (fungi and drought) resistance under controlled and field conditions and expect to do so from January 2018 (controlled conditions) and during Spring/Summer 2018 (field conditions). Integrative data analysis (molecular + quality) is also complete and allowed the identification of the most outstanding parental populations in terms of diversity and quality. Nevertheless, both outcomes took longer than expected at the beginning of the project due to the need of extra validation steps. 2018 IPC field trials will be crucial to apply this new knowledge collectively.

We are also ready to start the sensorial analysis of the maize bread developed from the new populations tested already under field conditions. As soon as the grain will be made available from the 2017 IPC field trials, this consumer's evaluation will be complemented also with nutritional and organoleptic characterization for comparison with previous characterization of traditional populations.

Goal definition

ITQB conceptualises the research as part of DIVERSIFOOD

Operationalisation/results



Name of the project: Maize from PPB in Portugal

Species concerned: Maize

DIVERSIFOOD partners involved: IPC

Level of implementation: regional

Issue and goals

Enhancement and market valorisation of Portuguese maize landraces through multi-actors, participatory and integrated approaches.

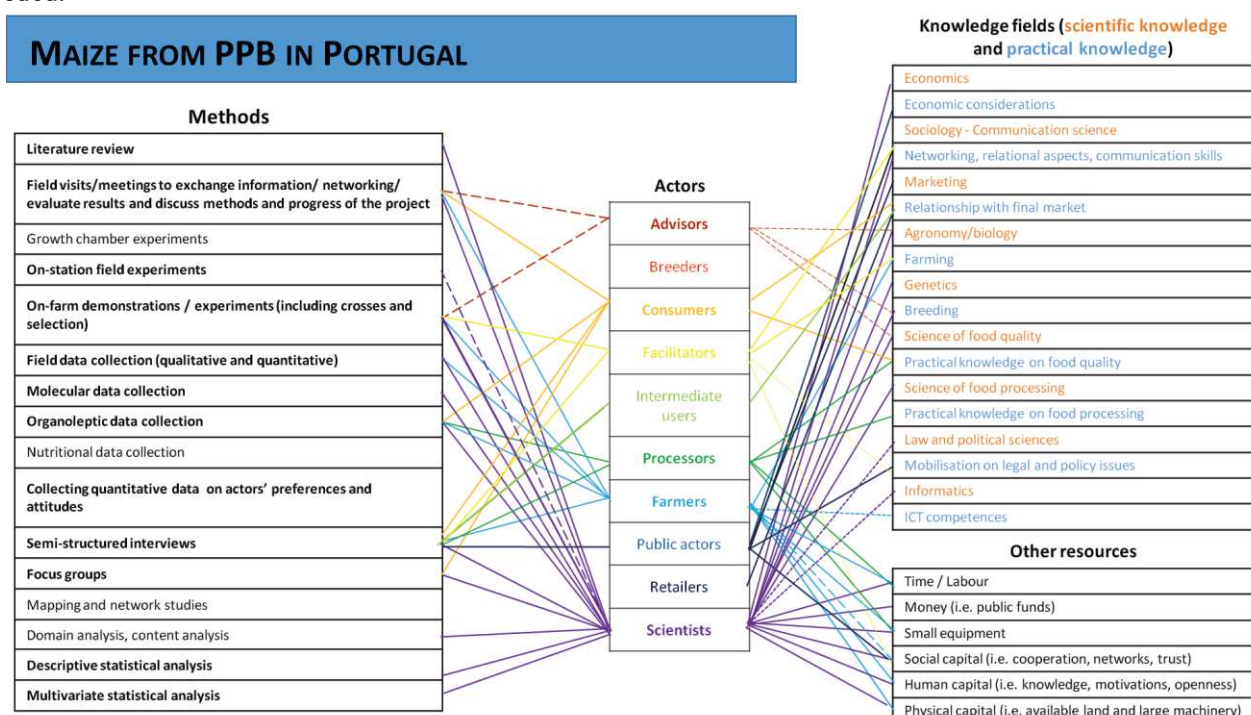
Process of the research operationalisation

Interaction between farmers and researchers has grown over the development of research

