



## Organic Knowledge Network Arable OK-Net Arable

### Evaluation of the usefulness of tools and end-user materials to farmers

Deliverable number	<i>D 2.2</i>
Dissemination level	Public
Delivery date	31 <sup>st</sup> November 2017
Status	Final
Lead beneficiary	PFT LTD (Organic Research Centre)
Author(s)	Katie Bliss, Susanne Padel, Charline Ducottet
Contributors	An Jamart, Lieven Delanote, Stoilko Apostolov, Carlo Ponzio, Airi Vetemaa, Cristina Micheloni, Stefano Bortolussi, Daniel Rolfsmeyer, Marion Casagrande, Ilse Rasmussen, Laurence Fontaine, Frank Oudshoorn, Casper Laursen, Zoltan Dezsény, Dominic Amos, Beth Cullen, Stephanie Fischinger, Bram Moeskops, Phil Sumption



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.

This deliverable contains original unpublished work except where clearly indicated otherwise.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.

## Table of Contents

Executive Summary.....	2
1 Introduction .....	4
2 Methodology.....	4
2.1 Evaluation through workshops .....	4
2.2 Practical testing.....	5
2.3 Data collation and analysis .....	5
2.4 Limitations of the tool evaluation.....	6
3 Results of the evaluation in relation to tool topics.....	7
3.1 Overview .....	7
3.2 Tools related to weeds and weed control .....	8
3.3 Soil fertility and nutrient management tools.....	9
3.4 Crop specific and rotation management tools .....	11
3.5 Pest and disease.....	12
4 Results of the evaluation by tool format .....	13
4.1 Overview .....	13
4.2 Technical Guides .....	15
4.2.1 Visual information.....	15
4.2.2 Practical Recommendations and action steps .....	16
4.2.3 Length and level of detail.....	18
4.3 Videos.....	20
4.3.1 Length of videos.....	21
4.3.2 Providing links to more detail .....	22
4.3.3 Video of practical demonstrations in the field .....	22
4.3.4 Sharing of experience from farmer to farmer .....	22
4.3.5 Providing updates .....	23
4.3.6 Local context and language.....	23
4.4 Websites.....	24
4.5 Decision Support Tools .....	25
4.5.1 Improve user friendliness .....	26
4.5.2 Improve reliability and practicality of output data .....	26
4.5.3 Enable interaction and data sharing.....	27
4.5.4 Opportunity to step back and reflect.....	29
5 Conclusion.....	29
6 Appendix: Summary of feedback on each tool.....	0

## Executive Summary

Organic farming is knowledge intensive and in supporting farmers in enhancing their production systems, there is a need to improve how knowledge is shared. This is the overall aim of the OK Net Arable project. Work Package 2 of the project is concerned with facilitating the testing of practical and educational materials with farmer innovation groups to improve knowledge provision in this sector. The work package adopts an interactive multi-actor approach, bringing together practitioners from regional innovation groups with each other, and with advisers and scientists.

This report presents feedback from farmers and advisors on knowledge exchange tools on the range of topics addressed in this project (such as soil and nutrient management, weed control, pest and diseases) and in a range of formats (technical guides, websites, decision support tools and videos). The feedback was gathered in 22 workshops held across 10 countries during 2016, working with established farmer innovation groups. It brings together some of the key findings that can help to inform the creation of knowledge exchange tools, which fit the needs of farmers, to support their learning and enhance organic farming.

Common characteristics of tools preferred by the farmer innovation groups include the use of visual information, inclusion of case studies, short summaries and practical recommendations. The opportunity to learn from other farmers experiences was highly regarded. Some findings also brought a fresh perspective to commonly held assumptions. For example, although in general farmers appreciate succinct tools which clearly outline practical implications and recommendations, this does not mean that they are looking for basic information. Understanding how certain practices have been applied in different contexts (soil, climate conditions, farming systems), the specific field operations that were performed (machinery, cultivations, position in the rotation etc) the impact on yields and farm economics are all details which farmers expressed were valuable and are lacking in many of the tools. Moreover, honest accounts of negative impacts, what didn't work and why, was also considered to be very useful and felt to be somewhat missing from existing knowledge exchange tools.

The topic which was rated most highly on average was weed control – in particular, tools on mechanical weed control, and ones comparing different machinery. However, a gap was identified in the availability of tools that provide information on weed biology, help identifying weak points in weed lifecycles and inform better weed management. Moreover, it was clear that more tools should focus on an integrated approach to weed control which includes preventative and cultural control as well as direct methods such as mechanical weed control, which should be more of a last resort. For soil management – tools on soil monitoring, reduced tillage and cover crops were considered particularly interesting and relevant. Reflecting findings in other work packages, pest and disease was considered less of a priority and although still of interest to farmers the tools were considered less relevant.

There was a clear indication that videos are a favoured means of knowledge exchange – including both those produced by researchers but also farmers' own videos. This is partially due to the ease of use. Also, farmers are using visual cues daily and videos appear to be an appropriate method to convey the effectiveness of different practices and 'in the field' information that farmers can relate to. It was indicated that more information on organic farming practices should be shared through a video format. However, these should be linked to other tool formats – such as technical guides and Decision Support Tools (DSTs) which allow for a deeper understanding of the details relevant to practical implementation (soil types, climate, field operations, species selection, timing etc).

There was a recognition of the huge potential of digital Decision Support Tools (DSTs) – in particular, those which enable the analysis of the whole rotation or farming system. Many participants expressed an interest in tools which could bring in data from existing farm management software and assist with

analysing the information to support decision making. However, those which were assessed were not considered to be easy to use and data entry in some cases was time consuming. There was also some concern about the reliability of output data and the practical management implications, and cost-benefit analysis in terms of yield and economics were often missing. As such the majority of DSTs were considered not particularly ready for practice. However, use of DSTs as an indication of the relative risk and opportunity of different actions as well as providing inspiration and new ideas was considered valuable. It was suggested that in future farmers should be more engaged in the R&D process of such tools to make them more appropriate to their needs.

Despite interest in videos and DSTs when it comes to putting things into practice – the technical guides were rated as most practical, namely due to the greater level of detail of the nuances of implementation.

Therefore, it is clear that a range of tools are necessary to support farmers to take new knowledge into action. The opportunity of placing these tools online is that they can be digitally linked – through key words and recommendation lists, which helps farmers to navigate through from inspiration in videos to the practical details and further information in technical guides. Websites have potential of linking practical experience with the science and the general with the detail. It is important therefore to consider how easy this journey through a website is to ensure users find what they are looking for. In general, farmers are approaching the sites with specific problems or practices in mind and it must be quick and easy to find what they need. Feedback on websites suggested that due to difficulty navigating through the site, relevant information on specific topics was hard to find and overall websites received low scores for ease of use. It is clear more work needs to be done on improving the user experience of websites and tailoring them to farmers' needs.

Another key element was the appropriateness to local soil, climate and socio-economic conditions. Tools which were tailored to other conditions were considered less / not relevant, depending on the topic. More 'fundamental' topics such as soil biology and soil testing methods were more transferable, whereas more applied practices such as weed control, cover crops and reduced tillage in local context was more critical.

Similarly, language was a barrier given that most farmer innovation groups were required to test tools that were not written in their native language. It was clear that for some groups (such as Belgium and Germany) the top level of information could be in English, but as soon as a deeper level of detail is required, the information should be in local language. Whereas for some of the other groups – Estonia, Bulgaria, France and Italy, it was important that all the information was in the local language. However visual tools, especially videos were considered more appropriate. The use of overly scientific / technical language was also in some cases expressed as a barrier, and clear, simple language and terms that farmers use in the field, were in general preferred. However, the use of a glossary to explain more technical terms was also appreciated.

One of the most resounding findings was the value placed on farmer-farmer learning. Overall it was clear that many farmers feel "*The best way to learn about something is to speak to someone who is doing it*" (Farmer in ORC Arable Group, UK, 2016). Moreover, in response to the exchange visits coordinated in the project it was clear that farmers appreciated the opportunity to exchange knowledge face to face 'in the field'. However, taking this online seems to be more of a challenge. Case studies of farmers sharing their experiences, including details of the context, what worked and what didn't, with photos / videos and sharing of economic / yield data were highly appreciated. Many participants also expressed an interest to interact online with various tools – both in terms of comments and discussion forums and sharing data – however it was also perceived to be a time consuming and thus many of these functions are currently underutilised.

## 1 Introduction

Organic farming is knowledge intensive and in supporting farmers in enhancing their production systems, there is a need to improve how knowledge is shared. This report has been produced as part of the Organic Knowledge Network Arable (OK-Net Arable) project which has the overall aim 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 citizens and consumer demand. The project has adopted an interactive multi-actor approach, bringing practitioners from regional innovation groups together with advisers and scientists.

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 end-user material based on this information); 3) to create a European platform for knowledge exchange focusing specifically on organic arable drawing on experiences from diverse contexts.

In order to better understand how to create farmer facing knowledge exchange tools which better meet the needs of farmers, a range of practical and end-user materials were tested with farmer innovation groups. The aim of this report is to synthesise the findings and identify some learnings for making knowledge exchange tools which can help to enhance research-farmer knowledge exchange and improve organic farming.

## 2 Methodology

A first offer of 30 selected knowledge exchange tools (i.e. material suitable for the end-user) related to organic arable farming was presented to all project partners (see D 3.3 for further details on the definition and choice of tools by the project) at the project meeting in Newbury in April 2016. 'Farmer Innovation Groups' in 10 countries (Bulgaria, Italy, UK, Denmark, Germany, Austria, France, Estonia, Belgium and Hungary) were encouraged to select up to 10 tools that could address problems and issues relevant to each group that had been identified in the first project year (see D2.1, Cullen et al., 2016 for details). The Farmer Innovation Groups could also propose additional tools relevant to the specific group that had not been included in the first offer and consider them as part of the evaluation. Two workshops for the evaluation of these tools (knowledge exchange material) were reported by 11 of the 14 groups in 9 countries during 2016, whereas three groups did not fully report on this.

### 2.1 Evaluation through workshops

Each group selected approximately 10 tools for a rapid assessment in a first workshop with farmers and advisors. The groups were invited to rate each tool qualitatively, giving a score from 1 to 5 for relevance, interest, ease of use and practicality. A total of 36 tools (see Appendix 1) were evaluated in this way, each by a small number of groups.

This included tools related to a range of topics;

- Weed control (7+1 also considered under pest and disease control)
- Soil fertility and nutrient management (18),

- Cropping system and crop specific tools (9)
- Pest and disease control (2)

The tools included four different formats;

- Leaflets and guidelines (21)
- Calculation/Decision support tools (6)
- Websites (4)
- Videos (5)

Each tool was allocated a 'tool number' (#) which is for reference in this report. A full list of tools by number is available in Appendix 1, which also includes hyperlinks to the tools in the farmknowledge.org platform where appropriate.

Most evaluations were carried out in face-to-face workshops, but in some groups the tool evaluation had to be done over the phone because of time constraints in organising a workshop.

From the initial 10 and any additional tools proposed by the group, each group selected 3 tools for a more detailed qualitative assessment in a second workshop. The groups were given a list of open questions in order to get a deeper understanding of the strengths and weaknesses of each tool. In total 12 tools were selected for a more detailed evaluation

## 2.2 Practical testing

The groups were also invited to carry out some practical testing of knowledge presented, which they would seek to implement in practice. The groups submitted proposals setting out what they wanted to test and how they would organise the testing, which were agreed by the project steering committee. Topics chosen varied and included some tools that are considered in this report.

- *Spade test* (#35) and production of video by ITAB, France
- *Soil quality test kit guide* (#15), *Bioland-Humusrechner* (#25) and *ROTOR* (#17); Bioland, Germany
- *NDICEA* (#34) (Nutrient management model); ORC Arable group, UK

Other groups carried out practical testing not directly related to tools discussed in the workshops:

- Mechanical Weed control demonstrations; Bioforum/INAGRO, Belgium
- Testing cover crop varieties (Green manure and cover crops); ITAB, France
- WUZI Dock Cutter; SEGES, Denmark
- SEMINBIO equal spacing seeder(see also #32); ConMarcheBio, Italy
- Roller Crimper and heritage cereals; AIAB, Italy
- Multi-spectral cameras for on-farm trial assessments; OMKI, Hungary
- Comb Harrow / Roller crimper for terminating cover crops; Bioselena, Bulgaria

The outcomes of the trials testing new/improved equipment are not considered for this report but will result in new knowledge sharing material to be produced through new videos and practices abstracts.

## 2.3 Data collation and analysis

The qualitative feedback for each tool from all groups in both tool evaluation workshops (1 and 2) was combined which enabled key themes to be identified that are presented here (see Appendix for a

detailed presentation of the results for each tool). All scores of the 1<sup>st</sup> workshop were entered into an excel table, broken down by scores for relevance, interest, ease of use and practicality and an average score. For the tools that were evaluated by more than one group, averages were then calculated. Due to the rapid assessment nature of the scoring process in workshop 1, the scores provide a qualitative guide to highlight areas for further analysis but not a quantitative assessment. Scores complement the written feedback and indicate topics that were considered particularly relevant or interesting and formats that were considered easy to use and practical. This process helped to paint a picture of the critical success factors in developing a good knowledge exchange tool and some common mistakes.

## **2.4 Limitations of the tool evaluation**

The tool evaluation consists of scoring and more in-depth open-ended questions which reflect discussion that the groups had. The assessment is qualitative in its nature and provides a useful guide to areas that should be explored in more detail. The questions to provide scores for 'relevant', 'interesting', 'easy to use' and practical' may have been interpreted differently in each group and a clear definition could have been provided to ensure consistency. Moreover, with such a small sample, the score of some tools are skewed because the opinion of participants and between groups is quite different. For example, for the earthworms' tools, four groups found it relevant and interesting, whereas three other groups found it too theoretical and another group found it too simple. Assessment of tools was also impacted by the language in which they were presented, making it very difficult for some groups to do tool evaluations, if no tools existed in their own language, and potentially by specific local and cultural conditions. Moreover, two groups chose to use a different system of ranking rather than allocating scores of 1-5 which meant that the numbers could not be integrated, however the data was still utilised to give an indication of preferred tools.

The tools and the topics were pre-selected by the project partners; if left to select their own tools perhaps the farmers and advisors might have chosen differently. The groups were arable to suggest additional tools of their own choice and several groups made use of this opportunity. Also, this first tool offer was not based on an equal representation of tool formats (most were technical guides) or topic, which affected the results.

It is also important to note that we were extremely grateful for farmers' time to engage with tool evaluation. It was at times challenging for the practice partners to engage the farmers fully in this process that at first did not seem to have direct relevance to addressing practical problems. However, the groups that reported on the tool evaluation provided very valuable insights reported here that will help inform improvements in knowledge exchange tools to enhance organic farming and beyond.

### 3 Results of the evaluation in relation to tool topics

#### 3.1 Overview

The survey of the farmer groups in the first year showed that the needs of the groups are varied and site and system specific, but the three topics of weed management, soil fertility and pest and disease control were ranked as highly relevant by all the groups (see Cullen et al., D 2.1).<sup>1</sup>

Weed management is a priority issue for the farmer innovation groups. There was a keen interest among participants to learn more about the latest mechanical control methods as well as information on weed biology and lifecycles to help develop more weed suppressive systems. Overall 8 tools for weed management were evaluated.

Soil fertility and nutrient management is also topic of great interest to the farmer innovation groups. The result of evaluation of 18 tools is reported together for both categories, as there was much overlap between the tools. Soil monitoring tools, in particular, were considered very relevant, and participants identified a need for simple tools which would enable them to do their own on-farm analysis. Tools related to the practicalities of integrating cover crops in the rotation and moving towards reduced tillage systems were also considered particularly useful.

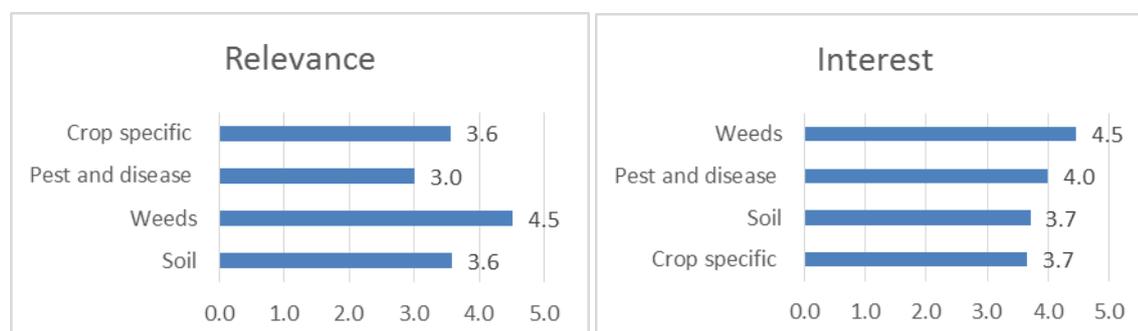
In total 9 tools were evaluated that either are crop specific or refer to the whole cropping systems, such as rotation planners.

Despite interest in pest and disease control, only 2 tools were tested on the subject. Feedback suggests that although this is considered an interesting topic it is less relevant to the urgent priorities on the farm.

The tools and themes were assessed for relevance and interest through a score (from 1-5 with 5 indication the best score), complimented with additional discussions and feedback in the workshops. Relevance reflected how appropriate the tool was to the priorities, challenges and conditions on-farm; interest indicated how engaged the groups were with the topic.

Tools on weed control were given the highest scores for relevance and interest, whereas tools on insect pest and diseases received lower scores on for relevance (although still considered interesting) which suggests that pest and disease tools are of interest but of less urgent priority (see Fig 1 below).

**Figure 1 Average scores for relevance and interest by topic**



<sup>1</sup> Cullen, Beth; Amos, Dominic and Padel, Susanne (2016) Organic Knowledge Network Arable - D2.1 Description of farmer innovation groups. Deliverable OK-Net Arable. Organic Research Centre, Newbury, UK. <http://orgprints.org/30748/>

It is important to recognise that these scorings are only an indication, so in the following sections we look at each topic considering also the feedback from the discussion in each farmer innovation group, seeking to understand why certain tools were considered more relevant and interesting than others.

In the following sections we have explored the feedback on the different tool by topics to understand why they were rated differently.

### 3.2 Tools related to weeds and weed control

On average tools on weed management were rated the highest on relevance (4.5) and interest (4.5) (see Fig. 4). The discussions suggested this was because weed control is one of the biggest challenges facing organic farming.

Tools on mechanical weed control received high scores, in particular those which compare different machinery. However, it was also recognised that innovation in this area is happening quickly and information can soon go out of date. A gap was identified in the availability of tools which provide information on weed biology, to help identify weak points in weed lifecycles to help inform better management. Moreover, it was clear that more tools should focus on an integrated approach to weed control which includes preventative and cultural control as well as direct methods such as mechanical weed control, which should be more of a last resort as it is costly and can cause other issues (i.e. soil compaction).

