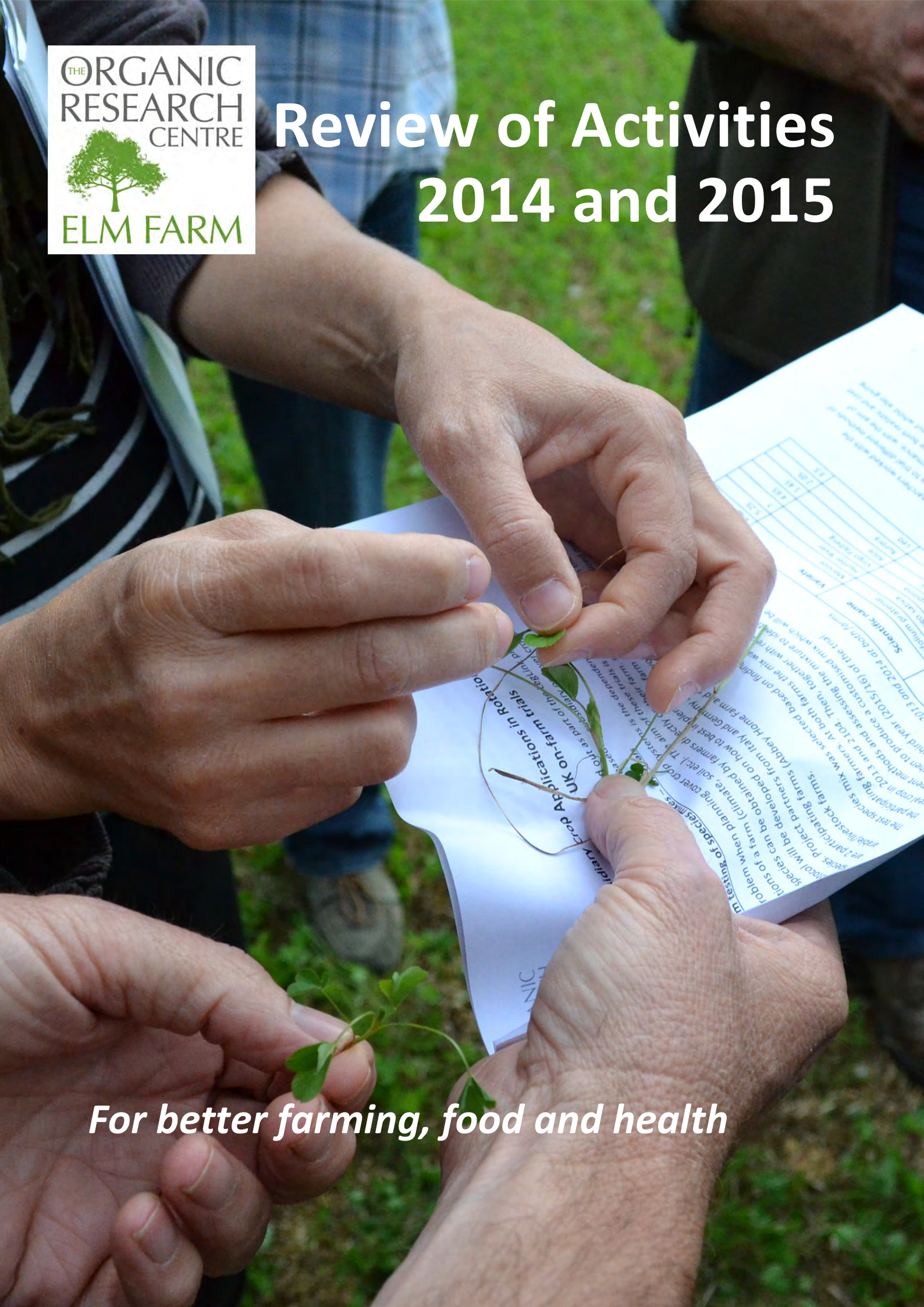


THE ORGANIC RESEARCH CENTRE



ELM FARM

# Review of Activities 2014 and 2015



*For better farming, food and health*

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The Organic Research Centre's vision is of a world which meets the nutritional needs of current and future generations with safe, affordable, high quality food, produced in a way that sustains and enhances the natural environment, and ensures the health and wellbeing of all. Since we were founded in 1980, we have been working, nationally and internationally, to:

- research and develop practical, sustainable land management and food production systems based on organic and agro-ecological principles
- foster knowledge exchange with and between current and future producers, food businesses and related professionals
- influence policy and public debates on the future of food and farming based on sound evidence

Organic farming and similar agroecological approaches work with natural ecosystems and biological processes to produce high quality food, maintain and encourage genetic diversity on farms and their surroundings, and encourage fair rewards for farmers and others participating in the food system.

Organic farmers capture solar energy to build soil life and soil fertility through biological nitrogen and carbon fixation. They use crop rotations and diversity to encourage natural weed, pest and disease control. Animals are kept free-range with access to pasture for foraging, which allows them to express their natural behaviours, and greater use of pastures ensures that they complement, rather than compete with, human food needs. Manures and crop residues are recycled to help close nutrient cycles, minimise waste and conserve non-renewable resources.

Organic and other agroecological farms are less reliant on external inputs, such as synthetic nitrogen fertilisers, fossil energy and pesticides. The result is food production that is less resource consuming, more diverse and more resilient, and therefore better equipped to cope with uncertainty at multiple levels. While individually the practices used can be adopted by any farmer, a key feature of organic/agroecological land management is combining them in a system-driven approach that can make food production and land management more sustainable and generates greater health and wellbeing of individuals, society and the environment.

Our work to develop and improve these approaches focuses on:

- Building resilience and conserving wildlife through diversity
- Protecting and improving our soils
- Conserving non-renewable resources and developing renewable alternatives
- Developing a climate-smart agriculture
- Promoting animal health and welfare
- Ensuring food security, productivity and public health
- Creating sustainable livelihoods
- Supporting farmer innovation
- Sharing and exchanging knowledge with producers, supply chain businesses, policy-makers and citizens.

Our independent status and institutional focus on these ideas and issues makes ORC unique in a UK context, and an active partner with many organisations and individuals sharing similar perspectives both in the UK and internationally.

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*Front cover: Diverse leys field lab at Abbey Home Farm*



*Mike Turnbull Chair of Trustees' Council of Management*



*Nic Lampkin Executive Director*

## Overview

This review of ORC's activities covers two years, 2014 and 2015. We are pleased that this period saw improvement in the recognition given to organic/agroecological approaches by practitioners, the food industry, citizens and policy makers. As a reflection of this, ORC, working with the Game and Wildlife Conservation Trust (GWCT), was commissioned by Scottish Natural Heritage, on behalf of the Land Use Policy Group of the UK Nature Conservation agencies, to produce a report on the contribution of agroecology to sustainable intensification, which was published in spring 2015. Subsequently, Defra has started to reassess the somewhat negative position it had taken to agroforestry in particular.

The initiation, by ORC in 2014, of an on-line knowledge hub, with financial support from Defra, paved the way for the Daylesford Foundation, working with ORC and GWCT, to launch a significant new on-line resource, *Agricology*, in 2015. This will support the adoption of agroecological approaches by all interested producers, regardless of labels, and complements other initiatives, such as the Duchy Originals Future Farming Programme, now relaunched as *Innovative Farmers*, with which ORC is already closely involved.

After several difficult years, the organic market has returned to growth, with some retailers showing renewed commitment to developing their organic ranges. Although we cannot claim credit for this growth, our work on improving organic market data contributed to a better understanding of these trends and we plan to progress this further in 2016. Our engagement in the intense debate on the EU organic regulation reform proposals, both in the UK and in the EU, has helped progress towards a more balanced outcome, although the reform debate will continue well into 2016.

ORC also made a significant contribution to improvements in the policy environment for organic farming. In England, ORC led organic sector negotiations with Defra on support payments for organic farming, providing critical evidence on the environmental benefits of organic farming and securing a recalculation of the maintenance payments, resulting in an overall improvement in support levels for English organic producers compared with Defra's original plans, estimated to be worth more than £5 million a year to the sector. In Wales, ORC led the Organic Centre Wales partnership involvement in developing the new Glastir Organic scheme, with more than 550 producers joining up in 2014 and 2015.

During this period, some significant new projects were started, including the EU-funded AGFORWARD (agroforestry), WHEALBI (cereal breeding), DIVERSIFOOD (new grains) and OKNET-ARABLE (sharing research and tools) projects. The 4.5-year, EU-funded SOLIBAM project was completed, reinforcing the progress we have made in the development of alternative approaches to plant breeding focused on genetic diversity. Building on our plant breeding work, we have secured a ground-breaking agreement for a temporary marketing experiment under the relevant EU seed marketing regulations to enable trade in wheat population seeds from 2014.

During 2014 and 2015, we also undertook some land sales in order to finance reinvestment in farm buildings, solar PV installation and releasing funds to address the challenges covered in more detail in the financial reports at the end of this document.

## Plant breeding for crop resilience

*Plant breeding is important to ensure that crops are well adapted to the environment in which they are grown and capable of resisting harmful pests and diseases, particularly if the use of fungicides and pesticides is to be reduced to protect the environment and improve sustainability. However, mainstream plant breeding methods can result in genetic monocultures that are susceptible to pests and diseases overcoming their resistance, and some breeding technologies such as GM are not accepted in organic farming.*

*The focus of our breeding programme is on increasing genetic diversity to produce crops that are more resilient to variations in climate and weather conditions; to weed, pest and disease pressures; and to other challenges. This can be achieved through the use of variety mixtures or composite cross populations with very high genetic diversity. As most modern varieties have been selected for high use of inputs not permitted in organic farming, we also aim to develop crop varieties specifically suited to organic production, e.g. which incorporate traits such as lower nitrogen requirements and higher competitive ability with weeds.*

### Projects:

**COBRA:** Coordinating organic plant breeding activities for diversity (Defra/CORE-Organic ERANET-funded, [www.cobra-div.eu](http://www.cobra-div.eu))

**Cultivating Innovation:** Agroecology, Plant Breeding and the Challenge to Intellectual Property Law (AHRC-funded, completed 2015, [www.cultivatinginnovation.org](http://www.cultivatinginnovation.org))

**ECO-PB:** European Consortium for Organic Plant Breeding (ECO-PB funded, [www.eco-pb.org](http://www.eco-pb.org))

*Winter wheat trials at Wakelyns Agroforestry integrating the best of the population approach with the best of pedigree line breeding.*

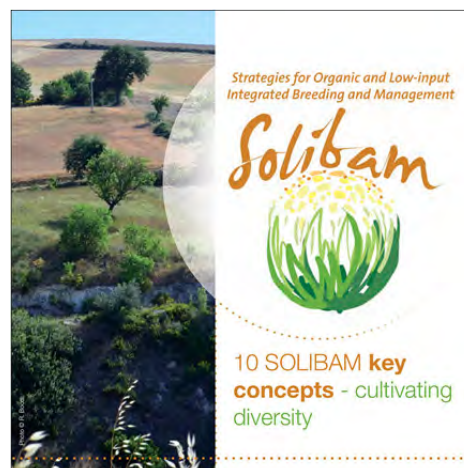


### Breeding for diversity, not uniformity

Exploiting diversity is at the heart of this programme and is embedded in the different projects that make it up. The **SOLIBAM** project was important in developing our thinking in this area, in particular how breeding and crop management can be integrated to produce a more sustainable food system. The process undertaken to elaborate the *SOLIBAM 10 Key Concepts* has had an impact both in our own work and at an EU level, with many of the principles now being seen in the EU Horizon 2020 research programme.

*The SOLIBAM 10 key concepts are:*

1. Resilience
2. Robustness
3. Functional biodiversity
4. Yield stability
5. Specific adaptation
6. Intercropping and associated crops
7. Sustainability
8. Evolutionary processes
9. Organoleptic quality
10. Participatory research



We looked at novel ways to exploit crop diversity in the SOLIBAM trials, assessing newly created diversity which has brought together genomes for which there was no previous known record, and combining different levels of genetic diversity simultaneously by physically mixing pure lines with composite cross populations (CCPs) and growing them together in an attempt to maximise the benefits of both.