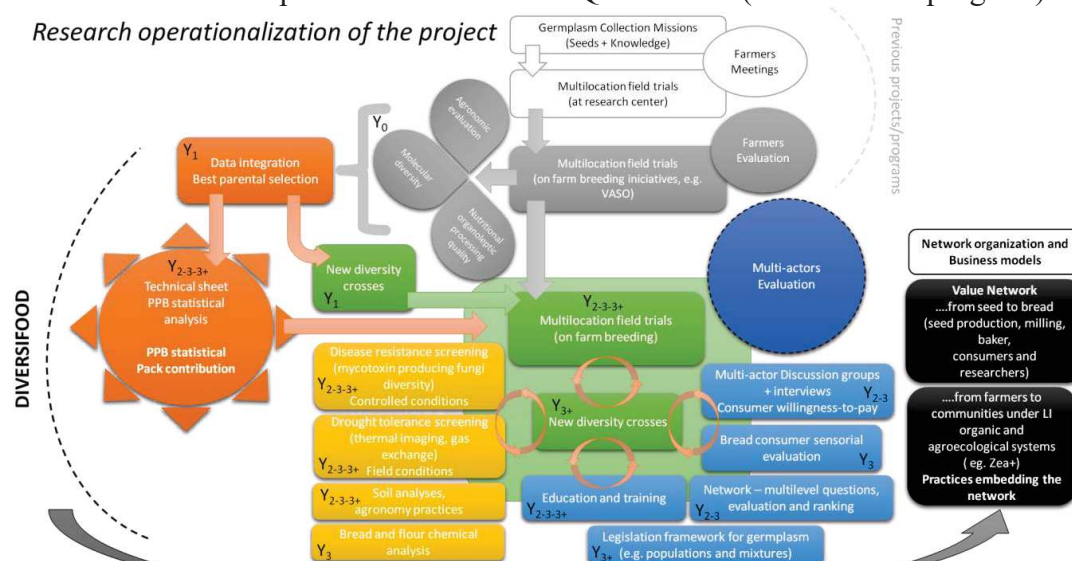
Evaluation of the project

Outcomes are really concrete, tangible for the farmers (a protocol for collaboration between IPC and [ADER-Sousa](#) (representing 30 associates of Sousa Valley); an agenda would be needed.

Based on the present and future results, guidelines to improve multi-actor approach of the value chain will be needed.



Common scheme of research operationalisation for ITQB and IPC (collaborative program)



