THE ORGANIC RESEARCH CENTRE

ELM FARM

In this issue:

Cover photo

Photo: Benchmarking lamb weights. See article on Flock Health Clubs (p6). Photo: Marion Johnson.

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Organic Research Centre

Bulletin

No. 129 – Autumn 2019

News in brief

Interactive effects of cover crops and weeds in low tillage

A new open access article resulting from the OSCAR (Optimise Subsidiary Crop Application in Rotations) project has been published in Agronomy and is available online:*Interactive Effects of Subsidiary Crops and Weed Pressure in the Transition Period to Non-Inversion Tillage, A Case Study of Six Sites Across Northern and Central Europe*. ORC's Sally Westaway is a co-author. We evaluated if subsidiary crops (e.g. cover crops) can mitigate the effects of non-inversion tillage on weed abundance. The results suggested that cover crops can contribute by controlling weeds but cannot fully compensate for reduced weed control of non-inversion tillage in the transition phase. Using non-inversion tillage together with cover crops is primarily recommended in low weed pressure environments.

Agroforestry benefits natural enemies and pollinators

A new review of agroforestry for pest control and pollination from our PhD student Tom Staton (based at Reading University) has been published: *Evaluating the effects of integrating trees into temperate arable systems on pest control and pollination.*

The review highlights:

- Integrating trees into arable systems significantly enhanced natural enemies of pests
- Arthropod pests were significantly reduced in these silvoarable systems
- Evidence for effects on pollinators is scarcer, but suggests beneficial effects
- Authors propose a framework for future research to explain variation in results.

Agricology Field Days

In Summer 2019 Agricology led three pilot 'Field Days' in conjunction with WWF and Innovative Farmers. The series of on farm events demonstrated agroecology in practice. They were led by farmers and supported by evidence from researchers through discussions and a farm walk. The pilot events focused on key agroecological practices and showcased solutions being implemented in different farming systems that covered a spectrum of farming systems including: Rob Havard, who focused on his Diverse Pastures, Andy Howard on intercropping, no till and cover crops and Joe Rolfe on integrated pest management. The pilot was launched at three regional locations across the UK and attracted over 150 farmers, partner organisations and researchers. Videos from the day can be viewed on the Agricology YouTube Channel.

Benefits of trees for animal health and nutrition

In August a webinar on tree fodder was held at Lynbreck Croft in Scotland with ORC's Lindsay Whistance, Sandra Baer of Lynbreck Croft and Lyn White of Soil Association Scotland, as part of Soil Association Scotland's Mob Grazing Field Lab. https://youtu.be/OxzwAuZimbg

Photo: OF&G

Sophie Alexander, chair of Organic Arable, presents a cheque to ORC's Ambrogio Costanzo at NOCC19

NOCC19 – Bred for Organic

Report, photos and presentations from National Organic Combinable Crops, OF&G's annual farming conference, held at York Grounds in East Yorkshire are online https://ofgorganic.org/news/bred-for-organic

World Congress on Agroforestry 2019 abstracts

Abstracts, videos, photos, cartoons and more, including a poster tribute to Martin Wolfe are now online. https://agroforestry2019.cirad.fr/replay

Diversification cluster web page launched

Six Horizon 2020 projects are working together in the crop diversification cluster. Projects within the cluster, including two that ORC are involved with – Diverimpacts and Diversify – are collaborating to increase the impact of crop diversification research and encourage sustained uptake of diversification measures by farmers in Europe through innovations across the agri-value chain. The other projects involved are Diverfarming, Legvalue, True and reMIX. www.cropdiversification.eu

Organic World Congress 2020 – call for contributions

Every three years, the organic sector assembles to host the Organic World Congress (OWC), the world's largest organic gathering. In 2020, the 20th OWC will be held from 21-27 September in Rennes, France. Drawing from the motto, 'From its Roots, Organic Inspires Life' OWC 2020 aims to provide organic and likeminded stakeholders working toward sustainable agriculture, value chains, and consumption with an opportunity to exchange their knowledge, innovations, and experiences. The congress offers momentum and inspiration to all who take part and is seen as a leading event for the global organic sector.

All contributions must be submitted via the online platform by October 21 2019. https://owc.ifoam.bio/

For more details on items on this page, including links to the publications, visit the News link at www.organicresearchcentre.com or, to receive more frequent updates, register for our E-bulletin service and follow us on Facebook, Twitter and Flickr.

About us

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The Organic Research Centre is a leading, independent, research charity working for better farming, food and health, promoting environmental sustainability, quality food and health and wellbeing for all. We work in the UK and internationally to: research and develop practical, sustainable land management and food production systems based on organic and agro-ecological principles; foster knowledge exchange with and between current and future producers, food businesses and related professionals; and influence policy and public debates on the future of food and farming based on sound evidence.

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Editorial: Will Brexit see GM safeguards dead in the ditch?

With a new Prime Minister and a 'die in the ditch' Brexit looming there are real concerns for the UK farming sector and organic in particular. A recent study has suggested a no deal Brexit would put more than half of UK farms out of business due to tariffs and the end of Basic Payment by 2022. The other area of concern for the organic sector in particular is the enthusiasm for GM by our new Prime Minister, who on day one of his premiership stated: "Let's liberate the UK's extraordinary bioscience sector from anti-genetic modification rules. Let's develop the blight-resistant crops that will feed the world". What would such an approach mean for organic farmers, farming and food in the UK?

Organic farming bodies both nationally and internationally have long stated that there is no place for GM in organic food and farming. Regardless of Brexit the UK organic sector's stance would not change. The EU Withdrawal Act 2018 states that the relevant EU regulations will be transferred into UK law, giving some responsibilities currently held by EU institutions to the UK and some to the devolved nations which have so far pursued policies sceptical of GM. With Johnson's enthusiasm we can anticipate early moves to water down GM regulations in England and perhaps across the whole UK.

Currently the EU regulations on GM in food and farming are regarded by some potential partners as a non-tariff barrier to trade. There is a risk that any post-Brexit trade deal could become a race to the bottom, lowering food standards and removing the requirement to label GM food for human consumption.

Weakened GM regulations anywhere in the UK could have major impacts on organic farming. Depending on which GM crops are approved and/or grown, risks include contamination of seed or feed stocks, cross-pollination of crops and contamination of land. In the 2000's Defra consulted on a number of issues including separation distances between GM and non-GM crops; who would be responsible and take liability for any contamination; and what 'contamination' actually means, including what level of GM presence constitutes contamination. The project was quietly shelved without any progress on what turned out to be a fiendishly difficult and politically sensitive subject. Now, we could be facing these challenges for real, even though there is no public desire or need for GM. The Food Standards Agency (FSA)'s Biannual Public Attitudes Tracker consistently shows that concern over GM has not diminished. A separate poll by Bright Blue found in April 2017 that even 63% of Conservative voters support a ban on GM crops.

Labelling of products containing GMOs is also a major issue, and one over which the EU (and currently the UK) and the US differ. Labelling is heavily supported, with a GfK NOP poll finding that 89% of people in the UK wanted GM products to be clearly labelled and 72% were willing to pay extra for non-GM food. US consumers, meanwhile, are still largely in the dark and the unlabelled inclusion of GM soya, maize (particularly as high fructose corn syrup) and oil seed rape (known as canola in the US) is almost universal in non-organic processed foods. Any deal to sell UK products into the EU would need to abide by the EU's GM regulations but a trade deal with the US could create pressure in the opposite direction. Iconic products like Kellogg's cornflakes are sold in a GM version across the US but made without GM ingredients for the EU market. Without GM labels the US recipe could quickly flood the UK market and consumers would lose their right to make informed choices.

To prevent potentially irreversible damage to the UK organic sector as well as our communities and ecosystems we need a robust and transparent process for authorising the use of GMOs. This process must prevent the release of any genetically engineered material into the environment without a rigorous and independent, case by case risk assessment. It must also recognise the validity of social, economic and ethical impacts of the use of GM in food and farming.