The **COBRA** project has developed another approach to using CCPs by using them as a 'breeding pool' to select individual lines that show certain desirable characteristics for organic production, e.g. traits linked with weed suppressive ability or other benefits. Lines selected have then been physically mixed and are currently grown to determine their potential as a 'new and improved' mixture for organic arable production.

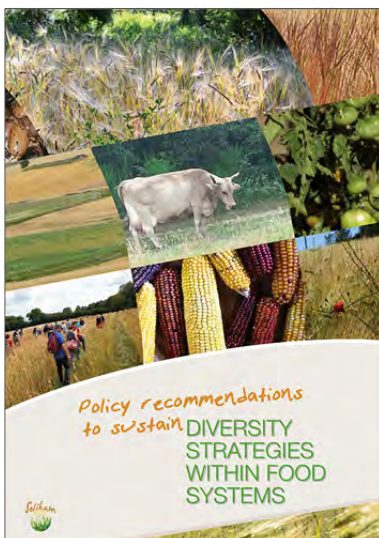
**QUOATS:** Harnessing new technologies for sustainable oat production and utilisation (Defra-LINK funded, [www.quoats.org](http://www.quoats.org), completed 2014)

**SOLIBAM:** Strategies for Organic and Low-input Integrated Breeding and Management (EU-FP7 funded, [www.solibam.eu](http://www.solibam.eu), completed 2014)

**WHEALBI:** Wheat and barley legacy for breeding improvement (EU FP7-funded, [www.whealbi.eu](http://www.whealbi.eu))

During 2014 and 2015, we:

- ✓ Continued the development and promotion of the concept of 'population' breeding, where each plant is genetically distinct, the opposite of conventional variety breeding with its emphasis on genetic uniformity.
- ✓ Secured a temporary marketing experiment under EU regulations to enable trade in seed from the populations from 2014, and produced seed to be marketed as the *ORC Wakelyns Population* in the UK.
- ✓ Extended our breeding work to include other crops and the initial stages of breeding traditional varieties



Bottom-up participatory approaches to breeding on-farm are also an important facet of our research activities. We have engaged in this through Duchy Future Farming field labs and these are on-going. For example, winter wheat lines selected by farmers at a field lab at Shimpling Park Farm in Suffolk have been re-sown, and were evaluated as part of the OF&G National Organic Combinable Crops event in 2015 with considerable interest from the farmers present.

Our experience with breeding the populations was also used by researchers at the University of Leeds as an innovation model for their **Cultivating Innovation** project.

Our role in the **WHEALBI** project involves developing concepts established in SOLIBAM regarding diversity-based breeding goals for organic cropping systems. Through data from our field trials, we are contributing to a model designed to assess the effects of site, season and climate change in wheat production, and expected to enable assessment of wheat performance under organic conditions.

In separate work on oats, the **QUOATS** project focusing on how new oat genetics perform in organic systems was completed in 2014. The conclusions were that weed competition was more important than disease, and that early establishment is important in weed competition (rather than later canopy cover or crop height). We found that organic yields cannot easily be predicted by conventional recommended list data and that grain quality is more influenced by variety choice than crop management. Therefore, variety choice should be based on weed competitiveness and grain quality rather than yield.

### Marketing ORC's wheat populations to farmers

As part of our plant breeding research we have engaged strongly in dialogue at a European level regarding developments in seed policy and suggested changes to the legal aspects of seed certification and marketing, which hitherto favoured conventional agriculture. As part of SOLIBAM we produced an influential policy document.

In March 2014, this led to the EC agreeing to an experiment that allows the limited marketing of wheat, oats, barley and maize populations within the EU until 2018. The UK officials are coordinating this on behalf of the EU and ORC is working with commercial partners to bulk up our winter wheat population seed for sale from autumn 2016. We have named the seed '*ORC Wakelyns Population*' in honour of the site and the people who were most closely involved with its production.

ORC and our commercial partners are likely to be the first to bring this exciting innovation to market in the EU. We are working closely with our EU partners (particularly in Denmark, the Netherlands and France) so that we can all learn from each other's marketing activities to make this experiment a success.

*Professor Martin Wolfe at Wakelyns Agroforestry pioneered our work on wheat composite cross populations, which has resulted in the 'ORC Wakelyns Population' that will be marketed in 2016*



## Soils and cropping systems

*Conserving soils, building soil fertility and designing systems to produce healthy crops, sufficient yields and quality food are fundamental to ensuring food security and public health. The return of carbon-rich crop residues to the soil, and the use of green manures and legumes for fertility-building in crop rotations help to conserve and enhance organic matter levels in soils, soil structure and soil biological activity. Crop rotations and polycultures also help regulate weed, pest and disease incidence, particularly in systems where the use of chemical inputs is restricted.*

*Our work in this area is focused on the development of productive organic cropping systems including the use of legumes, cover crops and reduced tillage systems without the use of herbicides. We have demonstrated that complex legume mixtures contribute to fertility building while supporting pollinators, and that reduced tillage can contribute to reduced energy consumption and enhanced soil protection.*

### Projects:

**BIOGREENHOUSE:** Towards a sustainable and productive EU organic greenhouse horticulture. (EU FP7 Cost-funded, [www.biogreenhouse.org](http://www.biogreenhouse.org))

**DIVERSIFOOD:** Embedding crop diversity and networking for local high quality food systems (EU H2020-funded, [www.diversifood.eu](http://www.diversifood.eu), started 2015)

**Dual biodiversity benefits from legume based mixtures** (Reading University PhD, ended 2014)

**GREAT Soils:** Growing Resilient Efficient And Thriving Soils (AHDB-funded, started 2015 <http://tinyurl.com/Gr8Soils>)

**OK-Net Arable:** Organic Knowledge Network Arable (EU H2020-funded, [www.ok-net-arable.eu](http://www.ok-net-arable.eu), from 2015)

*Ecodyn reduced tillage equipment in trials at Wakelyns Agroforestry as part of the OSCAR project*



### Reduced tillage and soils

Our work on integrating tillage systems and subsidiary crops has shown the challenges and potential of developing these sorts of approaches for, and with, organic farmers. The participatory approach used in **TILMAN-ORG** has meant that we have results and experiences from the farmer's field that can be used immediately by other farmers. In the UK we found that crop establishment was higher in reduced tillage (but unfortunately not yield, which was similar in spring but slightly lower for winter crops). We found weeds to be a challenge but earthworms increased and fuel use was reduced. The key findings across the whole project were that in most cases crop yields under reduced tillage tend to be reduced but not substantially. The use of green manures can mitigate this. However, further work is needed to develop farm-specific reduced tillage systems through optimised timing of nutrient supply and improved, more adaptable, machinery. Our on-going work in OSCAR (below) is further developing the use of the Ecodyn tillage system in the UK.

An important area of work within this programme is engaging directly with producers. The new AHDB Horticulture funded **GREAT Soils** project is working with both organic and conventional farmers (and their advisors, agronomists etc) to improve their soils. It is being undertaken in a participatory way to ensure that they have the right tools as well as the confidence to 'read the signs' from their soils and to take appropriate actions. It is building on our own work in this area (working with a number of collaborators) but also recognises the way in which organic farmers and researchers' have played an important role in raising the awareness and importance of soil health and fertility for a truly sustainable farming system.



**OSCAR:** Optimising subsidiary crop application in rotations (EU FP7-funded, [www.oscar-covercrops.eu](http://www.oscar-covercrops.eu))

**Sustainability of organic crop yields and rotations** (Defra funded, completed 2014)

**Sheep grazing of cereals to assist with blackgrass weed control** (Prince of Wales's Charitable Foundation funded Duchy Originals Future Farming Programme)

**TILMAN-ORG:** Reduced tillage and green manures for sustainable organic cropping systems (Defra/CORE-Organic ERANET-funded, [www.tilman-org.net](http://www.tilman-org.net))

During 2014 and 2015, we:

- ✓ Demonstrated that reduced tillage systems can work on UK organic farms without herbicides.
- ✓ Demonstrated the potential of diverse legume mixtures to support pollinators as well as build soil fertility.
- ✓ Created the OSCAR Wiki and cover crops toolbox to help farmers access information more easily.
- ✓ Established a network of organic and conventional growers to identify useful and effective soil assessment methods for UK horticulture.
- ✓ Established a group of organic arable producers to support the development of tools and knowledge exchange to improve crop productivity and quality.



## Legumes and cover crops

Given their importance for soil fertility in organic systems, we have continued to work on legumes, cover crops and leys.

Within the **OSCAR** project we are developing a



farmer friendly, innovative and highly informative information platform that includes a communal resource (wiki) for subsidiary crops as well as a decision support tool. The first parts of this platform are now live and the rest will be completed in the coming months. OSCAR is also looking at the performance of subsidiary crops that are underutilised or new to Europe and the UK, with several new *Vicia* and *Lathyrus* species performing particularly well.

In a joint PhD study with Reading University on the **biodiversity benefits of legume-based mixtures** (which was initiated as part of the former ORC-led Leglink project), Rob Brown found that increased legume species diversity can provide a season-long forage resource for a wider range of pollinating insects, while also providing a stable environment for earthworm species. However, mowing and grazing management can affect this negatively, with hay production providing the best resource.

## Improving productivity

The issue of the productivity of organic crop production remains much debated. In the Defra-funded **Sustainability of organic crop yields and rotations** project, we analysed results from several previous studies in the UK to assess whether nutrient supplies were adequate to maintain yields over the rotation. Our modelling found that enough nitrogen is supplied through biological fixation to support typical organic arable yields for at least 3-4 years following the ley if not lost through leaching, but that imported sources of P (in particular mined rock phosphate) are required to maintain an adequate balance of this nutrient and that large deficits of both P and K can occur in stockless systems.

In 2015 we secured EU H2020 funding for two new projects. The **OK-Net Arable** project seeks to address crop productivity and quality issues through an innovative approach to knowledge exchange being pioneered by ORC. This involves facilitating the co-creation of knowledge by farmers, farm advisers and scientists. We are leading facilitation of knowledge testing with farmer innovation networks in the participating countries for the whole project and will carry out this work in the UK with organic arable farmers.

The **DIVERSIFOOD** project will build on the progress made in SOLIBAM and other projects to develop sustainable farming systems. It will bring together farmers, scientists, processors, traders and consumers to promote the greater use of diverse plants and produce with a local and cultural identity. This will help to demonstrate how society at large can encourage sustainable agriculture, as well as simultaneously promoting this concept through production and marketing avenues.



Work continues on the **BIOGREENHOUSE** and **Sheep grazing for blackgrass control** projects, which will be completed in 2016 and reported more fully in our next annual review.

## Agroforestry

*Agroforestry is the integration of shrubs and trees with crops and livestock to benefit from the complementarity between the different species. This can lead to increased productivity compared with species produced separately, as a result of better solar energy capture during the growing season, improved resource utilisation and cycling, soil fertility benefits, shelter from wind, water conservation, and barrier effects on the spread of disease pathogens. Agroforestry also offers significant environmental benefits, from biodiversity, soil conservation, water quality and flood resilience through to climate change mitigation and carbon sequestration.*

*The focus of our agroforestry research programme is the evaluation of a range of agroforestry systems (including crops and livestock) in terms of their productivity, environmental and economic impacts, and their potential for agri-environmental policy. We are also investigating the potential of hedges and other landscape elements as sources for biofuels, generating an income to support their management and conservation.*

### Projects:

**AGFORWARD:** Agroforestry that will advance rural development (EU FP7-funded, [www.agforward.eu](http://www.agforward.eu))

**Can agroforestry reconcile conflicting demands for productivity, biodiversity conservation and delivery of ecosystem services?** (Reading University PhD, completed 2014)

**CO-FREE:** Innovative strategies for copper-free, low input and organic farming (EU FP7 funded, [www.co-free.eu](http://www.co-free.eu))

**SOLID:** Agroforestry in dairy systems, part of Sustainable Organic and Low Input Dairying (EU FP7 funded, [www.solidairy.eu](http://www.solidairy.eu))

*Ever-cheerful intern, Vincent Delobel, enjoying assessing willow biomass at Wakelyns Agroforestry*



### Hedgerows for woodfuel

The Interreg/Ashden Trust-funded **hedgerow woodfuel project TWECOM** has been an interesting mixture of scientific research and practical implementation, with research activities focusing on the impacts of harvesting woodfuel from hedges on biodiversity, microclimate and soil carbon, a comparison of different machinery options for harvesting operations, and calibrating estimates of hedgerow biomass with actual harvested amounts. ORC's own Elm Farm provided the focus for a valuable case study which investigated all aspects of local energy production from the farm's hedgerow network. Knowledge gained from the machinery trials was consolidated into a user friendly technical guide for farmers and landowners, agricultural and forestry contractors, conservation organisations and local authorities interested in managing hedges for woodfuel, and focuses on the logistics and practicalities as well as the methods and machinery selection.

