

Organic Knowledge Network Arable

OK-Net Arable

Facilitated and self-learning courses

Deliverable number	<i>D.4.2</i>
Dissemination level	Public
Delivery date	23-02-2018
Status	<i>Final</i>
Lead beneficiary	<i>CIHEAM-Bari</i>
Author(s)	<i>Ramez MOHAMAD, Lina AL BITAR, Deaa ALWANNEY, Suzana MADZARIC</i>



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 652654. This communication only reflects the author's view. The Research Executive Agency is not responsible for any use that may be made of the information provided.

Document Versions

Version	Date / Contributor	Summary of Changes
0.1	30-11-2017 / Ramez MOHAMAD	First draft
0.2	06-12-2017 / Lina AL BITAR and Ramez MOHAMAD	Second draft
0.3	15-02-2018/ Bram Moeskops	Review
1.0	22-02-2018 / Ramez MOHAMAD	Final version
1.1	09-05-2018 / Ramez MOHAMAD	Change of tables: Table 1 “List of participants’ countries in the facilitated on-line courses”; Table 2 “Number of participants by institutions”

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Executive summary

The Mediterranean Agronomic Institute of Bari CIHEAM-Bari produced this report as a part of the Organic Knowledge Network Arable (OK-Net Arable) project, Work Package 4. CIHEAM-Bari has developed two facilitated courses and a self-learning one according to the international E-Learning standards to promote the use of end-user material beyond the farmer innovation groups and the knowledge platform of the project. This report provides a description of these courses. Facilitated courses were developed using Learning Management System (LMS) on the CIHEAM-Bari e-learning platform and were addressed to 70 participants from 26 countries (77% European countries and 23% non EU Mediterranean countries). Participants represented different institutions and profiles, such as ministries of agriculture, Universities, associations, certification bodies, farmers, private companies, research centres, extension services etc. The self-learning course is delivered on the project knowledge platform to be followed indefinitely by users even after the end of the project.

Table of contents

Executive summary.....	3
Table of contents.....	4
Table of Figures	6
Table of Tables.....	6
1 Introduction	7
2 Facilitated courses	7
2.1 General overview.....	7
2.2 Participants.....	7
2.3 Course structure	9
2.3.1 Course programme.....	9
2.4 Tools and activities	9
2.5 Teaching materials.....	11
2.6 Module and tools evaluation.....	11
2.7 Monitoring.....	11
2.8 Course outcome	11
3 Self-learning course	12
4 Annex 1: Evaluation form	13
5 Annex 2: Modules description and evaluation	14
5.1 Module 1 - Strategies to enhance soil fertility and assessment of soil fertility and quality	14
5.1.1 Rationale:.....	14
5.1.2 Module objectives:	14
5.1.3 Module evaluation:	14
5.1.4 Tools evaluation.....	15
5.2 Module 2 – Fertilization strategies to enhance nutrient availability in organic arable crops.....	16
5.2.1 Rationale:.....	16
5.2.2 Module objectives:	17
5.2.3 Module evaluation:	17
5.2.4 Tools evaluation.....	18
5.3 Module 3 – Monitoring, preventive and curative measures for pests and diseases management	19
5.3.1 Rationale:.....	19
5.3.2 Module objectives:	19

5.3.3	Module evaluation:	19
5.3.4	Tools evaluation.....	20
5.4	Module 4 - Technical tools, strategies and machineries to tackle weeds in organic arable farming 21	
5.4.1	Rationale:.....	21
5.4.2	Module objectives:	21
5.4.3	Module evaluation:	21
5.4.4	Tools evaluation.....	22
5.5	Module 5 - Crops specific problems and potential solutions in cereals, legumes, fruits and vegetables	23
5.5.1	Rationale.....	23
5.5.2	Module objectives	23
5.5.3	Module evaluation:	24
5.5.4	Tools evaluation.....	24
5.6	Module 6 – Recovery and final synthesis	25
5.6.1	Rationale.....	25
5.6.2	Module objectives	25
5.6.3	Module evaluation.....	25
5.6.4	Tools evaluation.....	26

Table of Figures

Figure 1: Platform structure	10
Figure 2: First module on the learning path	10
Figure 3: Certificate template.....	12
Figure 4: Evaluation of the first module "Strategies to enhance soil fertility and assessment of soil fertility and quality"	14
Figure 5: Evaluation of the second module "Fertilization strategies to enhance nutrient availability in organic arable crops"	17
Figure 6: Evaluation of the third module "Monitoring, preventive and curative measures for pests and diseases management"	19
Figure 7: Evaluation of the fourth module "Technical tools, strategies and machineries to tackle weeds in organic arable farming"	21
Figure 8: Evaluation of the fifth module "Crops specific problems and potential solutions in cereals, legumes, fruits and vegetables"	24
Figure 9: Evaluation of the sixth module "Recovery and final synthesis"	26

Table of Tables

Table 1: List of participants’ countries in the facilitated on-line courses.....	8
Table 2: Number of participants by institutions.....	8

1 Introduction

The aim of the OK-Net Arable project is to improve the exchange of innovative and traditional knowledge among farmers, farm advisers and scientists to increase productivity and quality in organic arable cropping throughout Europe, and to improve their environmental performance, in order to satisfy citizen and consumer demands.

The project has three specific objectives: 1) to create a European network of well-functioning organic arable farmer innovation groups representing the best examples of co-innovation by farmers and researchers; 2) to digest and synthesize scientific and practical knowledge about organic arable farming to identify best practices (the project will develop and test innovative practical and educational material based on this information); 3) to create a European platform for knowledge exchange focusing specifically on organic arable farming drawing on experiences from diverse contexts. The project consists of 4 work packages.

The work package 4 "Knowledge platform and communication" aimed to establish a permanent online platform for knowledge exchange among organic and low-input farmers and their advisory services, and to disseminate the project outcomes. In the framework of this work package one of the main objectives is to develop on-line and self-learning to promote the use of end-user material beyond the farmer innovation groups and the knowledge platform of the project.

2 Facilitated courses

2.1 General overview

The objective of the on-line courses was to familiarize participants with the latest insights, context and concepts of organic arable farming with reference to tools and practices collected by OK-NET ARABLE project. The on-line courses presented the innovative and traditional knowledge collected and exchanged by farmer innovation groups, extension agents, scientists and stockholder groups throughout Europe. The first on-line course "Challenges of Organic Arable Farming" took place from April 3 to June 30, 2017; the second from September 4 to November 30, 2017. In a later step, the contents of the facilitated courses were used for the self-learning course which is described in the third section of this report.

2.2 Participants

A total of 70 participants (29% from project partner countries and 71% from other countries), from 26 countries (77% European countries with a priority to project partnering ones and 23% non EU Mediterranean countries (Table 1)), attended the first and the second courses, representing different institutions and profiles (Table 2), such as ministries of agriculture, associations, universities, certification bodies, farmers, private companies, research centres, extension services etc.

Participants to each course were divided into groups supervised each by a tutor to facilitate interaction and discussion in the forum created for this purpose.