However, weed control tools have received lower scores for ease of use and practicality, this may be that the tools themselves could be improved to provide more practical tips and action steps but could also be that this topic is harder to tackle. Fewer tools were tested focusing on weed management than soil (Fig 2) which may also reflect that there are fewer tools available.

**Figure 2 Average scores for weed management tools\***

Tool	Format	No. groups tested	Relevant	Interesting	Easy to use	Practical	Average score
Mechanical weeding in arable crops	Technical guide	3	5.0	5.0	4.0	4.0	4.5
Agricultural machinery as solution against weeds in organic agriculture	Technical guide	2	4.2	4.2	2.5	3.3	3.6
Weed management on organic farms	Technical guide	1	4.9	4.5	4.0	4.8	4.5
<i>Mechanical weed control in veg FiblFilm</i>	Video	1	4.0	5.0	3.0	4.0	4.0
<i>Weed control in organic vegetables Inagro</i>	Technical guide	1	5.0	5.0	4.0	4.0	4.5
<i>Hand seeders in the field Bioforum</i>	Technical guide	1	4.0	4.0	3.0	3.0	3.5
<i>CropProtect App</i>	Decision Support Tool	1	4.0	3.0	4.0	4.0	3.8
<i>Innovative seeder to prevent weed development in cereals - CREA Italy</i>	Technical guide	1	5.0	5.0	5.0	5.0	5.0

\* Green cells (5) show highest average score; lowest average score shown in red, tools shaded in blue were tested only by one group or were not given scores.

All of the tools on weed control were given high scores for relevance and interest. The tools which received the highest scores were focusing on specific machinery, in particular for mechanical weed control. The guide [Mechanical weeding in arable crops #8](#) included farmer case studies and data, although some felt it was a little out of date with some new mechanical weeders not included. A number of mechanical weeders are profiled in the video [Agricultural machinery as a solution against](#)

[weeds \(#11\)](#). Farmers appreciated this practical feedback on the action of the different machines and visual demonstration of the results.

The tool describing the [Innovative seeder to prevent weed development \(#32\)](#) is a guide to an equal spacing drill which mimics the effect of broadcasting to enhance crop competition against weeds. This innovative technique was considered very relevant and interesting as very little has been written on this elsewhere and the ConMarcheBio group took the machinery to practical testing in the field.

In regards to the tool [Weed management on organic farms \(#18\)](#), the ÖMKI farmer innovation group felt that *“weed management is the most serious issue among organic arable farmers in Hungary”* (ÖMKI Group, Hungary) and ranked this tool as highly relevant and interesting as no such guide currently exists in Hungary. However, some information was considered out of date and newer machinery not included (e.g. precision farming). As it was produced in the USA, many of the case studies and recommendations were less relevant to Hungarian agroecological conditions.

### 3.3 Soil fertility and nutrient management tools

The tools on soil fertility (including soil health) and nutrient management scored well overall for relevance and interest. In total 18 tools were tested in both categories, most of them are technical guides. Those considered most relevant were on the topics of green manure / cover crops (Tool [#1](#), [#3](#) & [#10](#) and building and measuring soil carbon (Tool [#6](#) & #25). Also, the [TilmanOrg videos on reduced tillage \(#3\)](#) were considered very relevant and interesting.

**Figure 3 Average scores for soil fertility and nutrient management tools\***

Tool	Format	No. groups tested	Relevant	Interesting	Easy to use	Practical	Average score
Cover crop and living mulch tool box	Decision SupportTool	7	4.4	3.6	4.0	3.0	3.1
Tilman-org: videos on reduced tillage in organic farming	Video	3	4.6	4.8	4.6	3.4	4.3
Bringing the dirt to your doorstep: organic no-till weed management	Video	4	2.0	4.0	4.0	1.0	2.8
Earthworms: architects of fertile soils	Technical guide	7	3.3	3.1	3.0	2.9	3.1
Regionally adapted humus balance in organic farming	Technical guide	3	4.2	3.8	3.2	2.8	3.4
Bioaktuell: web platform for reduced tillage	Website	5	2.2	2.5	2.2	1.6	2.0
Green manure and cover crops in organic agriculture: general introduction	Technical guide	2	4.0	3.0	3.0	3.0	3.3
Green manure and cover crops in organic agriculture: guide to the choice of the species	Technical guide	3	5.0	5.0	3.0	4.0	4.3
Muencheberg soil quality rating: visual method for assessment of soil properties	Technical guide	2	3.7	4.1	2.6	3.7	3.5
Soil quality test kit guide: visual assessment of soil quality and soil properties	Technical guide	2	4.0	4.0	1.0	2.8	2.9
Visual soil assessment: field guide	Technical guide	3	4.3	4.3	4.2	4.3	4.3
Sort out your soil: A practical guide to Green Manures	Technical guide	3	4.0	3.6	3.8	2.7	3.5
Nutrient management in farms in conversion to organic	Technical guide	2	3.9	3.4	3.4	2.9	3.4
<i>Bioland-Humusrechner</i>	Decision Support Tool	1	5.0	4.0	4.0	4.0	4.0
<i>Simple building blocks for improved soil</i>	Technical guide	1	4.0	4.0	4.0	3.0	3.8
<i>A guide to Nutrient budgeting on farms</i>	Technical guide	1	3.0	2.0	3.0	3.0	2.8
<i>NDICEA</i>	Decision SupportTool	1	3.0	4.0	2.0	4.0	3.3
<i>Spade test video</i>	Video	2	No scores allocated				

\* Green cells (5) show highest average score; lowest average score shown in red, tools shaded in blue were tested only by one group or were not given scores.

The tools with a high average score mainly relate to soil monitoring and increasing soil organic matter. They seem to be considered more relevant as they are suitable in varying country contexts and are relating to questions and problems that farmers are facing.

French participants found the criteria approach that is used in the [Cover Crop and Living Mulch Toolbox \(#1\)](#) helped them to adapt to make it more relevant to their systems, but would have liked more information on the practical implications for the species, such as establishment, destruction, seed rates and costs. They suggested that being able to add local information directly into the tool (rather than into wiki area that is associated with the tool) would help to make it more relevant to different contexts. The UK group supported this and felt it could be improved to help to identify the drilling window in the farm rotation. The ConMarcheBio Group (Italy) found the tool to be relevant but results are too generic and not offering tailored results to their region as the climate and soils options are limited. Several groups chose to translate this tool and adapt it to their local context.

The topic of reduced tillage seems to be interesting and relevant for many of the farmers. The [TilmanOrg videos on reduced tillage \(#3\)](#) were considered relevant (and practical) as they are based on farmers own experiences and perceptions about reduced tillage and green manures.

Despite the fact that reduced tillage appears to be a popular topic, some of the tools on reduced tillage were given low scores for relevance. The video [Bringing the dirt to the doorstep \(#4\)](#) demonstrates what is working in the US but was considered not to be appropriate or relevant to the soil conditions in the OK-Net Arable partner countries. [Bioaktuel \(#7\)](#) is a web platform for reduced tillage and nutrient management in Switzerland which is considered to be too general – “it gives some general information without any quantitative data” (BASE ABC Group, France) and also is perceived as only mainly relevant to the Swiss context.

There was a keen interest in tools for soil monitoring and analysis. The *Bioland humusrechner (#25)* was considered relevant as it seeks to help farmers measure their soil organic matter which is quite unique as a farmer facing tool. It is tailored to different regions of Germany however perhaps not so relevant to other European contexts.

### 3.4 Crop systems and crop tools

There was a keen interest in tools which support whole systems analysis and support rotation planning, however they received fairly low scores as many are not currently considered ready for practice.

Tools relating to the production of specific crops and / or to whole farm management were given average scores of 3.6 for relevance and 3.7 (see Fig. 4) for interest suggesting that these tools are considered of interest but less so than the tools on weeds and soils.

**Figure 4** Average scores for crop specific and rotation management tools\*

Tool	Format	No. groups tested	Relevant	Interesting	Easy to use	Practical	Average score
Practical advice for organic production of lupines	Technical guide	1	3.0	3.3	3.4	3.5	3.3
Criteria and management recommendations for organic cereal production	Technical guide	2	3.4	3.1	3.0	3.2	3.2
A farmer's guide to organic fruit and vegetable production	Technical guide	4	4.0	3.8	3.6	3.7	3.7
ROTOR: organic crop rotation planner	Decision Support Tool	3	2.0	4.0	4.0	1.0	2.8
Risk management for small grains	Technical guide	1	4.2	3.8	2.9	3.9	3.7
Knowledge exchange platform for agroecology	Website	4	5.0	3.0	2.5	1.0	2.4
CCBT website	Website	1	4.0	4.0	3.0	3.0	3.5
John Pawsey (Farmer) You Tube channel	Video	1	4.5	5.0	5.0	4.5	4.8
HighCrop	Cards	1	2.0	3.0	3.0	1.0	2.4

\* Green cells (5) show highest average score; lowest average score shown in red, tools shaded in blue were tested only by one group or were not given scores.

The crop specific and whole farm management tools overall received lower scores than those facing on key issues. The feedback on these suggests that they are considered to be too general and that it is harder thus to find concrete information for action.

A YouTube channel managed by a farmer in the UK group [John Pawsey YouTube \(#24\)](#) scored highly for relevance. The farmers in the group appreciated the practical nature of his short videos – simply taken in the field on his phone - which documents practices he is trying out across the farm. The combination of visual information, understanding of the context and updates over the time, as well as his open discussion of what worked and didn't work was appreciated by his peers.

Equally the [Knowledge Exchange Platform for Agroecology \(#22\)](#) scored highly for relevance – particularly due to the farmer video testimonies, and the possibility to contact them. This was considered a good way of popularizing the techniques and promoting understanding how they work in practice and triggering creativity (BASE ABC, France).

Although farmers in the ORC Group (UK) appreciated the potential of the [HighCrop tool \(#33\)](#) it received a low score for relevance. This card based visioning tool from Denmark supports farmers to take a step back and look at the whole farming system. This is quite a different approach to supporting farmer decision making, but despite its unconventional approach the farmers were receptive! Although they felt it is a valuable process to be clear about where you are going and getting family and staff on board, they felt the photo and recommendation cards in their current state were not relevant to their own farming situation and did not enable the step between the vision and how to get there. However, they support the development of similar tools, perhaps digital.

[ROTOR \(#17\)](#) is an organic crop rotation planning tool based in an access database which aims to help farmers plan rotations. The BASE ABC ABC group (France) considered it to be relevant when thinking about adding a new crop in a rotation and appreciated the ability to calculate nutrient budgets. However, many also felt that the tool was too general and, because it is based on assumptions and misses out key factors (e.g. weeds, climate etc) the predictions might not be relevant to their agro-climatic context.

There seems to be an interest from farmers in decision support tools that will help them with whole farm management such as [NDICEA \(#34\)](#), [ROTOR \(#17\)](#) and [HighCrop tool \(#33\)](#) but they felt that none of these are currently relevant enough to their particular context to make them useful and to invest the time required.

It is also of note that the [Farmers guide for organic fruit and vegetables production \(#13\)](#) was considered relevant to arable farmers – as many already grow fruit and vegetables or are considering including them in the rotation.

### 3.5 Pest and disease

Only two tools were tested on pest and disease which to some degree may reflect that this topic is considered lower priority (Fig 5).

**Figure 5 Average scores for pest and disease management tools**

Tool	Format	No. groups tested	Relevant	Interesting	Easy to use	Practical	Average score
Atlas of agricultural entomology knowledge base of pests and insects	Website / Database	1	2.0	5.0	3.0	1.0	2.8
<i>CropProtect App</i>	Decision Support Tool	1	4.0	3.0	4.0	4.0	3.8

\* Green cells (5) show highest average score; lowest average score shown in red, tools shaded in blue were tested only by one group or were not given scores.

[Cropprotect App \(#31\)](#) is an interactive phone app (relevance 4, interest 3). It was considered relevant as it uses visual clues to support identification of common and more unusual pests, disease and weeds of UK arable crops, provides seasonal information / recommendations to prevent as well as cure. Farmers found it relevant as it supports identification weeds, pest and diseases of arable crops and provides information on biology of the pest to enable management through knowledge-based

approaches. It is also possible to login and comment / document your own experiences – which farmers felt would make the information more relevant to different contexts, but this feature appears to be underutilised. The app also provides information on chemical-based approaches which is clearly not relevant to an organic farmer.

*“A useful tool that acts as a really good reminder at different times of the year to help make and tailor agronomic decisions such as cultivation techniques for control of particular weeds prior to drilling”* (ORC Arable Group, UK).

The [Atlas of Agricultural Entomology \(#21\)](#) is an Italian website which documents a wide range of agricultural pests and beneficial insects. It was not considered very relevant by the ConMarcheBio Group (Italy) as it does not address the main pest control challenges identified by the farmers and assumes a high level of plant protection knowledge. However, it was considered interesting as it clearly shows the life cycles of pests with the support of good visual information.

## 4 Results of the evaluation by tool format

### 4.1 Overview

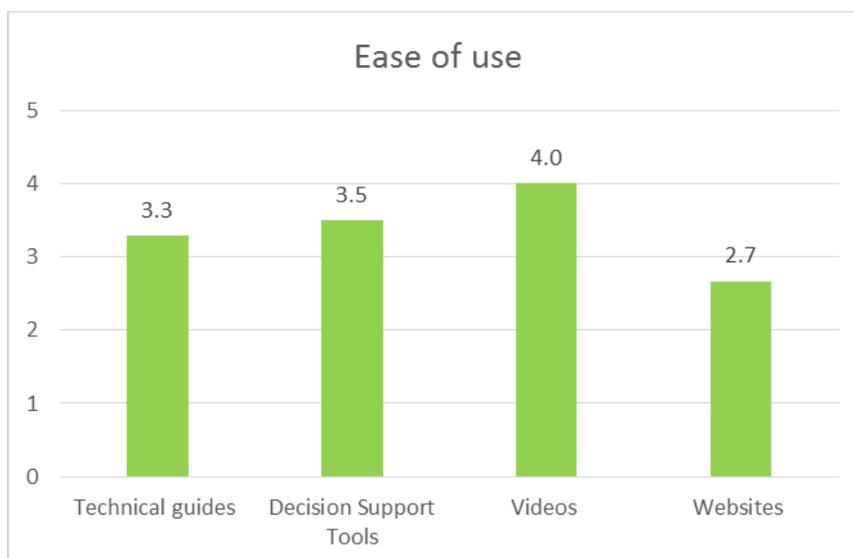
A range of tool formats are required to adequately share knowledge within the farming community. Each tool format (Leaflet and technical guide, video, website and calculation tools) has relative advantages and disadvantages and provides a slightly different function. As such they *can* complement each other well. Some are also better suited to certain types of information – for example videos can work better for introductory information, inspiration and updates over time, whereas technical guides are better for providing detail for practical implementation. Moreover, some users are more likely to prefer some formats over others and therefore providing a range of options is important to be able to reach as wide an audience as possible.

It is important to highlight, however, that there was overall positive feedback on videos as a method of sharing knowledge both from research and between farmers. Farmers are using visual cues in the field every day and relate well to seeing practices in action. The use of visual information in other tool formats, such as photos, flow diagrams and tables, was also considered valuable and more useful than long streams of text. Calculation tools were also considered to have a lot of potential, but many existing ones are not seen as currently ready for practice. Websites were considered less easy to use and less practical and are seen as hard to navigate and find specific information.

The clear advantage to taking knowledge exchange online (utilising tools such as websites and DSTs) is the opportunity to interact with other farmers and researchers. However, despite interest to do so, at present it seems that this functionality of many tools tends to be underutilised.

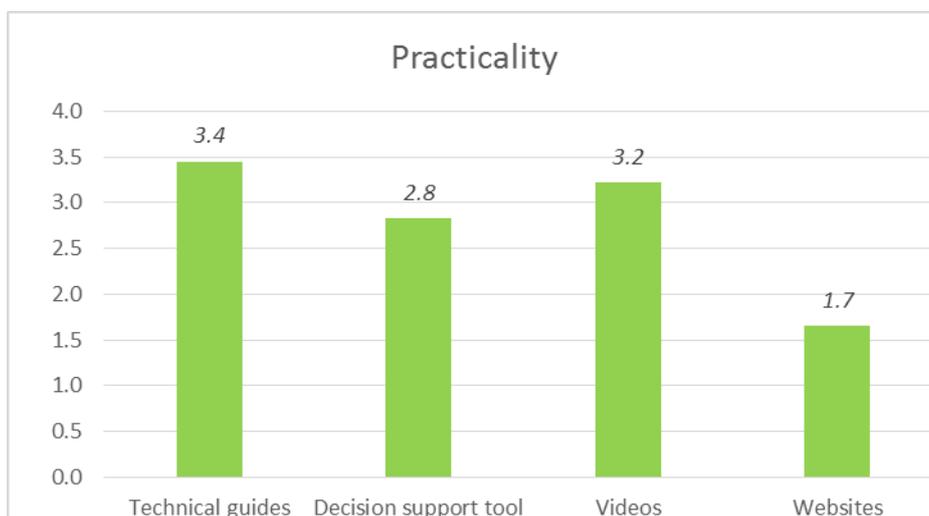
Tools were scored for ‘ease of use’ – which took into account the user friendliness of the format, the instinctiveness of the layout and energy it took to use them. Participants provided also feedback on what was easy to use and what made them more difficult to use. This was considered particularly important as farmers are time poor. Fig 6 shows that on average, videos were considered the easiest to use, followed by decision support tools. Interestingly websites were considered the least easy to use.

**Figure 6** Average scores for ease of use by format



All tools were also rated for ‘practicality’– relating to how effective the tool was in supporting farmers to put the techniques described / information into practice. Fig 7 shows that the technical guides received the highest average score, followed by videos and the decision support tool, with the websites receiving a low score, suggesting that information on websites is considered to be less transferable to practice.

**Figure 7** Average scores for practicality by tool format



It was clear that other farmers experiences of a particular practice was considered a critical factor in helping make a tool suitable for implementing in practice. For instance, [John Pawsey YouTube \(#24\)](#) is considered practical by the UK group because it is based on his own experiences on farm and provides practical ideas and tips. A practical tool gives recommendations and practical implications of findings, ideally outlining steps to action. Farmers appreciate a frank and honest portrayal of the challenges and trade-offs experienced by those that have put the strategy into practice. It arose in discussions in many of the groups that many tools created by advisory or research organisations tend to be trying to promote a certain practice, whereas farmers prefer to have an honest analysis of the advantages and disadvantages in different contexts, and in particular to hear how other farmers have got on.

Tools considered the least practical were seen to be not adapted to local agro-climatic conditions (for example the video [Bringing the dirt to the doorstep \(# 4\)](#) from the USA) or that were too complex.