The idea of coppicing hedgerows for woodfuel is somewhat controversial due to the value we, as a society, place on hedges as biodiversity hotspots and important landscape features. In order to promote wider adoption of woodfuel from hedges, we recognised the importance of raising awareness of the approach. From the initial stages of the project through to the final outputs, we engaged the full range of stakeholders relating to woodfuel production, hedgerow management and local energy production. This included workshops and farm walks with the local village community, technical workshops and machinery trials for farmers, foresters and industry, and national meetings attended by academics, researchers and students, policy makers and conservation groups.

A transnational agreed statement on EU policy was jointly prepared by project partners calling for policymakers to recognise the multiple benefits of hedgerow systems in a cross-sector policy, especially when developing a future vision on the role of biomass for a sustainable energy transition that goes hand-in-hand with ecological needs.

The performance of novel alley cropping systems combining trees and arable or livestock production continued to be studied in EU-funded CO-FREE and SOLID projects.

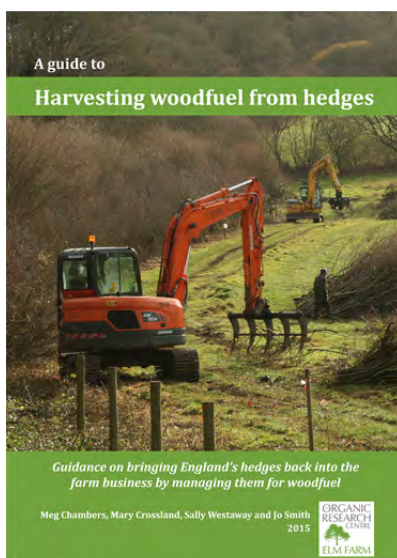
Integrating top fruit production into an agroforestry system, where woody species are integrated with crop production, may have a beneficial effect on the control of plant pathogens such as scab (*Venturia inaequalis*). The **CO-FREE** project aimed to evaluate this approach as a sustainable strategy for reducing copper inputs in organic and low input systems using two case studies.



**TWECOM:** Towards Eco-energetic Communities (Interreg/Ashden Trust funded, [www.twecom.eu](http://www.twecom.eu), completed 2015)

During 2014 and 2015, we:

- ✓ Demonstrated the potential for using existing woody landscape features such as hedgerows for local wood fuel production.
- ✓ Demonstrated the biodiversity and ecosystem service benefits of agroforestry in a PhD with Reading University.
- ✓ Continued assessing the performance of modern alley-cropping systems involving livestock or arable production.
- ✓ Organised, with the Woodland Trust, two agroforestry training days for woodland and farming advisers.
- ✓ Hosted the annual Farm Woodland Forum meeting.
- ✓ Planted new hedges, an avenue of fruit and timber trees, and in-field fodder trees at Elm Farm, with support from Pur, Accor Hotels and the Woodland Trust.
- ✓ Published a technical guide on harvesting woodfuel from hedges.



## Agroforestry systems

Scab levels in the highly diverse agroforestry system at Wakelyns were much lower than in a local organic orchard, which may be due to lower density and higher diversity of the apple trees reducing the spread of the pathogen. However, in the commercial agroforestry system in Cambridgeshire, some varieties were badly affected by scab, indicating that an agroforestry approach *per se* does not guarantee a reduction in scab levels. However, if combined with careful selection of resistant varieties and, if possible, mixed planting of varieties, the other benefits that agroforestry brings, particularly to arable systems, may make this approach attractive to arable farmers looking to diversify their enterprises or protect their farms against environmental problems.

To promote uptake by farmers, more information is needed regarding the establishment of new systems in terms of methods and costs of establishment, impacts on productivity and the environment, and the interactions between the tree and livestock components. For the **SOLID** project, the focus has been on evaluating the establishment of a new silvopastoral alley system combining pasture with short rotation coppice willow and alder at Elm Farm. The research found that establishing trees within a pasture had negligible impact on pasture production and biodiversity, and the microclimate within the first five years, although this may be due primarily to the low establishment rate and subsequent growth of the trees. Economic analyses showed that labour costs account for over 50% of total costs of establishing the system. Net present value (NPV) calculations showed that while overall the NPV is positive, the initial establishment is a large cash outflow that is not repaid, in this system, until five years after establishment; this may prove a barrier to many farmers contemplating agroforestry and suggests that support to cover establishment costs may be needed if uptake of agroforestry is to be encouraged. Including these types of novel systems in RDP agri-environment schemes in recognition of water regulation, biodiversity, soil protection and other benefits would enhance overall profitability.

**AGFORWARD**, a new EU-funded project, started in January 2014. In the UK, we are focusing on silvoarable and silvopoultry systems. In 2014 we organised stakeholder workshops to identify key issues and innovations. For silvopoultry farmers, management of the tree understorey is a key issue and trials are under way at the FAI Farm in Oxfordshire to investigate the establishment and performance of different sward mixtures under trees. For silvoarable systems, management of the tree understorey as a productive part of the system is being explored in the new agroforestry system at Tolhurst Organics, where daffodil bulbs and rhubarb crowns have been planted as understorey crops. Developing an 'agroforestry-adapted' wheat population has been the focus of trials at Wakelyns.

Two training events for advisers were organised with the Woodland Trust, to fill the gap in knowledge of agroforestry among forestry and agricultural advisers. We also hosted the annual Farm Woodland Forum meeting at Elm Farm in May 2015, taking the opportunity to showcase the various hedgerow and silvopastoral trials on the farm. The Woodland Trust provided funding for tree planting on Elm Farm. We have planted new hedges with species appropriate for bioenergy production (hazel, willow, sycamore and sweet chestnut), a tree avenue containing timber and fruit trees, and in-field trees to create a parkland habitat and provide tree fodder for livestock.

ORC continues to work with the European Agroforestry Federation (EURAF), the Woodland Trust, Farm Woodland Forum and other partners to further develop this approach.

## Livestock systems

*Keeping livestock is an integral part of many organic farming systems. Ruminant livestock (in the UK mainly cattle and sheep) can utilise grass and roughage as a feed resource so they do not compete with human food needs. For monogastric livestock (pigs and poultry), the main challenges arise from securing sufficient supply of protein to meet their dietary needs without undue reliance on imported feedstuffs, particularly soya. Organic farming systems also aim to improve animal welfare through access to pasture and to promote health through good animal husbandry.*

*Our work in the area covers both ruminants (mainly cattle) and non-ruminants (pigs and poultry) with particular focus on forage production and utilisation, including the role of legumes as a home grown protein feed resource. We are also investigating animal nutrition, in particular minerals and trace elements in ruminants and key proteins in monogastrics. The impact of forage, supplementary nutrients, grassland management and housing on animal health is also addressed.*

### Projects:

#### **Animal Health and Welfare:**

Occasional events funded using designated income transferred to ORC following closure of Farm and Food Society

**ICOPP:** Improved Contribution of local feed to 100% Organic feed supply for Pigs and Poultry. (Defra/CORE Organic ERANET funded, [www.icopp.eu](http://www.icopp.eu), ended 2014)

**OPTGRAZE:** Optimal grazing systems (NORSOK funded)

**SOLID:** Sustainable Organic and Low-input Dairy Production (EU FP7-funded, [www.solidairy.eu](http://www.solidairy.eu))

*Dairy cattle at Eastbrook farm, part of a field lab on reducing antibiotic use linking the SOLID and Duchy Future Farming projects*



### Dairy

Our work on dairy production aims to find practical solutions to make organic and low-input systems more sustainable. As part of the **SOLID** project, we cover forage production and feeding, soils and nutrient management, animal health, business and supply chain interactions, the assessment of sustainability and environmental impact as well as the use of agroforestry in dairy farming (see above).

We have developed a common approach for farmer-led research that addresses issues related to calf rearing on cows, reducing antibiotic use for the control of mastitis, comparing the establishment and productivity of diverse swards with that of conventional pastures, investigating the interactions between nutrition, health and levels of trace elements in the milk and determining the effects of mob grazing on soil and animal performance. All these areas of research have been identified as priorities by farmers, and in most cases the farmers are heavily involved in the conduct of the experiments or in the data collection and monitoring. The involvement of researchers in trial protocol development facilitates systematic data collection and analysis, making the results more robust and transferable beyond the group of farmers directly participating. All the studies have now been summarised and made available on the project website ([www.solidairy.eu/index.php/participatory-on-farm-research-in-solid](http://www.solidairy.eu/index.php/participatory-on-farm-research-in-solid)).

The studies confirm the value of direct farmer engagement in the development of practical solutions. For example, organic standards recommend that homeopathic and herbal remedies shall be used in preference to conventional therapies, but farmers find it difficult to obtain information about such treatments. In a discussion group run jointly with the Duchy Future Farming Programme some farmers reported using a liniment mint oil cream for preventing mastitis. This led to the setting up of on-farm trials on the effectiveness of this practice in reducing somatic cell counts (SCCs) in organic dairy cows on four farms. The SCCs of treated cows were found to be systematically lower compared to untreated animals, using data collected as part of National Milk Records. The results confirmed that liniment mint oil cream treatment can be used as a complementary on-farm practice to prevent mastitis incidences. It is likely that farmers will now be more confident in using this treatment, which will lead to reductions in the use of antibiotics. Participating farmers commented that the process of coming together to discuss the various practices used by other farmers helped them to improve further on the good practices they were already using.

During 2014 and 2015, we:

- ✓ Demonstrated that farmer-led research is an effective way for researchers and the farmer together to develop more sustainable practices.
- ✓ Identified several novel protein sources that could be utilised for pig and poultry production.
- ✓ Demonstrated the potential of the range to meet some of the nutrient requirements of pigs and poultry.
- ✓ Published technical guides for farmers on how to feed organic pigs and poultry with 100% organic diets and make best use of forage in their diets.

Technical Note 1



**Fulfilling 100% organic poultry diets: Concentrates**

**Introduction**

The main driver behind the poultry producers is allowing that feed fulfils the nutrient requirements of poultry, in an environmentally friendly way. This is particularly important for organic producers as the use of synthetic amino acids is not allowed. There has been a 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 to assist in meeting the nutritional requirements of the animals. This derogation was due to finish at the end of December 2014 but has now been extended to 31 December 2017 when it will become compulsory under the EU Organic Regulation (EC) no 853/2008 to produce all organic concentrate feed derived from 100% organic sources. This guide addresses the nutritional requirements of organic production and novel protein sources as viable alternatives to synthetic amino acids for organic poultry producers. See ICOPP Technical Note 2 for information on feeding roughage and foraging from the range.

**Nutrient requirements of poultry**

Nutrient requirements of poultry are relatively high due to their rapid conversion of feed into high protein eggs and meat. Deficiency of essential amino acids results in retarded growth, reduced egg size and weight. Deficiency of essential amino acids results in retarded growth, reduced egg size and weight. Deficiency of essential amino acids results in retarded growth, reduced egg size and weight. Deficiency of essential amino acids results in retarded growth, reduced egg size and weight.

