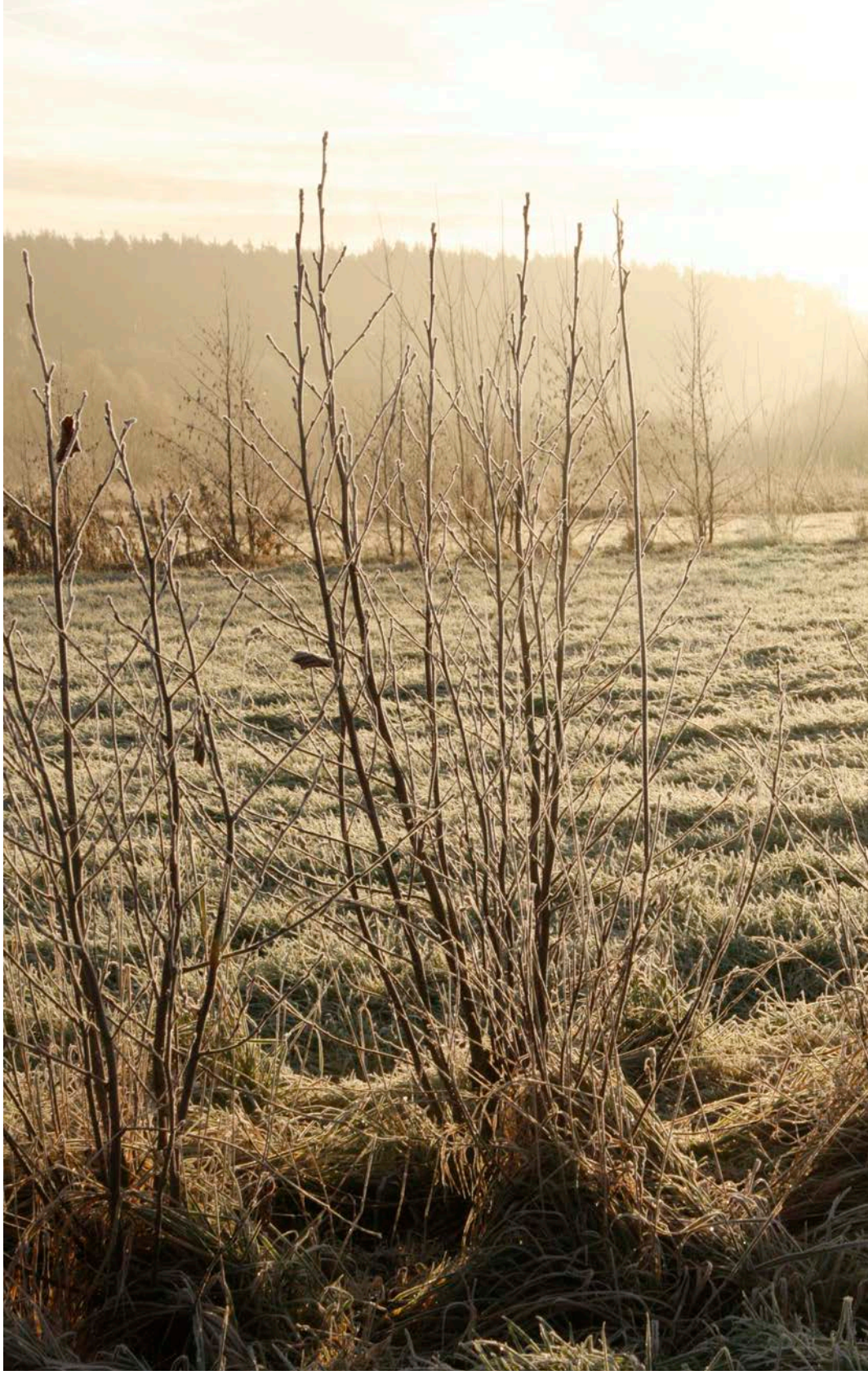
THE ORGANIC RESEARCH CENTRE

ELM FARM

In this bumper issue:

Cover photo

Silvo-pastoral agroforestry trials at Elm farm. See AGFORWARD feature pp13-17



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Organic Research Centre

Bulletin

No. 123 – Autumn/Winter 2017

News in brief

Insectageddon

ORC Director Nic Lampkin responded to the article 'Insectageddon' published by George Monbiot in the Guardian. The article, subtitled 'farming is more catastrophic than climate breakdown' was based on a study in the journal *Plos One* which revealed that flying insects surveyed on nature reserves in Germany have declined by 76% in 27 years. Nic states that while "He is right on many levels...what he does not state is that we already have an armoury of solutions to resolve many of the problems that are creating this potential 'insectageddon'. However, to implement these solutions, we desperately need the will of policy makers and consumers to trigger change. It is a myth to believe that you cannot have sustainable farming practices combined with profitable and competitive farming. Farming and wildlife don't need to be separated – they can be integrated to mutual benefit, as they have been for hundreds of years in European agriculture, giving rise to the insect and bird populations which are now in decline. At a stroke, we could help to reverse insect and habitat declines, improve soil and water quality and help to make livestock farming more sustainable and complementary to human needs."

Organic can feed the world but changes needed

A new study led by Swiss Research Institute of Organic Agriculture (FiBL) and recently published in *Nature Communications* shows that organic farming can play an important role in a sustainable food system. However this needs to be combined with changes to the food system such as; reduced consumption of animal products, avoiding livestock feed concentrates and reduced food waste. Under this scenario in 2050, even with over 9 billion people, the world's food security would be ensured without needing more agricultural land, greenhouse gas emissions would be lowered and the negative effects of today's intensive food systems, such as surplus nitrogen and high pesticide exposure, would be greatly reduced. In contrast, should consumption patterns remain unchanged 100% conversion to organic farming would lead to increased land use change to agriculture.

Agroforestry game-changer for UK?

At a recent meeting with representatives from the Farm Woodland Forum (the UK's agroforestry forum), Farming Minister George Eustice MP expressed a keen commitment to include agroforestry in future domestic agricultural policy post Brexit. Stephen Briggs, from Abacus Agriculture, attended the meeting with George Eustice together with Mike Strachan and Dr Paul Burgess, representing the Farm Woodland Forum and said: "Our meeting with the minister was extremely positive. Coming from a farming family in Cornwall he could appreciate the benefits of incorporating trees into agricultural production and he showed a genuine desire to look at ways to join up forestry and agroforestry. In the past this has fallen down a crack in the middle and the Government recognises that the current agri-environment framework stifles innovation in this field. However, we do need to develop workable business models for agroforestry to increase its adoption by the farming community. The AFINET (AgroForestry Innovation NETworks) project will act as a catalyst to do this."

Soil Farmer of the Year competition

The Farm Carbon Cutting Toolkit and Innovation for Agriculture's competition to find the UK's Soil Farmer of 2018 is open for applications. It aims to find farmers and growers who are engaged with and passionate about managing their soils in a way which supports productive agriculture, biodiversity, reduces greenhouse gas emissions, and builds soil organic matter. The competition is open to any UK farmer or grower managing their soils in a way which optimises soil health and quality. The competition is being generously sponsored again by Cotswold Seeds, and the top three entries will all receive prizes of fertility-building or green manure seed.
http://farmcarbontoolkit.org.uk/soil-farmer-year

Organic Regulation agreed

The trilogue agreement for a new organic regulation reached last June was adopted by the Special Committee on Agriculture (SCA) on 20th November and by the Parliamentary Committee on Agriculture on 22nd November 2017. The next step is the sign off in the Parliament's plenary and the Council of Agriculture Ministers. A number of concerns highlighted by IFOAM EU have been taken into consideration. However, there was a lack of a strong majority in both the SCA and the AGRI Committee and Austria (biggest share of organic land) and Germany (biggest EU market) did not endorse the text, citing a number of inconsistencies and mistakes that will make the practical implementation of the regulation very difficult.

ORC's annual conference takes a break in 2018

ORC will not be holding it's annual Organic Producers' Conference as usual in early 2018, the first break in twelve years. Instead, we are more actively involved in the Oxford Real Farming Conference, with an Agricology open day at Daylesford on 3rd January, and participating in workshops on the English Organic Action Plan, arable seed breeding and herb production with agroforestry (all on Friday 5th January). We will be launching the new Dean Organic Fund providing interest free loans to organic/agroecological producers and food businesses at ORFC. During the year we are also involved in more special events such as Winter Organic Cereals (see p.24) and the National Organic Combinable Crops event, to be held at Mark Lea's farm in Shropshire on July 3rd 2018. We plan to be back in 2019!

Farming partner sought for Elm Farm

We are looking for expressions of interest from suitable individuals keen to take on the management of Elm Farm from the end of 2018/early 2019 and work with ORC to support our research and provide an inspirational showcase for our work and the potential of organic farming. Further details will be available at ORFC and from Nic Lampkin (nic.l@organicresearchcentre.com) in early January, and open days are planned at Elm Farm for early February, dates to be confirmed.

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

ISSN 1367-6970
Bulletin editor
Phil Sumption

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: The new EU organic regulation has been agreed – is that it?

In November, EU Member State representatives in the Special Committee on Agriculture and Parliamentarians in the Agriculture and Environment Committee voted in favour of the new EU organic regulation text, but not unanimously. These votes are indicative only and the new regulation is not adopted until it has first been voted in a full Plenary in the EU Parliament, then adopted by the Council of Agriculture and Fisheries Ministers and then finally published in the Official Journal of the EU. It is highly likely that the new Regulation will proceed through these final stages unscathed, leading to implementation in late 2020 or early 2021. In the intervening period, the Commission will have to progress the implementation rules, and clearly the devil will lie in the details.

Brexit is, of course, another matter. In principle, the existing EU regulation (not the new one) will be incorporated into UK law if the EU Withdrawal Bill is passed. But if the transition process is agreed as proposed by the EU, then we could be in a situation of also adopting the new EU regulation into UK law. Even if not, the principle of regulatory alignment agreed at the end of the first stage of Brexit negotiations would mean adapting to the new regulation.

As the regulation working group for the proposed English Organic Action Plan has identified, there will quite a number of issues to resolve over technical advisory committees, import and export approval procedures, and even possibly a UK organic logo. Defra is now commissioning a study to examine some of these issues, which should report later in 2018.

Years and years of human endeavour have gone into the process of revising the regulations, to very little obvious benefit at this stage. We have to ask – what is the point? Is there not a better way to use our collective creativity?

Surely the idea of organic farming and food, developed over more than a century, is about something much more than regulation. Yes, the market for organic food and the regulations that underpin it are important to helping ensure the financial viability of farming systems based on organic/agro-ecological principles, which deliver significant public benefits as well as food, fibre, timber and energy.

But the regulations can only provide a baseline on which the creativity and innovative potential of individual producers can flourish. Regulations, and the organic market, should never end up as the sole purpose of our efforts, constraining and limiting our potential.

The organic idea is not primarily about restricting inputs and practices, or even finding acceptable substitute technologies. It is much more about encouraging the redesign and management of farming systems based on principles of ecology, social justice and health. Can regulations really capture this? What else can we put in place to encourage a broader perspective?

The organic movement has allowed itself to become side-tracked by the obsession with regulation. If as much energy had been put into research, training, education, communication, how much better might the systems that we are now operating be?

Let's make sure that the processes we will be putting in place in the coming months and years, in the UK and the EU, really help get the right balance between a supportive regulation and organic food market and the underlying organic principles, so that organic systems deliver their full potential for society as well as producers.

Nic Lampkin

Alternative wheats, a pathway to diversity……the story so far

*ORC crops researcher, **Dominic Amos**, discusses this year's trial results from ORC's research into the agronomic performance of three under-utilised, forgotten wheat species and looks ahead to this year's research plans as we try to learn more about these crops and their suitability for organic agriculture.*

For the past two years ORC has been running field trials looking at the performance of three wheat species, einkorn (*Triticum monococcum*), emmer (*Triticum dicoccum*) and rivet (*Triticum turgidum*), as part of the Diversifood project. This project is about diversifying crops in the field and hence food on our plates. Dr Ambrogio Costanzo, Principal Crops Researcher, is leading the work across the EU on field trials of several species of under-utilised crops.

The results from the 2016/17 trials are in and are starting to provide some interesting agronomic traits across all of the species as well as helping to reveal clusters by species for field performance (Figure 1). The principal component analysis (pca) below helps to simplify and visualise a set of data and is often used in the early stages of analysis as an exploratory method.

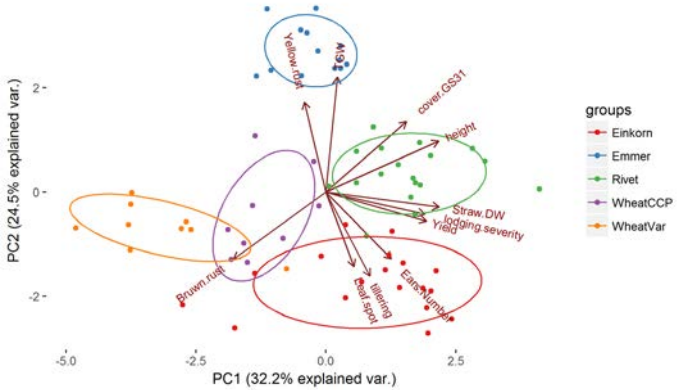


Figure 1: Principal component analysis for traits of 4 wheat species from ORC field trials in 2016/17

What should stand out immediately is how the species cluster together (coloured circles highlight this) to show similarities in performance for the key traits we measured. Taking einkorn (red dots) as an example, we can see how the varietal performance within this species shows similarities and that, across varieties, the species generally shows a high tendency to tiller (see figure 1: Ears.Number and tillering). This results in a higher yield. The einkorn also showed susceptibility to leaf spot but, on the other hand, the einkorn tested showed a strong trend for yellow rust resistance, and for low thousand grain weight, reflected in the small size of the grain. It does appear from the last two years of work that einkorn could, from an agronomic perspective, be a very useful addition to an organic arable farmers portfolio. In fact, it appears we are not the only ones to recognise the potential of einkorn as an alternative organic cereal crop, with at least one seed merchant (Copes) now offering the seed for sale on a commercial scale.

