THE ORGANIC RESEARCH CENTRE

ELM FARM

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Grower Sam Eglington's novel approach to lettuce breeding
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ORC E-Bulletin

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Organic Research Centre

Bulletin

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News in brief

Organic food use increases in Danish public kitchens and private canteens

2011 saw a 46% increase in sales (to €100 million) of organic products to professional kitchens in Denmark according to a new study from Organic Denmark (www.organicdenmark.dk). The growth has occurred in the canteens of private companies and in the public sector. The Danish government has a target of that an average of 60 % of ingredients used in publicly-funded kitchens and 500,000 meals made with those ingredients will be served daily by 2020. Copenhagen and other cities have shown that by avoiding food waste, buying in season, cooking from scratch and by using more vegetables and less meat that organic meals can be supplied for the same costs as conventional. They report that 70 % of the food served in Copenhagen municipality is now organic.

More positive health indications of organic food

The Journal of the Science of Food and Agriculture has recently published on line several papers on organic food quality and health:

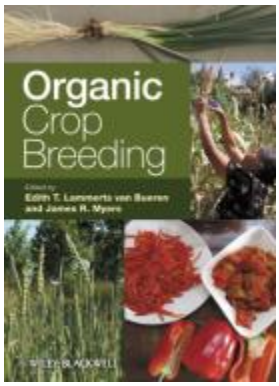
- A Polish study found that organic bell pepper fruits contained significantly more dry matter, vitamin C, total carotenoids, β-carotene, α-carotene, *cis*-β-carotene, total phenolic acids (as well as individual gallic and chlorogenic acids) and flavonoids compared with conventional fruits. [1]
- A second Polish paper reported a 2008 trial where organic tomatoes had a higher ratio of reducing sugars/organic acids, and contained significantly more total sugars, vitamin C and total flavonoids, 3-quercetin rutinoside, and myricetin in comparison with the conventional fruits. In 2009, organic tomatoes contained significantly more vitamin C, quercetin-3-*O*-glucoside and chlorogenic acid, myricetin and kaempferol compared with conventional. [2]
- A Dutch paper reports the results of an online questionnaire investigating the perceived health effects of eating organic food. 556 respondents (30%) reported no health effects, but others claimed improvements in general health, including improved resistance to illness (70%), mental well-being (30%), stomach and bowel function (24%), condition of skin/hair/nails (19%), satiety (14%) and fewer allergic complaints (14%). The results are complicated because the switch to organic food is often accompanied by use of more freshly prepared foods and other lifestyle changes. [3]
- A meta-analysis shows that organic dairy products contain significantly higher protein, ALA, total omega-3 fatty acid, *cis*-9,*trans*-11 conjugated linoleic acid, *trans*-11 vaccenic acid, eicosapentanoic acid, and docosapentanoic acid than those of conventional types, most likely due to differences in feeding. [4]
- Johannes Kahl and Machteld Huber and colleagues in the Organic Food Quality and Health association (of which ORC is also a member) have published two papers on food quality[5] and health[6] evaluation concepts.

IOTA to merge with ORC

The Institute for Organic Training and Advice, which provides accreditation and other professional development support services to organic advisers and trainers in the UK and Ireland, has agreed to merge with the Organic Research Centre. IOTA's identity will be maintained in the new arrangement, but IOTA will receive more support in developing services to support organic advisers, trainers and other professionals working with organic businesses. For its part, ORC will focus on initiatives to disseminate research and other information to all advisers and trainers working in the UK and Ireland, and will cease to operate its commercial Organic Advisory Service, which in the past has been in competition with other providers. Further information will be made available via the ORC and IOTA websites and e-bulletins as the process progresses.

New ORC plant health publications

ORC researchers Dr Thomas Döring and Prof Martin Wolfe have recently published a number of peer-reviewed papers and a book chapter on plant health and breeding:



Döring TF, Pautasso M, Finckh MR, Wolfe MS (2012) Pest and disease management in organic farming: implications and inspirations for plant breeding. In: Lammerts van Bueren ET, Myers JR (eds) Organic Crop Breeding. Wiley-Blackwell.

Döring TF, Pautasso M, Finckh MR, Wolfe MS (2012) Concepts of plant health – reviewing and challenging the foundations of plant protection. Plant Pathology 61:1-15.

Pautasso M, Döring TF, Garbelotto M, Pellis L Jeger MJ (2012) Impacts of climate change on plant diseases – opinions and trends. European Journal of Plant Pathology.

Döring TF (2011) Potential and limitations of plant virus epidemiology: lessons from the Potato virus Y pathosystem. Potato Research 54:341–354.

Agroforestry events and publications

Dr Jo Smith and colleagues in ORC's Agroforestry programme have been active with a successful event at Wakelyns in December, participating in the launch of the European Agroforestry Federation, leading an EAF submission to the European Commission on CAP reform and agroforestry and two new peer-reviewed publications:

Smith J, Pearce BD, Wolfe MS (2012) Reconciling productivity with protection of the environment: Is temperate agroforestry the answer? Renewable Agriculture and Food Systems.

Smith J, Pearce BD, Wolfe MS (2012) A European perspective for developing modern multifunctional agroforestry systems for sustainable intensification. Renewable Agriculture and Food Systems.

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[1] http://onlinelibrary.wiley.com/doi/10.1002/jsfa.5624/abstract
[2] http://onlinelibrary.wiley.com/doi/10.1002/jsfa.5617/abstract
[3] http://onlinelibrary.wiley.com/doi/10.1002/jsfa.5614/abstract
[4] http://onlinelibrary.wiley.com/doi/10.1002/jsfa.5639/abstract
[5] http://onlinelibrary.wiley.com/doi/10.1002/jsfa.5640/abstract
[6] http://onlinelibrary.wiley.com/doi/10.1002/jsfa.5563/abstract

About us

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Bulletin editor
Lawrence Woodward OBE

The Organic Research Centre is the UK's leading, independent research organisation committed to developing sustainable land management and food production systems based on IFOAM organic/ agro-ecological principles; disseminating knowledge to current & future farmers/ land managers and other related businesses; compiling evidence on systems performance and informing public debate through communication with policy makers and opinion leaders, and through them the wider public, in order to ensure the health and well-being of soil, plant, animal, people and the environment.

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Editorial: Proud to use the 'O' word

At a time when, at least in the UK, the policy and market mood appears to have swung away from organic, it is not surprising that some start questioning whether the organic movement has become too entrenched and exclusive. Some even suggest that we should stop using the word organic, because of ideological baggage it carries with it.

There were signs of this at the recent Soil Association Conference. Media coverage, especially in the farming press, was dominated by Phil Bloomer, Policy Director at Oxfam, calling for the organic movement to be less insular and even to embrace aspects of GM technology. Never mind that Oxfam is supposedly more supportive of organic and agro-ecological approaches than GM, having been a lead player in the IAASTD process that was a focus of the SA conference. Never mind that the technology Phil highlighted as one that might benefit organic – marker assisted breeding – is not actually genetic modification and is already used in organic plant breeding. His comments, and the delighted repetition of them by some media reporters, reflect a rather superficial understanding of both organic agriculture and GM.

The 'we must down play organic to make it more acceptable' line is also reflected in the marketplace, whether on the basis of commentaries from market data analysts such as Kantar Worldpanel, or the rebranding of some high profile organic products to de-emphasise and in some eliminate the word "organic". Although this trend is not as universal as sometimes projected in the media, it is happening. Whilst one can see the need to refresh brands from time to time, those companies that have built substantial businesses based on organic production and the positive image created by the organic movement might consider more the implications both to their businesses and the wider organic movement if they inadvertently undermine the potency of the organic name. Some businesses are already very concerned about this threat.

Yeo Valley, which has recently completed a major rebranding of its products, has obviously given this some thought. Both managing director Tim Mead and marketing manager Ben Cull have been at pains to explain that the new 'Yeorganic' branding is 'to show consumers that organic is something that runs through everything we do'. This is a strong reaffirmation of their commitment to organic but nonetheless the word has been "downsized" on the packaging and one wonders if the understanding of what organic really means has been "downsized" too. Mr Cull speaking to DairyReporter.com said that their new branding "is also our way of showing in a fun way, that we are more than just an organic label, and that we really do go the extra country mile to look after our land, animals and people too."

ORC and the organic movement has been built on the belief and practice that organic is all about looking after land, animals and people. It is concerning that this seems no longer to be synonymous with an organic label on a range of products. We know that the ideas and principles we are interested in and that motivate us to research, produce and consumer organic products are complex and often not easy to communicate in a simple way. But would changing the 'O' word help? If communicating complex ideas is difficult, then will it really be any easier if we used sustainable or agro-ecological instead? Over-time, these words have suffered from progressive loss of meaning as different interest groups attempt to adopt them for their own purposes.

If the word organic has also lost some of its meaning, what do we do about it?
We know from consumer surveys that consumers value local, free-range, fair-trade and a range of other, non-price product attributes, but don't automatically associate them with organic. We need urgently to re-imbue the word organic with its full meaning, not change it. One way may be by linking key words representing the values we care about: organic and local, organic and free-range, organic and welfare-friendly, organic and environmental, organic and sustainable, organic and fair-trade, replacing and with is whenever possible, while guarding against an assumption that the reverse is true.

There is obviously an urgent conversation to be had with friends in the organic movement, the organic marketplace and genuine agro-ecologists about why the real meaning and understanding of organic is being lost, what we should do about it, and how the market can be used to support rather than exploit organic principles. In the meantime – to paraphrase the old "Black Power" slogan - "sing it out and sing it loud, I'm organic and I'm proud"

Lawrence Woodward and Nic Lampkin

UK agroforestry: can it really deliver multiple benefits?

Agroforestry is a farming system where trees and crops and/or animals are grown together. The rationale is that the trees alter the environment to the benefit of the crops. It has long been used in the tropics where there are obvious benefits, such as shading by the trees reducing evapotranspiration from the crops. Now there is a growing interest in agroforestry in temperate regions; but can it reconcile conflicting demands for food production, biodiversity and other ecosystem services? ***Alexa Varah****, an ORC-sponsored PhD student at the University of Reading, is looking for some answers to this question.*

Agroforestry systems work through more efficient resource use and ecosystem modification by the trees for the benefit of the crops, reducing the need for external inputs. They allow intensive crop cultivation in the alleys between tree rows, whilst enabling additional productivity in the form of tree products.