Table 1: List of participants' countries in the facilitated on-line courses

Country			Number of participants
European countries	Countries of project partners	AUSTRIA	1
		BULGARIA	7
		BELGIUM	1
		FRANCE	2
		GERMANY	3
		HUNGARY	4
		ITALY	3
	Other countries	BOSNIA HERZEGOVINA	1
		CYPRUS	1
		IRLAND	5
		KOSOVO	1
		LATVIA	1
		MALTA	1
		POLAND	2
		PORTUGAL	1
		ROMANIA	4
		SERBIA	2
		SLOVENIA	3
		SPAIN	2
UKRAINE	1		
Non-EU - Mediterranean countries	ALGERIA	1	
	EGYPT	7	
	JORDAN	3	
	LEBANON	7	
	MOROCCO	1	
	TUNISIA	5	
TOTAL			70

Table 2: Number of participants by institutions

Institution	Agriculture (ministries, agencies, institutes..)	Associations	Universities	Research centres	Certification bodies	Environment and public health	Farmers	Private companies	Extension services
Number of participants	18	12	12	11	6	3	3	3	2
% of the total number	12,6	8,4	8,4	7,7	4,2	2,1	2,1	2,1	1,4

2.3 Course structure

Each course lasted three months and consisted of six modules covering the five topics of the OK-Net knowledge platform: Soil quality and fertility, nutrient management, pest and disease control, weed management and crop specific issues. Each module lasted two weeks and consisted of teaching materials was based on a PowerPoint presentation supported by related tools.

2.3.1 Course programme

- ✚ **1st module:** Strategies to enhance soil fertility and assessment of soil fertility and quality, from April 3rd to April 16th and from September 4th to September 17th.
- ✚ **2nd module:** Fertilization strategies to enhance nutrient availability in organic arable crops, from April 17th to April 30th and from September 18th to October 1st.
- ✚ **3rd module:** Monitoring, preventive and curative measures for pests and diseases management, from May 1st to May 14th and from October 2nd to October 15th.
- ✚ **4th module:** Technical tools, strategies and machineries to tackle weeds in organic arable farming, from May 15th to May 28th and from October 16th to October 29th.
- ✚ **5th module:** Crops specific problems and potential solutions in cereals, legumes, fruits and vegetables, from May 29th to June 11th and from October 30th to November 5th.
- ✚ **6th module:** Recovery and final synthesis, from June 12th to June 30th and from November 6th to November 30th. This module represented the synthesis and recovery of information provided in previous modules, with particular focus on farmer group's opinion on topics covered.

2.4 Tools and activities

The e-learning course was delivered on an on-line platform. The “Peer learning” approach was adopted to set up a “Community of practice” sharing common interests and stimulating participants to interact in a constructive and open-minded discussion. The interaction occurred in a discussion forum, on the platform, through which significant contributions were beneficial to the course contents (collaborative method).

Claroline was selected as Learning Management System (LMS) based on the applied methodology and adopting the most appropriate solutions, in terms of both user-friendliness and the cost-benefit ratio (Open Source).

Each participant was provided by a user name and password to enter the platform. Once the participant enters, Claroline demonstrates the platform structure (Figure 1) which contains tools (i.e. course description, agenda, learning path, announcements, documents, forum, links, chat) to facilitate the learning process.

Each participant had to follow each module by doing tasks classified in the following categories:

- Individual learning: to read the main teaching material provided in the “learning path” section (i.e. Figure 2) and the complementary material in the “document” section.
- Group discussion: to enter the “discussion forum” section to discuss with other group members the module content (i.e. to: open discussion, raise questions, develop the ideas or answer the questions raised by other members, provide comments....)