To protect farmers' right to choose, and our devolved nations' right to determine their own farming policy, we need effective measures to prevent contamination of non-GM crops, food and feed with GM material of any kind. This includes operating an effective 'polluter pays' liability regime that will ensure fair compensation for UK farmers, growers and any other business impacted by contamination with GM material of any kind.

To protect consumers' right to make informed choices we must retain our GM labels and extend them to cover products from GM-fed animals.

Bruce Pearce (ORC) & Liz O'Neill (GM Freeze)

An agroforestry journey in two workshops and a handbook

With interest growing amongst farmers and land managers in planting trees, an important part of the design process is considering the long-term maintenance and management of these more complex systems. This summer the ORC agroforestry team hosted two workshops on agroforestry farms as the final in a series of events guiding farmers and others through the process of designing and establishing agroforestry systems. The theme of these last two workshops was the long-term management and maintenance of these systems, with the aim of sharing experiences, good and bad, between those already on the agroforestry journey and those just starting out. ***Jo Smith*** *and* ***Sally Westaway*** *report.*

The Claydon Estate: Silvopastoral agroforestry

Grazing cattle at Claydon Estate

The beautiful parkland of the National Trust Claydon Estate in Buckinghamshire was the backdrop to the first workshop. Focusing on silvopastoral systems (integrating trees and livestock), the group heard first about the mature Loughgall sheep and ash agroforestry site in Northern Ireland, where work by the pioneering agroforestry researcher Prof Jim McAdam has shown that integrating trees into pasture extended the grazing season by 17 weeks due to lower soil moisture in the agroforestry during the spring and autumn. Farmers Stephen Briggs and Richard Gantlett shared their experiences of integrating trees into their organic farms (videos of these presentations are available on the Agricology YouTube channel: https://tinyurl.com/Agricology-CE)

The group then visited the mature ash silvopasture system on the Estate farm. The tour was led by Prof Steve Newman, who was instrumental in the establishment of the trial and has been conducting research on the trial over the last 30 years. The trial was planted in 1987 and consists of two blocks of 100 ash (*Fraxinus excelsior*) trees planted at two different spacings, one block at 400 trees per hectare and one block at 100 trees per hectare. The area is currently rotationally grazed by cattle but was originally grazed by sheep.

Prof Steve Newman

We were able to see that the lower density planting still had a productive and healthy sward growing underneath it and the grazier was still paying market rates for the use of this area. Steve explained how the timing of the tree leaves appearing and a full canopy developing was key to allowing the pasture growth in spring, with 60% of the sward productivity occurring when the ash had no leaves. The understorey of higher density planting was dominated by unpalatable species (nettle and thistles). Steve explained that in the higher density planting, his research had shown that pasture production had largely stopped by year 10, but the area was however still being used by the cattle for shade in summer and shelter in winter (hence the nettles and thistles, reflecting the higher nutrient loading!). There was some discussion in the field about how the trees were protected from browsing damage; Steve had replaced the initial rabbit guards, which were ineffective at protecting the trees from sheep, with wire mesh guards, then after five years he removed them and used an abrasive paint to coat the tree stems. This paint showed good results, discouraging animals from browsing the trees or chewing the bark.

Steve emphasised the importance of deciding on the product that you want when you are deciding what tree species to plant and growing the product not the tree. We also talked about the importance of planting trees grown from good genetic material, as many of the ash trees in the trial had relatively poor growth and form and were examples of trees grown from poor seeds.

The Gibside Estate: Silvoarable/ silvohorticulture

From Buckinghamshire we headed to the far north-east for the final workshop in August. Another beautiful National Trust Estate, Gibside, just outside Gateshead, was the location for this workshop focusing on maintenance and management of silvoarable and silvohorticultural systems.

Trying to find some shelter in the new shelterbelt at Gibside!

After the initial welcome and introduction, the group visited the Gibside Community Farm (GCF), perched at the top of the hill on the edge of the Gibside National Trust Estate. The Community Farm is a Community Supported Agriculture Scheme which aims to produce healthy organically grown produce for members and for sale locally. The lease of the field from the landowner the National Trust was finalised in 2017. The 5.8ha site is very windy, has 750mm annual rainfall spread evenly across the year and stands at 150m elevation. The design of the field and tree plantings was a collaborative effort with GCF members and led to an opportunity for inter-plot agroforestry rows (as an alley cropping design) and an area for a productive shelterbelt. Tree planting started in 2016 on a diverse apple orchard, followed by the shelterbelt and agroforestry rows in winter 2017. There is a seven-year rotation within the crop alleys, and the tree rows contain hazels (to cut for poles), basketry willow, and two rows of fruit and nut trees with alder for nitrogen fixing. Two rows of biomass willow (*Salix viminalis*) failed to establish in spring 2018, likely due to the lack of irrigation during a very hot summer; the group haven't yet decided what species they will use to replace these trees. The fruit and nut tree rows consist of a windward row of 'tougher' species including apples, cobnut, damson, greengage, with rhubarb planted under the trees. The leeward tree row has more delicate species including pears and plums. The shelterbelt will eventually shelter the field from the prevailing south-westerly winds, with a secondary purpose of food production. Five tree rows wide on 2.5m spacing, it has been planted with more resilient bushes on the windward side, two rows of smaller, fast growing trees and then two rows of full height trees.

Rhubarb in the tree rows

The Agroforestry Innovation Networks project

These workshops are part of the three-year EU-funded AgroForestry Innovation NETworks (AFINET) project. Since 2017, ORC has been working with partners across nine countries to get farmers and other practitioners together. The aim has been to work together to bridge the knowledge gaps and overcome perceived obstacles to agroforestry for the benefit of their farming businesses and the environment. Here in the UK we have held 11 workshops hosted on agroforestry farms across England and Scotland attended by just over 300 people, of whom on average half have been farmers or growers. In addition to these workshops, the project has produced a wide range of user-friendly outputs including focused technical factsheets, innovation tutorial videos and a searchable knowledge hub. Check out the website for more details: http://www.eurafagroforestry.eu/afinet

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727872

The Agroforestry Handbook

August saw the release of ***The Agroforestry Handbook: Agroforestry for the UK***, the first of its kind for the UK. It brings together the theory of agroforestry and practical management and design considerations into a neat, accessible and attractive publication that can be downloaded for free. The aim of the handbook is to help farmers and advisors assess the potential of agroforestry for their farm or clients and understand the possible benefits to the wider environment (e.g. carbon sequestration, reduced flooding risk). With its final chapter focusing on the economic case for agroforestry, with information on markets and pricing, this timely publication is invaluable for those starting on their agroforestry journey. The authors are leading researchers and practitioners with decades of experience in agroforestry from the UK and around the world and include ORC researchers, Jo Smith, Sally Westaway, and Lindsay Whistance. Edited by Ben Raskin and Simone Osborn from the Soil Association, and funded by the John Ellerman Foundation, a pdf of the Handbook can be downloaded from the Soil Association website: https://tinyurl.com/Agroforestry-Hbook

Flock Health Clubs – have they been a successful initiative?

Flock Health Clubs (FHCs) are a new initiative started by Flock Health Ltd., in an effort to improve communication and relationships between sheep farmers and veterinarians and to offer sheep farmers access to cost effective veterinary services. Over the past three years FHCs have been initiated in practices by interested vets. Anecdotally they appear to be successful, but there has been no consultation with vets or farmers to confirm this. The Innovation for Sustainable Sheep and Goat Production in Europe (iSAGE) project gave ***Marion Johnson*** *and* ***Lisa Arguile*** *(ORC),* ***Nicola Noble*** *(ORC/National Sheep Association) and* ***Wendy Jones*** *(National Sheep Association) the opportunity to interview participating vets and farmers as to their experiences.*

Six years ago, a study[1] revealed that two thirds of sheep farmers only contacted their vet in an emergency. Farmers felt that amongst vets there was a lack of interest and expertise in sheep and an inconsistent service. Many vets had no idea of the economics underpinning sheep production. An independent survey of 2,500 sheep producers[2] had found that 67% of farmers only used their veterinarians in an emergency to treat sick sheep and only 20% had regular contact. Between 2008 and 2013 little had changed to alter the notion that veterinary help was a last resort.