When designing and managing agroforestry systems, the aim is to maximise the positive interactions between the trees and the crops, and minimise the negative interactions. Positive interactions include increased soil organic matter, nutrient cycling and nitrogen fixation, reduced soil erosion, increased pollination and biodiversity, and provision of shelter and a more stable microclimate. Negative interactions are competition for light, water, nutrients, space and labour. These interactions can vary spatially and temporally, introducing another level of complexity. The system design (species selection, spatial and temporal arrangement etc.) and management are crucial in manipulating the interactions and determining productivity.

Previous research findings have been varied and temperate agroforestry has not been as well studied as tropical systems. Yet there is evidence to indicate that temperate agroforestry systems really can deliver benefits (Park *et al*, 1994; Graves *et al*, 2010), though as yet there is no evidence that it can deliver multiple benefits *simultaneously*.

By measuring four different ecosystem services (productivity, carbon stocks, pollination and biodiversity), we hope to be able to find out whether there are trade-offs between yield and other services and if so, to what extent? We hypothesise that agroforestry may help resolve both food production and environmental pressures in agriculture.

Poplar and cereals in France (Photo: INRA)

Exclosures for herbage cuts at an ash pasture site (A Varah)

How are we measuring the services?

We are measuring the four different services as follows:

PRODUCTIVITY	CARBON STOCKS	POLLINATION	BIODIVERSITY
Pasture: Herbage cuts 4x a year **Crop:** Yield samples taken pre harvest **Timber trees:** Allometric equations. **Fruit trees:** Yield sampling	**Above ground:** Crop samples taken/analysed for C content **Below ground:** Soil cores taken to 40cm, carbon in soil/ fine roots analysed. C in coarse tree roots calculated using allometric equations.	Pan traps and standardised transect walks to measure abundance and diversity of solitary bees, bumblebees and hoverflies as a proxy for the service.	Pan traps and standardised transect walks to measure abundance and diversity of butterflies and bees. Vegetation transects for plant species diversity.

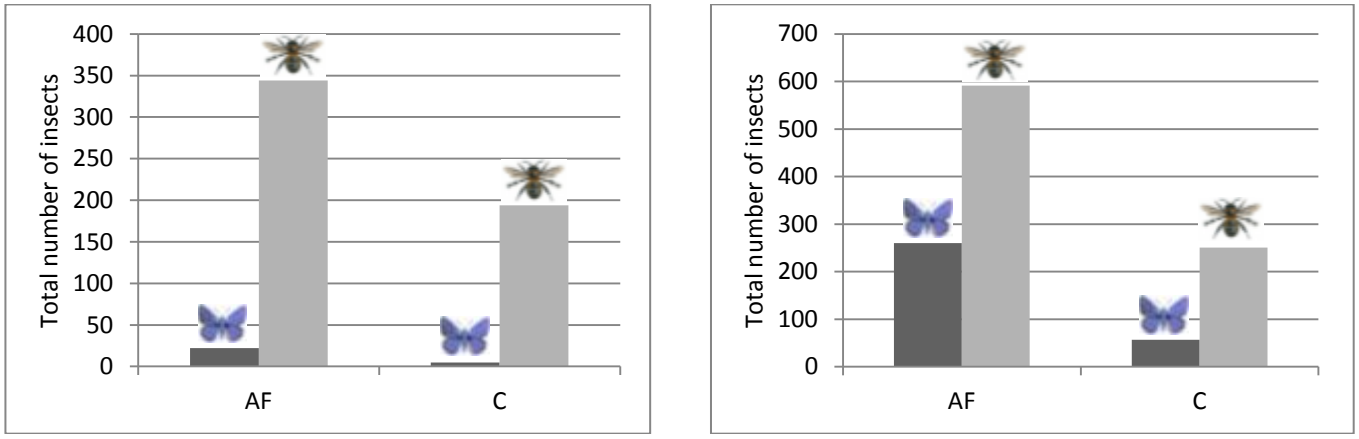
Each service is being measured in agroforestry systems across the south of the UK. Each system has a corresponding control which is the monoculture of the same crop as that grown in the agroforestry system.

The control systems are located as close to the agroforestry systems as possible and have the same or similar soil parameters, aspect and slope. Microclimate data are also being recorded in order to help explain any differences observed and to provide clues as to whether agroforestry systems might offer a more stable microclimate.

What have we found so far?

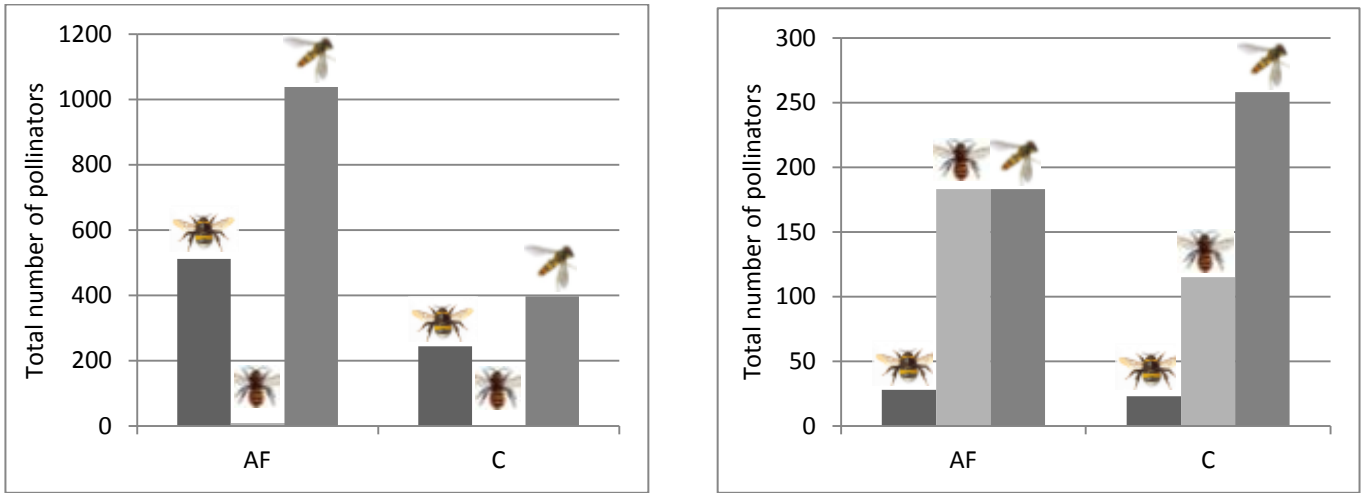
Biodiversity and pollinators

Initial results from 2011 appear to indicate higher abundance of biodiversity indicators in agroforestry systems compared to monocultures (Figure 1). Abundance of pollinators appeared higher overall in agroforestry systems when sampled on transect walks, but not all pollinator taxa were higher in the agroforestry systems when sampled using pan traps (Figure 2). Figures 1 and 2 show raw data only so as yet any trends indicated are not confirmed statistically.



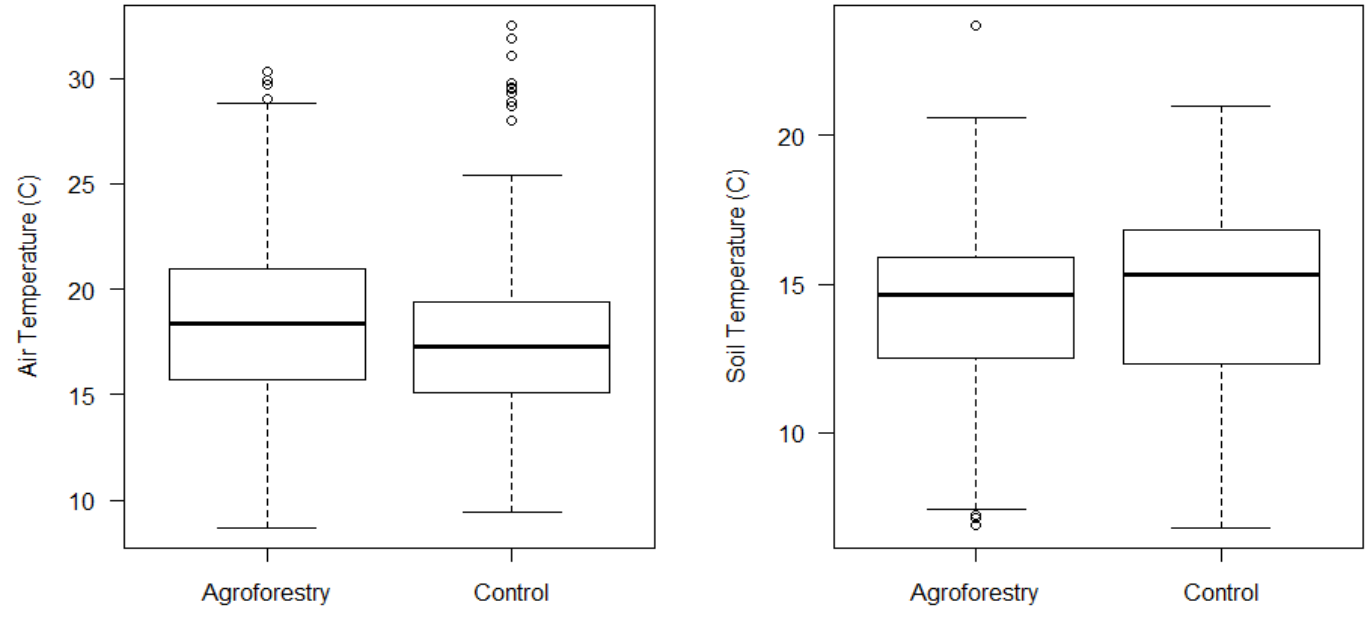
(a) standardised transects (b) pan traps

Figure 1: Total numbers of biodiversity indicators (butterflies and bees) recorded across five agroforestry systems (AF) and their controls (C). sum of Lepidoptera; sum of Apidae. Raw data only, not statistically verified.



(a) standardised transects (b) pan traps

Figure 2: Total numbers of pollinators recorded on standardised transects across five agroforestry (AF) and control (C) systems. sum of *Bombus* spp.; sum of solitary bees; sum of hoverflies. Raw data only.



(a) Air temperature (b) Soil temperature

Figure 3: Two microclimate parameters, air and soil temperatures, for five agroforestry systems (AF) and their controls (C)

It is interesting to note the differences in the data collected by the two different sampling methods: pan traps are better at sampling solitary bees than transect walks (solitary bees can be very small and easily missed), but there is also an attraction issue with pan traps: they are more attractive to insects when the surrounding habitat offers few resources, which may be why so many hoverflies were caught in pan traps in the control treatments (see Figure 2b).