The field trial last year was run on marginal blue clay land at Doves Farm in Berkshire and was a real test for the different crops. The land was not part of the arable rotation and the trials were following very extensive outdoor pigs, with a large weed burden. This ability to tiller could be einkorn's greatest asset as it helps to make up for the small seed size and makes it quite competitive against weeds. The pca also shows that einkorn tended to have lower ground cover in early spring, a feature of its later development and delayed phenology compared to the other species tested. Despite this, once established einkorn grows rapidly and will go from tillering to ear emergence in little over a month, with stem extension proceeding very quickly. The einkorn varieties are facultative types, meaning they can be sown in either winter or spring and we'll be testing that in 2017/18 with the varieties drilled at both times to look at the effect on growth, development and yield. One other potential trait to note is that einkorn may be suitable for grazing, with anecdotal evidence from Doves farm, where the crop is grown commercially, suggesting it tolerates sheep grazing in the spring without detrimental impact.

A feature of the 2016/17 trials was a comparison with modern elite line bread wheat and the ORC Wakelyns Population wheat (*Triticum aestivum*). Referring back to the pca (Figure 1), you can see just how poorly the elite lines (orange dots) Skyfall and Crusoe (selected for their VCU benchmark status) performed. Their semi-dwarf nature made them particularly susceptible to competition from weeds in these trials, providing an explanation for the low yield results. However, the establishment was poor and it is possible that, having been bred and selected under high input conditions, they don't possess the traits to help them grow on marginal, low fertility, high weed abundance land. Useful traits, including deeper rooting, improved nutrient uptake, and greater associations with the soil microbial community, may remain in the other wheat species tested. It should be stressed that we haven't measured these specific traits but it's a reasonable guess as to why the underutilised wheat species being tested performed that much better, beyond improved establishment and crop height.

Figure 2: Skyfall (benchmark wheat) surrounded by einkorn plots

While the trials at Doves Farm have been incredibly useful, we are moving the trials to the University of Reading crops research unit at Sonning Farm to explore other avenues. As well as testing the crops on less marginal land, we're able to include extra factors in our research, which wouldn't be feasible in a commercial farm setting. Other than exploring differences within and between varieties and species, we're now exploring the effects of tillage and rotational position. Plots of each variety are growing in both ploughed and shallow non-inversion tillage, and we also have plots growing as a first cereal, following a ley, or as a second cereal. As we saw from the plots we had drilled at the National Organic Combinable Crops event this year at Cottonworth Farm near Andover, higher fertility ground can cause taller, weaker straw and an increased risk of lodging, especially for these taller crops that don't possess the semi-dwarfing gene. One of the einkorn varieties being assessed is a modern semi-dwarf line and may fare better in the higher fertility and lower weed burden environment. All this should enable us to learn a lot more about the different species' field performance and enhance the 'getting to know them' phase of the project.

Figure 3: Clockwise from top left: einkorn, rivet and emmer

The missing piece so far is the quality and nutritional value. We aim to assess the suitability for end use as part of the project in collaboration with the University of Bologna. The rivet wheat we're growing is a close relative of Durum wheat and we're hopeful it might be able to provide a British grown alternative for pasta. Grain samples from this year's trials will be sent across to the labs in Bologna to run it through various pasta making tests to evaluate its suitability. Einkorn has potential for both milling and malting, but like spelt requires de-hulling for milling which adds an extra stage and cost to the processing. We are keen to develop collaborations with those working on and researching the processing and end-use of these alternative grains. As interest in these under-utilised species grows, and consumers and the market, develop a taste for these

Figure 4: Photo showing ear morphology of different wheat species. From left to right, miracle rivet, emmer, einkorn, rivet and common wheat.

niche products, the opportunities will increase for the organic farmer to add to on-farm crop diversity and tap into these niche markets and their value-added potential.

If you're interested in these under-utilised wheats and would like more information please feel free to contact the ORC Crops Team, and if you'd like to see the crops in the field we'd be happy to take you on a tour of the trials at Sonning.

Organic cereal variety trials—a new approach

Choosing the right variety is a challenge for every organic arable farmer, as emerged during discussion at National Organic Combinable Crops (NOCC) 2017. This year, ORC, Organic Arable and seven brave and motivated farmers have started a collective experiment to test seven wheat varieties in a radically new way. This is addressing three sources of bias of current variety testing:

i. The trial is on organic, not conventional land;
ii. It is on a field, not a plot scale;
iii. It is decentralised on seven commercial farms across England, using a solid statistical design which nevertheless allows each farmer to grow just three of the seven varieties.

We hope that this initiative, supported by the LIVESEED EU project, could be the first of many participatory and inclusive experiments and trials where groups of farmers can be supported in producing the data and information they need. More news will be available at NOCC 2018 at Greenacres farm, in Shropshire, where Mark Lea is growing big strips of all the seven varieties.

ORC Wakelyns Population

Seed of the ORC Wakelyns Population is on sale from Walnes Seeds.

Contact Andrew Cooper

andrew@walnesseeds.co.uk
tel. 01728 684180

ORC FABS meeting at Bradwell Grove

In September ORC Farmer and Business Supporters' (FABS) members came together for the third annual gathering at Bradwell Grove Farms in the Cotswolds. There was a focus on diversity and quality in organic crop production.

Farm manager Charles Hunter-Smart hosted the farm tour, which included Innovative Farmers field lab trials on anaerobic digestate application to organic arable crops. The business, which has been organic since 2005, includes arable crops, a beef suckler herd and a joint sheep enterprise. Charles has embedded diversity in his system with multi-mixture leys, which have been adapted over time.

After lunch at the Cotswold Wildlife Park, workshops were held on areas of our work that focus on diversity, followed up by identification of priority areas for future work.

Breeding, variety trials and seed production

Ideas that came up included:

- An organic seed round table, bringing all interested partners together to debate issues around varieties and agree a way forward;
- Lack of availability/choice in some crops, e.g. only one rye variety available as organic seed;
- Reliable data is needed on yields/quality and agronomic performance. Variety trialling is needed, but also better use of the recommended lists, as there seems to be a mismatch between varieties that potentially perform well in organic systems (e.g. exhibiting disease resistance, ground cover) and what is multiplied as an organic seed crop, particularly for those needing larger quantities;
- Problems of disease in some crops e.g. fusarium and bunt in farm-saved seed – how do we deal with it?
- Can bakers make do with lower protein levels?

In-field diversity

- Several farmers in the group are using diverse leys, which could be monitored, if funding available;
- Research is needed on varieties and best species combinations;
- Interest in agroforestry in organic arable rotations;
- What are the links between fertility and yields and yields and profitability?

Knowledge exchange

ORC is very active in knowledge exchange, through Agricology, IOTA and through our publications, conferences and events. But could we do more?

- Gaps in advisory provision were identified including agroforestry, agroecology, organic and mob-grazing;
- Would a subscription-based service such as a technical helpline be used/viable?
- Staff training for those employed in organic businesses is needed;
- More targeted workshops presenting project results.

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

Seed as Commons

Seeds and seed issues are being taken seriously in Europe. There is both a recognition of the problem of increasing market concentration in the seed sector and the galvanisation of a movement to counter further privatising and monopolisation of seeds as the basis of a sustainable food system. The 'Promoting Organic Plant Breeding in Europe' project was initiated by Demeter International Brussels Office in January 2016 and aims to promote the development and use of organic varieties on a European scale. The project provides a platform for networking and discussion among organic plant breeders and stakeholders. They organised the 'Seed as Commons' conference in Brussels in October, hosted by Maria Heubuch MEP. ORC Research Communications Officer and Seed Co-operative board member ***Phil Sumption****, was there and reports back.*

Johannes Wirz, Researcher, Section for Agriculture – Goetheanum, Switzerland, presented the newly released study Seed as a Commons. The slogan 'Seed is a commons!' emerged a few years ago in response to the expansion of power in the seed industry, particularly regarding the patenting of plants. But, can the concept be viable? How can seed production and plant breeding be legally and economically framed so that 'common good' is ensured? That was the starting point for his study. The breeding and cultivation of new crops requires substantial personal commitment, something we are well aware of! But it takes place in the public social sphere and not just the biological one. Seeds and varieties have cultural property and common property, as well as private property elements. The cultural heritage of seeds, which like literature or music is dependent on the creativity, perseverance and experience of a breeder or breeder community is vulnerable to disappearance.

The principles of ecological plant breeding are, according to Johannes, that varieties must be reproducible, i.e. full fertile (open-pollinated) and that breeding and selection must take place under organic conditions. In addition, we should respect cells and genomes as units and respect cross breeding barriers. Currently only 1-5% of varieties used in organic farming are derived from ecological breeding – showing the challenge that we face. Johannes explained that non-profit organic breeders have the expert knowledge to develop locally adapted varieties for organic agriculture. "Organic breeders deserve that governmental authorities as facilitators and the value chain as partners support their work."

There are many good examples of non-profit breeding initiatives; ORC Wakelyns Population is one, demonstrating increased yield stability under the variable environmental conditions that are common in organic systems. It is important, however, that breeding activities expand beyond the German-speaking regions, through training of breeders and linking of activities and co-operation with new partners, such as the Seed Co-operative in the UK. Ecological breeding can improve the quality of products as well as raw materials for the value-added chain. Therefore, models of financing should involve all partners in the food chain and farming associations. For the former, a one tenth of a percent fee on all fresh products is proposed; the latter could contribute with a steering and incentive tax. Ecological breeding makes contributions to other commons and like agrobiodiversity and ecosystem services justifies support from government agencies. The contributions of foundations is large and will remain so. Donors must recognise that breeding projects are designed around cycles of 10-15 years, and therefore dependent on long-term commitments of funds.

Peter Kunz, organic breeder from Switzerland, added: "Bringing forward organic breeding is a common task of the whole organic food chain. Organic operators should get actively involved and dedicate part of their profits to breeding."

Open-source seeds

Johannes Kotschi from OpenSourceSeeds/Agrecol, Marburg, Germany, presented the concept of open-source seeds licensing. Open-source licensed seed (OSS) is available for everyone. You may multiply the seed, sell it, pass it on, breed with it and enhance it without any restrictions. The licence grants new users the same rights that the previous owner enjoyed. Until now, it has not been possible to legally protect seed as a common good. If breeders forgo variety protection and grant unrestricted access to their varieties, they risk others converting the varieties into a private good. Common goods could be created but not sustained. Johannes explained: "Commons can only be sustained if they are protected. With the OSS Licence, a way has been found to redress this. The licence may, therefore, become an important tool to re-build a commons-based seed domain to be established as a second column to counterbalance the corporate seed sector."

Common purpose

Monika Messmer, President of the European Consortium for Organic Plant Breeding (ECO – PB) and FiBL researcher, highlighted the need for investment in organic breeding and innovation: "Projects like LIVESEED, that has just started under the Horizon 2020 framework, are of major importance to move the organic sector forward. We need to improve organic seed and plant breeding, therefore we need action on the technical, scientific, socio-economic and legislative level." ORC is a partner in LIVESEED.

Effimia Chatzinikolaou, Policy Coordinator IFOAM EU Group, said: "It is a priority for the organic movement to develop the organic plant breeding sector. It is important to change the current legislative framework on seed marketing in order to facilitate market access for organically bred varieties. If we want to reach 50% organic farming in the EU by 2030, this target also needs to be reflected in public research funding."

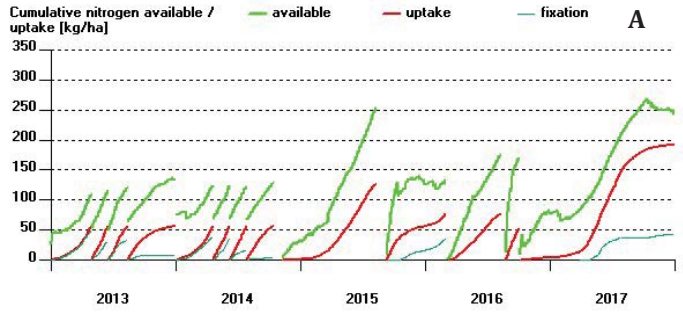
Alexander Gerber, Vice President of Demeter-International, concluded that plant breeding serves society: "Therefore, different models to ensure that the genetic basis of our daily food remains an accessible good need to be further developed and organic breeding needs recognition as an innovative approach for future food security."

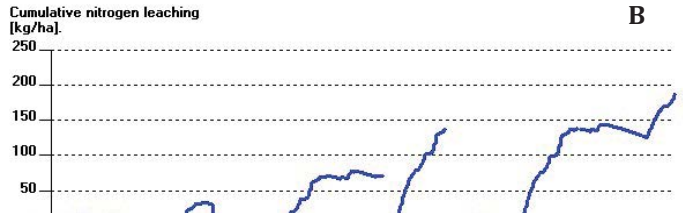
Are organic arable rotations mining the soil?