**Table 1. Amino acid requirements as percentage of laying broiler diets (values are normal 2017)**

	Layers (brown eggs)	Broilers (white egg)
Feed intake g/bird	100	120
Protein %	18.0	19.0
Methionine %	0.28	0.30
MethCysteine %	0.71	0.59
Arginine %	0.65	0.71
Lysine %	0.84	0.70
Tryptophan %	0.19	0.18
Threonine %	0.27	0.28

Technical Note 4



**Fulfilling 100% organic pig diets: Feeding roughage and foraging from the range**

**Introduction**

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. This has now been extended to 31 December 2017 when it will become compulsory under the EU Organic Regulation (EC) no 853/2008 to produce all organic concentrate feed derived from 100% organic sources. The Regulation also requires organic producers to make use of available organic feed to reduce their dependence on synthetic amino acids. This guide discusses the use of roughage and foraging from the range as viable alternatives to synthetic amino acids for organic pig producers. See ICOPP Technical Note 3 for information on alternative concentrates.

**Benefits of roughage and foraging**

Forage can make a valuable contribution to nutrition of all stages of pig development, offering a source of fibre and vitamins, enhancing feed intake, supporting gut health and reducing feed costs. Accounting for 50%-60% of total production costs, price of supplementary feed often fluctuates causing financial control issues for producers. Forage-based systems should benefit organic farmers economically by reducing overall feed costs.

Over-reliance on the use of high amounts of supplementary feed containing cereals and oilseeds can also result in high nutrient levels in outdoor organic pig systems, with only 30% of feed being supplied in pigs until slaughter, potentially resulting in environmental pollution as surplus nutrients are excreted.

Forage can meet 50% of the requirements energy requirement of dry sows. Studies indicate that forage intake increased if dry sows had access to a range of protein from supplementary feed. Levels of forage intake in outdoor areas have been found to range between 200 - 300g/day depending on restriction level, pig weight and season.

However, fresh forages are low in dry matter which means that the pig must consume more volume to get the same nutrient value as they would from a similar weight of supplemented feed with a higher dry matter content. For this reason, the use of pastures and forage-based systems is limited - they need a higher concentration of nutrients at these stages of development.

Another drawback to using forage, especially pastures, is that they may not be available during the winter and this means that the feeding program may have to be modified from one season to the next. Pigs should be rotated of pastures periodically to prevent heavy trampling and pasture contamination.

## Pigs and poultry

One of the biggest issues in organic pig and poultry production is meeting their requirements for protein from organic sources. Producers have relied on a derogation to organic standards that has allowed the inclusion of up to 5% non-organic feed. From December 2017 the derogation will end, and producers will be required to feed pigs and poultry a 100% organic diet. ORC and 11 partners across Europe investigated 100% organic feeding strategies to supply the required level of nutrients in different phases of production as part of the **ICOPP** project. Feed trials were carried out with pigs (sows, piglets and finishers) and poultry (layers and broilers) and focused on concentrate feedstuffs, roughage, and foraging from the range. The project also looked at availability of relevant feeds across Europe, nutritional values of new feedstuffs, and economic and environmental assessment of new strategies.

For pigs, we found that protein requirements could be contributed to by the inclusion of: peas and faba beans for lactating sows; sainfoin seeds, particularly if de-hulled; grass pea seeds (up to 30% of ration) if heat-treated to address antinutritional factors; and mussel meal up to 5% of rations for growing/finishing pigs. For growing pigs, the inclusion of grass-silage cut at an early stage of development in a mixed diet with concentrates contributes to the energy and protein supply (preventing ulcer damage), but daily gain and feed conversion rate become poorer when silage is included at over 10%. In a diet with lucerne silage for growers no differences were found in growth rates when soybean protein was substituted with pea protein.

For poultry, preliminary trials carried out by ORC and FAI in Oxford suggested that protein from *Spirulina* algae can replace soya in broiler diets. We also found that:

- Refining of ingredients of plant origin to enrich the relative content of methionine allows supply of relevant protein sources.
- Insect meal (*Hermetia illucens*) up to 12% in the diet can replace soybean cake without any difference in egg production, feed conversion, health or taste of eggs.
- The methionine content in the protein of early harvested lucerne is higher than that of soybean cake and almost twice as high as that of peas. In the diet for layers it may be included up to 20% dry matter without impairing egg production. In diets for slow growing broilers it can amount to 10-20% in the rearing period (weeks 1 to 4) and up to 30% in the fattening period (weeks 5 to 8) without impairing growth.

The use of roughage is mandatory in livestock organic production, but often the potential of roughage to contribute to the nutritional needs of pigs and poultry is unclear. Access to a foraging area represents a possibility for pigs and poultry to partly cover their nutritional needs by the biomass available in the range.

- 1m<sup>2</sup> of most habitats studied would contribute considerably to the daily requirements of laying hens for methionine and, in most cases, completely meet lysine requirements.
- Low-protein diets stimulate broilers to forage in the range area and this can contribute to protein supply in broilers of slow-growing genotypes without detrimental effects on growth.
- Foraging on well-established lucerne can make an important contribution to energy and protein supply in fattening pigs if they get regular access to new land (strip-grazing). However, the overall feed conversion rate becomes poorer, as was also seen when feeding grass silage to growing pigs.

## Environment, sustainability and health

*Food and agriculture have major impacts on the environment and health, both as a result of the production methods employed and the quality of the food produced. Research has shown that organic methods can conserve and enhance biodiversity and soils, reduce non-renewable energy and other input use, reduce pollution, protect water resources and mitigate climate change. Restricted pesticide and fertiliser inputs, more diverse crop rotations and the greater number of species grown all contribute.*

*Our research focuses on the wider impacts of organic and other farming systems and the assessment of their sustainability and contribution to delivery of ecosystem services. It also explores concepts of health applicable to individual organisms and ecosystems, reflecting that the interactions of soil, plant, animal, humans and the planet through 'health' is a key principle of organic agriculture. Human health is seen to be dependent on a healthy soil, healthy plants and healthy farm animals. This includes the provision of safe, nutritious, high quality food in sufficient quantities.*

### Projects:

**Assessing the GHG impacts of widespread conversion to organic farming in the UK** (Cranfield University PhD, part-funded by Ratcliff Foundation)

**Contribution of the Public Goods Tool to the Sustainable Intensification Platform** (Defra funded, [www.siplatform.org.uk](http://www.siplatform.org.uk))

**Food Quality and Health:** Occasional events funded by designated Mary Langman bequest income

**Further Development of Methodologies for Sustainability Assessment and Monitoring in Organic/Ecological Agriculture** (Ekhaga Foundation funded, completed 2015)

### Agroecology and sustainable intensification

ORC with the Game and Wildlife Conservation Trust was commissioned by Scottish Natural Heritage to produce a detailed report on the *Role of Agroecology in Sustainable Intensification* to contribute to the debate on how a more productive yet eco-efficient agriculture can be achieved. The study provided a comprehensive overview of how system redesign and individual farm practices can be applied to improve efficiencies in agriculture and the food chain, and how the productivity, financial and environmental performance of different farming systems could be influenced by their adoption.

*Table 1. Contribution of different agroecology practices and approaches to defined sustainable intensification objectives*

Practice	Productivity	Non-renewable energy use and GHG emissions	Biodiversity and related ecosystem services	Soil and water resource protection	Profitability
Fertility-building legume leys	+ (- if not utilised)	+	+ (++) if flowering)	++(if well managed)	-
Organic soil amendments	+	+	++	+	0
Reduced/zero tillage	+	+	+	+	+
Avoidance of agrochemicals	--	+	++	++	--
Extended crop rotations	+	0/+	+	+	+/-
Polycultures	++	0/+	+	+	+/-
Variety mixtures and populations	+	0/+	+	0	0/-
Field margin and other refugia	+/-	0/+	+ / ++	0/+	+/-
IPM/biological pest control	+	0/+	+	0	+
Diverse pastures	+	0/+	+	+	0/+
Mixed crops and livestock	+ (if complementary)	0/+	+	+	+/-
Mixed livestock species	+ (if complementary)	0/+	+	0	+/-
Integrated crop/farm management	0	+	+	+	0/+
Organic farming	--	+ (0 per unit product)	++	++	0 (with premiums)
Agroforestry	+	++	++ (- if bare understorey)	++	+/-

- = worse than conventional, 0 = similar to conventional, + = better than conventional

Source: Own assessment based on literature presented in the full report.

### Sustainability assessment tools

The question of whether farming provides a 'public good', beyond the production of food, was also addressed in 2014 through a Defra-funded project **testing a modified version of ORC's Public Goods Tool on conventional farms**. We worked with seven advisors from a variety of organisations working in the conventional sector who used the tool on 32 conventional farms. The feedback from the advisers and farmers was generally positive. The majority agreed that the tool gives relevant information and identifies areas of strength and weakness in the farm's public goods provision and has the potential to increase farmers' understanding of public goods and the provision of these on their farms. Several were interested in using the tool in future.

**Greenhouse Gas Platform:** Data synthesis, modelling & management (Defra-funded, completed 2015, [www.ghgplatform.org.uk](http://www.ghgplatform.org.uk))

**Health Concepts:** (Ekhaga Foundation funded, completed 2014)

**Health Networks:** (Ekhaga Foundation funded, started 2015)

**Role of Agroecology in Sustainable Intensification** (Scottish Natural Heritage funded, completed 2015, <http://tinyurl.com/znd7apt>)

**Testing of Public Goods Tool** (Defra funded, completed 2014)

During 2014 and 2015, we:

- ✓ Published a key report on agroecology and sustainable intensification.
- ✓ Received positive feedback on Public Goods Tool from non-organic producers and advisers.
- ✓ Further developed concepts for sustainability assessment.
- ✓ Provided data and guidance on tracking greenhouse gases in the UK GHG Platform.
- ✓ Reviewed health principles with farmer groups to improve system health impacts.
- ✓ Hosted the Food Quality & Health network's workshop on organic and sustainable diets.
- ✓ Published English version of FiBL dossier on Sustainability and Quality of Organic Food, with support from Sheep-drove Trust.



With funding from the Ekhaga Foundation, we were able to compare a range of **sustainability assessment** tools against criteria set out in the FAO's Sustainability Assessment of Food and Agriculture (SAFA) guidelines. In addition to identifying the strengths and weaknesses of existing approaches, this project highlighted the interdependencies and correlations between indicators on the basis of scientific literature, an expert workshop and an online survey. The project found that the inclusion of metrics within the areas of social sustainability and good governance should be encouraged within existing tools. It also identified areas perceived as potential strengths of organic farming (e.g. ecosystem diversity, soil quality and greenhouse gas emissions).

### Greenhouse gas emissions from agriculture

ORC work on the Defra-funded **Greenhouse Gas Platform** project included an analysis and evaluation of the usefulness of existing data sources for the GHG inventory. We also organised an industry focussed workshop to present the draft take-home messages for producers. A draft final report on data sources that could be used to monitor industry progress on GHG mitigation measures has been produced. The final reporting of this project will be in 2016.

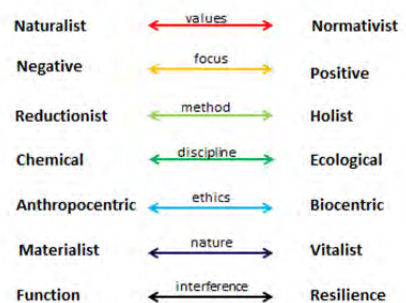
Early results from a staff PhD, supported by the Ratcliff Foundation, exploring the impacts of a widespread conversion to organic management in England and Wales on agricultural greenhouse gas emissions, have illustrated the relative energy efficiency of organic systems and the potential for organic practices to improve nitrogen-use efficiency and reduce N<sub>2</sub>O emissions.

### Health concepts and best practice networks

The Ekhaga Foundation has also enabled us to investigate the wider health impacts of organic and agroecological agriculture. In two projects (**Health Concepts** and **Health Networks**), we established an international and interdisciplinary network of farmers, advisors and scientists, to jointly develop new and improved approaches to health research in ecological agriculture. This work is based on the IFOAM principle of health, stating that the health of soil, plant, animal and human is one and indivisible; and therefore explores health impacts in all domains as well as ecosystems.

The Health Concepts project reviewed and defined concepts of health at the different levels. In the Health Networks project, groups of best practice farmers in the UK, Germany and Austria are now working together to identify which principles, visions or strategies they have adopted that make their farm and its outputs healthy. During a series of national and international meetings, the best practice farmer groups have established their own personal health principles and strategies, with the aim to support other farmers and growers in operating healthy farming systems.