Microclimate

There are significant differences between agroforestry systems and the control monocultures in terms of microclimate: air temperature is significantly higher in the agroforestry system while soil temperature is significantly lower. The lower soil temperature can be explained by the shading effect of the trees, but it is harder to explain the warmer air temperatures – further analysis is needed.

As expected, both wind speed and photosynthetically active radiation (PAR) are significantly lower in the agroforestry systems than in the controls.

Soil moisture was also significantly lower in the agroforestry systems. However there was no difference in relative humidity between agroforestry and control. Further analysis is needed to look at associations between shading and/or temperature, and the two moisture parameters.

What's next?

Further sample processing and analysis of 2011 data will allow us to look at the other ecosystem services and begin to see whether some are being provided at the cost of others. This project is ongoing for another two years and we will report more results and analysis of both the complementary benefits and competitive trade-offs of agroforestry systems as they become available.

References

Graves, AR *et al.* (2010) Implementation and calibration of the parameter-sparse Yield-SAFE model to predict production and land equivalent ratio in mixed tree and crop systems under two contrasting production situations in Europe. Ecological Modelling 221, 1744–1756

Park, J *et al.* (1994) The effects of poplar (P. trichocarpa × deltoides) on soil biological properties in a silvoarable system. Agroforestry Systems 25(2), 111-118

New projects at ORC

2012 sees a series of new projects starting at ORC – we'll be reporting further on them as they progress, but you can find out more in the meantime by visiting ***www.organicresearchcentre.com***

Reducing organic top fruit copper use

Co-Free is an EU-FP7 funded project to develop innovative methods, tools and concepts for the replacement of copper in European organic and low-input fruit, grapevine, potato, and tomato production systems. The 4.5 year project started in January and has 11 partners across 10 EU countries and will seek to develop copper-free production systems by providing alternative compounds; developing 'smart' application tools; and integrating these tools into traditional and novel copper-free crop production systems. Production systems will be evaluated against agronomic, ecological and economic performance. Strategies a) for 'smart' breeding goals by development of crop ideotypes and b) fostering consumer and retailer acceptance of novel disease-resistant cultivars will also be explored. Jo Smith at ORC will evaluate the potential of agroforestry-based apple production systems for replacing copper inputs.

Health concepts in organic farming

Despite its high profile in agriculture, particularly organic agriculture, the notion of health in agricultural contexts is currently not well defined or subject to conceptual disagreements. This lack of clarity creates a vacuum in which potentially misleading claims about health benefits can be made. If health in humans, animals, soil and plants is such an important goal, it needs to be clear what is meant by it. In this 15-month, Ekhaga Foundation funded, ORC-led international project, Thomas Döring and colleagues aim to clarify and critically assess health concepts to contribute to a new enlightened vision of health and to identify new pathways for improving health in agricultural systems. The project will initiate an open dialogue among various agricultural disciplines to deliver a novel, unified, and comprehensive idea of health in agriculture.

Network to improve organic market data

In February, Susanne Padel and colleagues started work on the EU-FP7 funded project 'European Data Network for Improved Transparency of Organic Markets' (OrganicDataNetwork). The three year project is led by Prof. Raffaele Zanoli from the Universita Politechnica della Marche in Ancona, Italy and involves research and industry partners from Italy, Switzerland, Germany, Czech Republic, France, Spain, Estonia, Turkey and the UK. The project aims to increase the transparency of the European organic food market through better availability of market intelligence about the sector to meet the needs of stakeholders involved in organic markets. ORC's role will be to lead two parts: developing an inventory of organic market data collectors and carrying out case studies on improving data quality in Germany, France, Italy, Czech Republic, the Mediterranean region and the UK.

Optimising use of cover crops

This 4-year, EU-FP7 funded project to Optimise Subsidiary Crop Applications in Rotations (OSCAR) starts in April. Led by the University of Kassel, Germany, OSCAR brings together 20 partner organizations from 11 countries to develop novel cropping systems based on cover crops, catch crops, living mulches and other subsidiary crops. This will increase the duration of soil coverage by plants, introduce diversity to the crop rotation and reduce the need for and the intensity of soil tillage. Particular attention will be given to conservation tillage systems. Optimisation of cover cropping systems aims to counteract the sometimes reduced yields associated with minimum or non-tillage systems whilst providing durable ecological benefits. Thomas Döring at ORC will lead the dissemination activities and develop a cover crop tool box.

Standards for protected cropping – a progress report

In previous ORC Bulletins we have discussed the nature of organic glasshouse cropping and charted the discussions around specific standards for this highly specialised area of organic horticultural production. There has been much discussion internationally and in the UK since we last reported although the introduction of definitive EU standards is still some distance away. ***Roger Hitchings*** *provides an update.*

In the next few months, ORC will be developing a policy position paper on the issue – if you have views on the subject, please let us know by e-mailing ***comment@organicresearchcentre.com****.*

Standards development is notoriously difficult and protected cropping is proving especially so. The IFOAM EU Group's special task force had over 20 active members drawn from a wide range of member states. Despite a unanimous agreement on the need for the organic sector to take the lead and develop a consensus position before EU regulators became involved, the differences in approach, attitude, structures and skills between member states and interests have been almost overwhelming. A number of face-to-face meetings were held with vigorous discussion. However, the group was unable to reach unanimous decisions on a number of key issues, so the final report included (at least) two options in areas such as:

- whether to grow in soil or substrate (where a third option was presented);
- no conversion period or 6 months conversion when dealing with 'natural substrates';
- open field nitrogen limits or exempted higher limits;
- a strict requirement to move away from fossil fuels or a more relaxed approach.

What has been agreed so far?

The IFOAM EU Group's special task force has reported and the Group's main Board has considered and voted on the recommendations, but there is still a measure of dissatisfaction and a final consolidated position paper has yet to be produced.

The IFOAM World General Assembly in Korea in September 2011 passed a motion which explicitly stated that all organic crop production should be soil-based. At first glance this seems clear cut but a) the decision can be interpreted to allow production in soil within containers; and b) there is a widely assumed and illogical caveat that herbs grown in substrate in pots will still be permissible.

The Soil Association's Horticultural Standards Committee has developed a set of standards that has been adopted by the SA Council.

A group of researchers and advisors from a number of EU Member States and Canada has secured funding under a COST Action to collate research outcomes on many of the technical aspects of protected cropping and to look at issues such as sustainability and standards development.

The issue of protected cropping standards is now on the 'to do' list of the EU Commission's Expert Group on Technical Advice in Organic Production (EGTOP), although discussions are unlikely to start before October of this year with a report due in December, meaning that further discussions between the Commission and Member States are likely to take place in 2013.

What are the key technical and principle issues?

There have been and remain a number of issues – technical and of principle – around which there are significantly differing views. It is hard to see these being resolved until a regulation is finalised. In fact the whole process could be thwarted by them. They will certainly be the subject of ongoing debate, to which we hope ORC's planned position paper will contribute.

Soil or substrate?

The EU Regulation does not definitively state that organic cropping should always be soil-based, although, as we have highlighted in previous articles, the importance of a healthy soil is referred to and is an underlying assumption. The Regulation does emphasise the importance of soil for the provision of fertility to the plant. The only specified exception is the use of substrates for mushroom production, which does not constitute a precedent as mushrooms are fungi that do not photosynthesise and need to draw all their nutrition from their physical surroundings.

The use of substrates for the production of 'herbs in pots' is not covered by the EU Regulation, but only by private standards. If the view is taken, based on organic principles/ philosophy and/or the thrust and underlying assumptions of the Regulations, that organic crop production should take place in soil, then 'organic production" of "herbs in pots" is questionable, if not illogical, untenable and possibly legally flawed (but see Box on next page).

The National Organic Programme (NOP) in the United States and the recently launched Canadian organic standards permit various forms of substrate production and that is being offered as a rationale for their use here. Mixing "soil" in a "naturally based" or "environmentally sound" substrate mix is also being presented as an acceptable alternative. Ultimately these approaches do not meet the objections of those who believe that crop production within substrates in concrete floored greenhouses or containers does not comply with the concept of organic.

Conversion period

It has been proposed that shortened conversion periods can be allowed in protected cropping. This idea has come from two different sources. The first argues that a system working with so-called 'natural substrates' does not need a conversion period because they can be brought in 'ready to go'. If "natural substrates" are deemed inappropriate as the basis for organic cropping, this argument falls.

The second push for shortened conversion periods comes when an existing conventional system wishes to convert to organic management. It will almost certainly have some

form of hydroponic system for the crops and the soil will be completely covered with plastic sheeting of various kinds. The argument for the shortened conversion period is based on the fact the soil has been 'protected' from the chemical based system. However, experience has shown that leaks almost always occur with significant increases in soil nutrient levels and that a soil deprived of air for a period of years effectively dies.

From the perspective of the UK and some other member states, including and robustly the French, this concept of conversion as being simply a method of "cleaning up the nasties" is nonsense. The justification for a shortened conversion on these terms is very hard to accept, given that the purpose of conversion is to ensure that the soil is in good condition and biologically active before cropping starts and the system can deliver crop nutrition and pest and disease control primarily through soil and plant ecosystem management, not reliance on outside inputs.

Nitrogen limits

This leads on to another, but less clear cut, problem. The intense production of greenhouse crops (even in organic systems) means that the usual levels of 170kgN/ha (average) and 250 kgN/ha (maximum) permitted under current regulations would not sustain a commercial yield of the more common crops such as tomatoes, cucumbers and peppers. It is debatable whether such intensive greenhouse production systems being certified as organic is acceptable in any case, but if they are, then some higher level of nitrogen input will also have to be accepted. These parameters are suggested for consideration:

- soil available N and applied N combined should not be more than the annual crop requirement;
- all possible re-cycling of on-site materials should be done as a first step;
- external sources should be judged on a sustainability assessment based on distance travelled, level of re-cycling involved, implications for soil health and reliance on organic sources (criteria used in the Soil Association fertility best practice matrix).

Energy

There is little argument against a move from the use of fossil fuel for heating. The discussions revolve around how much and how soon. It is proposed that growers should keep detailed records of their energy use and where it comes from, along with a forward energy plan to reduce reliance on fossil fuels (included in the SA draft standards). It would be good if the setting of specific targets could happen sooner rather than later and should ideally be embodied in Regulation 889/2008 in due course.