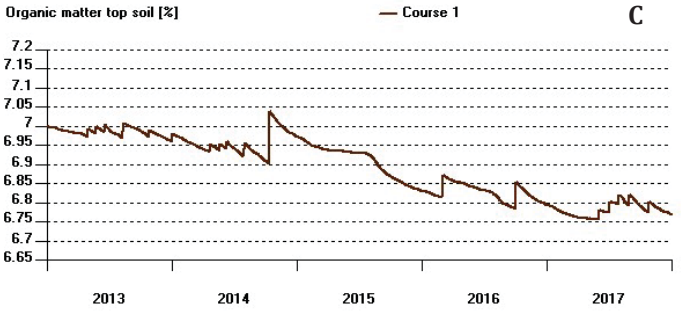
*Organic principles and standards emphasise the importance of practices that encourage long-term health and fertility of agricultural soils. Effective crop rotation, cultivation regimes and organic fertiliser application are important elements of the organic approach. Whilst such practices can undoubtedly increase the soil's health, their true impact is still uncertain, particularly with regard to soil nutrient and organic matter contents. ORC's Sustainability Researcher **Samantha Mullender** explains how modelling has produced some challenging results.*

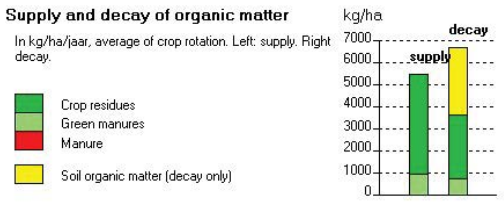
Introducing NDICEA

As part of the OK-Net Arable project, a group of organic farmers wanted to improve their understanding of the nutrient balance of their crop rotations. This was done by using a computer-based nutrient budgeting model called NDICEA.[1]









Results, Mineral balance

	N	P_2O_5	K_2O
Supply with fertilisers	83	44	53
Nitrogen fixation	60		
Deposition	10	3	8
Total supply	153	47	61
Removal with produce	81	33	73
Calculated remains	72	14	-11
Emission	10		
denitrification	17		
leaching	89		E
Accumulation org. matter	-55.3		

Figure 1: NDICEA outputs include graphs of nitrogen uptake vs. availability (A), leaching (B), organic matter in the top soil (C), supply and decay of organic matter (D) and a table showing mineral balances (E)

A researcher from the Organic Research Centre visited each farm for a couple of hours to assess individual field rotations using the model. The farmers provided data on climate, soil properties and management practices (e.g. seed rates, fertiliser application, cultivation regimes etc.) for one of their fields. Using this data, NDICEA is able to work out where nutrient surpluses and deficiencies occur over the seasons and rotation cycle. This provides information on environmental impacts like nitrogen (N) leaching and to identify if rotations are balanced for nutrients, helping to build soil fertility, or mining nutrients and organic matter.

Farmer experiences

Seven organic farms took the opportunity to look at one or more of their fields. They entered their crop rotation and management practices to see where, if anywhere, problems arose. The results caused some surprise for both farmers and researchers...

In all cases except one, organic matter was found to decline over the course of the rotation, even where leys with a high clover content formed a substantial part of the cropping sequence. Declines in organic matter were even seen on a farm with six years of grass/clover ley. Similarly, only one farm maintained a positive balance of phosphate and potassium. The only way it achieved this was through annual applications of either compost (35 tonnes per hectare (t ha^{-1}) or chicken manure (10-17 t ha^{-1}) for six (out of eight) years of the rotation.

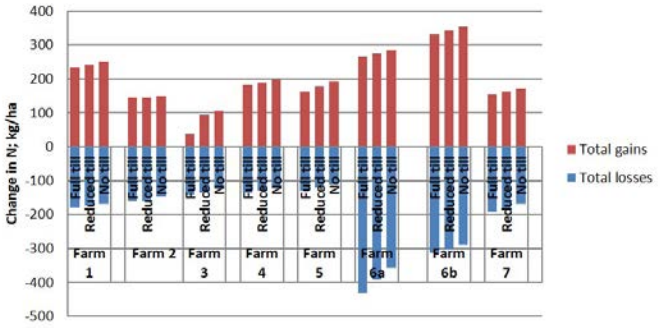


Figure 2: Nitrogen balance under alternative tillage practices

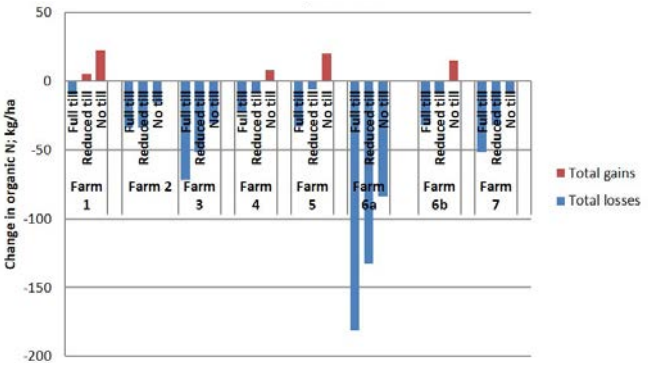


Figure 3: Organic N balance under alternative tillage practices

An additional discovery was that a lot of the nutrients added to the field through fertilisers (including compost or manure) or grass/clover leys were being lost through leaching or harvest. Even with grazing and no cutting, leys high in clover only retained the soil N and did not increase it, whilst gains in organic matter across the ley were only seen with reduced tillage AND when the last cut of forage was left on the field/ploughed in. Meanwhile, breaking the ley in the autumn led to most of the nutrients added being lost before the growing season of the next crop began, due to leaching and denitrification losses over winter.

Outcomes revealed

The biggest improvements were seen by changing tillage practices. The difference between conventional and reduced till, and reduced till and no till, were substantial for all the modelled rotations. In many cases this was enough to give positive nutrient balances. In some cases it built organic matter too. This is shown in the graphs above.

- Leaving the straw behind has very little effect on nutrient balances. It does, however, increase organic matter.
- Breaking the ley in the spring doesn't improve overall nutrient or organic matter balances. What it does do is make the nutrients from the ley available for the following crop, by reducing the amount of nutrients lost over the winter months. This is true even when the crop following the ley is planted in the autumn.
- Using digestate from anaerobic digestion could present an alternative to rock phosphate. In addition to supplying phosphate, digestate can add nitrates, potassium and organic matter to the soil.
- Increasing the yield of a grass/clover ley can lead to substantial benefits, improving organic matter balances and soil nutrient retention.

It must be remembered that no model is 100% accurate and that the outputs given by NDICEA are indications rather than definite outcomes. Despite this, the seven farms all reported just how useful the experience had been. Overall, the work has revealed some real problems to be addressed within organic arable farming. As farmer John Pawsey said: "No matter which way you look at it we are all mining the soil, unless we are bringing in nutrients to balance exports of meat, straw, forage and grain." Certainly a challenge for the future.

1. The NDICEA tool is available to download for free from http://www.ndicea.nl/indexen.php?i=endownload. Detailed instructions on how to use the tool are available from the same link.

This article first appeared as a blog on Agricology.co.uk

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Distribution of the added value of the organic food chain

*The organic market is increasing across Europe, but organic land area is not keeping up with this growth, especially in the UK. ORC was a core partner in a European Commission (DG AGRI) funded study to understand whether farmers are rewarded with a sufficient share of the added value in the organic supply chain, and are therefore motivated to convert and scale-up organic production. ORC researcher **Stefano Orsini** discusses the findings.*

The organic market in the European Union (EU) is continuing to increase. In the past decade, the value of European and EU markets has more than doubled, with an increase in organic food consumption by 110% from €22.4 to €47.4 .[1] Despite such a dynamic market, the land managed organically is not growing at the same pace, leaving the market potential at the production level untapped. This is also true for the UK, where the organic market was estimated to be worth £2.09 billion[2] in 2016, with an increase in sales by 7.1% compared to the previous year, whereas the amount of land farmed organically has continued to decline with a drop of 3.6%.

Organic products are usually more expensive in the shops and farm gate prices are higher in many cases, but there is a lack of published data on prices at the various levels of the value chain, and especially on how added value is distributed among the market players. The project 'Distribution of the Added Value of the Organic Food Chain' investigated 18 case studies of product supply chains (SCs) for apples, milk and pasta, with two case studies in each of the nine European countries involved in the study. Market players (e.g. processors, distributors and retailers) and other experts (e.g. from certification bodies) were interviewed to estimate the distribution of added value along the SCs, and to identify the key factors affecting added value creation and distribution. The case studies illustrated that the organisation of supply chains can vary considerably. Some examples of the SC case studies are illustrated in Figure1 below.

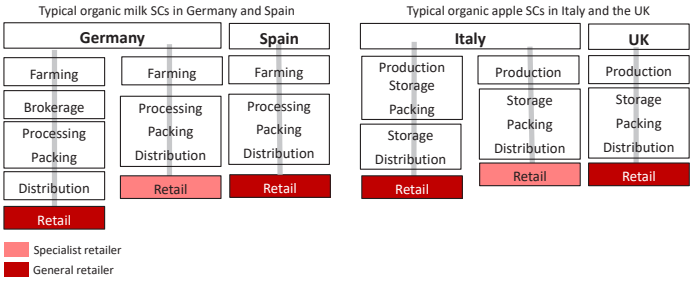

Figure 1: Examples of typical SCs studied. The boxes include operations undertaken by the same actor (integration of SC operations)

Capturing added value

Our results from the case studies reveal that organic producers get higher prices than conventional producers for the three products apples, milk and pasta (Figure 2).

Some organic producers capture more than 40% of the total added value, for example for organic milk in France and Germany, or even more than 60% as with organic apples in Estonia. Some others get less than 10%, such as milk producers in Spain and the Czech Republic. Producers of raw material for more processed food like pasta generally only capture a low share.

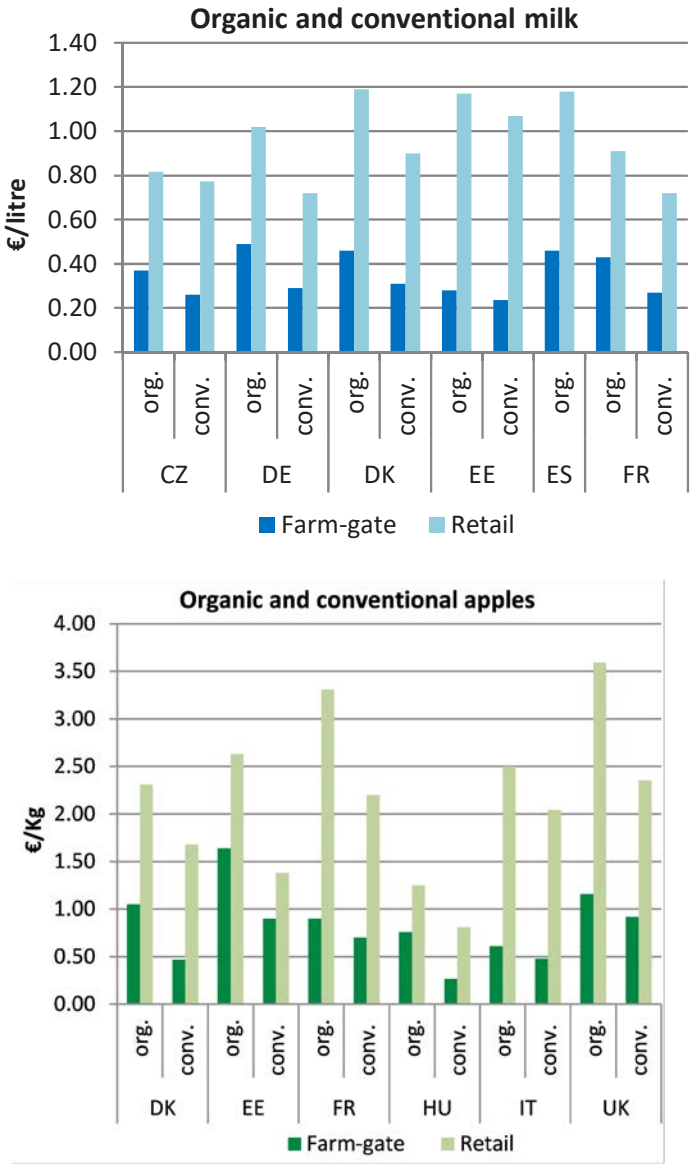

Figure 2: Farm-gate and retail prices for organic and conventional milk and apples at general retail, in €/kg (VAT excluded). Reference year = 2016

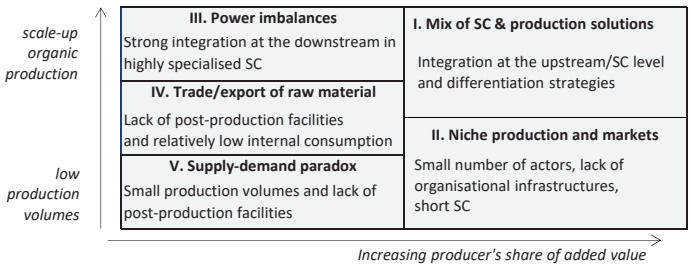

Figure 3: Five different models of organic SCs found in the case studies

Our study confirmed that multiples dominate the distribution side of the organic food chain in various markets. Cases of higher share of added value at production level were found both in specialist and general retailer SCs. This challenges some expectations that would essentially relate fair market models to specialist shop retailers.

In summary, the highest proportions of added value captured by producers are connected with the following cases (see Figure 3 facing page, below):

- **Niche production and markets**, as illustrated by the organic apples case study in Estonia, where the producer undertakes different SC operations including cold storage and packing, and at present can get more than 60% of the total added value. However, this emerging organic sector in Estonia involves only a small number of actors and lacks organisational structure, which prevents producers from scaling up production and penetrating the mainstream food market to meet a growing demand and to move out of the niche product category.
- **'Mix of SC and production solutions'** includes a number of business and marketing approaches that are more typical of more developed organic markets. Integration throughout the SC is key to let producers achieve a fair share of added value and economies of scale. For example, **cooperation among producers** of a supply chain often results in strengthened bargaining power, and reduced costs for collection, transportation and storage. Likewise, special **agreements between producers and retailers**, whether multiple or specialist, can result in win-win situations, where retailers commit to buy at a fair price products that meet specific high quality standards. Cooperation seems to be more likely to occur in countries and sectors with a strong tradition of cooperation like organic milk in Germany and organic pasta in Italy, where SC operators have developed together an interest in long-term economic sustainability and mutuality. Our case studies suggest that SC management based on cooperation is a precursor for successful **product differentiation** strategies in addition to organic, including the development of supplier brands such as the cases of organic milk in Germany (e.g. Bioland) or traditional-high quality organic pasta produced in Italy and sold in a supermarket chain.

