OK-NET Arable: Exchanging knowledge, enhancing organic farming

After three years the OK-NET Arable project, funded by the European Union's Horizon 2020 research and innovation programme, has finished. We are proud of the project, which aimed to 'Improve the exchange of knowledge among farmers, farm advisers and scientists to increase the productivity and quality of organic arable farming in Europe.' ***Katie Bliss****,* ***Susanne Padel*** *and* ***Phil Sumption*** *look back at the project's achievements compared to the aims.*

The complexity of organic farming requires farmers to have a very high level of knowledge and skills. But exchange on organic farming techniques remains limited. The OK-Net Arable project aimed to facilitate co-creation of knowledge by farmers, farm advisers and scientists to increase productivity and quality in organic arable cropping all over Europe.

OK-Net Arable was coordinated by IFOAM EU and involved 17 partners from 12 countries. ORC was the UK research partner. OK-Net Arable is one of the first four so-called thematic networks funded under the umbrella of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI). This EU policy instrument aims to foster innovation by connecting farmers and researchers.

Project aim: Synthesise existing knowledge

The project aimed to identify the best ways of exchanging knowledge on organic arable cropping. Based on this, farmer facing advisory material was collected and developed.

Tools collected	94
Videos made	8
Tools translated	28
Practice abstracts	43

The selection of knowledge exchange tools (i.e. material suitable for the end-user) was informed by feedback from the farmer innovation groups. In addition, new tools were made, including practice abstracts (2-page summaries of key practices) and videos, and others were translated, including 4 technical guides from FiBL. As a result knowledge from previous projects is more widely available. The tools are all available on our online knowledge platform farmknowledge.org (see box) and have been submitted to EIP-AGRI. They have also fed into online courses (also on farmknowledge.org) which link the theory of organic production with the practical solutions in the tools.

Project aim: Create European network of farmers

The project worked with 14 farmer innovation groups in 10 countries representing a range of farm types. Exchange between the groups and between the farmers taking part in the groups was intensified through two European farmer workshops and seven exchange visits.

There was positive feedback from farmers on the exchange visits and the opportunity to meet with peers from across Europe. There was interest in more exchanges in future and many felt willing to contribute to costs. Farmers valued the opportunity for direct visual observation, understanding of the context in which the practice was being tried and discussing with others what worked and what didn't work.

John and Alice Pawsey hosted an exchange visit between the UK group and French (ITAB) farmers and researchers at Shimpling Park Farm in June 2017. The focus was on intercropping, including relay cropping (buckwheat and oats/peas), undersowing and companion cropping (camelina and oats) and the use of the Cameleon combi-drill system. The group visited Wakelyns Agroforestry and the NIAB Innovation Farm.

Based on input from farmers and academic partners, recommendations on topics and methodologies for a common research agenda for organic arable farming were made.

Project aim: Create online knowledge platform

This is perhaps the most important legacy of the project. The platform offers evidence-based advisory material as well as facilitating farmer-to-farmer learning. This platform is a virtual meeting place for farmers, advisers and researchers that would otherwise not be able to meet. The farmknowledge platform, with toolbox and discussion forum, was launched in October 2016. It is available in 10 languages (using auto-translations and some materials published in several languages). The platform will act as the European knowledge hub for organic farming for farmers and advisers with other projects such as OK-NET Ecofeed (See Bulletin 123) and LIVESEED (Bulletin 122) contributing to it.

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UK Farmer Innovation Group

Farmers in the UK Farmer Innovation Group hosted a series of meetings across the country. At the first meeting hosted by Richard Gantlett at Yatesbury House Farm in June 2015 the group discussed challenges facing organic arable cropping in the UK and potential solutions, including effective techniques for knowledge exchange. Weed control and soil health were identified as priorities. The second meeting was held at Abbey Home Farm, near Cirencester, in 2016. Knowledge exchange tools — such as videos and decision support tools and apps on organic farming —were assessed by farmers to provide feedback on how knowledge and information could be better shared.

The third meeting was hosted by Charles Hunter Smart at Bradwell Grove in Oxfordshire, where the group chose to test the nitrogen dynamics model NDICEA in the field. Eight farmers worked with researchers from ORC to input data from their farms over the 2017 growing season. The final meeting was hosted by Tom Liddell at Fullerton Farms, Hampshire, in July 2017. This was an opportunity to share experiences of the NDICEA testing and discuss ideas for how to better manage nutrients in organic rotations. Beyond the project group members have the opportunity to stay engaged through FABS and in the Anaerobic Digestate field lab.

Field testing

The Farmer Innovation Groups were also invited to carry out some practical testing of knowledge presented or specific practices that addressed the issues identified by them. The groups submitted proposals that were reviewed by the project steering group and feedback was provided before the actual testing started. In total, 11 practical trials were carried out. The results of this practical testing summarised here have been reported by the Farmer Innovation Groups in the form of practice abstracts and/or videos that are shared on the knowledge platform.

