THE ORGANIC RESEARCH CENTRE
ELM FARM

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Organic Research Centre

Bulletin

No. 117 – Autumn 2014

News in brief

Organic farming can be as profitable as conventional

The 2012/2013 season was a difficult one for farming, due to adverse weather, and both organic and conventional sectors suffered reduced profitability. However, due to less reliance upon external inputs organic farm profitability fell less than on comparable conventional farms. Overall, in 2012/13 organic holding profitability was similar to comparable conventional holdings, with organic Less Favoured Area (LFA) cattle and sheep farm profitability significantly higher. These findings were published in the report *Organic farm incomes in England and Wales 2012/13* from Aberystwyth University and ORC, which presents results of research on the financial performance of organic farms in the 2012/13 financial year (with 2011/12 data for reference), using data collected through the Farm Business Survey in England and Wales.

The energy efficiency of organic agriculture

An ORC-led review of about 50 studies, published in *Renewable Agriculture and Food Systems,* has confirmed that most organic crop and livestock systems are more energy-efficient than their conventional counterparts. The difference is greatest when comparisons are made on a unit of area basis, although substantial increases in energy efficiency can also be observed per unit of product within most of the comparative studies reviewed. The difference between organic and conventional production tends to be greatest for grassland systems, due to the relative efficiency of producing grass in conjunction with clover. There are some important exceptions where organic performs worse. For example, potatoes, where a lower yield reduces efficiency, and other vegetables that require flame-weeding. Within livestock production, organic pig and poultry production systems also perform worse, where poor feed conversion and higher mortality rates can lead to lower energy efficiency overall. Despite this it is possible to state that most organically managed cropping and grazing-livestock systems will require less energy than conventional systems, on a unit area or weight of product basis. This is largely due to the absence of manufactured mineral nitrogen fertiliser and lower levels of imported feed.

Role of no-till in mitigating climate change

An international group of scientists, led by Professor David Powlson, Lawes Trust Senior Fellow at Rothamsted Research, have published a critical review in the journal *Nature Climate Change* which concludes that the role of no-till agriculture in mitigating climate change may be over-stated. The review found that there was sometimes a genuine, but small, net accumulation of organic carbon in soil under no-till compared to conventional tillage. But, much of the observed effect results from a redistribution of organic carbon with depth - extra organic carbon near the surface but less deeper in the soil. In addition, the soil sampling methods normally used tend to exaggerate the effect. Consequently the climate change mitigation achievable from converting to no-till agriculture is likely to be over-stated.

Poultry and pig derogations to continue

The derogation from the EU Organic Regulatory Board to allow organic pig and poultry producers to include up to 5% non-organic feed within their rations was due to finish at the end of December 2014. From then on all producers would have been required to feed monogastric animals a 100% organic diet. This has now been extended to 31 December 2017. The derogation to allow non-organically reared pullets of not more than 18 weeks for egg production to be brought into organic livestock units has also been extended from 31 December 2014 to 31 December 2017. This is likely to be a temporary measure, because the legislative proposal for a new regulation on organic farming published in March 2014 and currently under negotiation foresees a removal of all exceptional rules in the future.

Organic market strengthens

New figures from Nielsen, released by the Soil Association in September, show growth in the organic grocery market of +3.2% for the 4 weeks to 16 August 2014 compared with a fall in the non-organic grocery market of -0.9% in the same period. This continues a trend where organic sales have been growing at +1.2% compared with a stagnant non-organic market for the year to 16 August 2014. Organic sales in the UK now make up a 1.3% share of the £96 billion food and drink market.

Greater plant biodiversity increases soil nitrogen

Increased plant biodiversity improves grassland soil quality by boosting its nitrogen levels, even in the absence of nitrogen-fixing plants, recent research from the Netherlands has found. Previous research has shown that grasslands with higher biodiversity had higher levels of carbon and nitrogen. However, in the case of nitrogen it has been suggested that this was purely a result of increased numbers of nitrogen-fixing legumes, such as clover. This study was the first to show that, even without legumes, increased numbers of grassland species increased both carbon and nitrogen soil stocks.

Glastir Organic opens in Wales

Organic farmers in Wales wanting to continue receiving financial support must apply to the Welsh Government from 1-29 October as part of the first application round of Glastir Organic, with contracts starting on 1 January 2015. Support will be made available both to existing organic producers and converting farmers. Glastir Organic has been developed as an online application with support available for farmers that need help in making the transition to online services. Farmers joining Glastir Organic can also participate in other parts of the Glastir scheme, but it is not compulsory.

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About us

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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/ agroecological principles; disseminating knowledge to current and 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.

Registered in UK as
Progressive Farming Trust Ltd.
Company No. 1513190
Charity No. 281276
VAT No. GB314668159

Registered address
Organic Research Centre
Elm Farm
Hamstead Marshall
Newbury RG20 0HR

T: +44 (0)1488 658298
F: +44 (0)1488 658503
elmfarm@organicresearchcentre.com

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Editorial: Agroecology and organic farming – natural partners or complete strangers?

At the FAO's high profile conference on Agroecology in Rome in September, I was struck by the continuity of debates and issues over the last 30 years, particularly in the context of organic movement conferences and literature that I've experienced. I was struck even more by the reluctance to recognise this – even to mention organic farming – and too often when it was mentioned to deny that organic and agroecology were closely related.

I became increasingly concerned about this as the conference progressed. Even before I attended one of Miguel Altieri and Stephen Gliessman's Agroecology courses in 1986, I had seen organic and agroecology as different expressions of the same essential entity.

It is clear that agroecology, like sustainability, means different things to different people – from the study of agricultural ecosystems through to the application of ecological principles to the management of agricultural systems. For some, it is also about social, political and institutional change involving food systems as well as food production, including new models of producers selling more directly to consumers, direct political support and autonomy from big corporate structures.

All of which are contained within the principles of organic agriculture. Almost everything identified as agroecological at the conference could be found in an organic context and, in much of Europe at least, farms and processes identified as agroecological are almost invariably organic.

So why the problem recognising the close relationship between organic farming and agroecology? In a word: certification. To quote Coventry University/Garden Organic's *Mainstreaming Agroecology*: 'In contrast with agroecology, the practices of certified organic agriculture are codified in a clearly defined and transparent set of standards.'

Part of the criticism lies in the idea that there is a progression from current/ conventional practice through increased efficiency, input substitution and system redesign to fully agroecological systems. It is argued that organic standards tend to focus on input use (for understandable reasons as they are easier to audit than complex ecosystem service outputs), so organic farms get stuck at the input substitution stage and don't really engage with system redesign let alone true agroecology.

There are undoubtedly too many cases of organic farms stuck in a neo-conventional, input substitution mindset, but the idea that organic farming is not based on redesign and restructuring of the farm using agroecological approaches is a fundamental misunderstanding of organic principles and practice. There are many examples of systems redesign and pioneering agroecological systems that are also certified organic. There are also self-defined 'agroecological' systems which fall far short of the ideal.