On the other hand, the cases of low share of added value to producers can be related to the following circumstances:

- A lack of investment in special processing and storage facilities, and a lack of chain integration, were reported as structural weaknesses of the organic sector, preventing the development of efficient networks for collection, storage and processing. A **supply-demand paradox** seems to occur in some fragmented organic food chains, where producers find demand insufficient to justify scaling up organic production, and upstream operators find the supply insufficient to invest in special facilities for organic products. This is illustrated by the case of organic durum wheat production in Spain, which is usually exported to other countries, because of the limited domestic processing capacity to produce organic pasta.
- Typical examples of **power imbalances** were found in the markets for organic apples in France and Italy, which are the largest producers of organic apples in the EU, and where the downstream actors have developed their positioning strategy by providing integrated solutions and becoming strategic partners for their customers. The share of added value at wholesale level for apples was found to be remarkably high in Italy and France, while producers capture a relatively small share. The Italian and French case studies were conducted in two regions, Bolzano and Languedoc Roussillon, which are highly specialised in organic fruit production. The wholesalers play a central role, providing services for transport, storage, calibrated packaging and distribution. Another example where a downstream firm has strongly developed its positioning strategy is represented by the case study of pasta SC in Italy, where a big firm specialised in organic food distribution and retailing has appropriated value from other supply actors, and operates in a 'near-monopoly' situation according to some expert interviewees. This case study suggests that power imbalance between producers and retailers are not necessarily connected only with supermarkets.

Conclusions

Despite the positive market context which is currently characterising the EU organic sector, it seems that organic production alone may not necessarily be able to overturn the added value squeeze at the farm level, even though organic farm-gate prices have been always found to be higher than conventional. However, the variability of findings shows that successful examples for a fair distribution of added value in organic SCs exist in various outlet types and in various stages of development of the organic market.

If the potential of the growing market for organic food is to be realised at the production level in the EU, special effort is needed in some key areas that can help organic operators achieve economies of scale and reduce the SC fragmentation, which is still greater than in conventional chains. Producers can implement better SC and production solutions through cooperation and through product differentiation. There also seems to be a strong case to support investments in post-production operations, such as processing and storage infrastructures dedicated to organic food chain products. Finally, a priority area for the future development of the organic sector is the improvement of the availability of public data on the organic market, such as demand/supply and benchmark prices for specific products throughout the organic food chain. Market transparency is indeed vital to assist market players and policy makers in their investment and decision choices.

The 'Value added' research project was led by the German Thünen-Institute. Other partners were Università Politecnica delle Marche (Italy), FiBL (Switzerland), and partners in other six EU countries (the Czech Republic, Denmark, Estonia, France, Hungary and Spain).

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Homeopathy at Wellie Level

*This Autumn, ORC Livestock Researcher **Lindsay Whistance** attended a three-day course run by Homeopathy at Wellie Level (HAWL). This is a course that is tailored specifically for farmers and stockmen.*

I no longer work as a stockman so my main motivation for attending the course was first, to learn more about a 'like cures like' approach to healing, and second, to be able to interact with and better understand farmers who choose to use homeopathy as part of their repertoire.

Others attending the course represented conventional, organic and biodynamic farming as well as animal sanctuaries. Throughout the course it became clear that all farm types, herd sizes, species and animal age groups could benefit from the use of homeopathy and the focus on different species and age groups made for really interesting discussions. The lectures, delivered mostly by practising homeopathic veterinarians, were broken up with discussions and quizzes geared towards making us take decisions and ownership of a situation. Differences in approaches were discussed and really helped us to become more confident as the course progressed.

Each of the three days focussed on different aspects of homeopathy. The first day looked at the eight principles and the 'big six' remedies that farmers might typically use in their herds and flocks. We learned that each living creature contains a vital force that helps the body to maintain balance. When imbalances occur, the body strives to regain balance and it is this process that homeopathy focusses upon. Rather than attempting to eradicate, for example, bacteria which are ever present, homeopathic remedies are aimed at helping the body to help itself. Crucially, it only needs to be 'prompted' to activate the healing process by a remedy that causes the same pattern of symptoms in a healthy body, hence the term 'like cures like'.

Receiving a 'goodie bag' with a selection of remedies including the 'big six' and some reading material was a welcome surprise at the end of the day and enabled some of the group members to begin practising with them. Feedback and discussions on these cases enlivened proceedings on day two!

The second day was dedicated to taking cases for acute illness. As someone with an abiding interest in animal behaviour and welfare, I was very interested to see just how observant one needs to be to take a case history. One of the hardest things to do was to stop giving diseases a 'name' and to focus instead on the individual animal, determining what was wrong with it (location), what was going on when the disease began (aetiology), what else was wrong (concomitants), and what made the animal feel better or worse (modality) – LACM. Although the relevance of these aspects is minimised (or even ignored) with conventional treatments, most animal carers are nevertheless aware of these other things going on so the difficulty wasn't so much in 'seeing' them but in changing our perception of their value when identifying the correct remedy.

Day three was concerned with chronic cases and revision exercises. This was a day for focusing on animals that are 'never quite right', where 'if it's not one thing, it's another'

Box of homeopathic remedies

and because taking a case for these animals is more difficult, two more categories were added to LACM. These are 'behaviour' and 'generals or themes' (LACMBG). The timeline for case-taking is also necessarily longer for these individuals and the value of good record keeping became really obvious at this point.

The revision on day three included a recent case of three calves in the same group becoming ill after the wind had changed to a cold easterly. The three calves developed symptoms over a 24-hour period and although most symptoms were present in all three, there was enough of a difference for the study group to arrive at a different remedy for each of the calves. As we had been shown, we systematically worked through taking a case history and then using the 'Repertory' to see which remedies were appropriate for each symptom. We then counted up each time a remedy was named to identify the one most often recommended. Finally, we double checked in the 'Materia Medica' that this was indeed an appropriate remedy. The veterinarian lecturer who treated these animals confirmed that they were indeed the appropriate remedies and that the calves had regained health. This case really impressed upon me that it is the individual that is being treated – not the disease.

Learning about the remedies encouraged us to think about animals in their 'wholeness of being' and that any imbalance or dis-ease can be addressed, whether this originates in the body, the mind or the heart. On the first day, a traffic light system of colours was used to describe the health spectrum, where Green was health and Red was where veterinarian aid was needed. Amber was the state that included the progression from Green to Red and from Red back to Green and it was here that homeopathy was considered to have the most important part to play.

Verdict? Well worth the time and effort but now I need to remember to practice!

http://hawl.co.uk/

Agroforestry that will advance rural development

*Agroforestry was one of the buzz words of 2017, with a highlight being the Agroforestry 2017 conference at Cranfield in June attended by around 250 people including 130 farmers and foresters (see Issue 122 for a report on the event). This year also marked the end of our four-year European research project AGFORWARD, or AGroFORestry that Will Advance Rural Development. Agroforestry researcher **Jo Smith** looks back on what's been achieved in this project, the first for ORC to focus solely on agroforestry.*

How much agroforestry is there in Europe?

One of the key objectives of AGFORWARD was to understand the context and extent of agroforestry systems in Europe, a task which was a lot more complicated than it seemed at first sight. Land classification systems often don't pick up the differences between agriculture, agroforestry and forestry. Information on the extent of agroforestry in Europe is essential for the development of supporting policies; the fact that this information doesn't already exist reflects the difficulties of defining what agroforestry is (and isn't). A team led by Michael den Herder at the European Forestry Institute in Finland used the Land Use and Land Cover survey data from Eurostat, and used three main agroforestry categories based on the main farming focus and components: arable agroforestry, livestock agroforestry and high value tree agroforestry, with some overlap between the categories (high value tree agroforestry can include either arable or livestock components). In total, the team estimated that agroforestry in the EU 27 covers about 15.4 million ha (3.6% of territorial area and 8.8% of the utilised agricultural area (UAA))[1]. Of this, livestock agroforestry is the dominant system, covering 15.1 million ha, with the largest areas in Greece, Spain, France, Italy and Portugal. High value tree agroforestry covers 1.1 million ha, again with a focus in the Mediterranean countries. Silvoarable systems cover just 0.3 million ha with the dominant system combining arable crops with olive trees (109,000 ha). In the UK, agroforestry covers just 3.3% of the UAA with livestock agroforestry being the dominant type. Considering the many benefits that integrating trees and agriculture can bring with regard to balancing productivity with protection of the environment, there is a real need to look at how we can encourage uptake of agroforestry through better support mechanisms, knowledge exchange and skill-building.

Working with agroforestry farmers

At the heart of the project has been a network of 42 groups involving 665 agroforestry stakeholders who, in collaboration with the research institutes, have been developing and then field-testing innovations to improve their agroforestry systems. These have included farmers of traditional agroforestry systems such as the beautiful cork oak landscapes in Portugal and Spain, the bocage hedgerows in northern France, and wood pastures in Hungary, UK, Romania and Sweden; farmers of high value tree systems interested in introducing grazing or intercropping, including olive orchards in Italy and Greece, and grazed apple orchards in France and the UK; arable farmers in Spain, France, Italy, Greece, Germany and the UK; and pig, poultry and ruminant livestock farmers in the Netherlands, France, Italy, Spain, Denmark and the UK. The innovations trialled were really diverse, ranging from introducing free range and organic chickens into commercial apple orchards in the Netherlands to growing wild asparagus in olive orchards, to trialling 'invisible fencing' to control cattle movement in UK wood pasture systems, to investigating the establishment of valuable timber trees on arable land in Switzerland. More information on the different groups and trials can be found on www.agforward.eu. A key output from these various trials are a suite of 'innovation leaflets' which can be found at www.train.agforward.eu. In the UK, we worked with two stakeholder groups – silvoarable and silvopastoral farmers – which led to four on-farm trials. The silvoarable stakeholders identified two innovations to investigate — developing agroforestry-adapted cereals, which we trialled at Wakelyns Agroforestry (Box 4), and managing the tree understorey as a productive part of the system, which we explored with Iain Tolhurst at Tolhurst Organic CIC (Box 1). The silvopastoral stakeholders identified the development of shade tolerant understorey swards in woodland eggs/chickens as an innovation, and the value of tree fodder as an area that needed more investigation. We worked with the silvopoultry trial site at FAI Farms in Oxford to test and compare three sward mixtures from establishment to introduction of the chickens (Box 2), and on our own farm, carried out a pilot project on tree fodder (Box 3).

Agroforestry policy

A recognised barrier to greater uptake of agroforestry has been a lack of policy support, particularly in the UK where agroforestry has fallen through the gaps between agricultural and forestry policies. A review of policies relating to agroforestry in its broadest sense was carried out by a team led by Rosa Mosquero-Losada at the University of Santiago[2]. This report highlighted previous problems with European policies which set a threshold of 50 trees/ha above which farmers risked losing their direct payments (Pillar 1 of the 2017-2013 CAP); this threshold increased to 100 trees/ha in the current CAP but there is still confusion about how this is implemented in the different member states.

AGFORWARD

The Agforward project brought together a truly multi-disciplinary and international team of researchers with a common aim of promoting agroforestry practices in Europe that will advance rural development through improved competitiveness, and social and environmental enhancement. The project involved two international agroforestry institutions and over 23 universities, research and farming organisations from across Europe, and was coordinated by Dr Paul Burgess and his colleagues at Cranfield University in the UK.

AGFORWARD (Grant Agreement N° 613520) is co-funded by the European Commission, Directorate General for Research and Innovation, within the 7th Framework Programme of RTD. The views and opinions expressed in this report are purely those of the writers and may not in any circumstances be regarded as stating an official position of the European Commission.

Within Pillar 2 (the Rural Development Programme), the review identified 27 measures that can benefit or support agroforestry systems, including measures to support forest understorey grazing to reduce fire risks, forest farming, hedgerows and forest strips in arable lands or grazing in orchards[2]. The specific agroforestry measure (Measure 222 in CAP 2007-2013 and sub-measure 8.2 in CAP 2014-2020) supports the establishment (and management in CAP 2014-2020) has been implemented in only a limited number of RDP programmes (10 RDPs in CAP 2007-2013 and 12 RDPs in CAP 2014-2020). We have identified 15 recommendations to improve policy support for agroforestry in Europe[3]. One of the more innovative recommendations is the introduction of an 'agroforestry option' within each of the three categories of land use in Pillar 1 (arable land, permanent pasture and permanent crops), to be self-declared by the farmer, and supported by the submission of a management plan. This would ensure that agroforestry farmers maintain their eligibility for direct payments, one of the key barriers to agroforestry uptake in previous CAPs. These policy recommendations were presented to DG Agri in Brussels in October at a final high profile event in the European Parliament on November 29th.

Outputs

To complement the research outputs of AGFORWARD, a wide range of resources have been developed for students, farmers and policy makers. These include training tools for farmers, technicians and students, including reports, presentations, videos and booklets, hosted on www.train.agforward.eu. These will be added to in the final few months of the project. The ORC has produced a number of short films focusing on UK agroforesters including Iain Tolhurst, Alan Schofield, Ted Green and Wendy Seel, which can be found on-line at https://vimeo.com/channels/AGFORWARD

What next for agroforestry at ORC?

The AGFORWARD project has been a major project for the agroforestry team at ORC, and has opened up many new opportunities for on-going collaborations and new areas of research. The Agroforestry Innovations Network (AFINET) project which started in January 2017 is a great follow on to Agforward. AFINET is focused on making the outputs of research projects such as AGforward more accessible to farmers and other stakeholders. In the UK, we are working with the Farm Woodland Forum and have three on-farm agroforestry workshops planned for early 2018 (see back cover).

We also have a new project on using woodchip for soil fertility (See WOOFS p18)

In terms of research, the value of tree leaves as a fodder for livestock is a new theme that has been developed through AGFORWARD which has triggered a lot of interest and we would like to expand this in the future.

Acknowledgements

We gratefully acknowledge the cooperation and collaboration of Iain Tolhurst and his colleagues at Tolhurst Organic CIC, Martin Wolfe at Wakelyns Agroforestry, FAI Farms and Cotswold Seeds, and Brian Goodenough and Matthew Prince at Elm Farm. Thanks also to ORC interns Celine Venot, Dorothee Baum, Meg Cathcart-James and Valentin Deremetz for assistance with fieldwork and data collection.

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Harvesting tree fodder from an ash tree, June 2016

Box 1: Making the most of the space available – cropping the tree understorey

Planting trees into arable or vegetable fields means taking up to 20% of the land out of annual cropping. There may be no return from the trees for many years after planting; ranging from five years for top fruit and short rotation coppice to several decades for timber trees. In many agroforestry systems, the area between the trees and under the tree canopy is underutilised and unmanaged. This can create problems with weed control. One option is to plant alternative crops in the tree rows to provide an income in the years following tree establishment, or longer if shade tolerant species are used.