In the following sections, we have explored the feedback on the different tool formats in order to understand why they were rated differently and how they can be improved.

## 4.2 Leaflets and technical Guides

All tools that were exclusively in a written format were classified as technical guides. This is the most common way of sharing information with farmers. The guides varied in length (from 1 to 180 pages) and received different scores for ease of use and practicality.

Overall, the following comments were commonly made about what makes a good and bad technical guide. However, it is worth recognising there were also exceptions to these trends.

**Figure 8** What makes a useful and not so useful technical guide

☺ Useful	☹ Not so useful
Clear, plain language/ glossary for technical terms	Overly complex, technical language
Visual information – pictures, tables, diagrams	
Photos from the field	
Farmer case studies	Lack of application in the real world
Step by step guidance	
Easy to navigate – e.g. table of contents	
Succinct text, broken up with visuals, bullet points	Long streams of text
Practical implications / recommendations	

### 4.2.1 Visual information

A number of points were highlighted in regard to visual information in technical guides. Firstly, photos are one of the easiest ways to communicate the impacts of certain practices, particularly relating to crop health, establishment and soil condition. Moreover, some farmers mentioned that they can process such information more rapidly. It is important to them to be able to quickly find relevant information on a page through photos, diagrams and tables. One tool which was considered to make good use of visual information is [Mechanical weeding in arable crops \(#8\)](#). “There are lots of practical case studies, pictures and practical tables” (Bioforum Group, Belgium). The tool combines short sections of text with photos (see image left in Fig. 9) showing the mode of action of a finger weeder and how it can be regulated. *Tool #10 Green manures and cover crops a guide to the species* also includes farmer testimonies and this page (Fig. 9) makes use of visual diagrams to outline the weed control interventions throughout the farm rotation. Breaking up the text with boxes, bullet points and photos was also considered to make the information easier to digest.



The step by step process for counting earthworms as an indicator of soil biological activity was particularly appreciated.

**Figure 11** Example of practical information included **[‘Earthworms: Architects of fertile soils’](#)**

**Minimizing ground pressure and soil compaction**

- Compaction of the soil has negative impacts on earthworm populations and other organisms. The heavier the equipment, the greater the compaction of the soil.
- Machinery should be adapted to keep ground pressure to a minimum (tyre pressure, weight of machinery).
- To avoid soil compaction, only well-dried, good bearing soils should be cultivated.



*The on-land plough helps prevent soil compaction in the plough pan.*



*Lighter till and drill combinations spare earthworms.*

**Diversifying crop rotation to enrich the menu of earthworms**

- A diversified crop rotation with long-lasting and deep-rooted catch crops rich in clover or green manure crops, and diversified crop residues are the basis for rich soil life and essential to maintain or increase earthworm populations.
- A continuous cover of plant residues or vegetation on the soil (especially over the winter) is very beneficial to earthworms and other soil fauna.
- Perennial clover-grass meadows regenerate earthworm populations substantially and are more beneficial than a 1-year grass ley.

**Fertilizing in relation to soil properties and plant needs**

The type and the amount of fertilizer used both affect earthworm populations.

- A soil, which is fertilized adequately to the crop needs and in a well-balanced manner, is good for both crops and earthworms.
- Slightly-rotted composted manure contains more food for earthworms and, thus, is better suited to promote earthworms than ripe compost.
- Organic fertilizers should only be incorporated to a shallow depth. Deeply buried crop residues are detrimental to earthworms, because anaerobic conditions can occur.
- As the ammonia in unprocessed liquid manure is very harmful, especially to earthworms living near the surface in waterlogged soils, liquid manure should be stirred (and thus aerated) and diluted prior to application.
- Liquid manure should be applied to absorbent soils only and in moderate amounts of about 25 m<sup>3</sup> per hectare.
- To ensure neutral soil pH (H<sub>2</sub>O) lime should be applied routinely on the basis of pH measurements. Soil pH (H<sub>2</sub>O) below 5.5 is harmful to earthworms.



*When diluted and applied in moderate amounts at the right time, liquid manure is beneficial for earthworms and crop growth.*



*A rich earthworm fauna helps cut down silage up and improves water infiltration and storage.*



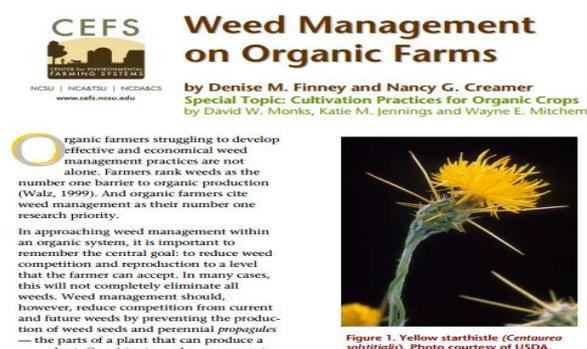
The tool [Green Manure and Cover Crops: Choice of species \(#10\)](#) was also found to be very practical because it gives clear instructions with some examples and schemes. To the contrary some tools received a poor rating for practicality because “clear recommendations are missing” (Bioforum, Belgium).

### 4.2.3 Length and level of detail

To be more accessible, it seems a good aim is 2 – 20 pages for a technical guide. The 6 pages of [Earthworms: Architects of fertile soils \(#5\)](#), see Figure 11) was considered by many to be an ideal length. Longer guides such as [Weed control in organic farming through mechanical solutions \(#11\)](#) (288 pages) were considered to be less easy to use because of long blocks of text, with minimal use of visual information.

The Estonian Group wrote about [Muencheberg soil quality rating \(#14\)](#) – 103 pages - that it was “a difficult, maybe too theoretical, not practical suggestions...it looks quite complicated” (Maheklaster Group, Estonia). Similarly, the Conmarchebio Group (Italy) wrote about [Soil quality test guide \(#15\)](#), which mainly consists of pages full of text, that it “it is hard to use. This tool is mostly suitable for advisors.” Feedback also included suggestions to be able to navigate within electronic versions of documents to help you find what you are looking for.

**Figure 12** Use of visual information in [Weed Management on Organic Farms \(#18\)](#)



However, there were some exceptions, where longer technical guides received positive feedback. For example, the guide [Mechanical weeding in arable crops \(#8\)](#) (82 pages) and the [Visual soil assessment Field Guide \(#16\)](#) (84 pages) were liked. These were namely those which contain a lot of visual information which breaks up the text. Similarly, [Weed Management on Organic Farms \(#18\)](#) (34 pages) was also considered acceptable as a longer guide as it is a comprehensive summary bringing together information on weed biology and a range of management techniques both preventative and curative, e.g. critical weed free periods.

Although it was clear that succinctness was appreciated by the farmer groups, in many cases there was demand for more detail. However, it is important to recognise what type of detail is appreciated by the farming community.

It was generally felt that many of the tools lacked the detail of context, in which a certain practice worked and did not work, the practicalities of implementation (such as cultivations, sowing window etc) and most importantly numbers – yield, income, cost savings, cost-benefit analysis etc.

Tools which included carefully presented detailed information were appreciated, such as [Risk management guide for small grains \(#19\)](#) 18 pages (see Figure 13). The synthesized outcomes of a number of trials was also appreciated in [Mechanical weeding in arable crops \(#8\)](#).

Figure 13 Examples of appropriate detail *Risk management guide for small grains* (#19)



Figure 11-5. Rye plants and seed.

rye varieties are not only genetically more diverse than varieties of other small grains (which all are true breeding lines), the crop itself is more susceptible than the other small grain species to the fungal disease ergot (caused by *Claviceps purpurea*). The sclerotia or ergot bodies that ultimately replace the developing kernel in

an infection can contaminate the harvested grain and are difficult to separate. Grain containing too much ergot is unfit for feed or food usage as the ergot bodies contain alkaloids that are toxic. Rye can be grazed as forage, used as a cover crop, and provides excellent weed control.

**TRITICALE**

Triticale is a man-made crop. It is a hybrid of either bread wheat or durum wheat and rye in an attempt to combine the drought re-

sistance and yield of rye with the quality of wheat. The first report of a hybrid of wheat and rye was in 1876. By the 1930s, breeders and geneticists across Europe were working on triticale. After initial problems with sterility of the offspring, breeders were able to produce a stable, fertile progeny and in essence a new species. Triticale can be an excellent substitution for rye or wheat, especially in drought prone areas or areas with poorer fertility.

Table 11-1. Small grain adaptation.

Small grain	TOLERANCE TO:								
	Heat	Drought	Wet/Poor drainage	Acidity	Alkalinity	Salinity	Weeds	Low fertility	Winter hardiness
Spring wheat	Moderate	Moderate	Moderate	>5.0	<8.2	Moderate	Moderate	Low	--
Winter wheat	Moderate	Moderate	Moderate	>5.5	<8.2	Moderate	Moderate	Low	Moderate
Durum wheat	Moderate	Moderate	Moderate	>5.0	<8.2	Moderate	Moderate	Low	--
Spelt	Moderate	Moderate	Moderate	>5.0	?	?	Moderate	Moderate	--
Barley (spring)	Moderate	Moderate	Low	>5.0	<8.2	High	Moderate	Moderate	--
Oat (spring)	Low	Low	Low	>5.0	<8.0	Moderate	Low	Moderate	--
Winter rye	Low	Moderate	Moderate	>5.0	<7.0	High	High	Moderate	High

In comparison the [Soil quality test guide \(#15\)](#), (see Figure 14) was considered to be too complex for implementation in the field. It is 88 pages of dense text, with very limited visual information. Feedback suggested in went into unnecessary scientific detail, requiring specialist equipment and calculations. Moreover, it did not make practical recommendations on what could be done with the results.

**Figure 14** Too much detail in tool Soil quality test guide (#15)

**4 Measure and Record Nitrate** 

- Align the nitrate/nitrite test strip with the bottom of the bottle with your thumb corresponding to the diagram on the bottle.
- After 60 seconds, compare the first pad (furthest from your thumb) along the nitrate scale as shown in Figure 7.3. Estimate the nitrate amount according to the degree of color change. Enter the value from the nitrate scale on the Soil Data worksheet in ppm. This value is an estimate of nitrate-N concentration in the extract.



Figure 7.3

**NOTE: The nitrate test strips have a shelf-life. Check the expiration date on the bottle.**

**CALCULATIONS:**

**Estimated** (lb NO<sub>3</sub>-N/acre) =  

$$\frac{(\text{ppm extract NO}_3\text{-N}) \times (\text{depth of soil sampled in cm}) \times \text{bulk density} \times 0.89}{10}$$

**Exact** (lb NO<sub>3</sub>-N/acre) =  

$$\frac{(\text{ppm NO}_3\text{-N}) \times (\text{volume water used}) \times (\text{depth of soil sampled, cm}) \times \text{bulk density} \times 0.89}{(\text{dry weight of soil}) \times 10}$$

Volume water used = 30.0 mL + [dry weight of soil x soil water content (g/g)]

**Note:** The maximum nitrate-N reading on the nitrate/nitrite test strip container is 50 ppm. If the sample reading falls into the 50 ppm category, the sample can be diluted to get a better estimate of the actual amount over 50 ppm. To dilute the sample, fill the eye dropper with filtered solution and place five drops in a plastic container. Add five drops of distilled water; mix gently by swirling the container. Take a reading with a new test strip as stated in Step 4. Multiply the estimated nitrate-N in ppm by 2 before using the calculations. If the nitrate reading falls into the category of 50 ppm again, repeat the dilution steps, and multiply the estimated nitrate-N in ppm by 4.

**Did You Know?**

Water samples may be taken from drinking water, well water, tile drainage, drainage ditches, and ponds. Dip a nitrate/nitrite test strip into the water and estimate the nitrate or nitrite concentration from the color chart on the test strip bottle. This test can give you an idea of how much N fertilizer is lost from the soil. (See Chapter 12).

### 4.3 Videos

The human brain processes visual information 60,000 times faster than words (see [Thomson-Reuters, 2016](#)). As such there is huge of untapped potential in using videos to exchange knowledge on organic farming. There was a lot of interest from the farmers in videos as a direct and simple way of learning. The use of visual information also means that the language barrier with exchange of materials between countries is reduced.

*“Videos are very direct and easy to understand”* (FIBL Group, Austria)

Figure 15 [John Pawsey YouTube Channel \(#24\)](#)



#### 4.3.1 Length of videos

Feedback suggests that ideally videos should be short (2-8 minutes) and longer videos should be cut into parts and grouped together. For example, [Tilman.Org videos on reduced tillage \(#3\)](#) is a collection of several related short videos (each less than 10 minutes), which means viewers can zoom into exactly the topic they are interested in. This may explain why the Tilman.org collection received more positive feedback than the video [Bringing the dirt to the doorstep \(#4\)](#) Although on the same topic (minimum tillage), the later was considered too long (20 minutes) and participants suggested they were unlikely to watch it in full.

Figure 16 Example of tool long video [Bringing the Dirt to your Doorstep \(#4\)](#)



Organic No-Till Weed Management

Similarly, [Mechanical weed control in vegetables \(#27\)](#) is a video produced by FIBL as part of the Bioaktuell videos to demonstrate a range of machinery in the field. The Belgian group commented that the film is too long (20 minutes) and suggested to “*cut the film in different parts so you can look into the machine you are interested in.*” (Bioforum, Belgium)

Another option for longer videos could be to outline the minutes at which different topics are covered.

#### **4.3.2 Providing links to more detail**

In some cases, short videos were criticised for being too general and simplistic, not able to get into the necessary detail for practical application. However, for this reason a number of groups suggested that videos are linked to other types of tools which can provide further information such as technical guides and Decision Support Tools (e.g Bioland Germany). This is a clear benefit of providing knowledge exchange tools on line. Links could be provided both on YouTube pages and between tools on websites such as farmknowledge.org

In this way videos can be seen as an easy to use ‘hook’ and inspiration for farmers to then delve deeper into existing knowledge to learn how to apply certain practices on their own farms.

Another suggestion was to include subtitles and slides which provide more detail on elements such as drilling dates, seed mixes and yields.

#### **4.3.3 Video of practical demonstrations in the field**

Videos are considered to be particularly appropriate for sharing information from in-field demonstration and trials. In particular the action of machinery – such as in [Mechanical weed control in vegetables \(#27\)](#) is best demonstrated through video so that farmers can not only see the engineering of the machine but also its effect on the crop;

*“The format – youtube video allows farmers to see the machines in action as if you were there yourself. The fact that you can see it at work from all sides (under, side,...) is very welcomed!”*  
(Bioforum, Belgium)

Similarly videos were considered useful to demonstrate step by step how to do something – such as the video made about the [Spade Test \(#35\)](#) as it supports farmers to carry out the spade test and assess their own soils. This could be taken into the field on a smart phone.

#### **4.3.4 Sharing experience from farmer to farmer**

One of the key benefits of the video format is the capacity for farmer to farmer knowledge exchange, such as those on [John Pawsey YouTube \(#24\)](#). John is a member of the UK Farmer Innovation Group and uses his mobile phone to capture interesting insights and updates as he walks his fields – making it a very direct form of communication. John is considered “*an ambassador for Organic Farming*” who is often innovating with new techniques. For example, he has tried relay cropping and grazing winter wheat with sheep to reduce weed pressure, and his videos are inspiring others. The UK group felt that “*YouTube channels are an excellent and engaging medium*” and the value of farmer made videos is that they tend to be “*Direct, practical and honest*”; sharing both successful and less successful innovations and seeking to understand the reasons why (ORC Arable Group, UK, 2017).

**Figure 17** Example of a video channel made by farmer John Pawsey (#24) for farmers



John also provides updates over time on practices that he is trying, so that viewers can follow progress over the year. He receives and responds to comments and finds it a useful way of both sharing knowledge and learning from others (although some other members of the UK group felt they would not have time to do this!).

There was an interest in support for farmers to make their own videos – perhaps with a video on ‘how to make a video’ and upload them on to a common YouTube channel.

The use of videos to profile farmers is also popular on the [‘Knowledge platform for Agroecology’ \(#22\)](#) which is detailed below. This tool was considered particularly interesting to the ConMarcheBio group “thanks to the several videos of farmers telling their stories” and sharing practical experiences from both organic and non-organic perspectives.

#### **4.3.5 Providing updates**

Overall one of the advantages of videos was considered to be the possibility for updates over time, in particular with trials and demonstrations – so that the farming community can see what happens next. Linking videos so that this chronology can be followed was appreciated. However, it seems that such updates were not always provided – perhaps due to time / resource constraints of the organisations. The possibility to provide follow up should therefore be considered when making videos.

Moreover, there was a suggestion that videos need to be recent in to be relevant. There seems to be a feeling that more recently uploaded videos are more likely to be watched than older ones as they go out of date quickly.

#### **4.3.6 Local context and language**

Although it was considered that the visual information to some degree helped overcome language barriers, it is still important to ensure that subtitles are provided. It was appreciated that [Tilman.Org](#)

[videos on reduced tillage \(#3\)](#) hosts a collection of videos with subtitles in different languages (German, French, Italian and English).

*“YouTube films should be short and in own language, preferable with subtitles even when in own language.”* (Bioforum, Belgium)

There were also suggestions that further information could be added in the videos with subtitles even in own language.

Moreover, although some learning can arise from watching videos relating to practices in very different contexts, for practical application it is important that videos relate to local conditions. For example [Bringing the dirt to the doorstep \(#4\)](#) received criticism due to the fact it was focusing on no-till systems which work in the US context. To the contrary [Tilman.org \(#3\)](#) received much more positive feedback as farmers could relate to the context.

#### 4.4 Websites

Taking knowledge exchange on organic agriculture online is being supported by the development of a number of websites which seek to bring information together – both within and between organisations. Although there is support for creating such hubs, feedback received on this tool format warrants further exploration.

**Figure 18** Example of a website *Knowledge Platform for Agroecology (#22)*



The website which received the most positive feedback was [Knowledge platform for Agroecology \(#22\)](#) which is built around different agroecological principles and farmer testimonies for using them. Starting with farmer experience and practical examples seems to be a logical way to lead people into learning more in other, more detailed tools.

The layout of the site -with icons and links was also considered to be logical and easy to use. The site makes use of key words and categories. However, comments included that it was quite general and didn't make specific recommendations. There was also a suggestion that a forum / discussion board and ability to comment would enhance the site. However, in further discussions it was clear that only a limited number of farmers use discussion forums due to time limitations. Moreover, it was considered that they were more likely to trust the advice of other farmers they have met than a stranger on a platform who may give bad advice!

The main difficulty with websites is that information is often said as too general, and sometimes only basic with superficial knowledge supplied. Another problem mentioned is that more detailed information is difficult to find. As such good functional design of the website is key to make navigation intuitive and tools easy to find.