Certification is a means to an end, to support the financial viability of organic farms and support consumer choice, not an end in itself. It is not a fundamental requirement of the production system, although it does help to guide producers in converting principles into practice. Equally, while no certification might mean more options and freeform thinking, as suggested by the Coventry report, it also carries the risk that agroecology, like sustainability, can mean anything you like. Certification doesn't of itself drive ecological thinking, but it can provide a foundation on which to design and build better systems, and should not be seen as a ceiling or constraint to inhibit farmers' creativity and innovation.

Throughout its existence ORC has worked to develop, promote and protect 'organic by principle and design'. For us, organic and agroecology are part of the same entity, where organic farming, not necessarily certified, is substantially different to 'organic by neglect or inaction'. Where organic practice falls short of the agroecological ideal, it also falls short of core organic principles. Organic producers and agroecologists should therefore be proud to stand on the same platform.

We are currently conducting a review of agroecology and sustainable intensification for Scottish Natural Heritage and the Land Use Policy Group, and leading agroecologist Pablo Tittonell of Wageningen University will be speaking at our conference in November – come and join us to continue the debate!

Nic Lampkin

The Prince of Wales's Food and Farming Summer School

The Prince of Wales's Food and Farming Summer School has been held since 2007, initially at Duchy Home Farm, Tetbury, and Highgrove, then at the Royal Agricultural College, Cirencester, and, since 2013, hosted by ORC. This year 58 leading individuals from farming, food businesses, research, government and non-governmental organisations came together to address the challenges of producing sufficient food sustainably, to meet not just the needs of current but also future generations.

The event kicked-off at Elm Farm with an overview of the sustainability challenges we face: the loss of biodiversity and genetic resources, depleting soil nutrients and the economic and social challenges of maintaining family farms. A visit followed to the 1,620 ha LEAF-accredited Leckford Estate in Hampshire, the Waitrose Farm. Leckford is a diverse estate, adding value to its products which are sold through Waitrose stores. Led by Andrew Ferguson and John Malley, we visited Abbotts Manor Dairy where 600 cows are housed and milked in a rotary parlour. The tour also took us to the large mushroom facility and the farm shop. After dinner at the Halfway Inn Lord Curry gave a 'back to basics' guide to sustainability in British agriculture.

Abbotts Manor Dairy, Leckford Estate

Teo Stefan and Susanne Padel introduce the antibiotics field lab

HRH The Prince of Wales meets organic farmer Luke Hasell (left) and Mike Curtis (right), who farms on the Somerset levels. Nic Lampkin and Susanne Padel look on.

HRH The Prince of Wales meets the weaners

On day two the group breakfasted at the Royal Oak, Bishopstone, near Swindon before debating the issues of food security and sustainable intensification, diet, food quality and public health with professors Tim Benton and Tim Lang. Helen Browning introduced the 540 ha organic Eastbrook Farm prior to the farm walk which included the free-range pigs, conservation grassland and sheep. We were joined by special guests including HRH The Prince of Wales.

The Duchy Originals Future Farming programme field labs were a major focus with ORC's Nick Fradgley on hand to introduce the trial on different approaches to weed control in spring wheat. John Pawsey and John Newman talked about trials on their farms. The last stop was the dairy cows, where ORC's Susanne Padel and dairyman Teo Stefan explained how the antibiotics field lab is working to improve the health of dairy cows while cutting down on antibiotic use. Later, HRH The Prince of Wales mingled with Summer School participants at a reception at The Royal Oak, which is run by Helen and her partner Tim Finney.

The afternoon of the second day saw the Summer School arrive at Duchy Home Farm (right) near Tetbury where HRH's passion for organic farming is put into practice. The tour was led by David Wilson and Geraint Richards.

The final day was about finding solutions. Firstly, the question of intensity. What can precision farming, integrated farming, organic farming and other such approaches deliver? This was followed by the question of scale. Does the future lie with smallholdings/micro-businesses, medium-scale family farmers or large estates? The final question posed was about diet. Can we change our food systems? Is changing what we eat more important in sustainability terms than how it is produced? These issues were hotly debated and the Summer School finished with participants reflecting on what they had learnt and what changes they will make a result of attending.

At Duchy Home Farm

Organic plant breeding: enhanced weed control, disease resistance and protein content in trial wheat lines

***Nick Fradgley** and **Henry Creissen** outline initial trial results which highlight the encouraging prospects for organic plant breeding through the use of selected lines of wheat populations*

In 2008 individual plants were selected from the organic winter wheat composite cross population (YQ CCP) maintained by ORC at our Wakelyns site. From these initial selections five lines were developed which were grown in full sized yield plots for the first time this season.

Post-harvest weed assessments identified several of the selected lines as great competitors against weeds. The average weed cover after harvest in the most competitive line (B30) was only 6.5% compared to the commercial variety Alchemy, which had over 33% weed cover. This competitiveness can be attributed to a high Leaf Area Index (LAI) early in the season which correlated negatively with post-harvest weed cover (P=0.017) and positively with yield (P=0.002) (Figure 1).

Disease resistance, quality and yield

All the selected lines were significantly more resistant to yellow rust than the commercial variety Solstice and their parent population (P<0.05). Two of the selected lines achieved protein content of almost 11% - similar to Solstice which is a Group 1 milling variety - and sedimentation values of over 70ml (Solstice had 66ml), with high Hagberg Falling Number (HFNs over 300s) and specific weights (over 80kg/hl). The highest yielding line out-yielded Alchemy by almost 1.5t/ha, whilst Solstice had much lower yields (4.67t/ha) compared to the two best performing lines.

Moving towards successful locally adapted crops through 'participatory plant breeding'

These initial positive results provide support for the potential use of populations as a breeding source from which successful, locally adapted wheat lines can be developed.

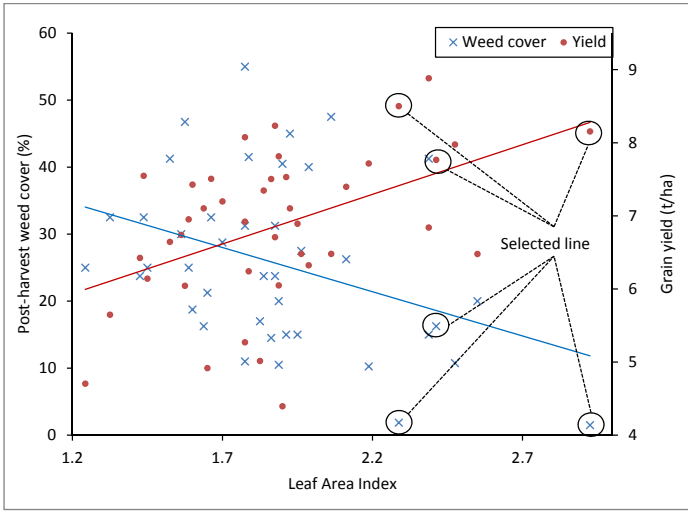

Figure 1. The relationship between average plot values of Leaf Area Index (LAI) with post-harvest weed cover (crosses) and grain yield (dots) for winter wheat selected lines, varieties (Solstice and Alchemy) and mixtures of selected lines.

This approach could enable farmers to develop their own varieties or mixtures from diverse breeding material. These lines and physical mixtures of the best-performing lines will be grown next year at Wakelyns and at John Pawsey's Shimpling Park farm, where the National Organic Cereals 2015 event will be held.