Working with organic grower Iain Tolhurst (Tolly) of Tolhurst Organic CIC, we compared the impact of different approaches to understorey management on economics and biodiversity (plants, including weeds, and invertebrates). Trees were planted in one field in March 2015 (see ORC Bulletin No.119 for more details), with a range of different crops established under the trees (Table 1).

Plant biodiversity, as measured by species richness, increased over time in the tree understorey in all rows with the exception of the long-term beetle bank, which was already well established at the time of tree planting and remained relatively stable in terms of species number and composition over the three-year monitoring period. The evenness of the species distribution in each of the tree rows increased over time, as the cover of the sown fertility building legumes (*Trifolium pratense* and *Trifolium repens*) declined while other unsown species appeared. Without management, grasses and other unsown species may start to dominate the understorey. For example, couch grass (*Elymus repens*) was seen to increase in the tree rows over time and this could potentially spread into the cropping areas and cause problems. Couch growth is more vigorous in the first year after tillage ceases. It is sensitive to shading and over time the amount of couch between the trees is likely to reduce as the cover increases; however it may still be a problem in the disturbed edges between the tree and the cropping areas.

Table 1: Description of understorey composition (T=Tree row)

Row	T1	T2	T3	T4	T5	T6
2015	Legume and herb mix planted July 2013	Long term beetle bank	Grass, vetch, red clover	Natural regeneration	Legume and herb mix planted July 2012	Legume and herb mix planted July 2012
2016	Legume and herb mix planted July 2013	Long term beetle bank	Grass, vetch, red clover	Rhubarb crowns planted Spring 2016	Daffodils and narcissi planted Dec 2015	Daffodils and narcissi planted Dec 2015
2017	Globe artichokes planted April 2017	Long term beetle bank	Herbaceous cut flowers planted May 2017	Rhubarb crowns – 25 plants replaced	Daffodils and narcissi	Daffodils and narcissi

Rhubarb in understorey at Tolhurst Organic

A large proportion of the establishment cost was for reinforced wire mesh cages to protect the apple trees from deer damage. This cost was covered by the charity supporting the initial tree planting, but may be a barrier that prevents other farmers from planting such systems where deer pressure is high. If markets can be established for the new crops then the addition of understorey crops makes the short term financial picture look better, spreading the risk and repaying the establishment costs within a 2-3 year period. These crops need to be chosen carefully for disease resistance and ability to compete with the existing vegetation. Over time, competition with both the understorey vegetation and the trees is likely to affect the viability of the understorey crop. Different crops may be more appropriate at a later stage or it may be that, as the system matures and a return on the trees is seen, there is no longer a need for understorey crops. The management implications of introducing new crops into an already diverse system should also be considered, particularly with regard to labour requirements, timing of harvesting and any ongoing maintenance.

Box 2: Establishing shade-tolerant swards in silvopoultry systems

It is well known that free-range poultry are more inclined to use the range when it is enriched with trees, and feather pecking is also reduced when more hens use the range. Thus, establishment of trees in the outdoor run is considered to improve hen welfare. However, an issue with existing poultry agroforestry systems identified by producers of the Sainsbury's Woodland Chicken Development Group is the lack of vegetation under the trees due to a closed canopy reducing light levels at the ground; and where trees have been pollarded to open up the canopy, weeds have established rather than grasses. The development of a shade-tolerant sward mixture that could establish and survive under the trees and also offer potential nutritional (and perhaps medicinal) benefits for the chickens was identified as a priority by the producers. We worked with Cotswold Seeds to develop three sward mixtures to compare, and trialled these mixtures in the silvopoultry experimental site at FAI Farms in Oxford. The mixtures were sown in replicated 15 year old mixed broadleaf plots and compared with a natural regeneration control. Mix 1 was a commercially available standard sward mixture for chicken enclosures, Mix 2 was a customised grass-only sward mixture with shade tolerant species and Mix 3 a diverse sward mixture including grasses, legumes and forage herbs. Chickens were excluded for the first three months to allow sward establishment and then introduced for a six week period at two densities and compared with control plots without chickens.

Findings from this trial demonstrated that establishing a sward under the trees is possible but the challenge is to maintain the sward in the presence of chickens. Optimising chicken pressure appears to be the key to maintaining a sward. Once the trees are thinned, commercially available seed mixtures can be sown to provide ground cover. This has economic implications for poultry keepers as the more specialised mixtures are likely to have higher seed prices as the seed is more expensive to source. Sward establishment rates increased one month after sowing for all mixtures, indicating higher weed suppression potential after four weeks and minimum growth time required for establishment. In order to develop systems that are beneficial for both farmers and chickens further research is needed into how to distribute the flock more evenly, therefore spreading the pressure across the range.

Trialling sward mixtures at FAI Farms, with and without chickens

Box 3: Tree fodder – food for thought

The value of tree leaves as livestock fodder is of increasing interest to farmers, as a buffer to climate change impacts on forage yields and quality. Within AGFORWARD we carried out a small pilot project to investigate the fodder value of some selected tree species on Elm Farm. Leaf samples were collected from Short Rotation Coppice (SRC) alder (*Alnus glutinosa*) and willow (*Salix viminalis*) in August 2015, and from ash (*Fraxinus excelsior*), goat willow (*Salix caprea*) and elm (*Ulmus minor)* trees on Elm Farm in June 2016. Leaf samples were taken from whole branches in both the SRC trees and standard trees; thus leaves were of varying ages. As part of a pilot study on the effect of air-drying tree fodder over winter and testing palatability, branches of the ash, goat willow and elm were bundled, tied and left to dry naturally in a covered barn from June to March. In March, leaf samples were taken from the air-dried bundles, before the bundles being fed to housed cattle and young stock (See video at https://vimeo.com/217077820).

Table 2. Chemical composition of tree leaves

Common name	Latin name	Date sampled	Dry Matter (%)	NDF (% DM)	ADF (% DM)	Lignin (% DM)	DOM (%)
Willow	*Salix viminalis*	Aug-15	33	37.29	22.12	11.33	55.29
Common alder	*Alnus glutinosa*	Aug-15	38	37.61	24.76	13.51	76.19
Ash	*Fraxinus excelsior*	Jun-16	39	29.59	14.84	5.02	85.68
Goat willow	*Salix caprea*	Jun-16	35	32.15	20.57	8.77	73.51
English elm	*Ulmus minor*	Jun-16	37	43.06	12.15	3.31	77.72

Digestible organic matter (DOM) varied between species, with lowest levels recorded for samples collected in August (Table 2). However, DOM of the other species was higher and compared favourably with typical livestock forages such as hay (47-67%), grass silage (52-67%) and grazed grass (64-75%).

Feeding air-dried tree fodder to cattle and youngstock at Elm Farm

The greatest potential for tree fodder, however, may be as a source of minerals, particularly to address deficiencies in feed or forage. Essential mineral elements are those which are known to have a metabolic function in animals or plants. Zinc is present in all animal tissue, organs and bones, playing an important role in growth, cell repair, hormones, enzyme activation, the immune system, and skin integrity. Zinc also plays a role in the optimum utilisation of nutrients and a deficiency can impair protein and carbohydrate metabolism. Willow is particularly high in zinc, with *Salix caprea* containing 144 mg/kg DM and *Salix viminalis* containing 245 mg/kg DM. The level of zinc in willow is substantially higher than those found in grass at 5 mg/kg DM, in silage at 25-30 mg/kg DM and in hay at 17-21 mg/kg DM. Levels of iron were notably high in the dried samples and in elm, in particular, at 258 mg/kg DM. Willow and alder contained substantially higher levels of manganese than other tree species. All the tested elements increased in the air-dried leaves compared to fresh leaves although where levels were low in the fresh samples, this increase was minimal. For example, phosphorus in elm was 2.3 g/kg DM fresh and only 2.4 g/kg DM air-dried. Levels of phosphorus (an essential component of the skeleton) were highest in the dried goat willow (5.5 g/kg DM) but all trees compare favourably with grass at 2.8-3.5 g/kg DM, silage at 2.0-4.0 g/kg DM and hay at 1.5-3.5 g/kg DM.

The results of mineral analysis in this study add to the existing body of knowledge which is being compiled in an online database (http://www.voederbomen.nl/nutritionalvalues/). However, differences in mineral content between species, between fresh and dried samples and between seasons indicate that the value of tree fodder can be better understood with further analysis. The high levels of minerals in tree fodder suggest that trees can offer an alternative source of mineral supplementation. The higher levels in dried samples, compared to fresh, suggest that there is further scope to extend the value of minerals in tree fodder beyond the growing season.

Box 4: Developing agroforestry-adapted cereals at Wakelyns Agroforestry

Growing trees and cereals in close proximity to each other, as in alley-cropping systems, means that the two components may compete with each other for resources such as water, light and nutrients; in such situations, cereal yields may be lower, particularly in the alley edge zone, adjacent to the trees. The development of arable crops specifically adapted for agroforestry systems was identified as an innovation for further development at the UK silvoarable stakeholder workshop. Evolutionary plant breeding can be used to develop varieties that are particularly well adapted to growing in close proximity to trees. The principle is to let natural selection act on these diverse crop populations to select the plants that are best suited to the prevailing conditions i.e. develop an 'alley-edge' population and an 'alley-centre' population.

At Wakelyns Agroforestry in Suffolk, a replicated cross-over experiment aimed to compare performance of selected material in each environment based on the hypothesis that wheat lines will perform best in the environment from which they were selected (i.e. 'alley-edge' selected lines will perform better in the 'alley-edge' plots than 'alley-centre' lines). A spring wheat composite cross population (CCP) was grown in plots across the willow system agroforestry alley in 2014. Plots of bulk CCP were selected and harvested separately from plots on either side of the alley, adjacent to the tree rows (East of Trees (EOT), West of Trees (WOT)) and the Centre of Alley (COA). In spring 2015, plots measuring 1.2m by 10.2m were drilled in a replicated cross-over trial (i.e. where plants selected from each alley location in 2014 were grown in each of the three alley locations in 2015 in three blocks) in a hazel Short Rotation Coppice (SRC) agroforestry system.

In 2015, wheat yields ranged between 0.90 and 3.99 t/ha (@15% moisture content); hectolitre weights between 367.83g and 383.79g (@15% m.c) and thousand grain weights between 42.90 and 50.48g (@15% m.c.). There was a significant effect of location on yield and hectolitre weight, but not on TGW. Yields and hectolitre weights were significantly higher in the centre of the alley than at either edge (Figure 1). There were no significant differences between the different selections (EOT, COA and WOT) for any of the yield parameters, and no significant interactions between the selections and their locations. This suggests that in 2015, there was no adaptation of selected populations to their selected locations (i.e. EOT populations do not perform any better in the EOT locations than in the other locations).

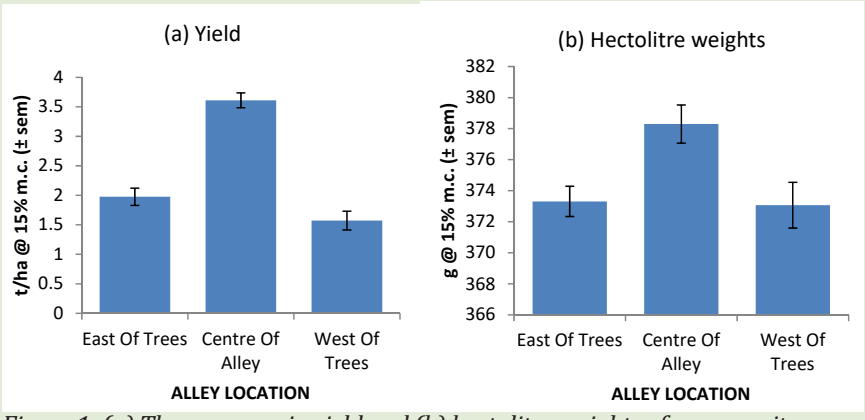

Figure 1: (a) The mean grain yield and (b) hectolitre weights of a composite cross population (YQCCP) in three positions across a ten metre wide alley in 2015

In 2016, in contrast, some differences emerged when looking at the yield of the three populations. The same trial design as in 2015 was sown in a different alley between two willow rows, one of which had previously been coppiced. Yields ranged between 0.7 and 2.2 t/ha, with the EOT bed (alongside the coppiced willows) yielding 30% more the other positions combined (results not shown). This contrasts with the 2015 results where the central alley location yielded highest (Figure 1) and is probably due to lower competition for light in the EOT bed compared to the standing tree row on the other side. As far as the three selections are concerned, while there were no significant differences between the selections from the centre of the alley vs. the selections at the two edges, between these latter, the EOT selection yielded 35% more than WOT selection, regardless of the location (Figure 2). No significant interaction between alley location and selection was found. In conclusion, these results suggest that a population reproduced on the eastern side of a tree row for two seasons can becomes more productive than the same population reproduced in other positions in the alley. Whether this is because of natural selection due to differential environmental pressure across the alley, resulting in an advantage for the EOT position, or because conditions in the WOT (e.g. persistence of high humidity) results in less healthy seeds is not clear, but the reasons are worth investigating.

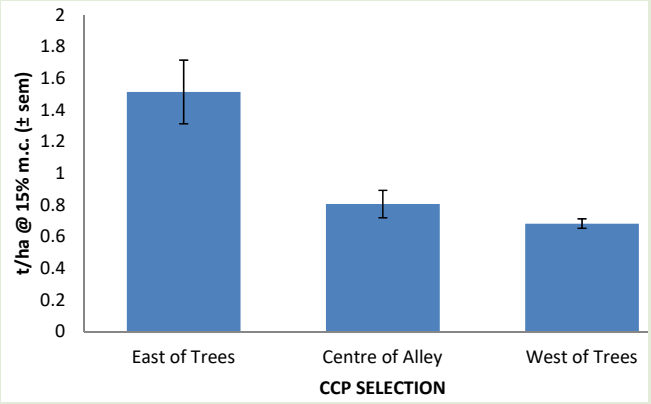

Figure 2: Spring wheat grain yield of the YQCCP population selected in the East of Trees, Centre of Alley and West of Trees positions in 2016.