The aim of the Flock Health Club (FHC) is to promote farmer interaction with a sheep-focused vet resulting in increased sheep expertise (both vet and farmer) and better relationships between farmers and their vets. Through member evenings and discussions information is available to farmers which will increase their awareness of best health practices, generate insights for improvements in their systems and provide opportunities for benchmarking both from a production and a financial perspective.

In return for a monthly subscription paid to their practice, farmers receive access to regular discussion groups and meetings with other FHC members. Some practices offer additional benefits for those who subscribe to the FHC membership such as free visits, free faecal egg counts (FEC) and discounts on services ranging from fertility testing to postmortems. All FHCs run lambing sessions in an effort to improve lamb survival.

Veterinary opinions of Flock Health Clubs

Fifteen vets who have run FHCs at their practices for over a year were interviewed. All were universally positive. FHC farmer members were regarded as forward thinking and innovative, actively looking for advice and generally in the top 5-10% of farmers in the area.

Every vet practice felt that they had a good relationship with FHC members, often better than with general sheep clients. There was more communication, as FHC members were more likely to call them than the average sheep client and actively seek advice. They were engaged, spent more time talking and were keen to improve their flocks.

Several vets felt that as general sheep clients realised there was an interest in sheep in the practice, backed by robust knowledge and a desire to get to the bottom of health issues, they engaged more as well. One vet commented that their confidence in treating sheep had increased with their involvement in FHC and this spilled over into their interactions with sheep farming clients. FHC members had an improved sheep health knowledge and were more aware of the impacts of health issues such as lameness or parasites on their farms.

Several clubs were careful when they held meetings to schedule them to fit the farmers' calendars and one noted that if there was an external speaker or a practical demonstration attendance was higher. Ten clubs had a meeting attendance rate of over 75%, with six achieving 100%. A wide range of topics are covered in meetings, often reflecting the seasonal challenges or a local health issue. Farmers in most practices were consulted as to topics of interest to them and venues on farm. The majority of practices identified that the provision of some sort of meal contributed to the success and congeniality of their FHC.

All agreed that smaller numbers encouraged interaction and farmers got to know each other. One vet felt that if the numbers increased the farmers wouldn't get the attention they deserved. Several groups recognised that the farmers that attended were of high calibre and they tried to discourage individuals who were opinionated, knew it all and didn't interact well with a group.

When vets were asked if they had seen changes in their members' flocks since joining FHC all agreed that they had; the most common changes cited were in parasite management, lameness and reduced lamb losses. Two vets commented that the members of their FHC were in the top end of farmers in their area and thus they had not seen much in the way of change as their management was good already.

The main negative aspect of running an FHC was the time it took up in preparation and facilitation. A number of vets expressed a feeling of running out of topics and being out of their comfort zone if exploring other topics. It was acknowledged that information could be shared but the presenting vet still had to become familiar with the topic and format of someone else's work.

One practice felt that vets weren't natural facilitators and needed to learn, another expressed a degree of frustration that they perceived a message from an external speaker was always received better by farmers, even though the vet had given the same information. Keeping meetings small and congenial was important as the frustrations caused by 'time wasters' and 'difficult clients' were then reduced.

Vets also pointed out that FHCs motivated them to attend

other sheep courses and professional groups to keep their knowledge up to date.

No vet felt that there was a disadvantage to running a FHC.

Farmer opinions of Flock Health Clubs

Farmers who participated in this survey represented a diverse selection of farmers, from those with 10 breeding ewes to those with 3600 breeding ewes, on acreages ranging from 20 to 1500 acres and more. FHCs are open to all and the range of farmers from small holders and pedigree breeders through to large commercial operations suggests that the opportunity is being widely taken up.

Most of the farmers surveyed felt that FHC membership fees provide value for money. The participating vet practice governs the fee structure; therefore, fees may vary between areas and practices. A number of respondents highlighted that the additional benefits, such as reduced fees for parasite management and a number of free visits, provided by practices to FHC members were an attraction. The range of incentives and benefits varied with club/practice and were thus not universal. Some farmers indicated they wanted more benefits with their membership, but they may have belonged to a less generous practice.

Farmers recognised and acknowledged the opportunity to update thinking, develop and exchange ideas and knowledge with other likeminded farmers and vets at FHC meetings. Financial benefits mentioned included discounted medications and free FEC tests that in turn reduced reliance on anthelmintics and associated costs. FHC meetings also provided the opportunity for farmers to mix socially with like-minded farmers. Many farmers highlighted that the main advantage associated with their FHC membership was the ability to develop and exchange knowledge between other farmers and their club vet, their relationship with whom had improved. There was a clear appetite for more meetings, the ability to hear talks, consider benchmarking and visit more farms.

Consideration of dates and timings when setting meetings was identified as a potential improvement that could be made to planning FHCs, as was customising meetings for large and small farms and flexibility of venues. Farmers commented that they really enjoyed opportunities to discuss flock issues together and wanted more opportunities to do so.

Echoing the comments of vets, farmers felt that FHC membership had improved their knowledge of sheep issues, indicating positive changes had occurred within their management practices, and many members also indicated that they had seen noticeable positive changes in their flock since becoming a member. Documenting changes at this stage can be difficult as personal knowledge can change quickly but management and flock improvements may take time to activate and implement.

It is clear that a large proportion of participants felt they were benefiting from the scheme.

Again mirroring vet comments, the majority of farmers felt that being part of a FHC had improved their relationship with the club vet. This has come about as a result of increased farmer-vet interactions, and the vets' own interest in sheep. One of the goals of the founders of FHCs was to increase the number of vets who had specialist sheep knowledge, a vision that coincides with farmer feedback highlighting a preference for engaging with a vet who is interested in sheep. Farmers agreed the likelihood of them calling a vet had increased, irrespective of the health issue, and as farmers took a more proactive role in health management – turning to preventative measures rather than emergency management of an issue when it arises.

No farmer felt there was a disadvantage to FHC membership.

Ancillary environmental benefits arise from the more considered use of anthelmintics and antibiotics contributing to the long-term sustainability of medications available to the industry. Further benefits accrue from changes in grazing and feeding practices, farmers being more aware of alternatives to their current management practices, and the opportunities and help available for instituting changes. Simple considerations such as changing to a breed more suited to the locale or careful use of external inputs such as concentrates and minerals, should all contribute in both the short and long term to economic sustainability.

Conclusions

FHCs provide an opportunity for farmers to update themselves on changing practices and new techniques within the sheep sector. Involvement in running an FHC also encourages the vet to update themselves on the latest research/knowledge that impacts sheep production and to pass this information on to farmers.

FHCs have been shown to be an important means of widening farmers' knowledge both from delivery of a given topic and discussion with like-minded farmers. Improvements in animal health, nutrition, awareness of housing and reduction of disease will all contribute to animal welfare through improvements in flock management and ultimately flock status.

Veterinary surgeons are more involved with sheep clients and farmers are receiving a better more knowledgeable service.

Are FHCs a success – vets and farmers agree – absolutely!

The study was supported by Fiona Lovatt of Flock Health Ltd and Jasmeet Kaler of the School of Veterinary Medicine and Science, Ruminant Population Health at Nottingham University. Drs Kaler and Lovatt contributed to the design of the questionnaires for vets and farmers. The surveys and interviews were conducted by Nicola Noble, ORC/NSA. The analysis of the study was completed by the iSAGE team at ORC and NSA.

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iSAGE has received funding from the European Union's Horizon 2020 research and innovation programme (grant agreement 679302). More at www.isage.eu.

