



Federación
Galicia EFA

Trainer's Manual

Recovery and Transmission of Agroecological Knowledge



«Project Reference: 538785-LLP-1-2013-1-FR-LEONARDO-LMP»
This project has been funded with support from the Lifelong Learning
Programme - Leonardo da Vinci sub-programme



Lifelong
Learning
Programme

«Project Reference: 538785-LLP-1-2013-1-FR-LEONARDO-LMP»
This project has been funded with support from the Lifelong Learning
Programme - Leonardo da Vinci sub-programme



Federación
Galicia EFA

Authors

Alexia Calvo González (Universidad de Santiago de Compostela)
José Gil Facorro (Federación EFA Galicia)
Rosa Leis Romarís (Federación EFA Galicia)

Edit: Federación EFA Galicia

Publish: Federación EFA Galicia

This project has been funded with support from the European Commission.

This publication (communication) reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



Lifelong
Learning
Programme

INDEX

PRESENTATION	1
MODULE 1. CONTEXTUALISATION	5
1. The posture of the trainer and the target population towards the agroecology	5
2. Ways of valorisation the agroecological knowledge	8
MODULE 2. VALIDATION OF TRANSMISSION METHODS OF AGROECOLOGICAL KNOWLEDGE IN THE LOCAL CONTEXT OF GALICIA	19
Didactic Unit 1. Training in recovery and transmission of agroecological knowledge in the cultivation of hops	28
Didactic Unit 2. Training in recovery and transmission of agroecological knowledge in the cultivation of local horticultural varieties	52
MODULE 3. TRANSMISSION OF AGROECOLOGICAL KNOWLEDGE TO STUDENTS IN A LOCAL DEVELOPMENT CONTEXT'S FRAME	67
CONCLUSIONS	68
GLOSSARY	69
BIBLIOGRAPHY	70
WEBGRAPHY	71

PRESENTATION

Background

The approach of conventional agriculture has had high yields in agricultural productivity of the recent decades. But this productive model, which uses chemicals, generates a negative environmental impact. On this basis, in recent years it has emerged a special interest in seeking greater harmony between agriculture and the environment, where agroecology is positioned as the main focus.

Taking into account progress towards agriculture that respects the environment through an ecological perspective, from the European Union have taken innovative some training programs for recovery and transmission agroecological knowledge.

The **SAGITER project** is an initiative within the European Programme *Leonardo da Vinci* (Lifelong Learning Programme) for the development of the educational innovation. It is the framework of this **training manual**.

The SAGITER project

Objectives

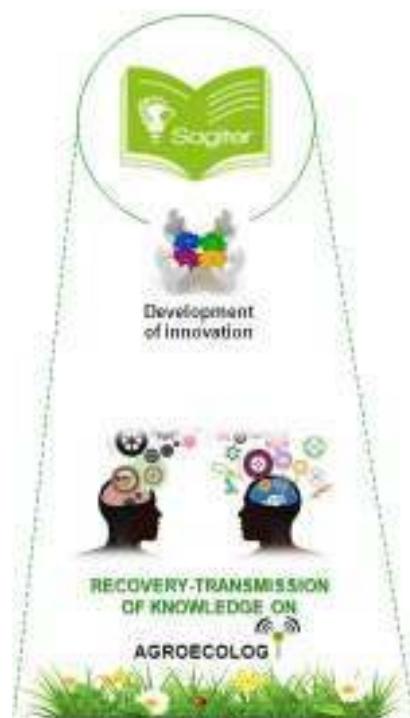
It is based on the hypothesis that the possibility of progress towards an agriculture that respects the environment can be achieved through the interaction between traditional or popular knowledge (local and situational) and scientific knowledge (generalist and specialized). To that end, it is necessary to inquire into the "ecology of knowledge" in order to recover the role of agriculture with regard to the generation of social, cultural, economic and ecological wealth.

The main problem to solve is to respond to:

- How can agroecological knowledge be transmitted?
- What educational methods can be used to adapt the transmission according to the type of knowledge and depending on the receiving public?

The objective of the SAGITER project is to offer a prospective training to the trainers (through innovative pedagogical devices) to be able to enhance, recover and transmit traditional agroecological knowledge.

Figure 1. The SAGITER project: recovery and transmission of agroecological knowledge.



Source: made by myself.

The overall purpose of this project is:

- Participate in evolution towards productive and sustainable agriculture by creating a training path for trainers which integrates several teaching approaches adapted to presenting, promoting, and learning and deploying agroecological knowledge.
- Review the modes of acquisition and transmission of knowledge by enabling the trainer to evolve from a position of knowledge transmission (teaching) to one of facilitator/mediator/guide towards the emergence and consolidation of such knowledge with the learner.
- Facilitate the exchange of experiences and practices, updating the concept of agroecology and sensitizing to current and future producers to learn and acquire traditional ecological techniques.
- Participate in a dynamic of promotion of agroecological knowledge and of innovative learning systems that will be implemented over time in all territories. It is hoped to create a robust European network around this knowledge that will complement the objective of this project.

Involved entities and work methodology

With a duration of 3 years (November 2013 - October 2016), in this project participated eleven entities related to agricultural training and advising from seven different countries, as you can see in Figure 2.

The main promoter of the project at European level is Montpellier SupAgro, Institute for Higher Education in Environment in Florac (Francia). In addition, this institution coordinates the cooperation of other participants.

The representation of Spain has been through The Federation of Vocational Training Schools EFA Galicia (Spain). It is an institution dedicated to promoting vocational training in rural areas.

Figure 2. The involved countries and its participant organizations in the SAGITER project.



Source: made by myself.

The work methodology has been composed of the following stages:

1. Coordination
2. Organisation of local development groups
3. What is applied in terms of organisation and training and how this is analysed
4. Implementation of experimentation and training/actions
5. Feedback and adaptations, extract giving good practices
6. Writing of the training modules
7. Evaluation

Figure 3. Several encounters of the SAGITER project participants.



Source: www.sagiter.eu

Trainer's Manual

Objectives. Target population

The purpose of this manual is to create a training itinerary for trainers which to integrate different pedagogical approaches adapted for recovery, learning and transmission of agroecological knowledge.

Trainers could benefit from a training program (in which the project results will be integrated) that will allow them to transmit the acquired knowledge. There are several groups that may be interested, such as farmers, technicians and / or future agricultural advisers.

Methodology for the writing of the manual

To prepare the manual was used as reference the shared information by the project partners in the SAGITER. Particular attention has focused on valuation techniques of agroecological knowledge developed by each project participant.

Other relevant information has been to the training procedures carried out by EFA Galicia to experience certain traditional agroecological practices in the Galician territory.

Contents

This manual proposes a series of educational content (theoretical, methodological and experimental) that can be adapted and used to develop, evaluate and improve the training of trainers in the recovery and transmission of agroecological knowledge.

The contents are organized into three modules:

- Module 1: it is explained the position that would have to adopt the trainer and the receiver public in the face of agroecology. It is also presented the classification of the different modes of valorization of agroecological knowledge developed within the framework of this project.
- Module 2: includes two didactic units on the training itinerary to follow for the recovery and transmission of certain agroecological knowledge of Galicia. Specifically, on the cultivation of hops and cultivation of various horticultural varieties.
- Module 3: It is focusing on how it should be the transmission of agroecological knowledge within logic of local development.

At the end of the document it includes general conclusions, a glossary and bibliography section.

MODULE 1. CONTEXTUALISATION

1. THE POSTURE OF THE TRAINER AND THE TARGET POPULATION TOWARDS THE AGROECOLOGY

The transmission of agroecological knowledge should respond to a teaching-learning model different from the traditional characteristic model of the agrarian extensionism.

The ways of acquisition and of knowledge transfer from trainers can be of two types: the "teaching-learning" which would correspond to the traditional model, or "share-build", which focuses on the dialogue of local knowledge and the exchange of knowledge (Martínez-Mendoza *et al.*, 2010). The application of the perspective of "share-build" facilitates:

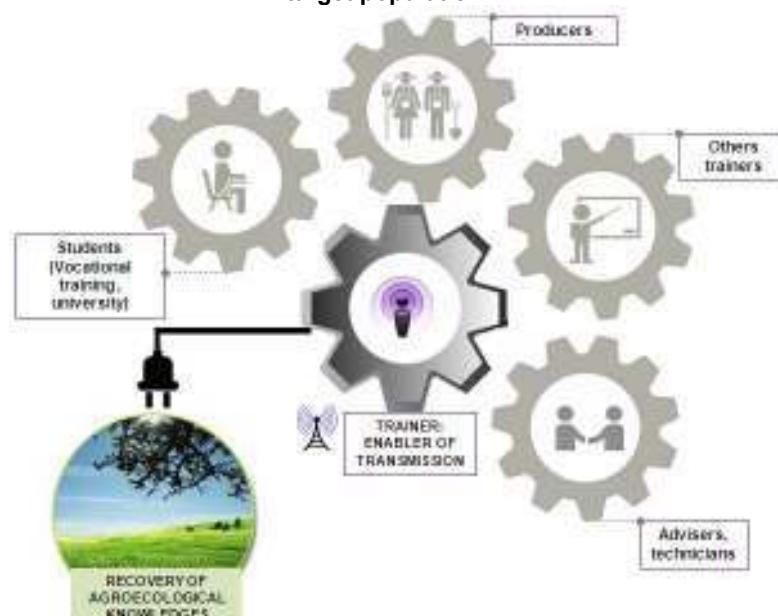
- The evolution of the conventional stance of the trainer as a transmitter of knowledge (trainer) to the position of facilitator and guide in the discovery and consolidation of knowledge in agroecology.
- Consequently, self-learning and professional development of the target population of the formative actions.

Within the ambit of this project, the position to be adopted by the trainer is meant as an intermediary that facilitates access to knowledge about agroecology (see Figure 4).

For taking that position, it is necessary that the trainer retrieves and compiles the needed information to develop the relevant educational resources. Subsequently, through the rotation of theoretical and practical training activities, the trainer could share and transmit the knowledge gained on agroecology.

As for the target population, the posture to adopt should be focused on developing the ability to assimilate, share and build new knowledge. By way of their participation in training, they could implement acquired knowledge about agroecology in the future.

Figure 4. The position of the trainer in the training. The target population.



Source: made by myself.

1.1. COMPETENCES TO ACQUIRE BY TRAINERS

The trainers need to acquire some competences that are characteristic of a prospective training model. Through observation, experimentation, questioning, feedback of experience, validation and communication, can be established how to promote practical training in the transmission of agroecological knowledge.

The acquisition of the necessary competences (see Figure 5) allows that trainers evolve from the position of transmitter of knowledge to the facilitator of the learning process.

Figure 5. Competences to acquire by trainers.



Source: adapted from EFA Galicia.

1.2. COMPETENCES TO ACQUIRE BY THE TARGET POPULATION

In the same way as for the trainers, the target population of training has to acquire another set of specific competences. Those skills belong to a learning model characterized by reflective observation, exchange of experience and active experimentation of theoretical and practical contents (see Figure 6).

Figure 6. Competences to acquire by the target population.



Source: adapted from EFA Galicia.

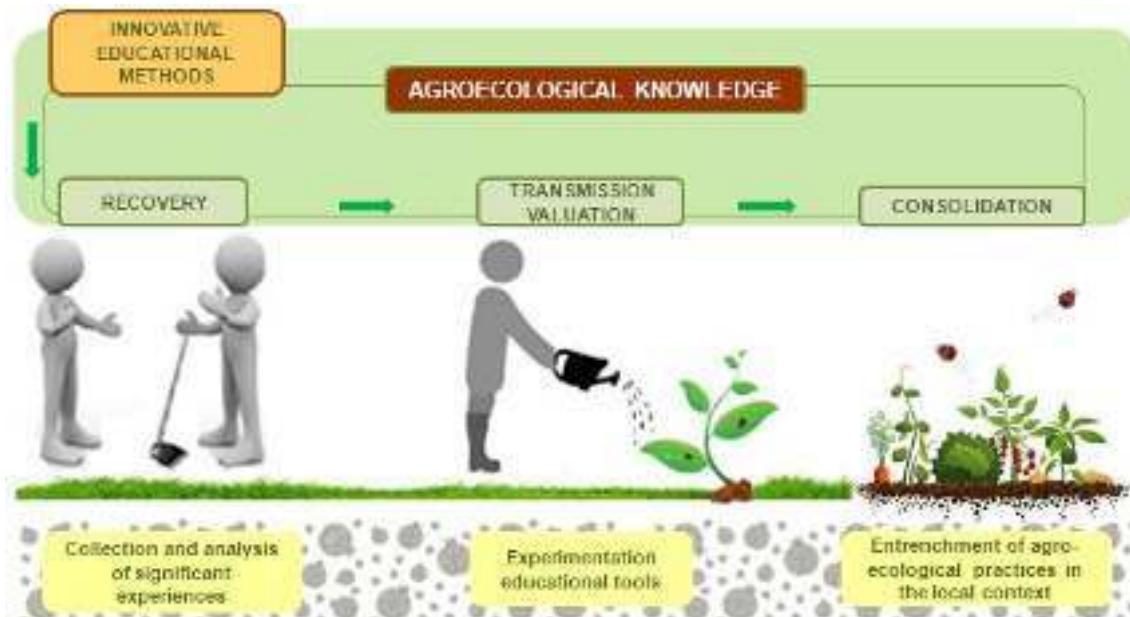
2. WAYS OF VALORISATION THE AGROECOLOGICAL KNOWLEDGE

Within the bounds of the project SAGITER, some innovative pedagogic tools have been developed for recovery and transmission of agroecological knowledge. These methods will be used by trainers with which it is intended to respond to the following questions:

- What educational methods can a trainer use to retrieve existing knowledge in agroecology?
- How can a trainer perform the transmission of this knowledge (know-how, behavior) and facilitate its recovery?

The objective of applying these tools is to instruct trainers to be able to transmit agroecological knowledge so they can be recovered, recycled and consolidated in the processes and practices carried out today (and probably in the future).

Figure 7. Objectives of the application of ways of valorisation the agroecological knowledge.



Source: made by myself.

The application of these educational methods is to develop a specific teaching strategy. To that effect, it is necessary to collect and analyze meaningful experiences on agro-ecological practices which are implemented in a given local context. Once trainers have been instructed in the knowledge they want to convey, they will take the position of facilitator-transmitter of knowledge to the target population (technical advisers, farmers, etc.).

The teaching strategy obtained from the formative itinerary planned by SAGITER allows integrating the lessons learned by trainers on agroecology at any stage of educational process.

1. WAYS OF VALORISATION OF PARTICIPANT INSTITUTIONS IN SAGITER

The 11 participant institutions in the project SAGITER (pertaining to 11 different countries) have proposed a total of 23 ways of valorisation. The most of organizations have managed their own method (or more than one). Figure 8 shows where and what educational tools have been developed in each country.