Project news

WOOFS: WOOdchip For Fertile Soils

WOOFS is a new EU-funded EIP Operational Group of researchers, farmers and foresters from the UK. The group is led by ORC and formed to investigate the role of woodchip in soil health, to provide an incentive for farmers to manage woody elements on their farm as part of a whole farm system..

There is evidence to suggest that the application of uncomposted (ramial) woodchip at an appropriate phase in a crop rotation can increase soil organic matter, water-holding capacity and nutrient levels of soils. However research on this subject is limited. This project will trial the addition of uncomposted vs composted woodchip from on-farm woody resources as a soil improver. By linking management of farm hedges and trees with the improvement of soils for agricultural production and providing an additional economic incentive for management of hedges and on-farm woody resources the project aims to increase the sustainability of the system as a whole. Through partnership with farmer, forestry and adviser groups results will be disseminated via a range of mechanisms including conferences, workshops, web material and technical leaflets.

Replicated field trials will be set up on three farms in the South of England this winter and will run for three years. Alongside the trials, a review of existing research and knowledge on the subject will be carried out and management plans for farm hedges and woodlands will be produced to ascertain the potential for on-farm production of ramial woodchip.

Agroecological soil management

This EU-funded EIP Operational Group will assess the potential for deriving targeted recommendations for soil management in organic and agroecological farming through the commercial use of alternative soil analysis techniques.

Organic and agroecological farming is fundamentally based on management of soil life and ecology to optimise forage and crop productivity. This dependence on soil life distinguishes these systems from conventional farming, where plant nutrient supply is largely focused on provision of soluble nutrients in the form of fertilisers that can be readily absorbed by the plant. None of the current techniques for soil analysis have been systematically assessed for their suitability to provide sound recommendations for soil management and nutrient availability specifically for organic and agroecological farming.

The project will compare Albrecht (Base Cation Saturation Ratio) analysis, and soil respiration analysis with Standard (pH, P, K, Mg, organic matter) soil analysis. These approaches will be compared in field trials on three different dairy farms in the UK: Duchy Home Farm (David Wilson), Severn Dale Farm (Lyndon Edwards) and Glebe Farm (Wil Armitage). The trials started in August 2017 and will run through to Spring 2020. The farmer-led project involves farmers, advisers, researchers and soil analysis service providers who will bring experience in these techniques.

The above projects are funded by the European Agricultural Fund for Rural Development and the RDPE/Defra

OK-NET EcoFeed

Organic Knowledge Network on Monogastric Animal Feed (OK-NET EcoFeed) is a three-year project funded by the EU's Horizon 2020 research and innovation programme, starting in January 2018. It is led by the IFOAM-EU Group and there are nine other partners from across the EU including the Soil Association. It aims to help farmers, breeders and the organic feed processing industry achieve the goal of 100% use of organic and regional feed for monogastrics; in particular pigs, broilers, laying hens and parents of broilers and laying hens. It aims to close the research and innovation divide in this area by summarising, sharing and presenting best practice, and communicating relevant research that is not widely known by practitioners.

ORC will coordinate the Innovation and Thematic Groups. OK-Net EcoFeed will work with 11 Innovation Groups (IG) across the EU, facilitating cross-border knowledge exchange through the implementation of Thematic Groups (TG), for pigs, broilers and laying hens. OK-Net EcoFeed will work in a bottom up way, to identify agricultural and feed processing practice, innovative ideas and practices to inform the subsequent work of the project. The project will use a 'Science Bazaar' approach, to identify the most urgent knowledge needs to focus on. The TGs will identify cross-sectoral issues and synergies.

Project outcomes will include factsheets, videos and ration-planning tools (lack of nutritional information has been identified as a major knowledge gap by end-users). All will be disseminated through the OK-Net Knowledge Platform (farmknowledge.org), that has the ambition to be the central hub for practice-oriented knowledge on organic farming in Europe, as well as through practice abstracts to be uploaded onto the EIP-AGRI website.

The above project received funding under agreement No. 773911 from the European Union's Horizon 2020 research and innovation programme.

Sustainable economic and ecological grazing systems

The three-year 'Sustainable economic and ecological grazing systems - learning from innovative practitioners' (SEEGSLIP) project is led by the Centre for Ecology and Hydrology and funded by the UK's Global Food Security Programme. It aims to evaluate the ecological, agronomic, economic, environmental and social impacts of the pasture fed livestock approach to grazing management and its potential as the basis of a more sustainable GB-wide system.

It aims to provide much-needed evidence about the benefits of pasture fed livestock approaches ('herbal leys', 'diverse swards' and 'mob grazing') for those farming grazing livestock, consumers of Pasture for Life (PfL) products and the wider public. Such evidence will be valuable for livestock producers (including those already engaged in the practices) and for government and farming bodies, like the Agriculture and Horticulture Development Board (AHDB) with the power to influence farmer decision-making.

ORC's input will focus on the application of the Public Goods Tool on 60 Pasture Fed Livestock farms.

First European Congress on Agroecology

Agroecology Europe is an association which aims to promote Agroecology in the farming and food sector and beyond in Europe. The Association organised the first Agroecology Europe Forum in October in Lyon (France). The three day conference was packed full with sessions on a range of interesting topics. ***Susanne Padel*** *and* ***Ambrogio Costanzo*** *report back.*

'Go agroecology' or 'go organic'?

On the first day, there was an interesting question as to whether 'going agroecology' would be more beneficial than 'going organic' and to try and work out how "the science, the movements and the practice of agroecology" relate to each other. Some delegates were clear that organic agriculture and agroecology are often seen as opposed ("organic agriculture is farming according to a recipe") and that there is mistrust at times and that should be addressed. For those of us used to working with UK organic farmers and seeing agroecology and organic as nicely overlapping, this antagonism doesn't seem real. But the perception is there and is linked to experiences and perspectives in different countries.

Agroecology and food sovereignty

In the opening plenary, Jan Douwe van der Ploeg, of Wageningen University, highlighted many of the hidden treasures of agroecological farming in Europe that are poorly recognised (for example, in relation to hedge management, weed control in pastures or farmers' markets). Agroecology is often focused on poorer farmers, but it can and should help to realise win-wins for economy and ecology in farming. He also reminded us that agriculture (and agroecology) needs interaction between social, biological and other sciences, perhaps in the form of Action Research with farmers and growers in the driving seat.

Co-evolution of organic farming and agroecology

During the session we heard from Erik Gall of IFOAM-EU, who claimed that most farmers practising agroecology in Europe are organic farmers. However, US organic farmer John Hayden has practised agroecology for 25 years and contrasted his approach with his neighbouring organic farmer who is certified by NOP but not at all tuned into agroecology. However, the roots of organic farming and agroecology are clearly very closely related and one of the workshops agreed that the presence or absence of regulation and certification appears to be one of the major differences between them. The jury is out as to whether in all countries and all sectors certification is always the most important step. Certification should provide consumers with reassurance that the principles that we expect from these practices are really upheld at the farm level, but we are all aware that this is not always the case. Certification is absolutely essential for building trust. The organic sector could do more to engage in debates about the underlying philosophy and the principles with all its constituents. In this workshop Susanne Padel presented on 'Transitions to Agroecological Systems', showing pathways in the transition towards agroecology and organic farming based on UK examples (more in next Bulletin).

There are other options that could be developed including third party certification and participatory guarantee systems (e.g. PGS). One participant proposed the idea of a more dynamic certification system where farms have to demonstrate how they improve their farm every year instead of simply fulfilling the minimum requirements. John Hayden stated that for them farm certification is a marketing strategy. He pointed out that many people assume that local products are organic and that is a frustration, shared by many.

A number of workshops filled three intense days, from the application of participatory approaches, to a fresh look at legume cropping systems. We were particularly engaged by the workshop on the role of digital solutions and new technologies. Is the 'digital revolution' compatible with agroecology, which is founded on independent experimentation rather than a high dependency on external support services? How can these technologies support 'true' agroecological innovation, where farmers take back the control of their solutions? The response depends on how the technologies are designed and (especially) who is involved in their design, as the experiences presented by the speakers from the Capsella[1] project showed.

Highlights of the closing plenary included contributions from the floor; demanding more agroecology in agricultural policy making and in education; and a call to 'ban all pesticides'. Travelling home it occurred to me that the concept of organic farming without pesticides is still a radical and challenging one. Set aside the dangers that some associate with certified organic farming - of the dominance of corporations and large supply chains. There is still a lot to do to realise that vision.

References/further reading

1. http://www.capsella.eu/

http://www.agroecology-europe.org/agroecology-forum-2017/

Abstracts of all talks and posters can be downloaded here: http://www.agroecology-europe.org/abstratcts-talks-posters/

Staff news at ORC

Olivia Davies

Olivia joined us in August as Communications Assistant on the Agricology project. After 15 years in the events and marketing world, Olivia took a two-year diploma in Countryside Management. She has a deep-rooted passion for the environment and sustainable farming and joins the team to work on the social media and website content.

Alexander Jackson and Tegan Gilmore

We said goodbye to Alex, who leaves our admin team to pursue his career in the music industry; and Tegan who has been assisting our Crops team this season.

UK fears US decision on organic hydroponics post-Brexit

In early November the United States Department of Agriculture's (USDA) advisory body, The National Organic Standards Board (NOSB), met in Jacksonville, Florida, to vote on a proposal to outlaw organic hydroponic systems under US Organic Standards. The vote came down narrowly in favour of allowing organic hydroponics. ***Phil Sumption*** *considers the consequences.*

Photo: Dave Chapman/KeeptheSoilinOrganic

Organic tomatoes growing at Wholesum Harvest

The decision raises a number of issues for organic production both in the US and in the UK and Europe. One of the IFOAM Principles of Organic Agriculture is the Principle of Ecology. This states that: Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. In the case of crops this means that production should be based on the living soil.

These principles, wholly endorsed by ORC, are reflected in UK and EU organic standards. We believe that ecological systems feeding the soil and not the plant are fundamental to organic production. In the last few years some US organic certifying bodies have allowed organic hydroponic production to carry the USDA organic label, which has mobilised pioneer organic farmers and growers to protest against this. Despite these protests and rallies the National Organic Standards Board (NOSB), which comprises 15 invited representatives from industry (including organic farmers), voted narrowly to allow hydroponics.

They also voted to allow container growing and aquaponics, while outlawing aeroponic production. The EU regulation is clear: hydroponic production is outlawed and very strict rules are applied to container growing. This means that it is not possible to have equivalence between the two systems of organic certification either side of the Atlantic. ORC Director Nic Lampkin said: "This is not organic farming or organic food. Shame on the NOP for taking this position. Now we need to go for global rejection of the US position."

He continued, "In the short term, I would hope that the organic equivalence agreement between the EU and US will stop US hydroponic products entering the EU, as they are not permitted under the EU regulation.

"Of more concern is what happens when we leave the EU. Currently all the signs are that the UK will adopt the EU organic regulation and will attempt to secure bilateral equivalency agreements with the 12 countries that currently have EU agreements on similar terms. My concern though is that when the UK tries to get bilateral agreements we may be forced to accept compromises, for example, accepting US hydroponics in return for UK organic dairy producers continuing to be able to export to the US. At this stage, there is no actual proposal for this to happen. However, this is a risk that we need to consider, especially in light of trade discussions in the future."

Why grow in the soil?

The principle of soil-based production in organic farming is fundamental. This should encompass both the idea of the soil as an ecosystem and the maintenance of its biological activity and the interaction between soil, sub-soil and bedrock. While biological activity may be considered more important than connectivity with bedrock (this issue is pertinent as demarcated beds, with plants grown in a growing medium on top of concrete, are permitted in some Member States), organic production should not normally take place without both elements present. The mantra 'Feed the soil, not the plant' is well known—Healthy plants, animals, and humans result from balanced, biologically active soil.

Hydroponic production uses nutrients in solution. Reliance on liquid nutrient sources should not be permitted because a further basic principle of organic farming is that nutrients should primarily be provided from the soil and low solubility sources. Liquid feeding should only be permitted as a 'top up' to the system providing the materials used are compatible with the principle of promoting soil biological activity.

Hydroponics is a long way from agroecology - where's the ecology and interaction with other species in an agroecosystem? Some systems rely on artificial light, whereas organic farming should be about direct photosynthesis. It is an industrial process with high capital, large infrastructure and high energy intensity, even if mitigated by waste heat or solar PV.

Alan Schofield, chair of the Organic Growers Alliance said: "The implications as I see them could be very serious for all organically grown UK fruit and protected cropping and could undermine the whole market for these crops if we accept equivalence with the NOP in a post-Brexit world. At present under the 2011 USA/EU trade deal the NOP is deemed equivalent to the EU regulation with one or two exceptions. If the UK was to go for a quick trade deal with the USA, this area of organic standards will have to be revisited, as this vote could mean that the NOP has manifestly changed since 2011.

"The present UK organic market has been built on the integrity of all those who grow in the soil and this is what the consumer expects when purchasing organically grown fresh produce. This [vote} is certainly a victory for those who wish to use the organic brand but not grow in the soil."

Further reading

1. ORC (2013) Final expert report on organic protected cropping. ORC Bulletin No.113.
2. EGTOP Final Report On Greenhouse Production (Protected Cropping): https://ec.europa.eu/agriculture/organic/sites/orgfarming/files/docs/body/final_report_egtop_on_greenhouse_production_en.pdf
3. See also: Towards protected cropping standards - a principled approach in ORC Bulletin 110
4. Reports, submissions, photos and videos from the campaign Keep the soil in organic www.keepthesoilinorganic.org

Developing an industry-led Organic Action Plan for England

Since June 2017, English Organic Forum (EOF) members have been working on the development of a new organic action plan for England, to be launched early in 2018. ***Nic Lampkin,*** *Chair of the Organic Roundtable and English Organic Forum, reports on progress so far.*

Defra is supporting the process, through the establishment of a joint Organic Roundtable with the EOF. While Defra will not fund the plan directly, they will help facilitate the sector undertaking actions and may be able to provide support through other existing programmes, such as Countryside Stewardship and other RDP schemes. The schedule for the development of the action plan coincides with the development of the Agriculture Bill for post-Brexit policy, and the action plan will provide a good basis for input to that process.