Plant teams in the field – Intercropping in practice in the UK and Sweden

*Intercropping has been shown to be beneficial for pest, disease and weed management, preventing lodging in cereals, improving water quality, soil fertility and biodiversity as well as increasing resilience to climatic and agronomic shocks. Much of the innovation is happening in farmers' fields and on-farm trials are an important step to enhance understanding of the benefits and challenges of working with different plant teams in a variety of contexts. ORC's Knowledge Exchange Officer **Katie Bliss** shares insights from farmer and researcher experiments of different intercrops in the UK and Sweden.*

Factors to consider

When deciding on a plant team combination it is important to consider the key objectives and the traits of the intercrop components to find a mixture that fits your needs. For example, which crop is the priority, what is the end-use? Is there a production challenge that you are aiming to address such as weed or pest pressure? Alongside this, it is important to determine the best seed rates and ratios, taking into account the competitiveness of the different crop species in the intercrop, and how varietal choice could be maximised e.g. to optimise maturation dates.

Intercropping in practice

Much of the innovation in this area is happening in farmers' fields. In the UK we are working with a group of farmers sharing experiences of different plant teams online and in the field as part of the DIVERSify project and the Innovative Farmers 'Intercropping in Arable Systems' field lab. The main mixtures can be grouped as cereal/legume mixtures and oilseeds plus companions. In 2017/18 four farmers trialled plant teams on their farms, as part of the DIVERSify project, including Carlin peas and spring triticale, wheat and beans on two different organic farms, and spring oil seed rape and beans.

This year two of the farmers continued formal trials with ORC via Innovative Farmers; one continued to work with wheat and beans whilst another trialled linseed and oats. Here we share some insights into some of the plant teams tested over the last couple of years and key findings from these trials.

Winter wheat and beans at Roundhill Farm, Wilts

Motivation: *Weed control (particularly wild oats) and increase protein of a mixed livestock feed*

With a heavy wild oat problem, James Hares hoped that intercropping beans with wheat would allow the wheat to take the niche of the wild oats and outcompete them in his organic system. in 2017 James established two 1ha strips – one an intercrop of beans (Tundra at 175kg/ha) and wheat (Mulika at 125kg/ha) and one of monoculture beans. Both strips were drilled with a Weaving Sabre Tine drill, the intercrop in two passes. James observed a huge difference in the size of the weeds in the monoculture vs the intercrop and quadrat cuts showed that there was an average of 74% less dry matter weed biomass in the intercrop than the monoculture! The vast majority of these weeds were wild oats.

Although the bean yields were low due to the weed pressure in both fields, there was a slightly higher bean yield in the monoculture (0.59t/ha) than in the intercrop (0.48t/ha beans; 1.43t/ha wheat) suggesting that the wheat may be competing with the beans. As such James lowered the wheat seed rates for the 2018/19 season. Nevertheless, the combined yield of the intercrop was higher than the monocrop and as the intercrop was harvested and used as a mixed feed for his own livestock, James felt that the lower bean yield was compensated by the weed suppression benefits and additional feed value of the wheat.

James noticed that the wild oats in the intercrop (left) had much less biomass than those in monoculture

Based on this success James repeated the trials in 2019 (with a much smaller area of monoculture). He lowered the wheat seed rate to 100kg/ha and increased the beans to 200kg/ha in both the intercrop and monoculture. The weed biomass results replicated the previous year, with 73% less dry weed biomass in intercrop v monocrop (again mainly wild oat although more black grass, charlock and poppies than in the previous year). Unfortunately, the weed burden in the monoculture was so high that they had to mow the crop before the wild oats could go to seed and it was not taken to harvest.

Carlin peas and triticale at Green Acres Farm, Shrops

Motivation: *Scaffolding for the peas crop and ease of harvest*

As reported in the Summer 2018 Bulletin (No. 125), Mark Lea is growing Carlin peas for Hodmedod's 'British grains and pulses' but finds them a challenge at harvest due to their high propensity to lodge. In 2017/18 he trialled pairing the Carlin peas with different seed rates of triticale to determine which level provided optimal support for the crop. The highest yield of peas was at the 20% seed rate (2.29t/ha) but all of the intercropped strips had a higher pea yield than the monoculture peas (which yielded 1.91t/ha). However, the

Comparison between 20% triticale (2.29t/ha) (left) and 30% triticale (2.34t/ha) intercropped with Carlin peas (right)

highest triticale rate of 30% was Mark's favourite when it came to harvest as the standing ability of the crop was much improved and it was 'much more pleasant to combine.'

In 2018/19, Mark split his field to try an increased triticale rate of 40% in comparison to the 20% rate. He reports a very challenging year for organic pea production due to the high weed burden but that the intercropping did aid in weed competition as well as providing a good level of scaffolding as per the year before. However he felt that the 40% triticale rate was providing more competition than he would like with the peas.

Intercropping in Sweden

Alongside DIVERSify and Innovative Farmers, another Horizon 2020 funded project – DiverIMPACTS – is facilitating a growing network to share experiences of crop diversification from across Europe. This includes many different case studies such as diversifying rotations and intercropping, and their integration across value chains. Hodmedod's (UK) and Nordisk Ravara (Sweden) are businesses supporting farmers to diversify their rotations and produce locally grown pulses – including lentils, peas and beans. These crops can be challenging to produce but have clear benefits for the rotation. Challenges include suffering from lodging (and consequent impact on harvestability and quality) as well as weeds, pests and diseases. Many farmers are exploring the potential for intercrops to address some of these issues, and the businesses buying their products are keen to support them in finding solutions. In June a group of farmers, Hodmedod's staff and researchers travelled to Sweden to visit farmers innovating with intercropping and share experiences. Here is an insight into what we saw and learnt:

Lentils and oats at Fagraslätt Farm, Sweden

Motivation: *Oats to provide scaffolding to lentils and aid weed suppression*

Lentils have been traditionally grown in some parts of Sweden and are on the increase again. Lentils are low growing and lodge easily, in the gravel soils of southern Sweden this can mean harvesting small stones which are difficult to clean out. They are also sensitive to weed competition, particularly if there is poor/delayed establishment. In response to this many of the farmers we visited are intercropping with oats – to hold the lentils off the floor, whilst also suppressing weeds.

Red lentil and pea trials at Per Modig's farm. A spiral separator forms part of Per's seed cleaning and separation business.

Per Modig had selected oats with red lentils and green puy lentils as a plant team as he found them easier to separate than other cereals. He has drilled lentils (90kg/ha) with oats (40kg/ha) and compared weed biomass and crop yield to a monoculture strip. Although the oats can increase the moisture content of the lentils, Per felt this was outweighed by benefits for scaffolding and weed suppression. His expected harvest was around 1-1.5t/ha of lentils and about the same for the oats. His on-farm separation set up, which also served other farmers in the Nordisk Ravara network, included a series of cleaners including a spiral separator which was particularly effective at separating similar sized seeds.

Per Modig's trials are part of a trial at the Swedish Agricultural University, Alnarp comparing different varieties of the traditional puy lentil intercropped with oats, and the effect of an additional harrowing. They were drilled with lentils at 100% Relative Density (RD) and oats 20% RD.

Peas and oats at SLU Alnarp, Sweden

Motivation: *To increase resilience to in-field heterogeneity and climatic shocks*

We visited another trial, part of another Horizon 2020 research project – Remix. Raj Chongtham is looking at the impact of intercropping oats and peas to help manage in field heterogeneity and resilience to stresses – including drought and flooding, and nutrient availability.

Peas and oats were a common mixture grown by the group in Sweden. The UK farmers were concerned about how to separate a crop of peas and oats as split peas can difficult to clean but the Swedish farmers explained that they used screens with long slots for oats as well as a spiral separator and have not found it to be a problem.

Joel Månsson in camelina and lentils trial.

A similar mixture of camelina and lentils was being trialled by Joel Månsson and Emma Sandberg at Norra Knästorpsvägen. They found camelina to be great for supressing weeds and also forced the lentils to senesce a little earlier.

In summary...

These examples are just a brief snapshot of a huge amount of innovation happening in the field, but demonstrate some of the potential benefits of intercropping for weed suppression, scaffolding and pest control. In some cases, one of the crops has failed for various reasons – but the intercrop has provided insurance to ensure at least one crop has been brought to harvest! The effectiveness of different plant teams seems to vary significantly from farm to farm and from year to year, so the best way to learn what can work for you is to try on a small area of your own farm. In selecting your plant team, be clear about what your objectives are, what the intended use is and which crop is your priority.