Although it was appreciated as a good overview of reduced tillage, bringing a lot of information ‘all-in-one’ the [Bioaktuel \(#7\)](#) website was considered to be more difficult to navigate and many were not able to find the more detailed technical guides contained on the site. “one of the participant found it interesting because it provides basic knowledge but does not really like the form of the website” (BASE ABC, France).

Moreover, the information was considered to be quite general, with limited recommendations and data. It was also thought the website could be improved if some farmers testimonies/ experiences or case studies were included to show how some people are putting it into practice. Equally, websites in non-native languages are unlikely to be used.

**Figure 19** Example of page on the website [Bioaktuel \(#7\)](#)

### Mikroorganismen als Pflanzenstärker

Das FiBL testet Mikroorganismen, Pflanzenextrakte und Kompostsäfte bei verschiedenen Pflanzen. Die Forscher untersuchen, ob die Produkte eine Wirkung zeigen. Wenn dies der Fall ist, schauen sie weiter, wie sie angewendet werden können.

Es gibt Bakterien und Pilze im Boden, die Phosphor und Stickstoff für die Pflanzen besser verfügbar machen können und somit deren Wachstum verbessern. Gewisse Pflanzen- oder Kompostextrakte stärken die Pflanze und steigern ihren Ertrag. Immer mehr werden Produkte mit den oben erwähnten Substanzen auf dem Markt angeboten. Nach mehreren Versuchen sieht das FiBL für einige der Produkte Anwendungsmöglichkeiten in nährstoffarmen Böden (vor allem Phosphor betreffend), bei extremen pH-Werten (=sehr alkalische oder saure Böden), oder im Falle von klimatischem Stress. Eine Kombination mit Kompost als Dünger wirkt sich meist sehr positiv aus. Es gibt jedoch kein Zaubermittel, das die klassischen Düngemittel ersetzen kann. Für die tropische Landwirtschaft könnte es interessante Anwendungen der erwähnten Produkte geben, besonders auf arme, ausgelaugte Böden. Das FiBL wird 2016 oder 2017 genaue Anwendungsempfehlungen für die Praxis veröffentlichen.



Einimpfung von Mikroorganismen beim Mais durch FiBL-Mitarbeitende.  
Foto: © FiBL, Sarah Symanczik

#### Ein komplexes Thema

Die Erforschung der Substanzen ist nicht einfach. Deshalb arbeitet das FiBL mit anderen Instituten und Herstellern aus Europa zusammen. Die Forscher haben zuerst eine geeignete Methode entwickelt, um die Wirkungsweise zu verstehen. Zudem mussten sie eine molekularbiologische Technik entwickeln, die es erlaubt, die Persistenz einiger Bakterien zu beobachten, die zuvor in den Boden eingepflanzt wurden. So

Although not fully developed at the time of the workshops, some farmer groups also provided feedback on the OK-Net knowledge platform during other project meetings. They commented that it is not always so easy to find the tool or the information there were looking for. Links between resources to enable users to move between related relevant content could also be useful. Farmer case studies and experiences of putting the practices into action would also be of use. Unfortunately, there was also only limited uptake of the discussion platform, discussions at a third workshop focusing on the platform suggested that farmers were more likely to discuss with each other through other existing social media channels such as twitter.

## 4.5 Decision Support Tools

Tools which synthesized information in a way to support farmers to make decisions were classified as Decisions Support Tools – this included databases, models, digital applications and websites.

*“Decision support tools (DST) are designed to help users make more effective decisions by leading them through clear decision stages and presenting the likelihood of various outcomes resulting from different options (Dicks et al., 2014; Parker, 2004).”<sup>2</sup>*

There was recognition of the huge potential of digital Decision Support Tools (DSTs) and appreciation of the “playful” nature - the ability to test out new ideas, bringing together scientific knowledge to work towards practical solutions. However, many of the calculation tools or DSTs evaluated by the farmer groups were not considered currently ready for practical use (not user friendly, time consumer data entry) and improvements are needed to make them more appropriate and useful to a farming audience. It is also clear that farmers should not expect them to provide ‘prescriptions’ but more as a guide and to inspire new ideas.

There was particular interest in calculation tools or DSTs which enable the analysis of the whole rotation / farming system. Both [ROTOR \(#17\)](#) and [NDICEA \(#34\)](#) required the input of large amounts of data, such as cropping, fertiliser applications and operations, all data farms are frequently required to report on to authorities. As such there were questions as to whether future versions of such tools could link to data from existing farm management software.

#### **4.5.1 Improving user friendliness**

It was a common theme that many of the DSTs appear to have been developed more from a researchers’ perspective than with an understanding of farmer’s needs.

[ROTOR \(#17\)](#) is a crop rotation planning tool in an access database. First impressions were that the tool could be very useful as there is a need for bringing together complex information to support decision making. However, the groups found that the input criteria were limited (e.g. all rotations have to start with clover / grass) and as such it was impossible to put in accurate data for a rotation. The concept is good, but improvements are needed to ensure that data in and out are accurate for farmers to trust the results. Moreover, the need to use a log in and password to access the tool is considered a barrier.

Similarly, [NDICEA \(#34\)](#) is a nutrient model which simulates nutrient dynamics across rotations. This was developed for use by researchers and advisors and not intended to be used by farmers. However, due to interest to test its use on-farm, researchers in the UK worked with 8 farmers to input farm and crop rotation data into the model and observe the impact on nutrient dynamics. The group found the tool to be useful to demonstrate that current systems have a negative nitrogen and organic matter balance and as such were able to develop scenarios to seek to rebalance it together with the researchers. Farmers found this to be a valuable process to identify potential changes to the rotation – such as moving to spring cropping, reducing tillage and keeping continuous cover.

*“Useful to show N limits. Good facility to put in actual performance/conditions.” (ORC Arable Group, UK)*

There is an interest to adapt the user interface of this tool to make it more suitable for farmers to use “on a rainy day” without the assistance of researchers. To save the results of different scenarios for future reference and to provide more user-friendly graphics / recommendations could support this.

#### **4.5.2 Improve reliability and practicality of output data**

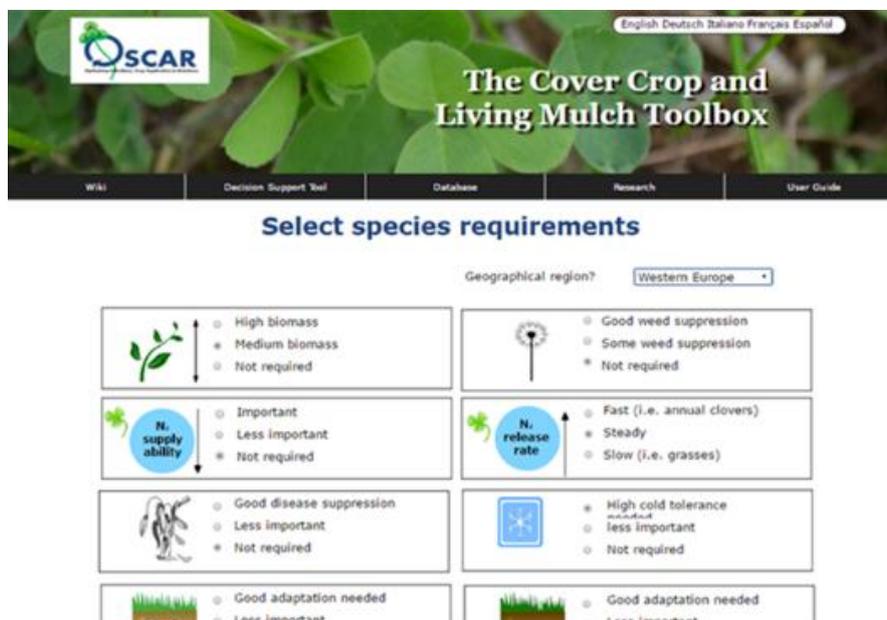
The [Living mulch and cover crop tool box OSCAR \(#1\)](#) was considered to be a useful tool. In particular, the user interface of the toolbox (see below) was considered to be easy to use, simple check boxes

---

<sup>2</sup> David C. Rose a, et al., “Decision Support Tools for Agriculture: Towards Effective Design and Delivery.”

support the toolbox to select cover crop species appropriate to your own farm conditions and objectives.

**Figure 20** The well-liked web-tool *Living mulch and cover crop tool box OSCAR* (#1)



*“The software is self-explanatory and therefore very easy to use”* (Bioland, Germany).

*“The participants found the criteria approach relevant, the tool is easy to use and playful”* (ROTAB, France).

However, there was also some concern about the reliability of output data (as species that were considered inappropriate to local conditions were suggested). It also only looked at individual species, whereas users were keen for it to support the identification of relevant mixtures and their interactions, positive and negative, with each other and consequent crops in the rotation. Users also felt it needed to include information on the practical management implications (for example identifying an appropriate ‘window’ in the rotation, including sowing dates, seed rates etc). Moreover, there was no indication as to the relative cost of the seed / benefit in terms of yield and cost savings, which users felt could be integrated at least with a cost weighting to give an indication.

#### 4.5.3 Enable interaction and data sharing

Overall there was an interest in being able to input data to online decision support tools and interact with other farmers and advisors to discuss challenges and identify solutions. [CroProtect App \(#31\)](#) is an interactive mobile phone application and website which provides guidance on pest, weed and disease management.

**Figure 21** The CROPROTECT App and illustration of UK user community (#31)



Farmers appreciated the interface which allows users to input farm information such as crop types and crop protection needs and pulls together a large amount of data (from academic, industry and other users) to generate tailor-made information on pest and disease biology and identify relevant solutions. They did not, however, comment on issues regarding data ownership. Available on a mobile device it provides helpful visual cues for identification of pests in the field, which was appreciated by the farmers. However, although the tool does start with non-chemical approaches, they were disappointed that many of the solutions make reference to chemicals. A similar tool tailored to organic systems could be of interest.

Users have the possibility to set up an account and are then able to comment in the discussion forum and ask questions on specific pests to other members. Although the group found this a valuable feature, it also appears this feature is somewhat underutilised. Feedback suggests that such forums need a critical mass of people to encourage others to post. CROPROTECT also includes an option for farmers to share data on pest prevalence to support mapping. Again, farmers found this interesting and useful, but wondered if they would have time to do so.

Similarly the [Living mulch and cover crop tool box OSCAR \(#1\)](#) (see Figure 20) has an associated Wikipedia page which allows farmers to report on their own experiences – however this was not linked directly to the species selection DST and many people found these two elements of the tool disjointed. There was therefore an interest to be able to feed farmers' own data into the tool and improve the accuracy and local appropriateness of the results, making use of 'Big Data'.

Many participants also expressed an interest to interact online with various tools – both in terms of comments and discussion forums and sharing data – but it was also perceived to be time consuming and hence not necessarily feasible. It is worth noting that many farmers commented that they would prefer to directly contact another farmer that they have met previously face-to-face or through social media, because this allows them to learn about the context of their farming systems and trust that they are a 'good farmer'.

#### **4.5.4 Opportunity to step back and reflect**

Overall, participants were acutely aware that it is not realistic for DSTs to provide detailed ‘prescriptions’. However, they were excited about the possibility of turning large amounts of data and information into practical recommendations. Many of the groups recognised that realistically such tools could only really be used as a guide: to provide an indication of the relative risk and opportunity of different actions.

DSTs were also considered a valuable opportunity to step back and reflect on the whole farming system, inspiring new ideas and approaches. For example, [HighCrop \(#33\)](#) is a particularly unusual tool which uses a physical pack of photo cards to support farmers through a ‘visualisation’ process of where they would like to see the farm in the future, and other cards to break down the actions needed to get there. Despite initial scepticism the process of visualisation was considered useful by the farmers, however the cards in their current form did not link well enough the vision to be useful steps to action. There was a suggestion that something along the same lines could be developed as a digital tool.

In summary it is clear there is a lot of interest in the potential of DSTs to support farmers in pulling together the complex information that they need to process on their farm to make informed decisions. It was suggested that in future farmers should be more engaged in the R&D process of such tools to make them more appropriate to their needs.

## **5 Conclusion**

Organic farming is knowledge intensive and there is considerable potential for enhancing the digital knowledge exchange through tools that support learning in organic farming. Working with the farmer groups of the OK-Net Arable project made clear that farmers value the direct exchange with other farmers, through farm walks and regional, national and international workshops. It is therefore not desirable that online knowledge exchange platforms are seen as a way to replace the direct exchange between farmers or between farmers and researchers. However, on-line knowledge platforms can do a lot to improve farmers’ access to knowledge and information and support learning and knowledge exchange.

One of the most important steps to improve the on-line knowledge provision through tools and websites is to consider the user. Knowledge tools and knowledge platform developer should aim to obtain feedback from farmers on the usefulness of their offers. Farmers make daily decisions, considering a complex mixture of agronomic, economic and social factors. Many comments on the tools indicate that the farmers are missing the contextual information under which conditions recommended practices have worked or not work. This could be addressed through the inclusion of case studies. Moreover, farmers have limited time available for learning and knowledge exchange and this must be used efficiently to get to what they consider relevant and practical information.

There is no silver bullet and a range of format and tools are required. Depending on the topic, some types of tools are more appropriate to communicate certain types of information than others and different users have different preferences. But linking tools on similar topics (for example in one website or through a tutorial or webinar) could be a very useful method of supporting farmers on that journey.

Tools on mechanical weed control, weed ecology and integrated weed control measures (considering preventive and curative action) were considered relevant. The technology for mechanical weed control is changing, so there is need for regular updates. Also, tools for soil monitoring, reduced tillage

and cover crops were of interest to the farmer groups. There was also a demand for whole farm tool and evaluation/calculation tools which enable the farmer to step back and analyse or reflect on their whole farming system. These would ideally bring together various data to assist with rotation planning, nutrient management and economics. However most of the tools currently available were not considered fit for this purpose. Finally, there was positive feedback for those tools which highlighted both the preventative as well as curative approaches.

Farmers also highlighted the importance of contextual information (climate, soil, farm type and region) in which certain techniques have worked and not worked. So more than giving details of the technique, there must also be details of how it can be practically implemented in a range of different circumstances. This includes details like which machinery, field operations, timings, soil conditions, and place in the rotation etc., where a need for honest, balanced assessments of different practices was identified. The adaptation to local conditions also includes language, and this was noted in most countries, but particularly where no or very few tools could be offered in national language. The OK-Net arable project has created an opportunity to translate several tools which was greatly appreciated by the farmer innovation groups.

In terms of format, there was clear preference for well-structured tools with clear headings so that the wanted information can be located. If the use of scientific terms cannot be avoided, a glossary to define them should be included. However, despite the need for contextual detail shorter was by and large considered to be better, but there were exceptions to this in terms of technical guides.

Language and constraints on farmers' time are likely to be among the reasons why farmer prefer tools that have visual information in the form of either videos or technical guides with photos and figures. Farmers are probably also used to process visual cues in their day-to-day decision making and take a lot of contextual information from how soils or crops look like. They also like real data in terms of likely impact on yields, income, investment and potential cost savings.

Videos were the most preferred tool format in terms of ease of use, because videos provide quick and direct access to the information, the pictures (especially with sub-titles) can reduce the language barrier and videos can include farmers' experiences. The farmers preferred short videos (5-10 minutes) that are suitable for different or clearly specified conditions, but videos can also have missing information. This could be completed with a link to more detailed information, such as technical guides or calculation tools/websites.

Websites can create the opportunity to bring a lot of information together in one place, including linking practical experience to more detailed information and to link different relevant tools on the same topic, but some websites were considered to be too general, only presenting fairly basic information that farmers know already, not regularly updated and difficult to search.

Regarding Decision Support Tools there is unrecognised potential, because such tools could support the pulling together of complex and contextual information in a simple way to provide guidance on decision-making. However, some of the tools that were evaluated raised questions about the reliability of the assumptions or the practicality of the results, as well as the need for regular updating and for adaptation to local conditions and languages.

There was feedback that some tools (e.g. Bringing the dirt to the doorstep (# 4) were 'promoting' certain techniques and not providing a realistic account of the pros and cons in different circumstances. This raises issues of trust. Farmers mentioned that they felt there was a tendency for researchers to hide things that didn't work, including negative impacts of management practices. Information about what did not work was considered to be as valuable as what did work and the farmers felt that there should be more of a culture of sharing this information.

This could be one of the important reasons why the opportunity for farmer-to-farmer knowledge exchange and learning appears to be a critical factor to the appeal and relevance of tools. Farmers' insights and opinions on the implementation of certain practices in the form of case studies, photos and tips were seen as important. Farmers trust other farmers' experiences and rely on the contextual information to make a judgement on whether or not a practice would work in their own circumstances.

Also, the evaluation made evident that what is considered relevant to the practical context and what is interesting is not always the same and there are some contradictory trends which merit further exploration. For example, groups expressed a desire for more specific tools, which focus on a specific issue or practice. Such tools are favoured over general tools and websites, the later often considered too broad. At the same time, tools that were too long and presented too much detail were not liked, but some long technical guides were appreciated.

There is a need to provide deeper understanding in what tools are wanted and liked as well as continuing to provide more and more tools that help organic farmers address the many practical challenges they are facing, particularly in countries where access to knowledge and information (including on-line) is limited. The detailed findings presented in this report can help to inform the creation of knowledge exchange tools, which fit the needs of farmers, to support their learning and enhance organic farming.

## 6 Appendix: Summary of feedback on each tool

1.	Cover crop and living mulch tool box (OSCAR) .....	1
2	Practical advice for organic production of lupines .....	6
3	Tilman-org: videos on reduced tillage in organic farms.....	6
4	Bringing the dirt to your doorstep: organic no-till weed management .....	8
5	Earthworms: architects of fertile soils .....	9
6	Regionally adapted humus balance in organic farming.....	13
7	Bioaktuell web platform with different sections .....	14
8	Mechanical weeding in arable crops .....	16
9	Green manure and cover crops in organic agriculture: general introduction .....	18
10	Green manure and cover crops in organic agriculture: guide to choose the species .....	18
11	Weed control in organic farming through mechanical solutions .....	19
12	Criteria and management recommendations for organic cereal production.....	20
13	A farmer's guide to organic fruit and vegetable production .....	21
14	Muencheberg soil quality rating: visual method for assessment of soil .....	22
15	Soil quality test kit guide: visual assessment of soil qualities and soil properties.....	23
16	Visual soil assessment: field guide .....	24
17	ROTOR: organic crop rotation planner .....	25
18	Weed management on organic farms .....	27
19	Risk management for small grain .....	29
20	Sort out your soil: A practical guide to green manures .....	29
21	Atlas of agricultural entomology – a knowledge base of pest insects.....	31
22	Knowledge exchange platform for agroecology.....	31
23	Nutrient management for farms in conversion to organic.....	32
24	John Pawsey Youtube channel.....	34
25	Bioland Humusrechner .....	34
26	Weed control in organic vegetables / INAGRO.....	35
27	Mechanical weed control in vegetable production FiBL video .....	36
28	CCBT Website.....	37
29	Simple building blocks for improved soil .....	38
30	A guide to Nutrient budgeting on farms.....	38
31	CropProtectApp .....	39
32	SEMINBIO: Innovative seeder for weed control in cereals.....	40
33	Highcrop.....	40
34	NDICEA .....	42
35	Spade test .....	43
36	Arvalis.....	44

## 1. Cover crop and living mulch tool box (OSCAR)

Web-based decision support tool

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30563>  
<https://orgprints.org/30563>  
<https://web5.wzw.tum.de/oscar/toolbox/database/intro.html>

Relevant	Interesting	Easy to use	Practical	Average score
4.4	3.6	4	3	3.1

The OSCAR tool box is web based and consists of 3 main elements: a wiki, a decision support tool and a species data base. The wiki can be edited so it allows participation.