#### Seven dimensions of health concepts



Döring et al. 2012, *Plant Path.* 61:1-15

We have continued as members of the international **Food Quality and Health** (FQH) organisation, attending a conference organised by them in Rome on organic and sustainable diets in 2014, which was followed by ORC hosting an FQH international workshop on organic and sustainable diets at ORC in April 2015.

## Business and markets

*All farmers need to earn a living and sufficient income to ensure that their businesses are sustainable. The development of specialist markets for certified organic food provides a means by which consumers can access organic food and producers and food businesses can gain some financial return for adopting practices that yield environmental and other benefits not normally compensated by the market.*

*Despite not using yield-enhancing inputs, organic producers achieve similar incomes to comparable non-organic farms, thanks to consumer willingness to pay a premium for products with legally-backed certification of organic authenticity. As part of this, producers have developed innovative marketing and processing initiatives and close links with consumers in new business models such as community supported agriculture.*

*This programme focuses on the analysis of farm incomes and costs of production, the availability and quality of organic market data, sector/market development as well as consumer attitudes, behaviour and willingness to pay, helping producers, food businesses and policy-makers to make better informed decisions.*

### Projects:

**BOBL:** Better Organic Business Links (EU Wales RDP funded, [www.organiccentrewales.org.uk/business-bobl.php](http://www.organiccentrewales.org.uk/business-bobl.php), started and completed 2015)

**OrganicDataNetwork:** for better European organic market information. (EU FP7-funded, [www.organicdatanetwork.net](http://www.organicdatanetwork.net), completed 2014)

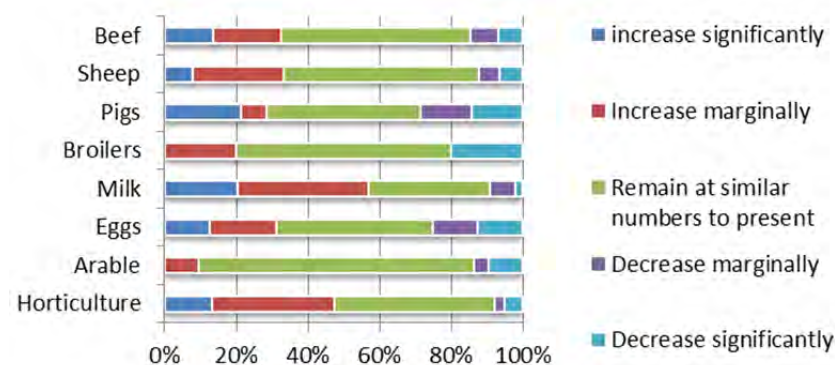
**Organic Farm Incomes in England and Wales:** Annual reports (Defra/Welsh Government funded)

### Organic market data

The UK is one of the largest markets for organic agriculture in Europe, with an estimated annual turnover of nearly £2 billion in 2015 and predicted continued growth following a period of decline during the recession.



As part of the **OrganicDataNetwork** project, ORC oversaw six case studies on improving organic market reports in the UK, France, Germany, Italy, the Czech Republic and the Mediterranean. Challenges exist throughout Europe regarding organic market data collection. For example, data on sales through supermarkets may be available from market research companies, but sales through farm shops, farmers' markets and box schemes are much harder to track. Reliable import/export data exist only in very few countries. The UK case study confirmed a lack of consistent, reliable data about the organic market from farm to fork. This is likely to prevent existing business opportunities on farms and in the processing and retail sectors from being realised. Defra also requires evidence for policy development and implementation, as well as meeting EU reporting requirements.



During this project, we carried out a survey of 223 organic producers in England in 2013 (similar to the organic producer surveys carried out by Aberystwyth University and SRUC in Wales and Scotland respectively) with questions about current production and marketing as well as future intentions. Most producers planned to remain at current levels of organic production: milk and horticultural producers were most likely to indicate planned increases; pig and poultry producers planned reductions.

The OrganicDataNetwork project was completed with a synthesis report bringing together the results from the entire project and a Code of Practice for organic data collection. ORC held a meeting of UK organic data stakeholders presenting the project outcomes and making plans for continuing the dialogue around UK organic market data in 2014. At the final project meeting in Brussels, Ivica Karas from the Organic Agriculture unit of the EU Commission stressed the importance of the OrganicDataNetwork project for the future development of the EU organic sector and the market.

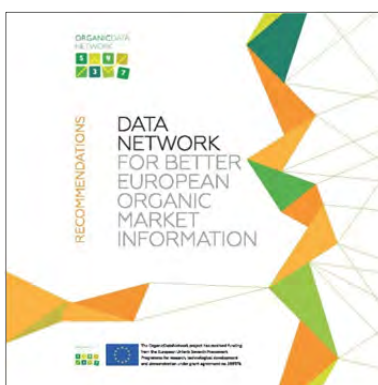
The lessons learned in this project and previous work have encouraged us to look actively with industry partners at the possibility of establishing a UK Organic Market Observatory in order to bring about a significant improvement in the availability of data to support business and policy decision making.

### Organic Farm Management Handbook

Published every two years since 1994, provides essential facts and figures for farmers (Funded by sales and Triodos Bank sponsorship)

During 2014 and 2015, we:

- ✓ Published the 10<sup>th</sup> edition of the *Organic Farm Management Handbook*.
- ✓ Contributed to a *Code of Good Practice for the collection of Organic Market Data (OrMaCode)*, which will help develop a more consistent approach to data collection in the UK.
- ✓ Produced a Welsh organic market report in collaboration with the Soil Association and Organic Centre Wales.
- ✓ Contributed to a guide for organic producers on communicating organic values as part of the BOBL project in Wales.



### Supply chain development

We worked as part of Organic Centre Wales on the **Better Organic Business Links (BOBL)** project in Wales, which concluded in 2015. ORC produced a report on the 2015 Welsh Organic Market, which also highlighted business opportunities for the organic sector in Wales. The value of the organic market in Wales/West is estimated to be £100-140m through all sales channels, with many organic businesses trading throughout the UK and beyond. ORC also supported the writing of a guide for producers on communicating food values using the Common Cause value map. This highlighted that every organic farmer has a specific and personal story to tell, referring to the values of 'Universalism' and 'Benevolence', both associated with supporting positive social change. As part of the BOBL project, we also developed a costings tool for small-scale horticulture producers and compiled benchmarking data for the livestock sector.

### Financial performance of organic farms

With financial support from the Welsh Government Organic Centre Wales contract, we continued to produce the annual reports on **Organic Farm Incomes in England and Wales**. In joint publications with Aberystwyth University, we analysed Farm Business Survey (FBS) data for 2012/13 and 2013/14. The profitability (Farm Business Income) of most organic farm types continued to be similar to that of comparable conventional farms (except for horticulture), although organic less favoured area farms were significantly more profitable than the comparable conventional group. A further joint publication with Aberystwyth University analysed trends for the period from 2006/07 to 2011/12. For most farm types, the profitability of organic farms has held up much better than might have been expected from the retail market trend data during the economic downturn.

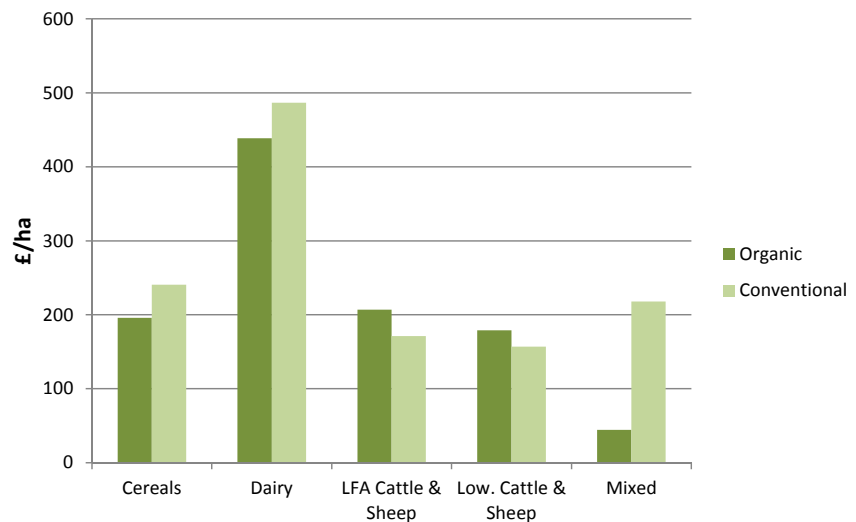


Figure: Organic and conventional Farm Business Income (£/ha, 2013/14)

Every two years since 1994, ORC (originally in collaboration with Aberystwyth University) has produced the **Organic Farm Management Handbook**. This essential reference guide for farmers, advisers and students contains key data on organic farming regulations, policy support, management and physical and financial performance. It is the most comprehensive guide to individual crop and livestock enterprise costings available for use in farm planning. The 10<sup>th</sup> edition was published in 2014. A new edition is planned for 2016, subject to additional sponsorship being secured.

## Knowledge exchange and communication

*Knowledge exchange recognises that learning and dissemination of research results is not a one way process, but involves the active engagement of the users of research outputs, as well as the willingness of researchers and intermediaries to learn from users and practitioners, and to ensure their active engagement in the whole research process.*

*This programme builds on the participatory ethos in our research by actively involving producers and other stakeholders in the development and implementation of trials and interpretation of results. We are also developing our approach to knowledge sharing using the internet, printed publications and events including conferences and training courses.*

### Projects:

**Agriculture:** On-line information hub with practical information for sustainable farming (Defra-funded in 2014, as [ecofarminginfo.org](http://ecofarminginfo.org), Daylesford Foundation-funded as [www.agricology.co.uk](http://www.agricology.co.uk) from 2015)

**Bulletins:** Monthly e-bulletin and quarterly printed bulletin (Funded by donations and subscriptions)

**DOFFP:** Duchy Originals Future Farming Programme (Prince of Wales's Charitable Foundation-funded, completed 2015)

**Education:** Contributing to post-graduate courses and student supervision (Funded by institutions involved and Erasmus)

**Events:** Annual producers' conference, short courses and more (Funded by fees and donations, including bursaries for young people, students and apprentices)

**Innovative Farmers:** Successor to DOFFP supporting farmer innovation clubs (Prince of Wales's Charitable Foundation-funded, started 2015, [www.innovativefarmers.org](http://www.innovativefarmers.org))

**IOTA:** Institute of Organic Training and Advice provides accreditation and support for UK & Irish organic specialists (Subscription- and sponsor-funded)

### Supporting farmer-led innovation

Farmers have always been at the forefront of agricultural innovation and are familiar with finding new solutions to cope with changing market, climatic and political conditions. Whereas other farmers may rely on external inputs supplied by corporations, organic farmers have to be innovative in finding solutions to solving production problems.

Many of our research projects already involve a participatory research approach, where producers are not only involved in hosting research trials but are actively engaged in the development and implementation of the trials and interpretation of the results.



*Field lab experience:  
The grower and his woodchip compost*

We continued to contribute to the Soil Association-led **DOFFP** project, funded by the Prince of Wales's Charitable Foundation with royalties from the Waitrose Duchy Originals brand. Some of the results were presented to HRH The Prince of Wales as part of a special event at Eastbrook Farm during The Prince of Wales's Food and Farming Summer School hosted by ORC in July 2014. Field labs, designed to introduce producers to the idea of running their own, on-farm trials to test innovations, were a major element of the programme and ORC's input.

The second phase started in April 2015 leading to the launch of **Innovative Farmers** in Autumn 2015. ORC has been involved in running and/or providing researcher input to several field labs, including: woodchip composts; seawater minerals; growing quinoa organically in the UK; controlling creeping thistles in arable crops and grass leys; fertility-building leys and green manures; growing heritage thatching wheat varieties; using compost teas on crops; the use of observation techniques to improve dairy herd performance; feeding sprouted cereals and pulses to livestock; and the use and interpretation of soil analysis results.