Other issues

There are a number of issues that have not to date been adequately covered, such as the use of rotations, steam sterilisation, rainwater re-cycling and carbon dioxide enrichment. There is more unanimity about these aspects, but still some different points of view. In general:

- there is a view that rotations are preferable, but not essential, as long as fertility and weed, pest and disease control is "adequate", "can be achieved", "of the highest order", yet little clarity about what that means;
- there is a large degree of unanimity that steam sterilisation should be prohibited, but it can be argued that it is permitted under the Council Regulation's reference to thermal control of weeds, pests and diseases – however, the mode of action of thermal control of weeds is very different to thermal sterilisation of what should be a living, biologically active, soil;
- no-one disagrees that water should be recycled from fixed and where possible from film structures;
- it is generally agreed that CO_2 should only be used as a by-product from the holding's heating requirement.

The debate on protected cropping standards has some way to run before there is a common approach across the EU. A consensus is emerging on some issues, but there remains gaps and dissatisfaction on others.

Organic cropping in soil in containers

During the soil/substrate debate within the IFOAM EU group, the specific situation of small farmers and growers in Sweden and other Nordic countries who, due to climatic conditions, face very late and short growing seasons, was discussed. In order to mitigate the late springs, they have developed a form of "container production" which uses a mixture of soil and "sustainably sourced" substrates. While this appears to contradict basic organic principles, these Swedish growers are not agri-businesses exploiting the organic market, but are committed organic producers.

In an effort to find a compromise, Marianne Schonning of the Swedish organic farmers' organisation and Lawrence Woodward looked at the issue and quickly realised that a clear definition of soil needed to be agreed. Having come up with one that covers the physical, biological and energy parameters, they considered how that might fit within the needs of a regenerative rotation. They believe that their compromise proposal meets the principle that organic production is soil-based, fulfils the IFOAM General Assembly requirement and enables small-scale organic growers to maintain the viability of their systems. However, the proposal was not accepted by the IFOAM EU Group Board. As part of the ORC's policy debate on this issue, we summarise the main elements here:

Organic cropping systems take place in 'living soils' (see page 19 for definition). However crops can be grown in soil material that has been taken from the organic holding and placed in "demarcated" (separated) beds or containers provided that:

a) The material is taken, used and then returned to the original field in a rotational sequence which will allow its reintegration into the soil system and that the cropping rotation on the holding is planned to allow this reintegration and regeneration of the used soil material.
b) The soil material constitutes the growing medium although soil amendments permitted in EC Regulation Annex 1 can be used as adjuncts.
c) Fertilisation is from accumulated soil fertility and rotational methods and/or with materials listed in Annex 1 used in accordance with a cropping and nutrient balance programme.

Do you have views on this? Let us know by e-mailing comment@organicresearchcentre.com

Developing better organic systems: Producer conference 2012

Over 200 delegates attended the 6th ORC Organic Producers Conference held in January this year at the University of Aston Business School Conference Centre. This was the first time the conference has been held in an urban setting and it seems that most people appreciated the central location and ease of public transport access. The conference programme was the most wide-ranging to date and the sessions were generally well received; the final session with Miguel Altieri was excellent. The general view of the delegates was that this was one of the best organic conferences. Here are brief summaries of the sessions – a fuller version and the speakers' presentations is on-line at: www.organicresearchcentre.com.

OPENING SESSION

CAP reform proposals and UK organic producers

The opening plenary explored the impact of the CAP reform proposals on the organic sector. Juern Sanders provided an overview of support payments for organic farming and how these vary throughout the EU with the UK having the lowest rates of support for organic farming. Nic Lampkin gave an update on the proposed reforms, highlighting the Commission's intention to give organic farming greater prominence: payments under Pillar 1 (currently the SFP) will be split into a 'basic payment' and a 'greening element' consisting of 'Ecological Focus Areas' (7% of land area), diversified crop rotations and protection of permanent grassland. Organic farming systems will qualify for this element automatically, although many are now arguing that other agri-environment scheme participants and other certification schemes (e.g. LEAF) should qualify too. Nic highlighted that organic farming is the only approach that has a legal basis in EC regulations and pointed out that some UK organisations/individuals are going to significant lengths to argue against organic farming. Christopher Stopes provided an update on IFOAM and the IFOAM EU Group's activities in lobbying Brussels. He warned that there is an enormous weight behind maintaining the status quo of the CAP and that more work is needed to ensure that adequate recognition and support is given to the organic sector.

Defra Minister supports efforts of organic sector

The conference opened with a message of support from Defra's farming Minister, Jim Paice. In it, he described the event as an excellent example of the organic industry working together to set a benchmark for others.

He said: 'I have often said that organic farming is one of the pioneers of sustainable farming methods. It offers important lessons that can be taken up by the wider UK agricultural sector, as we strive to increase production but to do so sustainably. Organic production also gives consumers the choice of certified organic products that include the assurance of recognised animal welfare. These are some of the reasons why I am pleased that the role of organic farming continues to be supported in the European Commission's proposals on CAP reform. Discussions are still at an early stage, but I can assure you my intention is to press for the best deal possible for UK farmers, including organic farmers.'

ARABLE SESSIONS

Global temperate silvo-arable systems

A core rationale of agroforestry is that, as well as environmental benefits, it can deliver higher overall productivity than monocultures through more efficient resource use and ecosystem modification by the trees for the benefit of the accompanying crops. The design and management of the system are crucial to its success. The rationale appears to be justified at Wakelyns Agroforestry, where positive land equivalent ratios (LERs) were reported in the session. The practical challenges of establishing an apple/arable system on a fenland farm were described; they included tenancy issues and permissions, SFP eligibility, labour, skills, and tree establishment, among others. Benefits include cropping and enterprise diversity, soil protection and habitat conservation. Lessons gathered from overseas, were presented, reinforcing the idea that system design and management is crucial to its success, and highlighting the need for CAP reform. It was reported that the European Agroforestry Federation, founded in autumn 2011, is addressing CAP reform.

Biosolids and products – the way forward

This session covered the use of biosolids on farms in the UK and provided a useful technical overview of how biosolid products can be generated safely, and the barriers to their wider uptake. The use of human urine on farms was also explored as an area with significant potential to help close the nutrient gap on organic and non-organic farms. It became clear throughout the session that drivers are needed at both government policy and grass roots levels to encourage uptake of biosolids in UK agriculture.

Optimizing N inputs and timing for cereals

The general principles and recent research on cereal nitrogen requirements were reviewed and the need to match nitrogen supply with crop demand in order to optimise yields and minimise losses was highlighted. This includes the choice of cereal species and varieties, with oats noted as a good nitrogen scavenger. Recommendations on the use of manure were discussed including covering manure heaps to prevent nutrient losses; regularly testing of manure for N, P and K; ensuring good levels of aeration; and strategically targeting manure applications over the rotation. It was pointed out that good soil aeration is an essential component of organic nitrogen management. Therefore, soil compaction needs to be addressed by appropriate measures. Finally, it was postulated that an important aim in organic nutrient management is the stabilisation of nitrogen in the soil.

HORTICULTURE SESSIONS

Reduced tillage for arable/field-scale vegetables

Reduced tillage (RT) in organic farming is currently receiving plenty of attention. The session heard from farmer David Wilson and two researchers investigating RT on organic farms. David has been using non-inversion-tillage since 2009. His experiences have been mostly positive: reduced fuel use and less time to carry out operations were particularly welcome. However the machine's performance weakens under wet conditions, as the duck-feet shares can become clogged with soil, and weeds and volunteers are encouraged. Some European trials investigating RT on organic farms reveal clear benefits to soil parameters, including greater organic matter and reduced erosion; however, nitrogen mineralisation can be delayed. In field vegetable crops, ridge building can be hampered under RT and reduced yields of crops including carrots were reported, although higher potatoes yields have been found. Developments in soil tillage are often farmer led and improved knowledge transfer would be beneficial.

TILMAN-ORG
A European Network

Reduced tillage and green manures
for sustainable organic cropping systems

Untapped horticultural markets

This session dealt with farm business diversification. The speakers, all horticultural growers, presented the on-farm enterprises which they have established alongside their vegetables: cut flowers, organic eggs and Christmas trees. In all three cases, these were contributing to farm profitability and also job satisfaction. Speakers offered practical information on the management and economics of their businesses. The session generated a positive sense that enterprise diversification works well in horticulture to maximise efficiency of time and space usage, and indeed that all three of the case studies presented could work quite comfortably on the same farm.

Community vegetable production

Community supported agriculture (CSA) is defined as '…any food, fuel or fibre producing initiative where the community shares the risks and rewards of production, whether through ownership, investment, sharing the costs of production, or provision of labour'. This session featured speakers with a range of experiences of CSAs in the UK. Jade Bashford outlined the financial models that can be used to raise the capital required and highlighted key outcomes from the latest CSA evaluations in England and Wales. Will Johnson and John English followed by talking about their respective experiences at Canalside CSA in Leamington and The Community Farm in the Chew Valley, using two different approaches. Discussion centred around developing the community educational role of CSAs, maintaining the enthusiasm of volunteers, the importance of communication and balancing economic, social and production needs.

Functional biodiversity for growers

The central role that biodiversity plays in crop production is well recognised by organic growers who appreciate the pest control, decomposition and pollination services the 'wild' biodiversity on their land provides. This session explored how to encourage and support these beneficial beasties, with a focus on bumblebees and earthworms. Rob Brown from the University of Reading highlighted the importance of legume diversity for providing an extended floral resource to support bumblebees throughout the season, as well as the need for sympathetic management of non-crop habitats as nesting sites. Dan Carpenter from the Natural History Museum illuminated the wonderful world of earthworms, with a focus on careful soil management to support earthworm populations. An inspiring presentation from Iain Tolhurst showed that his 'whole-system' approach put biodiversity at the core of his production system, with fruit and vegetables simply a by-product!

DAIRY SESSIONS

Grass seed variety and availability issues

The session provided a valuable exchange between farmers, plant breeding scientists, certification bodies, seed merchants and a Defra representative. The farmers' main concern was the limited availability of organically approved seeds (particularly high sugar grasses), through their chosen merchant. Flexibility was limited by the creation of mixes to suit the 65% organic seed rule. There are some structural problems in the way the market works. Better communication through the grass seeds working group could help to feed in the needs of organic farmers, to inform seed producers and those who design mixes. The specialist and risky nature of seed production as a business was pointed out. Breeding programmes are now selecting for both seed yield and forage quality, but multiplication of popular varieties is a long term task. Procedures and grounds for permission to use conventional varieties were discussed, with more transparency requested.