OSCAR's strong points seem to be that the tool is relevant, easy to use and practical.

However, many participants highlight the fact that information is lacking for the tool to be really useful and accurate. For example, many times participants would like to know more about the availability and cost of seeds, and seed rates. Farmers also commented on the necessity to check other tools to have the full information and to be able to take their decisions. Some participants even proposed some complementary references to add to the tool such as feedback from farmers or advisors for instance. However, the wiki tool of OSCAR can be edited, which could permit farmers' feedbacks to be updated online.

Another point that seems to be related to the lack of information concerns the fact that some climate and soil conditions are not included, which could be useful e.g. for farmers to know if the crops they are interested in could be grown in their country or in their region. The Italian group commented that they don't know if the cover crops are suitable in the Marche region. The Italian group concluded that the tool was not "ready to use". This analysis seems to be harsh compared to other participants. Therefore, the inherent challenge of this kind of tool is to make it sufficiently general to be relevant for everybody but at the same time providing some more specific information to be practical to all farmers.

What's more, information is not the only thing lacking, since farmers also expect the tool to give them some recommendations, such as "species mixing recommendations for instance to improve the chances of success of the cover crop" (ITAB group, FRANCE).

Moreover, special attention has been drawn on the need of translation of the tool in more languages which was partly initiated during the project. When the tool testing started, the tool was only available in only two languages (German and English) and translation into French and Danish was started. The user guide is only available in English.

However, despite the language barrier, participants drew attention to the fact that basic understanding of the tool is possible for farmers with some knowledge of English.

French farmers also commented on the fact that one other similar tool already exists, developed by Arvalis in France and duplication should be avoided.

Besides, participants also emphasised that they would to be able to attend face-to-face meetings to share knowledge about cover crops (for example the OK-Net Arable intercropping event in the UK and the workshop at Tech & bio created opportunities).

## 1.1 ROTAB and BASE ABC, France

The tool is service –oriented and this is very interesting according to the participants. There should be more information related to the cover crop management (sowing, destroying, etc). One participant mentioned that this kind of tool was proposed by Arvalis ([#36](#)) in France for conventional farming. Another tested the Arvalis tool and got the answer that “no cover crops were suitable for his demand”. He also mentioned that there were a lot of tools similar to this one that are being developed within different projects and that it is important to avoid redundancy. Nevertheless, such tools are very interesting.

*What do you like about the tool? What don't you like about the tool?*

Positive aspects: The participants found the criteria approach relevant, the tool is easy to use and "playful". Moreover, it is adaptable to the system of each one.

Negative aspects: Some criteria are not taken into account or very little explicit:

- The starting vigour of the cover crop this might already be included in the weed competition criterion
- The type of destruction (might be implicitly covered by "living mulch" or "cold tolerance"
- Details expected number of years for the living mulch-
- Information about previous crops
- Geographical regions lack accuracy

*Does the tool provide useful recommendations? Do the recommendations address specific issues or challenges you face? Are the recommendations relevant to/appropriate for your farm system? Is any information missing?*

The tool is relevant, but users would like to have information on the nuances between the different varieties of a given species. Participants would also like species mixing recommendations to increase the chances of successful cover crop. Information on seed rates and appropriate varieties should also be provided. Some participants raised the possibility of adding information on the local availability of species and the price of seeds. They appreciated having access to the data on which the tool is based (especially link with organic e prints).

*Does the tool present information in an accessible way? Is the language/terminology easy to understand? Are you familiar with the tool format (i.e. leaflet, website, video)?*

The format is good and easy to use.

*Do you think the tool is easy to use based on your current knowledge? Would you require assistance to use the tool? From whom? Would you require any additional information to use the tool? What kinds of information?*

The tool is easy to handle but there are difficulties navigating between the database and the tool.

*Would you use the tool or apply recommendations provided by the tool? Are there time/cost/labour implications related to the recommendations? Would the tool change your ideas/practices/approach to your farm? How? What would you expect to gain from using the tool?*

Participants were motivated to use the tool, but the question of cost and seed accessibility arises. One participant, for example, identified the Hungarian vetch, which he wants to test.

*Have you used similar tools before? Which ones have you used? Have they been useful/not useful? Why? Would other farmers use the tool?*

This tool is similar to the one developed by Arvalis (<http://www.choix-des-couverts.arvalis-infos.fr/> ).

*How could the tool be improved? If you could provide feedback to the creators of the tool what would you say? Any additional comments?*

The participants propose to translate the tool into French (N.B. this is planned and already started within the frame of the OK-Net Arable project).

The participants propose to add complementary "references" to the tool:

- feedback from farmers or technical advisors (ex: for a species, one clicks and this leads to the experience of a farmer)
- link to agricultural or extension press articles (and not just scientific articles as is currently the case).
- link to OSAE

Participants are nevertheless aware of the difficulty in keeping the tool updated with the link to additional reference sources.

It would be interesting to be able to add the possible species mixtures and complementarities between the species as well as to specify the previous / next and the purpose of the cover crop in the rotation. For the time being, there is also a lack of information on the effect of the frequency of some species in rotation, through cover crops (pure or mixed) on diseases (especially soil-borne pathogens), in particular with legume crops. It would also be interesting to be able to integrate information on the use or not of ploughing.

The participants propose to add new criteria (cf above in the negative aspects).

## **1.2 Bioforum, Belgium**

*What do you like about the tool?*

It is very relevant, practical and easy to use.

*What do you dislike about the tool?*

English is OK for a first-level search. Language forms a barrier for use especially when farmers want to explore some further information.

*Is the tool relevant to the interests/needs of the group?*

It is very topical. Cover crops are an important issue for farmers. Farmers want also to explore novel cover crops or combinations.

*Is the content of the tool interesting?*

Yes, it is very interesting, and the right questions are asked. It makes possible to discover new or less common species. On the other hand, it was perceived that other sources of information are more suited for further information (e.g. ITAB – leaflets). There was also some doubt about validation of the information in our climate and soil conditions.

*Is the format of the tool easy to use?*

Yes, but still some information / possibilities for choice are missing for the farmers: impact on diseases, suitability with other crops in the rotation (e.g. cabbage), time of sowing, suitability for combination with other covercrops. There should also be some levels for choosing the criteria.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

The advisors find the language is very important to make farmers use a tool. This was only partly confirmed by farmers. Most of them said that they could understand some keywords in English, so the first-level search should be possible. It should be very practical and simple for the farmers to use. On the other hand, for advisors it is necessary they know on what data the toolbox is based on and why certain choices are made by the database. Such kind of tool is feasible for bigger topics such as determination tables for diseases, weeds, fertilisers, greenmanures. This is probably not possible for rotations decisions.

### **1.3 ConMarcheBio, Italia**

Highly relevant for the soil fertility issues raised by the farmers. However, it seems too generic and does not offer specific solutions (cover crops) for the Marche region. It is not ready to use.

### **1.4 Estonian farmers ORG, Estonia**

*What do you like about the tool?*

Looks really easy to use and practical.

*What do you dislike about the tool?*

It is not known if it offers possible solutions for our conditions.

*Is the tool relevant to the interests/needs of the group?*

Very relevant, would like to have Estonian version of it.

*Is the content of the tool interesting?*

The topic is very relevant and interesting.

*Is the format of the tool easy to use?*

Yes.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

Maybe, but question is if it is realistic during the project. Also, it probably gives initial suggestions, but maybe there is a need to adjustment according to exact conditions.

### **1.5 Bioland, Germany**

*What do you like about the tool?*

This tool is superbly edited, easily and quickly understandable. It is very handy to get an overview about the farm and possible crops.

Moreover, overall the results are corresponding with the expectations, which means the programme does not lose its professional accuracy through its straightforward handling.

*What do you dislike about the tool?*

The selection of soil conditions is mixed up and misleading. As a whole the choosing opportunities are not always logical and sufficient.

*Is the tool relevant to the interests/needs of the group?*

The tool is very valuable to make some quick suggestions and give a practical recommendation concerning cultivation.

*Is the content of the tool interesting?*

The connection is interesting in any event, because it provides for a swift entry for newcomers into organic farming as well as for consultants into farming consultancy. Catch crops play a vital role especially in organic farming.

*Is the format of the tool easy to use?*

The software is self-explanatory and therefore very easy to use.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

The software can be tested very quickly in practice and examined in terms of accuracy. It is user friendly and has understandable explanatory power.

## **1.6 ORC Arable Group – UK**

*What do you like about the tool?*

Like: that it has all the species data in one place to be able to compare. Easy to use steps

Don't like: Doesn't make any reference to costings (could at least rank them by cost) – even better would be some idea of return on investment.

*Does the tool provide useful recommendations? Do the recommendations address specific issues or challenges you face? Are the recommendations relevant to/appropriate for your farm system? Is any information missing?*

Would be better with costings and return on investment or cost benefit analysis figures. How do the economics stack up? Looking at longer term benefits of leys etc – modelling?

Would be better if it helped to also think about drilling dates and the window for sowing and destroying as that is the key issue in the UK.

Establishment method – machinery required etc the practical implementation side.

*Does the tool present information in an accessible way? Is the language/terminology easy to understand? Are you familiar with the tool format (i.e. leaflet, website, video)?*

Like to use an online tool – but it is hard to find the right place on the website.

It is also about time – would probably prefer to be recommended a seed mix and then look at the costings of it.

*Would you use the tool or apply recommendations provided by the tool? Are there time/cost/labour implications related to the recommendations? Would the tool change your ideas/practices/approach to your farm? How? What would you expect to gain from using the tool?*

Only has sandy and clay soils – would be better to have more options. No option for releasing compaction. Ph is the wrong way around – confusing! Some of the species are really more suitable for longer term leys

*How could the tool be improved? If you could provide feedback to the creators of the tool what would you say? Any additional comments?*

Overall think it is better to have a conversation with someone who is doing it! Most value comes from sharing knowledge with other farmers and finding out what they are doing. Would like to use meetings more for sharing knowledge.

Need more costings and financial data in resources for decision making – that is the key questions and often not included! Could it also somehow explore the trade-offs? However, may not necessarily help as would be different on different farms.

### 1.7 SEGES, Denmark

Most farmers mentioned this tool as interesting. They all filled out the form for individual farmers, which was translated into Danish. The below mentioned comments on the tool came forward:

- Not too demanding
- Not time-consuming compared to the knowledge you receive and to other available tools
- Not expensive
- User friendly
- Relevant
- Can result in change of management practice on farm (at least in choice of sorts)
- Able to increase yields in cover crops as right sorts are chosen
- A good tool to gain knowledge
- Makes them able to challenge the knowledge and recommendations by the advisors

## 2 Practical advice for organic production of lupines

Technical leaflet

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30564>  
<http://orgprints.org/30564/>

Relevance	Interesting	Easy to use	Practicality	Average score
3.0	3.3	3.4	3.5	3.3

This tool was commented on by FIBL Austria

- Most relevant information, briefly, compact. A very nice Flyer.
- Format is very small. Can be spread easily and content is nice.
- Maybe DIN A4-Format is better than Flyer Format, because flyers are too small for usual DIN A4 Folders.

## 3 Tilman-org: videos on reduced tillage in organic farms

Video

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30565>  
<http://orgprints.org/30565/>

Relevant	Interesting	Easy to use	Practical	Average score
4.6	4.8	4.6	3.0	4.3

The topic “reducing tillage” seems to be interesting and relevant for farmers. Moreover, the use of videos seems to be the major strong point of the tool, which are easy to use, direct and accessible. They should be short, according to the participants.

Videos are suitable to explain well techniques to farmers. However, two difficulties linked with videos have been highlighted. The first one is that it is difficult to “keep videos up to date” (FIBL Austria, BASE ABC France) so that farmers are informed about the newest innovation and information.

Another difficulty can be that videos are not detailed enough, and farmers need to combine videos with other tools, such as research reports if they want a complete information. This barrier reduces the practicability of the videos. However, this more accurate and precise information seems to be already available on the Tilman.org website, following the link to “publications” or “technical notes”.

Despite the fact that some videos are available in other languages than English (German, French, Italian and Spanish), participants emphasised that more translation is needed because they don’t always know a lot of English.

### 3.1 BASE ABC , FRANCE

One participant asked how it could be possible to use such videos. It is interesting for farmers but might not be enough detailed for going further. Very difficult, combine with a DSS. Positive comment that the videos are short.

One of them liked that the videos reviewed a large number of cropping operations with machinery demos. One of them highlighted that such videos should be often updated.

### 3.2 ConMarcheBio, Italy

These videos show and explain very well several innovative management practices to control weeds, mostly by mechanical tools. But their practical usefulness is reduced by the fact that detailed information should be further sought in the related research and trial reports, which would make it difficult for the full practical application of the tool.

### 3.3 Maheklaster, Estonia

- *What do you like about the tool?*

Video in general is good material to look at. We looked only one video to get the picture. Farmers comments are good and video is well made.

- *Is the tool relevant to the interests/needs of the group?*

Such kind of video is relevant. Reduced tillage is very interesting direction to go for organic farmers.

- *Is the content of the tool interesting?*

It seems interesting, we propose to translate them into Estonian

- *Is the format of the tool easy to use?*

Yes, it is easy.

- *Is practical testing of the tool (format and/or recommendations provided) feasible?*

Hard to tell, depends on the content of all the videos. Of course, just looking some videos is probably not enough to make management decisions at farm. There should be combination of videos and text material with practical information.

### 3.4 FIBL Austria

Videos are very direct and easy to understand.

The harrow which has been shown is an older one. It's difficult to keep videos "up-to-date". Partly some videos on the web are very old and technically not updated or even worse – simply not right anymore. Farmers who are using the internet and videos want to see new stuff. That's the problem with blogs, videos and so on. There has to be somebody who keeps them up-to-date. It's the same with data bases or old project homepages. Nobody cleans them out. Farmers and advisors are confronted with old and new information and have to sort out by themselves.

Basically, sending a link to farmers is very easy and used quite often. Videos are also used in courses to relax a little bit in between. Videos should not be too long. They are highly self-explanatory.

Content is interesting, if somebody is interested in this information. Just a language course is needed, if the farmer is not speaking English. This content is interesting as a kind of "first information". It's not detailed, but well done as an entry in this topic. If somebody wants detailed information that's not the right thing.

Easy to click on. No advice is needed.

### 3.5 Bioforum, Belgium

YouTube films should be short and in own language, preferable with subtitles even when in own language

## 4 Bringing the dirt to your doorstep: organic no-till weed management

Video

Link to OK knowledge hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30566>

<https://www.youtube.com/watch?v=fkMB5meXMGg>

Relevant	Interesting	Easy to use	Practical	Average score
2.0	4.0	4.0	1.0	2.8

The tool is composed of one video which lasts 20 minutes (too long compared to the length of the tillage-org videos which don't last more than 10 minutes and usually last about 3 minutes). The video is in English.

A video is a good tool because it is easy to follow, and it can be watched after a day of work. "Youtube videos are an excellent source of information" (ORC Arable Group-UK). However, compared with

Tilman-org, the video seems to be too long (20 minutes), whereas in the Tilman-org, videos last about 3 or 4 minutes. This is the main explanation for the lower scores, compared to Tilman-org videos (#3).

Besides, because the video has been done in the USA, all the participants enlighten that American conditions are not suitable for their own climate and soil conditions. The Italian group even qualified the tool as “not relevant” for their farmers.

- Another criticism is that there is a “lack of context information in the video” (ITAB FRANCE).
- Moreover, language seems to be one more time a barrier to a good understanding for farmers.
- One participant highlights that meeting between farmers are always better to exchange than a video.

#### 4.1 ROTAB, France

Generally, the participants were **interested in such videos used for machinery** or cropping practices demos and found that they were a good way of communicating information but were concerned that conditions from the US might not be applicable. One participant felt that this was more like advertising rather than presenting results.

#### 4.2 BASE ABC , France

The participants insisted on the difficulty to transpose the results to French pedoclimatic conditions because (i) there was a lack of context information in the video and (ii) the experimentation is set in the US.

They globally liked the video media but were sceptical regarding the partiality of the results: they suspected the authors to present only the successful results. One of them suggested to translate the video into French or to develop such videos in France. One person highlighted that videos could not replace a meeting with or visit to other farmers for knowledge sharing.

#### 4.3 ConMarcheBio - Italy

The weed management practices shown in this tool-video are not suitable for the soil conditions of the Marche region. So, although the practices sound good under the US conditions and useful information is provided about cover crops and their impact on soil fertility, the tool is not relevant to our farmers.

#### 4.4 ORC Arable Group, UK

Youtube videos are an excellent source of information, particularly videos demonstrating techniques with a very practical element. Videos are easy to follow, especially in the evening at the end of a day's work. More practical advice should be shared via video.

## 5 Earthworms: architects of fertile soils

Technical guide

Available in three languages: German, English and French.

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30567>  
<http://orgprints.org/30567/>

Relevant	Interesting	Easy to use	Practical	Average score
3.3	3.1	3.0	2.9	3.1

The guide was discussed by eight groups.

The participants have very different opinions about the tool with some groups finding it interesting, easy to use and practical and some groups finding it not relevant.

Four groups found the tool easy to use and practical because of

- The presence of very good pictures,
- Clear subtitles and short texts.
- Format can be printed or read online (as it is short).

Three groups found the tool not relevant

- Because too much theoretical and narrow.
- Some participants in the French groups enlighten that there was overlap with other tools.
- The Estonian group found the tool to be for beginners, and thus not really relevant.

Other sceptical comments included missing information about on the effect of some machinery on the worms (ORC Arable Group-UK) and the lack of a glossary explaining scientific terms.

Language is seen as a barrier, even if this leaflet is already available in three languages (French, German and English).

### 5.1 ConMarcheBio Italy

This tool is too theoretical and far from the farmers' practical experience. Moreover, it is too narrow, limited to one subject (earthworms).

### 5.2 ROTAB, France

The participants of the ROTAB group felt it was similar to the spade test method, but more detailed (focused on earthworms). The data of sampling is very important and should be mentioned in the tool. One participant mentioned that counting casts might not be accurate.