Table 1 lists these ways of valorisation designed for each of the project partners.

Figure 8. Number of ways of valorisation by those involved countries.



Source: www.sagiter.eu.

Table 1. Classification of ways of valorisation by participant countries and educational institutions.

Participant country	Educational institutions	Way of valorisation
France	<i>SupAgro, Institute for Higher Education in Environment - Florac</i>	The interview of explicitness
		Life story
		Self-confrontation interviews
		Methodology for semi-structured survey
		Transfer a tool of ground in pedagogy
		The instruction of "sosie"
	<i>Cultivons Nos Jardins/Fumeterre</i>	-
	<i>Savoir-Faire et découvertes</i>	Shared gestures: an experience to live
	<i>The Merle training center</i>	-
	<i>Geyser</i>	Analysis conducting the interview The transmissions table
Germany	<i>Department of Geography, University of Marburg</i>	Depth interviews and qualitative content analysis
		Questionnaire for farmers
		Questionnaire for consumers
Spain	<i>Federation of family agrarian schools in Galicia (EFA Galicia)</i>	Video permaculture
		Trainer survey
		Survey method adviser's for a cooperative
Belgium	<i>Vlaamse Landmaatschappij</i>	Advising of enterprises
		Networks of organic farms
Slovenia	<i>Chamber of agriculture and of the forest</i>	Farmers circles
		Nonformal transfer of agroecological knowledge
Hungary	<i>Szent Istvan University Gödöllő</i>	Case study : KACÁR FARM
		Methods of knowledge transfer
		Questionnaire for students
Romania	<i>USAMV de Cluj Napoca</i>	Predator

Source: adapted from www.sagiter.eu

1.1. Classification of ways of valorisation

The ways of valorisation can be classified by different criteria. Two different criteria are to be considered:

Criteria 1: by fields of activity, which is the area (or group of areas) where the ways of valorisation will be developed.

Criteria 2: by the typology of used technique to collect and / or analyze information on agroecological knowledge and practices.

A. Criteria 1: by fields of activity

Fields of activity have been defined within the framework of SAGITER project, which are presented in Table 2. Through this approach it is possible to pigeonhole each way of valorisation in one (or more) of these fields according to the domain (s) where the educational experimentation is done.

Table 2. Fields of activity catalog where can be develop the ways of valorisation.

	Analysis of practice: It would be the field where there is an interaction between trainer and students in the classroom and in the pedagogical intervention that occurs before and after the educational processes.
	Animation group: It is the area where is encouraged the participation student in order to create a collaborative and reflexive environment.
	Education: It would be the way through which may be disseminate subject to target population of training.
	Sequence of education: includes interrelated activities whose aim is to teach educational content.
	Interview: It is a meeting between different actors where orally significant ideas are exchanged in order to obtain information regarding a target.
	Survey territory: is the activity to obtain information from a representative sample of a territory under study using a structured questionnaire.
	Training: group of training activities that are developed to improve the skills and qualifications of the target population.

Source: made by myself.

It should be noted that **each of the ways of valorisation has been labeled by their authors in one or more fields of activity**. So the following classification is to be performed based on the assessment that each partner has done for each of its educational tools. In Table 3 can see in which field of activity is classified each of the ways of valorisation, noting how some of them can be included in various options (the different colors assigned to each way attempt to show it).

Table 3. Classification of ways of valorisation by fields of activity according to the author's judgment.

	Analysis of practise		Interview
	<ul style="list-style-type: none"> • Survey method adviser's for a cooperative • The transmissions table • Analysis conducting the interview • The interview of explicitness • Self-confrontation interviews • Farmers circles 		<ul style="list-style-type: none"> • Trainer survey • Survey method adviser's for a cooperative • Shared gestures: an experience to live • Life story • Self-confrontation interviews • The instruction of "socie" • Depth interviews and qualitative content analysis • Questionnaire for farmers • Questionnaire for consumers
	Animation group		Survey territory
	<ul style="list-style-type: none"> • Survey method adviser's for a cooperative • Predator • Self-confrontation interviews • Networks of organic farms • Farmers circles • Nonformal transfer of agroecological knowledge 		<ul style="list-style-type: none"> • Trainer survey • Survey method adviser's for a cooperative • The transmissions table • Transfer a tool of ground in pedagogy • Questionnaire for farmers • Questionnaire for consumers
	Education		Training
	<ul style="list-style-type: none"> • Video permaculture • Methodology for semi-structured survey • Networks of organic farms • Farmers circles • Methods of knowledge transfer • Questionnaire for students 		<ul style="list-style-type: none"> • Shared gestures: an experience to live • Methodology for semi-structured survey • Advising of enterprises • Networks of organic farms • Farmers circles • Nonformal transfer of agroecological knowledge
	Secuence of education		
	<ul style="list-style-type: none"> • Predator • The transmissions table • Shared gestures: an experience to live • Methodology for semi-structured survey • Transfer a tool of ground in pedagogy • Nonformal transfer of agroecological knowledge • Case study : KACÁR FARM • Questionnaire for students 		

Source: adapted from www.sagiter.eu

B. Criteria 2: by the typology of used technique

1) Ways of valorisation based on the use of techniques to recover information

These educational tools are classified based on the predetermined techniques to search and collect information about agroecological knowledge. Interviews or questionnaires are some of the methodological tools that allow having the necessary information.

Taking into account the variability of actors who can participate in this project by providing information, the techniques can be applied to farmers, technical advisers, trainers, etc.

The collected information will be the material available to the trainers to teach and transmit knowledge agroecological. The general form to proceed with these methods is:

- a) Define what measurements or observations are required.
- b) Determine the study sample, i.e. the population under study.
- c) Conduct observations in context and appropriate time. Thus, quantitative and qualitative information could be collected.
- d) Finally, document data in ways that can be agreed (audio, video, etc.).

Of the 23 ways of valorisation, more than half of them use specific techniques to gather information, which are presented in Table 4.

Table 4. Classification of ways of valorisation based on the use of techniques to gather information on agroecological knowledge.

	<p>Ways of valorisation based on the use of interviews</p> <ul style="list-style-type: none"> ▪ Depth interviews and qualitative content analysis ▪ Shared gestures: an experience to live ▪ Self-confrontation interviews ▪ The instruction of “sosie” ▪ Analysis conducting the interview ▪ The interview of explicitness <p>Ways of valorisation based on the use of surveys/questionnaires</p> <ul style="list-style-type: none"> ▪ Methodology for semi-structured survey ▪ Survey method adviser's for a cooperative ▪ Trainer survey ▪ The transmissions table ▪ Transfer a tool of ground in pedagogy ▪ Questionnaire for farmers ▪ Questionnaire for consumers ▪ Questionnaire for students
-------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Source: made by myself.

2) Ways of valorisation based on the use of techniques to gather and analyse information

This classification (see Table 5) is focused on those ways of valorisation that simultaneously collect and analyse information on agroecological knowledge.

Techniques such as discussion, video viewing, the advising or case studies are some of the tools used in experimental procedures.

The role steps are specific to each way, but it is performed the gathering and the analysis of the information simultaneously.

The information analysis aims to show the relationships, patterns, trends, etc. that can be found among the data to be collected. It involves making an accurate assessment of knowledge in agroecology, of the processes and practices.

Table 5. Classification of ways of valorisation based on the use of techniques to gather, analyse and transfer information on agroecological knowledge.

	<p>Ways of valorisation based on the use of videos to gather, analyse and transfer knowledge</p> <ul style="list-style-type: none"> ▪ Video permaculture <p>Ways of valorisation based on the use of working groups to discuss and advisor in order to collect, exchange and transmit information</p> <ul style="list-style-type: none"> ▪ Predator ▪ Farmers circles ▪ Nonformal transfer of agroecological knowledge ▪ Networks of organic farms ▪ Advising of enterprises <p>Ways of valorisation based on the use of case studies</p> <ul style="list-style-type: none"> ▪ Case study : KACÁR FARM <p>Ways of valorisation based on the use of other specific techniques that are helpful for training</p> <ul style="list-style-type: none"> ▪ Transfer a tool of ground in pedagogy ▪ Methods of knowledge transfer
-----------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Source: made by myself.

1.2. Description of ways of valorisation

This section will describe an educational tool of each of the members of the project SAGITER. In those cases that have more than one way of valorisation (e.g. the French organization SupAgro that has proposed six methods) has been selected one of them of discretionary form. The aim is to show the representative line of work of each of the participants with respect to how to raise the formula pedagogical training of trainers for the recovery and transmission of agroecological knowledge.

The organizations that develop educational tools are 9. And so, in this section be going to describe 9 ways of valorisation. The description is presented in descriptive cards, where the following is collected:

- Organization that has developed the tool (and the country to which it belongs).
- The aim (purpose) to implement the way of valorisation.
- A brief description of the procedure and the used technique.
- Some informative references on the website of the organization (or on the web of the tool in some cases) and / or email address of the responsible person for the methodology.

Figure 9. Way of valorisation of EFA Galicia (Spain).

SPAIN	
Federation of family agrarian schools in Galicia	
TRAINER SURVEY	
OBJECTIVE	DESCRIPTION
To conduct a research in the teaching ambit through a survey for a teacher. The aim is to identify and assess how agroecological knowledge are transmitted by trainers in schools.	To develop a survey about agroecological knowledge for a teacher must take into account the following points: a. Starting situation: environment and educational level in which teaching was exercising, matters in which he/her teaches and student characteristics. b. Development: attitudes of students observed by trainer; how include the agroecological knowledge in programming, what mechanisms used to transmit this knowledge and where to apply these transmission mechanisms of agroecological knowledge. c. Final evaluation: how to evaluate the transmission of agroecological knowledge by the center?, how to asses this transmission by the teacher? and how to assess by student the work and teacher collaboration?
WEBSITE http://www.efagalicia.org	After considering the above issues, it raises a number of questions with three response options. For example, to the situation of departure: environment in which he performs teaching: <i>How is the environment in which transmits its agro-ecological knowledge? a) Rural; b) Urban; c) Periurban.</i>
CONTACT EMAIL jose.gil@efagalicia.org	

Source: adapted from www.sagiter.eu

Figure 10. Way of valorisation of SupAgro (France).

FRANCE		SupAgro, Florac
THE INTERVIEW OF EXPLICITNESS		
OBJECTIVE	DESCRIPTION	
To describe a tacit knowledge about agroecology which is often difficult to define or identify. The aim is to understand how a person performs a particular real action, which is their behavior and what goals wants to achieve.	<p>The practical procedure is to conduct an interview with open questions and at an individual level. The objective is to promote the evocation of the interviewee in order that it can provide all the necessary information on the actual practice of agroecological action. Taking into account the nature of the process which involving people in order to give their personal opinion, it is noteworthy that the interviewer has to maintain ethical conduct in regard to informed consent, anonymity and confidentiality of gathered information. Other important questions are: the interviewer position with the interviewee, the context in which the meeting is held, etc.</p> <p>The dynamics of work to follow is:</p> <ul style="list-style-type: none"> -First, the interviewer has to start asking questions about a particular situation and about the scenario in which the situation is developed. The idea is to help the interviewee to externalize and remember his/her experience. For example: <i>Would you like to tell me how do the cultivation of corn in the garden that has next to his/her house?</i> - Then the interviewer will try to keep a fluent conversation with the interviewee asking open questions about the situation to be treated in order to the interviewee can easily describe it. 	
WEBSITE http://www.supagro.fr/web/florac/		
CONTACT EMAIL michel.vidal99@educagri.fr		

Source: adapted from www.sagiter.eu

Figure 11. Way of valorisation of Savoir-Faire et découvertes (France).

FRANCE		Savoir-Faire et découvertes
SHARED GESTURES: AN EXPERIENCE TO LIVE		
OBJECTIVE	DESCRIPTION	
To know the skills and projects of those peasants and craftsmen who use agroecological production techniques and help to develop the local economy. It is a practical experience where knowledge about agroecology are transmitted. There is an opportunity to exchange experiences with experts and learn what techniques they use, how, why and what.	<p>It is a way of valorisation where workshops are organised (freely) with a duration of two hours approximately. The aim is having a participation of small groups of people who are interested in to know, learn and practice skills in agroecology. The characteristic of this method is that these people will be accompanied by experts in agro-ecological practices in the area. These experts will provide their testimonies and demonstrate what their experience; they will teach them what are the procedures to follow.</p> <p>In short, it is a practical initiative focused on practicing a technique, a gesture or a characteristic attitude of the experts. The aim is to transmit certain agroecological knowledge of a local context.</p>	
WEBSITE http://lesquestespartenaires.fr	  	

Source: adapted from www.sagiter.eu

Figure 12. Way of valorisation of Geyser (France).

FRANCIA		Geyser																																
THE TRANSMISSIONS TABLE																																		
OBJECTIVE	DESCRIPTION																																	
To value how can be transmitted agroecological knowledge based on basic principles of agroecology. This objective is achieved through the development of a table where the necessary information is collected.	<p>This technique consists of building a table in order to assess a certain agroecological knowledge based on five basic principles of agroecology and in the skills of the trainer. The table model is presented below. First, each of the boxes is completed, where it must assess the agroecological knowledge based on the principles (by rows) and skills (by columns), as shown by the examples of the table. Finally, it is necessary to determine what would be the best ways to transmit assessed knowledge in the boxes, answering the question, How to transmit them?</p> <table border="1"> <thead> <tr> <th>5 main principles of agroecology</th><th>Skills</th><th></th><th></th></tr> <tr> <th>Know-how PRAXIS</th><th>Knowledge CORPUS</th><th>Behaviour COSMOS</th><th></th></tr> </thead> <tbody> <tr> <td>Knowledge of the place, limitations => TO OBSERVE</td><td></td><td></td><td></td></tr> <tr> <td>Adaptation to the environment => TO EXPERIMENT</td><td></td><td></td><td></td></tr> <tr> <td>Preservation of the resources (water, soil...) => TO SAVE</td><td>matching</td><td>agroecology</td><td>The resources of our planet are limited</td></tr> <tr> <td>Management of the complexity, diversity => TO IMITATE nature</td><td></td><td></td><td></td></tr> <tr> <td>Collective organisation => TO COOPERATE</td><td>Animation, coordination</td><td>Different forms of organisation</td><td>Empathy, tolerance</td></tr> <tr> <td>How to transmit them?</td><td>To show, to control</td><td>To explain, to answer questions</td><td>To adopt a behaviour</td></tr> </tbody> </table>		5 main principles of agroecology	Skills			Know-how PRAXIS	Knowledge CORPUS	Behaviour COSMOS		Knowledge of the place, limitations => TO OBSERVE				Adaptation to the environment => TO EXPERIMENT				Preservation of the resources (water, soil...) => TO SAVE	matching	agroecology	The resources of our planet are limited	Management of the complexity, diversity => TO IMITATE nature				Collective organisation => TO COOPERATE	Animation, coordination	Different forms of organisation	Empathy, tolerance	How to transmit them?	To show, to control	To explain, to answer questions	To adopt a behaviour
5 main principles of agroecology	Skills																																	
Know-how PRAXIS	Knowledge CORPUS	Behaviour COSMOS																																
Knowledge of the place, limitations => TO OBSERVE																																		
Adaptation to the environment => TO EXPERIMENT																																		
Preservation of the resources (water, soil...) => TO SAVE	matching	agroecology	The resources of our planet are limited																															
Management of the complexity, diversity => TO IMITATE nature																																		
Collective organisation => TO COOPERATE	Animation, coordination	Different forms of organisation	Empathy, tolerance																															
How to transmit them?	To show, to control	To explain, to answer questions	To adopt a behaviour																															
WEBSITE http://www.geyser.asso.fr/																																		
CONTACT EMAIL phi.barret@geyser.asso.fr																																		

Source: adapted from www.sagiter.eu

Figure 13. Way of valorisation of the Department of Geography, University of Marburg (Germany).