For more information contact katie.bliss@agricology.co.uk
More results will be shared on the Innovative Farmers and Agricology websites

DIVERSify and DiverIMPACTS have received funding from the European Union's Horizon 2020 research and innovation programme under agreement No. 727284 & 727482

Farming for health: turning aspiration into reality

Suddenly talk of 'health and harmony' in farming and food is everywhere but what does it mean? Very few producers farm and grow for health. Do we even know how to do it? Founder and former Director of ORC ***Lawrence Woodward*** *is part of a new initiative called Whole Health Agriculture which seeks to build on organic principles and practice to 'make health infectious'.*

Lawrence Woodward launches Whole Health Agriculture at UK Organic Congress, November 2018

We are facing a worldwide health crisis – in our natural resources, in our ecosystems, in crops, animals and humans. Dis-ease (I use that term deliberately) is rife in all of these areas; and it will overwhelm us if we continue our folly of failing to recognise that the health of all of them is not just inextricably linked but is one and the same.

Organic farming came about as a direct response to that threat. It is the only farming and growing system consciously built on a concept of health. Whatever the merits of such things as agro-ecology, 'agricology', precision farming, low-input farming, regenerative farming, pasture-fed farming or any of the other buzzword farming approaches, they are not conceptually or systemically built around health in the way that organic farming is.

The idea of 'the living soil' and Lady Eve Balfour's memorable phrase "that health – whether of soil, plant, animal and man – is one and indivisible" highlights the philosophy and concept of health which is the fundamental basis of organic farming and food. But the reality is that few farmers and growers actually farm for health as a priority output. There is an assumption that if we don't do some things and do others then 'health' will happen. It's a sort of comfort blanket rather than a management strategy. In fact, we don't really know how to manage the dynamic of positive health. We are not clear about how it works, how it's transmitted, how and why some farms and holdings ooze health so much it smacks you in the face and others don't – even when they seem to be doing the right things.

The goal of Whole Health Agriculture (WHAg) – which was launched at the Organic Congress in 2018 – is to explore and develop these concepts and their practical application: and to tell the story of positive health management and the need for it.

WHAg is looking for people – farmers, nutritionists, medical professionals, consumers, in fact citizens of all types – to join us in this investigation, this development and in spreading this message.

From organic farming to whole health agriculture

I started in organic farming in 1975 in a direct response to the oil crisis of those years. The question of "How do we feed ourselves when oil runs out?" soon became "How can we feed ourselves and maintain a civilised society in a world of finite and diminishing resources?" These questions were the driver behind the formation and work of Elm Farm – the Organic Research Centre – for the 30 plus years I was involved there.

But over that time I became increasingly obsessed by health questions: what makes a 'healthy' farm? What qualities does it have? How are these passed on in its food and environment to people and animals?

Of course, from experience and R&D we do know some things: we know the characteristics of well functioning and long lasting organic systems, which the United States Department of Agriculture described in 1981 as:

"Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilisers, pesticides, growth regulators and livestock feed additives. To the maximum extent feasible, organic systems rely on crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients and to control insects, weeds and other pests.

"The concept of the soil as a living system….that develops….. the activities of beneficial organisms… is central to this definition"

Here we can see what organic farmers do not do, what positive things they do instead and the context in which they work; i.e. the living soil.

This context was further expanded by IFOAM in its organic principle of ecology which "roots organic agriculture within living ecological systems. It states that production is to be based on ecological processes, and recycling. Nourishment and well-being are achieved through the ecology of the specific production environment. For example, in the case of crops this is the living soil; for animals it is the farm ecosystem; for fish and marine organisms, the aquatic environment."

I am convinced that much of the variability in the quality and success of organic production and in the quality of organic food is due to the degree to which farmers and growers follow and put into practice these precepts and characteristics. But I am equally convinced that how they are followed and practised – the nature and nuance of their management – is the critical factor. Furthermore, it seems to me to be likely that 'communication' or 'transmission' factors which make the whole greater than the 'sum of the parts' is determined by the quality of that management. I postulate that it is this which is critical in achieving a consistent and long term dynamic of health and wellbeing. It's why some farms ooze health and others don't.

WHAg believes that understanding this and making positive health management a central part of organic production is vitally important. We are hoping others will agree and will join us in making it happen.

https://wholehealthag.org/

This article first appeared in The Organic Grower, Autumn 2019. Re-printed with kind permission of the OGA.

The National Food Strategy and the English Organic Forum

The National Food Strategy (NFS) shows great ambition for sustainable food and farming. The Strategy, being developed by Defra under the leadership of Henry Dimbleby, will respond to the need for a 'resilient, sustainable and humane agriculture' and a food and farming system that 'restores and enhances the natural environment for the next generation in this country.' ***Christopher Stopes****, OF&G Policy Advisor and Chair of the English Organic Forum, explains.*

Launched earlier this year, the terms of reference for the NFS[1] outline that it is intended to be an overarching strategy for government, designed to ensure that our food system:

- delivers safe, healthy, affordable food; regardless of where people live or how much they earn
- is robust in the face of future shocks
- restores and enhances the natural environment for the next generation in this country
- is built upon a resilient, sustainable and humane agriculture sector
- is a thriving contributor to our urban and rural economies, delivering well paid jobs and supporting innovative producers and manufacturers across the country
- delivers all this in an efficient and cost-effective way.

This new strategy will be based on an independent review of England's food and farming because, as the then Secretary of State Michael Gove concluded, "No part of our economy matters more than food". The NFS is a milestone: it takes the first bold steps towards a much needed joined-up approach to building a resilient food and farming sector, which, like organic's founding principles, has health – of soils, plants, animals, people, food and planet – at its heart. There is a commitment to work across government departments, breaking down the silos that have resulted in our collective failure to ensure our food system has the characteristics listed above.

In the launch of the call for evidence[2] the NFS team are "looking for ideas big and small. From government policies to simple practical things that make a difference in your community or your business. These might be things that are already working well, here or abroad, and that could be scaled up or used differently. Or they might be new ideas: things that haven't been tried yet at scale, but which you think have the potential to improve the system."

Their search is "for innovations you have seen work in your home, your neighbourhood, or your business, in this country or beyond: ideas that help citizens make informed decisions about the food they eat, or which increase access to and affordability of high-quality food; ideas that make food production more environmentally sustainable, creating a flourishing countryside rich in wildlife; ideas that help farming, fishing and food businesses and communities thrive, benefitting employees and the wider community; or that promote the highest standards of animal health and welfare; or that could put England at the forefront of innovation and reshape our food system in the coming years."

Let's give the NFS team a loud and clear response to the call for evidence and demonstrate that organic food and farming is well-placed to meet these aspirations. Indeed, they are shared by organic farmers, growers and food businesses in England, the UK, Europe and around the world.

Organic farming and growing delivers multiple public goods and benefits, simultaneously. These mirror citizens' concerns – climate change, animal welfare, protection of biodiversity, soils and the whole environment. Furthermore, organic has a robust and legally binding built-in system to demonstrate traceability and provenance as it is built on a certified, system-based approach to food production.

With almost half a million hectares under organic land management and over 3,500 certified organic producers, organic is a success story. But the success here is a mere shadow of what is being achieved in other countries in Europe; these can be the inspiration to frame the NFS and encourage the agricultural policy now being developed in England.

Organic is an important part of a future-orientated approach to food production. Substantial quantities of fertilisers and pesticides are not spread on organic land; livestock are not produced in intensive systems. Non-organic farming has contributed to the transformation of farming systems resulting in biodiversity loss, pollution and climate change.

In the UK, over one quarter of the population buy organic food and drink, and organic is even more important for younger millennial consumers and in households with young children (under 11 years old) – they are the future consumers!