### 5.3 BASE ABC, France

One participant of the BASE ABC groups did not read into details and did not noticed that there was a protocol. Nevertheless, the tool was found complementary to the spade test tools.

One of them found it very interesting, especially if the earthworm population is sampled over time.

One commented on overlap with other tools on visual soil assessment.

### 5.4 Bioforum, Belgium

*What do you like about the tool?*

Earthworms are an important and visible indicator for good soil quality. All farmers know about them, but a clear synthesis is missing in Dutch. This leaflet gives an answer to this question: nice tables and

figures, relevant photo's, clear subtitles with short texts each time. The leaflet is very specific to organic farmers and not to general.

*What do you dislike about the tool?*

Language is a barrier. Even some farmers indicated that they understand English, they want to read full texts in their own language. The group searched for a national alternative for the FIBL tool, but did not find one and considered translation.

*Is the tool relevant to the interests/needs of the group?*

Yes! Farmers asked for a specific workshop on earthworms in one of next field visits.

*Is the content of the tool interesting?*

Yes, all information on how to work with earthworms is there, how to count,.. this in writing and in pictures

*Is the format of the tool easy to use?*

Yes, but we would adapt a bit to make it still more practical. An added A4 page where they can write down the counting, so to be able to bring their counting results to the workshop.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

See above. Proposal for translation, small adaptation and specific workshop in the field.

*What we learned for our own communication?*

Also, for some common topics, synthesized information is needed in a way that the goal audience gets all needed and (only) relevant information in his own language.

## **5.5 Maheklaster, Estonia**

*What do you like about the tool?*

Good visual information suitable for beginners in organic farming. Good material to present e.g. in beginner's courses or even must to read for beginners – short chapters and a lot of graphs and pictures.

*What do you dislike about the tool?*

It is information experienced organic farmers have to know already.

*Is the tool relevant to the interests/needs of the group?*

Not really – it's more for beginners.

*Is the content of the tool interesting?*

Hard to tell if there is not chance to read it thoroughly.

*Is the format of the tool easy to use?*

It is easy to follow – design is quite good.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

Not really, it's more like background knowledge every organic farmer has to know, but not technology to implement.

## 5.6 Bioland, Germany

*What is good?*

The leaflet is well structured and has clear illustrations. There are many pictures which provide a good overview. The amount of information is manageable. It is available in three different languages.

## 5.7 ORC Arable Group- UK group

A fascinating document which is right in terms of length and style. A very useful, informative and thought-provoking document. The guide has a very helpful “so what” summary at the end to help with management practices. There are some scientific words that could be placed in a glossary for those without the background or knowledge in the area.

The guide could contain a better explanation of why earthworms benefit from organic/integrated management systems. It would be useful to have more information about the effects of specific machines/equipment (rotary) on earthworm populations. It would be helpful if more advice were offered on how to mitigate some of the less beneficial practices, as what's bad for earthworms may be beneficial in another context. This would help to adapt the system to the benefit of earthworms without compromising the productivity.

*What is bad?*

The tool cannot be used in an interactive way. But since it is a leaflet that is not necessarily a disadvantage.

*Relevance for the interests/needs of the group?*

The leaflet enables farmers to estimate and assess the abundance of earthworms in agricultural land. That way it is possible to draw conclusions on the management and farmers can adapt their measures to be more “earthworm friendly”. Through consequent attention to and implementation of the taught information, soil fertility can be improved by raising the number of earthworms. This also includes matters of erosion protection due to higher rates of water filtration by vertical earthworm channels.

*Interesting content?*

The content is interesting and does not lose topicality, especially in the light of rising numbers of extreme weather events caused by continuing climate changes.

*How well is the handling of the tool?*

The handling of the tool is very good.

*Practical application of the tool?*

In general, the tool is suitable for practical application. Nevertheless, changes in soil life are only to be expected in medium- and long-term ranges and are measurable only after a long period of time. A precise documentation is expected to be very complicated.

## 5.8 FIBL Austria

Classic and well-known leaflet. Shortly summarized information, nice overview, something “to hold in hand”, good pictures

It’s used often in consultations, advantage is the double usability – it can be printed or read online. The printed version is nice to integrate in presentation in front of a group of farmers. Then the leaflet can be projected on the wall.

Content is interesting for farmers and advisors. Target group are farmers and advisors.

The format is easy and with double usability. But it would be even better if the content of the leaflet can be separated that extracts or tables can be used for presentations.

There are many very good and interesting leaflets. There are tested all the time in daily work.

## 6 Regionally adapted humus balance in organic farming

Technical guide, only available in German

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30568>

<http://orgprints.org/30568/>

Relevant	Interesting	Easy to use	Practical	Average score
4.2	3.8	3.2	2.8	3.4

The tool was discussed by three groups. The topic of the tool seems to be interesting and relevant, but several participants highlight that the tool is not really practical to use, because of the complexity. Even if this technical guide is well presented and contains figures, pictures and diagrams, they can be hard to understand too.

Comments indicate that the technical guide might be too long, compared to other guides,

### 6.1 OMKI, Hungary

It was difficult to discuss the tool with Hungarian Farmers, because of the regional focus and a lack of necessary data collected. Farmers with higher education appreciated this tool. One senior organic inspector commented after the workshop that such a tool could be crucial, because most of the farmers do not make any calculations on field and farm scale on nutrient balance.

### 6.2 Maheklastar, Estonia

*What do you like about the tool?*

Looks like well-presented material with a lot of examples and real figures.

*What do you dislike about the tool?*

Not sure that numbers and content are relevant to our conditions, maybe it is too regional.

*Is the tool relevant to the interests/needs of the group?*

Maybe also more relevant to advisors. It is actually difficult to tell if all the tables and schemes are easy to understand

*Is the content of the tool interesting?*

Topic is interesting, hard to tell if it is interestingly presented.

*Is the format of the tool easy to use?*

Figures can be complicated to understand

### **6.3 Bioland, Germany**

*What do you like about the tool?*

The detailed descriptions are very thrilling and helpful. Special characteristics of humus accounting and all their difficulties as well as their importance are presented and explained very well.

*What do you dislike about the tool?*

The practicality in terms of quick results is not apparent.

*Is the tool relevant to the interests/needs of the group?*

Accounting of humus is especially important for organic agriculture in particular. That is because humus is an important nutrient accumulator and is able to influence climate change even on a global scale and therefore underlines the importance of accounting humus.

*Is the content of the tool interesting?*

The content supplies numerous recent and thrilling figures and is therefore very interesting.

*Is the format of the tool easy to use?*

The format is good in order to transfer knowledge, the practical use however is very complex. High receptivity and active thinking are required.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

In general, the tool is practical; where appropriate, software (e.g. Excel table) could be helpful for actual calculating for a farm.

## **7 Bioaktuell web platform with different sections**

Website, available in French and German

Link to OK Hub:

Soil Tillage <http://farmknowledge.org/index.php/search-for-ok-tools?v=30569>

Nutrient management <http://farmknowledge.org/index.php/search-for-ok-tools?v=30575>

<http://www.bioaktuell.ch>

Relevant	Interesting	Easy to use	Practical	Average score
2.2	2.5	2.2	1.6	2.0

Two sections of the website were tested by four groups in total.

Participants found information provided by the “Bioaktuell website” fairly general, supplying mainly basic knowledge. This makes the tool mainly interesting for beginners. Some groups found the website not so easy to navigate. Two groups (Estonia and Italy) explained that the tool should be more local to be suitable for their countries. Language is also seen as a barrier, because the website is available only in German and in French.

Other comments refer to links to technical guides on the pages of the website which give more detail.

### 7.1 Maheklaester, Estonia

Feed on the section on reduced tillage

*What do you like about the tool?*

A lot of information in one place.

*What do you dislike about the tool?*

German language is a bigger obstacle than English.

*Is the tool relevant to the interests/needs of the group?*

Such kind of websites are important, but probably there is need to have local ones. It is probably too Switzerland oriented for best usage for us.

*Is the content of the tool interesting?*

Difficult to tell, there is no time to look under all headlines, potentially is.

*Is the format of the tool easy to use?*

In general, such type of website is quite easy to use.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

Maybe some parts of it

### 7.2 BASE ABC, FRANCE

The participants looked at the section for nutrient management, which provides some information the interesting technical leaflets. Participants found the tool not specific enough, because it gives some general information without any quantitative data.

- One participant suspected that this lack of information may be deliberate, so that people interested would contact the provider of the website.

- One participant subscribes to the FiBL newsletter and found that they do a “good job”. He visits regularly their website when he identifies interesting topics in the newsletter.
- One is very interested in the fertilization as a topic, because he does not use such inputs.
- One of them found it interesting because it provides basic knowledge but does not really like the form of the website.

### 7.3 ConMarcheBio- Italy

Quite generic and “all-in-one” web platform, mostly usable by central/north European farmers.

### 7.4 BIOLAND, Germany

*What do you like about the tool?*

The tool is clearly arranged and has a clear structure.

*What do you dislike about the tool?*

Due to the subdivision into many sub themes, there is a need to click through everything all the time. Moreover, it mostly supplies basic knowledge.

*Is the tool relevant to the interests/needs of the group?*

The tool is not relevant, since its content should be basic prerequisite for organic farming.

*Is the content of the tool interesting?*

The content is still interesting for beginners, and lateral entrants as a good medium to inform themselves about organic farming.

*Is the format of the tool easy to use?*

Due to the different sections navigation is complicated. The design is not so attractive and faster jumps between the sub items would be helpful.

## 8 Mechanical weeding in arable crops

Technical guide, French

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30571>

Relevant	Interesting	Easy to use	Practical	Average score
5.0	5.0	4.0	4.0	4.5

The tool was discussed by two groups. Despite the length of over 80 pages, they found the content detailed but easy to use. They liked the fact that it contains case studies, photos and practical tables.

However, some improvements could be done, for example by converting it into a website and translating it into other languages. Some information also appears out of date.

## 8.1 ITAB, FRANCE

The participants assessed this tool positively. They appreciated the case studies (farmers' examples) and the technical detail represented on the figures. One of them used it with a group of farmers during a training session on mechanical weeding and the farmers found it very practical. It has been used both for organic and conventional farmers.

Possible improvements:

- Adding further case studies (with the data of the organic systems trials carried out by the participants of the group)
- Make it available as a website (instead of a brochure) to make it more interactive
- Some recent weeding technologies were missing and be updated

It was also suggested by three participants that the leaflet should focus not only curative mechanical weeding but also include insights on preventive crop management (e.g. rotations). The title could be changed because it is too much focused on mechanical weeding.

## 8.2 Bioforum, Belgium

*What do you like about the tool?*

Although it is quite a lot of information the layout makes it easy digestible. You can read it as separate leaflets. There are lots of practical case studies, pictures and practical tables.

*What do you dislike about the tool?*

The fact it is a book (> 80 pages) in another language may form a barrier for most farmers and advisors.

*Is the tool relevant to the interests/needs of the group?*

Yes, good overview of possible interventions for each crop.

*Is the content of the tool interesting?*

Yes, the format of the tool easy to use? It should be possible to navigate within the document. In the digital format, some youtube films could be integrated.

## 9 Green manure and cover crops in organic agriculture: general introduction

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30572>

Relevant	Interesting	Easy to use	Practical	Average score
4.0	3.0	3.0	3.0	3.3

No further comments provided

## 10 Green manure and cover crops in organic agriculture: guide to choose the species

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30573>

Relevant	interesting	Easy to use	practical	Average score
5.0	5.0	3.0	4.0	4.3

### 10.1 Summary

The tool in French and was only evaluated by groups in the French speaking countries (France and Belgium).

Participants highlight that the tool is relevant, interesting and practical. However, the Belgian group found it too dense and not easy to use, and the language did play part in this.

### 10.2 Bioforum, Belgium

*What do you like about the tool?*

Very interesting information, nice tables, very practical and clear instructions, some examples, flow scheme on page 12.

*What do you dislike about the tool?*

too much and too dense text. A clear content is missing. Layout should be more expressive. Maybe navigation through the digital document should be nice.

*Is the tool relevant to the interests/needs of the group?*

Yes, farmers are convinced of the importance of cover crops, but have many questions on choice and management.

*Is the content of the tool interesting?*

Yes, good overview

*Is the format of the tool easy to use?*

No, too dense and many farmers have difficulties to read and understand French texts in depth.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

Yes, if translated. The Oscar toolbox appears more user friendly at first sight, but the ITAB-fiches contains much more relevant information.

## 11 Weed control in organic farming through mechanical solutions

Technical guide

<http://orgprints.org/30574/>

[http://orgprints.org/19829/1/2657\\_Handbuch%20Unkraut%20LR.pdf](http://orgprints.org/19829/1/2657_Handbuch%20Unkraut%20LR.pdf)

Relevant	Interesting	Easy to use	Practical	Average score
4.2	4.2	2.5	3.3	3.6

The guide is only available in German and has 288 pages.

The tool was discussed by two groups that found the topic relevant and the content interesting. The two groups were divided on whether the guide is easy to use or not.

The Belgium group highlights that it contains too much information and does not have a proper layout. The Estonian group, on the other hand, really liked the tool and would like it to be translated into Estonian, highlighting that farmers appreciate long texts, when they are relevant.

### 11.1 Bioforum, Belgium

*What do you like about the tool?*

Complete overview of weed management in organic farming. Lots of information but too much text and not appropriate layout for farmers, it could be of interest for new advisors or conventional advisors that want to learn more of organic practices. Many results from research.

*What do you dislike about the tool?*

It is quite a lot of information and farmers and advisors didn't think they would use it. If the book is in another language than national language it won't be read. Many results from research. Clear recommendations are missing.

*Is the tool relevant to the interests/needs of the group?*

Yes

*Is the content of the tool interesting?*

Yes

- *Is the format of the tool easy to use?*

No

## 11.2 Maheklaster, Estonia

*What do you like about the tool?*

Very comprehensive material, a lot of different machinery described and technologies suggested.

*What do you dislike about the tool?*

German language is bigger obstacle than English.

*Is the tool relevant to the interests/needs of the group?*

The topic is very relevant and good handbook is needed in this field.

*Is the content of the tool interesting?*

It looks very interesting and we would like to have it translated into Estonian (at least part of it, needs to have a review, maybe all articles are not so relevant (e.g. soya and maize)

*Is the format of the tool easy to use?*

Yes, our experienced farmers can read long materials if they are well presented and relevant.

## 12 Criteria and management recommendations for organic cereal production

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30576>

Relevant	Interesting	Easy to use	Practical	Average score
3.4	3.1	3.0	3.2	3.2

The tool has been published in German and contains some tables. It was discussed by two groups, but only the Estonian group provided a summary of the discussion. According to the Estonian group, the tool is not relevant because too general and not adapted for Estonian climatic and soil conditions. The material is easy to use (9 pages) but only available in German.

The Hungarian group referred to the layout of similar technical guides on organic potato and tomato production that were already translated into Hungarian. No additional comments are reported.

### 12.1 Maheklaster, Estonia

*What do you like about the tool?*

Gives a good overview about organic cereal growing in Switzerland conditions.

*What do you dislike about the tool?*

Maybe it is too general for actual use, too regional too.

*Is the tool relevant to the interests/needs of the group?*

Not really, too general

*Is the content of the tool interesting?*

In principle yes, but in more detail and according to our conditions.

*Is the format of the tool easy to use?*

Material is well presented and structured.

## 13 A farmer’s guide to organic fruit and vegetable production

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30578>  
<http://orgprints.org/30578/>

Relevant	Interesting	Easy to use	Practical	Average score
4.0	3.8	3.6	3.7	3.7

The tool is a technical guide in English that is 32 pages and contains some few tables and photos (black and white). Only one group evaluated the tool. More evaluations are needed. According to the Estonian group, the tool is too general and only for beginners. Information is missing.

### 13.1 Maheklaster, Estonia

*What do you like about the tool?*

Good material, that gives overview to beginners who want to start with organic vegetables and fruits

*What do you dislike about the tool?*

Too general, if you want to start, you need much more information

*Is the tool relevant to the interests/needs of the group?*

No, it’s for beginners

*Is the content of the tool interesting?*

Not for our group.

*Is the format of the tool easy to use?*

It is well presented and easy to read.

## 14 Muencheberg soil quality rating: visual method for assessment of soil

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30578>  
<http://orgprints.org/30579/>

Relevant	interesting	Easy to use	practical	Average score
3.7	4.1	2.6	3.7	3.5

The tool is in English and 103 pages long, with many pictures and tables. It was discussed by three groups.

### 14.1 ConMarcheBio, Italy

The group found the tool applicable but commented on the fact that it demands a deep background in soil science and is therefore not suitable for all farmers, only for expert advisors and farmers with expertise.

### 14.2 Maheklaester, Estonia

*What do you like about the tool?*

Comprehensive material for soil evaluation

*What do you dislike about the tool?*

A bit difficult, maybe too theoretical, not practical suggestions.

*Is the tool relevant to the interests/needs of the group?*

Maybe more advisors tool, not very practical for farmer. Maybe not applicable to our conditions.

*Is the content of the tool interesting?*

Gives a lot of information.

*Is the format of the tool easy to use?*

It looks quite complicated.

### 14.3 SEGES, Denmark

Farmers recognize soil fertility and soil quality as important issues in organic farming in Denmark. Thus, this tool is very interesting – maybe along with the tool: “Earthworms: architects of fertile soils”. Especially the fact that the test is easy to perform and does not require additional expensive equipment is well received among the farmers. Furthermore, the result (a score from 0-100) is considered a good, practical and useable end-product that is easy to understand and relate to. It is considered useable for groups of farmers gathering in order to gain knowledge on soil quality and one organic agricultural advisor expressed that she want to test it in her “farm school”. However, the farmers found the scoring manual is very comprehensive, and for a field manual, an abstract should be made.

## 15 Soil quality test kit guide: visual assessment of soil qualities and soil properties

Technical guide

<http://farmknowledge.org/index.php/search-for-ok-tools?v=30581>

E-print link does not work

Relevant	Interesting	Easy to use	Practical	Average score
4.0	4.0	1.0	2.8	2.9

The tool is a technical guide of 88 pages. Participants comment on the fact that a lot of trials and of scientific experiments are needed to assess soil with this guide. The tool itself contains lot of text.

### 15.1 ConMarcheBio, Italy

Although the topic is interesting and relevant to the farmers' challenges, it is hard to use. This tool is mostly suitable for advisors.

### 15.2 BIOLAND – Germany

*What is good?*

Numerous parameters regarding soil quality were collected. The tool can be used in an interactive way.

*What is bad?*

There is no German version available. The only language is English.