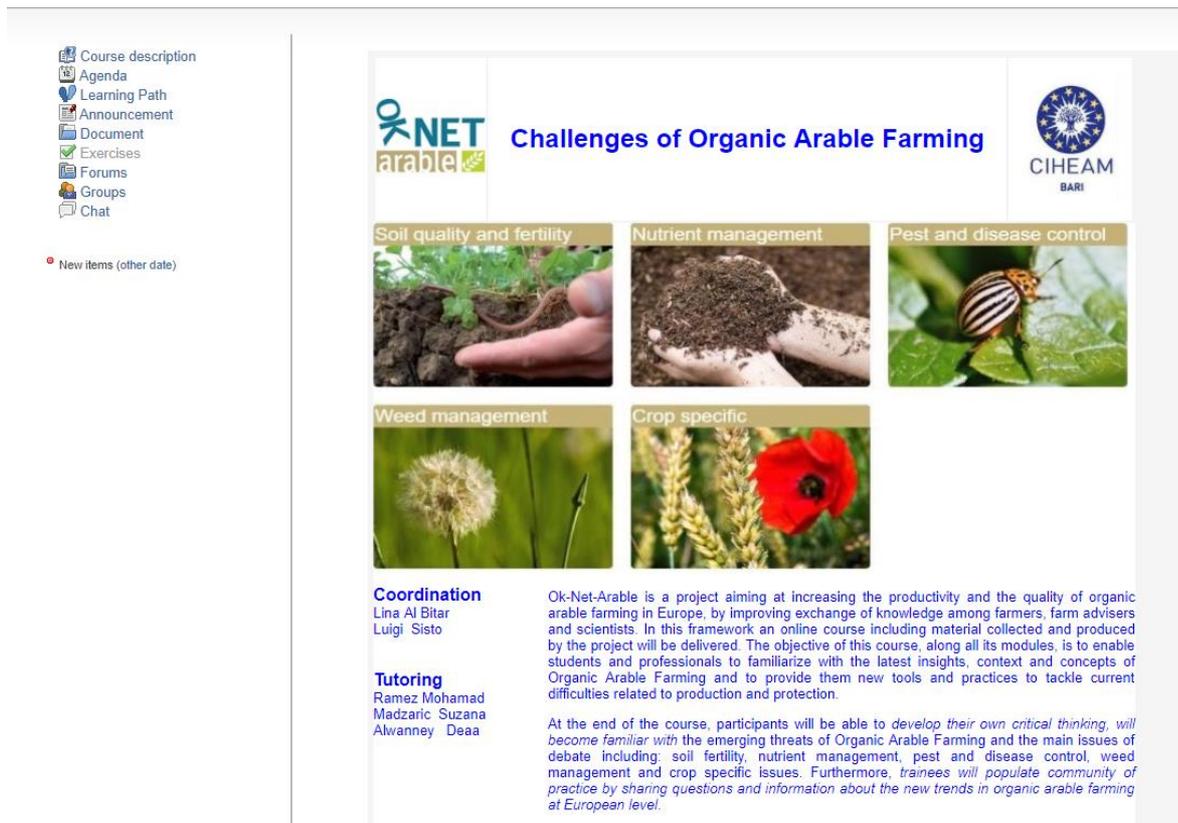


Figure 1: Platform structure

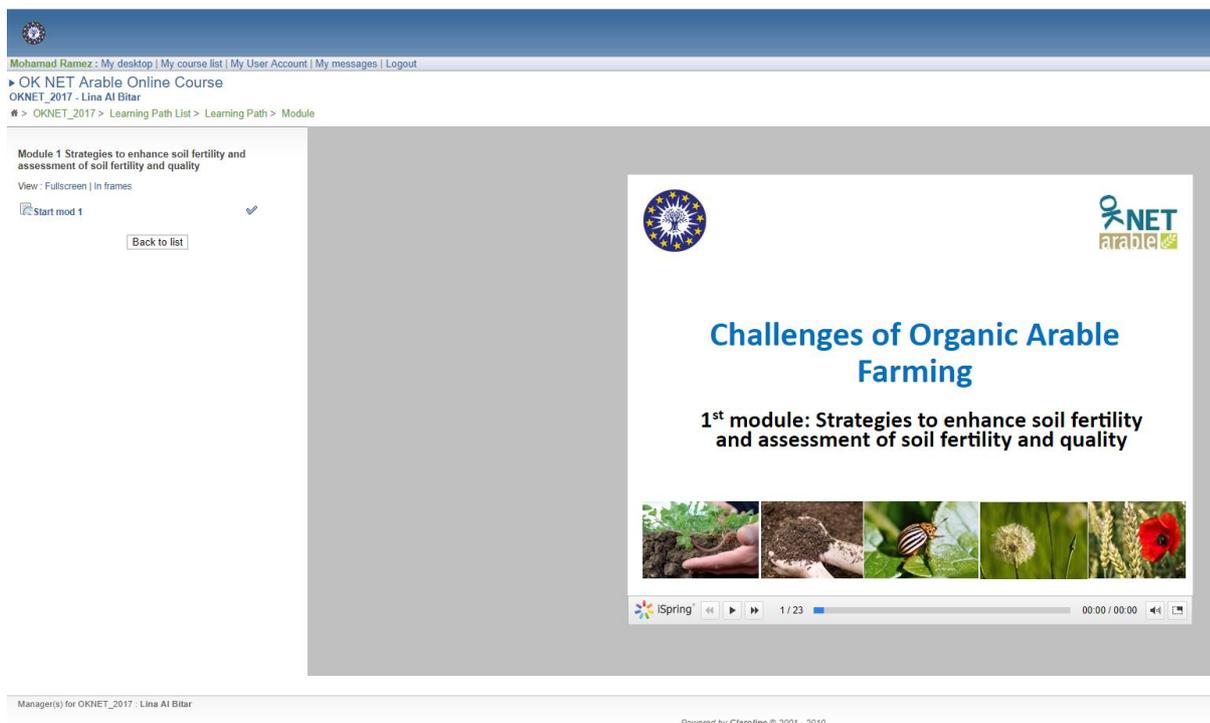
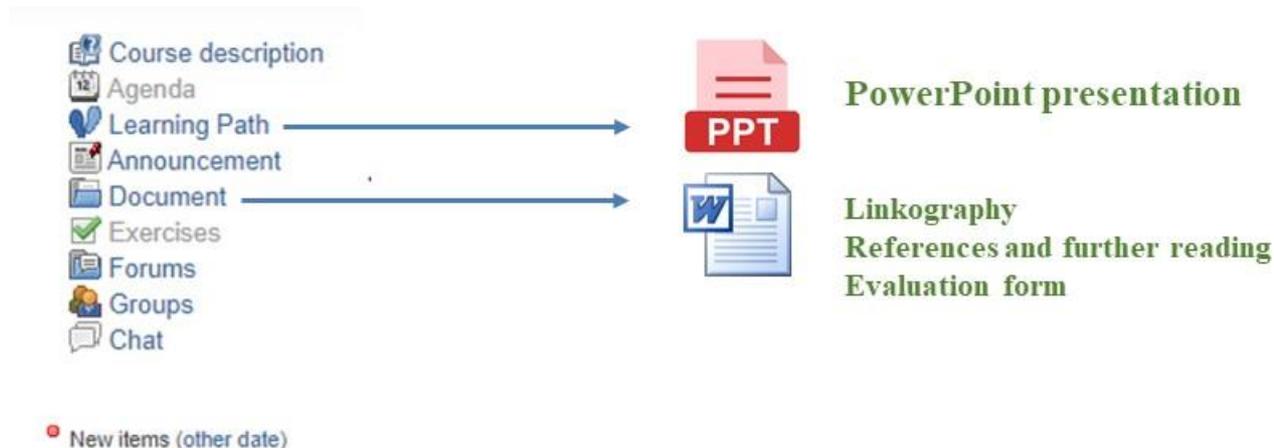


Figure 2: First module on the learning path

2.5 Teaching materials

Course material (infographic below) were basically based on a PowerPoint presentation containing a theoretical background and supported by related specific tools (practice abstracts, leaflets, guidelines, data calculation tools, videos, books, reports, web pages etc.) taken from the OK-Net knowledge platform <http://farmknowledge.org/>. The material was prepared in English by the course tutors: first starting by screening the available tools on the platform in order to extract all the tools that are linked to the module; a second screening was done to the extracted tools to filter the English based one. Selected tools were integrated in the on-line courses and used to support the arguments covered in the PPT presentation. Furthermore, the list of references and further reading, linkography and an evaluation forms were provided in the “document” section of the platform.



2.6 Module and tools evaluation

At the end of each module participants were asked to fill in an evaluation form to evaluate the module and tools provided in the module (Annex 1). The module evaluation included five categories (fair, good, very good and excellent) to be evaluated while in the tool evaluation, participants were asked to evaluate each tool by giving a score from 1 – to 5 (i.e. 1 means ‘not at all useful’ and 5 means ‘very useful’). Both evaluations were complemented with specific comments or suggestions area. It is worth mentioning that all the comments were included in this report as they were written by participants without any modification or language correction. Evaluation results are shown in annex 2.

A tutor was assigned by CIHEAM-Bari to each group in order to: prepare the teaching materials, guide the participants through the learning process, moderate the discussion forum and interactions, answer questions or address them to the external experts whenever needed (the system facilitated the access of any external expert to the discussion forum), monitor and solve any occurred technical problem, collect and elaborate evaluations.

2.7 Monitoring

The course was monitored by the tutors and by a monitoring system which reported the access history of all participants to all e-learning tools.

2.8 Course outcome

The courses were completed successfully. Participants showed interest and satisfactory impression on the course particularly on material organization and presented tools. The courses were beneficial and modules provided 70 participants with relevant knowledge in the organic arable farming, and helped them to contribute to the development of the organic agri-food sector in their countries.

A certificate of completion was issued by CIHEAM-Bari and IFOAM EU (i.e. Figure 3).



Figure 3: Certificate template

3 Self-learning course

Material used in both facilitated courses were re-organized to be used in the self-learning course. Material was uploaded on the OK-Net knowledge platform in a space devoted to the self-learning course <http://farmknowledge.org/index.php/courses>. The course is now open and free for all users. They can easily read and/or download the material. Each presentation provides links to the tools enabling users to read and/or download them and add comments.