As an example, the field lab on the use of woodchip compost as a peat-free propagation material in organic horticulture reached over 50 growers and interested stakeholders, inspiring them to try producing their own compost/growing medium and/or to compare alternative substrates. Within the financial, time and space constraints of a one-season experiment, very useful results were obtained. A small network of enthusiastic and engaged growers and advisors has formed with the intention to exchange knowledge and experiences on this subject again in the future. The grower who developed the idea was pleased that his material (low tech, produced on-farm from predominantly local materials) compared well with peat-based imported products. For all the growers participating, the field lab strengthened their knowledge of trialling ideas in a way that is specifically tailored to their own circumstances and will help them to be more independent.



**ORC's Library:** a unique archive of organic farming ideas and research literature over 100 years (Funded by donations and volunteers)

**Prince of Wales's Food and Farming Summer School:** 3-day event at ORC, Duchy Home Farm and Highgrove (Funded by fees, sponsorship and bursaries)

**Publications:** Technical guides, dossiers, fact sheets and more (Funded by sponsorship, project funding and sales)

**STOAS:** Sustainability Training for Organic Advisers (Funded by EU Leonardo, finished 2014)

**Websites and social media:** ORC's main website, Facebook, Twitter, Flickr (Funded by donations)

During 2014 and 2015, we:

- ✓ Created the **Agricology** online information hub for practical, sustainable farming, with support from Defra and the Daylesford Foundation.
- ✓ Supported farmers testing solutions in **DOFFP** and **Innovative Farmers** field labs.
- ✓ Engaged with more than **1000 farmers and others** in conferences, field labs and other events each year.
- ✓ Published more than **100 bulletins, technical guides, factsheets, articles, peer-reviewed papers and conference presentations.**
- ✓ **Trebled our social media outreach to more than 2000 Twitter followers and 1500 Facebook likes.**



## On-line practical information resources

ORC has teamed up with the Daylesford Foundation, Allerton Project (GWCT) and other organisations to launch

**Agricology**, a new online resource that translates scientific research into practical information to help farmers become

more profitable and more sustainable, while protecting the environment. Agricology works through [www.agricology.co.uk](http://www.agricology.co.uk), on social media and through on-farm events and covers a diverse range of farming approaches embracing agro-ecological perspectives, including integrated, organic and biodynamic farming, agroforestry and permaculture. The Daylesford Foundation has pledged nearly £500,000 to the project from 2015-2019.



## Conferences and events for professionals and students

ORC ran two **Organic Producers' Conferences** in Birmingham in January and November 2014, the second jointly with the Soil Association's Soil Symposium, attracting around 200 participants for each, and we continue to receive good feedback. In both years, we were able to support English producers attending these events with funding from the Rural Development Programme for England secured through Smithsgore/CCA Landskills. We also hosted the 2<sup>nd</sup> **Prince of Wales's Food and Farming Summer School** at ORC in July 2014, which was attended by more than 30 participants and a dozen highly expert contributors and featured visits to Helen Browning's Eastbrook Farm, accompanied by HRH the Prince of Wales, Duchy Home Farm and Waitrose's Leckford Estate. We also organised several **training events and workshops**. **Bursaries** received from the Organic Growers Alliance, Meadowbrook Trust, Greenham Common Trust, Ernest Cook Trust and some individuals supported the attendance of young people at these events.

Other key events for ORC were our annual **open day at Wakelyns Agroforestry** in June 2014, OF&G's **National Organic Cereals/ Combinable Crops** (NOCC) events in July 2014 and 2015, and the **IFOAM Organic World Congress** in Turkey in October 2014.

ORC continues to provide support to advisers and trainers in the UK and Ireland through **IOTA**, including accreditation of specialists, CPD events, some focusing on current ORC work, and an on-line Wiggio discussion forum. IOTA has provided feedback from advisers to help improve the implementation of organic support in England and Wales (see below) and keeps organic advisers informed of the latest policy developments. IOTA was a partner in the EU Leonardo-funded **STOAS** project, which provided training on farm sustainability assessment, including ORC's Public Goods Tool, to organic advisers and advisory service managers in Germany, Switzerland and the UK.

ORC staff provide input to **education for postgraduate students**, including: the SRUC PgD/MSc on Organic Farming; the Bari MSc on Mediterranean Organic Agriculture; the Schumacher College MSc on Ecological Horticulture; hosting students and interns at ORC; and jointly supervising PhD and MSc dissertations with Reading, Southampton, Cranfield and other universities.

Information on our work is also published through leaflets, factsheets, articles, peer-reviewed papers, technical guides, research reports and conference presentations (see pages 22-23), in our printed Bulletins and monthly e-bulletins, on our website, as well as through social media (Facebook, Twitter, Flickr).

## Policy development and evaluation

*EU and government policies impact on organic producers in two main areas:*

*a) the support available to producers for production and marketing of organic products in recognition of the environmental and other public goods produced, and b) the regulations defining organic farming and related certification systems enabling the organic market to function.*

*Our work focuses on both the development and evaluation of policy support and payments for public good benefits, and the development and evaluation of regulations, standards and certification systems. We engage with external governmental and non-governmental organisations in order to facilitate the sound development of the organic sector in the UK and internationally, and to influence policy-makers at local, national and international level in order to ensure that the potential of organic/ agroecological approaches is recognised and appropriate policies are developed.*

### Projects:

#### Policy Advocacy Programme:

Supporting policy development with sound evidence, in particular

- CAP/RDP implementation
- Organic support payments
- Agroecology/ecosystem services
- EU organic regulations
- EU seed regulations
- Organic sector development
- Climate change
- Genetically modified organisms
- Food security, quality and health
- Research and innovation

(funded by multiple donors including: ATeam Foundation, Daylesford Foundation, Doves Farm, Pye Charitable Settlement, Rhug Estate, Sheepdrove Trust and individuals)

**Research for Transition:** Documenting organic farming research activity and future requirements. (Funded by European Parliament Greens/EFA, [www.greens-efa.eu](http://www.greens-efa.eu), completed 2015)

### Support payments for UK organic producers

ORC has worked intensively during 2014 and 2015 to ensure fair implementation of the new **Common Agricultural Policy and Rural Development Plans** in the UK, with significant impact.

In **England**, ORC led the organic sector (co-ordinated through the English Organic Forum) negotiations with Defra on support payments for organic farming, providing critical evidence on environmental and financial performance. As a result, we secured a recalculation of the maintenance payments, resulting in an overall improvement in support levels for English organic producers compared with Defra's original plans, estimated to be worth more than £5 million a year to the sector. The new payment rates summarised above were announced in November 2014, with the first new agreements starting in January 2016. During 2015 we have focused more on addressing implementation issues, in particular the restriction on existing Environment Stewardship agreement holders taking up the organic conversion or maintenance options.

In **Wales**, ORC led the Organic Centre Wales partnership's work developing the new Glastir Organic scheme under contract to the Welsh Government. The new scheme, with payment rates summarised above, was launched in autumn 2014 to coincide with the ending of previous support schemes. More than 550 producers joined up in 2014 and 2015, with clear evidence now emerging that the decline in organic land area in Wales has been halted. During 2015, our work has focused more on the development of organic management plans, a formal requirement of Glastir Organic.

ORC also supported discussions in **Scotland and Northern Ireland**, and provided similar environmental and financial evidence to support the campaign, in the end successful, for the reintroduction of maintenance support in Northern Ireland, where the government had originally proposed to end all support for organic farming.

Crop/land category	Conversion (Years 1-2)	Maintenance (From Year 3)	Notes (All values £/ha)
Horticulture/ top fruit	E:400/450 NI: 358 S: 400 W: 600	E:200/300 NI: 197 S: 200 W: 400	E: max 20ha**** NI: up to 60ha** S: max ha limit*** W: max 20ha****; cert. costs 80*
Arable/ rotational land	E: 175 NI: 149 S: 280 W: 130	E: 65 NI: 53 S: 65 W: 65	NI: up to 60ha** S: max ha limit*** W: cert. costs 10*
Improved grassland	E: 75 NI: 144 S: 140 W: 130	E:40 NI: 53 S: 55 W: 65	NI: up to 60ha** S: max ha limit*** W: cert. costs 10*
Unimproved grassland/ rough grazing	E: 50/8 NI: 9 S: 12.5 W: 15	E: 20/8 NI: 8 S: 8.5 W: 15	E: encl. <15ha plots NI: no area limit S: max ha limit*** W: cert. costs 3*

E: England, NI: Northern Ireland, S: Scotland, W: Wales, all 5 year agreements

\*W: certification costs supported extra, limited to £500 per holding per year

\*\*NI > 60ha: arable/grass 45 conv., 20 maint.; horticulture 149 conv., 53 maint.

\*\*\*S: maximum 300ha improved land, or 1000ha all land; W: max 400ha all land

\*\*\*\*E&W: hortic includes leys + rotation rules; >20ha, rotational/improved land rate;

E: higher hortic. rate applies to top fruit, conversion 3 years

**Welsh Government Organic Advice Service:** providing policy advice on the development of Glastir Organic and other issues through Organic Centre Wales (funded by Welsh Government)

During 2014 and 2015, we:

- ✓ Secured better support payments for organic producers in England and Wales and helped restore payments in Northern Ireland.
- ✓ Contributed to seven EGTOP reports leading to EU organic regulations changes.
- ✓ Helped set the EU research agenda for organic farming through our work with TP Organics and IFOAM.
- ✓ Secured a modification to EU seed regulations to enable trial marketing of cereal 'populations'.

Category	Standard	High	Very High
Arable	£120/ha	£150/ha	£180/ha
Arable (with 10% of land in permanent grass)	£100/ha	£130/ha	£160/ha
Arable (with 20% of land in permanent grass)	£80/ha	£110/ha	£140/ha
Arable (with 30% of land in permanent grass)	£60/ha	£90/ha	£120/ha
Arable (with 40% of land in permanent grass)	£40/ha	£70/ha	£100/ha
Arable (with 50% of land in permanent grass)	£20/ha	£50/ha	£80/ha
Arable (with 60% of land in permanent grass)	£10/ha	£30/ha	£60/ha
Arable (with 70% of land in permanent grass)	£5/ha	£15/ha	£30/ha
Arable (with 80% of land in permanent grass)	£2/ha	£6/ha	£12/ha
Arable (with 90% of land in permanent grass)	£1/ha	£3/ha	£6/ha
Arable (with 100% of land in permanent grass)	£0/ha	£0/ha	£0/ha

## Organic regulations and standards

At the European level, ORC continued to engage with the implementation and reform of EU Organic Regulations. Nic Lampkin, as member and Vice Chair of the **EU Expert Group for Technical Advice on Organic Production (EGTOP)**, contributed to the production of seven reports on topics from wine and aquaculture to food and feed additives, in most cases leading directly to changes in EU regulations. ORC staff also contributed to the debate on the new EU organic regulation both through the **International Federation of Organic Agriculture Movements (IFOAM)** and through Defra.

## Research and innovation

The EU also plays a key role in funding organic farming research and innovation. ORC has helped set the agenda for this through engagement with the European **Technology Platform for Organic Food and Farming (TP Organics: [www.tporganics.eu](http://www.tporganics.eu))**, with Susanne Padel contributing to a complete revision of their Strategic Research and Innovation Agenda published in 2014 and making presentations at EU level events. ORC supported the formation of the global **Technology Innovation Platform of IFOAM (TIPI)** in February 2013, and contributed to the development of a global research strategy presented to the IFOAM Organic World Congress in October 2014.

In 2015, ORC played a leading role in a project to review current **EU organic research activity**, funded by the Greens/EFA in the European Parliament.



ORC engaged with the new **European Innovation Partnership Agri Focus Groups**, preparing for the implementation of EIP-Agri under the new RDPs, hosting a meeting of the Organic Crop Productivity group in Newbury and participating in the Integrated Pest Management Group.

## Other policy activities

ORC continues to support the development of the UK organic movement and producer groups, in particular the **Organic Growers' Alliance, Organic Seed Producers** and **Organic Arable**. We have hosted half-yearly meetings of the **UK IFOAM groups** and the **English Organic Forum** and participate as an observer in the **NFU Organic Group**, to help co-ordinate policy positions with respect to the European Commission and Defra.