*Relevance for the interests/needs of the group?*

The soil quality test kit enables experienced farmers/consultants to gain specific information about the physical, chemical and biological condition of the examined soil. There are numerous, objective measurement parameters at the user's disposal to assess performance of the examined soil. To evaluate the parameters measured, it is necessary/helpful to have a sound agricultural education (master school, university degree or others), if there weren't extensive explanations provided by the tool. Probably rather a tool for consultants than individual farmers.

*Interesting content?*

The tool leads us to expect interesting results, if it is going to be used in practice. But even without concrete, practical use it supplies parameters of various soil qualities.

*How well is the handling of the tool?*

Handling of the tool cannot be reviewed, because it is not physically available and there is only a description of it. To test soil for all parameters a time requirement of several hours is to be expected.

*Practical application of the tool?*

Provided such a kit is available, practical tests would be possible.

## 16 Visual soil assessment: field guide

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30578>  
<http://orgprints.org/30582/>

Relevant	Interesting	Easy to use	Practical	Average score
4.3	4.3	4.2	4.3	4.3

The tool is a technical guide for visual soil assessment that is 84 pages long and contains pictures. Four groups provided some feedback on their discussion. All the groups said that such tools are interesting for advisors but look too complicated to be used by farmers, unless they have a degree. The Italian and French group found the topic to be interesting and relevant for farmer, but the Austrian group found it was only interesting for advisors.

### 16.1 ROTAB, France

Some of the participants already heard about this tool that could be used by farmers. One of them is interested in testing it.

One participant already tested it and the method does not vary enough with changing conditions. This method is not adequate to test mid and long-term dynamics. It only addresses chemical fertility and is not available in French.

Another participant (researcher in soil sciences) explained that there are other visual assessment tools, all with different drawbacks and benefits but the results and information provided is similar. He also presented another tool developed by ISARA: a spade test combined with earthworm identification. The group was therefore with a summary of this new tools.

### 16.2 BASE ABC, France

Participants did not know this tool but were interested in it. Some of them knew about a similar tool (spade test) but not that one. One of them liked the pictures helping for the visual assessment in the guide. One of them found it interesting to monitor the soil fertility (she just converted to organic and expected to be able to follow some changes).

### 16.3 OMKI, Hungary

The more educated farmers understood the importance of this tool and the practices it describes, but the report comments on the fact that many Hungarian farmers cultivate the soil in a traditional way, disregarding any derived from visual assessments.

### 16.4 FIBL, Austria

Comments indicate that the target group of this tool are advisors, not farmers. Combination of content and method. The information might be suitable as input for a discussion group, but this would need more preparation.

A very detailed and great description of soils and soil scores, which interesting background information for advisors. The score card is considered relevant, but more information on what parameters are used would be wanted. Excerpts or extracts of this information might be interesting for a presentation.

## 17 ROTOR: organic crop rotation planner

Calculation tool /Decision support tool

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30578>

<http://orgprints.org/30580/>

[http://www.zalf.de/en/forschung\\_lehre/kerntemen/kerntema2/Pages/default.aspx](http://www.zalf.de/en/forschung_lehre/kerntemen/kerntema2/Pages/default.aspx)

Relevant	Interesting	Easy to use	Practical	Average score
2.0	4.0	4.0	1.0	2.8

All the groups found the tool interesting and the French group explained that it was useful for looking at nitrogen leaching or even a “potential weed infestation”. But not all groups found the tool relevant, because some crops were missing (Austrian group) or it was found to be too theoretical (French Group).

- The French and the Italian group found the tool easy to use.
- The French group would like the tool to be translated into French.
- The Austrian group commented on the list of crops not being entirely relevant
- The French, Italian and Austrian group found that it should be adapted to their own conditions. Without translation/adaptation the practical value was seen as really low.

However, the tool is seen to be too much theoretical with some information missing (French group).

Some scientific literature is available. The tool is only in English.

### 17.1 BASE ABC , France

One participant found it similar to MASC tool.

Another one found it interesting when converting to organic farming, but was “afraid” by the quantitative aspect of the tool. This could be useful as a basis for starting the process of conversion and as a basis of discussion. It seems difficult to use it (because not parametrized in France).

Another participant found it interesting and very practical concerning N leaching. He was wondering if the parametrization would be requiring a lot of effort (and data).

Another participant was very sceptical and found the tool too theoretical: there are too many factors (e.g. weeds, climate) that could not be properly taken into account in such a model.

Another participant mentioned that it could be interesting to get range of values (or classes) instead of absolute values as outputs of the tool.

One of the participants try to run it and could not find the English version (and did not speak German).

Another one found that it was similar to the cover crop topic, because it could help to make rotation choices and could give ideas.

One of them liked the systemic approach of the tool, taking into account all the crops of the rotation and providing aggregated indicators over time related to N dynamics. It could give unexplored ideas.

This tool catches the eye of the last participant but he warned that results of such ex ante tools should be carefully interpreted.

*What do you like about the tool?*

Participants stressed that the data can be useful for making official of N use. Moreover the information on the N and C balances are very interesting. It is a very relevant tool when inserting a new crop in rotation (e.g. rye) and explore its integration in a rotation.

*What don't you like about the tool?*

It should be translated into French, to choose the type of soil appropriately. There is a risk of misinterpretation and use of tool outputs if the tool is not using data from the French context. It would be interesting to increase the list of species.

*Does the tool provide useful recommendations? Do the recommendations address specific issues or challenges you face? Are the recommendations relevant to/appropriate for your farm system? Is any information missing?*

It integrates a lot of input data and has great simulation capability. It proposes N outputs but also potential weed infestation (criterion appreciated by the participants). As it stands, this tool helps to explore, and make foresight rather than being directly operational.

*Is the language/terminology easy to understand? Are you familiar with the tool format (i.e. leaflet, website, video)?*

The tool is user-friendly and includes many criteria. It has an important simulation capacity (proposed many rotations) and opens perspectives for the integration of new crops in crop rotation.

*Do you think the tool is easy to use based on your current knowledge? Would you require assistance to use the tool? From whom? Would you require any additional information to use the tool? What kinds of information?*

The tool would be easier to use if translated into French

*Would you use the tool or apply recommendations provided by the tool? Are there time/cost/labour implications related to the recommendations? Would the tool change your ideas/practices/approach to your farm? How? What would you expect to gain from using the tool?*

The tool provides interesting information on potential weed infestation that can help managing weed control. This allows to explore new rotations (prospective information) which can then be tested on farms.

*Have you used similar tools before? Which ones have you used? Have they been useful/not useful? Why? Would other farmers use the tool?*

The computer version is not necessarily the most suitable. The tool is adapted to the reasoning of a farmer because it takes into account the criteria taken into account by the farmer when designing his/her rotation and cropping plan.

*How could the tool be improved? If you could provide feedback to the creators of the tool what would you say? Any additional comments?*

Use French soil quality classes as inputs. Complete the list of species for French conditions and add intercropping options as well. The objective is to be able to respond to new market opportunities (e.g. new crop collected by the cooperative) and to test the integration in the rotations before the implementation. It is therefore necessary to propose also uncommon species. Add disease criteria. Set up the tool in French conditions, involving farmers. This could be the objective of a new project.

## 17.2 ConMarcheBio, Italy

Easy to use and interesting because a real systemic approach is used in designing the crop rotation. However, it is scarcely relevant for the main prominent challenges identified by Italian farmers. In addition, the tool does not take economic aspects of the cropping system into account and it seems specifically suitable for the Baltic area, so rather far from the agro-ecological characteristics of the Marche region. This makes its practical value very low.

## 17.3 FIBL, Austria

First impressions have been high interest and a little excitement. It's always fun, if you "can play" with a tool like this. Target group are farmers and advisors.

After first trials there has been disappointment, because it was not working the way the advisors wanted it to work. Such a calculation tool is interesting, but not relevant for farmers and advisors if they cannot find the crops, that are used by the farmers. The choice of crops is too limited.

Tools like this can be interesting for farmers/advisors. Together with a handbook usually they are easy to use by the farmers themselves. It would be interesting, if the choice is free. And adapted for Austrian conditions.

## 18 Weed management on organic farms

Technical guide

Link to OK Net Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30586>

<https://content.ces.ncsu.edu/weed-management-on-organic-farms>

Relevant	Interesting	Easy to use	Practical	Average score
4.9	4.5	4.0	4.8	4.5

The tool is a technical guide that was tested only by one group.

### 18.1 OMKI- Hungary

The topic is relevant and interesting topic and booklet is easy to use and practical. However, it is not adapted to Hungarian conditions and is not up-to-date (2008) and information about new machinery is missing.

Weed management is the most serious issue among organic arable farmers in Hungary. This echoed when talking about this tool.

*What do you like about the tool? What don't you like about the tool?*

It is complex and detailed. Good structure. Practice-oriented. Covers mainly all the relevant topic of weed issues. Cover crops described very well.

Some part is not up-to-date any more since it was published in 2008 – new machines were developed since then (especially in precision farming)

*Does the tool provide useful recommendations? Do the recommendations address specific issues or challenges you face? Are the recommendations relevant to/appropriate for your farm system? Is any information missing?*

Information is useful and practical.

The recommendation mostly relevant. Some part does not fit to the Hungarian conditions because the different production practices/machinery use in USA and Europe. These parts need to be adapted.

Some newer type of machines are missing, these need to be included and described.

It is good that there are farm examples, they should be chosen from Hungary.

Numerical Data on line-space and other sowing information should be described in a table format.

Perennial weeds need to be described according to the Hungarian conditions, the species are different in the US and Hungary.

*Does the tool present information in an accessible way? Is the language/terminology easy to understand? Are you familiar with the tool format (i.e. leaflet, website, video)?*

It is a booklet, 34 pages. Easy to use, easy to read.

*Do you think the tool is easy to use based on your current knowledge? Would you require assistance to use the tool? From whom? Would you require any additional information to use the tool? What kinds of information?*

It is a booklet, pretty simple. No external assistance needed. Would be useful to insert a list of terms to define possibly unknown words/expressions.

*Would you use the tool or apply recommendations provided by the tool? Are there time/cost/labour implications related to the recommendations? Would the tool change your ideas/practices/approach to your farm? How? What would you expect to gain from using the tool?*

Most of the recommendations are relevant. It is straightforward to use but need to be practiced.

To achieve more effective weed management strategies is feasible using the booklet.

*Have you used similar tools before? Which ones have you used? Have they been useful/not useful? Why? Would other farmers use the tool?*

No publication specially for organic weed management in Hungary, so in its category it will be the first one. Farmers who tend to use written materials tend to use it.

*How could the tool be improved? If you could provide feedback to the creators of the tool what would you say? Any additional comments?*

In all details it needs to be adapted into the Hungarian agro-ecological and farming conditions. The newest techniques available in weed management (e.g. precision farming) needs to be included and described. Hungarian farmer case studies include.

Into the downloadable Hungarian pdf versions hyperlinks should be incorporated which show external resources and relevant information without describing them in details within the booklet. Include actualized reference list.

## 19 Risk management for small grains

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30587>  
[http://organicriskmanagement.umn.edu/sites/organicriskmanagement.umn.edu/files/small\\_grains.pdf](http://organicriskmanagement.umn.edu/sites/organicriskmanagement.umn.edu/files/small_grains.pdf)

Relevant	Interesting	Easy to use	Practical	Average score
4.2	3.8	2.9	3.9	3.7

No discussion comments provided

## 20 Sort out your soil: A practical guide to green manures

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30588>

Relevant	Interesting	Easy to use	Practical	Average score
4.0	3.6	3.8	2.7	3.5

The tool is 21 page guide in English with lots of pictures, tables and diagrams. It provides some explanations about each legumes or non-legumes plants

All the groups found that the too was interesting and practical, but not all found it relevant. The German group found it to be more for beginners than for experienced farmers.

- All the groups stated that it was easy to use.
- The Maheklauster, Estonia, emphasised that it was practical, whereas the German group didn't. So, the groups have quite different and sometimes opposite opinions about the tool.
- Moreover, some information is missing according to the UK and to the German groups. For instance, the costs of the seeds could be added.
- The Estonian and the German groups put light on the fact that it was not transferable to their conditions.

### 20.1 OMKI, Hungary

A debate emerged when showcasing this tool whether it is feasible using green manures in Hungary or not. (Lack of precipitation is the limiting factor.) The tool itself was not discussed in detail after that.

## 20.2 Maheklaster, Estonia

*What do you like about the tool?*

Looks like very practical, visual and informative well-structured material.

*Is the tool relevant to the interests/needs of the group?*

The topic is very relevant, but growing suggestions are maybe not exactly suitable for our conditions.

*Is the content of the tool interesting?*

Yes. Maybe more crops could

*Is the format of the tool easy to use?*

Yes, it is well-structured and easily readable.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

It probably gives initial suggestions, but maybe there is a need to adjustment according to exact conditions.

## 20.3 BIOLAND, Germany

*What is good?*

The tool provides a good overview on many of the common green manuring crops and mixtures. Each species is presented with a picture, all relevant growing information like seed rate, seed time and seed depth are given. In addition, there is a classification into nitrogen collecting or conserving plants. The persistence of the species is indicated in three categories: short-term, medium-term and long-term. The focus lies on clover species. Even rarely cultivated species like black medick or yellow sweet clover are described.

*What is bad?*

Only one language available (English). The family of the Brassicas comes off badly: important catch crops like radishes, turnip, rape, fodder rapeseed and autumn turnip are missing.

*Relevance for the interests/needs of the group?*

Probably very useful for newcomers to the field of green manuring crops. Experienced organic farmers won't learn anything new here, therefore it is not really relevant.

*Interesting content?*

Interesting yes, but not complete! Not transferable to other climates as the ones prevalent in the UK without adaption. Ultimately, even many seed producers and seed traders have such a catalogue to inform their customers.

*How well is the handling of the tool?*

With good English skills this tool is easily understandable. It is not interactive. It is not designed for specific farm's needs. The reader needs to decide alone what is relevant.

*Practical application of the tool?*

No, because there is no further analysis or evaluation.

## 20.4 ORC Arable Group- UK

The tool lays out all the information in a way that is easy to get to without having to go through the entire document. The only element that would be useful would be more about the cost of the seed, or even a going a bit further by adding the cost of planting and seed, vs potential N output and possible reduction in future tillage costs. Very difficult I know but if possible would be very useful.

## 21 Atlas of agricultural entomology – a knowledge base of pest insects

Website/ database in Italian

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30589>  
<http://www.agraria.org/entomologia-agraria.htm>

Relevant	Interesting	Easy to use	Practical	Average score
2.0	5.0	3.0	1.0	2.8

The atlas was only discussed by the Italian group which provided the following feedback.

### 21.1 ConMarcheBio- Italy

It may be useful only for a farmer able to use internet and with a background on plant protection topics. The tool is not specific for organic agriculture. It is interesting because the pest life cycles are clearly shown and explained, with the support of good pictures. This tool does not however address the main challenges identified by our farmer groups.

## 22 Knowledge exchange platform for agroecology

Website

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30590>  
<http://www.osez-agroecologie.org/>

Relevant	Interesting	Easy to use	Practical	Average score
5.0	3.0	2.5	1.0	2.4

This French website was discussed by four groups. It aimed also at conventional farmers interested in agroecology rather than organic farmers only. The Italian and French groups found the tool interesting and relevant. The Italian group appreciated the videos, whereas the French group regretted that the website is not only about organic farming. The German group commented that the design is modern and good according but felt not able to comment on the content because of the language

### 22.1 BASE ABC, France

One of the participants found the website very inspiring and that it that such a website should be developed for organic farming in France. There are a lot of technical leaflets and some farmers' interviews and he suggested to add more "human beings" (forums). He also liked the form.

One of the participant did participate to the website (he was interviewed and a video and a webpage presenting his farm are included in the website). He is frequently contacted (once a week) by farmers who visited the website for technical or conversion advices/discussion. The website also made him connect with a neighbouring farm and they are now running an experiment together. He deeply regrets that the website is not 100% OF.

Another participant knew the website and found it interesting for popularization of knowledge and that it triggers creativity. He consulted information regarding agroforestry.

The last participant would be interested in such a website that was totally dedicated to OF.

### 22.2 ROTAB, France

Comments made included

- The website was targeting conventional farmers interested in agroecology rather than organic farmers.
- Overall interesting
- Would like to select several objectives simultaneously.
- Good interface and good provider of different resources (bibliography).

### 22.3 ConMarcheBio, Italy

This tool is deemed as highly interesting and relevant, especially thanks to the several videos of farmers telling their stories. It is a big "container" of practical farming cases. However, its value for testing purposes is quite limited.

### 22.4 BIOLAND, Germany

*What do you like about the tool?*

The design is very inviting and modern.

*What do you dislike about the tool?*

The tool is in French only and there is no possibility to change languages.

*Is the format of the tool easy to use?*

Only for persons who speak French. To allow a sound review of practicability and content it should be offered in multiple languages.

## 23 Nutrient management for farms in conversion to organic

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30591>

Relevant	Interesting	Easy to use	Practical	Average score
3.9	3.4	3.4	2.9	3.4

This technical guide in German was tested by the groups in Austria and Germany.

The German group found the topic relevant and the tool practical but would prefer it to be either shorter or longer with more details. The Austrian group found the tool complicated that would be useful for advisors, not farmers.

### 23.1 Bioland, Germany

*What do you like about the tool?*

It is high-quality, understandable and practical specialised literature. This tool links crop rotation with nutrient management in a reasonable way.

*What do you dislike about the tool?*

The text is too long and too short at the same time. It either needs to be even more compact or more detailed with a better structure.

*Is the tool relevant to the interests/needs of the group?*

It is a very complex and relevant topic. To possess background knowledge as well as specialist knowledge is key for successful organic agriculture.

*Is the content of the tool interesting?*

What makes this topic so interesting is the fact that a lot of farms are in the process of transition into organic agriculture. Therefore, it is important to face the issue of nutrient flow in good time.

*Is the format of the tool easy to use?*

Because it is a text, it is suitable to look up specialist knowledge. The format is useful and appropriate, but the text should be reduced by half or be more detailed and better structured.

### 23.2 FIBL- Austria

The background information is very useful, and the content is ok, but there were some concerns about the credibility of the authors; some found it difficult to use.

The information is not useful for farmers. It would lead only to a lot of questions. It may be prepared and presented to a small group of farmers. The target group of this tool are advisors, not the farmers.

If the tables would be in excel it would be very helpful. The way it is, the user would have to create their own excel sheet.

The usability of this tool is not quite clear. At the end of this booklet there is a checklist. But it's quite complicated.

BFU is a free program, but it's quite difficult to use. One of the advisors has been tried it out before. There is a huge amount of information that has to be filled in (and known). It's complicated. Testing the tool would require taking soil samples to validate the tool under different conditions.