The plan is focused on securing the recovery and growth of the organic sector in England to deliver environmental and other public benefits as well as market opportunities, during a period of policy and market uncertainty as we approach Brexit. A number of key challenges and opportunities have been identified. Opportunities include growth in consumer demand and export and import substitution opportunities. The challenges include halting the slide in organic land area, and getting more producers responding to the opportunities, and adapting to changed policies under Brexit.

In the first stage of the development work, six working groups have been established. These have formulated first proposals for specific action points, many building on existing initiatives from the organic sector:

Citizen access to and engagement with organic food (led by Lynda Brown of the Biodynamic Association), including a focus on home/school gardens (Garden Organic), promotion (Organic Trade Board) and public procurement (Food for Life) and similar initiatives;

Small-scale production and short supply chains (led by Jyoti Fernandes of the Land Workers' Alliance), including better access to RDP support for small scale producers, group certification and joint marketing initiatives;

Trade, national supply chains and domestic supply (led by Adrian Blackshaw of the Organic Trade Board), including improving market data, supply chain co-ordination to improve UK supply utilisation and exploiting trade/export opportunities;

Regulations and equivalency (led by Roger Kerr, Organic Farmers & Growers), including issues to be faced when UK takes responsibility for implementing regulations outside the EU framework, such as export, import, input and equivalency approvals. This is an issue that Defra implements on a UK-wide basis, so further development and consultation will include our Scottish, Northern Irish and Welsh colleagues;

Research, advice, training and information (led by Nic Lampkin, Organic Research Centre), including proposals for a joint organic information service to support new converters and existing producers, continued access to EU research funding, support for participatory research and knowledge exchange initiatives such as Innovative Farmers;

A selection of Organic Action Plans

Support for the public benefits from organic land management (led by Laura McKenzie, Soil Association) including improved conversion and maintenance support recognising public benefits (environment, society, public health) of organic farming, topped up by market actors or other companies (e.g. water companies) where there is specific need to encourage extra converters;

The initial proposals were discussed with Defra, including Minister George Eustice MP, on 1st November. They received constructive responses, with the Minister agreeing to look at several issues in the near future.

There will be further consultation on the details, and work on developing joint initiatives between organic organisations, in the next few months, which will also allow us to take account of new Brexit related policy developments expected at that time. We welcome participation in this process – please contact Nic Lampkin (nic.l@organicresearchcentre.com) if you would like to help, indicating which areas you can assist with. Nic can also be contacted for copies of relevant documents.

A workshop on the action plan has been scheduled as part of the Oxford Real Farming Conference at 12:00 on Friday 5th January 2018.

A further meeting of the Organic Roundable is planned for March 2018, with the launch of the action plan envisaged later in the spring.

Acknowledgements

Financial support for the development of the Organic Action Plan has been provided by the ATeam Foundation, Organic Farmers and Growers, Soil Association, Soil Association Certification, Organic Trade Board, Garden Organic, Organic Food Federation, Biodynamic Association and Rhug Organics.

The grain, the bovine and the ugly: unravelling the 'spaghetti soup' of greenhouse gas emissions from the livestock sector

Climate change is a classic example of a 'problem of many hands', i.e. with so many actors no one person can be reasonably held to account[1]. Despite this diffusion of responsibility, there is a growing awareness of the essential need to address consumer behaviour. With these issues in mind the All-Party Parliamentary Group (APPG) on Vegetarianism and Veganism recently organised a public discussion in the Houses of Parliament. Senior Sustainability Researcher ***Laurence Smith*** *highlights some of the issues that were under discussion.*

The environmental impact of animal agriculture has come under increasing scrutiny in light of the Paris Climate Change Agreement and the associated greenhouse gas reduction targets. A recent report[2] from Oxford's Food Climate Research Network (FCRN) has also highlighted the complexities in this area, receiving considerable coverage, and some misinterpretation, within the popular media. The relevant issues within this area were discussed at the meeting, which brought together leading experts from the fields of agricultural research, overseas trade and international policy.

Antony Froggatt, a senior research fellow at Chatham House, summarised the results from a recent report that explored the potential for reducing emissions through changes to national diets[3]. By 2050, the global livestock production industry alone could account for the entire greenhouse gas allowance agreed at the COP 21 meeting in Paris. Despite its significance there is a low level of public awareness on the full impact of meat production and in particular, the relative greenhouse gas impact of methane emissions from enteric fermentation within ruminant livestock farming. At the same time Antony highlighted that very little is being done to tackle emissions from the food system, compared to other sectors such as transport and energy.

Helen Harwatt, independent researcher and author of the recent paper 'Substituting Beans for Beef'[4] highlighted that methane heats the climate much more potently than CO_2 over a much shorter timeframe. Tackling livestock-derived methane could therefore deliver relatively quick results compared to reducing CO_2 emissions from fossil fuels. Helen emphasised that changing diets in the near term would be a 'walk in the park' compared to dealing with the repercussions of climate change in the longer term. The urgency of taking action at a policy, institutional and personal level was therefore seen as being of paramount importance. Within her research Helen found that substituting beans for beef in the US could lead to a land-area one and a half times the size of California being released. This land could potentially be used for other purposes such as wildlife conservation or carbon sequestration. Such a shift would also help to improve the health of US citizens through a reduction in cholesterol intake. Louise Davies, Head of Campaigns & Policy at the Vegan Society, also emphasised the potential synergy between environmental and public health objectives through a switch to plant-based protein and emphasised the role of policy and public procurement in encouraging a more sustainable consumption.

The group discussion that followed highlighted the fact that consumers in OECD countries currently eat twice the amount of protein they require. Whilst there is therefore considerable scope for reducing the amount of meat consumed, there was general agreement that it can be hard to tell voters how to lead their lives and many MPs in the UK feel that they have to represent their farmer constituents' interests. A suggestion was made to remove farm subsidies or to introduce a meat tax in order to raise the price of meat. Although this suggestion seemed popular with the group, it was recognised that such measures could unfairly burden lower-income families. Despite this, a desire for the true costs of production, including water pollution and greenhouse emissions, to be integrated into the price of meat was strongly expressed and recent work by the Sustainable Food Trust was referred to in this context[5]. Members of the audience were also highly supportive of agroforestry and fruit and nut production, as sustainable alternatives to meat on grassland areas, due to the environmental benefits that accrue within these systems (e.g. carbon sequestration and biodiversity increases).

The meeting was very well attended, highlighting the current nature of the issues under discussion and the sense of urgency that now exists following recognition that the next 10-20 years will be critical for greenhouse emission reduction. At the same time there is an increasing recognition of the complexity of the issues faced within the realms of meat consumption, sustainable grassland management and agricultural subsidy. The FCRN report encapsulates this complexity: "Land constraints and population growth mean we can no longer rear animals in traditional ways while also continuing to fulfil an ever-growing demand for animal products" and "the shift to intensification changes the nature of the problems, and by some measures, makes things worse". Clearly, there are multiple objectives for the production of food and public goods from a limited land-base, and a 'least-bad' solution for livestock farming may be required in order to feed ourselves and manage land areas effectively[2]. More research is clearly required and a new Centre for Ecology and Hydrology-led project involving ORC will help to shed light on this complex area (see p22).

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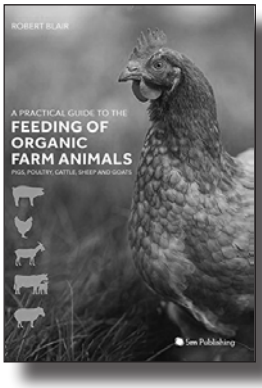
Book reviews

A Practical Guide to the Feeding of Organic Farm Animals: Pigs, Poultry, Cattle, Sheep and Goats. Robert Blair (2016). 5M Publishing



This book examines organic feeding in a diverse range of livestock species. The introduction is well written, covering a range of issues associated with the organic feeding of livestock and the challenges to consider regarding some organic regulations. It also highlights the controversial issue of what constitutes genetic modification and where to draw the line for inclusion of these products within organic feeds. Despite this being a crucial topic of debate within the organic sector, sadly, this is not discussed further. Also, within some paragraphs the author digresses from introductory information, providing far 'too much detail', which should be discussed elsewhere within a more appropriate chapter. Finally, the author fails to summarise the outline of the book and to whom it might be useful.

Chapter two briefly discusses organic feeding regulations, comparing EU and New Zealand regulations in a useful table that can be used by the reader for benchmarking. Interestingly, EU regulations from 2007 are referenced in this chapter, whereas the versions quoted in the first chapter are those of 1999. Consistency is needed. This chapter also attempts to scrutinise regulations from other countries in comparison to the EU/New Zealand, which becomes very confusing and obstructive. The author then goes on to provide a detailed summary of different feed sources, selecting specific examples within each feed category that are regularly used within livestock systems. This leads nicely into the third chapter focused on pigs.

The next three chapters discuss individual livestock systems in further detail, allowing the reader to select chapters specific to their interests. Further detail is provided on livestock digestion, explaining both anatomical and physiological features within each species. For pigs, poultry and cattle, diagrams of the digestive systems are provided, which aids understanding. Information is then provided on different feeding regimes depending on animal use (e.g. market, breeding stock, periods of gestation/lactation etc.). Finally appropriate breeds, management strategies, animal behaviour and health are summarised within each chapter. It is worth highlighting that repetition does occur between chapters, where sections of text are identical to those in chapter two. I presume this is to ensure the reader comprehends each livestock chapter without the need to read the whole book.

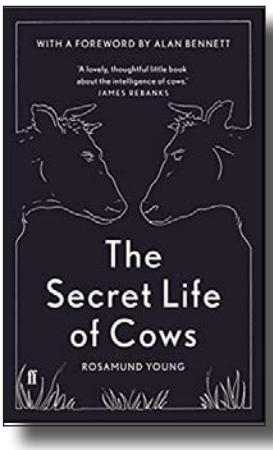
Unfortunately, chapter five is the weakest chapter of the book. It doesn't follow the same format or discussion pattern of either chapter three or four. Most of the same topics are discussed but in a random, unstructured order. It also groups all ruminants under the same broad heading and tends to concentrate on cattle, overlooking sheep and goats. Within this chapter, laboratory methods for analysing 'feeding' are described, copied word for word from chapter two, which could have been referenced, rather than repeated.

Finally, chapter six briefly discusses integration of these livestock systems, highlighting some future developments with regard to environmental sustainability. Regrettably, there is no attempt to summarise the previous chapters or suggest where the future is heading for feeding organic livestock.

Overall, this short book contains a lot of useful information for any farmer investigating organic feed for their livestock system, anyone wanting general guidance or advice on organic feeding or someone looking to improve feed efficiency organically. However, further information is required in the neglected chapters.

Nicola Smith

The Secret Life of Cows. Rosamund Young (2017) Faber & Faber.



I read this book when it was first published in 2003. It was a delight to read then and it was equally delightful to revisit it fourteen years on [The re-issued book, with a forward by Alan Bennett has been named as one of The Times' Books of the Year for 2017 and features on their Bestseller list].

In *The Secret Life of Cows*, Rosamund Young spills the beans on what goes on behind the gate at Kite's Nest Farm. She tells tales of on-farm animal relationships, revealing how close bonds can develop not only between individuals of the same species but also between different species. Stories including a piglet and lamb buddying up are both charming and act as a reminder that farm animals can develop these cross-species relationships when given the opportunity. Any temptation to criticise the book for being overly anthropomorphic should be curbed since this is a tool that is used by all animal owners on a daily basis and to great effect.

The star of the book, unsurprisingly, is the cow and rather than separating the book into chapters, themes such as intuition, friendships, decision making and communication are woven around tales of individual cattle. Alongside this, the author reveals just how much, or how little, effort is required from humans so that each animal at Kite's Nest Farm has what he or she wants - when it is wanted. Such 'bespoke' help requires detailed knowledge of each character and their state of health. It also requires an enriched environment so that each animal can find for itself most of what it needs most of the time. If the cow is the star of the book then this is the message.

The author's writing style is easy and engaging. For those wishing to learn about the generic behaviour patterns of cows, there are other books that fit the bill. For those wishing to gain insight into how enriched environments and sensitive management can enable animals to lead lives that more than fully live up to the aspiration of 'a good life', then this is where to begin.

Lindsay Whistance

Winter Organic Cereals 2017: Diversity in the field - the way forward?

On November 23rd fifty farmers, millers, bakers, researchers and more gathered at Casterley Barn on Rushall Farm near Pewsey, Wiltshire, for our first (and hopefully annual) 'Winter Organic Cereals' event. The theme of the day was to discuss cereal diversification in the field and beyond, which fit in well with the location as Rushall have been undersowing and growing spelt for years. ORC Crops and Breeding Researcher ***Charlotte Bickler*** *reports on the outcomes of the day.*

The Wookey family have been farming organically since the 1970s. We enjoyed learning more about the farm, and its history, from Joe during the morning introductions. This was followed by a session on mixed cropping or 'plant teams', such as intercropping. Then in the afternoon we explored emerging opportunities in alternative cereal markets from field to fork. It was great to have a mix of people from across the supply chain present to share their perspectives, insights and thoughts whilst also creating links with each other.

Intercropping: good, bad or indifferent?

In the morning workshop, the main aim was for delegates to share their experiences of intercropping and consider what direction they think research in this area should take. This is part of the DIVERSify (Designing Innovative Plant Teams for Ecosystem Resilience and Agricultural Sustainability) project which aims to increase the diversity of crop systems by identifying and optimising successful 'plant teams' that work well, and reliably, together under known conditions. Similar workshops are being held by thirteen partner institutions from Sweden to Kenya to ensure a range of farming systems and environments are considered.

There were some recurring themes in our group discussions including:

- Identifying crop combinations that work on individual farms and whether there is room for 'prescription';
- The loss of availability and knowledge of varieties that work well in intercropped systems;
- Restrictions within the market which limit the incentive to produce mixed products;
- Lack of capacity to process such products.

By working together, we began to unpick these barriers and explore potential solutions. Bringing people together to discuss their experiences felt like a positive step forward in encouraging the uptake of mixed cropping systems, which hold such potential for farmers, producers and the environment.