The results reported here are from the first year of trials in the COBRA (COordinating plant Breeding Activities for diversity) programme, led by ORC with funding from Defra and other EU countries

Wheat populations are heading for the market

As regular readers of the Bulletin will know, over the past 13 years ORC has developed and studied wheat Composite Cross Populations (CCP). Along with researchers from around the world, we have been able to demonstrate the yield stability of populations due to their genetic diversity. However, whilst it has been possible to scientifically investigate them in the field it has been illegal to trade or market populations.

This is about to change because in April the EU agreed to allow the temporary marketing of CCP of certain cereals across Europe for a four and a half year trial period. During this time it will be determined whether an agreed protocol for sale and distribution of populations will be sufficient to protect both farmers and breeders from exploitation. The protocol retains all the current requirements for ensuring healthy seeds but additionally, at its centre is a transparent database of the origin and previous use of the populations.

ORC has been closely involved with FERA – the government agency responsible for seed issues in the UK - in the development of this initiative and we have also been gearing up to make one of our wheat CCP available under this new marketing experiment. During this past year we have been multiplying our stock at Vine House Farm, near Spalding and recently harvested our 1.2 ha plot with a yield of 7.5 tonnes/ha. We will be growing the seed as a registered seed lot this coming season with the aim of having it available for sale for sowing in the autumn of 2015.

This is a major breakthrough in our work and something which 13 years ago seemed highly improbable. We are very excited and in future issues of the Bulletin will be providing more information as our population heads for the market. As part of the countdown we will be running a competition to name the population. The judges will be announced in the near future and bribery will be an integral part of the process.

Growing Agroforestry – the PUR project

The Woodland Trust has joined forces with ORC and the Soil Association in an innovative programme to develop agroforestry on farms in the UK. PUR is a French company which, supported by the hotel chain Accor, supports reforestation and agroforestry projects throughout the world. ***Mike Townsend OBE****, the Trust's Principal Advisor, outlines how the project is helping farms on the ground.*

Thoughtful integration of trees and shrubs into farming systems – agroforestry – can take many forms, and can support production; help improve animal health and welfare; mitigate the impacts of extreme weather; support pollinators and crop pest predators; yield timber and other products as well as having wider environmental benefits beyond the farm.

In recent years the Woodland Trust has worked with farmers and researchers to identify the benefits of trees within UK farming systems; identifying the types of support farms need to make agroforestry systems work and overcoming the barriers to implementation – some of which are practical and financial and some of which are policy barriers.

Support from PUR

Through the PUR partnership the Woodland Trust is offering farmers:

- A free whole farm tree planting assessment
- Design of planting scheme(s)
- Advice on tree planting and maintenance
- Supply of trees and guards (farmer contributions will be decided on an individual basis)

In return, farmers are asked to plant and maintain the trees and allow us to monitor the effects on the farm for an agreed period of time. Fourteen projects have been undertaken on farms to date, including planting at ORC's Elm Farm. Four examples are set out below.

Berkshire – hedges for woodfuel

ORC at Elm Farm has planted 50 in-field trees, 560m of new hedges and 100 avenue trees in a 500m avenue. The hedges are part of a woodfuel scheme and will be allowed to grow and then be coppiced at regular intervals for the production of on farm energy. The species choice is thus somewhat unusual compared to traditional hedging and consists of hazel, sweet chestnut, willow and sycamore, with standard trees planted every 20m (oak, walnut and hornbeam).

In the tree avenue, rowan, oak, field maple and hornbeam have been supplemented with cider apple and desert apple varieties to provide fruit and cider. The in-field trees are of oak, walnut, hornbeam and lime, and together with the standard trees in the hedges, will provide fodder and timber for on farm use. The planting has been designed to provide shade and shelter for livestock. Linking to the local landscape has also been important and the in-field trees in particular will link in with neighbouring parkland and, together with the hedgerows, increase the habitat for wildlife.

ORC recognises the wider benefits of supporting the rural economy, providing local renewable energy, and playing a part in reducing flood risk. They hope the farm can act as a demonstration to other farmers thinking of ways in which they can make trees part of their farming system. Designing the scheme has helped identify critical barriers to adoption. The costs of fencing and the expertise and equipment for managing the trees in particular were identified, together with the availability of labour to undertake the tree planting.

Nottinghamshire – fruit trees

David Rose had been interested in trialling an agroforestry scheme for a number of years but no funding was available. The PUR project has provided the perfect opportunity to support the development of a scheme which integrates apple trees into an arable cropping system.

David has planted over 450 apples trees of various varieties suitable for cider making as well as a further 125 elder, walnut and sweet chestnut. Cider will be produced on the farm and sold through the farm's visitor centre. The walnut and sweet chestnut are to be used for timber and the elder for Belvoir Fruit Farms, the drinks company in the nearby Vale of Belvoir.

Trees have been planted in straight rows 30 m apart with the aim of arable cropping the intervening alleys. Along the lines of trees, wildflower seed mixes have been sown in a 3m wide band to encourage pollinators. The hope is that not only will the trees produce a sellable crop, but the additional shelter will improve wheat yields.

Shropshire – trees for self-medication by dairy cows

Tim Downes, has an organic dairy, beef and arable farm where he milks 250 dairy cows, and intends to increase numbers over the next couple of years. He is already convinced of the shelter and water management benefits of trees but has now undertaken an area of experimental tree planting in a pasture field to gather data on tree species preferences of dairy cows, the level of voluntary intake and the effects on animal physiology. Evidence suggests there may be significant health benefits from fodder trees integrated into dairy systems, particularly in reducing intestinal parasites and improving the efficiency of digestion. The new planting should help to identify practicalities and constraints that may be associated with developing silvopastoral dairy systems. Tree species choice was determined by selecting palatable trees using both anecdotal and hard evidence within the academic literature. Chosen trees are small-leaved lime, sycamore, hornbeam and elm - despite disease risk, as browsed elm is likely to remain too small for attack by the elm bark beetle.

A number of unmanageable areas of the farm, which cannot be accessed by machinery, have been planted in the past. Many of these are now reaching a stage where they might be used for the biomass boiler which heats the farm house and office. Tim estimates they are saving £2,000 worth of heating oil a year through the use of woodfuel from the farm.

Aberdeenshire – shelter for vegetables

Four hectares of Wendy Seel's 52 ha farm is used for growing organic vegetables. A lack of shelter hampers production on the exposed site, so a shelter belt and hedges have been incorporated, changing the microclimate by reducing wind speeds, increasing ground level temperatures and reducing evapotranspiration loss from crops. The planting should also help to reduce soil erosion and help attract and retain pollinating insects. The narrow shelter belt, made up of four rows of trees, has been planted on the western edge of the vegetable field, while four hedges have been planted within the field as part of the agroforestry approach. Lack of flexibility and the complexity of the available grant support had previously deterred Wendy from planting, but the PUR project has meant that a scheme could be put in which met her needs with the minimum of fuss.

A 'PUR(fick)' approach

The PUR partnership and programme will make a significant contribution to developing practical agroforestry in the UK. These on-farm case studies benefit participating farmers but will also help us develop more UK-based evidence for agroforestry systems.