GERMANY		Department of Geography, University of Marburg
DEPTH INTERVIEWS AND QUALITATIVE CONTENT ANALYSIS		
OBJECTIVE	DESCRIPTION	
To collect and analyse qualitative information on agroecological processes through the technique of depth interviews.	<p>The procedure involves in depth interviews to people with agroecological knowledge. Then, the information obtained is analysed through a specific method (Mayring, 2010). Some of the main features of the technique of depth interviews are:</p> <ul style="list-style-type: none"> • It is an oral interview where the interviewer acts as moderator. He should maintain a close conversation with the interviewee. • The interviewer has freedom in relation to the content and design of the interview. This leads to the interviewee can provide information more spontaneously. <p>The steps to follow are the following:</p> <ul style="list-style-type: none"> - To do the interview and collect information (in audio or video files) - To transcribe information - To analyse qualitative information by the Mayring method (2010) <p><i>Mayring (2010): Qualitative Inhaltsanalyse. Grundlagen und Techniken. 11. Aufl. Weinheim: Beltz.</i></p>	
CONTACT EMAIL nicola.dellmann@gmail.com		

Source: adapted from www.sagiter.eu

Figure 14. Way of valorisation of the Vlaamse Landmaatschappij (Belgium).

BELGIUM	
Vlaamse Landmaatschappij	
ADVISING OF ENTERPRISES	
OBJECTIVE	DESCRIPTION
<p>To encourage the practice of ecologic agriculture by creating advising systems for a particular local context.</p> <p>The aim is that the advising on agroecology is performed by advisers with an academic degree and also by farmers or stockmen with sufficient experience.</p>	<p>This method has been proposed by the Flemish government in order to offer a program of advising to anyone who is interested in agroecology. To that effect is taken into account the experts collaboration with sufficient experience in a particular agroecological field.</p> <p>The process to follow is the following:</p> <ol style="list-style-type: none"> 1. Selection of experts to provide the advising. To this end, the aspirants must pass a test to show their level of knowledge and whether they can be advisers. One of the conditions is that it is not necessary to have a title that endorses such knowledge; it is sufficient to show that certain knowledge are managed. 2. Publication of the list of selected advisers. Thus, interested parties can contact with them and establish a schedule for meetings.
WEBSITE	
http://fv.vlaanderen.be/nl/bio/subsidie/s/bedrijfsadvisering	
CONTACT EMAIL	
tervo.verwimp@vln.be	

Source: adapted from www.sagiter.eu

Figure 15. Way of valorisation of the Chamber of agriculture and of the forest (Slovenia).

SLOVENIA	
Chamber of agriculture and of the forest	
FARMERS CIRCLES	
OBJECTIVE	DESCRIPTION
<p>To facilitate the exchange of practices and knowledge among professionals in the field of agroecology.</p> <p>The purpose is to identify and transmit a wide range of knowledge and experience of a given local context.</p>	<p>This way of valorisation is for organising discussion workshops called "circles of farmers". The main features and the work dynamics of those "circles" are:</p> <ul style="list-style-type: none"> • It can be formed groups of between 5 and 20 members who share the same interests or have the same productive orientation. • The circles members shall define the objectives to be achieved and the number of meetings per year. That number will be based on those objectives and should be 4 meetings per year at least. • Each of the meetings will be moderated by an agricultural adviser, who will facilitate and maintain the group dynamics for obtaining optimal results. On the other hand, the adviser can help organise the meetings and make records of the works that are developed in the workshops. • The assistants will discuss different knowledge where the aim is to exchange significant experiences. • The activity of the circle can be complemented with field works, company visits, etc. Other professionals who do not belong to the circle can be invited in order to participate in discussions and / or present their experiences.
WEBSITE	
http://www.kqzs.si/	
CONTACT EMAIL	
anton.janotic@kqzs.si	

Source: adapted from www.sagiter.eu

Figure 16. Way of valorisation of the Szent Istvan University Gödöllő (Hungary).

HUNGARY *Szent Istvan University Gödöllő*

CASE STUDY: KACÁR FARM

OBJECTIVE To reactivate traditional forms of farming and food production in order to preserve the customs of a particular area or region. The aim is to recovery of agroecological practices and have the opportunity to diversify food production in the future.	DESCRIPTION The research technique used is the case study. It is to analyse current issues, contemporary phenomena, etc. which represent some sort of real-life problems. In this method it is proposed to take real examples of traditional food producers and / or they perform agroecological practices; these examples will be the reference to transmit those knowledge. The case study proposed by the University Gödöllő exemplifies a farm (called Kacár). It uses ecologic methods to produce of sustainable products (or animals). An educational farm was created in order to share experiences with anyone who is interested in learning how to make an artisanal production. The company has various installations (for livestock, to grow vegetables) which are traditional buildings (such a forgo, a furnace, etc.). There are interactive workshops for people to learn the necessary processes for agroecological production.
WEBSITE http://sziu.hu/	
CONTACT EMAIL jucit.covic@gmail.com	

Source: adapted from www.sagiter.eu

Figure 17. Way of valorisation of the USAMV de Cluj Napoca (Romania).

ROMANIA *USAMV de Cluj Napoca*

PREDATOR

OBJECTIVE To discuss in group the ways of transmission and acquisition of knowledge on agroecology in a region. The aim is to demonstrate the importance of such knowledge and its historical, cultural, legal roots, etc.	DESCRIPTION Predator is a kind of role play where there are three different groups involved: <ul style="list-style-type: none">• Group 1: It is composed of people who will have the role of farmers with agroecological knowledge of the area.• Group 2: In this case it consists of participants who are interested in "to take possession" of knowledge of group 1.• Group 3: They would be the moderators of the game established between groups 1 and 2; it is set as a requirement that members of this group know how to handle the technique of role play. The game dynamics is: <ul style="list-style-type: none">- Group 1 presents and defends their level of agroecological knowledge to group 2, explaining all details in order to defend its legitimacy.- Group 2 discuss with group 1 and try coveting their knowledge; Group 2 should play the role of "predator" for that end; this group should provide the necessary arguments to demonstrate that it can acquire and therefore use them. The method proposes that after playing a certain time, the groups roles must be exchanged for each develop all the competences proposed by this method.
CONTACT EMAIL afiu@yahoo.com	

Source: adapted from www.sagiter.eu

MODULE 2.

VALIDATION OF TRANSMISSION METHODS OF AGROECOLOGICAL KNOWLEDGE IN THE LOCAL CONTEXT OF GALICIA

This training module focuses on showing how innovative methods were employed by trainers EFA Galicia to transmit and recover traditional agroecological practices to different groups (vocational students, academics, other trainers, advisers, farmers, etc.).

The objectives of these transmission methods are:

- The trainers adopt a position on the teaching of agroecology to facilitate the self-learning of the receiver audience.
- Mobilize local actors in order to recover and enhance of traditional practices in the territory capable of being updated; thus its transmission is ensured within the framework of vocational education and training.
In the Galicia region, many traditional practices can be recognised, but in this work has paid attention to two of them:
 - The cultivation of hops for beer production.
 - Horticultural products as cruciferous (cabbage, cauliflower), solanaceaeas (tomato, pepper) or legumes (beans, peas).

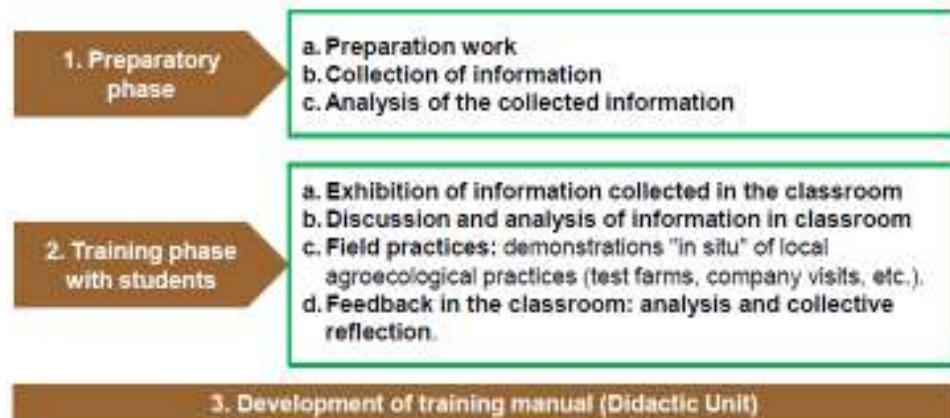
In this module, it is going to explain the methodological procedures used by trainers to transmit and recover agroecological practices about the cultivation of hops and various vegetable varieties in Galicia.

1. TRANSMISSION METHODS USED BY EFA GALICIA

Main features and general phases

- They are based on field observation and experimentation; to that effect, working groups are created with the actors of the territory.
- The transmission of the methods is carried out following the natural process of cultivation in reality.

Figure 18. General phases of transmission methods EFA Galicia.



Source: EFA Galicia.

Ways of valorisation that have been used

The ways of valorisation developed by EFA Galicia in the SAGITER project were implemented by trainers in order to collect the necessary information during the preparatory phase of each of the experimental procedures of the agroecological knowledge transmission.

- Trainer survey
- Survey method adviser's for a cooperative
- Video Permaculture

A. Trainer survey

The objective of using this methodology¹ is to identify and assess how are transmitted agroecological knowledge by trainers in schools.

To develop a survey about agroecological knowledge for a trainer must take into account the following points:

a) Starting situation

1. *Environment in which makes teaching.*

At this point it is very important to note that the trainer must respond about the characteristics of the training center environment or where the trainer will make the transmission of agroecological knowledge. This knowledge can be transmitted in the following environments: rural or urban environments, assessing whether there is or not agroecological previous knowledge.

2. *Educational level in which teaching was exercising.*

It is necessary to differentiate between teaching agroecological knowledge to students in the earliest stages of education or compulsory education and transmitting this knowledge to students of vocational training centers, high school or university.

At this point the survey would be placed in a context and with different objectives depending on the student who is directed the transmission of knowledge.

3. *Matters in which he/her teaches.*

It is important that the trainer clarify the matters that he teaches to determine the subjects and their relation with agronomy and the relationship of these with agroecological knowledge.

4. *Student characteristics.*

It is relevant the provenance or origin of students those who this agroecological knowledge is transmitted. It is therefore interesting that the trainer answers the way to transmit the agroecological knowledge to different students according to whether they are urban, rural or neo-rural.

¹ It is described in a synthesized form in the Module 1, section 1.2. Description of ways of valorisation.

b) Development

1. Attitudes of students observed by trainer.

In this section will be interesting to investigate the preferences of the students, because the trainer will be more or less able to transmit agroecological knowledge depending on acceptance and previous knowledge of the subject by the student.

The survey questions in this section should be aimed how the trainer analyses their students and how he/she discovers his knowledge in agroecological practices in order to transmit them after. The most important points are the professional projects of students and the way they carry them out.

2. How include the agroecological knowledge in programming.

It is very important for better transmission of agroecological knowledge including these in the teaching programs of the various training courses in order to reach easier the student.

The trainer will have to answer the questions of how the agroecological knowledge is related to the programming of the course and how does the transmission of this knowledge throughout the academic year. It would also be interesting to ask what sequence of activities includes, how develops and what times invests for execution.

3. Mechanisms used to transmit this knowledge.

The trainer should explain what type of techniques was used for the transmission of knowledge: the experiments of field, visits to producers with agroecological knowledge, interviews by the students to current and retired producers, videos, conferences, etc., related to agroecological knowledge.

4. Where to apply these transmission mechanisms of agroecological knowledge.

Places or areas where can be apply the transmission mechanisms of these agroecological knowledge: the classroom, test farms, the farms engaged in agroecological practices or own farms or farmland of students. Also the ICTs will help to the trainer to disseminate and implement the transmission of the different knowledge. This requires that the trainer has knowledge in handling these tools and responsive to their level of demand.

c) Final evaluation

1. *How do the transmission evaluate of agroecological knowledge by the center?*

The trainer should answer questions such as: how do the center's installations help to the transmission of agroecological knowledge? How does it help the relationship between the various areas of teaching that are complementary with those of other trainers?

2. *How to asses this transmission by the trainer?*

What mechanisms used by the trainer to determine his ability to transmit this knowledge (attitude, concepts, interest, application of knowledge by students, etc), what effects in short and long term professional future of students and if there is continuity in monitoring activities around agroecological knowledge by the trainer.

3. *How to assess by student the work and trainer collaboration?*

Evaluate the trainer's ability to motivate and encourage students in the practice of agroecological knowledge: use of self-assessment techniques and other techniques trainer evaluation by students, which and what results are obtained.

From the foregoing, EFA Galicia developed a model survey to collect the necessary information:

STARTING SITUATION

a) How is the environment in which transmits its agroecological knowledge?

- Rural
- Urban
- Periurban

b) In this environment, is there knowledge on agroecological knowledge?

- Yes
- No

c) What educational level do you teach?

- Mid-level training courses
- High-level training courses
- University

d) What subjects do you teach?

- Related to horticultural crops
- Related to livestock production
- Related to forest harvesting
- Related to the natural environment in general

e) Where do the students come?

- Rural zones
- Urban zones
- Periurban zones

DEVELOPMENT SURVEY

- a) How do you identify the different students in their knowledge of agroecology?
- b) What theoretical or practical activities do you perform to identify different students?
- c) Are these activities introduced in the programming of different subjects? What time of year are they introduced?
- d) How are these activities developed for the transmission of agroecological knowledge?
- e) Where is the transmission of knowledge done and how is it complemented with ICTs?