Name of the project: diverse tomato varieties from fields to fork

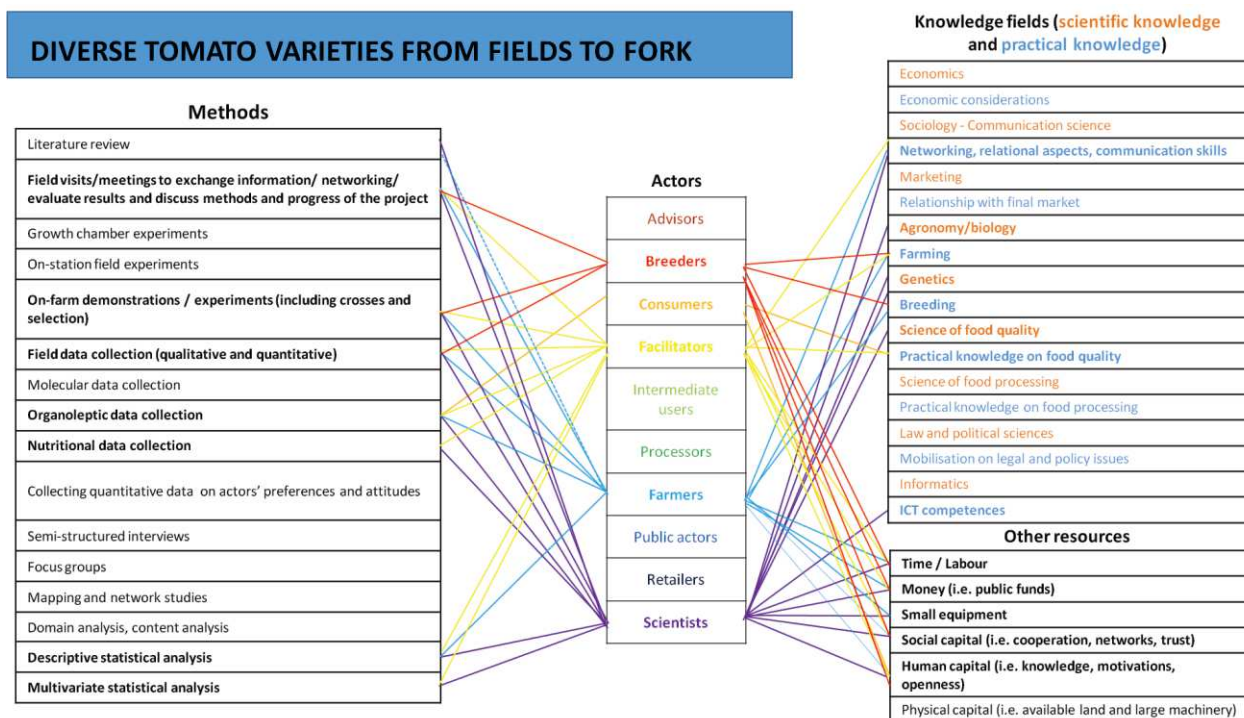
Species concerned: Tomato

DIVERSIFOOD partners involved: ITAB and RSP

Level of implementation: national project

Issue and goals

Studying diverse tomato varieties from soil to fork to identify varieties adapted to local organic and small scale farming and valid from an organoleptic point of view. Creating new varieties by farmers. Developing a specific organisation of seed management and collective experimentation.



Process of the research operationalisation

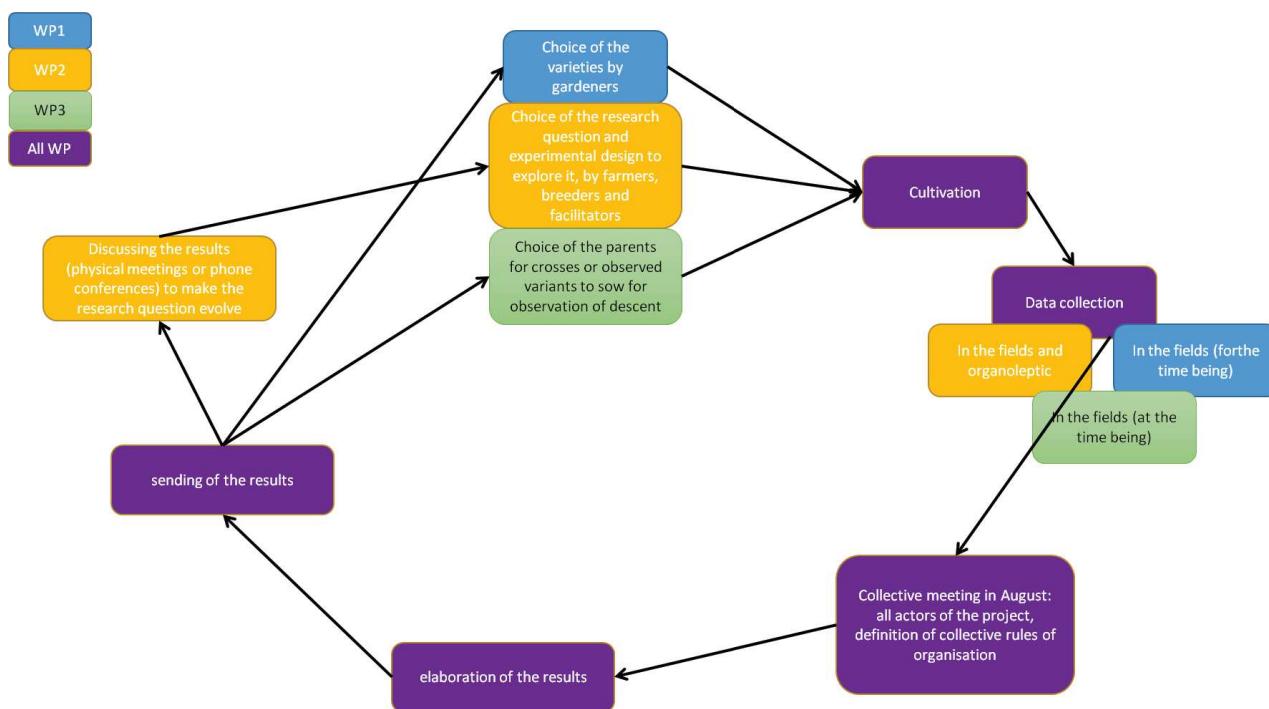
A national collaborative research project (RSP + ITAB + Les Croqueurs de Carottes (group of small scale breeders)). Collaboration from conception to dissemination of results: elaboration of experimentations, evaluations, actions and the rules for working together; implementation of the specific tasks (trials, tasting, crosses, analyses of results).