SOLID project and innovation needs for dairying

Following an introduction to the project, everyone in the room was involved with identifying and developing ideas for on-farm research activities to help dairy farmers improve the sustainability of their systems. The dairy farmers assessed the sustainability factors of their own farms and, with others in the industry, discussed what research topics they felt were most important to investigate. Key areas of interest included: soil health and quality, with the need for a simple tool to allow farmers to assess soils for themselves; animal welfare improvement; and the interaction between feeds and breeds. Better feed management included comparing different grass and legume mixtures and their long-term performance, including under drought conditions.

Improving dairy cow health and welfare

Philip Day talked about the lameness problems at Merrimoles Farm and how they were tackled in the Healthy Feet project, bringing the prevalence of lameness down from 47% to 11%. As part of the Assurewel project, the Soil Association wants farmer input into how the inspectors' reports can be used to support improved manage-

ment. A list of possible dairy cow welfare measures was presented. Participants were asked to discuss these and encouraged to propose additional measures. Discussion of the best method(s) of assessment for a farm assurance / organic inspection followed. Overall conclusions were that inspectors' knowledge is important in promoting discussion with farmers, but personality is also influential.

Looking at animal based welfare measures is a positive move for all.

Lean or fat – making money from milk

Two farmers with unusual dairy businesses described their systems and plans. Both employ once a day milking to reduce costs and pressure on the cows and staff. Two aspects of monitoring the dairy business were covered – monitoring physical performance through milk records and health records, and financial performance through costing inputs, from feed inputs right through to whole farm costings. The value of comparing the performance of a range of farms, and assessing differences was presented. Although the traditional "margin over concentrate" measure might seem of low relevance to forage based organic herds, even this showed tremendous variation within a group of organic farms producing 6-7000 litres/cow/year. Accounting for forage costs is valuable since these can be variable and have a large influence on whole farm profitability. Modern technology can collect a wealth of information; farmers need to know how to make the most of it.

MEAT SESSIONS

Changing organic feed regulations

Have we in the poultry and pig industry been our own worst enemy in the move to 100% organic feeds? Have things not moved forward because we simply haven't tried hard enough to make it work? Mike Colley (FAI Farms) is working on breeding birds that are truly suitable for an organic system, Hi Peak Organic Feeds have created a range of 100% organic diets at minimal extra cost and Robin Fransella at Defra says that amendments to Annex V of the EU Regulation may open up more possibilities for use of novel ingredients. It seems from discussions in the workshop that when we do more than scratch at the surface of this problem we can solve it. The problems appear to be more logistical than actual – 'We could get different ingredients for you but there is no real demand or bin space'. How long can excuses like this continue to be justification for not moving to 100% organic?

The new ICOPP research project is looking at this question in more detail. See ORC's website for more info.

Sheep scab – scratching beyond the surface

Identification of sheep scab is not easy; it can be confused with lice so check for both and treat accordingly so getting veterinary diagnosis or guidance on sampling is recommended. Prevention hinges on effective quarantine for 21 days, (vital for a large number of other sheep diseases), and is a simple and effective way to reduce incidence. Measures include double fencing sheep pastures, working co operatively on common land and thoroughly cleaning transport (ideally using own trailer /lorry). Strategic treatment should be considered for quarantined animals, although withdrawal periods are an issue and should be discussed with certification bodies. Buying in stores is a big risk – avoid buying from dealers where sheep from a range of sources are mixed. Future prospects include vaccine and a pre- clinical serological test.

Carbon emissions from extensive organic livestock systems

This IOTA session provided an update on the issues that can arise when completing greenhouse gas assessments of extensive livestock systems. Chris Lloyd from EBLEX gave an overview of the work Cranfield University and the E-CO_2 project have been carrying out to help EBLEX understand more about the drivers for greenhouse gas emissions and engage with beef and sheep producers at a practical level. Poppy Johnson presented an overview of the initial results from the Soil Association's Low Carbon Farming project, highlighting the disparity between the carbon calculators that are currently available. Bill Grayson gave a farmer's perspective on carbon footprinting, highlighting that his system takes five years to produce a carcass which does not tick all the boxes as far as greenhouse gases are concerned, however his system is potentially sequestering a significant amount of soil carbon, which is currently excluded from product footprinting guidelines (PAS2050).

Reconciling prices and costs of production

Nic Lampkin presented the results of a detailed study of beef and sheep production costs based on the latest Farm Business Survey data. These showed that although input costs are lower in organic systems, the overall costs are not. It was only after including support payments that both organic and non-organic farms show a positive net margin with organic farms more profitable than non-organic. Bob Kennard showed how the price premiums for organic beef and lamb have eroded over the last 10 years dropping to virtually zero at the height of the recession. Of greater concern is the fact that prices have not increased after inflation is taken into account and that supermarkets retain all the retail price premium rather than sharing it with the supply chain. The conclusion from the session: as premiums remain low and support payments will be reduced with CAP reform a strategy of cost improvements combined with more EU wide marketing of British premium organic outdoor meat might be the best option for the organic red meat sector.

OTHER SESSIONS

Practical steps to supply chain sustainability

This session explored sustainability within the supply chain and how producers can go about assessing options for reducing their impact within environmental, economic and social areas. There was an overview of the work Organic Centre Wales have been carrying out to help organic farmers identify hotspots for improvement. Roger Kerr provided a practical example of how Calon Wen have been improving their sustainability and Iain Cox explored how sustainability can be assessed effectively and improved upon through case study examples.

Corporate organics and organic principles

'Big isn't necessarily bad' was the message from the speakers in this session, in fact organic done on a large scale and sold through the multiple retailers enables more people to access organic food. The IFOAM Principles of Health, Ecology, Fairness & Care can be adhered to on a large scale. Andrew Burgess of Produce World said that large companies acting in a responsible way can magnify the benefits of the principles. Adrian Dolby of Barrington Park Estate runs a successful business farming around 2,800 ha of the Cotswolds in a proper rotation adhering to the principles as well as the rules. Finn Cottle (Soil Association) asked without the large scale producers how are people who live in cities supposed to access organic food? Some participants were concerned that non-organic products such as 'pesticide free' will 'steal' the market if simple messages are more attractive to consumers.

Communicating organic: ads, apps and raps

We were taken on a journey from some wordy and worthy adverts of the 90s to the interactive campaigns of the 00's and today. Speakers discussed changing perceptions of the word "organic" in terms of branding and marketing. We were told in the digital age a whole new communication package is needed that is joined-up and includes conventional adverts (TV, radio, magazine/papers, billboards etc) as well as the new media of web-pages, Facebook, Twitter etc. We were encouraged not to be afraid of this new age of digital consumer generated content – re-tweet and follow, like and comment and build your customer networks that way. Calon Wen demonstrated this in action from the design of their packaging to the website, Twitter, Facebook and QR codes that takes you to their microsite.

Legumes, multi-species and multi-functional

This session explored the use of grain and forage legumes. Lesley Smith (SAC) presented the Green Pig Project, in which feeding trials on pigs have shown that peas and faba beans are a viable home-grown alternative to soyabean meal in pig rations, although in organic systems additional measures may be needed to ensure sufficient methionine. The economics of feeding peas/beans was discussed, as was the feasibility of achieving a 100% organic pig ration. The Legume LINK project, which uses diverse mixtures to improve the reliability and productivity of the ley phase, was jointly presented by a researcher, Heather McCalman (IBERS), and one of the participatory farmers, John Newman (Abbey Home Farm). Feedback from farmers was positive, and John showed that the 'all species mix' (a mix of 12 species) was continuing to retain its diversity. The cost of seed mixtures and use of inoculums was discussed: The Legume LINK trials have been inconclusive on the benefits of inoculum.

A date for your diary:

2013 ORC Organic Producers' Conference

22-23rd January 2013

Aston University, Birmingham

CLOSING SESSION

Making agro-ecology work in practice

Prof. Miguel Altieri (right) with Prof. Martin Wolfe (left) – pioneers of an agro-ecological approach to farming

The session was introduced by Martin Wolfe, referring to a long-standing common vision of the importance of diversity in the design of farm systems, which was reflected in a joint paper with Miguel Altieri to the IFOAM Copenhagen conference in 1996.

Miguel Altieri from University of California, Berkeley, highlighted the global challenges facing agriculture, and questioned whether further development of industrialised agricultural approaches could meet them. 50% of the world's food was produced by subsistence producers who had limited access to these technologies, while only a third was produced using Western, commercial industrial models. He presented examples of innovative agro-ecological approaches being used and developed by indigenous farmers in Latin America and other countries.

However, Altieri also emphasised that an agro-ecological approach was not just about biology or technology, but reflected a set of principles encompassing food sovereignty, social justice, environmental soundness, economic viability and cultural diversity. He argued that in some situations, such as California, many organic farms were still focused on input substitution and had not fully engaged with these agro-ecological principles. At the same time, there were many farmers using agro-ecological principles who were not certified organic. The challenge was to bring these approaches closer together, building on significant common ground and taking inspiration from the examples of individual producers acting as 'lighthouses' to show the way forward.

Altieri also argued that it was not just a case of small farms – there is potential to design larger farms to be more biodiverse. But we need to be aware that farmers are on a (learning) journey and need to moderate risks from changing too radically at first. Consumers also needed to be aware of changes that might result from more biodiversity, which could be reinforced by more community involvement. We can't depend on public institutions to lead reform due to their penetration by corporations – farmers need to organise to create new institutions (e.g. peasant universities) to meet their needs.

A real green revolution

The development of an on-farm lettuce variety by an organic grower in Norfolk might produce a robust plant with a good flavour, but it could also lead a return to empowerment for growers and farmers, ORC researcher ***Louisa Winkler*** *finds out.*

Sam Eglington, Woodlands Farm (Photo: L Winkler)

A large patch of varied and vigorous lettuce plants lends a spring-like freshness to Norfolk's wintry landscape. They belong to Sam Eglington, a grower based at Woodlands Farm near Dereham in Norfolk, and are part of his work to develop a specially-adapted, own-variety lettuce. "I'm hoping to develop a more winter-hardy plant with good flavour," says Sam. "There is strong demand for lettuces through December and early January, driven by the Christmas market and by general scarcity of fresh greens."