On **seeds**, our work with the **European Consortium for Organic Plant Breeding (ECO-PB)** and securing authorisation for the trial marketing of cereal populations is reported above under Plant Breeding. We also joined many organisations in raising concerns about other planned changes to EU seed regulations, with potential negative impacts in particular on horticultural production, which eventually led to the withdrawal of the proposed changes.

On **genetic modification**, we continue to be concerned about the possible impacts of several breeding technologies and their potential for genetic simplification, unintended impacts on target organisms, and the transfer of novel genetic material into wild populations. We have therefore continued to support **GM Freeze** and **GM Education**, while focusing our main efforts on the development of alternative breeding and agroecological approaches (see above).

On **climate change**, we continue to work with the IFOAM/FAO-sponsored **Round Table on Organic Farming and Climate Change (RTOACC)** and to participate in the delivery of the **English agricultural industry greenhouse gas action plan (GHGAP)**.

## Facilities and resources

*Our programmes need to be underpinned by good quality facilities, staffing and other resources. The development of quality facilities also provides opportunities for in-come generation to support our work. ORC is fortunate that it owns land and buildings donated by its founders, David and Bridget Astor.*

### Projects:

**Farm land:** We own an 85 ha farm land and buildings at Elm Farm, managed organically by a tenant.

**New livestock building:** In 2014-15, a new building with rooftop solar PV was erected to replace older buildings sold.

**Tree and hedge planting:** Woodland Trust support helps us plant trees and hedges on the farm.

**Farm trail:** A circular route with information boards and leaflets provides public access to the farm.

**Conference/wedding venue:** Refurbished in 2009; we cater for meetings, events, weddings and private functions.

**Refurbished offices:** Since 2008, we occupy new offices in former barns, incorporating multiple sustainability features.

**Farmhouse:** Once the main offices and needing refurbishment, this provides accommodation for interns, staff and event participants.

**Renewable energy:** The offices/hall use ground-sourced underfloor heating and solar PV electricity creating a carbon neutral work space.

**Wakelyns Agroforestry:** Until late 2015, crops and agroforestry trials were conducted at a second site in Suffolk, with staff in rented offices.

**Information technology:** Good computing resources are hampered by lack of access to broadband and reliance on satellite links.

**Human resources:** 20 employees, interns and volunteers operate with Investors in People accreditation.

**Fundraising:** In addition to supporting the development of new ideas, communication and policy work, donations are needed to cover parts of our overhead costs not covered by project income.

**Administration:** Facilities, financial, and HR management and IT support are provided in house.

**Quality management:** Our systems are ISO 9001-2008 accredited.

*2015 saw completion of a new livestock building with rooftop solar PV, which generates electricity to meet our power requirements and provides a surplus to export.*



As a result of the land sales initiated in 2013, we have been able to progress the construction of a new livestock building with solar PV installation. The building work started in 2014 and was completed in 2015. The solar PV capacity, in combination with energy efficient buildings, means that ORC's conference venue and offices now have an A+ (better than zero carbon) energy performance rating. At the same time, we have put on hold plans to develop a community heating scheme based on woodchip produced on the farm due to the poor economic prospects for this project.

The land sales also provided the opportunity for us to plant new boundary hedges in several locations, as well as over 50 in-field trees in some fields, and an avenue of trees along a bridle way through the middle of the farm. This work was supported by the Woodland Trust under a scheme initiated by Pur and Accor Hotels.

The Pang Valley conservation volunteers provided significant help in the maintenance of the farm trail at Elm Farm, in particular helping with a section of hedge laying, clearing overgrown sections blocking the trail and restoring steps in Donkey Field.

Further work is needed to improve our IT systems, in particular broadband access, as we are still dependent on satellite for internet connection and have poor quality landlines. Fibreoptic broadband services reached nearby Kintbury in 2014, while a new dedicated rural fibre network being installed by Gigaclear for West Berkshire Council should reach Hamstead Marshall and Elm Farm during 2016.

*The conference venue in the refurbished, Grade 2 listed barn has become increasingly popular for external events, including weddings and parties.*



We successfully retained our Investors in People and ISO-9001 Quality Management accreditation during the two years.

## Project partners and external representation

### UK research partners

ADAS UK Ltd; Agri-food and Bioscience Institute; Centre for Ecology and Hydrology; Duchy College; East Malling Research; Food Animal Initiative; Food and Environment Research Agency; Forest Research; Game and Wildlife Conservation Trust; Garden Organic; Genome Analysis Centre; Harper Adams University College; James Hutton Institute; National Institute of Agricultural Botany; Rothamsted Research; Scotland's Rural College; Universities of Aberystwyth, Bristol, Cambridge, Cranfield, East Anglia, Exeter, Hertfordshire, Leeds, Newcastle, Nottingham, Reading, Southampton.

### UK industry partners

Agriculture and Horticulture Development Board: Beef & Lamb (was EBLEX), Cereals & Oilseeds (was HGCA), Dairy (was DairyCo); Bernard Matthews Ltd; British Oat and Barley Millers' Association; Calon Wen Organic Milk Co-Operative Ltd; Du Pont (UK) Ltd; Farm Consultancy Company; GB Seeds Ltd; Halo Foods Ltd; KWS UK; Linking Environment And Farming; Meadow Quality; Mole Valley Feed Solutions; Nairns Oatcakes; Oat Services; Organic Arable; Organic Farmers & Growers Ltd; Organic Milk Suppliers Co-operative; Organic Seed Producers; Phytatec (UK) Ltd; Poultry Xperience; Promar; Royal Society for Protection of Birds; SAC Commercial Ltd; Senova Ltd; Shimpling Park Farms; Smithsgore/CCA Landskills; Soil Association Certification Ltd; Tolhurst Organic Partnership C.I.C.; Velcourt Ltd.

### Overseas partners

Aalborg Univ. (DK); Aarhus Univ. (DK); Aegean Agricultural Research Institute (AARI, TU); AFAF (FR); Agence Française pour le Développement et la Promotion de l'Agriculture Biologique (ABIO, FR); Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC, ES); Agrarmarkt Informations GmbH (AMI, DE); Agrifood Research (MTT, FI); Agro Solomonescu S.R.L. (RO); Benaki Phytopathological Institute (GR); Agro-Levures et Derives SAS (FR); Agrológica (DK); AGROOF (FR); Agroscope FDEA-ART (CH); Agrovegetal S.A. (ES); Akinao SAS (FR); Arcadia International (BE); Arcoiris SRL (IT); Aristotelio Panepistimio Thessaloniki (GR); Assemblée Permanente des Chambres D'Agriculture (FR); Association de Coordination Technique Agricole (ACTA, FR); Associazione Italiana per l'Agricoltura Biologica (AIAB, IT); Bayerische Landesanstalt für Landwirtschaft (LfL, DE); Bio Fruit Advies BV (NL); Biocop Productos Biológicos S.A. (ES); Bioforsk (NO); Boerenbond Projecten vzw (BB Projects, BE); BTU Cottbus (DE); Centre d'Ecologie Fonctionnelle et Evolutive (FR); Centre de Recherche Public-Gabriel Lippmann (CRP-GL, LU); Centre for Agricultural Research, Hungarian Academy of Sciences (AI-HAS, HU); Centro di Ricerca p. l. Produzioni Foraggere e Lattiero-Casearie (CRA-FLC, IT); Centro di Ricerca per lo Studio delle relazioni tra pianta e suolo (CRA-RPS, IT); Centro di Sperimentazione Agraria e Forestale Laimburg Azienda (LAL, IT); Centro Interdipartimentale di Ricerche Agro-Ambientali (IT); Centro Internazionale di Alti Studi Agronomici Mediterranei - Istituto Agronomico Mediterraneo di Bari (IT); Ceradis BV (NL); Ceska Zemedelska Univ. v Praze (CULS, CZ); Consiglio Nazionale delle Ricerche (IT); Consiglio per la Ricerca e la Sperimentazione in Agricoltura (IT); Coordination

Nationale des Organisations Paysannes du Mali (ML); ECOZEPT GbR (DE); Eidgenössische Forschungsanstalt Agroscope Reckenholz-Tänikon (ART, CH); Eigen Vermogen Van Het Instituut voor Landbouw en Visserijonderzoek (Ev-Ilvo, BE); E-Nema Gesellschaft fuer Biotechnologie und Biologischen Pflanzenschutz mbH (DE); Escola Superior Agraria de Coimbra (PT); Estonian Crop Research Institute (ECRI, EE); Estonian Univ. of Life Sciences (EE); European Agroforestry Federation (FR); European Forestry Institute (FI); Federación Andaluza de Asociaciones de Ganado Caprino de Raza Pura (CAPRA, ES); Ferrari Costruzioni Meccaniche SRL (IT); Fondazione Edmund Mach (IT); Forschungsinst. für Biologischen Landbau (FiBL, CH); Friedrich Wenz GmbH (DE); Fytofend SA (BE); Gautier Semences SAS (FR); Graminor (NO); Helmholtz Zentrum München (DE); Hochschule Weihenstephan-Triesdorf (DE); Humboldt Univ. Berlin (DE); IFOAM EU Group (BE); Imo-Control Zertifikasyon Ticaret Limited Sirketi (TU); INAGRO (BE); Institut Technique de L'Agriculture Biologique (ITAB, FR); Inst. for Agricultural and Fisheries Research, Plant Sciences, Crop Husbandry and Environment (BE); Inst. for Sustainable Development (SI); Inst. Agronomico do Parana (BR); Inst. de Tecnologia Quimica e Biologica-Univ. Nova de Lisboa (PT); Inst. per la certificazione ed ambientale (ICEA, IT); Inst. Superior de Agronomia (PT); Inst. National de Cercetare-Dezvoltare Pentru Biologie si Nutritie Animala (INCDBNA, RO); Instytut Ochrony Roslin-Panstwowy Instytut Badawczy (PL); Instytut Uprawy Nawozenia i Gleboznawstwa, Panstwowy Instytut Badawczy (PL); International Centre for Agricultural Research in the Dry Areas (ICARDA, MA); International Centre for Research in Agroforestry (ICRAF, KE); ISARA Lyon (FR); JNK Plant Breeding (DK); Joint Research Centre - European Commission (BE); Julius Kühn Institut (JKI) Crops (DE); Juvan Luomu Oy (FI); Kai Kreuzer BMI (DE); Lantmännen SW Seed (SE); Leibniz - Institut für Pflanzengenetik und Kulturpflanzenforschung (DE); Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF, DE); Lithuanian Institute of Agrarian Economics (LI); Louis Bolk Instituut (NL); Magyar Tudományos Akademia Agrar-tudományi Kutatóközpont (HU); Marangon SRL (IT); Mekelle Univ. (ET); Mitteltulundusuhing Okoloogiliste Tehnoloogiate Keskus Ceet (EE); National Institute for Agricultural Research (INRA) (FR); Nordic Genetic Resource Center (SE); Nordic Seed (DK); NymE KKK (HU); Organic Norway (Oikos, NO); PH Petersen Saatzucht Lundsgaard GmbH & Co KG (PHP, DE); Parco Tecnologico Padano SRL (IT); Philipps Univ. Marburg (PUM, DE); Regionaal Landschap Lage Kempen vzw (RLKL, BE); Saatzucht Donau GesmbH & Co KG (SZD, AT); Scuola Superiore di Studi Univ. e di Perfezionamento Sant'anna (SSSA, IT); SEGES (DK); Sejet Plantbreeding (DK); SERVICE-ICAR S.R.L. (IT); Societa Italiana Sementi SPA (IT); State Priekuli Plant Breeding Institute (SPBI-Priekuli, LV); State Stende Cereal Breeding Institute (SSBI-Stende, LV); Stichting Dienst Landbouwkundig Onderzoek (DLO, NL); Swedish Univ. of Agricultural Sciences (SLU, SE); Technical Institute of Organic Farming (ITAB, FR); Technical Univ. of Denmark (DTU, DK); Technische Univ. München (TUM, DE); Technologiko Ekpedeftiko Idrima Stereas Elladas (GR); The Hebrew Univ. of Jerusalem (IL); Thise Mejeri Amba

(DK); Thünen-Institut (DE); Trifolio-M GmbH (DE); Univ. de Extrademura (ES); Univ. degli studi della Tuscia (UNITUS, IT); Univ. degli studi di Perugia (UNIPG, IT); Univ. Politecnica delle Marche (UPM, IT); Univ. de Barcelona (ES); Univ. für Bodenkultur (BOKU, AT); Univ. Kassel (DE); Univ. Zürich (CH); Univ. Babeş Bolyai (RO); Univ. Gent (BE); Univ. of Copenhagen (DK); Univ. of Haifa (IL); Univ. of Maribor (UMFALS, SI); Univ. of Torino (UNITO, IT); Univ. of Udine (UniUD, IT); Vegetable Research Centre Kruishoutem (BE); Veneto Agricoltura (IT); Wageningen Univ. and Research (WUR, NL); WERVEL (BE); Wim Govaerts & Co (BE); Zuidelijke Land- en Tuinbouworganisatie (ZLTO, NL).