4 Annex 1: Evaluation form




**MODULE & TOOLS
EVALUATION**

You are kindly asked to evaluate the module “Strategies to enhance soil fertility and assessment of soil fertility and quality” and the tools provided to enrich it. The analysis of the information collected through this questionnaire is an essential step in the process of improvement.

a) MODULE EVALUATION

Please rate each of the following objects on a rating scale of “fair, good, very good, excellent”

Object	fair	good	very good	excellent
Clearness of content				
Benefit of contents for your curriculum/profession				
Benefit of provided tools				
Time devoted to the module				
Overall evaluation				

Suggestions

.....

b) TOOLS EVALUATION

Please rate each tool used in this module on a rating scale from 1 to 5, where 1 is ‘not at all useful’ and 5 is ‘very useful’ and complete the evaluation by providing your comments or suggestions either positive (+) or negative (-).

Tools		Usefulness (from 1 to 5)	Comments and suggestions	
Type	Title		(+)	(-)

5 Annex 2: Modules description and evaluation

5.1 Module 1 - Strategies to enhance soil fertility and assessment of soil fertility and quality

5.1.1 Rationale:

In organic farming systems, soil fertility means more than just providing plants with macro- and micronutrients. An effective fertility management interests plants, the soil organic matter and the soil biology. Additionally, it is one of the central roles of organic agriculture to either enhance or sustain the overall quality and health of the soil ecosystem.

5.1.2 Module objectives:

This module aimed to introduce the major problems in soil fertility of organic arable farming, explain soil fertility and soil quality concepts, and to provide information about strategies that contribute to fertility enhancement and quality assessment of the organically managed soils. Eventually, such module was meant to encourage the participants to discuss on this important topic.

5.1.3 Module evaluation:

As shown in Figure 4, very few participants found the time devoted to this module inadequate. Content clearness and overall evaluation tended to be very good, while benefits of the content varied from good to excellent. Tools used in this module contained some practical guidelines to estimate soil fertility and some relatively new means in managing soil fertility. These tools motivated participants and enriched the discussion, and that is why majority of participants evaluated the benefit of provided tools positively (very good and excellent).

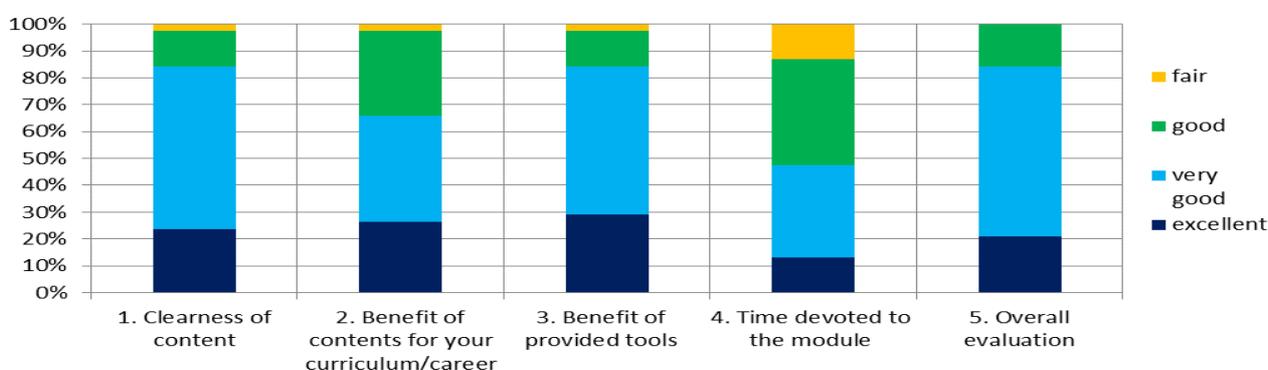


Figure 4: Evaluation of the first module "Strategies to enhance soil fertility and assessment of soil fertility and quality"

Suggestions and comments reported by participants:

- The Hyperlinks are so useful and add so much information however big material needs time and efforts to be read, so I suggest that the main examples or points that have to be delivered can be simplified in additional slides.
- Movies are great tool to deliver fast the information in a known language.
- It could be great to give us the main method or easy method that can help us to assess the different important soil parameters in the field without the need to read hundreds of pages.
- Time devoted to the module is sufficient but only if you are full time involved in the learning. Unfortunately, it is not enough if you are working at the same time.
- Vocal explanation to accompany the slides would enhance the presentation.

- It was great to get straight into the methods which are being used by both farmers and researchers right across Europe.
- There was a good mix of resources and tools throughout the module to highlight the key points being addressed in the module.
- The YouTube videos are particularly informative as you can see key results.
- Downloadable PDF of the slides would be helpful to access content in the future.
- PPT is quite basic (therefore the low mark in content), most of the information needs to be looked up in the pdf /tools which makes it quite time consuming in case somebody would like to get all information.
- I suggest more paper (practice abstract) and videos, they are very useful.

5.1.4 Tools evaluation

As shown in the infographic below, in this module 18 tools were evaluated. The score ranged between 3.3 for the tool “Indo-swiss collaboration in biotechnology” and 4.4 “Earthworms: architects of fertile soils”.

Tool	Score	Comments
 Aerated compost tea (ACT) to improve soil biology	4.4	<ul style="list-style-type: none"> ▪ Interesting and instructive. ▪ Straightforward
 Catch crop in maize	4.1	<ul style="list-style-type: none"> ▪ Direct information but the application is limited to this crop.
 Cover Crop (Rye) and No-Till System in Wisconsin	4.2	<ul style="list-style-type: none"> ▪ Interesting concept
 Earthworms: architects of fertile soils	4.5	<ul style="list-style-type: none"> ▪ Very exhaustive material
 Intercropping grain peas with barley	4.2	<ul style="list-style-type: none"> ▪ Useful but further examples are still needed.
 Reduced Tillage: Farmers' Motivations and Problems	4.0	<ul style="list-style-type: none"> ▪ Important details for farmers.
 ROTOR: organic crop rotation planner	4.1	<ul style="list-style-type: none"> ▪ Excellent tool, very instructive. In some cases, it needs special access.
 SmartSOIL Tool	4.1	<ul style="list-style-type: none"> ▪ Diversified results and interesting figures. However, many information are too general.

	Soil quality test kit guide	4.2	<ul style="list-style-type: none"> ▪ Informative and rich in applicable information.
	Sort Out Your Soil: A practical guide to green manures	4.4	<ul style="list-style-type: none"> ▪ Clear and concise content but more practical examples of crop rotations would be useful
	The Muencheberg Soil Quality Rating (SQR)	4.0	<ul style="list-style-type: none"> ▪ Oriented for specialists. Innovative and practical methods in soil quality assessment.
	The Spade test - Visual soil assessment in the field	4.2	<ul style="list-style-type: none"> ▪ Important remarks and useful information for farmers.
	Tilman-org: videos on reduced tillage in organic farming	4.2	<ul style="list-style-type: none"> ▪ Clear practices explanation.
	Visual soil assessment: field guide for cropping	4.1	<ul style="list-style-type: none"> ▪ Knowledgeably prepared and presented.
	Biofactor project EU	3.8	<ul style="list-style-type: none"> ▪ Easy to navigate website and promising information, but the presentation is still unattractive.
	IMPROVE-P	3.6	<ul style="list-style-type: none"> ▪ Rich alternative P sources.
	Indo-swiss collaboration in biotechnology	3.3	<ul style="list-style-type: none"> ▪ Not interesting to small EU farmers.
	Visual soil assessment (vsa) field guides	3.9	<ul style="list-style-type: none"> ▪ Detailed practical guide.