The process started off almost by accident in 2008, when lettuces Sam grew from bought-in seed of Cocarde (red) and Bergamo (blonde) included an off-type Bergamo plant that overwintered unusually well, with good texture and flavour. He allowed this plant to grow to maturity, along with a few Cocarde plants growing nearby, and saved its seed. The generation grown from this seed in 2009/10 was uniform, as expected, and Sam saved the seed of one plant, but a surprise followed when he grew out the next generation in 2010/11.

Since lettuce tends to be self-pollinating (the out-crossing rate is thought to be around 5%) and commercial varieties are homozygotic inbred lines rather than hybrids, Sam had expected to see little or no difference between parent and offspring plants, but the 'grand-children' of the overwintering Bergamo included a diverse range of both red and blonde individuals, indicating there had been one or more cross-pollination events between it and the Cocarde.

Sam let the plants in this generation grow to maturity and selected a number of individuals with good winter-hardiness and leaf quality. The seed saved from these individuals constitutes his seed bank. In 2011/12, Sam has taken a few seeds from each plant and sowed them in small outdoor beds. The significant degree of heterozygosity amongst the parents shows up in the diversity of leaf forms amongst the offspring (see front cover). Sam will now use these 'family groups' as a selection unit, where a 'family' is the offspring of one plant, and he will use his observations in the field to narrow down his seed bank, keeping only the seed of the best and most consistent family groups to grow lettuce crops for a few more seasons[1]. The great advantage of the family group selection method is that it offers some variation and appeal in terms of the product to be sold, but within boundaries set by the grower. "You want variety within certain parameters," Sam points out. "It's useful to have different forms and textures, but you do need some predictability about the final product."

So is it really worth Sam's while to invest resources in producing his own lettuce seed with a degree of local specialisation? In addition to the time involved in planting, observing, harvesting and threshing, Sam must devote a fair amount of ground (2m x 20m) to growing out the family groups for selection of the best.

These efforts yield lettuces with the characteristics he needs for his market, well adapted for his local conditions, i.e. a highly saleable product, with a small cost saving on seed. Potentially, he can go on to develop particularly good plants into inbred pure lines; he sees around four possible cultivars emerging from these efforts. All of this is useful, as it is legal to sell plant products even of an unregistered seed variety. But further to this, Sam is also motivated by the democratisation of seed resources and the re-empowerment of farmers and growers.

This is a value which informs ORC's work with development of on-farm and diversity-based plant breeding methodologies such as those explored through Wheat-Breeding LINK and SOLIBAM. From the research perspective, it is encouraging to meet farmers sufficiently interested in having their own seed resources to invest valuable assets in cultivating them. Sam's message about variability within limits is a useful lesson; diversity for its own sake is not necessarily beneficial or easily manageable, and the grower needs to be assured that his or her crop will meet market requirements consistently. Family group selection is a neat way of achieving this.

Even then, it remains problematic for own-varieties that the supermarkets, which dominate UK grocery retail, demand rigorous uniformity and give growers little choice but to fall back on highly inbred or F1 hybrid varieties which are predictable in their performance. While commercially developed pure varieties will no doubt remain valuable, and probably the chief source of seed for farmers and growers, it would be great to see more experimentation with own-variety development and more farmer control over seed resources. For this to be worthwhile, however, an expansion of the market for more varied vegetables whether through relaxation of supermarket standards or the development of other retail channels such as farmers' markets is needed.

[1] An approach described in *Return to Resistance: Breeding Crops to Reduce Pesticide Dependence* by Raoul A. Robinson (1996).

Managing Johne's disease on organic farms

Johne's disease (paratuberculosis) can be found on an estimated 50% of UK dairy farms. There is no treatment and clinically affected animals inevitably die of the disease. Before the onset of clinical signs, infected animals suffer from a range of conditions including milk drop, poor fertility, mastitis and elevated cell counts, lameness and digestive problems, which lead to economic loss and adverse animal welfare impacts. Clinical cases represent the tip of the iceberg and if cows are culled due to these secondary conditions before the onset of the clinical stage, the disease may spread in the herd unrecognised. ***Peter Plate*** *of the Damory Veterinary Clinic in Blandford discusses the implications for organic farmers.*

Epidemiology

Johne's disease is caused by a bacterium (*Mycobacterium avium paratuberculosis*, MAP). While young stock are susceptible, clinical symptoms – predominantly weight loss and diarrhoea – occur mainly in adult cattle after an incubation period of several years.

Susceptibility to the infection decreases with age. Newborn calves are very susceptible and the vast majority of infections occur during the first week, probably the first day of life. There are two main sources: faeces from infected cows are by far the most important, followed by colostrum and milk. One high shedding cow, producing 50kg of faeces per day, can in theory infect 50,000 calves a day, each requiring just 1g of faeces to get infected.

Essential control measures

It is crucial to minimise the spreading of Johne's disease: individual calving boxes should ideally be cleaned out after every calving. Calving outdoors, with any subsequent housing in a clean, lightly stocked straw yard which is regularly and generously bedded and frequently cleaned out, is also recommended.

The infection rate in a herd increases if one cow or bull can infect more than one calf, and in most calving yards this is the case. There are two ways to break this cycle:

- Identifying high risk cows and separating them prior to calving. Calves from this high risk area should not then be used for breeding. All cows in the main calving area are therefore low risk cows and unlikely to shed MAP.
- Removing all replacement calves out of the calving area as quickly as possible.

Colostrum and milk are vehicles for MAP infection from cow to calf as well, but to a lesser extent than contaminated calving yards. Often infection attributed to milk or colostrum is actually caused by faeces from dirty teats and udders, sucked by calves.

Ideally every calf should only get colostrum and milk from its own dam. If milk and colostrum are pooled, one shedding cow contributing to this pool has the potential to infect a large proportion of calves. Several strategies can be used to prevent this spread:

- Identify high risk cows and do not let them contribute to colostrum and milk pools.
- Milk off colostrum hygienically from the calf's own dam, feed via bottle or tube and feed milk powder thereafter. However, feeding milk powder has implications regarding organic standards, and organic milk replacers are costly when available.
- Pasteurisation is another way of reducing the risk (60 C, 60 minutes), but pasteurizers are expensive.

Under no circumstances should waste milk from sick cows be fed to replacement calves in infected herds. Infected cows show other conditions at an increased rate, so the "waste milk pool" is a positive selection of high risk cows. Waste milk can be fed to calves reared for beef, which will not reach the age to develop the disease, or other species like pigs.

However, to reiterate the critical point: the best colostrum and milk management is worthless if calves already become infected via faeces in the calving yard.

Identifying high risk cows

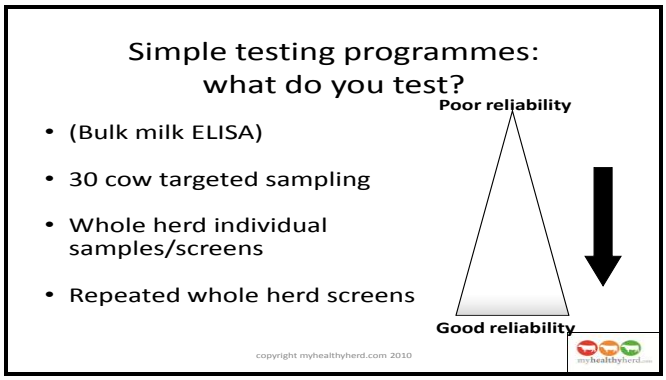
In recent years newly introduced testing and surveillance programmes have made comprehensive Johne's disease control achievable for every dairy herd. Screening tests can be used to find out whether or not a herd is likely to be infected, and to identify high risk animals in infected herds in order to prevent the infection spreading. The most commonly used is an antibody test on blood or milk.

The easiest and most accessible approach is to test bulk milk. However, this is very crude with poor sensitivity and may give false security. In fact all current tests are limited because they only detect infected animals at the later stage of infection and are not able to identify infected young stock. While reasonably sensitive in finding Johne's disease in cattle with clinical signs, the detection rate decreases even in adult animals in the pre-clinical stage.

The upshot is that a positive test result means that the animal is very likely to be infected, but a single negative test result only indicates the animal may or may not be infected. However, animals that repeatedly test negative are unlikely to shed the bacterium while testing negative, although they may become positive at a later stage.

This means that regular testing is necessary and a quarterly antibody test of all milking cows is a critical tool to divide affected herds into high risk and low risk animals which can then be managed separately with regards to calving, colostrum and milk feeding (see Figure).

To check for infection in an apparently uninfected herd, a 30-cow screen targeting high risk cows should be done every 6-12 months depending on risk. If cows are well selected (3-8 years olds with health and production problems – poor yield, fertility, mastitis or cell count problems, lameness, digestive problems), even with the poor sensitivity of the antibody test, a 30 cow screen is likely to pick up at least one infected animal in an infected herd.



If the test is positive, steps can then be taken to limit the spread and control the disease within the herd; if negative, focus should be to prevent the introduction of the disease through bringing in infected animals.

Organic standards and risk of Johne's disease

Some organic standards or practices are clearly beneficial for the control of Johne's disease. Closed herds with the breeding of own replacements are recommended and if followed will limit the main risk of introducing the disease into uninfected herds. Outdoor calving will reduce the risk of spreading disease in the calving area.

Others are more ambivalent. For example organic standards prescribe weaning of calves from 12 weeks. Until then the diet must at least include 51% natural milk, with a maximum of 49% organic milk powder being allowed. This prolonged feeding of cows' milk, while natural and beneficial with regards to calf immunity and health, can obviously be a risk factor in spreading Johne's disease.

Therefore it is very important for organic farmers to know a) the status of the herd through 30-cow screens and b) if the herd is infected, to identify high risk infectious animals through quarterly testing so that they can be kept out of the colostrum and milk pool.

Although not explicitly prescribed in the standards, it is a common organic practice to keep calves with cows for several days or use nurse cows to rear calves. Again, here is a risk factor for spreading Johne's disease, which can be reduced if high risk cows are identified and only low risk cows are used as nurse cows.

Conclusion

A potential link exists between Johne's disease and Crohn's disease in humans. The diseases are clinically similar (chronic diarrhoea), but the evidence is contradictory. MAP DNA was found in the gut and blood of Crohn's patients at a higher rate than in healthy people, but there does not seem to be an increased risk of Crohn's disease in people with regular close contact with cattle.