## 24 John Pawsey Youtube channel

Video channel

<https://www.youtube.com/user/JohnPawseySPF>

Relevant	Interesting	Easy to use	Interesting	Average score
4.5	5.0	5.0	4.5	4.8

This video channel of one organic farmer in the UK was only looked at by the UK group. Overall, the feedback was positive that youtube channels could be a good knowledge sharing tool and engaging medium. However, it might be difficult for all farmers to replicate the standard of videos made by John. If support could be given by someone with the skills and equipment who could visit farms to make videos it could be a very useful and popular tool.

### 24.1 ORC Arable Group- UK

The UK participants found the video channel to be excellent, very informative and impressive and John is a great ambassador for organic farming.

The following comments were made:

- Making videos from the field is really valuable – can see what John is trying out, and he follows up with what happens next. *“Second best to standing in the field with him”*.
- Also believe that John will be honest about what works and what doesn't work which is really important. The details of what went wrong are as important of what went well!
- Other members of the group don't understand how he has time to do that!

The farmer, John, said that he finds people commenting on his channel useful feedback from which he learns a lot.

## 25 Bioland Humusrechner

Calculation tool for decision support

No link provided as Excel sheet used by advisors with farmers.

Relevant	Interesting	Easy to use	Practical	Average score
5.0	4.0	4.0	4.0	4.0

This German calculation tool was suggested and discussed by the Bioland group.

The tool appears to be relevant and interesting, so budgeting humus (or soil organic matter) is a topic that matters for farmers. For wider testing the tool would need to be translated, there are not equivalent tools elsewhere.

## 25.1 Bioland, Germany

*What is good?*

Calculation according to two different methods of accounting humus (CC / Leithold&Hülsbergen). Up to three specific, operational crop rotations can be analysed. Yields and remain of harvest's main products and by-products are selectable. Organic fertilisers can be entered with own figures. Input of K / K2O depends on the method of analysing

*What is bad?*

Only one language available (German), but translation would be easy.

*Relevance for the interests/needs of the group?*

Very relevant, because it is possible to determine the current humus balance of the farm with little effort in comparison to other methods. Out of this, relevant changes in crop rotation and fertilising can be derived. It is a good tool with regards to sustainable cultivation and soil fertility.

*Interesting content?*

The content is interesting for every operations manager who wants to improve soil fertility sustainably.

*How well is the handling of the tool?*

All entries and evaluations are easily workable and logical.

*Practical application of the tool?*

Practical application is very feasible in the scope of individual consultation as well as during group consultations.

## 26 Weed control in organic vegetables / INAGRO

Technical Guide

[https://leden.inagro.be/DNN\\_DropZone/Publicaties/293/Onkruidbeheersing.pdf](https://leden.inagro.be/DNN_DropZone/Publicaties/293/Onkruidbeheersing.pdf)

Relevance	Interesting	Ease of use	Practicality	Average score
5.0	5.0	4.0	4.0	4.5

This tool from INAGRO was suggested and discussed by the Bioforum, BelgiumGroup (Belgium)

### 26.1 Bioforum, Belgium

*What do you like about the tool?*

As language is such a big barrier, we tried to find alternative likeminded leaflets and brochures in our national language. The INAGRO leaflet was to the point, short brochure (8 pages) with lots of practical information, colourful, lots of pictures and clear tables, good titles, very good layout which draws your attention. Available as pdf and as printed leaflet.

*What do you dislike about the tool?*

No negative remarks by farmers. May be a small update may be needed.

*Is the tool relevant to the interests/needs of the group?*

It is still very relevant although it was published in 2010. May be the leaflet is not known enough?

*Is the content of the tool interesting?*

Yes, very relevant. Although it could be of interest for existing organic farmers, the target group is mostly beginning organic farmers

*Is the format of the tool easy to use?*

Yes, see above

## 27 Mechanical weed control in vegetable production FiBL video

Video

<https://www.youtube.com/watch?v=kGWNsgttNXk>

Relevant	Interesting	Easy to use	Practical	Average score
4.9	4.5	4.0	4.8	4.5

This video was discussed by only the Bioforum, Belgiumgroup (Belgium).

This 20-minute video presents several machines for mechanical weed control in commercial vegetable production, such as star cultivator, ridge cultivator, flex tine harrow, torsion weeder, finger weeder, computer-controlled cultivator, camera-controlled goosefoot cultivator, brush hoe, duo-parallelgramm, bed-disc weeder, multi-row rototiller, and subsurface cultivator.

### 27.1 Bioforum, Belgium

*What do you like about the tool?*

The format – youtube video allows farmers to see the machines in action as if you were there yourself. The fact that you can see it at work from all sides (under, side,...) is very welcomed! Some farmers mentioned that they use youtube from time to time to see machinery.

*What do you dislike about the tool?*

The film is too long, and it was remarked to cut the film in different parts so you can look into the machine you are interested in. Language is a barrier for farmers, but even without translation or with only some small keywords, you can learn a lot from such a video.

*Is the tool relevant to the interests/needs of the group?*

Yes, the tool is very relevant. It would be nice to have a collection of all machinery usable in organic arable production with demonstration. This may be a suggestion for the tool testing fund.

*Is the content of the tool interesting?*

Yes, you can see the machine working and look for the result. Comment helps to understand and some small tips and tricks about working with these machines are very much appreciated.

*Is the format of the tool easy to use?*

Yes, but would need to be adapted to own language or subtitling, it is also too long.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

Yes. It gives a good overview of current machinery. It may be completed with some in depth information about each machine.

*What we learned for our own communication?*

- youtube videos should be short and in own language, preferable with subtitles even when in own language.
- All researchers and advisors should be well informed so that they can take the information to the farmers. Different approaches are needed to make that existing information or tools continue to be used: newsletters, facebook,...
- It was perceived that farmers use at this moment video mostly to inform themselves about machinery. For technical information (for example variety choice, fertilisation,... they do not use video that much.

## 28 CCBT Website

Website

<http://www.ccbt.be/?q=english>

Relevant	Interesting	Easy to use	Practical	Average score
4.0	4.0	3.0	3.0	3.5

This Belgian website tool was suggested and discussed by the Bioforum, Belgiumgroup (Belgium).

This tool was discussed by the Bioforum, Belgiumgroup (Belgium) who provided the following feedback. INAGRO is a partner of the network and commented that it is necessary remind users about relevant publications from time to time (for example through a list of linked articles that were published earlier) even if the ebsite provides archive and search engine.

### 28.1 Bioforum, Belgium

*What do you like about the tool?*

Current and very practical results from applied research. One centralised database for all applied research on organic farming in Flanders, for the different crops / farming systems.

*Is the tool relevant to the interests/needs of the group?*

Yes,

*Is the content of the tool interesting?*

Yes, good feedback from farmers

*Is the format of the tool easy to use?*

Yes, monthly newsletter by post of by mail (most of farmers read the newsletter by mail). On the other hand, in the discussion in the workshop, we discovered farmers do not use the archive and the search engine that much.

## 29 Simple building blocks for improved soil

Technical guide

<https://leden.inagro.be/Artikel/guid/2393>

Relevant	Interesting	Easy to use	Practical	Average score
4.0	4.0	4.0	3.0	3.8

This tool was suggested and discussed by the Bioforum, Belgiumgroup The group preferred to present the Dutch leaflet to the farmers, rather than an English one. . that provided the following feedback.

### 29.1 Bioforum, Belgium

*What do you like about the tool?*

Clear roadmap. All steps are well documented by short and practical text + instructions and clear pictures. Covers most soils of Flanders. Only 12 pages. Water resistant paper.

*What do you dislike about the tool?*

Digging deep ditches in hard soil.

*Is the tool relevant to the interests/needs of the group?*

Yes, own observation of soil can tell you a lot about your farm and soil management in a cheap way.

*Is the content of the tool interesting?*

Yes, it goes to the basis of organic farming. If there is a problem with a crop that doesn't grow, the reason often can be found in soil. This leaflet helps farmers to analyse the problem.

*Is the format of the tool easy to use?*

Yes, the leaflet can be taken into the field. After some time, farmers know instructions by heart.

*Is practical testing of the tool (format and/or recommendations provided) feasible?*

The tool is already implemented. However, it seems that some repetition from time to time is needed.

## 30 A guide to Nutrient budgeting on farms

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=30654>

[http://www.agricology.co.uk/sites/default/files/IOTA\\_a\\_guide\\_to\\_nutrient\\_budgeting\\_on\\_organic\\_farms.pdf](http://www.agricology.co.uk/sites/default/files/IOTA_a_guide_to_nutrient_budgeting_on_organic_farms.pdf)

Relevant	Interesting	Easy to use	Practical	Average score
3.0	2.0	3.0	3.0	2.8

This 12-page technical guide (in English) tool was suggested by the UK partners and discussed by the UK group.

### 30.1 ORC Arable Group, UK

Tool feels too conventional and misses or underestimates all the unseen “stuff” going on. The cycle seems too simplistic and misses many nutrients out. Might be quite useful in conversion and during the early years of managing an organic system but less useful for more experienced organic farmers.

Training of farmers to recognise crop nutrient deficiencies could be more useful for on-farm nutrient management. The farmers looking at their crops and interpreting what they see in terms of crop growth and development could be equally powerful, but farmers need to be able to accurately diagnose various deficiencies.

Plants are the best indicator of soil health and nutrient availability.

(Although nutrient budgeting might be viewed as preventative while diagnosing crop nutrient deficiencies is more curative)

## 31 CropProtectApp

Web-based tool that can be downloaded as app

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=31801>  
<https://croprotect.com/>

Relevant	Interesting	Easy to use	Practical	Average score
4.0	3.0	4.0	4.0	3.8

This tool was suggested and discussed by the UK group.

### 31.1 ORC Arable Group- UK

A useful tool that acts as a good reminder at different times of the year to help make and tailor agronomic decisions such as cultivation techniques for control of specific weeds prior to drilling.

The interface is simple, looks great and is easy to use. The user being prompted to add or ask for more information is useful.

A key system for weeds but would like more information on seed banks.

Appreciated the interface which allows users to input farm information such as crop types and crop protection needs and pulls together a large amount of data (from academic, industry and other users) to generate tailor made information on pest and disease biology and identifies relevant solutions. Liked that it is an app and so can have on their phone in the field – photos are helpful visual cues for identification of pests in the field.

Like that the tool starts with non-chemical approaches, but disappointed that many of the solutions make reference to chemicals. A similar tool tailored to organic systems could be of interest.

Users have the possibility to set up an account and are then able to comment in the discussion forum and ask questions on specific pests to other members, which is considered valuable. Although, it also appears this feature is not really used. Feedback suggests that such forums need a critical mass of people to encourage others to post.

CropProtect also includes an option for farmers to share data on pest prevalence to support mapping. The group found this interesting and useful, but wondered if they would have time to use it

## 32 SEMINBIO: Innovative seeder for weed control in cereals

Technical guide

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=32604>

Relevant	Interesting	Easy to use	practical	Average score
5.0	5.0	5.0	5.0	5.0

This tool was suggested and discussed by the ConMarchBio group (Italy) that did also carry out practical testing of the machine described in the tool. It is not possible to conclude about the usefulness for other regions from this discussion.

### 32.1 ConMarcheBio- Italy

The prototype of sowing machine devised by the CREA\* of Foggia seems very relevant for the challenges identified by the farmer groups, since weeds are a major yield limiting factor for durum wheat in the Marche region, where the organic wheat value chain plays the most important role in sustaining the economics of organic farming in the region. Furthermore, the sowing machine can be easily tested in the ConMarcheBio farms thanks to an already running cooperation with CREA of Foggia. Bearing this in mind, the advisors assigned to this tool (proposed by ConMarcheBio) the highest score.

## 33 Highcrop

Advisory tool using a set of cards for visualisation of strategic decision-making

<http://orgprints.org/24442/>

Relevant	Interesting	Easy to use	Practical	Average score
2.0	3.0	3.0	1.0	2.4

This tool was provided by the Danish partner and discussed by the UK group.

### 33.1 ORC Arable Group- UK

*What do you like about the tool?*

- Visual aid – really helps to be able to see things and make a vision
- Visioning is a powerful process which can help to be clear about where you are going and getting staff and family on board.
- Going through a process like this is worthwhile, but less part of our culture.

Some really liked the tangible cards and being able to move them around and see all of it which they felt would be hard on a digital platform

*What don't you like about the tool?*

The action cards do not connect at all to the vision – would be good if they could be part of a stepwise process of getting to the vision / objectives.

- Some felt it would be better as a digital tool.
- Like concept but it doesn't work as it is.

*Does the tool provide useful recommendations? Do the recommendations address specific issues or challenges you face? Are the recommendations relevant to/appropriate for your farm system? Is any information missing?*

Some of the recommendations are not relevant to UK context or are not relevant to all farms – so perhaps they can choose to leave them out.

The recommendations were seen as very specific and missed a connection to overall goals, which could have included questions like how to engage the public with the farm, or direct selling milled flour etc.

Some suggest it could be better as a digital tool – and could automatically pick out steps that are useful to the vision and link to resources and research. However, they recognise that takes out the ability to make your own inferences of the meaning of the vision cards.

The intervention / action cards are a bit repetitive and focus on only some recommendations on farm. Others they disagreed with – for example to store green manures and put them into an AD plant, they felt was wasteful.

One participant (Farmer and advisor) wondered if it could be linked to something like the ORC Public goods tool which measures performance on key sustainability indicators on farm – having visual cues such as this could help with making the process more engaging. Pictures give motivation

Not challenging me to think about how I am going to change my farming system. Need to start with where I am at and digitally select what I could do – ten examples and can link to recommendations / pictorial examples / research. Links.

- *Does the tool present information in an accessible way? Is the language/terminology easy to understand? Are you familiar with the tool format (i.e. leaflet, website, video)?*

Like the visual nature of the tool - but It is a bit confusing to have all the action cards and have to go through them all.

Could it be digitally based to get through to specific information that is useful.

Could the tool help to assess where you are at with certain parameters on farm and help advise how to make steps to improve?

- *Do you think the tool is easy to use based on your current knowledge? Would you require assistance to use the tool? From whom? Would you require any additional information to use the tool? What kinds of information?*

Easy to use – but some felt it made it a bit too complicated with the constraints and axis etc.

They found the visioning element at the beginning most valuable.

- *Would you use the tool or apply recommendations provided by the tool? Are there time/cost/labour implications related to the recommendations? Would the tool change your ideas/practices/approach to your farm? How? What would you expect to gain from using the tool?*

Some of the recommendations were not applicable. More specific recommendations tailored to my conditions?

Could be used as an education tool for children / agricultural students. Board game? Include information in organic research.

Could it be used to evaluate how we are doing?

Could be good to go through it with your staff – space for discussion and make sure you are all on the same page. Joint vision – one farmer took it home to try!

*Have you used similar tools before? Which ones have you used? Have they been useful/not useful? Why? Would other farmers use the tool?*

Not used anything similar!

Could it be an app?

*How could the tool be improved? If you could provide feedback to the creators of the tool what would you say? Any additional comments?*

Tie the actions to the vision – stepwise decision making at a whole farm level. Concept is very useful but in its current form it doesn't work.

### 34 NDICEA

Decision Support Tool

Link to OK Net Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=31675>

<http://www.ndicea.nl/indexen.php>

relevant	interesting	Ease o f use	practicality	Average score
3.0	4.0	2.0	4.0	3.3

This tool was suggested by the UK partner and discussed by the UK group that also carried out some practical testing of the model with farmers. It was also briefly discussed by the Austrian partner.

#### 34.1 ORC Arable group, UK

*What do you like about the tool? What don't you like about the tool?*

Useful but not enough options for soil type or depth.

Very good needs a considerable time investment. Could be useful if you have the time. Not useful for colour blind people due to use of red and green in charts, otherwise good.

*Does the tool provide useful recommendations? Do the recommendations address specific issues or challenges you face? Are the recommendations relevant to/appropriate for your farm system? Is any information missing?*

No recommendations given

Good if you have the background knowledge: good rotation design

*Does the tool present information in an accessible way? Is the language/terminology easy to understand? Are you familiar with the tool format (i.e. leaflet, website, video)?*

Results charts in red and green. Difficult to read but otherwise useful.

*Do you think the tool is easy to use based on your current knowledge? Would you require assistance to use the tool? From whom? Would you require any additional information to use the tool? What kinds of information?*

This tool is quite complex to use but there is a lot of useful information there I like it a lot.

Useful to show N limit. Good facility to put in actual performance/conditions.

### **34.2 FIBL, Austria**

To improve the tool, should be added:

- soil type options
- Depth options
- Subsoil options

Look a simple modelling tool which I look forward to trying

Could be sequel based to make more user friendly and a more modern tool.

### **35 Spade test**

Link to OK Hub: <http://farmknowledge.org/index.php/search-for-ok-tools?v=32099>

This tool was suggested and discussed by one of the French groups.

The spade test is a soil assessment approach that provides the user with a score of soil compaction. This information could then help the user (i) to understand crop performances and (ii) to adapt crop management to avoid or limit soil compaction. The French group invited the developer of a spade test guide to the group meeting and made a video.

#### **35.1 ITAB, France**

The practical application of doing a spade test in the morning helped the participants to strengthen their skills, competencies and abilities. They practiced the test in pairs before getting feedback and demonstration from the designer of the tool (Joséphine Peigné). The commented that they would now be able to replicate the test on their own. At the end of the morning, group members were skilled to assess soil structure with a quick and simple tool in their experiments. They are now able to compare soil structure between different spade samples, e.g. compacted and “typical” area of a given field. They would now be able to use the spade test to compare cropping systems and/or monitor soil structure over time on their experiments.

The spade test practical testing was very useful for strengthening the participants skills. There are several outcomes: participants (i) are now able to carry out the spade test on their own and assess soil structure recommendations (ii) shared experience and discussed the results with the tool designers and (iv) will further use the tools to advise farmers. Videos have been shot and a video will be released by ITAB.

## 36 Arvalis

French tool box for choice of cover crops, similar to the cover crop and living mulch toolbox.

<https://www.english.arvalisinstitutduvegetal.fr/index.html>

This tool was suggested by ITAB and discussed by the French groups.

### 36.1 ITAB, France

The participants were interested in using this tool because it was possible to give more information on the cropping system and on crop management as input data compared with OSCAR Toolbox (#1) (e.g. sowing date, destruction operation, farm location). They also were expecting species mixtures in the output list.

The participants got different results compared with OSCAR list of output. Even if the Arvalis tool seems to be more precise (a lot of information are required on the cropping system and on crop management), the results provided for each output species is not that precise. One important drawback of the tool is that the criteria weighting for ranking the species is not accessible to the user, giving the feeling of a “black box”. Participants also regret that the species were described with class variable (e.g. +, -, or +/-) and they feel this result vague and difficult to interpret. They suggested that organic farming might be an input criteria that would then select specific species, according to some criteria (e.g. mechanical control of the cover crop).

As a conclusion, the participants planned to use both tools and combine the results with their own expert knowledge to choose suitable cover crop species in their systems.