5.2 Module 2 – Fertilization strategies to enhance nutrient availability in organic arable crops

5.2.1 Rationale:

Inadequate nutrients supply is often a factor limiting yields in organic farming. In addition to a short introduction of the topic, the course will offer innovative practices and tools allowing for a more efficient use of natural resources and processes in order to improve farm nutrient recycling and to optimize the use of nutrients into the soil.

5.2.2 Module objectives:

The objective of the module was to present the main problems related to the nutrient management in organic arable farming. Trainees got information about tools and practices that can help them develop a sound nutrient management plan and enable them to participate in the discussion on this important topic.

5.2.3 Module evaluation:

Participant evaluated positively this module (**Figure 5**). Few of them evaluated the time devoted to the module as fair. This point was also mentioned in the participant comments (listed below) where they explain that each module and tool contained a lot of useful information, while other participants could not devote enough time to the learning process due to other commitments.

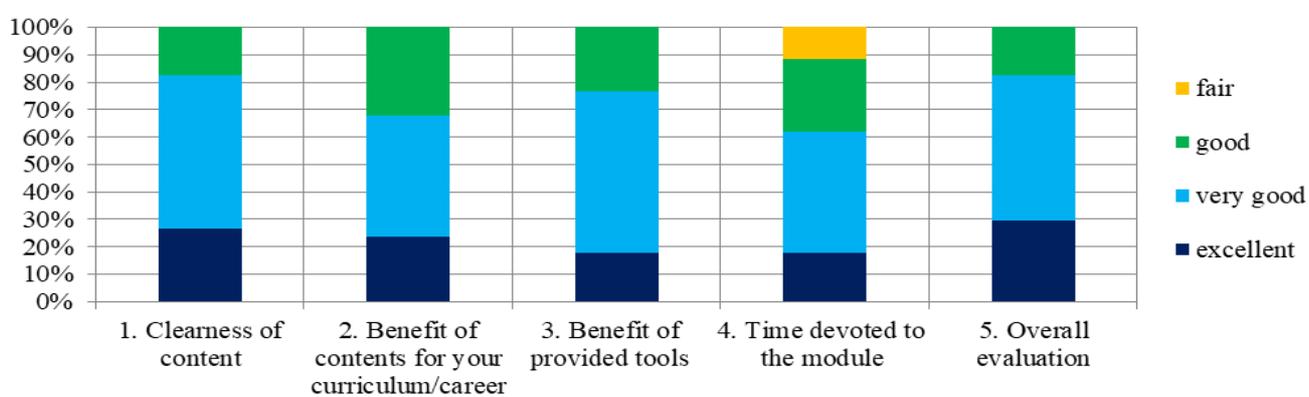


Figure 5: Evaluation of the second module "Fertilization strategies to enhance nutrient availability in organic arable crops"

Suggestions and comments reported by participants:

- The links related to the calculation tools used in this module are interesting but I prefer to read a summary of the tools in the power points or provide us a document as an example.
- Videos are the greatest tools to transmit the message in the online course as it need less time, clear, practical and transmit the full message so I hope there will be more videos in the upcoming module especially it add some juice to the course.
- This module is very interesting but I hoped more information on commercial mineral and organic fertilizers.
- Some information, which should be opened in the Organic E-prints where obviously removed or not accessible.
- It could be good to have more scientific research.
- This module was very comprehensive, sample rotations might be useful however it may follow in later modules.
- I hope to give us some trials and experiments suitable for our climate as in Jordan and Lebanon if you can.
- To include not only the common case, but as well specific cases, for example in case of orchards where crop rotation or intercropping are not appropriate tools for nutrient availability enhancement.
- Increase in subject because very important for all soil
- Thanks a lot for your exerted efforts.

- I think this module has been very interesting. The content is summarised, but a lot of additional information can be found using the links and references. Although the practice abstracts are very useful, it would be very interesting to have some more videos because they are very good and very practical.
- I suggest to make annex for each crop how to deal with the nutrient requirements and fertilizers with ideal quantity
- Organizing detailed seminars or workshops on specific topics mentioned in the module as compost and tools for nutrients calculation and other updated information mentioned in the topics of the module.

5.2.4 Tools evaluation

As shown in the infographic below, in this module nine tools were evaluated. Scores ranged from 4 for the tool “Nitrogen supply for winter oilseed rape” and “Diverse fertility building leys in arable rotations” to 4.4 for the tool “Incorporating green manures”. In general, all tools were scored positively above 4. Comments highlighted the practical applicability of proposed tools and their importance for farmers. Furthermore, participants found the given tools very informative and easy to understand.

	Tool	Score	Comments
	Nitrogen supply for winter oilseed rape	4.0	<ul style="list-style-type: none"> ▪ Straightforward, easy to understand practical advices. ▪ Useful for work purposes, easy to understand material.
	Winter field peas as green manure before maize	4.1	<ul style="list-style-type: none"> ▪ Good practice to recommend for farmers. ▪ A good example hot to solve a problem with weeds together with fertilization.
	Efficient use of nitrogen from livestock manure	4.2	<ul style="list-style-type: none"> ▪ Very practical recommendations about different effects of N on yield in winter and spring crops related to different pre-crops.
	Hairy Vetch – an Excellent Green Manure for Dry Conditions	4.1	<ul style="list-style-type: none"> ▪ Interesting, good information. ▪ Very informative cultivation information for dry regions.
	Growing cover crops in organic arable crop rotations: Best practices from Denmark	4.1	<ul style="list-style-type: none"> ▪ Very useful information for temperate regions. ▪ Nice example of good agricultural practices.
	Nitrogen budget calculator	4.1	<ul style="list-style-type: none"> ▪ Easy to use, important information for farmers to make better fertilization plan. ▪ Good source of data and tools download possibilities.
	Cover crop and living mulch toolbox	4.3	<ul style="list-style-type: none"> ▪ Great database. ▪ Good informative tool with condition specific filter. ▪ Excellent help for agricultural advisors.



[Diverse fertility building leys in arable rotations](#)

4.0

- A lot of useful information provided at the end of abstract for future reading.



[Incorporating Green Manures](#)

4.4

- Very useful to see the different machines in action.
- Good presentation of advantages and limits of each machine.
- This video is easy to communicate to farmers.