Research stages: networking; agronomic breeding/evaluation; organoleptic breeding/evaluation; rallying and mixing diversity, trainings.

The project is organised in 3 “workpackages”:

- WP 1: Evaluation of existing tomato varieties by gardeners all over France (about 30 gardeners involved)
- WP 2: in-depth studies (specific research questions) (3-4 farmers of small scale breeders involved)
- WP 3: new diversity (observation and creation of novelties) (about 33 gardeners or farmers or small scale breeders involved)

In this network, most of the facilitators are scientific also. There are 3-4 facilitators who have a scientific background for most of them.



Evaluation of the project

Difficulties: in the relationships between certain partners during participatory process; to get data from gardeners and even farmers despite their interest in the project (and also difficulties to have experiments planted in the right way); of management due to the large spreading of participants (national level). Need to clarify the objectives for all the participants (different levels of commitment).

The work done takes much more time and energy than planned, so need to adjust to objectives.

Adjustments will be done in the project according to the first results = adaptability of participatory methodology.

The project is at the beginning. The objective of the first years is to « build the group », the common culture. Some rules of the group have started to be edited. This project tries to copy the organisation of the national cereal breeding group. But the species is very different, and thus the people involved around also, and this implies a specific way of doing to find.

Name of the project

Species concerned: Rivet wheat

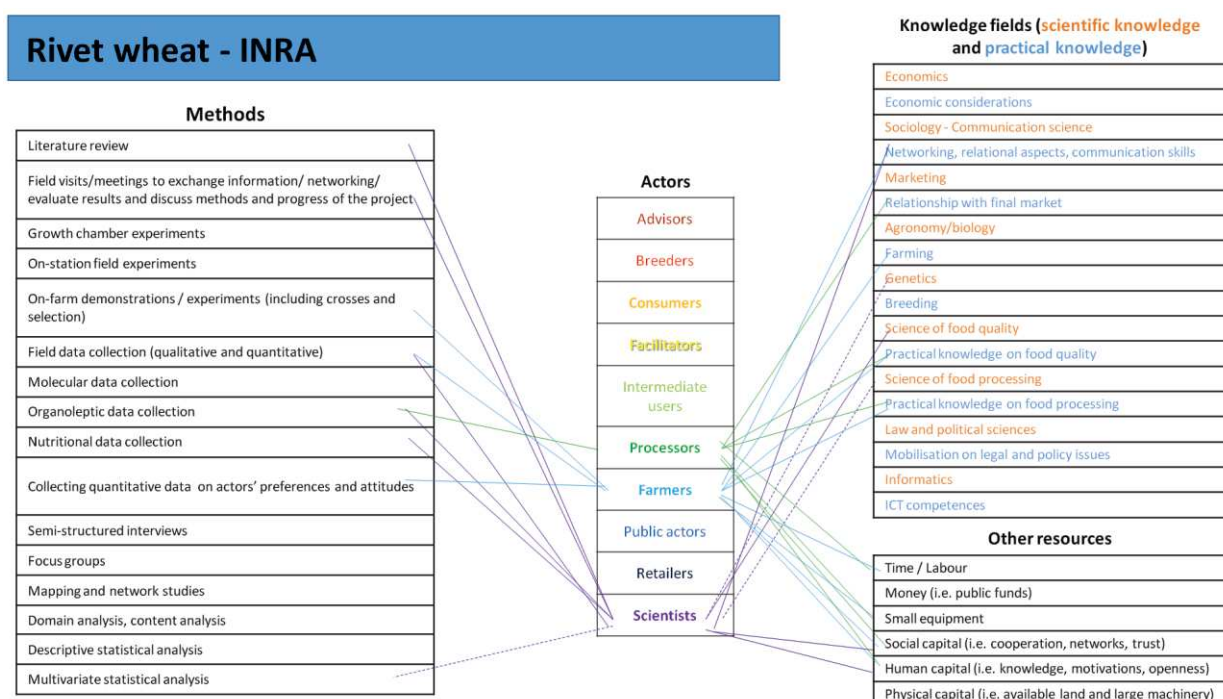
DIVERSIFOOD partners involved: INRA, ITAB and RSP

Level of implementation (Country(ies), national, regional, else): France, links with ORC trials.