For further information contact the Woodland Trust. Tel: 01476 452356 or via wooodlandtrust.org.uk/plant-trees

Cover Crops: Wiki'd OSCAR is now online

Wiki'd OSCAR is not a nasty uncle; it's an online cover crops database created as part of the EU funded project 'Optimising Subsidiary Crop Application in Rotations.' ***Henry Creissen*** *explains.*

'The Cover Crops and Living Mulch Wiki' – www.covercrops.eu – has been developed by ORC to be an interactive, user-fed knowledge source of regionally relevant information on subsidiary crops (i.e. crops grown for the ecological services they provide rather than as cash crops). It contains information on: cover crops and living mulches, species mixtures, fertility building leys, different tillage systems and farm case studies.

As the name suggests it resembles Wikipedia pages; is easily navigable using the side menus; and will be constantly evolving through contributions which can include adding comments, editing pages, uploading images, creating pages, translating pages, and reports of grower experiences. By the end of the project in 2016 the pages will have been translated into German, French and Italian.

Contributions and suggested improvements are more than welcome – in fact they are necessary. We are particularly interested in adding to the growers' experiences section and plan to extend this section to include a discussion forum where growers can exchange information and discuss issues and targets surrounding cover cropping and conservation tillage systems.

The overall OSCAR project aims to develop new cropping systems based around the use of cover crops and living mulches and to optimise these systems for use in low-tillage agriculture. Its goal is to increase the duration of the soil coverage by plant canopies; minimise the need for and intensity of tillage; increase the diversity of species within vegetable crop rotations; reduce the need for fertilisers, pesticides and herbicides; maintain water resources and reduce the need for irrigation in arid climates.

For more information please email: henry.c@organicresearchcentre.com. The OSCAR project website can be found at http://web3.wzw.tum.de/oscar/index.php?id=2

Do reduced tillage and non-inversion tillage techniques work on organic farms? Results from new European research

There is widespread agreement across agriculture that reducing the intensity of tillage operations is a 'good thing'. But there are always 'pluses and minuses' and how far 'reduced tillage' can benefit or adversely impact organic farms has been a significant – at times contentious – question in recent years. Now the results of a three year, major EU study – 24 trials across 10 countries, case studies and farmer interviews – are providing some answers. ***Sally Westaway*** *reports.*

TILMAN-ORG
A European Network

In recent years research has shown that reduced tillage and the use of green manures can alleviate the problems created by repeated use of deep inversion tillage techniques such as mouldboard ploughing. Increased levels of soil organic matter, improved soil stability, increased soil biological activity and reduced fuel consumption have all been reported as benefits of reduced tillage[1,2]. However, the adoption of reduced tillage techniques in organic systems can present a challenge for effective weed control.

Through the Tilman-Org project researchers from the ORC have collaborated with European partners to investigate optimum techniques of applying reduced tillage and green manures to organic systems. The project aimed to:

- summarise existing knowledge and experience across a wide range of soils and climates;
- understand changes in soil quality and greenhouse gas emissions after reduced tillage and green manures in organic rotations;
- optimise weed management;
- increase nutrient use efficiency;
- design viable organic cropping systems applying reduced tillage and green manures for major European regions

ORC's role was to monitor an on-farm trial at Duchy Home Farm in South West England. Started in 2010, this trial compared conventional shallow mouldboard ploughing at 15cm with a reduced tillage system using an Ecodyn cultivator at 7.5cm.

Key results from the Duchy trial:

- Crop cover after establishment was significantly higher for the reduced tillage plots in all three years. However this did not translate into higher yields and average grain yields were similar between tillage treatments for spring crops (spring oats and spring barley) but 50% lower for winter rye under reduced tillage.
- There was more weed cover after crop establishment under reduced tillage in all three cropping years, although later in growing season there was no difference in total weed cover or biomass between the two treatments.
- Shifts in the community composition of weeds were observed. In year 3 the density of grass weeds was greater under reduced tillage and in year 4 (the ley phase) weed species composition varied significantly between treatments with species such as *Sonchus asper* and *Taraxacum* agg. found in greater quantities in the reduced tillage plots and *Rumex* spp. and *Cirsium arvense* in the conventionally ploughed plots.
- Reduced tillage had a significant effect on soil physical properties, earthworm numbers and community composition. After three years there was an increase in the numbers of smaller earthworm species but the total biomass of earthworms was lower under reduced tillage compared to conventional ploughing. In year 3 the top 15cm of the soil was more compact with increased soil bulk density after Ecodyn cultivation. These differences between treatments in physical soil conditions and earthworm community composition were not seen under the grass/clover ley, indicating that the removal of cultivation allowed the soil and earthworm populations to recover.
- Fuel use was reduced by a third with reduced tillage and tillage operations could be completed in a quarter of the time compared to conventional ploughing.

The trial highlighted the need for more long-term monitoring of changes to weed communities and soil conditions under reduced tillage and for the development of machinery appropriate for differing farming situations.

Key results from the whole Tilman-Org project:

A survey of 159 farmers interviewed across the 10 participating countries found that the main farmer motivations for switching to reduced tillage techniques are improved soil conservation and reduced energy input. The key reservations noted included concerns around effective weed control and the potential of increased labour[3]. No-tillage and reduced tillage practices were more popular amongst farmers in Mediterranean countries; whilst green manures are more often grown in wetter temperate regions.

The adapted Ecodyn at Duchy Home Farm

Farmer Case Study: David Wilson, Farm Manager. Duchy Home Farm, Gloucestershire, UK

David has trialled the Ecodyn cultivator, a Non Inversion Tillage (NVT) machine developed by an organic farmer in Germany. The machine was used for 3 out of 4 years in the arable phase of a 7 year rotation. The fields were monitored during both the arable phase and the grass/clover ley which followed. The Ecodyn is designed as a one pass machine combining a cultivator and a drill. To suit the farm and soil type, the Ecodyn was modified by adding levelling tines on the outside of the machine and changing the seed feed tubes from plastic to stainless steel.

David found that use of the Ecodyn decreased fuel use significantly and improved efficiency in terms of the timing of operations. It led to 'very good germination in dry conditions with rapid crop establishment in a dry spring'. However 'it doesn't work well in wet conditions and needs dry, free flowing soil, a plough is better to lift and aerate water damaged soils'. The crumbler roller became blocked quickly in any sort of damp conditions and David removed it completely. The machine's supporting legs, designed for deep loamy non-stony soils, kept bending in the stony soil and had to be replaced multiple times.

Nonetheless, David plans to persevere with the Ecodyn usingit to tear up the turf on a 3 year ley on a compacted heavy clay soil. He has changed the machine set up to use narrow points for this. David would like to see a UK machinery manufacturer take the concept and produce a machine more appropriate for UK soils.