FINAL EVALUATION

- a) Do the necessary means (both physical and human) exist for the transmission of agroecological knowledge?
- b) The school and the educational team, do they work together and understand their way of working?
- c) What are effects seen in short term on the way to work of the students and their interest in agroecological knowledge?
- d) Is there an application of this agroecological knowledge when the educational stage finishes?
- e) What are mechanisms used to evaluate students and trainer in the transmission of agroecological knowledge?

B. Survey method adviser's for a cooperative

The goal is to do a research in a cooperative enterprise dedicated to agricultural crop (or other group or business organization) conducting an interview to a consultant (technician) of that cooperative. The aim is that the trainer can identify and assess which is the form for transmitting agroecological knowledge to the partners of the business association.

As in the previous way of valorisation, for making this survey a number of aspects were taken into account:

a) Starting point

Situation of cooperative / group.

It is normal to think that every cooperative is located in a rural setting, but today there are the consumer cooperatives and also the urban producers of agro products, so it will be very interesting to ask what kind of cooperative is? Which collective do you represent and where does the adviser work? because they can be different the partners producing that partners who consume. The questions types can include:

- Type cooperative or grouping where the adviser works
- What area belongs cooperative (rural, urban, both)?
- Number of partners
- Kind of partners

1. Role in the cooperative or grouping and relationship with partners/members.

- Tasks to perform
- Relationship of these tasks with the agro-ecological knowledge or practices
- Influence of these tasks in relations with partners (individual advice, workshops ...)

2. *The partners' origin.*

It is important to analyze by the advisor of the cooperative the transmission capacity of agroecological knowledge, methods or tools of collection, transmission to use, etc.

- Where are the partners from (rural, urban, neorural)?
- The activities of the partners
- Age, formation, etc., of the partners (this helps to know better the agroecological awareness)

b) **Development**

1. *Concerns of partners observed by the adviser.*

It will be interesting to investigate the preferences of the partners because the adviser will be more or less able to transmit agroecological knowledge depending of acceptance and prior knowledge on the subject.

The survey questions in this section should be directed to find out how the adviser analyses the partners in order to discover their prior knowledge in the agroecology.

- Which products do partners require and what should their characteristics be?
- How (and under what guidelines) are they produced?
- Why do they want to consume or produce these products through agroecological knowledge?
- Do they need knowledge and have needs of individual and group learning activities?

2. *How can agroecological knowledge be included in the activities of the cooperative or group?*

- How does the adviser relate the agroecological knowledge with the training activities of cooperative or group?
- How will these activities be conducted in group or individually?
- How much is time spent and what are the criteria to organisation of the training (homogeneous or heterogeneous groups, etc.)?

3. *What can tool or means be used to transmit this knowledge?*

Los mecanismos o las técnicas que usa el técnico para transmitir los saberes agroecológicos pueden ser diversas, pero siempre deberían estar relacionadas con su función en la cooperativa. En la encuesta al técnico se le debe de preguntar por:

- How are practical works in field performed or visits to partners or other producers who possess agroecological knowledge?
- If technical journeys are made, how are they performed and what is the target audience?
- If producers with agroecological knowledge makes visits and their knowledge can be transmitted to partners
- If any information on agroecological knowledge is sent by telematic via and what type it is (articles, magazines, videos ...)

4. *Where to apply these transmission mechanisms of agroecological knowledge.*

Por último se debe de pensar en los lugares o ámbitos donde aplicar los mecanismos de transmisión de estos saberes agroecológicos.

- What are places, capacity, partners taken into account (or not) within the cooperative or the group for the transmission of the agroecological knowledge?
- □What are farms selected for the technical visits and what are criteria used?
- □What are ICTs used for dissemination or to involve more audience?

c) **Final evaluation**

1. *How to evaluate the transmission of agroecological knowledge by the cooperative or group?*

The adviser should answer questions related with: how can the facilities and the organization of the cooperative or group help to the transmission of the agroecological knowledge?

2. *How to evaluate this transmission by the adviser?*

- Mechanisms used by the adviser to determine their ability to transmit this knowledge (attitude, concepts, interest, application of knowledge by the partners, etc.)
- What are effects seen in short and long term about the professional future by the partners or members of group?
- □Is there continuity in the monitoring of the activities around the agroecological knowledge by the adviser?

3. *How to evaluate the work of the adviser in the cooperative or group?*

Este apartado es muy importante para valorar la capacidad del técnico para poder incentivar y animar a los socios en la práctica de saberes agroecológicos.

- What does self-assessment tools have the cooperative or the group and the own adviser?
- What do assessment tools have to evaluate the transmission capacity of agroecological knowledge by the adviser of the cooperative or group?

The survey model by EFA Galicia was as follows:

STARTING SITUATION

- a) How is the environment in which transmits its agroecological knowledge?
 - Rural
 - Urban
 - Periurban
- b) In this environment, is there knowledge on agroecological knowledge?
 - Yes
 - No
- c) What environment are the members of the cooperative?
 - Rural
 - Urban
 -
 - Periurban
- d) What are the roles of the technical in the cooperative?
 - Coordination of activities
 - Control of production processes
 - Execution of production processes
 - Staff training in different areas of the cooperative
- e) Do the members of the cooperative have staff working on their farms?
 - Yes
 - No

DEVELOPMENT SURVEY

- a) How do you identify the different partners in their knowledge about agroecology?
- b) What are tools used to identify the different partners in their agroecological knowledge?
- c) Are these tools introduced in the program of activities of the cooperative? What time of year are they introduced?
- d) How are these activities developed for the transmission of agroecological knowledge?
- e) Where is the identification and transmission of knowledge done?
- f) How are these tools complemented by ICTs?

FINAL EVALUATION

- a) Do the necessary means (both physical and human) exist for the transmission of agroecological knowledge?
- b) The cooperative and partners, do they work together and understand their way of working?
- c) What are effects seen in short term on the way to work of the partners and their interest in agroecological knowledge?
- d) Is there an application of this agroecological knowledge when complete production process finishes?
- e) What are mechanisms used to evaluate partners and manager in the transmission of agroecological knowledge?

C. Video permaculture

This mode of recovery is to collect the necessary information on permaculture practices. The aim is that the information collected can be transmitted to audience in order to future producers can apply it and to recover the local horticultural varieties of the region sustainably.

In order to make the audiovisual, the former first worked with a group of local producers in order to identify and make contact with a producer (farmer permaculture) that could participate. Then, he made the video collecting explanations and demonstrations of the farmer permaculture.

The various parts of the video were:

1. Information collection farmer (permaculture) by the trainer.
 - 1.1. Knowledge of the interviewee.
 - 1.2. Knowledge of the activity
2. Presentation in the classroom to future producers of the collected information.
3. Class practice to complete the transmission process of agroecological knowledge.

2. STRUCTURE OF MODULE 2

In this module two didactic units are raised:

- **Didactic Unit 1:** Training in recovery and transmission of agroecological knowledge in the cultivation of hops.
- **Didactic Unit 2:** Training in recovery and transmission of agroecological knowledge in the cultivation of local horticultural varieties.

DIDACTIC UNIT 1.

TRAINING IN RECOVERY AND TRANSMISSION OF AGROECOLOGICAL KNOWLEDGE IN THE CULTIVATION OF HOPS

This didactic unit aims to show the procedure followed by a trainer to retrieve and transmit to future producers the traditional knowledge about the cultivation of hops.

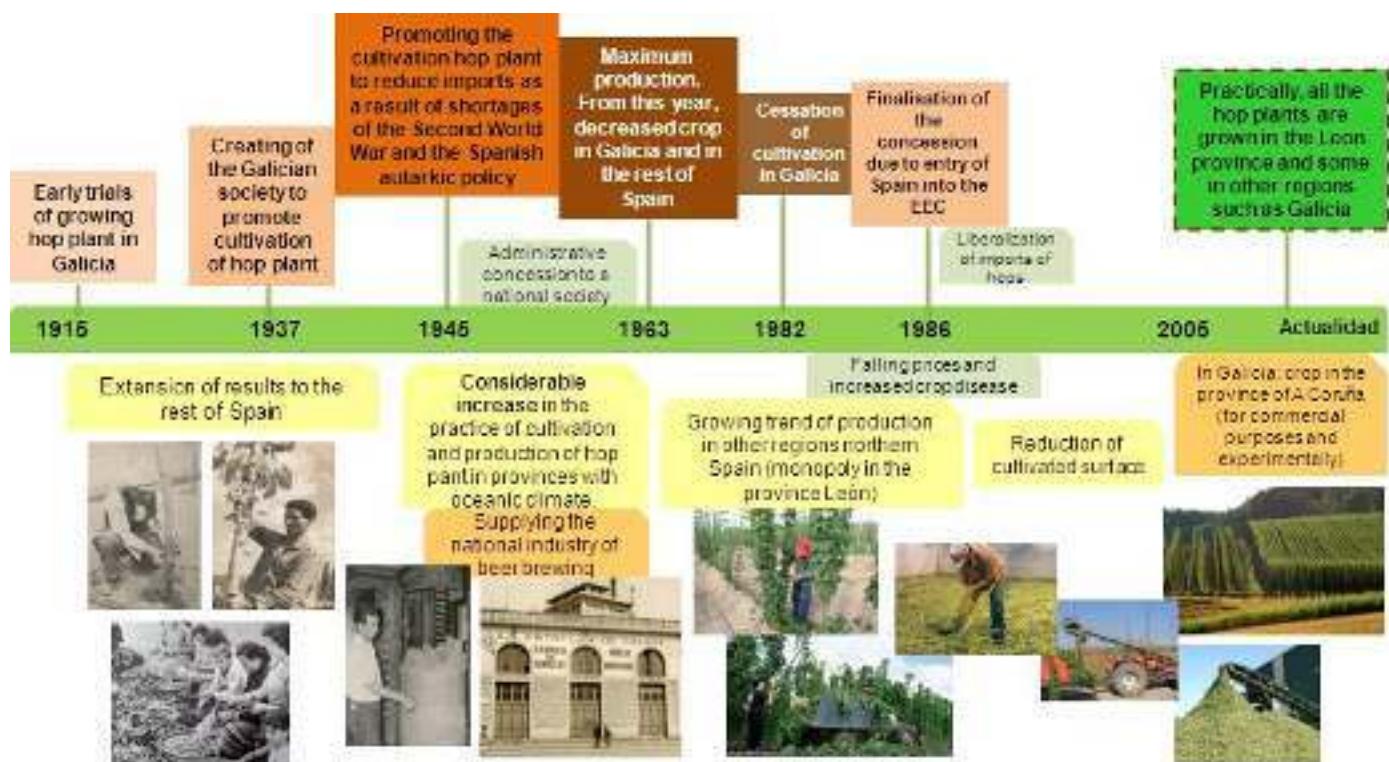
1. HOPS

1.1. Historical context and current situation of growing hops

Historically, the main use of hops has been the beer brewing (along with malt, water and yeast) providing its characteristic aroma and bitterness. Besides its use in brewing, the hop plant has many other utilities; for example in pharmacology it has been used given their sedatives, antimicrobial, anti-inflammatory and anticancer properties.

Figure 19 shows how the growing hop plant evolved for producing beer in Spain and specifically in the Galicia region.

Figure 19. Historical development of hops crop in Spain (and in Galicia).



Source: made by myself. (Photos: LUTEGA and [www.marinasbetanzos.org.](http://www.marinasbetanzos.org/))

Today, hop plants are cultivated in Galicia thanks to research carried out in recent years by "Agricultural Research Centre of Mabegondo" (CIAM)², in collaboration with Corporación Hijos de Rivera S.L. (Manufacturing and distribution company Estrella Galicia)

Following the implementation of that research project for reactivating of hops crop, private initiatives have emerged in Galicia by individuals who are grouped mainly in the cooperative "Hops Technology of Galicia" LUTEGA³. From the CIAM and Hijos de Rivera is available to all members of this cooperative the result of investigations in order that they can apply the knowledge to their crops.

1.2. Natural process of growing hops

The hop plant belongs to the family of *cannabaceae*, genus *Humulus*, which has three species: *H. japonicus*, *H. yunnanensis* and *H. lupulus*, of which only the latter has value for brewing beer.

The productive life of the plantation is established in 20 years. It is a plant with a strong apical dominance, so until it doesn't finish the vertical growth the lateral branches do not appear; in these branches are produced flowers. It is a dioecious species, in which the female flowers are clustered in bunch, which have cone-shaped flakes; these flowers contain a substance amber color, bitter taste and special flavor, called "lupulina". The purpose of the crop is to collect these flower cones, which are used in the beer brewing.

In Figure 20 general aspects about the production cycle of hop plant are reflected.

² CIAM is a center of the Galician public administration that conducts basic and applied research in specific research programs of preferential resources and agricultural technologies. It is located in the municipality of Abegondo, province of A Coruña.

³ LUTEGA is an agricultural cooperative that seeks the implementation of hops cultivation in Galicia, and its transformation and marketing among the top producers of beer.

Figure 20. General aspects of growing cycle hops.

Installations	Plantation	Pruning
<p>Seeing that the hops is a climbing plant, it is necessary to use a permanent system of trellising known as wire fence colloquially. It is a lattice of galvanized metal wire fastened by wooden posts with a height between 5.5 and 7 meters. They are installed before planting time, although they can be also installed in the second year.</p>  <p>Wooden posts to install the wire fence</p>	<p>It can be done with rhizomes (which is the vegetal material more used in Spain) or with plants. The time of planting is when the buds begin to leave. Herbaceous cuttings are also used or by in vitro techniques.</p>  <p>Rhizomes hops</p>	<p>When the plant has passed its early years, it needs to go through a period of winter dormancy, which starts late fall and ends in late winter. Its pivoting root system allows to regrow when their annual crop cycle begins (in early spring). It is time for pruning, which will take place when the buds are observed on the ground surface, uncovering the stump of the plant, cutting the buds and re-covering the plant with ground (in Spanish "aporcado").</p>  <p>Pruning buds hops</p>
Fertilisation	Climbing	Growth
<p>The most suitable pH is between 6.0 and 6.5 (neutral or slightly acidic soils). In Galicia there are usually acidic soil, so it is necessary to correct acidity (liming). In addition, as is a plant that requires high levels of soil fertility, it is recommended to do fertilizations with high levels of phosphorus and potassium.</p>	<p>It is done manually, usually in the first half of May. It is advisable to choose the buds of intermediate development to put them in the system of trellising and eliminate the rest (usually 6 buds per plant and 3 buds per tutor). The stems that are chosen are screwed in the direction of clockwise from the bottom up. This is known as climbing (in Spanish "trepas").</p>	<p>Hops is a plant of rapid growth with apical dominance, reaching its peak height at the end of June. At that time the lateral branches start growing and flowering occurs in mid-July. The maturation of the flowers will last until harvest.</p>  <p>Hop plants to achieve maximum height growth</p>
Irrigation	Agroecological treatments	Harvest
<p>It is advisable to overwater from the second year of cultivation using drip irrigation systems (the most recommended), flood, rains, etc. The appropriate time is in June (depends on the weather), when the plants reach the top wire fence.</p> <p>It should be noted that productivity may decrease by 30% if there is no irrigation.</p>	<p>Hops may suffer diseases such as mildew (<i>Pseudoperonospora humuli</i>), which is the most important in Galicia, followed by powdery mildew (<i>Sphaerotheca macularis</i>). The attacks usually occur in rainy summers. Treatment of these diseases can be done with organic products such as diatoms or Bordeaux mixture.</p>	<p>The harvest is done when the contents of resins, tannins and essential oils are higher, which takes place from late August to mid-September. It is a semi-mechanized operation. A tractor with trailer and an accessory to cut are required. The first step is to cut the tutors (or "trepas") about 30 cm from the ground to separate the root system. This is done mechanically with the implement saw that cuts the tutor and the plant and they are falling on the trailer. Once that has been harvested, it is very important to carry the plants to make peeling treatment (separating flowers remaining plant material).</p>

Source: adapted from www.marinasbetanzos.org

1.3. Processing hops

A. Peeling: when the flowers are harvested, they deteriorate quickly, so the peeling should be done as soon as possible. To that end, plants are passed by a machine called "peelers". This is done by passing the plant material through a mesh and suffering vent streams. The end result contains 15% of impurities which are mainly leaves and other products.