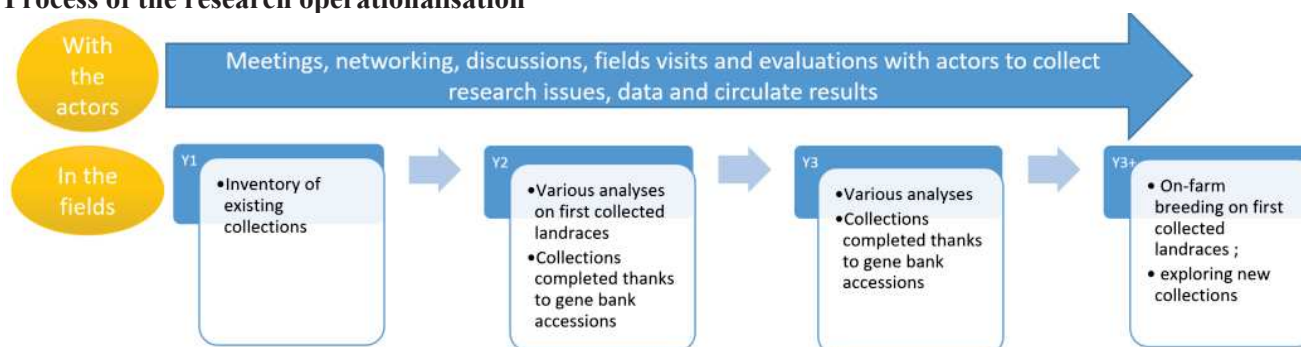
Issue and goals

Before the project, farmers and pasta makers had already launched experimentations and pasta making in several areas in France; DIVERSIFOOD will help to connect the actors and will provide means to share their questions and first experiences so as to boost the renewal of the species thanks to on-farm breeding.

To organise the networks of peasants and pasta makers interested in the species, to manage first trials to rediscover the diversity within the species and to proceed to the first evaluation of qualities for pasta making.



Process of the research operationalisation



Evaluation of the project

New products and new landraces identified in the framework of on farm breeding.

LUKE

Name of the project

Species concerned: Buckwheat

DIVERSIFOOD partners involved: LUKE

Level of implementation (Country(ies), national, regional, else): Finland

Issue and goals

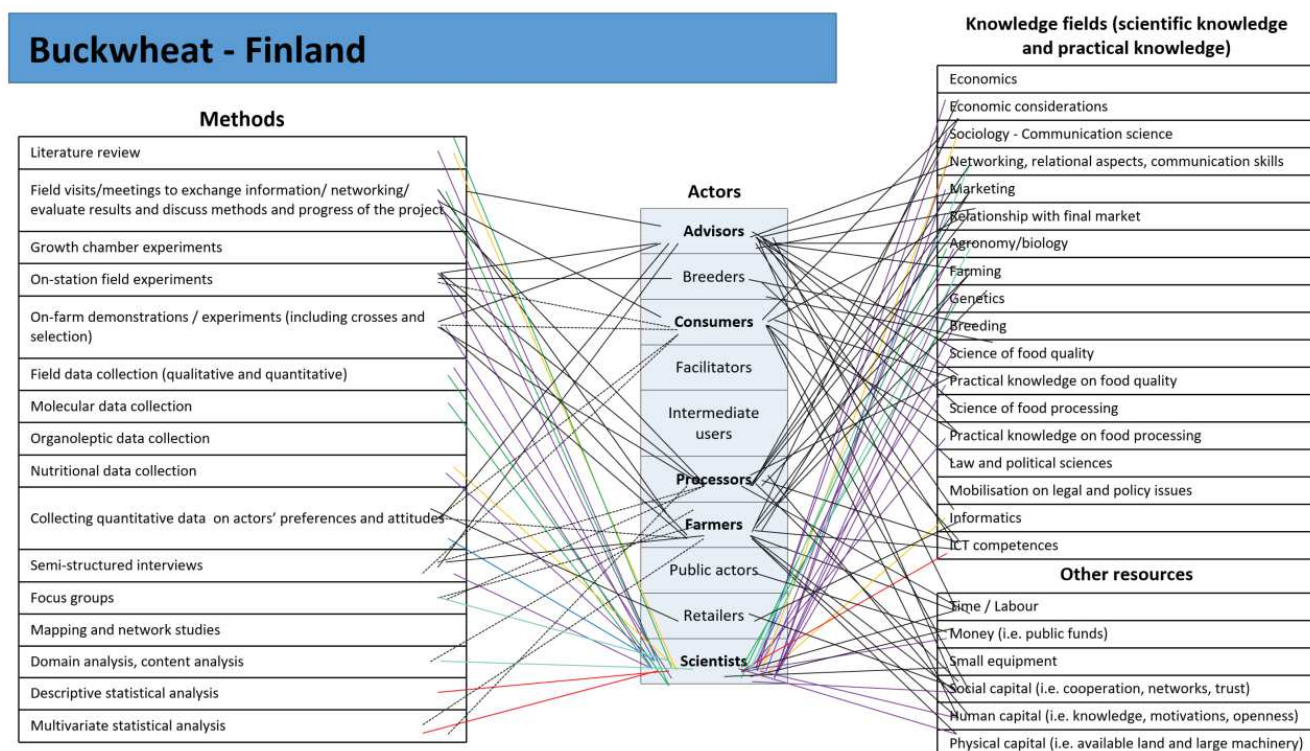
Issues concerning Buckwheat (WP2.2 and 3)