A meta-analysis of existing literature encompassing 58 studies showed that, across all regions, yields under reduced tillage were, on average, reduced by approximately 7% compared to conventional ploughing. However, in subtropical and dry Mediterranean climates reduced tillage techniques resulted in c. 10% increase in yields[4]. A difference in yield response between soil types was found with yield increases under reduced tillage seen on clay soils and yield reductions on sandy soils. Weed pressure and yields showed only a weak correlation. Conversion to shallow inversion tillage from deep inversion appeared to have many benefits (for example, increasing soil carbon) with minimal changes in yields; this response was applicable across a wide range of soil types.

The 24 Tilman-Org field trials across Europe showed considerable variability in yields between trials but, on average, reduced tillage methods led to an 8% yield reduction. Results of soil analysis indicate that this may be due, in part, to lower available mineral nitrogen in spring under reduced tillage. The use of green manures increased yields by an average of 8% depending on the crop, with 28% more mineral nitrogen available in spring, suggesting that the application of green manures alongside reduced tillage could mitigate yield losses from reduced tillage alone.

Of the project field trials 40% showed higher weed abundance in reduced tillage compared to conventional ploughing. Weed community composition was influenced by tillage; 14 studies looked at weed communities and more than half showed a clear effect of tillage on weed community composition, with more perennial and volunteer species under reduced tillage and weed biodiversity often higher. A model to assess the functional traits of weed communities has been developed. Initial results from this model suggest that overall the weed communities found in conventional ploughing are taller, flower later and perennials are less abundant compared to reduced tillage. These differences were more pronounced in long-term trials.

Tilman-Org field trial results also indicate that soil carbon stocks are more stratified in reduced tillage compared to conventional ploughing and increase in the top soil. A subset of trial sites were selected for more in-depth analysis. A crop and site specific microbial (bacteria and fungi) reaction to different tillage treatments was also noted. N_2O emissions also tended to be higher in reduced tillage, depending on farm management and the previous crop.

Overall results from the Tilman-Org Project suggest that in most cases crop yields under reduced tillage tend to be reduced but not substantially. The use of green manures can mitigate this. Further development is needed to develop farm specific reduced tillage systems through optimised timing of nutrient supply and improved, more adaptable, machinery.

Acknowledgements:

The Tilman-Org project was led by the Swiss Research Institute for Biological Agriculture (FIBL), financial support was provided by the CORE Organic II funding bodies, including Defra, being partners of the FP7 ERA-Net project, CORE Organic II (www.coreorganic2.org).

We would like to thank David Wilson from Duchy Home Farm for his involvement, help and enthusiasm with the UK trial.

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Dairy cows and diverse swards

***Robert Richmond** is in his 10th year of organically managing Manor Farm in Chedworth, Gloucestershire. The farm covers 223 hectares plus 120 hectares of woodland and tracks. Soils are Cotswold brash. There is a dairy herd of 160 Jersey x Friesian cows and followers which this year are set to achieve their target of 6000 litres with approx 4000 litres coming from forage. ORC has been following his grazing system as part of the Sustainable Organic and Low Input Dairying (SOLID) project. Robert is an advocate of diverse swards and describes his own system.*

It's very easy, when deciding upon a grazing system, to pick a name and try to replicate an approach which has been designed for a different climate.

In the UK much grassland management is based around set stocking (defined as: "A method that allows a specific, non-variable number of animals on a specific, non-variable area of land during the time when grazing is allowed"[1]), with a growing number of people managing short grass rotational grazing – as advocated by the New Zealanders. But what is most important is to have clear goals as to what you want to achieve from that grazing system. Are we only interested in milk from forage? Do we want to build soil nitrogen? Or do we want to build soil fertility?

Managing 'hungry land'

I manage a farm at 250m up in the Cotswolds on 'hungry' land. Ryegrass leys are renowned for burning off in the summer, so I decided to look at deeper rooted options – and now grow diverse herbal leys on the farm (see Table 1). Over the past ten years I have grazed these leys at varying stages – from ideal NZ grazing height, to strong pasture with chicory 1.8m tall.

The extremely tall pasture grown after first cut silage, over the summer months, provided an ideal feed for autumn calving dry cows – whilst having a huge effect on soil structure and biological activity – not to mention the wildlife benefits associated with it.

Now the herd is spring calving, the need for this pasture is less – but I still shut up older leys and let them accumulate a large amount of cover from late July onwards to provide winter grazing for dry cows and young stock.

Sward establishment and maintenance

The most successful method of establishing the swards has proved to be undersowing a spring cereal (e.g. oats last year) with the mixture. The mixture is sown at 29.7 kg per hectare. In the first year the sward would be grazed once after harvesting the cereal. An autumn sown field has been slower to develop productivity, and some herbs have been lost. Swards last well for 4-5 years, when they are re-seeded, with species composition evolving over time.

Robert considers it is necessary to take the sward height down once a year and this is best achieved in winter when the swards are relatively highly stocked with dry cows. Older swards can be rejuvenated in the spring by over sowing when the dry cow grazing has opened up some bare patches. He had hoped that the species would all perpetuate themselves by seeding but this has not happened.

Species	***kg/ha recommended***	***Rob's observations***
Italian ryegrass (*Lolium multiflorum*)	3.7	provides bulk at start but doesn't persist.
Perennial ryegrass (*Lolium perenne*)	3.7	
Cocksfoot (*Dactylis glomerata*)	3.7	early - but doesn't withstand frost
Timothy (*Phleum pratense*)	2.5	later season growth 'winter green'
Meadow fescue (*Festuca pratensis*)	3.5	
Tall fescue (*Festuca arundinacea*)	2.0	for 'bottom' – can result in open sward
Smooth meadowgrass (*Poa pratensis*)	0.9	
Crested dogstail (*Cynosurus cristatus*)	0.9	
Yellow oatgrass (*Trisetum flavescens*)	0.9	
Creeping red fescue (*Festuca rubra*)	2.5	
Red clover (*Trifolium pratense*)	1.2	for N fixation
White clover (*Trifolium repens*)	1.2	other legumes may be beneficial
Alsike clover (*Trifolium hybridum* L.)	0.7	helps reducing bloat risk
Birdsfoot trefoil (*Lotus corniculatus*)	1.0	
Sanfoin (*Onobrychis viciifolia*)	9.9	
Sweet clover (*Melilotus* spp.)	2.5	
Chicory (*Cichorium intybus*)	2.5	for drought tolerance and minerals
Ribwort plantain (*Plantago lanceolata*)	0.5	
Burnet (*Sanguisorba minor*)	3.1	herbs 'do what they do'
Yarrow (*Achillea millefolium*)	0.6	
Sheep's parsley (*Petroselimun sativum*)	1.2	
Total	***48.5***	

Table 1. Species used at Manor Farm. Rob Richmond sows at 2/3 the recommended rate

ORC interns Manon Pontini and Daria Eric assessing diverse swards at Manor Farm in August 2014

The dairy herd is run on what's best described as 'tall grass grazing'. Rotation length is determined so cows enter paddocks just as the pasture is about to flower – the diversity in the sward means that quality, in terms of energy and digestibility, is maintained, whilst protein and energy are better balanced than in the short lush pasture. When grazing this pasture I aim to leave a longer residual in the paddock – this achieves two things – a much faster regrowth immediately after grazing – and a gradual build-up of dead material in the sward, which is trampled as the season goes on, to feed the soil.