Figure 21. Peelers of the Agricultural Research Centre of Mabegondo (CIAM).



Source: made by myself.

B. Drying: the goal is to reduce the moisture content of the flowers from 75 -80% to 9-11%. This operation will facilitate preservation and further processing. To avoid potential problems of deterioration should be dried as soon as possible.

Figure 22. Drier of the Agricultural Research Centre of Mabegondo (CIAM).



Source: made by myself.

C. Conditioning, pellet production and packaging: the packaging is done overnight following after the drying. In this conditioning the hops can earn between 1 to 2% moisture.

The process of pellet production helps reduce the volume occupied by the same number of hops up to four times. This process is divided into two phases. The first involves grinding the flowers to convert the powdered hops. Subsequently, it must be compressed to group it and reduce its volume. Nowadays, the companies prefer the hops in pellet.

The packaging is done in vacuum-packed, in aluminized bags normally 0.5, 1 or 5 kg.

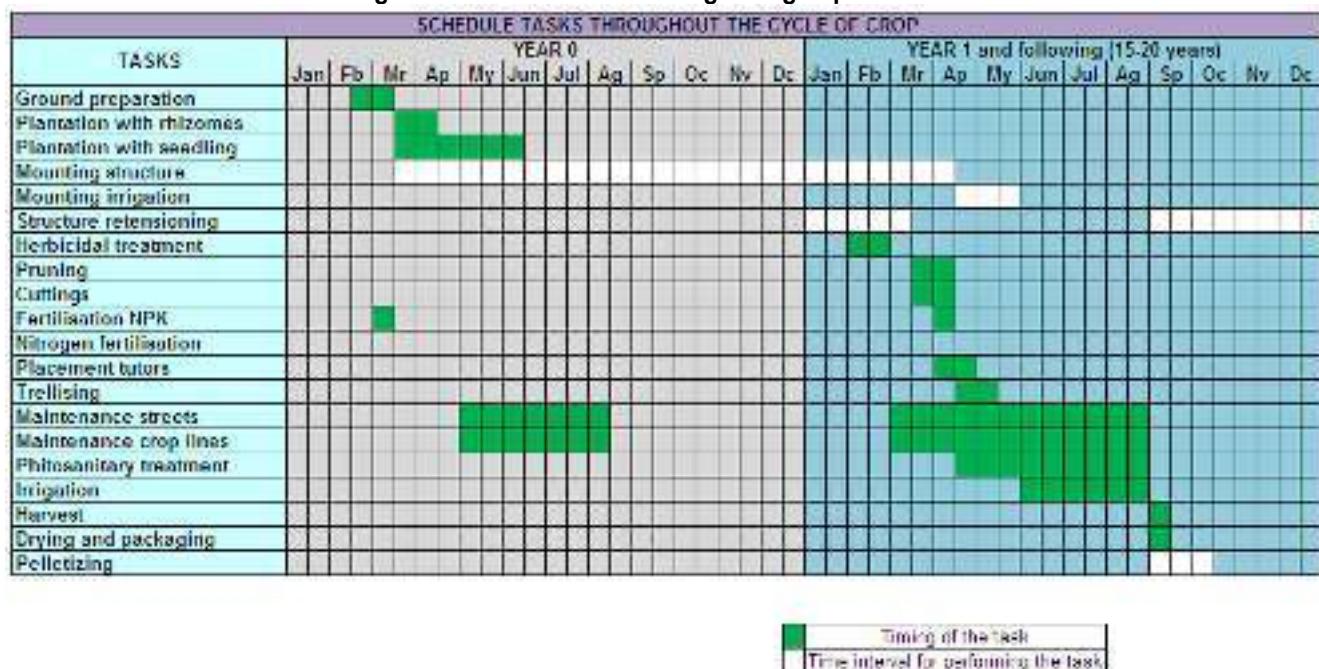
Figure 23. Pelletizing and packaging bags in the Agricultural Research Centre of Mabegondo (CIAM).



Source: made by myself.

1.4. Timeline of tasks of growing and processing hops

Figure 24. Timeline of tasks of growing hops.



Source: www.marinasbetanzos.org

2. METHOD OF TRANSMISSION OF AGROECOLOGICAL KNOWLEDGE IN THE CULTIVATION HOPS

2.1. Timing

The work calendar of the training activities planned by EFA Galicia was carried out in parallel with the natural process of growing hops.

The different phases of this calendar followed the general scheme adopted by EFA Galicia to apply the methods of transmission of agroecological knowledge (see Figure 18). The tasks performed in each of the phases are presented in the Table 6. In later sections specified in what consisted each of them.

Table 6. General work calendar of the transmission method about the agroecological crop hops followed by EFA Galicia.

PHASES- Activities	TIMING
Preparatory phase <ul style="list-style-type: none"> ▪ Preparation work ▪ Gathering of information: meetings and several interviews (application of the ways of valorisation "Trainer Survey" and "Survey method adviser's for a cooperative") and the collection of other information. ▪ Analysis of the collected information 	October 2013- Sept. 2014
Training students <ul style="list-style-type: none"> ▪ Exposure in the classroom of the collected information ▪ Discussion and analysis of information in the classroom ▪ Field practices ▪ Feedback in the classroom 	Start in Sept. 2014 – 2h / month during 8 months

Source: EFA Galicia.

1) Preparatory phase

The aim of this phrase was that the trainer could have all the information necessary to know what knowledge could be transmitted to the receiver public.

A. Preparation work

The preparation work started by collecting bibliography (historical documents, photographs, videos, etc.) to recover the historical memory of hops. This was made possible by:

- The identification of stakeholders in the agroecological production: old farmers, advisers, research centers. Collaboration highlights:
 - Agricultural Research Centre of Mabegondo" (CIAM).
 - "Hops Technology of Galicia" LUTEGA, with the assistance of technical advisers Belén Matilla, Ricardo Rilo and Miguel Sánchez.
 - Local actors of the territory related to the cultivation of hops.
- Agreements with educational institutions in the region.
- Participation beer industry: the case of the Galician company "Estrella Galicia" (Hijos de Rivera S.L. Corporation).

After identifying who would be the agents that could provide the sought information, the trainer began to collect data on the cultivation of hops.

B. Gathering of information

The collection of information took place through different routes:

- Several meetings and personal interviews (and / or group) to old farmers (1950 to 1984) of the region As Mariñas (A Coruña) (Manuel José Castro Vilariño, Josefa Filgueiras Pita y José María Calo Faraldo) and current producers (Maria José Davila). Notably for interviews, the ways of valorisation ("Trainer Survey" and "Survey method adviser's for a cooperative") were applied.
- Collection of photos, videos, newspaper articles, testimonies and anecdotes from neighbours, etc. to complement the collected information in interviews. It is noteworthy that to compile this documentation was organized a contest (Project "Green Gold"). In addition to recovering the historical memory, it was sought to disseminate and promote the practice of growing hops.

Figure 25. Convocation of the Project "Green Gold" and subsequent photographic exhibition on the cultivation of hops.



Source: LUTEGA.

- Organization of working groups with old farmers (cooperatives), technicians (Belén Matilla, Ricardo Rilo y Miguel Sánchez), companies (José Manuel García Pedreira, of Ingeniería Ramisquido - Laracha, A Coruña), trainers (José Agra and José Gil, trainers in agricultural process of EFA Fontebó), local development groups, etc. in order to participate in the process of knowledge dissemination with students.
- Visits to cooperatives and case studies on production farms in order to learn about the traditional production of hops.

Then, the data of the survey conducted by the trainer to a LUTEGA cooperative technique - Belén Matilla - are presented; for that, the "Survey method adviser's for a cooperative" was used.

STARTING SITUATION

a) How is the environment in which transmits its agroecological knowledge?

- Rural
- Urban
- Periurban

The LUTEGA cooperative is based in the city of A Coruna, but its development activity takes place in the region of As Mariñas, periurban area, and its productive activity in rural areas, so it can be concluded that agroecological knowledge is transmitted in the three environments.

b) In this environment, is there knowledge on agroecological knowledge?

- Yes
- No

A large number of people or children of these people, who previously worked in hops, lived in the countryside and with time and the disappearance of the crop, they moved to periurban and urban areas in search of work, but they still remember the ways of working and agroecological knowledge. Those who preserve this knowledge in rural areas, are most resisted the abandonment of farming and continue to live in that environment.

c) What environment are the members of the cooperative?

- Rural
- Urban
- Periurban

The partners are the rural environment as they are hop producers, recyclers and researchers of different agroecological knowledge on cultivation.

d) What are their roles in the cooperative?

- Coordination of activities.
- Control of production processes.
- Execution of production processes.
- Staff training in different areas of the cooperative.

Although it seems that I work a lot, the role of management in a cooperative with few partners means having to do a lot of thing; this also helps to facilitate the transmission of agroecological knowledge in different points of the production process, but the most important points for this task are the execution and formation.

e) Do the members of the cooperative have staff working on their farms?

- Yes
- No

Most of them did, but seasonally: in times of "aporcado" and harvest time.

f) Do these members have knowledge in agroecology?

- Yes
- No

The partners are usually who have some knowledge and who can transmit this knowledge to their workforce.

DEVELOPMENT SURVEY

- a) How do you identify the different partners in their knowledge about agroecology?
She made visits to their farms, talked with them and observed their way of working. There are also analytical methods that indicate whether the final product is produced in accordance with agroecological knowledge, for example, if the impurity levels are above 5% or if there are pesticides in the harvested hops.
- b) What are tools used to identify the different partners in their agroecological knowledge?
- The observation and monitoring of the crop.
 - Personal interviews on the farm in which they are asked about their ways of working and the problems.
 - Meetings in group in the cooperative where agroecological knowledge are shared and exchanged.
 - The field days and farm visits by groups of partners to see directly the way to work or the performed work.
 - Training courses for further specialization in the agroecological knowledge within the cultivation of hops.
- c) Are these tools introduced in the program of activities of the cooperative? What time of year are they introduced?
Yes, they are. They are often made in times of low work, from late September to mid-February. All partners involved in the choice of dates for the different activities, which favors a greater quorum and greater involvement by partners.
- d) How are these activities developed for the transmission of agroecological knowledge?
- For the observation and monitoring of the cultivation of each of the partners a technical or myself, makes the visit at random and without notice, allowing ensure proper execution of tasks in the crop.
 - For interviews, notice is given one week in advance and all matters of concern to producers are noted.
 - In group meetings in the cooperative, an agenda is carried out and we talk about the problems of the cooperative and the way of solving the general troubles. We exchange things about the way to work and agroecological knowledge that marks the cooperative. Normally a training technical talk and some experience of a partner are considered. To end, we open a round of debate.
 - The field days and visits to farms are made in two types of farms on the one hand in those best applies agroecological knowledge and gets good results and on the other side where the worst results are obtained, in order to analyze the possible advantages or problems encountered in each of the visits. These seminars are conducted during the production process of the crop.
 - Training courses usually last two months, investing one morning a week, to facilitate the realization of other daily chores. These courses are made by younger and future producers because they are not closed for partners, which will allow in the future the entry of new partners. The topics covered are about management and monitoring crop, as well as methods and practices in line with the agroecological knowledge to optimize the economic performance of the crop.

e) Where is the identification and transmission of knowledge done?

The locations are the cooperative, the holdings of the partners, the GDR (rural development groups), schools as yours (the EFA Galicia) with farm practices, fairs and outreach events about organic products, etc.

f) How are these tools complemented by ICTs?

At all times there is a promotion on the Internet, so that all members and other interested people are aware of the generated events by the cooperative.

FINAL EVALUATION

a) Do the necessary means (both physical and human) exist for the transmission of agroecological knowledge?

With regard to physical media yes, because for transmitting agroecological knowledge it is not necessary a lot of material but it takes time and only human resources have it. We do not have time and the cooperative does not have enough structure to cope with personnel costs for the transmission of agroecological knowledge.

b) The cooperative and partners, do they work together and understand their way of working?

At the moment yes, but they get discouraged if production is not good or the results of the means used do not work. As few partners is easier to work individually and in groups.

c) What are effects seen in short term on the way to work of the partners and their interest in agroecological knowledge?

The short-term effects are good, partners receive them well but whenever they see an economic result to compensate them the effort. The interest is shown by the increasing demand for information by new producers.

d) Is there an application of this agroecological knowledge when complete production process finishes?

At the moment it is early to draw conclusions as it takes little time working. Training by producing partners, as well as by the workforce, is scarce and we should take account the recommendations for the results to be the ideal, but we are improving a lot.

e) What are mechanisms used to evaluate partners and manager in the transmission of agroecological knowledge?

Visual observations, interviews and product analysis to evaluate partners are made. We continually evaluate the manager, with protests if things do not go well.

C. Analysis of the collected information

After collecting all the necessary material, the trainer proceeded to analyze it with the help of the working groups. This collaboration allowed supplementing the information to be had and help to select the most relevant data for transmission of knowledge in the training phase with students.

2) Training students

The aim is that the trainer could convey to the public the agroecological knowledge in the cultivation of hops. To do this, they conducted a series of training activities that were scheduled according to the natural cycle of growing hops. These activities were carried out sometimes in the classroom and others in various places, such as:

- From visits made to Agricultural Research Centre of Mabegondo" (CIAM), the LUTEGA cooperative and industrial manufacturing plant Estrella Galicia.
- In several farms with plantations of hops (see Figure 26).