5.3 Module 3 – Monitoring, preventive and curative measures for pests and diseases management

5.3.1 Rationale:

Increasing the resilience of a cropping system is a major goal for organic farming in order to maintain productivity and crop health. In order to design organic production systems that are more resilient to disease and pest attacks, it is essential to provide a range of component strategies and combine different approaches, including new plant protection products, decision support systems and cropping systems adapted to specific crops and conditions.

5.3.2 Module objectives:

The objective of the module was to deliver a set of measures to be applied by organic farmers in order to efficiently manage diseases and pests, with an emphasis on system resilience and prevention. Special attention was given to the replacement of copper compounds. Tools provided offered some alternative methods in disease and pest control.

5.3.3 Module evaluation:

This module was evaluated positively and prevalently as very good and excellent (**Figure 6**). It was pointed out that the information provided brought a lot of practical knowledge (more details can be found in the comments below the evaluation figure).

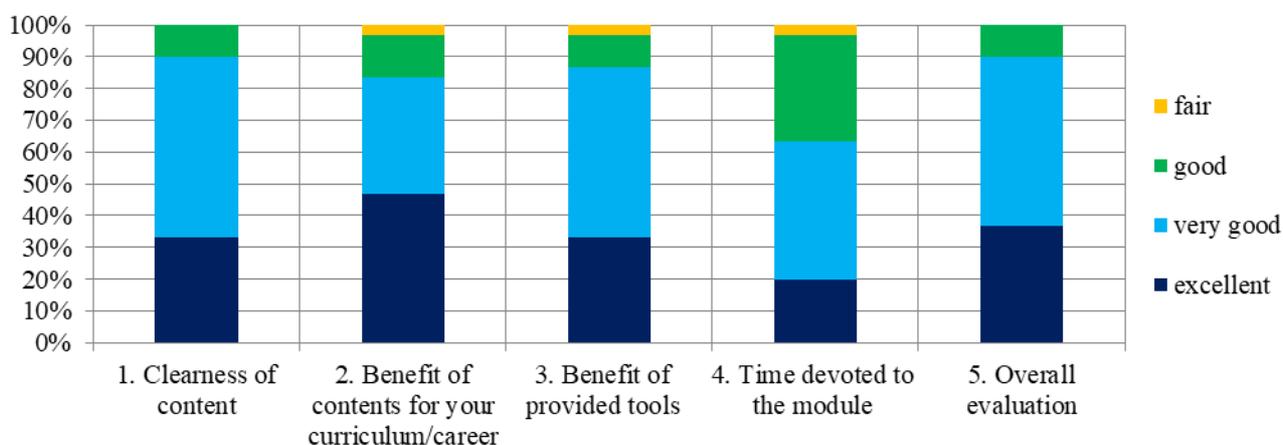


Figure 6: Evaluation of the third module "Monitoring, preventive and curative measures for pests and diseases management"

Suggestions and comments reported by participants:

- Excellent module very practical and many interesting resources to look at, good mix of resources.
- Very interesting and useful module, gained a lot of new knowledge
- I suggest to give more details about the preventives measures of pest management, like setting traps and kinds of traps, kinds of flowers and plants planted as trap crops or as nest for natural enemies, botanicals extracts used for pest control, etc.
- Maybe we can all share our success in new experiments for pest control in organic in way of paper or leaflet.
- Devoting more than module for this topic or a specialised course on monitoring and controlling pests with updated information regarding techniques and regulations.
- I really liked this module. It helped me to think further about organic and market access based on production constrains
- Good module - In Ireland, diseases are more significant problem than pests (the climate is too damp/wet for pests to thrive). However, for more intensive indoor polytunnel horticulture production, pests can be a significant problem.
- Pest and diseases control is important task for organic farmers. Some of the tools are nice to share among producers.
- This module need a long time because it is very important in organic agriculture
- It has been a very interesting module. I usually work with topics related to crop protection and this module has been a very nice opportunity to get more information and to see how people are working in other European places. Quite complete, well summarised and with lots of references and good additional information.
- I suggest to make annex of plant protection for economic diseases with the recommended dose.

5.3.4 Tools evaluation

In this module six tools were presented to participants (infographic below). Scores ranged from 4 for the tool “Risk management for small grains” to 4.5 for the tool “Reducing the use of copper in potatoes”. All tools were scored more than 4.0. Participants highlighted the importance of the proposed tools for farmers, since pest and disease control remains one of the most challenges in organic arable farming.

	Tool	Score	Comments
	<u>Reducing the use of copper in potatoes</u>	4.5	<ul style="list-style-type: none"> ▪ Excellent tool. Perfect for recommendation to farmers. ▪ Very practical data in abstract.
	<u>Use of rock dust against the rape pollen beetle</u>	4.2	<ul style="list-style-type: none"> ▪ Good idea. ▪ Very useful detailed information, easy to apply. ▪ Important information about rape beetle problem.
	<u>Biorationals - Database for ecological pest management</u>	4.3	<ul style="list-style-type: none"> ▪ Useful tool for organic farming. ▪ Great website that contain much information.
	<u>Control of wireworms in organic potato cultivation</u>	4.4	<ul style="list-style-type: none"> ▪ Very informative video. ▪ Very useful measure to control wireworms. ▪ Very actual theme.



[Risk management for small grains](#)

4.0

- Useful information for farmers.
- Wonderful and useful manual.
- Practical and very exact information.



[Testing peas for legume fatigue](#)

4.3

- Interesting, it seems very practical.
- Good testing way.

5.4 Module 4 - Technical tools, strategies and machineries to tackle weeds in organic arable farming

5.4.1 Rationale:

Most of the biological diversity in our crop fields comes from the presence of weeds. They provide habitat for both beneficial insects and mycorrhiza fungi. However, weeds may cause a real yield loss and managing them using non chemical control strategies includes many challenges.

5.4.2 Module objectives:

This module aimed to provide general information about common weeds, by presenting basic knowledge to be acquired before designing a plan for weed suppression (e.g. intercropping options). It also tried to rise the awareness about different mechanical weed control options and cropping systems that suppress weed incidence.

5.4.3 Module evaluation:

The overall evaluation of the module showed a positive satisfaction expressed by very good and excellent with particular satisfaction with the content clearness and benefit acquired from tools (Figure 7). Most provided tools were video and the majority of participants considered them an excellent way in learning; some participants found inadequate the time devoted to the module.