The English Organic Forum (the organic sector wide representative body) shares the NFS vision and is calling on the NFSand the Government to back a target of 10% of land under organic management. The Organic Action Plan, drafted by the EOF, sets out the specific policy, citizen engagement, and development priorities needed to achieve this target. At this level, organic will offer a meaningful contribution to the urgent changes required in the way we produce our food.

The EOF looks forward to working with Henry Dimbleby to help deliver a National Food Strategy that makes the most of the organic opportunity, based on the evidence of success and drawing on the inspiring examples of leadership shown in other countries in Europe. As the former Secretary of State said: "We have a once in a generation opportunity" to reset the compass for future generations and help deliver the nutritious and high quality food our citizens deserve.

Further information

1. Defra (2019) Developing a national food strategy: independent review 2019 – terms of reference https://tinyurl.com/NFS-terms
2. National Food Strategy Call for Evidence. https://www.nationalfoodstrategy.org/callforevidence/ The Call for Evidence is open until the 25th October 2019

comment@organicresearchcentre.com

Better wheat varieties and the quest for an organic ideotype

*A group of organic farmers is looking to find alternatives to the varietal status quo that are neither bred for, nor generally tested under, organic husbandry. By setting up their own variety trials, testing a wider range of genetics and getting a better understanding of the crop traits useful for them on their farms, they hope to learn much more about the wheat they grow. ORC Crops Researcher **Dominic Amos** presents results from the ongoing work as part of an Innovative Farmers (IF) field lab.*

Varietal choice is one of the main influences an organic farmer has during an arable cropping cycle, yet there has, to this point, been no UK breeding programme addressing the needs of the organic arable sector. So, most organic farmers rely on conventional varieties bred for high inputs, with the twin goals of yield and disease resistance prized above all else. This approach makes sense for the environments these crops will generally be grown in but for the typical organic arable farmer, who may find weeds and soil fertility, or at least nitrogen availability, the biggest challenges, the varieties on offer may not be fit for purpose. The question is, are there better varieties out there, waiting to be discovered?

Plot trials and field-scale on-farm trials

The plot trial takes place at Bradwell Grove near Burford, on shallow, typical Cotswold brash land. Farmers are also growing selected varieties at a field-scale to help improve the overall relevance by providing data from their own farms. This approach gives the farmers the opportunity to look for alternatives to their current farm varieties, with the plot trials used to provide a broad comparison, and more general indications of performance and traits, while the on-farm field-scale trials help provide more focus and real world commercial performance. One farm taking part is looking for an alternative to the group 1 wheats they already grow, while on another they are comparing high yielding hard group 4 wheats to their usual milling wheats.

Traits

Typical agronomic data such as height, disease resistance and ear number were collected from the plots. Ground cover, height and growth habit were also recorded in late winter and early spring at a time when competition with weeds, and for resources, is important. Assessment in March and then April provided data on changes in these traits and gave a proxy for spring vigour, with those varieties growing quickly, getting taller and covering the ground faster deemed to be more vigorous. On initial investigation, the only trait that looked related to yield was growth habit, with the more prostrate generally higher yielding. Previous work on traits has shown a strong link between crop ground cover and yield. A full report on the traits measured and the possible correlations to yield and quality will be available soon through the IF portal.

An option we are considering for the plot trials this October is the use of varietal mixtures, combining three or four varieties to increase genetic diversity in the crop and hopefully maximising complementarity of traits in the field to improve productivity. If a single variety doesn't possess all the traits desirable for organic production, using mixtures could be a way around this, but as always end market is a consideration and quality traits must also be complementary.

Farmers' rankings

Two field lab meetings took place this season, giving farmers the chance to select their favourite varieties based on the crop traits in front of them. It was a really interesting exercise to see and hear the farmers discussing and picking their preferred varieties. At early stem extension the farmers were interested in traits like ground cover and growth habit and selected both Montana and Mv Fredericia (AWC1), with six votes each, but for different reasons. Fredericia was selected for being tall and erect, with good vigour and suitability for inter-row hoeing, while Montana was chosen for it's even canopy, high ground cover, and its lack of disease. This does raise an interesting point about organic ideotypes and suitable traits, given that so much depends on the management of the crop, with further evidence that one size doesn't fit all. Tall varieties may generally make sense but if the farm uses a weed surfer, this may not be so. Likewise, prostrate varieties may not be as suitable for inter-row hoeing. Of course, this was one of the main working hypotheses of the ORC Wakelyns (YQ) population, that it could offer whichever traits a particular farm required, given natural selection on the farm over time.

At the late season meeting, the farmers selected Hallfreda, a near market line from a Swedish breeder Lantmannen SW, being tested for its suitability under UK organic husbandry. The variety was very green, and free of disease at this late stage of the season with a good canopy which appealed to the farmers. We will test this variety for a second year to confirm its organic credentials. With the added bonus of bunt tolerance, it could be a variety for the future.

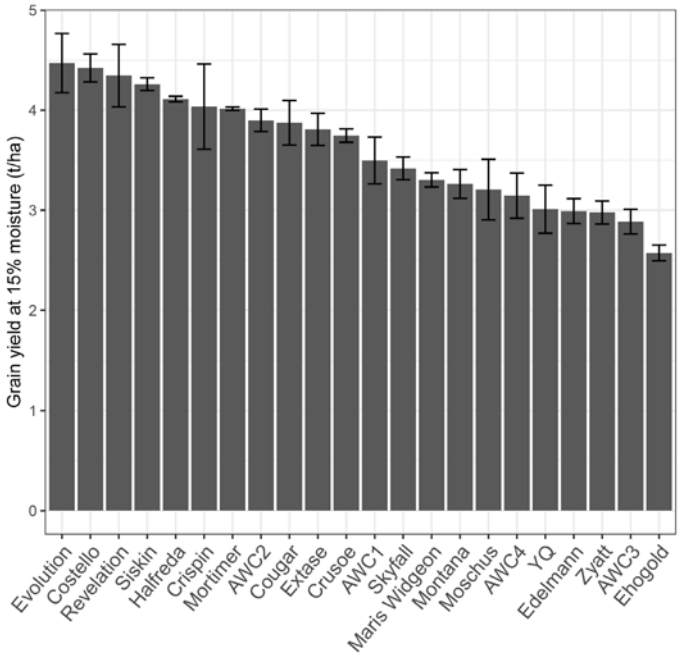


Figure 1: Grain yield from 2018/19 IF variety trial. Error bars show standard error.

Quality; protein, specific weight, Hagburg falling number

We can observe the classic yield/protein trade-off but may find varieties with reasonable performance under all three quality measures like Edelmann and Moschus.

HFN results are partly a feature of varietal phenology and harvest date. They don't all ripen on the same day, but due to the nature of this kind of trial, they must all be harvested at the same time. This helps explain the poor results for Ehogold, an earlier variety.

Table 1: Quality results from 2018/19 IF variety trial

Variety	Specific Weight kg/hl	Protein %	Hagberg Falling Number
AWC1	73.8	8.5	329
AWC2	70.1	7.4	240
AWC3	72.8	10.5	302
AWC4	71	8.8	282
Costello	73.5	6.9	319
Cougar	68.8	7.3	285
Crispin	73.4	6.6	338
Crusoe	69.6	7.5	344
Edelmann	76	9.8	327
Ehogold	75.6	11.4	266
Evolution	68.9	6.2	242
Extase	72.3	6.9	308
Halfreda	72.4	7.4	354
Maris Widgeon	73.4	8.4	270
Montana	72.9	8.4	359
Mortimer	71	7.5	298
Moschus	74.4	9.4	341
Revelation	69.6	7.1	291
Siskin	72.3	6.8	336
Skyfall	70.6	8	317
YQ	73.9	8.7	288
Zyatt	71	9.2	293
Average	72.2	8.1	306

The search still continues for high quality milling varieties that provide both the protein and the yield. At the moment that yield penalty seems too high to justify from a financial perspective. The route to higher protein conventional varieties produced organically probably lies in targeted breeding, looking for greater nitrogen uptake and efficiency of nitrogen translocation from stems and leaves to the grain.

Farmer variety selections at stem extension. Here Montana with pegs indicating it is a preferred variety.