Figure 26. Places where the experimental agroecological practices about hops crop were carried out.



Source: LUTEGA.

A. Exposure in the classroom of the collected information

In the classroom, a series of training activities were carried out in order that students were able to know the work methodology and the collect information by the trainer.

B. Discussion and analysis of information in the classroom

Also in the classroom, different sessions were held to discuss and analyse the presented information by the trainer. The aim was that students were able to handle certain knowledge in order to develop the field practices.

C. Field practices

The training activities were varied:

- Application of good agroecological practices with future producers, following the schedule of tasks the natural process of growing hops.
- Some visits to the field to observe and practice how the process of growing hops and other visits to breweries and current farming cooperatives.

Figure 27. Working group developing a training activity on agroecological farming hops.



Source: www.sagiter.eu

D. Feedback in the classroom

Back in the classroom, the trainer and the students collected all the graphic material of the previous phases to analyze and record all processed information.

3. A TRAINING ACTIVITIES PARALLEL TO THE TRANSMISSION OF KNOWLEDGE

During the course of the training phase with students, some specific training activities were conducted; to that end, the natural process of growing hops was followed, as shown in Figure 28. It should be noted that these activities were begun at the time of the harvest of hops in 2014 and ended a year later; this allowed experiencing many of the own tasks of an annual cycle of the hops crop.

Figure 28. Programming training activities in correspondence with tasks hops crop.



The description of the following sections of each of the training activities focuses on:

- The objectives of the activity.
- The specific transmission methods that were used.
- The work schedule of the transmission methods (timing).

ACTIVITY 1:

Collection of hops with the farmers and the adviser of the cooperative

Goals

The objectives of this activity are:

- ❖ To stimulate the interest in students for growing hops.
- ❖ To discover a crop in which agroecological techniques can be applied.
- ❖ To know collection techniques.

Transmission method

First there was a preparatory session in the classroom with the student group, where there was a first approximation training on agroecological growing hops and harvesting. It was at this time when the trainer explained in the classroom all the information.

Providing that the harvest of the hops was to take place, the group visited to a farm owned production LUTEGA. Once there, a technical adviser to the cooperative (Belén Matilla) explained *in situ* how to carry out this process manually. Students had to observe how the different tasks were made to then develop collection operations individually (learning by practice).

Figure 29. Students practices for collecting of female flowers of the hops.



Source: www.sagiter.eu

Timing

Following the schedule of tasks for the cultivation of hops, the time of harvest should be in September. Therefore, this training activity took place during that month in 2014.

Each of the transmission methods had the following duration:

- Preparatory session with the group in the classroom: 1 h.
- Group visits and observational learning and development of learned technique in the farms individually: 7 h.

ACTIVITY 2:
Cleaning the lines and collection of strings

Goals

- ❖ To observe agroecological techniques for removing weeds.
- ❖ To show the importance of cleaning waste in the plots.

Transmission method

Los métodos utilizados para transmitir las prácticas de limpieza y recogida de cadenas fueron similares a las actividades generales sobre la cosecha de lúpulo.

The trainer started with a preparatory session in the classroom where he explained the necessary tasks for removing weeds in the plots and the way of treating the waste. The importance of not using chemicals was highlighted as is customary in conventional agriculture.

The next activity was to visit a farm crop, where an expert on agroecological practices explained to the students how controlling weed. On the other hand, the expert explained them how stacking the waste (from removing weeds or debris left over from the harvest) in order to form strings along the lines of planting and facilitate subsequent collection. The purpose of these practices is cleaning the soil for the next crop cycle.

Students were able to observe the development of the work and then they practiced the shown techniques.

Timing

The development of this activity took place in October of the same year (2014).

The duration of each transmission methods:

- Preparatory session with the group in the classroom: 1 h.
- Group visit to the practices farm in order to explain the techniques and make individual practices: 7 h.

ACTIVITY 3:
Introduction of winter crop

Goals

On account of the annual cycle of hops is paralyzed from late autumn to late winter (winter dormancy period), the soil can be optimised in order to grow other winter plants or so-called green manure.

Green manures are cover crops that contribute to increase the fertility of agricultural soils (providing nutrients and organic matter) and also to control weeds, pests and diseases (Guzmán-Casado and Alonso-Mielgo, 2008). These manures are not grown for consumption but rather the aim is to cut and incorporate "in green" on the field as fertilizer. They are very convenient for long periods of time where the soil will remain uncultivated, because they protect it from erosion and prevent weeds proliferate.

Among the plants that can be used as winter plants or green manure are legumes, cruciferous vegetables (radishes, cauliflowers, rapeseed, watercress, etc.) or grasses.

In this training activity, the main objective was to observe the optimization of the soil when the winter dormancy period of growing hops takes place.

Transmission method

First, there was a preparatory session in the classroom with the group to explain the basic contents on the implementation of winter crops. Subsequently, there was a visit to the farm production where this time, the producers showed the students how to carry out the implementation of these crops. Finally, each student performed the individual practice, developing related to sowing, planting, soil preparation tasks, etc.

Timing

This activity was held in November 2014 and the preparation of classroom training was 1 hour and 7 hours for group visits to the farm.

Figure 30. Rapeseed cultivation between the production lines of hops in the Agricultural Research Centre of Mabegondo" (CIAM).



Source: made by myself.

ACTIVITY 4:
Visit hops processing plant - Estrella Galicia Company

Goals

- ❖ To product valorization and know the profitability.
- ❖ To establish contact with the commercializing companies.

Transmission method

The students group had the opportunity of visiting the industry of one of the largest brewers in Spain: Estrella Galicia factory, of the Hijos de Rivera S.A. company. This industry has the largest production of Galicia.

Students were able to observe how the hops are used to make beer, especially the use of hops cultivated in agroecological form in Galicia (bio-Galician hops of the CIAM). These hops are used to make a special edition of beer that the company sells to the end of each year with great acceptance among consumers.

Figure 31. Industrial manufacturing plant of Estrella Galicia in A Coruña.



Source: www.iffe.es

Timing

The visit to the factory of Estrella Galicia took place in December 2014 during a time about 4 hours.

ACTIVITY 5:

Transmission of traditional production processes by the old farmers

Goals

- ❖ To discover ways of working and traditional production techniques.

Transmission method

The purpose of this method of transmission was to transmit to future producers the traditional practices used by old farmers for the hops crop.

To this end, the trainer carried out personal interviews to different hops producers to collect varied information.

Figure 32. The trainer conducting personal interviews with old farmers.



Source: www.sagiter.eu

Then, there were meetings with the working groups, where former producers (Manuel José Castro Vilaríño, Josefa Filgueiras Pita and José María Calo Faraldo) current producers (Maria José Davila) and students participated.

Figure 33. Trainer meetings with the working groups.



Source: www.sagiter.eu

They conveyed traditional knowledge and various experiences were exchanged in order to sensitize future producers to implement these techniques. They used different material, as old photos, videos, newspaper articles, etc.

Timing

Interviews and meetings were in January 2015, with duration of 3 hours each type of activity.

ACTIVITY 6:
Preparation of crop production lines

Goals

- ❖ To observe and do the previous processes to clean and to pruning the hops plants.

Transmission method

The aim was that students could learn the necessary skills to prepare lines of hop growing. For this, the trainer had a previous session in the classroom.

Subsequently, they visited the Agricultural Research Centre of Mabegondo (CIAM) where they could observe what practices were to follow. There they received explanations on how to maintain the ground. This work is to maintain a permanent herbaceous cover to protect the soil and then having to make periodic mowing (this operation must be performed in the ranks and on the streets). Thus, the soil is ready for the following operations: the pruning and replanting.

Timing

The schedule for this training activity was in February 2015, coinciding with the dates of the schedule of tasks for land preparation. The duration of each activity was:

- Preparatory session with the group in the classroom: 1 h.
- Group visit to the Centre for Agricultural Research - observation of practice: 2 h.
- Experimentation in the farm individually: 3 h.

ACTIVITY 7:
Pruning and replacement of plants

Goals

- ❖ To differentiate healthy from diseased plants.
- ❖ Learning how to make pruning practices.

Transmission method

On account of the cycle hops crop was to begin, the trainer focused on conveying to students how to prune plants hops and how to replace those that did not prosper after planting.

Pruning is to unclog the strain of the plant (mismatching), cut the buds and recapping with earth ("aporcado" in Spanish).

Figure 34. Pruning of the buds hops.



Source: www.marinasbetanzos.org

On the other hand, if the plant has not grown in the right conditions it is necessary to replace it, planting new ones (with rhizomes or plants)

Following the instruction of the trainer, there was a previous session in the classroom to explain the theoretical foundations of practices. Then they visited some farms where farmers taught them how to perform the pruning and the replacement of plants. Then they had to make individual practices.

Timing

This activity was in March 2015, which is the appropriate time to perform the tasks of winter pruning and replacement of plants. The classroom session lasted 1 hour and the visit to the farm and individual practices of the students had a combined duration of 7 h.

**ACTIVITY 8:
Placing tutors**

Goals

- ❖ To discover manual techniques of tutors placement and its purpose.
- ❖ Analysis of new biodegradable tutors.

Transmission method

To install (and maintain) the structures for growing hops is necessary to know some basics, such as the need to put placing tutors on wooden poles. Stems of plants will grow on these tutors.

First, the trainer organised a session in the classroom with students to explain the most important foundations for the installation and maintenance of structures for cultivation.

Then they made a group visit to the field practice for doing an on-site demonstration.

In the field practices also they received explanations about the material of the tutors, which usually are made of plastic or wire. But there is the possibility of using tutors made with biodegradable material (such as coconut fiber or ecological esparto).

After observing how to place tutors, the students made individual practices.

Figure 35. Field practice of placing tutors.



Source: www.sagiter.eu

Timing

These activities were in April 2015: the classroom session was 1 h. and visits and individual practices were 7 h.

ACTIVITY 9:

The climbing

Goals

- ❖ To select the most productive branches for climbing.
- ❖ To do the weed control.

Transmission method

Considering the growing cycle of hops, one of the most important operations is the climbing (or staking) of the plant. This action is performed manually and the development of the plant depends on its proper implementation.

The general procedure for the climbing is to select 6 buds with an intermediate development; then these buds are entwined from the bottom up in two tutors, i.e., 3 buds by tutor. The rest of buds should be removed.

The operation of weed control can be done when the climbing.

For all this, the trainer visited a farm to see how it should be carried out these practices; the aim was to convey that knowledge to their students in the classroom practices.

Finally, the students practiced these techniques in farm production.

Figure 36. Demonstration of the climbing of the hops buds.



Source: www.sagiter.eu

Timing

These practices were developed in June 2015, with a total duration of 4 h.

ACTIVITY 10:
Preventive and productive pruning

Goals

- ❖ To prevent disease and pests by removing lower leaves; this operation allows better aeration of the hop plant.

Transmission method

Students visited the field where they observed how to do the preventive and productive pruning.

This type of pruning is to avoid fungal diseases that are favored by the foliage of the basal part of the plant. This operation is to manually remove the leaves of the lower part of the plant, thus allowing better aeration.

The activity ends with individual experimentation by students doing pruning practices in the plantations of the farm.

Timing

The work program was as follows:

- In July 2015, they were used 2 h. for observing the practice of pruning and the practical classes lasted 4 hours.

ACTIVITY 11:
Bio treatments for fungal diseases and the samples using diatoms

Goals

The hops crops may be affected by pests and diseases that may reduce future production. This activity had the objective of showing knowledge on phytosanitary treatment of hops with respect to the chemicals products used in conventional agriculture⁴. The main objective was that the students knew how to apply ecological treatments to eliminate major pests - red spider mites (*Tetranychus urticae*) and aphids (*Phorodon humuli*). They also knew as decrease the proliferation of the most common diseases, which are powdery mildew fungi (*Pseudoperonospora humuli*) and powdery mildew (*Sphaerotheca macularis*).

Transmission method

In the latter activity, students did practices of researching and experimentation on new products "bio" that had already been used in other groups of agroecological practices (horticultural project group).

Some of the ecological products were earth of diatoms. This material acts as a natural insecticide that helps eliminate pests and reduce diseases. It is of animal origin and it is harmless to both human health and plants. It is also a fertilizer that provides many nutrients to the soil that are of great importance for hops plant growth.

After investigating this type of phytosanitary treatments, the students made practical applications in the field.

Timing

In the same way as activity 10, the actions on treatments "bio" were conducted in July 2015. The students learned for 1 h. how to apply these treatments and then they performed experiments for 2 h.

⁴ The application of agrochemicals in the cultivation of hops in Spain is regulated for this purpose.

DIDACTIC UNIT 2.

TRAINING IN RECOVERY AND TRANSMISSION OF AGROECOLOGICAL KNOWLEDGE IN THE CULTIVATION OF LOCAL HORTICULTURAL VARIETIES

This didactic unit focuses on transmission methods used by the trainer for disclosure on agroecological horticultural production in Galicia to agricultural producers (and / or future).

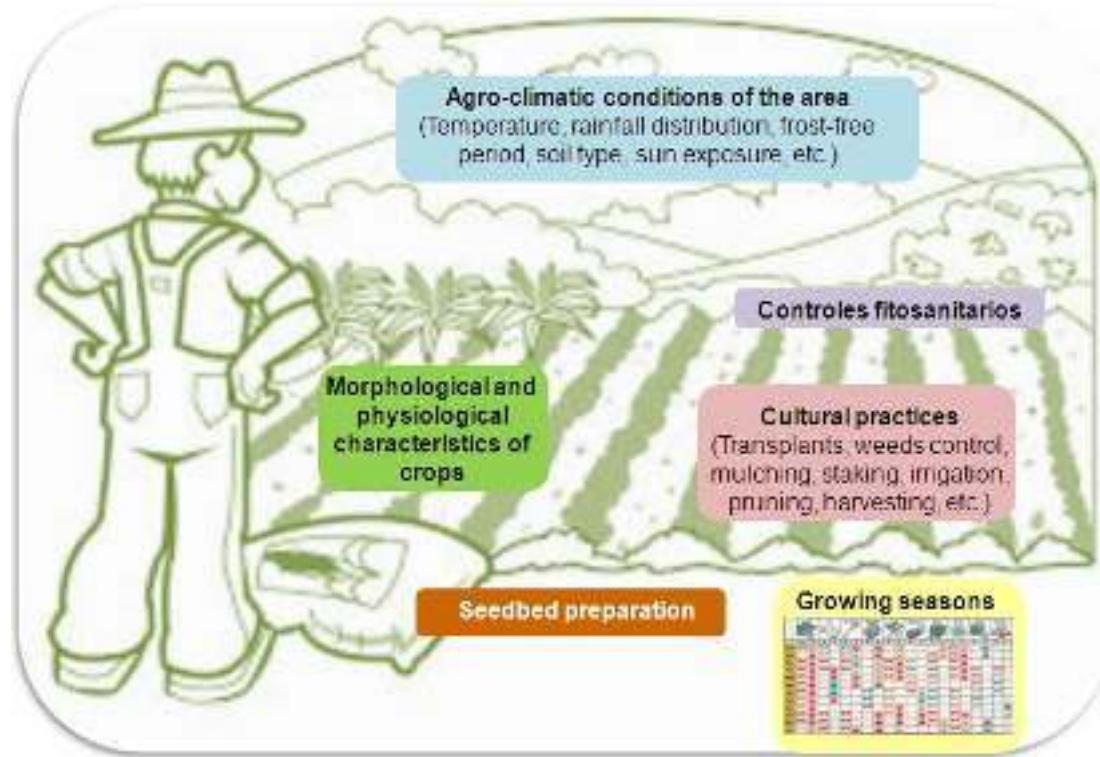
1. RECOVERY OF AGROECOLOGICAL PRACTICES IN HORTICULTURE

Horticultural production is a technique with a varied structure of crops and production systems. Based on the local climate, soil and also by social preferences, a wide range of varieties are cultivated.