Building soil fertility and production

My aim with this system is to achieve efficient milk production whilst building soil fertility. The most important factor in building soil organic matter is the capture of sunlight. Energy from the sun is used by the plants to combine atmospheric carbon dioxide and water, producing new organic matter. The more the plant produces in excess to its needs – the more it sequesters into the soil, feeding the soil biology. This is an important route to build soil organic matter. Grazing tall swards allows the sward to develop a large canopy, and capture a large amount of sunlight. Higher residuals after grazing lead to faster regrowth–so the sward is capturing large amounts of sunlight for as much of the year as possible.

This year I am grazing 190 spring calving cows on 100ha of pasture. 50ha of this pasture has been cut once during the summer for silage – with cows on target to produce 6000l off a tonne of cake. These pastures under this management are transforming these soils, with organic matter increasing by 0.8% / year (from 4% OM to 8%OM in 5 years being recorded in several fields).

According to Newman Turner 15–20% OM is required to get the best out of soil – still some way to go! But I am confident that a diverse sward, under a tall grass rotational grazing system is achieving the goals of production and building soil fertility. The added bonus is the contribution which these flowering pastures provide to pollinators and wildlife in general – now being recognised by Natural England.

Instead of getting hung up on a name and long grazing intervals, it is more important to grow a pasture which suits the soil and climatic conditions of the farm, and then graze it in a way to achieve the farm's goals.

ORC at Manor Farm: Measuring pasture productivity, animal performance and soil organic matter as part of the SOLID project

The grazing approach with diverse swards was introduced to Manor Farm by Robert Richmond with the aim of increasing Soil Organic Matter (SOM). An ORC team has been collecting data to assess what is happening on the ground, as part of the SOLID project.

Herbage yield and composition of the grazed swards were assessed on two fields, representing the age range of swards across the farm, on a monthly basis. A one square metre quadrat was randomly placed in the un-grazed area (i.e. in front of the grazing cows) and again in the grazed area (i.e. behind the grazing cows). All the vegetation within the quadrat area was cut to approximately 5 cm height to mimic the grazing pattern of the cows and the fresh weight of herbage was recorded.

Samples were then separated into clover and other legumes, broadleaves, grass and senescent material. This was used to determine percentage of grass, clover, broadleaved species and bare ground on the grazing plots and to estimate forage dry matter (DM) intake of the grazing cows. The DM content and forage proportion of each plant species within the sampled area were determined and forage yield (t DM/ha) was calculated for each sampled field. Additional herbage samples were analysed by wet chemistry for metabolisable energy (ME) content.

Based on the farm grazing data and milk production data we will evaluate the production efficiency of this grazing system. In addition, calculated DM yields based on the plate meter readings will be compared with the actual DM yields (determined in the lab) to evaluate the relevance of the equation used to calculate DM yields from the plate meter readings for this type of sward. These results will be presented in a later issue of the Bulletin.

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Rob will be speaking at The ORC Organic Producer Conference in the 'Behaviour of legumes and grasses in both dairy grazing and forage situations' workshop on the 'Practical research and innovation' day - Thursday 27th November 2014. The aim of the workshop is to explore opportunities that including a wider variety of legumes and grasses can bring to dairy producers.

What can sustainability assessments tell us about supplying organic vegetables in the UK?

*Sustainability 'assessments' and 'benchmarking' are now an established part of agriculture and socio-economics. But there are various approaches; and different methods can give conflicting results. ORC's Senior Sustainability Researcher **Laurence Smith** has been involved in some recent research applying two different assessment methods to a UK organic vegetable system.*

Modern food supply systems (production and distribution) are heavily dependent on fossil energy and other non-renewable resources. Most goods are now distributed through regional distribution centres before being transported to centralised and (often) out-of-town supermarkets. In 2006 a Defra analysis showed that the food industry in the UK is responsible for 14% of national energy consumption and for 25% of heavy goods vehicle kilometres[1]. Direct marketing and local selling of products offers a way for farms to by-pass the energy-intensive mass distribution system. Such distribution systems are particularly appropriate for vegetables, which have a relative short lifetime and are most attractive to consumers when they are fresh. However there is evidence that, depending on the distance travelled and the mode of transport, the local system may be more energy consuming than the mass-distribution system[2].

Understanding these potential contradictions is important for developing organic food production and distribution systems that achieve the highest levels of sustainability. To contribute to this, ORC participated in a study led by Mads Ville Markussen of the Technical University of Denmark (DTU) to investigate the environmental impacts of contrasting production and food distribution systems by comparing a case study of a working organic vegetable production system with two constructed models.

What we studied and the methods used

The case study farm is a small stockless organic unit comprising field vegetables and a market garden. The open fields are managed in a 7-year crop rotation and the garden is managed with a 9-year rotation. The fields are characterised by a low-fertility soil with a shallow top soil and high stone content. Produce is distributed by weekly round-trips of 70 km, where multiple bags are delivered to neighbourhood representatives. Vegetables are supplied to 200–300 customers a week.

The two modelled systems – UK2-Low and UK2-High – were constructed to express the range of yields and standard practices for organic vegetable production as described in the Organic Farm Management Handbook[3]. Both systems were modelled to use imported manure as the main source of fertility and to provide vegetables in the same quantity at the consumer's door (defined as the functional unit and expressed as food energy) and of comparable quality as the case study farm. The mix of vegetables provided is identical to the case study farm but the modelled distribution system is supermarket based using published LCA reports for supermarket distribution chains[4].

All the impact categories relevant and representative of agricultural systems were considered in this study, including non-renewable resource use as derived from fossil and nuclear resources and Global Warming Potential over 100 years. We used two different sustainability assessment methods: emergy accounting and Life Cycle Assessment (LCA).

Emergy accounting quantifies direct input of energy and materials to the system and multiplies these with suitable conversion factors called Unit Emergy Values (UEV), to estimate the solar equivalent joules (seJ) required per unit (kg) or joule (J) of product. This enables production systems to be compared through their relative solar 'transformities' (i.e. total seJs), with a lower transformity value per unit indicating a greater efficiency in converting input resources into food products.

The LCA approach quantifies environmental impacts associated with a product, service or activity throughout its life cycle[5]. It looks at the impact of the whole system on the global environment by tracing all material flows from their point of extraction from nature up to the moment of their release into the environment as emissions.

What we found

As shown in Table 1, the case study farm provides the vegetables with the highest resource efficiency (lowest UEV or transformity) and is overall more efficient than both modelled systems.

	Solar transformity (seJ/J)
UK1 case study	5.20×10^6
UK2-Low	8.58×10^6
UK2-High	8.52×10^6

Table 1. Solar transformity for the case system, M-Low and M-High:

Nonetheless, the case study farm uses significantly more diesel in the cultivation phase (see Figure 1). This may partially be explained by the tractors being less efficient than those assumed for the modelled systems. The fact that 30% of the seed potatoes are farm-saved in the case study farm results in a considerable emergy saving as compared to both modelled systems. The total emergy use in distribution is three times higher for the modelled systems than for the case study farm, primarily as a result of diesel use for HGV transport and gasoline used for shopping trips between the consumer homes and the supermarket.