However, the economic impact is clear. A US study comparing Johne's disease-infected with non-infected cows found that they gave 4000 litres less milk over the lifetime (partly due to a drop in milk yield, starting in the second lactation, partly due to a shorter life), with the greatest losses attributed to pre-clinical, secondary conditions.

The animal welfare impact is serious. The same study showed that infected cows as they regress through scouring, weight loss and death were:

- five times more likely to be lame;
- twice as likely to develop cell count and mastitis problems;
- almost twice as likely to develop respiratory and digestive problems.

Preventing the introduction of Johne's disease into uninfected herds and controlling and reducing it in infected herds should be a priority for every dairy farmer. Some organic standards and practices appear to favour the spread of the disease within a herd; whilst others have the potential to reduce it. New screening and management strategies are a welcome means to overcome these issues and organic farmers should apply a pro-active and precautionary approach based on them. Due to the long incubation period any measures taken now will take several years to take effect. Therefore a detailed control plan should be discussed with the vet.

Acknowledgements

Peter Orpin, Richard Sibley of Myhealthyherd for developing and encouraging a nationwide Johne's control strategy.

Further information

myhealthyherd.com: contains a Johne's control strategy including risk assessment, surveillance and control options

johnes.org: Johne's information centre of the University of Wisconsin

Hayton A (2007) Johne's disease. Cattle Practice 15(1):79-88

Nielsen S (2009) Use of diagnostics for risk-based control of paratuberculosis in dairy herds. In Practice 31:150-154.

Improving the sustainability of organic and low input dairying

ORC is responsible for co-ordinating a series of on-farm, farmer-led research projects which will be carried out over the next 3-4 years, as part of the EU funded SOLID project.

An open meeting to develop ideas for the projects is planned, giving dairy farmers the opportunity to suggest and discuss suitable topics and get involved.

The event will be held at at Hanley Court, Tidenham, Chepstow, NP16 7NA on Thursday 3 May 2012 10.30 – 2.30.

Group discussions will be followed by lunch and a farm walk at Severndale Farm by kind invitation of Lyndon Edwards.

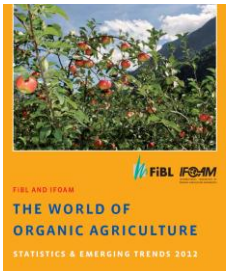
Please book in advance by contacting Gillian Woodward at ORC, tel. 01488 658279, e-mail: gillian.w@organicresearchcentre.com

SOLID
Sustainable Organic and Low Input Dairying

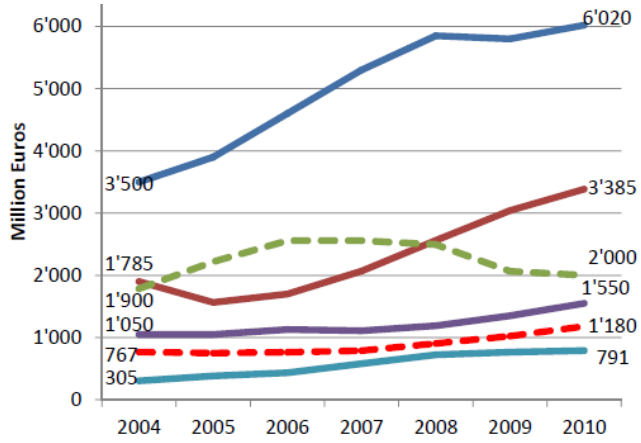
Organic markets improving? At least for some....

In the last couple of months, a series of market reports have been published that provide some encouragement for the recovery of the organic market in the UK, although the contrast with trends in other countries cannot be greater. ***Nic Lampkin*** *reports.*

Global markets growing, some very strongly



Although the number of standholders and attendance was down at February's Biofach international organic trade fair in Nuremberg, perhaps a reflection of reduced Mediterranean government budgets to support attendance, the market mood was more positive, reflected in the statistics presented in the annual FiBL/IFOAM global organic market data report (www.organic-world.net).



Development of organic market in (from top) DE, FR, UK, IT, DK, CH. (Source: Willer/FiBL)

The European organic market grew to €19.6 billion in 2010, with the UK the only country to show a decline. Switzerland, Austria and Denmark have organic market shares over 5% of the total food market. In France, organic land area and holdings increased by 25% in 2010. The German market grew 9% to a 3.7% share of the total food market, despite the EHEC crisis, due in part to Dioxin and Fukushima concerns. German organic meat and poultry sales increased 40% in 2011, due to better availability. The US organic market grew 10% in 2011 to $ 32 billion, while the number of certified operators grew by 3% to 17,600, according to data just published by the US NOP.

UK market still out of step, but positive signs

The Soil Association's 2012 organic market report, launched at their annual conference in March, showed a continued decline of 3.7% in the overall size of the UK organic market. However, some products showed increased sales, with lamb up 16%, baby food up 6.6%, poultry up 5.8% (including turkeys up 56%) and health/beauty and textile products also up. Beef sales were steady after strong growth in 2010.

One explanation for the differences between the UK and other countries may be the concentration of the organic market in four main retailers (Tesco, Waitrose, Sainsburys and Asda), and within those the importance of own label brands, which means that decisions by a few to cut lines or shelf space can have a big impact on total sales. While the share attributed to multiple retailers by the SA report fell by 5% in 2011, it still accounted for 71% of sales, compared with 54% in Germany and 47% in France.

Committed Scottish producers stick with it

The latest SAC Organic Market Link report (www.sac.ac.uk) found that, while the number of certified producers had fallen and the production of cattle and sheep was projected to fall by 14% and 3% respectively between July 2011 and 2012, demand had remained firm and consistent over the last 12 months. Prices for prime cattle were stable, and remained very strong for store cattle and lambs. This year's data also showed more producers than last year planning to remain in organic production for longer than five years.

Wales still leads UK nations, despite slight fall

Welsh organic certified area statistics for 2010, and production data for 2011, published by Organic Centre Wales (www.organiccentrewales.org.uk) in December 2011, showed a slight fall in the certified area compared with 2009. However, organic land still accounted for 8% of total Welsh agricultural area, compared with the UK average of 4%. Livestock numbers increased in 2011, accounting for 5, 4 and 4 % of all Welsh cattle, sheep and poultry numbers respectively. Producers were more confident about remaining organic, although 42% indicated they would withdraw within five years, in part reflecting uncertainty about future support.

Certcost project recommendations published

Biofach 2012 also saw the publication of the final recommendations for the EU-funded Certcost project (www.certcost.org). ORC's Susanne Padel participated in the project, which evaluated the economics of the EU's organic regulatory system, looked at differences in implementation in selected EU countries and highlighted six key areas for improvement:

1. Harmonise supervision of the certification system, approval of control bodies and data collection
2. Develop further use of risk-based inspection systems
3. Raise consumer awareness of, and trust in, organic certification logos
4. Strengthen the institutional basis
5. Increase transparency and enhance the information provision to organic operators
6. Invest in the knowledge system.

Further details on these recommendations, as well as on the findings of the study, are available from www.certcost.org.

Protecting the pollinators

Pollinators are a key component of biodiversity and provide an essential ecosystem service for wildflowers and a large number of crops. Within the UK alone, the annual value of pollinators to agriculture has been estimated at £440 million. However, in recent decades there has been a dramatic decline in many pollinator groups, including bees and butterflies, leading amongst other things to negative impacts on fruit production and seed setting in flowering crops. ***Robert Brown, Hannah Jones*** *and* ***Simon Potts*** *(University of Reading) and* ***Thomas Döring*** *(Organic Research Centre) are looking at how diverse legume mixtures can play a significant role in reversing this decline.*

The worrying decline in pollinators such as bees and butterflies is attributed to the loss of floral resources in farmland, habitat loss, agricultural intensification and pesticide use.

Grass/clover leys, which are central to organic farming in the UK and are of increasing interest in conventional farming, provide a much needed flowering resource and are a promising tool to reverse the decline. However, as new research shows, many of these leys can be improved from the pollinators' perspective as they are relatively species-poor with a limited flowering duration.

In particular, continuous floral succession from early spring onwards is needed to maintain pollinator populations. Therefore, increasing the species diversity of legume leys has the potential to increase the benefits to pollinators throughout the flowering season by providing a variety of flowers which bloom sequentially through the season, thus extending the availability of pollen and nectar. As part of the ORC-led, Defra-funded Legume LINK project, we looked at how diversity within legume leys affects pollinators and quantified the effect of ley management on pollinator diversity and abundance.

From the 35 farm sites participating in the overall project where legume mixtures were sown in 2009, ten organic field sites were chosen for this study. Sites were selected by management type and either grazed by sheep (9-10 ewes/ha) or regularly mown. The sites were sown (as part of the farmer's standard legume ley) with 0.5ha of a diverse legume mixture called the all species mix (ASM), consisting of ten legume and four grass species.

The effect of the ASM on pollinators was compared to the farmer's standard legume ley on a 100m pollinator obs ervation transect within each legume plot, using methodology stipulated in the Butterfly Monitoring Scheme. The flora of each transect was recorded monthly between April and September as flower abundance and species diversity along the length of transect.

In total 3,231 individual pollinators were recorded throughout the season, of which bumblebees comprised 58%. The ASM tended to have a greater number of flower density than the control leys, both in the early season and late season, although, overall differences in floral assemblage were not significant.

The total number of flowers differed significantly between grazed (9.0 per m^2) and non-grazed sites (30.5 per m^2). Accordingly, the number of pollinators recorded on non-grazed sites (23.2 per m^2) tended to be greater than on grazed sites (8.0 per m^2), though the difference was not statistically significant. The lack of significant differences is probably due to the fact that management of grazed sites was not constant throughout the season. Sheep were removed from grazed sites for a two week period in June in two farms to allow the regeneration of the ley, and this allowed mass flowering of white clover.

The ASM supported significantly more bumblebees and hoverflies early in the season (May), and hoverfly and solitary bee species later (August). The control sites supported a larger number of hoverfly species in mid-season. Bumblebee species generally tended to show a preference for un-grazed plots during June and July.

Management of the leys where it impacts on floral resource availability affects pollinator community composition. Sheep grazing significantly reduced floral resources for pollinators throughout the year. When grazing pressure was removed from grazed sites, mass flowering of white clover occurred in both ASM and control plots. However, many of the taller flowering species had either been excluded from the ley, or were unable to recover in time to flower, before grazing resumed.

More work needs to be done but these preliminary results indicate that diverse legume leys have an important role to play in protecting the pollinators on UK farms.