1. Mechanical weed control; Bioforum/INAGRO, Belgium
A classic tine harrow (Carré), a precision tine harrow (Treffler), a rotary hoe (Carré) and a rotary harrow (Einböck) were demonstrated to a group of 20 organic farmers. They discussed the machines and their effectiveness in the field, which was followed by weed counts. Each machine had advantages under different conditions. The rotary hoe breaks up the crust, while the harrow works more delicately. For all machines, multiple or crossed passes increased effectiveness. Most effective in the trial conditions (hard crust, sandy loam) were two passes of the harrow, or a combination of two passes of the rotary hoe followed by the harrow. At the final farmer exchange workshop inter-row hoeing of winter cereals was discussed but considered not suitable under many conditions and some more experienced organic farmers advocated a 'do nothing' approach to weeds in winter cereals, which works if the rotations are well-balanced and the soil is in good condition.

2. Comb harrow; Bioselena, Bulgaria
Many farmers in Bulgaria unfamiliar with using the comb harrow for weed control had doubts about its efficacy, so a trial was organised to test the effect of harrowing on wheat, spelt and einkorn. In the early stages, weeds with shallow roots were successfully eradicated and the presence of others (burdock, stork's bill) were reduced. Yields increased by 13% for wheat, 17% for spelt and 23% for einkorn.

3. WUZI dock-cutter in pasture; SEGES, Denmark
Docks are often present in the grass ley phase of the arable rotation and can only be controlled with additional tillage. The group tested a dock-cutter that terminates docks and prevents re-growth through re-seeding in the area the dock was cut out. The group found it more convenient than digging-out docks, but time consuming for larger fields or fields with high infestations as it still needs 20-30 seconds per dock for one person and the machine. The group saw the potential of further innovation in self-driving robots drilling out the docks.

4. SEMINBIO® prototype seeder; Con Marche Bio, Italy
This new machine optimises seed distribution in the three axes of space. It was tested in durum wheat and found to ensure a fast soil cover by the crop, a rapid and improved uptake of nutrients, and enhanced competitive ability against weeds. It can be combined with other weed control measures, such as a comb harrow.

5. Roller crimper; AIAB, Italy
Soya bean is a challenging crop in organic systems due to its low ability to compete with weeds during growth. The trial in Central Italy tested several methods of sowing soya bean into a mulch and found some of them to have good results in terms of weed control, and preservation of soil water even during the dry summer in 2016 and yields comparable to traditional establishment. The effectiveness of a mulch depends on the amount of mulch biomass, but this can cause some difficulty for the planter.

6. Roller crimper; Bioselena, Bulgaria
No-till is considered suitable for Bulgarian conditions, but so far is only used on one non-organic farm and cover crops are not widely used. The group decided to try the roller crimper on two organic farms in different parts of Bulgaria. The results showed that no-till can work in organic farming in Bulgaria but several years of trials would be necessary. Also, the size of the machines and weight of the tractors needed might limit its use on small-scale organic farms.

7. Testing cover crop varieties; ITAB, France
Trials of different white clover varieties and mixes undersown in winter wheat in central France (Yonne) showed some interesting differences. Comparing dwarf (Huia and Rivendel) with intermediate 'Hollandicum' (Merwi and Jura) cultivars one intermediate cultivar produced the highest biomass. The highlights the importance of variety testing for fertility-building crops.

8. Multi-spectral cameras for field trials; OMKI, Hungary
During the testing a drone was used for imaging field trials. The analysis of the remote sensing images allowed determination of weed infestation, field heterogeneity and SPAD (Soil Plant Analysis Development) and NDVI (Normalized Difference Vegetation Index) were calculated. The NDVI data did not correlate well with traditional sampling results.

9. NDICEA model; ORC Arable group, UK
Together with two researchers from ORC the UK group used a computer-based nutrient budgeting model (NDICEA) to assess individual field rotations on seven farms, using farm specific data, to identify where nutrient surpluses and deficiencies occur over the seasons and rotation cycle. In many cases, the model predicted potential loss of organic matter and encouraged the farmers to reflect on their planned rotations and soil cultivation practices. (See article in Bulletin No.123.)

10. Soil assessment methods; Bioland, Germany
The group explored several tools for soil assessment in their workshops and then opted for demonstrating a quick method of assessing soil compaction in the field. A simple and quick test of water infiltration in the soil can be used. It promotes an understanding of the effects of soil compaction and the importance of soil-conserving cultivation. It is easy to understand and impressive for non-scientists and can be used in training events, for example for farm staff.

11. Using spade test with farmers; ITAB, France
The French group carried out a demonstration of the spade test using a French description of the approach.

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