The LCA results also highlight the importance of the distribution phase to the environmental impacts of the modelled systems, in particular for non-renewable resource use and Global Warming Potential (GWP) (see Figure 2).

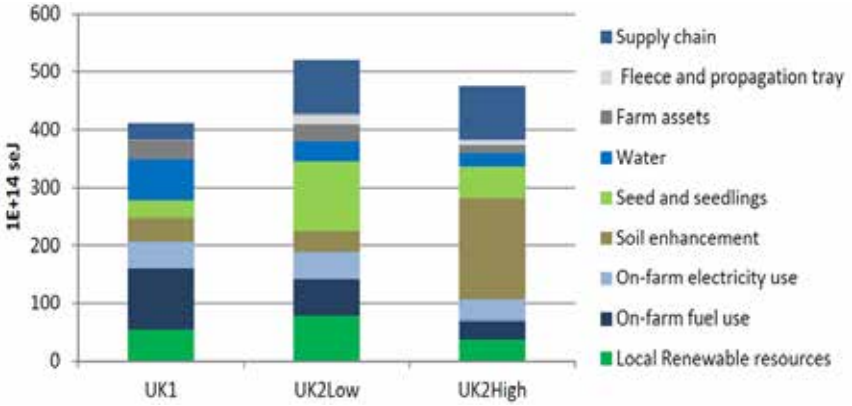

Figure 1. Emergy profiles without labour and services for the case study, M-Low and M-High

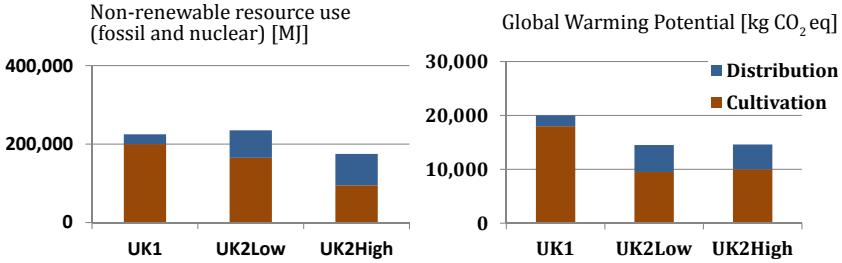

Figure 2. LCA results for the case study, UK2-Low and UK2-High, for the impact categories non-renewable resource use and Global Warming Potential (GWP)

The use of non-renewable energy resources in the case study farm system is similar to UK2-Low, while UK2-High is around 30% lower. Despite this the GWP of the case study system is about 40% higher than both modelled systems. This is related to differences in specific management practices in the case study farm – notably; a) the on-farm production of transplants and b) composting, which may not be as efficient as centralised production of transplants and use of imported manure and rock phosphate for nutrient supply respectively in the models. It should also be noted that high-yielding crops tend to use less fuel per unit output and that gross yield is more or less independent of the mix of non-renewable/renewable energy resource use per crop.

Conclusions

This study shows that the two assessment methods used – emergy and LCA – lead to the same conclusion regarding the supply chain but differ to some extent in the assessment of the production systems. These differences are to a large part due to how co-products, e.g. manure, are accounted for.

A key principle in emergy algebra is that emergy used in a process should be assigned to all co-products; therefore the manure inputs in the modelled systems include the emergy associated with livestock production. In the LCA approach, only emissions associated with transportation, storage and application of imported fertility are counted and impacts of livestock production are assigned to the milk and meat production.

The results of the emergy analysis showed that the case study farm is more resource efficient than the modelled standard practices. LCA results for the cultivation phase, where several impact categories were considered, were less conclusive as the case study farm had neither consistently more nor consistently less environmental impacts compared to the modelled systems. However, for the distribution phase, both the emergy assessment and LCA evaluated the case study farm to perform substantially better than the modelled systems.

Acknowledgements

This article draws on the recent paper by Markussen et al[6] and published in the journal *Sustainability* (April 2014) http://www.mdpi.com/2071-1050/6/4/1913 which describes the study in more detail. The study was part of the EU Framework 7 SOLIBAM project supported by EU grant no. KBBE-245058-SOLIBAM in which ORC was a partner.

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ORC Wakelyns Agroforestry: Seeds to trees – the value of diversity

ORC Wakelyns Agroforestry open day in Suffolk was held on 19 June. The day was built around two field-based workshops with opportunities for wider discussion around these sessions. The topics were Exploiting within-crop diversity by recreating modern landraces: the potential for participatory plant breeding (PPB) using cereal populations; and Systems diversity – Agroforestry in action.

Right: Martin Wolfe explains the agroforestry system. Far right: Cereal population trials.

Assessing public goods provision on conventional farms

The question of whether farming provides a 'public good', beyond the production of food, which can justify public support, is an important issue for policy makers. This prompted us to develop a sustainability assessment tool for use on organic farms. An updated version has now been produced for conventional farms. ***Catherine Gerrard*** *and* ***Laurence Smith*** *describe how it has been tested.*

The Public Goods tool was developed in 2010/11 as part of a project funded by Defra through Natural England. It assesses a farm on a number of areas which may be impacted by agricultural management practices and may be related to public goods such as water quality, air quality, etc. These areas are: soil management, agri-environmental management, landscape and heritage, water management, fertiliser management and nutrients, energy and carbon, food security, agricultural systems diversity, social capital, farm business resilience, and animal health and welfare management.

Each area or 'spur' is assessed by asking questions based on a number of key 'activities' with each activity having at least one corresponding question allowing the advisor carrying out the assessment to evaluate the detailed ways in which the farm provides each public good. The original project culminated in a pilot of the tool on 40 organic farms.

The modified tool has removed the focus on organic farms to enable it to carry out assessments on conventional farms. It has now been tested in a pilot on 32 conventional farms. Seven external advisers were contracted to each carry out between three and five assessments on conventional farms with which they already had an advisory relationship. As well as carrying out the assessments, the advisers were provided with feedback forms: one for each farmer being assessed and one for the advisers themselves. These asked about the process of the assessment (quality of questions, time commitment required) and the impact of the assessment on the farmers' consideration of issues around sustainability and provision of public goods. The adviser was also asked for suggestions for future development of the tool.

How the farms scored

The farms assessed included nine dairy, seven beef and sheep and eight cereals farms with smaller numbers of other farm types including poultry, general cropping, mixed and horticultural.

Figure 1 summarises the data from the 32 farms, showing the minimum, mean and maximum scores on each of the 11 spurs (note that for *animal health and welfare management* there were only 24 farms in the sample; the remainder were stockless). For some spurs (e.g. agri-environmental management, landscape and heritage) there is a large range between the minimum and maximum scores whereas for others (e.g. *animal health and welfare management*, *fertiliser management*) there is a much tighter range of scores.

The highest scoring spurs on average were *soil management* and *animal health and welfare management* which both had a mean score of 4.1 and the lowest scoring spur was *agricultural systems diversity* with a mean score of 2.5.