Group discussions on experiences of intercropping

The detailed discussion had built up everyone's appetite and all guests enjoyed their lunch (thanks Rachel and team!). Following lunch, groups were trucked down to Rushall's 5,000 tonne organic grain store, which can dry and clean not only their own grain, but grains for other organic farmers, too, and process alternative cereals, such as spelt. Delegates could also see the colour sorter in action removing contaminants. There were also a lot of questions about the System Cameleon which has recently been brought on farm. Tweaks have had to be made to the technology to cope with the undulating Wiltshire downs which hadn't been appreciated at first.

Touring the grain store with Joe Wookey

Want to get involved?

There is funding available as part of the project to cushion the risk for farmers who want to experiment or demonstrate 'plant teams' in their own fields. Farmers can submit applications to trial their own mixtures; comparing these to a nearby monoculture and collecting basic crop performance data. Farmers can also apply to demonstrate their own mixtures to peers through on-site demonstration days.

Farmers participating in the project will be asked to devote a suggested minimum area of 2,000m^2 to their plant team. This area could be a stand-alone plot or a strip within an existing crop. Once the plots are established, the farmers will be able to work with a DIVERSify 'science buddy' to collect basic data.

It is anticipated that farmers will receive funding up to 1,000 Euros each, although applications for support above this figure are welcomed where they are justified, e.g. if both data collection and on-farm demonstration are offered.

Please see https://www.plant-teams.eu/ (the application form is available under 'links & resources'), or contact: diversify@organicresearchcentre.com.

We have also created an **Innovative Farmers** group to support this process called "Intercropping in Arable Systems". We will be meeting on January 30th at Elm Farm to develop your ideas for on-farm trials. Please let Charlotte Bickler charlotte.b@organicresearch.com know if you are interested in attending.

Alternative cereal systems

Giuseppe Nocella introduces CERERE

After the tours, the afternoon session was based around the CERERE (Cereal Renaissance in Rural Europe) project which was introduced by Giuseppe Nocella from the University of Reading. The project aims to promote the use of local and heritage varieties of cereals and alternative grains, such as einkorn and emmer. It studies their health attributes and quality alongside successful examples of production and processing in alternative cereal supply chains incorporating local knowledge and traditions. Two parallel sessions were run: one focusing on supply chain models and marketing; and the other focusing on baking and eating diverse cereals. Andrew Trump kicked off the former, giving an overview of the work of Organic Arable and some interesting examples where alternative grains have been embedded in the market via the development of innovative supply chain models. For example, working with Whites Oats, focusing on quality and transparency in pricing has created a sustainable and increasing market for organic oats. He was followed by Rupert Dunn (Torth y Tir), who gave an overview of his experiences and the challenges of entering the market as a social enterprise focusing on short supply chains growing, milling and baking heritage wheats in Pembrokeshire.


Rupert Dunn

In the other session, Michael Marriage (Doves Farm) gave an introduction to growing and processing alternative cereals. This was followed by Dr Paola Tosi (Reading University) introducing her research on the composition, processing and nutritional aspects of these grains.

Aside from the organised sessions, we really enjoyed the opportunity to meet and discuss ideas with so many people that we have worked with for some time or hope to work with in the future. There are many opportunities for cereal diversification in the field and beyond, and we are keen to continue to push forward research and innovation in this stimulating area.


Diversity in the field? Introductions at Winter Organic Cereals

DIVERSify and CERERE have received funding from the European Union's Horizon 2020 research and innovation programme under agreement No. 727284 & 727848

ORC's amazing adventures in India

***Nic Lampkin**, **Konstantinos Zaralis** and **Anja Vieweger** battled the smog to attend the 19th IFOAM Organic World Congress in Delhi, India, from the 7th - 11th November.*

First we took part in the very successful and interesting pre-conferences, including: Technology Innovation Platform (TIPI Organics); Accelerating Innovation - The Role of Science, Policy and Practice; Organic Animal Husbandry - Role of Livestock in Sustainable Agriculture; and Food Systems 3.0. Then the main IFOAM - Organics International conference started - full of innovative and inspiring talks from farmers and scientists from around the world.

In the scientific track, Anja Vieweger presented the latest outcomes of our work on farmers' own principles of health and their interpretation and translation of the IFOAM principle of health into practice (Health Networks project, Ekhaga Foundation Sweden). Konstantinos Zaralis spoke about our project on participatory approaches to identifying, developing and field testing innovations to improve UK agroforestry systems (Agforward, EU-H2020).

In parallel to the main conference, the seed festival celebrated crop genetic diversity and showcased an amazing display of regional and national varieties and crop species. The colourful collections attracted a large and diverse audience from local farmers to international scientists.

The week was packed with amazing adventures, ranging from Nic's first drive in a tuk tuk (in heavy smog, at night without lights and against traffic of course), hearing about over 120 different rice varieties, enjoying delicious food all week, re-connecting with old friends and building new relationships for future collaboration, to accepting that 40-miles bus journeys may easily take over 4 hours and that the organic sector has much to look out for from Asia in the future!

Organic is Operational

*The European Innovation Partnership (EIP-AGRI) held the 'Organic is Operational' workshop in Hamburg in June 2017, bringing together 33 Operational Groups (OGs), 5 Horizon 2020 projects as well as other innovative projects, all working in organic farming or closely related subjects. ORC Senior Programme Manager **Susanne Padel** was the coordinating expert for the event and reports back.*

The European Innovation Partnership for Agricultural productivity and Sustainability (EIP-AGRI) was launched in 2012 to contribute to the European Union's strategy 'Europe 2020' for smart, sustainable and inclusive growth. This strategy sets the strengthening of research and innovation as one of its five main objectives and supports a new interactive approach to innovation: European Innovation Partnerships. It works to foster competitive and sustainable farming and forestry that 'achieves more and better from less'. It contributes to ensuring a steady supply of food, feed and biomaterials, developing its work in harmony with the essential natural resources on which farming depends. EIP-AGRI Operational Groups (OGs) are funded under the Rural Development Programmes (RDPs), are project based and tackle a specific farmer problems. Currently ORC is involved with two English EIP-AGRI projects: one focused on Agroecological soil management and the other on the use of woodchip (see p18). Each OG has to include farmers; other members can be advisers, researchers, other businesses, NGOs, etc. Organic farming was one of the top five themes and the focus of around 40 of the 300 OGs that had been established by April 2017. EIP-AGRI also works through Focus Groups and specific research projects under H2020.

The objective of the Hamburg event was to promote cross-border knowledge exchange and networking among the various OG actors working on new solutions for organic farming systems across Europe, and to bring them in touch with relevant EU Research. The workshop included field visits to farms and research stations engaged with organic OGs in Northern Germany. In total more than 70 participants, from 12 countries attended, including farmers, advisers, researchers, innovation brokers and people from the farming industry. ORC is involved with two thematic networks, funded under Horizon 2020 and promoted by EIP-AGRI: OK-net Arable and AFINET.

Innovation is crucial for creating a competitive and sustainable farming sector that is fit for the future. The EIP-AGRI initiative of the EU Commission supports bottom-up innovation through the OGs, linking farmers with research and other important actors, so that good ideas can lead to improved practices on farms and in related businesses, along the supply chain, and in rural communities. This includes new technology, new organisation of the supply chain (organisational innovation) and new ways of working with each other (social innovation). The field lab groups of Innovative Farmers work in a similar way, and some of the Operational Groups in the UK started as field labs.

What is specific innovation in organic farming?

Finding new ways of innovating is also vital for the organic sector. Organic farming is value-driven and has close connections to consumers and the value chain creating new opportunities. The sector also collaborates with other sectors, such as tourism and public health. Organic farmers are willing to share knowledge and experience, and there is a tradition of bottom-up innovation and interactive ways of working together.

However, organic farming is also regarded by some as a closed and inward looking sector, one overly reliant on knowledge generated internally to bring positive change. There is a lack of scientific research knowledge, informing current practice, even if the collaboration with the conventional sector is improving, as shown in a recent brochure 'Innovating for Organics'[1] published by TP Organics.

Topics of Operational Groups in Organic Agriculture

Organic cropping systems and arable production

- Home grown protein supply through growing, processing and infrastructure for native pulses and novel feed sources (e.g. clover pellets);
- Various strategies for improving soil fertility and yields through use of catch crops, composts;
- Mycorrhiza and reduced tillage/controlled traffic;
- Coping with problem weeds, such as docks, through biological weed control;
- Developing organic production strategies for specific crops (e.g. soil fertility and water management in vineyards), producing organic oil seed rape, and weed control in vegetables and perennial crops.

Organic horticulture

- Solutions for specific pest/disease challenges, such as disease control in potatoes, controlling the maize rootworm, rodent control in orchards;
- Use of technology and novel inputs in organic fruit production;
- Organic vine production.

Organic livestock

- New tools for improved grassland and pasture management;
- Strategies for housing, feeding, herd management and health and welfare of organic layers and pigs;
- Maintaining rare breeds and working with minor species (e.g. rabbits).

Developing the market

- Use of heritage varieties and diverse populations of cereals (mainly wheat);
- All year round vegetable production (e.g. growing winter vegetables);
- Bread making with low-protein wheat;
- Marketing for specific products (e.g. goat meat, laying hens at the end of their productive cycle).

Common challenges and opportunities among the organic operational groups

Yield stability for organic production was identified as a major issue by the EIP-AGRI Focus Group on Organic Farming. It is also one of the main topics in the thematic network OK-net Arable which created an Organic Knowledge Hub for farmers[2]. Participants felt that there is lack of research as to how organic farmers can improve yields and enhance yield stability for the various crops they grow. Introducing (technical) innovation in organic agriculture one also has to consider the acceptability of any new technologies to consumers.

Several common technical challenges were identified which could also provide opportunities for future innovation projects. These include:

- Working with legumes and the nitrogen cycle;
- Adaptation to, and mitigation of, climate change;
- Working with seed mixtures and suitable cultivars;
- Plant protection, pest and disease management;
- Increasing the productivity of organic farming without increasing production costs;
- Bio-mimicry (copying biological processes) as a new field of research;
- Developing new adapted machinery;
- Developing animal welfare-friendly housing systems;
- Small farms have specific challenges in meeting the high costs of machinery;
- Land management for soil conservation.

An important topic was the organic market, which also presents many opportunities. Farmers and consumers perceive the added value of short and organic food supply chains. The market can be developed in innovative ways and there is also a market for innovation (e.g. new crop varieties and populations, new products, new markets). Networks can be set up along the whole supply chain to increase the value of organic products.

Other issues mentioned included a potential market for ecosystem services and the challenge of preserving livelihoods and social structures in rural communities.

Working together

OGs put farmers at the centre. There is a need therefore to ensure farmers are equal partners and are rewarded for their time and effort, including during the preparation phase of a project. It is also important to enable organic and non-organic farmers to work together. The perspective of 'conventional' farmers can help bridge the gap between integrated production and organic farming.

An interesting discussion emerged around the trade-off between flexibility in shaping innovation projects and control requirements required by the administrators. Sometimes, the realities on the ground require changes to be made and farmers' innovative ideas do not always fit the application form boxes. In line with rural development guidelines the funding agencies prefer project applicants to present clear and results-based work plans. Farmers may find the bureaucracy of project applications very challenging and are therefore less likely to take the role of the lead applicant, relying on professional support through consultants or innovation brokers.

Field visit: Arable soil management at Gut Wulksfelde

It was a pleasure to visit the farm of Rolf Winter, an old colleague of mine, with whom I had worked with in North Germany before I came to the UK.

Rolf Winter is now the farm manager of Gut Wulksfelde, a well-established diverse organic farm just outside Hamburg. The farm focuses on arable and vegetable cropping on very light and partly peaty soils. The farm also has a bakery, a farm shop and catering service to add value to what the farm produces and make use of the opportunity that farming just outside a large city provides. As part of Ackerhelden.de they offer small plots which are already planted with organic vegetables that families can care for and harvest throughout the season. Rolf also showed us how Gut Wulksfelde uses compost and silage as a fertiliser for growing potatoes. Approximately 12.5% of the cropping area of Gut Wulksfelde is used for conservation, with landscape elements including 22 amphibian ponds, 18 km of hedgerows, an extensive newly-planted orchard as well as participation in some specific agri-environment measures. The farm takes part in the operational group on Sustainable yield increase in ecological cash cropping using farm specific catch cropping strategies to enhance soil fertility and conserve the soil.

Photo: Alfred Grand

The workshop discussed ways of getting the best out of the groups. A good facilitator is crucial, as is finding the 'right' partners and establishing clear roles and common rules. Using videos and visuals can help overcome language problems, across borders, and in fostering common understanding of the practicalities of working on farms and in 'translating' scientific knowledge into farming language. Good communication strategies need to be developed for each group, identifying the target audiences and informing them using a variety of tools and events.

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Events and announcements - details at www.organicresearchcentre.com

Events

3 January 2018: Agricology Field Day. Mixing it up: Leys, livestock and life in the soil. Daylesford Farm, Kingham, Glos GL56 0YG 9.30am – 1.30pm. Get ahead of the curve and join Agricology on farm for this fringe event to the Oxford Conferences. Coach from Oxford available.

4-5 January 2018: Oxford Real Farming Conference. ORC will hold workshops on: 'Organic arable breeding as a "citizen science" experience' and a 'Workshop on new English organic action plan', both on day two.

Do you have agroforestry on your land? Would you like to share your experiences with others? Are you interested in planting more trees on your farm? If so please join us at one of our forthcoming AFINET group meetings.

11 January 2018: Trees and vegetables. AFINET meeting. Duchy Home Farm, nr Tetbury, Glos

25 January 2018: Trees on livestock farms. AFINET meeting - Shropshire

30 January 2018: Intercropping field lab. Elm Farm, Berkshire.

15 February 2018: Trees on arable farms. AFINET meeting. Whitehall Farm, Peterborough, Cambs

27 February 2018: Wonderful Woodchip! Tolhurst Organic, Oxon. SustainFARM event.

13 June 2018: Wheat Landraces for Healthy Food Systems. 1st International Conference, Bologna, Italy

3 July 2018: National Organic Combinable Crops 2018. OF&G event hosted by Mark and Liz Lea, Green Acres Farm, Shifnal, Shropshire.

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