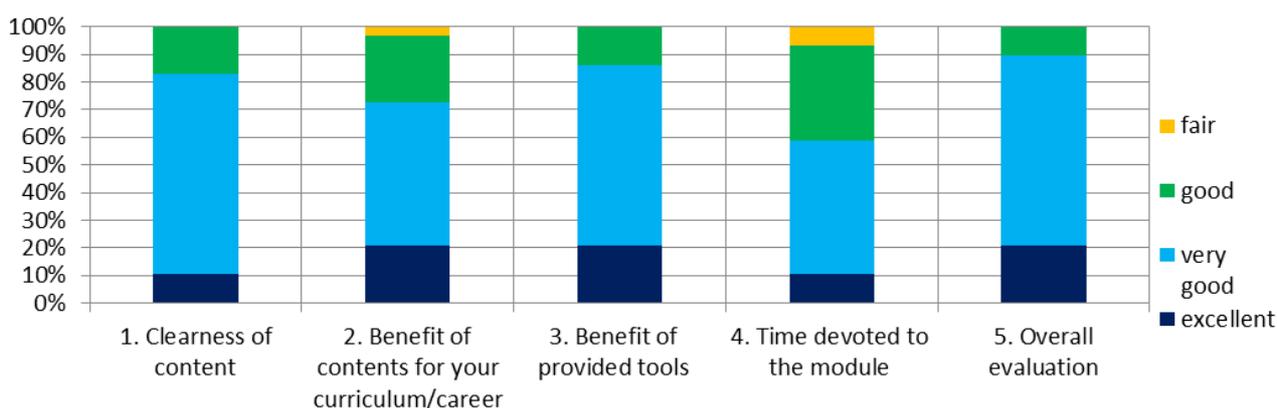


Figure 7: Evaluation of the fourth module "Technical tools, strategies and machineries to tackle weeds in organic arable farming"

Suggestions and comments reported by participants:

- I like a videos a lot, words with pictures. Short and exactly leaflets, to show it to the advisors or farmers
- There was many useful references in the module and the brainstorming session on the end had the potential to be interesting, however I think that the time allocated to the module was not long enough and hence the limited any discussion on the brainstorming sessions as people are only finishing it towards the end of the 2 week.
- It might be useful to have it at the beginning of the module to see if would stimulate discussion at an earlier stage.
- Useful module, I have gained a lot of new information on tillage techniques.

5.4.4 Tools evaluation

The infographic below shows high scores to the tools related to weed management. The tool “Perennial weed control in organic agriculture” was scored the highest (4.6). The lowest score was 4 given for “Reduced tillage systems - practical recommendations” and “Effects of reduced tillage on yield, weeds and soil carbon” tools. The efficiency of video was highlighted.

Tool	Score	Comments
 Reduced tillage systems - practical recommendations	4.0	<ul style="list-style-type: none"> ▪ Condensed information ▪ Informative
 Effects of reduced tillage on yield, weeds and soil carbon	4.0	<ul style="list-style-type: none"> ▪ How to reduce ploughing and intensity of tillage, very good results.
 Bringing the dirt to your doorstep: organic no-till weed management	4.5	<ul style="list-style-type: none"> ▪ Formation of more pronounced stratification of crop in the soil.
 Reduced Tillage: Farmers' Motivations and Problems	4.5	<ul style="list-style-type: none"> ▪ Very good example of GAP. ▪ Not always a clear message.
 Cover Crop (Rye) and No-Till System in Wisconsin	4.5	<ul style="list-style-type: none"> ▪ Very interesting concept ▪ High level of useful information.
 Satellite based and camera-controlled steering systems	4.2	<ul style="list-style-type: none"> ▪ This promising technique is perfectly described. ▪ Good under specific climate conditions
 Crop rotation and its ability to suppress perennial weeds	4.3	<ul style="list-style-type: none"> ▪ Good presentation Not really a top novelty.
 Controlling docks by stubble cultivation	4.4	<ul style="list-style-type: none"> ▪ Problems with signals and covering the country.

	Reducing weed seed pressure with the false seedbed technique	4.5	<ul style="list-style-type: none"> Practical, good and short enough. Widely practiced to reduce weeds. Not much research being collected on it
	Weed management on organic farms	4.2	<ul style="list-style-type: none"> Sort of a textbook. Explained in details and important reference.
	Perennial weed control in organic agriculture	4.6	<ul style="list-style-type: none"> Very interesting techniques Latin names of weeds are missing.
	Reduced Tillage Stubble Incorporation - Comparison of Different Machine Types	4.4	<ul style="list-style-type: none"> Good suggestions for summer dock treatments. A lot of new machines that we do not use here in organics
	Mechanical Weed Control in Maize	4.2	<ul style="list-style-type: none"> The presented method leads to soil inversion and exposure to erosion.
	Control of creeping thistle by stubble cultivation	4.3	<ul style="list-style-type: none"> Very good and adequate information about managing of creeping thistle. Useful also: hot water injection into the soil around thistle
	Weed control in soy with the finger weeder	4.1	<ul style="list-style-type: none"> How to use a finger weeder in soya. Not so many soya producers.
	Black-grass control in winter cereals with hoeing	4.0	<ul style="list-style-type: none"> Practical advices about <i>Elymus repens</i> the critical weed.

5.5 Module 5 - Crops specific problems and potential solutions in cereals, legumes, fruits and vegetables

5.5.1 Rationale

The yield gap that normally exists between organic and conventional production varies from crop to another due to different crop-specific factors. While cereals and tubers suffer mainly from nutrient availability (basically nitrogen deficiency), legumes are difficult to be managed because of weeds and diseases. Insect pests are particularly important in oil crops. Each crop group shows variations in the susceptibility to the different yield-limiting factors. Hence, agricultural practices such as choosing varieties and crop rotation design have a major impact on crop yield and quality.

5.5.2 Module objectives

The main aim was to draw attention about the main challenges in growing five crop categories (cereals, legumes, oil crops, tubers and fruit trees), focusing on the yield limitation factors. The reasons behind yield gaps between organic and conventional as well as the key pests and potential solutions were discussed.

Practical tools to improve the cultivation of these specific crops were provided. Participants were expected to develop a suitable and integrated management strategy for each discussed category.

5.5.3 Module evaluation:

The overall evaluation of the module showed a positive satisfaction expressed by very good and excellent (Figure 8).

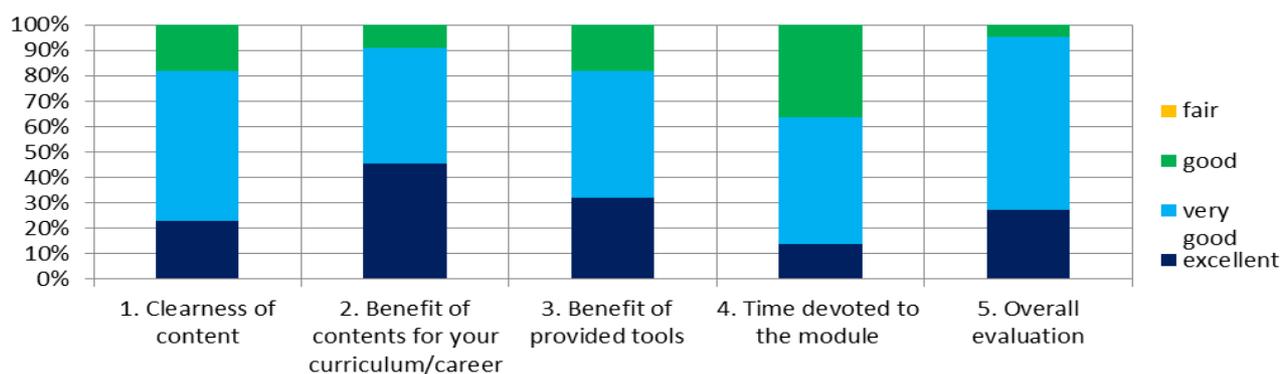


Figure 8: Evaluation of the fifth module "Crops specific problems and potential solutions in cereals, legumes, fruits and vegetables"

Suggestions and comments reported by participants:

- The vast majority of participants had neither specific comments nor suggestions.