What next?

So, will organic farmers continue to rely on conventional high input varieties? Not necessarily, but until UK focused organic breeding programmes are set up, this kind of work is important to inform decision-making. Alternatives do exist but these in the end may be more suited to smaller scale, local supply chains and artisanal producers. This model suits the ORC Wakelyns population, and supports continued interest in other genetically diverse populations, (so called 'heterogenous material') and heritage varieties. For those farmers interested in these alternatives and a very low input approach, the Heritage Grain Alliance is a good place to start.

If maximising yield is the main goal, conventional varieties still offer the best option. It's in their DNA.

Modern 'continental' organic varieties showed promise in terms of desirable traits but susceptibility to UK pathogens limited performance. The farmers who grew Ehogold were really impressed by it and its traits for a large part of the season ... until yellow rust took hold, severely affecting grain filling and hence yield. While a risk, it's not a given that 'continental' varieties will succumb to disease so more will be tested this year from biodynamic breeder Peter Kunz. Montana, a German E quality wheat bred by KWS, and Hallfreda, show that continental varieties can do well in the UK.

Knowing which of these varieties will offer the best performance, and most consistently, is still an important part of the puzzle, which is where linking this IF variety trial work to our wider Liveseed project farm focused variety testing model comes in. The trials will hopefully allow identification and subsequent testing of interesting genotypes to perhaps bring novel lines into commercial organic production. Testing a restricted number of varieties at a field scale with a network of farmers, whilst maintaining a reference plot trial, is by far the best compromise to draw conclusions about varietal performance in organic systems.

The Liveseed trial has 12 farms taking part this year with a control and bridging varieties across groups, anyone can get involved in the variety trial network. The beauty of having a single control variety across all farms is it acts as a probe into the farm and as a benchmark to allow comparison against. The control this year will be Siskin so anyone wanting to get involved just needs to grow this variety in comparison to at least one other of their choice, preferably two including the farm variety. If you include one of the bridging varieties, Montana, YQ, Crispin or Revelation, even better.

Another way to get involved is to feed into the selection of the plot trial varieties. Just send your suggestions to the crops team at ORC. We only have around 22 spots to fill and have to keep a core of varieties across years but will have spaces spare for farmer choices.

To keep informed of how this field lab and others are progressing sign up and become a member of the Innovative Farmers network.

European Cereal Diversity Festival

In June members of ORC's Crops and Business and Marketing Teams participated in The European Cereal Diversity Festival in Denmark. The festival theme embraced cultivation, heritage varieties, landraces, heterogeneous populations and varieties bred for organic farming. The ORC team had the opportunity to share experiences on value chains and cultivation of cereal diversity. ***Abel Villa*** *presents some of these key insights from his session, while* ***Dominic Amos*** *gives an overview of his presentations and a summary of the Festival.*

What is a value chain?

From a practical perspective, a value chain refers to a description of a series of activities that add value. In the agricultural sector, a value chain is a group of people that work in various stages of crop production. The value chain includes every person that works to get the crops from the farm where they are grown – i.e. input suppliers, farmers, processors and wholesalers – to the consumer that will end up eating them.

For example, let's take a closer look at Figure 1. Imagine what an agricultural value chain looks like and understand the roles and activities of farmers, traders, sellers and other actors as well as supporting functions and processes to get crops to market.

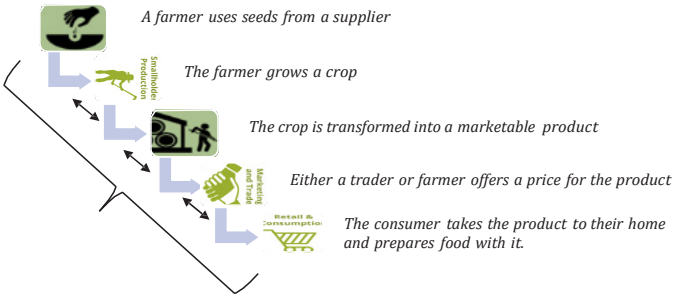


Figure 1: Illustration of an agricultural value chain

During the European Cereal Diversity Festival in Denmark, we were interested in exchanging ideas with farmers and practitioners. Our purpose was to grasp the perspective of practitioners who are connected with heritage cereals. We also had the opportunity to talk to farmers predominantly, but also bakers, traders, wholesalers and consumers.

Value chains in practice

Organic Arable and Scotland the Bread hosted a discussion on agricultural value chains with farmers sharing their stories and experiences. One particular aspect famers made evident is the need for a more holistic understanding of what the role of a farmer should be. They described a shift away from being a 'mere supplier' towards becoming 'nurturers', conscious and responsible actors and preservers of diversity.

Organic Arable highlighted the importance of information flow. They made the case that at the moment retailers behave as gatekeepers for information. Consumers' increasing interest in the origin of their food, and who produces it, is quite often limited by interaction with the retailers alone. It's becoming more apparent that consumers have many more questions about products than can be answered by the retailers. Farmers concern is that retailers alone deal with these questions and therefore unintentionally withhold information. For example, they expressed:

"if the retailer has lots of customers, then there will be lots of questions. There are lots of questions from the customer or consumer, given that there are thousand different customers, and those customers have one question each, and that makes thousand questions. The problem is that the supermarket will only have answers to a very few of those questions" (Organic Arable).

Organic Arable have come up with a solution that they call the 'Network Approach'. The logic is that information flow should function as a network and not linear as the products flow. The use of technology is one way to make information about farmers more accessible. The idea is to bring Organic Arable's farmers more to the forefront by featuring online profiles as part of the offer to consumers. The profiles should include who farmers are, what they do, how they farm and more importantly why they do it. The intention of the network approach is to be an eye opener e.g. "if one of the farmers practices hunting, which might be a controversial topic, at least it is important that their customer knows the farmer and the farmer becomes aware of what their customers think about that". Thus, bridges are created so that information flow is a competitive feature to take advantage of.

Scotland The Bread employs a collaborative approach to produce and supply Scottish flour and bread. This approach configures a value chain around the supply of healthy, equitable, locally controlled and sustainable products. Scotland The Bread is primarily driven by a social purpose, addressing the lack of food. Although there are plenty of food products available in supermarkets, there is a lack of nutritious and affordable food. In their view, food should nurture people. That is why a diverse group of practitioners (plant breeders, farmers, millers, bakers, nutritionists and citizens) are bringing knowledge and expertise to growing and producing healthy food. Working with scientists in leading institutions, they have embarked in the search for heritage Scottish and Nordic wheats to find nutrient-rich varieties that give acceptable yields and adapt to local conditions. In parallel, they focus on stimulating a market for improved grains by building and strengthening capacity in communities dedicated to artisan bread making. (see Bulletin 118).

Diversifying wheat

Dominic Amos shared ORC's work on diversifying wheat from the last three years. This included research through the EU Diversifood (Embedding crop diversity and networking for local high quality food systems) project (reported in Bulletin 128) looking at alternative wheats – einkorn, emmer and rivet – their nutritional qualities and performance compared to modern bread wheats in lower fertility, high weed pressure environments. Results from the project were discussed and

the project database was also showcased. The trials conducted at Reading University's Sonning Farm suggest that these alternative wheats are well suited to low-fertility rotational positions and can withstand the stresses associated with less intensive tillage with no yield penalties. Their performance can be judged in two ways, where in very challenging environments they can be more productive than bread wheat and in less challenging environments can offer higher nutritional value. The top performing entries of each species are now being multiplied with the aim of testing on-farm. In addition to the Diversifood project, work on cereal diversity has been taking place across the EU through the Healthy Minor Cereals project.

Randi Froseth from the Norwegian Institute of Bioeconomy Research (NIBIO) in Norway, spoke about their work on the yield and quality of heritage spring wheats in comparison to modern varieties. This complemented ORC work, that was also presented at the Festival comparing performance under organic husbandry in different tillage regimes of four winter wheat genetic classes representing 'breeding progress' (land races, historic cultivars, modern cultivars, elite breeding lines). The trials, that took place in the Whealbi (Wheat and barley Legacy for Breeding Improvement) project, tested crop performance under ploughed and shallow non-inversion tillage over two years (see Bulletin 125). Results showed that in terms of grain yield, varieties always outperformed landraces although breeding progress was diluted when comparing modern and historic varieties with modern outperforming historic only under ploughing in one year. The elite lines outperformed the modern varieties in the first but not the second year.