Yields of buckwheat have decreased in Pirkanmaa region.

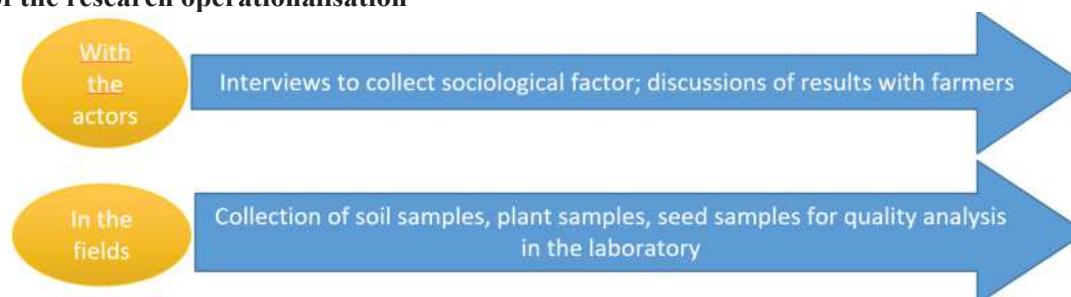
The aim is to know the biological and/or sociological factors behind this problem. Are the origin of sowing seed and the time of harvesting factors of influence on the low yields?

Issues concerning the connection between crop species diversity and people buying food (WP5.2)

The aim was study, what is the connection using the method of crop species diversity, statistical data from retailers, and literature