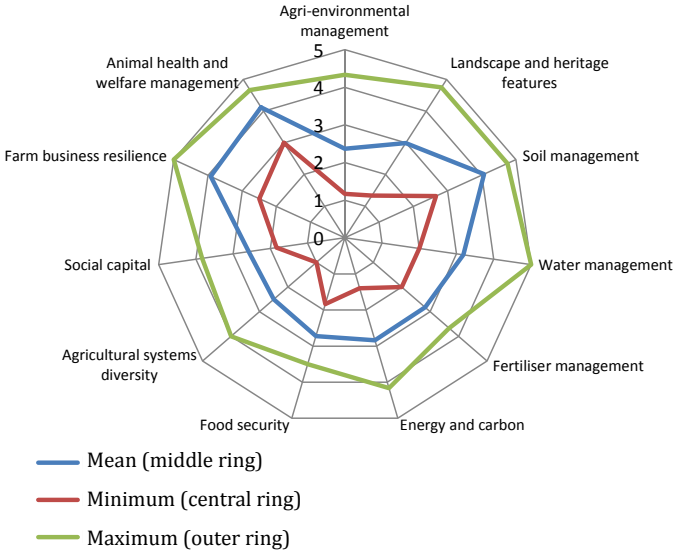

Figure 1. Summary spur data for the 32 farms.

The highest scoring activities on average were *erosion* under *soil management* and *irrigation* under *water management* with a mean score of 4.9. The lowest scoring activity with a mean score of 1.3 was *on-farm processing* under *agricultural systems diversity*. The most variable activity, with a coefficient of variation of 81%, was *water management plan* under the *water management* spur and the least variable, as well as the highest scoring, was *erosion* under the *soil management* spur.

It is not possible to investigate the impact of farm type on the scores as the extremely small sample sizes (the dairy farm type has the most coverage but its sample is only eight farms) will not allow statistical analyses to be carried out. Similarly it is not advisable to compare the results of this conventional pilot of the Public Goods tool with the previous organic pilot: neither sample was selected in such a way as to be representative, both samples are very small and some changes were made to the tool in the period between the two pilots.

Positive feedback and making progress

The feedback from the advisers and farmers was generally positive. The majority of the advisers and farmers agreed that the tool gives relevant information and identifies area of strength and weakness in the farm's public goods provision. The median rating the farmers gave for their understanding of public goods before using the tool was 4 and the median rating for the understanding after using the tool was 8. Two of the advisers felt the Public Goods tool was suitable for use on conventional farms, four felt that it was mostly suitable and one that it was partly suitable.

All seven advisers said that they would advise other farmers to use the tool and six of the seven stated that they would be interested in using the tool in their advisory work. Similarly 83% of the farmers said that they would recommend the tool to other farmers. The majority of the advisers and farmers rated the tool as 'good' across almost all of the quality criteria (quality of the pre-visit information, ease of understanding of the principles, length of time to complete the assessment, quality of the questions, and reporting format). In addition the majority of the farmers rated the opportunity to ask questions as excellent (the advisers were not asked this question as it directly related to their involvement in the assessment).

Encouragingly there was interest from farmers and advisors in repeating the assessment in a year or two to see how planned management changes might alter the scores for their farms. Which is exactly how progress towards meeting the goals of delivering public goods can be made.

Acknowledgements

The authors would like to thank Defra for funding this project. Thanks also go to all of the farmers who took part in the project and the seven advisers who carried out the assessments.

Other events

25 November 2014: Soil Association National Soil Symposium. St John's Hotel, Solihull

6-7 January 2015. 2015 Oxford Real Farming Conference

New staff at ORC

Researcher Sally Westaway is about to have her second baby. We are delighted for her and wish her good luck. During her maternity leave Sally's responsibilities will be split between ***Mary Crossland*** *and* **Meg Chambers**.

Mary joins us as agroforestry researcher in the Crops and Agroforestry Team. She graduated in Environmental Science from the University of Southampton, completing her dissertation on 'the viability of small-scale heartnut (*Juglans ailantifolia* var. *cordifomis*) production in the United Kingdom. Since graduation, she has undertaken internships with a number of organisations including the ORC, where she assisted on the TWECOM(Towards Eco-Energetic Communities) project by completing a literature review of the ecosystem services provided by hedgerows. She recently finished a research fellowship with The World Agroforestry Centre in Kenya. Her research interests focus on the interface between social science and agroforestry, ecosystem services and Geographical Information Systems for environmental management.

Meg will be working on the woodfuel element of the TWECOM project. In this role she will be planning and co-ordinating the hedgerow harvesting machinery trials this winter, and establishing the feasibility of installing a woodchip boiler and district heating network at Elm Farm to heat local properties, as well as a woodfuel production hub also at Elm Farm connecting local biomass production with local bioenergy users. She has an MSc in Land Reclamation & Restoration from Silsoe at Cranfield University in Bedfordshire and a BSc(Hons) in Biology specialising in ecology, environmental sciences and agroecology from the University of York, which included a year studying in the Environmental Sciences (Geoökologie) department at Universität Bayreuth in Germany. Over the last six years Meg has worked on the restoration and sustainable management of ancient woodlands, working on projects to raise awareness amongst woodland owners of the need to improve the level and quality of management in order to improve the ecological value of woodland as wildlife habitat. In addition to her work at ORC, Meg continues to provide woodland and orchard management advice, a fruit tree pruning service, and looks after Hungerford Marsh for BBOWT. She also sits on the Council of Partners for the North Wessex Downs AONB and is the forestry representative for the North Wessex Downs LEADER Programme LAG.

9th Organic Producers' Conference

26-27 November 2014, St. John's Hotel, Solihull
in tandem with the National Soil Symposium, 25th November, same venue

Book online at www.organicresearchcentre.com

Sponsored by WOODLAND TRUST and Triodos Bank

Wednesday 26th November 2014
Diversity in practice: Producer-focused technical and business sessions

Plenary speakers include:

Emeritus Prof Allan Buckwell (Institute for European Environmental Policy): What is sustainable intensification – does organic farming fit the bill?

Prof. Pablo Tittonell (Wageningen University): Agroecological solutions for future farming

Workshops

- Making money out of growing fruit and veg
- The GM threat: time to take action
- Breeding for organics
- Making succession work
- EU organic regulation
- Keeping growing: ensuring success
- Designing agroforestry systems
- Emerging opportunities in organic supply chains
- Micro-dairies
- Policy/CAP implementation

Thursday 27th November 2014
Practical research and innovation: Bringing producers, researchers and advisers together to make change happen

Closing plenary: Farmer groups leading innovation and research

Speakers include:
Victor Leforestier (BASE, France)
Inge Van Oost (DG Agri)
Helen Browning (Soil Association)

Workshops

- Postgraduate research in organic farming
- Organic business management
- Dairy research and innovation: breeding choice
- Make legumes do the leg work
- On-farm grower trials
- Conversion planning
- Organic food quality and health
- Feeding pigs and poultry
- Legumes and grasses for grazing and forage

Booking:

Registration for either or both of the events is through the same Eventbrite booking system, accessible via the ORC and Soil Association event pages. Residential packages including Symposium and ORC Conference are available from £188 +VAT. Day tickets from £56 + VAT. Discounts available under RDPE for English producers. Bursaries are available on application. Early bird ends 31st October. For further information: www.organicresearchcentre.com

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