ORC work on landraces and alternative so called 'ancient' wheats (defined as hulled wheats einkorn, emmer and spelt) will continue through a European Innovation Partnership (EIP) project working with a small group of farmers in Wales who are investigating re-cultivation of traditional landraces such as the winter type Hen Gymro ("Old Welshman") and the spring type April Bearded along with einkorn and emmer wheat and a bread wheat population sourced from a farmer in Brittany.

Resilience

In another session Dominic Amos and Bruce Pearce also spoke about the benefits of genetic diversity for resilience using examples from ORC's ongoing work with the ORC Wakelyns (ORCW) population. The presentation was complimented by a trip to the demonstration field to look at population wheats, with Odette Weedon from Kassel University talking about their experiences with the cycling ORCW populations and their German versions. Some of their work on populations was also presented at a session on functional crop diversity showing population adaption to organic management. At the same session Lars Kiaer from Copenhagen University presented work from the Diversify (Designing innovative plant teams for ecosystem resilience and agricultural sustainability) project on cereal/legume intercrops and on wheat and barley varietal mixtures from the MixBar project.

One of the most fascinating parts of the Festival was the demonstration field (pictured) with more than 500 plots of landraces, populations, heritage varieties and organically and biodynamically bred cereals. We're hoping to include one or two varieties from Continental biodynamic breeders

Demonstration field at Kalo Organic Agricultural School

In the field with breeder Peter Kunz

Getreidezuchtung Peter Kunz and Dottenfelderhof in our winter wheat plot trials this season. Peter Kunz talked about the principles of their breeding programme in the field and highlighted the importance of selecting for a long translocation period as the crop switched from the construction to the production phase. He also talked about their ethos of 'three yields', with the roots, straw and grain all playing a role providing yield for the soil, farm and human or animal respectively.

Diverse thoughts

The Festival offered the opportunity to exchange views and new ideas with people involved in cereal diversity from production to plate (and glass) across Europe. The Festival succeeded in its aim of inspiring farmers and producers (and researchers) to develop further these varieties.

The European Cereal Diversity Festival at Kalo Organic Agricultural School in Denmark, was organised by the Cerere project and took place in conjunction with the 11th annual Nordic Heritage Cereal Conference that rotates around the Nordic countries and 'Let's Cultivate Diversity', held for the 4th time. The Festival brought together farmers, researchers, advisors, millers, bakers and brewers from all across Europe and further afield, all with a common interest in increasing cereal diversity within the food system. ORC attendance at this event was covered through our work in the Cerere project, hoping to promote a cereal renaissance in rural Europe.

This project received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement n° 727848

Events and announcements - details at www.organicresearchcentre.com

Events

23 October 2019: Soil nutrient management. Abbey Home, Cirencester . A workshop with Mark Measures for farmers, growers, researchers and advisers on soil nutrient and fertility management in organic and agroecological farming. Contact Sarah Jameson: info@organicadvice.org.uk

26 October 2019: Health, Harmony and Holism. Biodynamic Association Conference and AGM 2019, Glasshouse College, Stourbridge

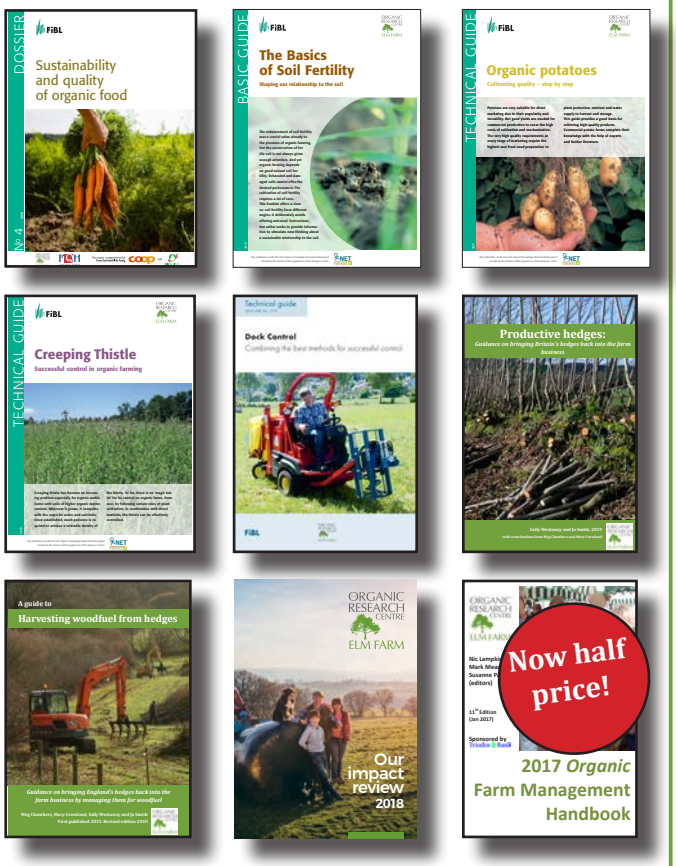
21 November 2019: Agroforestry – A Win Win for Farm productivity and the Environment. 4-6pm The Market Tavern, Melton Mowbray. AFINET UK event. Contact: sally.w@organicresearchcentre.com

3 December 2019: Organic Innovation Days 2019. TP Organics 5th annual event in Brussels

8-9 January 2020: Oxford Real Farming Conference The 11th annual Oxford Real Farming Conference at Oxford Town Hall. http://orfc.org.uk/

21-27 September 2020: Organic World Congress 2020. ***From its Roots, Organic Inspires Life.*** Rennes, France. https://owc.ifoam.bio/2020/conference-fora

Technical guides/publications



Download or order hard copies and for full publications list: https://tinyurl.com/ORC-pubs

Impact Review: https://tinyurl.com/ ORC-impact18

Join ORC's Farmer and Business Supporters' Group

ORC is at the forefront of UK research on organic and other agroecological approaches to sustainable and healthy food production, including knowledge exchange and policy advocacy on behalf of organic farmers and businesses.

While much of this work is supported through project funds from the EU, governments and foundations, we rely heavily on donations from individual supporters to provide vital underpinning for our activities.

Regular monthly or annual donations help us to plan ahead with greater confidence about our ability to undertake new initiatives on behalf of organic farmers and food businesses.

Will you join the growing band of farmers and businesses willing to support us like this?

We're not just asking for your support – we're offering something in return to say thank you!

FAB supporters have:*

- The opportunity to attend FABS annual events to hear about our current activities, with space to discuss your priorities for research, information and policy initiatives
- Opportunities to participate in bids and funded projects
- Networking opportunities and events
- Pre-publication access to research reports, technical guides, bulletin articles, conference papers and other publications, with an invitation to feedback comments where appropriate
- Access to the research team and a quarterly update on progress and staff news, with links to on-line resources, for each of the main areas of ORC activity
- Links to and (optional) membership of relevant on-line discussion forums
- Discounted access to ORC conferences and events, including our annual conference
- Free subscriptions to ORC's printed bulletin, monthly e-bulletins and the Organic Farm Management Handbook every two years or so.

Please give us your support and sign up today!

To join the ORC FABS group, please pledge a regular annual donation (or monthly equivalent) of at least:

£100 (Supporter) £250 (Bronze)
£500 (Silver) £1000 (Gold)
£5000 (Platinum/Organic Ambassador)

We are keen to recognise the different levels of support, but all supporters will receive the same benefits.

To register, please contact Gillian Woodward at ORC: 01488 658298 ext. 554
gillian.w@organicresearchcentre.com

**We are reviewing our FABS activities – please contact Bruce Pearce if you would like to know more: bruce.p@organicresearchcentre.com*