Traditional knowledge on the development of local agriculture has to be transmitted to all current (and future) horticulturists as guarantor of recovery of practices in this sector. It is necessary to do a reverent agriculture with the environment and local development, highlighting some techniques as permaculture.

With the recovery of agricultural practices it seeks to identify and study the different traditional products from one region in order to preserve and optimize their production processes. The knowledge transfer is focused on handling and cultivation form. Therefore, it is necessary to consider a number of agroecological factors to develop this type of crops. These factors to consider are shown in Figure 37.

Figure 37. Factors to consider for performing each of horticultural crops in a given local context.



Source: made by myself.

2. LOCAL HORTICULTURAL VARIETIES. Examples of the Galicia region

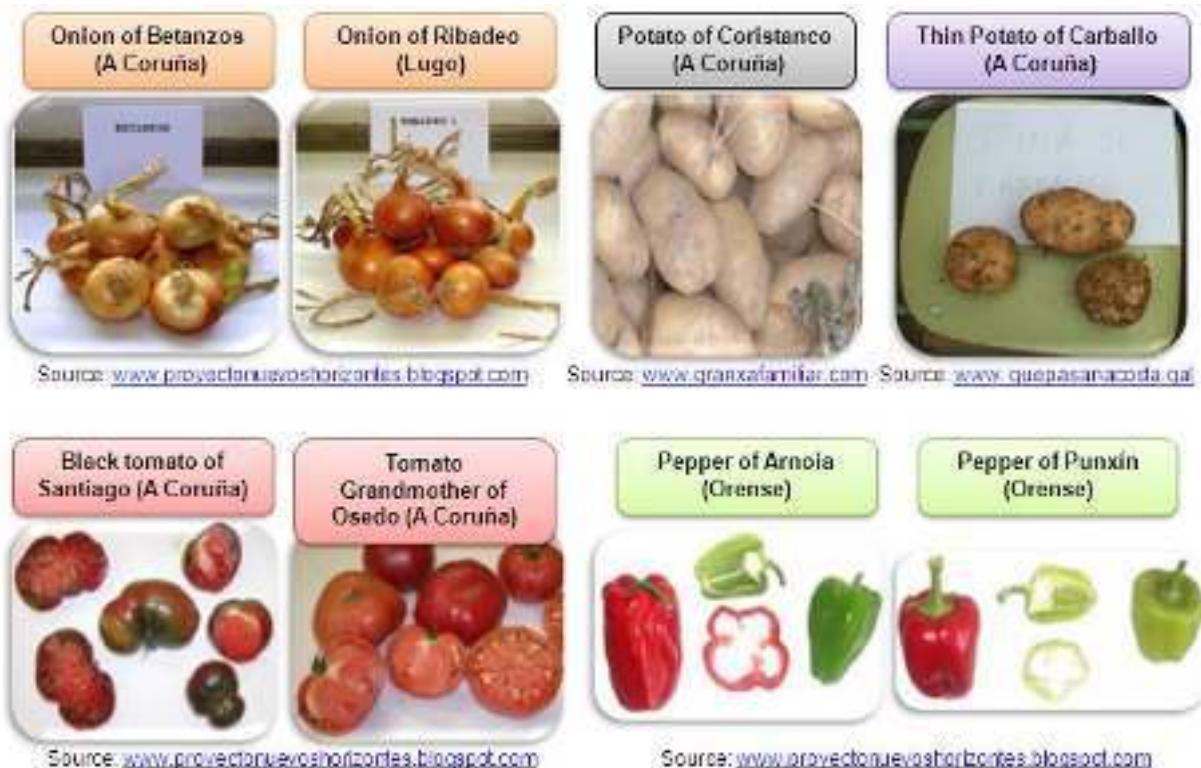
The horticultural varieties of a local agricultural ecosystem have a number of properties that support the attempt to recover and / or maintain their ways of cultivation and production. First, they are characterized by a wide genetic diversity, which helps them adapt to climate, soil and sanitary conditions of the biotope where they develop. Another feature is the ability of the producer to reproduce those varieties each year, thus improving the performance of their productions. Given this set of advantages, today there is a growing commercial interest in this type of local varieties, considering its organoleptic qualities.

Taking the example of Galicia, it is a region with a large agricultural diversity and a wide variety of native species. Despite its characteristic climate of Atlantic influence (frequent rainfall, temperature variations and high relative humidity) Galicia has excellent production due to soil conditions that are conducive to development of all kinds of growing vegetables.

The production of local vegetable varieties in Galicia is carried out throughout the year, with two growing seasons: between November and February, where cruciferous vegetables are grown (such as cabbage or cauliflower), sheet products as well as onions; March to October, others are grown, such as tomatoes, peppers, potatoes, beans, etc.

Among the variety of cultivated native species in certain local contexts of Galicia, in Figure 38 are some examples.

Figure 38. Examples of local horticultural varieties of Galicia.



Source: made by myself.

3. PERMACULTURE. Practical application in order to recover horticultural crops

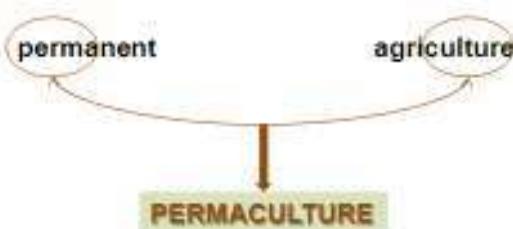
Permaculture is a practical philosophy of design in which ecological principles are applied to achieve sustainable development in the present and future.

It was developed by Bill Mollison and David Holmgren in 1978 with the publication of his book "*Permaculture One: A Perennial Agriculture for Human Settlements*" (Mollison and Holmgren, 1978). Concretely it is defined as "the conscious design of landscapes which mimic the patterns and relationships of nature, while this philosophy also supplies food, fiber and abundant energy to provide for local needs".

Mollison's original idea was to "try to copy the forest ecosystem to create agricultural systems with minimal environmental impact and to generate maximum food" (Cerviño-Fernández, 2013). From a holistic view, this practice aims to teach how to observe the dynamics of natural ecosystems to design production systems that meet human needs without degrading the natural environment. The centerlines are food production, energy supply (both axes focused on self-sufficiency) landscape design and organization of fair and equitable social structures.

A habitat designed according to the principles of permaculture is understood as a system in which the lives of human beings, animals and plants are combined in a respectful and beneficial. The permaculture action is expressed in seven areas represented in the known "permaculture flower" (Figure 40). In each flower petal contains the principles, strategies, methods, practices or elements that have to be chosen.

Figure 39. The permaculture comes from permanent and from agriculture.



Source: adapted from Mollison and Holmgren (1978).

Figure 40. Permaculture flower.



Source: www.permacitylife.com

4. METHOD OF TRANSMISSION OF KNOWLEDGE AGROECOLOGICAL IN THE CROP OF LOCAL HORTICULTURAL VARIETIES

4.1. Timing

The programming carried out by the trainer to conduct the training activities on horticulture (see Table 7) follows the same work dynamics as that of the didactic unit about hops.

EFA Galicia students and a group of local actors interested in participating in this project received this training: Lucia Lorenzo (horticulturist in traditional agroecological farming - Pontecelso, A Coruña), Dolores Pombo (horticulturist in traditional agroecological farming - Coristanco, A Coruña) and Manolo Andrade (Permacultor and expert adviser in biodynamic agriculture - Oza-Cesures, A Coruña).

Table 7. General work calendar of the transmission method about crop of local horticultural varieties followed by EFA Galicia.

PHASES- Activities	TIMING
Preparatory phase <ul style="list-style-type: none"> ▪ Preparation work ▪ Gathering of information: through meetings and interviews several (highlighting the implementation of the way of valorisation "Video permaculture"). ▪ Analysis of the collected information 	June 2014- Sept. 2015
Training students <ul style="list-style-type: none"> ▪ Exposure in the classroom of the collected information ▪ Discussion and analysis of information in the classroom ▪ Field practices ▪ Feedback in the classroom 	From March to October 2015

Source: EFA Galicia.

1) Preparatory phase

During this stage the trainer collected all the necessary information to have basic knowledge.

A. Preparation work

The previous tasks to the collection focused on contacting and meeting with local producers (dedicated to conventional agriculture, organic agriculture or permaculture), such as: Lucia Lorenzo (horticulturist in traditional agroecological farming - Pontecelso, A Coruña), Dolores Pombo (horticulturist in traditional agroecological farming - Coristanco, A Coruña) and Manolo Andrade (Permacultor and expert adviser in biodynamic agriculture - Oza-Cesures, A Coruña). Also with trainers such as Juan Antonio Santos and José Gil (trainers in integrated and ecological agriculture Fontebóá EFA, A Coruña).

In June 2014 began to contact producers in order to encourage their participation in training on recovery of local varieties of vegetable orchards.

When attendees showed their interest, a definitive work group was created (10-15 participants). The trainer contacted a permaculture farmer Manolo Andrade (Permacultor and expert adviser in biodynamic agriculture - Oza-Cesures, A Coruña) with the objective that this farmer could participate in training specifically.

B. Gathering of information

The trainer collected information on agricultural practices through:

- Meetings, interviews and observation practices in local areas of study with the working group of producers.

Figure 41. Observing practices of local varieties with farmers working group.



Source: www.sagiter.eu

- Realisation of the "Video permaculture" with specialized producer in this practice.

The video can be viewed at the following link:



C. Analysis of the collected information

After making the video and have all the necessary information, the trainer analyzed and prepared the didactic materials.

2) Training students

The training activities conducted by the trainer with the students (including the pre-established group of producers) took place respecting the natural cycle of cultivation of local horticultural species used for this type of practice: tomatoes, potatoes, beans and cruciferous vegetables such as cabbage or cauliflower.

A. Exposure in the classroom of the collected information

In the classroom, the trainer transmitted to students all collected knowledge on ecological horticultural production. The same was done with the information of the "Video permaculture" through his viewing and further analysis.

B. Discussion and analysis of information in the classroom

After the information was analyzed and then practical workshops were conducted both collectively (using the technique of observation group) and individually.

C. Field practices

The practical classes were held on farms of training centers EFA Galicia or in private farms.

Activities in these classes were as follows:

- Explanation of agroecological techniques for the recovery and cultivation of local horticultural varieties (soil preparation, planting, soil analysis interpretation, etc.).

Later, students put it into practice through group work and individual.

Figure 42. Individual practice of a student on horticultural crops.



Source: www.sagiter.eu

- Group visit to a farm, where a producer made a demonstration of different farming techniques. After the students put into practice these techniques.

D. Feedback in the classroom

From this knowledge transmission, feedback made in the classroom between the trainer and students / group of local producers served to evaluate and interpret all developed activities in theoretical and practical classes.

5. A TRAINING ACTIVITIES PARALLEL TO THE TRANSMISSION OF KNOWLEDGE

The activities of the training phase are scheduled taking into account the natural cycle of cultivation of horticultural varieties. The purpose was that certain tasks of cultivation (land preparation, seedlings, cultural practices, etc.) coincided with the completion of these activities. In Figure 43 the schedule is presented for each of the training activities in this didactic unit.

Figure 43. Programming training activities in correspondence with tasks crop of local horticultural varieties.



Source: made by myself.

The description of the following sections of each of the training activities focuses on:

- The objectives of the activity.
- The specific transmission methods that were used.
- The work schedule of the transmission methods (timing).

ACTIVITY 1:

Session with 50/60 participants for presentation of the training program

Goals

- ❖ To encourage the public to participate in training.
- ❖ To create the final working group (10/15 part.)

Transmission method

In this training workshop had between 50 and 60 attendees where the trainer presented the training program on recovery of knowledge for growing local organic orchards. They discussed issues related to horticulture and the recovery of local varieties. Thus, participants were encouraged to would engage in training activities to be developed in this project.

Finally, a final working group was created (10-15 participants).

Figure 44. Briefing of the training program with local producers.



Source: EFA Galicia.

Timing

Based on the schedule, this activity took place in February 2015. The briefing lasted approximately 3 h.

ACTIVITY 2:
Training session with local seed varieties in organic farming

Goals

- ❖ To know existing local varieties.
- ❖ To know the procedure for preparing seed.

Transmission method

Before proceeding to explain the seedbed preparation techniques, the trainer explained some local horticultural varieties of Galicia in the classroom.

Subsequently, a visit was made to a greenhouse for seeing seedbeds of different varieties of lettuce. Producers / students were able to follow the explanations of the producer on the techniques employed to carry out the preparation of seedbeds.

Figure 45. Training workshop on preparation of lettuce seedbeds.



Source: EFA Galicia.

Finally, each of the students put into practice the learned techniques on how to develop horticultural seedbeds of local varieties of Galicia.

Figure 46. Various horticultural seedbeds of local species of Galicia.



Source: adapted from www.proyectoenvoshorizontes.blogspot.com

Figure 47. Aspects to consider for the preparation and management of horticultural seedbeds.**Seedbeds:**

'They are small plots which are conveniently prepared where vegetables are planted in order to be transplanted to the field' (Fernández-Cuevas, 1968)

General factors to consider for the preparation and management of horticultural seedbeds**1. SITE SELECTION**

- Well oriented
- With good aeration
- Sheltered from the prevailing winds
- Isolated harmful agents
- With availability of sufficient water
- Easy care and surveillance horticulturist

2. SUBSTRATE PREPARATION

- A good mix substrate with good water retention and aeration is prepared
- The most used substrates to mix and prepare the ground for growing vegetables are sand, peat (coconut fiber can be used as an environmentally friendly substitute) and compost (for mixing approximately equal parts by volume)

3. GUIDELINES FOR SOWING

-Sowing can be directly on the ground or make covered seedbeds (through containers). It depends on the species to sow.