Acknowledgements

This study was funded by the BBSRC and the Organic Research Centre. The authors would especially like to acknowledge the support of the participating farmers, and the LegumeLINK consortium (funded by Defra's Sustainable Arable LINK programme and industry partners)

Making organic farming the climate resilient agriculture

*'Climate-smart agriculture' is in vogue. Emanating from FAO and the World Bank, it has been rapidly and widely taken up by every agricultural interest group. They are all claiming kinship, but it looks increasingly as if the adoption papers have been snaffled by industrial and GM agriculture and that it's going to be a prominent member of the 'sustainable intensification' family. As **Lawrence Woodward** and **Laurence Smith** report, this was part of the background to a recent meeting of the international Round Table on Organic Agriculture and Climate Change (RTOACC), held at ORC, which considered the most recent findings on the role organic agriculture can play in climate change mitigation and adaptation.*

There may be few things most proponents of industrial/GM agriculture and more organic/agro-ecological approaches have in common, but there is one area on which there is significant agreement; namely the desire to include agriculture, or more specifically agricultural land-based 'carbon sinks', within international climate change mitigation measures. For example, Monsanto was lobbying for soil carbon offsets to be included in the original Kyoto agreement and now IFOAM (on behalf of the international organic movement) is arguing for the same thing in the current round of climate change discussions.

There are three points to consider here. Firstly, there is a need to look very closely and critically at the factors that led to the organic movement taking apparently similar positions to GM companies and the proponents of 'sustainable intensification'. The desire to get a bit of whatever is going for organic farmers, in financial support or market terms, is understandable. But are we missing a bigger picture? Some development groups think we might be.

Secondly, the provision for 'carbon offsetting and trading' in the fancifully named 'Clean Development Mechanism' of the Kyoto Treaty was essentially a device (which failed) to keep the US and other big industrial greenhouse gas emitters in the agreement by providing a mechanism to reduce the size of their emission cuts. There is a strong case that the carbon offset markets have been a major contributing factor in the failure to make any significant reduction in industrial emissions. Moreover, post Kyoto schemes such as REDD (Reducing Emissions from Deforestation and Forest Degradation) have been heavily criticised for the adverse impacts they have brought about on traditional and sustainable forest management, local economies and the rights of indigenous people[1].

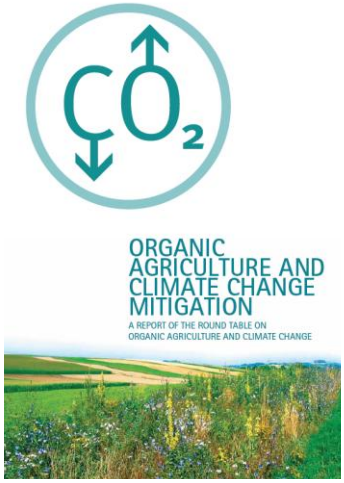
Thirdly, there are major technical problems in establishing any meaningful agricultural land-based carbon sequestration scheme. Despite several years of discussion, credible measurement, reporting and verification protocols remain elusive, as do methods of demonstrating that 'additional' sequestration is actually occurring and is permanent. Trading action on measurable and verifiable greenhouse gas emissions from regulated manufacturing industries for variable, imprecise and vulnerable carbon sequestration from agriculture seems irresponsible given the scale and urgency of the climate change problem.

We ought to be asking just how many carbon credits justify the organic movement getting on the wrong side of these arguments. Or better still, what position flows from a proper understanding of the IFOAM principles.

[1] see "Why we should continue to oppose the inclusion of agriculture in climate negotiations" www.econexus.info and papers by Larry Lohman http://www.thecornerhouse.org.uk/resources/results/taxonomy:14)

In any event, despite the hope and hype that has been expressed within the organic sector, it is very unlikely that organic agriculture as a system would be accepted for credits within the 'carbon market'.

In December of last year, FAO (www.fao.org) and RTOACC published a report 'Organic Agriculture and Climate Change Mitigation', which is available on the FAO website. One of its conclusions was that conversion from conventional to organic management 'has no chance of being approved (as an accredited methodology for carbon markets), as it is not specific enough.'



However, the report argued that specific organic practices have the potential to generate carbon credits, including:

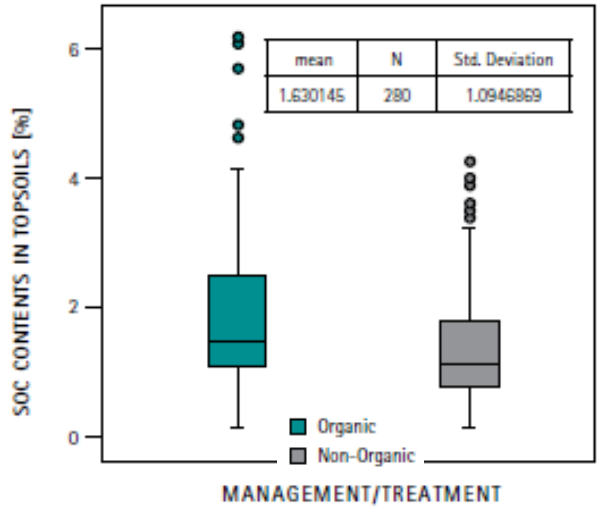
- Replacement of chemical fertilisers
- Production and application of compost
- Application of legumes in crop rotations
- Avoidance of burning agricultural waste and residues
- Increase of soil organic matter (soil C sequestration)

However, in a significant departure from some claims made a few years ago, the report stated that: 'soil carbon sequestration (in organic systems), is not as effective from the carbon offset perspective as originally assumed'.

Organic farming and carbon sequestration

This aspect of the report was discussed at some length during the RTOACC meeting at ORC. The Swiss Research Institute of Organic Agriculture (FiBL) has been working to provide some clarity on this issue by conducting an in-depth meta-analysis of published data, comparing the soil properties of conventional and organic farming systems. The report drew on this work.

FiBL researchers reviewed 45 scientific papers and over 280 data sets within a quantitative meta-analysis. All of the studies assessed were based on pairwise comparisons and consisted of a mix of plot experiments, field trials and farm comparisons. The results from the meta study found that soils under organic management had significantly higher soil organic carbon concentrations (SOC %); and soil carbon stocks than those managed non-organically (37.4 compared to 26.7 tonnes C/ha), although in some of the studies, concentrations were falling over time and only the rate of decrease was lessened by organic management.



Unfortunately, as the authors note, many of the studies reviewed suffer from shortcomings that reduce their scientific value. The largest of these is the fact that none of the studies contained data on the baseline situation (i.e. soil carbon concentrations and stocks at the start of the experiments), which makes it impossible to determine if the differences in SOC between treatments is due to the management itself, or the residual effect of the previous land-management. There were also issues relating to missing bulk density and soil carbon stock data, as the vast majority of studies included in the report only measured soil carbon concentrations.

They also point out that the papers are drawn from a narrow base of land use types and pedo-climatic regions with some production types showing large variation in performance. For these reasons the authors conclude that although there is strong scientific evidence of higher soil organic carbon concentrations under organic management compared to conventional; the evidence of carbon sequestration rates for organic farming practices is uncertain.

Organic farming and climate change adaptation

Soil carbon is only one aspect of soil quality and improvements in humus content, aggregate stability and biological activity are well documented under organic management (Siegrist *et al.*, 1998; Mäder *et al.*, 2006; Lampkin, 2007; Scialabba and Müller-Lindenlauf, 2010). These aspects have a particularly important role in ensuring the resilience and adaptability of agriculture under climate change.

Adaptation (to climate change) has received far less attention than mitigation (against climate change), but is now being looked at more closely. It was one of the main themes of the recent RTOACC meeting, which highlighted some of the evidence, for example of buffering in periods of drought, that indicates organic farms may have an enhanced 'ecological adaptive capacity'.

Adaptive capacity is also enhanced by the diversity of farm enterprises, income streams, markets and societal and cultural support. Again the RTOACC meeting highlighted that, in these areas, organic agriculture was already relatively strong with much further potential. It was agreed that adaptation strategies were most likely to be effective if locally developed and focussed, also a strength of organic farming, as vulnerability to climate change varies considerably between regions.

Because of these adaptive capacities, both existing and potential, it seems more appropriate to consider the organic approach as a "resilient" rather than a "climate smart" agriculture. We shouldn't push the distinction to unreasonable lengths, but the former seems more about working with and being part of, whilst the later stands somewhat apart "looking for an edge".

The Round Table for Organic Agriculture and Climate Change will be publishing minutes of the meeting held at ORC shortly (see www.organicandclimate.org) and will continue to help provide a robust evidence base on the benefits that organic agriculture can provide for both climate change mitigation and adaptation. ORC is an active member and we will provide regular updates.

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From page 8: Definition of 'living soil'

(This definition was proposed by Schonning and Woodward, though not accepted by the IFOAM EU Group Board)

'Soil can be defined as the unconsolidated mineral or organic material on the immediate surface of the earth that (a) serves as a natural medium for the growth of land plants and (b) has been subjected to and shows effects of genetic and environmental factors of climate (including water and temperature effects) and macro-/micro-organisms, conditioned by relief, acting on parent material over a period of time.

A number of differentiated horizons exist within soil from the surface to the underlying parent rock (the soil profile). Physical, chemical and biological processes functionally interact within and between these horizons, as does energy, thereby constituting a 'living' system.'

(adapted from: Glossary of Soil Science Terms (2008) The Soil Science Association of America; Introduction to Soil Science and Soil Resources(www.pedosphere.com); Jeny, H (1994) Factors of Soil Formation, Dover Publications, New York; Soil Taxonomy, 2nd edition, Natural Resources Conservation Service, USDA)

Events and announcements

Forthcoming events

17-18 April 2012: IFOAM EU Congress, Denmark
Smart change**:** policy change for sustainable, organic CAP

19-20 April 2012: SOLIBAM Project Congress, Rome
The role of diversity in low-input and organic systems

3 May 2012: SOLID Project Dairy Research Workshop
Hanley Court farm, Chepstow – see page 15 for details

24 May 2012: Farm Woodland Forum, Bangor Univ.
Trees, farms and ecosystem services

28 June 2012: ORC Wakelyns Agroforestry Open Day
With guest speakers and updates from ORC researchers

5 July 2012: OF&G National Organic Cereals Event
Featuring ORC research and economic reports

22-23 January 2013: ORC's 7th Organic Conference
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