Process of the research operationalisation



Evaluation of the project

Achievements

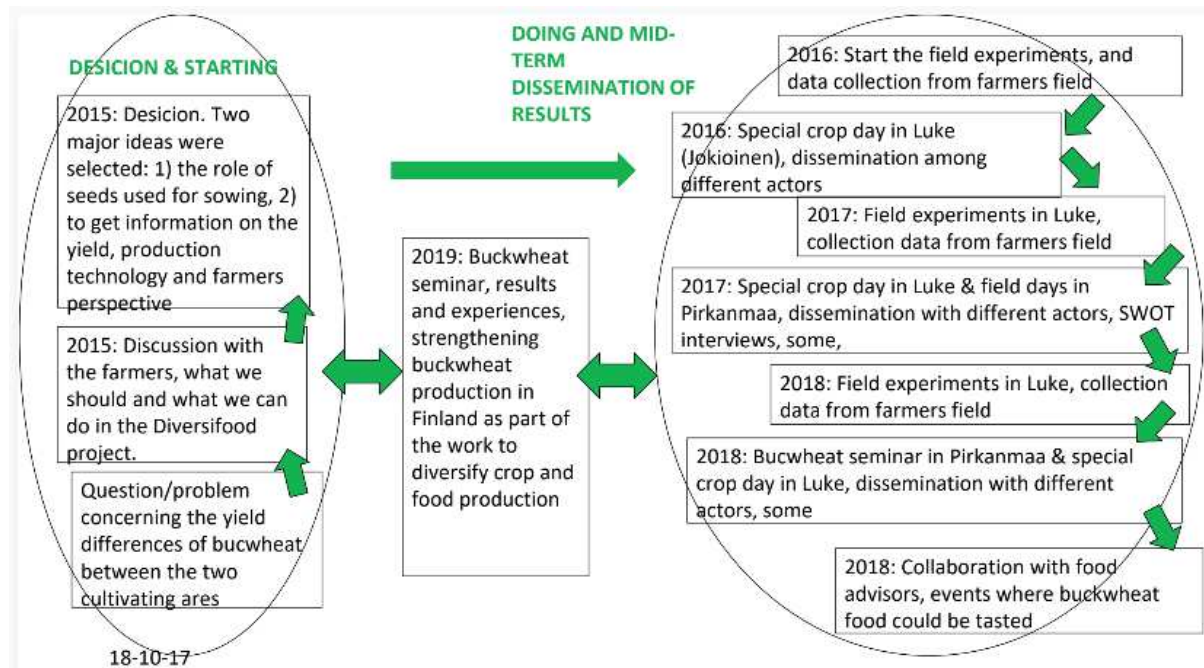
- WP2.2: Participatory work with farmers, semi structured interview on the decision to cultivate buckwheat, based on the field samples we are able to analyse the yield potential in two different regions in Finland, and get understanding on the yield losses on the other area
- Wp3: Field experiment on the effect of the origin of sowing seeds (produced in 2015) to the seed yield next year (in the year 2016). This is related to the question, do the seed 'remember where they come from'. For example, if the seeds have been produced far away from the site it will be sown next year, or

the seeds have been produced near the area it will be sown. Which one is better? – this we are solving. Buckwheat, like the other highly cross pollinated crops, may be adapted to the area it is produce, and if the seeds are transferred ‘too’ far away from the origin, it may not

- Wp5.2. Research on the possible connection between crop species diversity and how consumers buy food (food, which has not been processed, or only little).

Difficulties

- concerning Luke, time to time we have had lack of scientist and technical people to carry on the experiment
- Working with buckwheat farmers – time to time it has been difficult to get information concerning their buckwheat production. May be, because most of the buckwheat farmers are part time famers and very busy.



How are the actors involved in the research? Can you specify this more?

Farmers

WP2.2 Luke has been interviewing them with different aspects, for example we have asked question concerning the production technology, why they cultivate buckwheat and the strengths and weakness of buckwheat production. Luke took also samples from their field (in 2016, 2017, 2018), based on which we have analysed the yield potential and differences in two major cultivation areas

Wp3 farmers collected seeds from their own fields, and with these seeds, sources Luke made the field experiments (2016, 2017, 2018). Farmers have attained also to special crop days (in 2016, 2017, 2018), and buckwheat seminars organised by Luke.

Processors - upgraders

WP2.1 Luke interviewed them. In WP3 they were organizing to get the seeds, the production logistics which were according to researcher's need. They have been organizing field days of buckwheat.

Advisors

In dissemination how to use buckwheat in cooking, we have collaborated with food advisors. They prepared the food, which consumers could taste and Luke has been disseminated the importance of agrobiodiversity and among them also buckwheat. Luke has been participating the field days.

Breeders - have attained to buckwheat field days, also discussion concerning the breeding work

WP5.2: Retailers –Luke got information on the selling statistics concerning the selected food items.

How are the actors involved in the research? Can you specify this more?

Luke

The following scientist/specialists have taken part of the project
Marjo Keskitalo - Research Scientist, in the picture the line 'lila'



Lauri Jauhiainen – Research Scientist, statistical analysis, in the picture the lines with red
Johana Leppänen – communication, in the picture the lines with yellow
Marja Kujala – scientist – data demo retailers, in the picture the lines with blue
Pirjo Yli-Hemminki – postdoc, data analysing, partly with molecular data, in the picture the lines with green
Jaana Nissi (technician) – partly involved to interviewing the farmers, in the picture the lines with light blue
Other people, which role are not described in the picture
Marjo Kasi, - university student, involved to interviewing the farmers
Laura Turunen – university student, field experiments
Anja Lammi – university student, field experiments
Other technical staff of Luke (Aino Lahti, Kirsi Raskio, Kauku Kyläsoirri, etc) - field experiments