5.5.4 Tools evaluation

Being a minor crop in many of participants' countries, maize gained lower attention and thus "No-till cultivation of maize" tool scored the lowest (4.5). However, all other tools were scored between 4.7 and 5 due to their richness in practical tips and crop-specific information. Comments praises in the clearness and diversification of tools. More details on tools evaluation are presented in the table below.

Tool	Score	Comments
 A farmer's guide to organic fruit and vegetable production	4.1	<ul style="list-style-type: none"> ▪ Very useful material ▪ Straightforward, practical advice
 Cultivating a diverse wheat population suitable for low-input and organic farming	4.3	<ul style="list-style-type: none"> ▪ Well-presented content, easy to understand
 Risk management for small grains	4.1	<ul style="list-style-type: none"> ▪ Organic producers are using higher seedling rate because of harrowing and better yields
 Rolling of grains to prevent winter kill damage	4.1	<ul style="list-style-type: none"> ▪ Widely used technology in Latvia
 Intercropping grain peas with barley	4.4	<ul style="list-style-type: none"> ▪ Our farmers use such mixtures, but not very often

	No-till cultivation of maize in rolled forage peas	4.3	<ul style="list-style-type: none"> Very practical
	Testing peas for legume fatigue	4.4	<ul style="list-style-type: none"> Good example of practice
	Catch crop in maize	4.3	<ul style="list-style-type: none"> Very useful info about How to control erosion in case of sowing corn
	Direct Sowing of Maize	4.4	<ul style="list-style-type: none"> Information in practice, to show directly to bio farmers.
	Mechanical Weed Control in Maize	4.5	<ul style="list-style-type: none"> Availability of water and soil fertility are well presented
	Reducing the use of copper in potatoes	4.6	<ul style="list-style-type: none"> It would be enough that we can solve problems in potatoes and not to have some problems with accumulating Cu in soil.

5.6 Module 6 – Recovery and final synthesis

5.6.1 Rationale

Innovation and research in agricultural sector should be always oriented towards practical application of research findings. This is the point where farmer's role is crucial. Further, farmer's needs and obstacles that they face during production should be a driving force behind research protocols. This cohesion (farmers / researchers) significantly contributes in solving production challenges.

5.6.2 Module objectives

Beside the objective to recall some important issues from the topics covered during the course, this module was designed to put an emphasis on organic arable farmer groups (that participated in OK-Net Arable project) and their perspective about topics had a part of the course. Thus, this module synthesized all previous information with new inputs from farmers groups.

5.6.3 Module evaluation

This module was evaluated positively with almost 40% as excellent (**Figure 9**). Some of the participants found limited the time devoted to the module. In the discussion forum they pointed out the importance of presenting farmer's point of view and how each country (under different environmental conditions) has different scenarios and production challenges.

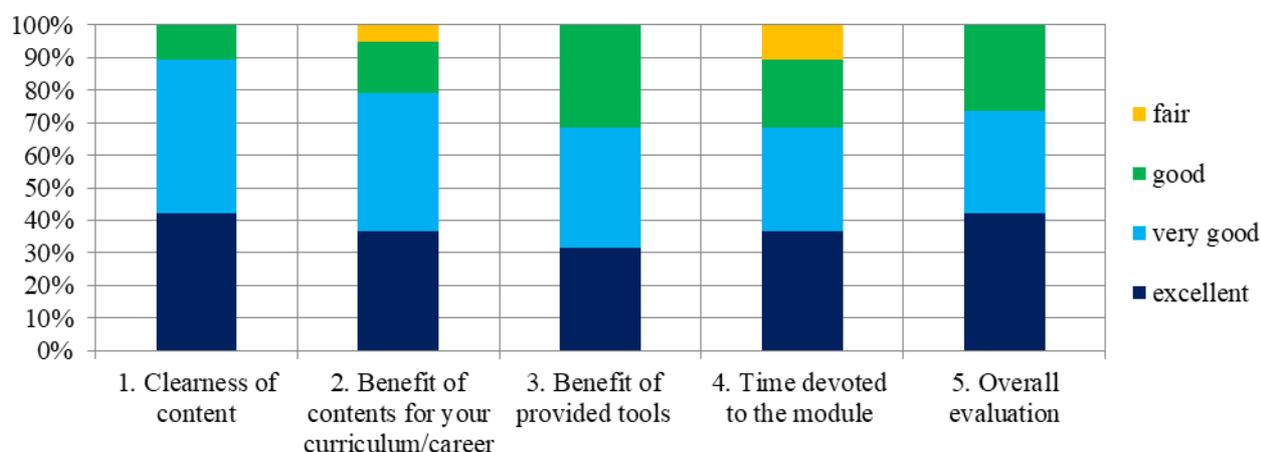


Figure 9: Evaluation of the sixth module "Recovery and final synthesis"

Suggestions and comments reported by participants:

- It might have been interesting to add a module on the sorting and storage of crops.
- I guess this is a very important module where the theory meets the practical situation. I guess we can learn a lot from farmers experience and success stories.
- To have more technical details about vegetable crops (Tomatoes, Cucumber...)
- No suggestion, just I want to say THANK YOU VERY MUCH
- It is a very Interesting module, especially that it covers Farmers experiences and expectations about organic agricultural practices.

5.6.4 Tools evaluation

During the course, additional tools were uploaded on the project platform and integrated in the module. Five topics were presented in this module and this gave the opportunity to include the aforementioned tools as a part of teaching material. All tools were evaluated positively with a minimum score of 4.1 up to 4.5 for the tool "Basics of the soil fertility management" (infographic below). Participants pointed out that practice abstracts were user friendly and very efficient to communicate information to farmers.

Tool	Score	Comments
 Basics of soil fertility management	4.5	<ul style="list-style-type: none"> ▪ Clear and colourful document with all the essential knowledge about soil fertility. ▪ Excellent material, helpful in preparing lectures for farmers.
 Commercial organic fertiliser as supplementary fertilisers in potato crop production	4.2	<ul style="list-style-type: none"> ▪ Useful information for potato growers. ▪ It helps to have good fertilization plan.
 Monitoring weed regulation services by carabids	4.1	<ul style="list-style-type: none"> ▪ Labour intensive but interesting practice. ▪ Easy to understand and to follow.



[Calculate the risk of wireworm infestation in the field](#)

4.2

- Very effective test.
- Nice example that connects science and practice.



[Using crop rotation to control wireworms](#)

4.3

- New and useful information.
- Wireworms are hard to control and this kind of information will help to farmers.



[Controlling potato beetles with Bt](#)

4.3

- This could become very popular for organic farmers.
 - Easy and effective technique.
-