For example:

Seeds sown directly into the ground: garlic, spinach, beans, peas, corn, potato, radish, carrot

Seeds sown in seedbeds or trays: chard, eggplant, squash, onions, cabbage and cauliflower, endive, lettuce, pepper, leek, tomato

4. SOWING

- The seeds are spread evenly over the well flattened substrate, and then the seeds are covered with fine soil or compost; compacting the ground a little. They must be at a depth of about 2 times its diameter. Water should be applied as a fine rain (preferably with a sprayer).

5. TRANSPLANT

- It should be performed when there is no risk of frost and when the plant height exceeds the container (about 8-10 cm)
- After performing some planting holes in the substrate, each plant is removed carefully. They will be introduced in the holes and finally they will be watered.

Source: adapted from Fernández-Cuevas, 1968.

Timing

The seedbed preparation can be performed from February according to the schedule of tasks cultivation of most horticultural species. Therefore, this activity was held in March 2015, with duration of 3 h.

ACTIVITY 3:
Soil preparation - fertilizer in organic farming and farm visit

Goals

- ❖ To know agroecological techniques of soil preparation.
- ❖ Presentation of horticultural exploitation by the producer who applies these agroecological techniques.

Transmission method

In order that current and future producers could know agroecological necessary techniques to prepare the soil, a visit to a particular farm was organised. First, the producer taught them facilities.

Again, the students could see how performing cultural operations to implement and / or care for a horticultural plantation in ecological (fertilization, transplanting, watering, pruning, staking, etc.) through the testimony of the producer. As in other times, learning the techniques was through individual practice of each student.

Figure 48. Observation of students on cultural practices to be done in agroecological farming.



Source: www.sagiter.eu

Timing

In April 2015 they conducted a visit to the farm (for 3 h.) coinciding with cultural operations in a horticultural crop at this time of year.

ACTIVITY 4:

- A. Visit permacultor and realization of video**
- B. Working with video in the classroom: view and analyze**

Goals

- ❖ To know the practice of permaculture.
- ❖ To discover the usefulness of audio-visual for the collection of information about the practice.

Transmission method

A. Visit to permaculture farmer and realization of video

The methodological procedure began when the trainer (José Gil) collected information in order to know both the permaculture farmer (Manolo Andrade) and the activity that he performs. For this, the trainer conducted a short interview following the pattern of the developed models in the SAGITER project.

Figure 49. Moment of the interview between the trainer and permaculture farmer.



Source: <https://youtu.be/pO4VCwqQrs>

The trainer learned that the farmer grows and investigates various horticultural species that are useful for organic farming and permaculture, vindicating the importance of such practices to avoid using chemical products and have a healthier product consumption.

With regard to activity, data on the type of agriculture were collected; it was the agriculture of natural balance or biomimicry, a practice of "tilling 0" (without using tools).

According to Riechmann (2003, p. 28.) "The biomimicry is the science that seeks to understand the operating principles of life at different levels (particularly at the ecosystem level) in order to reconstruct human systems so that they fit harmoniously into the natural systems".

The farmer explains that this practice is:

- i. Building a bancal of land (using, for example, wooden slats) where it is necessary to keep the land without any type of tillage (unturned) with the main purpose of maintaining the biodiversity of microorganisms. With minimal space, he claims that it is possible to get a very productive bancal where a variety of species can be grown throughout the year.
- ii. On the other hand, the land is covered with "mulch" (or padding) of dry grass (or straw) to keep moisture (not have to water as much) in order that the land is not in contact with air and can still maintain all bacteria, mycorrhiza, etc. This also helps the plants can be more resistant to drought and can have a better flavor for consumption.
- iii. Finally, the plants are planted (or sown) manually without using farm tools as the "mulch" facilitates this type of operation (because the earth is more manageable).

Figure 50. Knowledge of the activity: permacultur farmer explanations of how to make agriculture of biomimicry.



Source: <https://youtu.be/pO4VCwvqQrs>

B. Working with video in the classroom: view and analyze

The activity continued with viewing in the classroom by the students of the portion of the video about the information of the farmer and the used practices, and where the trainer gave appropriate explanations⁵. Students could handle basics of permaculture on biomimicry. Finally, they did practices with the help of the trainer to complete the transmission process of agroecological knowledge.

⁵ At this stage it is important to note the interaction and the different transmission roles played by the farmer with the trainer and then the trainer with the students.

Figure 51. Presentation of the trainer in the classroom of the contained information in the "Video permaculture".



Source: <https://youtu.be/pO4VCwvgQrs>

Permaculture practice took place on a farm training center. To do this, the trainer explained how to design and build a culture bancal according to the practice of biomimicry. In Figure 52 some of the moments of the training process of students can be seen.

Figure 52. Practice class of permaculture.



Source: <https://youtu.be/pO4VCwvgQrs>

Both work with the video in the classroom (viewing and analysis) and practices on the farm are also included (in summary form) in the final video as a result of the implementation of way of valorisation "Video permaculture".

Timing

This activity was held in September 2015, using 3 h. to visit and interview the farmer; 4 h. to make all the audiovisual work, 1hr to expose the video in the classroom and finally the dedication of 3 h. for practicing of permaculture in the farm center.

ACTIVITY 5:

Soil study and interpretation of soil analysis with group of horticulturists

Goals

- ❖ To know the nutritional requirements of soil and study an alternative crop.

Transmission method

During this activity, the trainer transmitted to students and the group of producers how to conduct a soil study. To do this, he explained the basic operations required for collecting soil samples, which subsequently must be analyzed in the laboratory. Then he taught how to interpret a soil test.

Figure 53. Training workshop on the soil study with producer group.



Source: www.sagiter.eu

Figure 54. General aspects for a soil study.

Soil analysis:

They are the essential part of any program of agricultural management in agricultural production. With this study can be known aspects such as: soil fertility, availability of nutrients or amendments that are (or not) necessary to perform.

ACTIVITIES FOR DOING THE SOIL STUDY: (Garrido-Valero, 1993)

1. Observation of the development problem
2. Observation of the extent and depth of the soil
3. Definition of sampling points.
4. Sampling and data collection in the field
5. Decision on the analysis to be performed
6. Preparation of samples for dispatch to the laboratory
7. Analysis of samples in the laboratory
8. Interpretation of the analyzes
9. Decisions for good management soil



Source: www.recorridocida.com



Source: www.ambienteysdesarrollointeligente.blogspot.com

Source: adapted from Garrido-Valero (1993).

Timing

This training workshop was in November 2015 for 3 h.

MODULE 3.

TRANSMISSION OF AGROECOLOGICAL KNOWLEDGE TO STUDENTS IN A LOCAL DEVELOPMENT CONTEXT'S FRAME

Agroecology, as an alternative to the negative consequences of modern agriculture to social, economic and especially environmental level, is presented as one of the new paradigms to promote sustainable local development.

The ability to retrieve, transmit and consolidate local knowledge and experience requires that educators facilitate the involvement of the "carriers" of this knowledge (producers, trainers, technicians, scientists, etc.) to determine how they use them, how they have acquired and to collect the necessary information. In this way, answers can be obtained and develop learning processes to transmit learned lessons through theoretical and practical training. The interaction established between different local actors can create a chain of transmission from the "owners of knowledge" to "the needy of knowledge" (Martínez-Mendoza *et al.*, 2010).

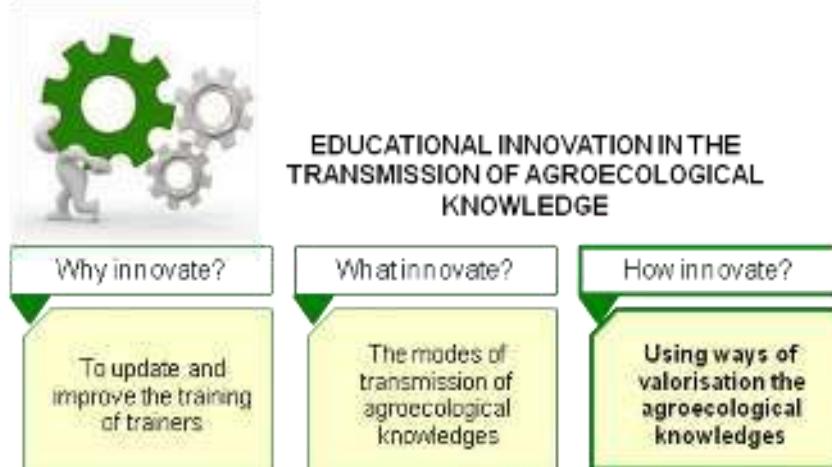
The training programs for the recovery of agroecological knowledge have to generate participatory spaces, promote interest and to wake new concerns in the local producers. It is also important to emphasize the idea of creating in the receiving public a sense of responsibility and ownership on ecosystems and the territory to which they belong. In short, the trainers have a task of promoting and pedagogical training for the valorisation of local resources in order to accompany the construction (and evolution) of knowledge in agroecology.

1. DEVELOPMENT OF INNOVATION IN THE WAYS OF TRANSMISSION OF AGROECOLOGICAL KNOWLEDGE

The ways of transmitting agroecological knowledge need innovative processes of methodological and didactic character. These processes have to have an impact on improving the training of trainers and the quality of education they impart.

Taking into account that there are different strategies of educational innovation, in the case of transmission of agroecological knowledge it is proposed that the trainers be trained in the domain of methodological tools such as those that arise under the SAGITER project. The use of these teaching methods must allow updating their methodological training and effectively ensure the process of dissemination of knowledge and local experimentation.

Figure 55. Training innovation in recovery and transmission of agroecological knowledge.



Source: made by myself.

GENERAL CONCLUSIONS

In the following, general conclusions are presented on the itinerary of training for trainers of this document.

Figure 56. General conclusions of the proposed training itinerary.

There is a need for an **educational model** that responds to the interests of **trainers** for the **transmission of agroecological knowledge**.

SAGITER contributes to respond to certain priorities of the new strategy of the European political - **Europe 2020 Strategy** - about

- a) **improving training** based on the acquisition of knowledge in a professional environment
- b) protection of biodiversity and the **development of agriculture that respects the environment**, promoting the exchange of best practices.

In this work is proposed an **Itinerary of training of trainers** based on the application of methodological tools (**ways of valorisation and transmission methods**) for recovery and training in agroecological knowledge

It promotes knowledge gathering (*Know how, behavior*) on the 'ecology of knowledge' of a territory

It aims to update, promote, transmit and retrieve traditional agroecological practices and local experimentations.

To promote the diversity of **environmental and agroecological practices** in the receiving public of training against the conventional agricultural practices

Source: made by myself.

GLOSSARY

Agricultural extensionism. It is to facilitate processes to the producers by way of which they can develop and strengthen their own work: teaching new practices and technologies; solving problems, in order to generate a real impact to improve their living conditions.

Biotope. It refers to a geographical area with uniform environmental conditions for the development of certain species of plants and / or animals.

Bordeaux mixture. It is a combination of copper sulfate, lime and water which is used to combat fungal diseases.

Compost. It is the result of applying a technique to transform all sorts of organic residues of animal and / or plant; it can be used as fertilizer.

Diatoms. It is a material made of fossilized microscopic algae that occur as siliceous sedimentary rocks of intense white color.

Dioecious species. This is a species that has male individuals and female individuals.

Ecotype. Group of plants which are genetically distinct and occupy a specific habitat.

European Programme Leonardo da Vinci (Lifelong Learning Programme). Programme funded by the European Commission which is focused on the needs of education and training of all those involved in education and vocational training.

Neorural. It refers to the person who leaves the city and goes to rural areas with an alternative life project.

Organoleptic qualities. They are the physical properties of a material that can be perceived through the senses, such as taste, texture, smell or color.

Periurbano. Concerning the status of interface between cities and rural areas.

BIBLIOGRAPHY

- Alonso-Mielgo, A.M., Guzmán-Casado, G.I. (2008). *Buenas Prácticas en Producción Ecológica. Cultivo de hortícolas.* Ministerio de Medio Ambiente y Medio Rural y Marino, Madrid, 28 pp.
- Cerviño-Fernández, P. (2013). *El bosque comestible.* Revista Ecohabitar, 39: 38-41.
- Fernández-Cuevas, A. (1968). *Semilleros.* Hojas Divulgadoras, nº7-H. Ministerio de Agricultura, Madrid, 24 pp.
- Garrido-Valero, M.S. (1993). *Interpretación de análisis de suelos.* Hojas Divulgadoras, nº 5/93 HD. Ministerio de Agricultura, Pesca y Alimentación, Madrid, 40 pp.
- Guzmán-Casado, G.I., Alonso-Mielgo, A.M. (2008). *Buenas Prácticas en Producción Ecológica. Uso de Abonos Verdes.* Ministerio de Medio Ambiente y Medio Rural y Marino, Madrid, 20 pp.
- Jiménez-Jiménez, B. (1995). *La formación del profesorado y la innovación.* Educar, 19: 33-46.
- Martínez-Mendoza, F.Z., Bakker, N., Gómez-Hernández, L. (2010). *Herramientas para la Metodología Campesino a Campesino. Innovación pedagógica para construir saberes agroecológicos.* Leisa revista de agroecología, 26 (4): 9-11.
- Mollison, B., Holmgren, D. (1978). *Permaculture One: A Perennial Agriculture for Human Settlements.* Tagari Publications, Tasmania, 130 pp.
- Riechmann, J. (2003). *Un concepto esclarecedor para pensar la sustentabilidad.* El Ecologista, 36: 28-31.

WEBGRAPHY

Consulted websites from January to April 2016:

- www.agq.com
- www.agriculturesnetwork.org
- www.agrohuerto.com
- www.ambienteydesarrollo3unefa.blogspot.com
- www.benbo.eu
- www.botanical-online.com
- www.campogalego.com
- www.ciam.es
- www.construnatura.com
- www.corporacionhijosderivera.com
- www.ecoagricultor.com
- www.farodevigo.es
- www.granxafamiliar.com
- www.holmgren.com.au
- www.lavozdegalicia.es
- www.lutega.com
- www.magrama.gob.es
- www.marinasbetanzos.org
- www.permacitylife.com
- permacultureprinciples.com
- proyectoñuevoshorizontes.blogspot.com
- www.redagricola.com
- www.sagiter.eu
- www.tierramor.org



Federación
Galicia **EFA**



«Project Reference: 538785-LLP-1-2013-1-FR-LEONARDO-LMP»
This project has been funded with support from the Lifelong Learning
Programme - Leonardo da Vinci sub-programme