### Directorships, Boards and Government Committees

**Chambers M** Advisory Member, North Wessex Downs AONB Council of Partners  
**Chambers M** Forestry representative/ Member of Local Action Group for North Wessex Downs LEADER Programme  
**Girling RD** Member, International Society of Chemical Ecology  
**Girling RD** Member, European Innovation Platform Agri Focus Group for Integrated Pest Management in Brassica  
**Girling RD** Visiting researcher, Southampton University  
**Howlett S** Secretary, European Consortium for Organic Plant Breeding  
**Lampkin N** Permanent member, European Commission Expert Group for Technical Advice on Organic Production  
**Lampkin N** Member, Defra/Natural England Agri-env. Stakeholders Group  
**Lampkin N** Member, Greenhouse Gas Action Plan Steering Group  
**Lampkin N** Member, Board of Technology Innovation Platform of IFOAM (TIPI)  
**Lampkin N** Member, NFU Organic Group  
**Lampkin N** Director, Task 37/Probiogas UK  
**Lampkin N** Co-ordinator, Engl. Org. Forum  
**Measures M** Director, Neil Wates Trust  
**Measures, M** Trustee, Foundation of Rachel and Pamela Schiele  
**Padel S** Member, Steering Group, Better Organic Business Links, Org. Centre Wales  
**Padel S** Member, Steering Committee, EU Technology Platform 'TP Organics'  
**Padel S** Pool member, European Commission Expert Group for Technical Advice on Organic Production  
**Pearce B** Director and Member of Management Committee, GM Freeze  
**Pearce B** Pool Member, European Commission Expert Group for Technical Advice on Organic Production  
**Pearce B** Member, IFOAM EU Poultry Group  
**Smith J** Member, Farm Woodland Forum Executive Committee  
**Smith J** Member, European Agroforestry Federation Executive Committee  
**Smith J** Member, North Wessex Downs AONB Council of Partners  
**Smith L** Member, All Party Parliamentary Group on Renewable/Sustainable Energy  
**Smith L** Member, Round Table for Organic Agriculture and Climate Change  
**Smith L** Deputy Member, Greenhouse Gas Action Plan Steering Group  
**Sumption P** Committee Member, Organic Growers Alliance  
**Woodward L** Director, Future Sustainability  
**Woodward L** Director, Organic Arable  
**Wolfe M** Hon. Member, British Society for Plant Pathology  
**Wolfe M** Director, East Anglia Food Link

## Publications (\* = Peer-reviewed)

Five issues (114-118) of the ORC Bulletin were published during 2014 and 2015, including many articles from ORC staff which are not itemised in the following list of publications.

- Åkerlind M, Johansson B, Stenberg H, **Zaralis K**, Nadeau E (2015) Predicting intake capacity of growing bulls. In Udén P (Ed) *Proceedings of the 6th Nordic Feed Science Conference*. Report 291. Swedish University of Agricultural Sciences, Uppsala. pp 123-129.
- Barret P, Marq P, Mayer C, **Padel S** (2015) *Research for transition: Europeans deserve a better agricultural and food policy*. Université catholique de Louvain and Organic Research Centre commissioned by the Greens/EFA in the European Parliament, Brussels.
- Bocci R, Rey F, Chable V (Eds) (2014) Policy recommendations to sustain diversity strategies within food systems. [www.solibam.eu](http://www.solibam.eu). Contributing authors: **Wolfe MS**, **Pearce BD**, **Howlett SH**.
- Brown R** (2014) *Dual biodiversity benefits from legume-based mixtures*. PhD Thesis, Reading University.
- Chable V, Goldringer I, **Howlett SA**, Barberi P, Miko P, Mendes-Moreira PMR, Rakszegi M, Østergård H, Borgen A, Finckh MR, Pedersen T, Bocci R (Eds) (2014) Diversity strategies for organic and low input agricultures and their food systems. *Proceedings, SOLIBAM Final Congress*, Nantes, July.
- Chambers M**, **Crossland M**, **Westaway S**, **Smith J** (2015) *A guide to harvesting woodfuel from hedges*. Technical Guide. Organic Research Centre, Newbury.
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- Crossland M**, **Westaway S**, **Gerrard C**, **Smith J** (2015) A protocol for monitoring the impacts of harvesting hedges for woodfuel on biodiversity. User guide. Organic Research Centre, Newbury.
- \***Döring T**, **Vieweger A**, Pautasso M, Vaarst M, Finckh MR, **Wolfe MS** (2014) Resilience as a universal criterion of health. *Journal for the Science of Food and Agriculture*, doi: 10.1002/jsfa.6539
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## Financial report 2014 and 2015

### New grants and contracts

A total of £565k new project funding was secured in 2014:

- ✓ Defra. Analysis of productivity of organic cropping systems. 2014. £25k.
- ✓ Defra. Testing of public goods tool on non-organic farms. 2014. £26k.
- ✓ Defra. Development of on-line organic farming information hub. 2014. £20k.
- ✓ Defra. Sustainable Intensification Research Platform. 2014-2015. Led by NIAB. ORC share £10k.
- ✓ Ekhaga Foundation. Health Networks. 2015-2016. Led by ORC. £78k.
- ✓ EU Horizon 2020. Embedding crop diversity and networking for local high quality food systems (DIVERSIFOOD). 2015-2019. Led by INRA. ORC share £203k.
- ✓ EU Horizon 2020. Organic knowledge network arable (OK-Net Arable). 2015-2018. Led by IFOAM EU. ORC share £119k.
- ✓ Prince of Wales's Charitable Foundation/Duchy Originals via Soil Association. Use of sheep grazing to control blackgrass in organic cereals. 2014-2016. £9.5k.
- ✓ NORSOK and others. Optimal grazing systems for livestock. 2014-2016. Led by Bioforsk, Norway. ORC share £11.5k.
- ✓ Scottish Natural Heritage/Land Use Policy Group. Contribution of agroecology to sustainable intensification. 2014-2015. £24k.
- ✓ Various funders. Small projects. £11k.
- ✓ Welsh Government/EU. Better Organic Business Links. 2014-2015. Led by Organic Centre Wales. ORC share £28k.

In 2015, a total of £1.048 million new project funding was secured during the year, a significant improvement on 2014:

- ✓ AHDB: GREAT Soils. Led by Soil Association. 2015-2018. Value to ORC £89k.
- ✓ A-Team Foundation and Green MEPS: Policy evaluation and advocacy. 2015. Value to ORC £17k.
- ✓ Daylesford Foundation: Agriculture on-line knowledge hub. Led by Daylesford Foundation. 2015-2018. Value to ORC £176k.
- ✓ Defra/FACCE SURPLUS ERANET: SUSTAINFARM. Led by University of Copenhagen. 2016-2019. Value to ORC £179k.
- ✓ EU Horizon 2020. Innovation for Sustainable Sheep and Goat Production in Europe (ISAGE). 2016-2020. Led by Aristotle University of Thessaloniki. Value to ORC £470k.
- ✓ Prince of Wales's Charitable Foundation: Innovative Farmers. Led by Soil Association. 2015-2017. Value to ORC £82k.
- ✓ Various funders. Other small projects. Value to ORC £6k.

*Despite a continuing operating deficit, the overall financial position at the end of 2014 was improved thanks to land sales which also enabled reinvestment in facilities. However, 2015 saw a sharp reduction in income, presaged by only £0.56m new project income secured in 2014 compared with £0.93m in the preceding year.*

*Efforts during the year did not succeed in closing the gap, although significant progress was made in securing new funding for future years, with over £1m raised. Expenditure (including staff) reductions were not able to close the gap, resulting in a substantial loss for 2015.*

### 2014 summary

At £1.02m, income generated from donations, grants, investments and charitable activities was 5% higher than in 2013. Income from research and information projects increased by 9.8% to £0.86m, representing 85% of total incoming resources.

Voluntary donations fell by 19% to £113k, while investment and estate income was largely unchanged at £45k. The receipt of voluntary donations was again helped by a £25k challenge fund from our main sponsor, the Mr & Mrs JA Pye Charitable Settlement.

Expenditure at £1.19m was up 14% compared with 2013, including provision for liabilities. Overall expenditure on charitable activities increased by 15% to £1.17m. Of this, expenditure on research projects fell by 0.6% to £0.77m, while expenditure on information service projects increased by 61% to £0.40m. Total staff costs increased by 6% to £0.71m, a reflection of increased project activity.

Fundraising costs at £4.2k and project bidding costs at £34.7k were both significantly reduced. The expenditure on fundraising represented 4% of the voluntary donations, and that on project bidding 6% of the £0.56m raised. However, it was recognised that the significant reduction in total funds raised would impact on future activity.

The trading and depreciation deficit (net outgoing resources) increased to £167k (2013 deficit: £69k), continuing a run of earlier deficits. However, the sale of some land (ca. 5% of our holding) at premium prices generated a net gain of £289k. As a result, a net overall surplus (net movement in funds) of £124k was achieved.

Tangible fixed asset values increased by £85k thanks to the land disposals and reinvestment of £149k in the new £250k livestock building with rooftop solar PV installation completed in 2015. Our net current liability and negative reserve situation also improved, but continues to represent a major challenge.

The outturn for the year was not as good as budgeted. Although income increased, a larger increase had been anticipated, with the aim of reducing the trading deficit to zero. As indicated above, project income secured was lower than the previous year, as were voluntary donations. While this loss of expected income was mitigated to an extent by lower than budgeted expenditure, the reduction was not sufficient to avoid an increased trading loss. While the gain on land sales more than covered this loss, it was recognised that the income issue still needed to be addressed, and would if anything be more challenging in 2015.



## Continuing statutory funders

Defra (Direct, LINK and CORE Organic ERANET projects)  
European Commission DG Research (FP7 and H2020 research projects)  
Welsh Government (Organic Centre Wales)

## Individual donors/supporters

I Alexander; S Alexander; C Allen; B Allison; R&C Ash-Wheeler; L Astor; J Atkins; M Barratt; MA & EJ Bennett; C v Beuningen; A Bragg; J Bunting; J Cant; D Chambers; P Conford; S Coppard; D Court; N Cremer (bequest); J Cresswell; Y Crocker; P Davies; A Dennis; A Dumskyi; R Ewbank; R Gantlett; A Gerrard; D Gibbon; B Gillett; E Goff; R Guy; C Haynes; C Hunter-Smart; A Jedwell; P Kearney; W Kendall; M Kennedy; M Kunz; T Latter; C Lavell; E Lord; Countess of March; C Marriage; M Marriage; Rev. Mason; R&E May; G. Mayall; Mr & Mrs McCarthy; D Morton; J O'Brien; D O'Neill; D Owen; B Panvel; J Pawsey; D&L Peck; P Plate; L & W Pope; J Porritt; Y Pye; Duchess of Richmond; H Roberts; RA Rowlands; Dame T Sackler; A Sandwith; S Sarikhani; G Sayer; A Sharples; C Sinclair; J Smith; T Stenning; R Tandy; M Turnbull; Rev. Turner; R Unwin; H Videgard; H Vogtmann; M Wagner; W Waterfield; D Watts; N Wookey; D Younie.

## Trusts and corporate sponsors

Abacus Organic Associates; Ashden Trust; A Team Foundation; Birchpiece Farm (J Burdett); R Body Charitable Trust; Commonwork Trust; Constance Travis Trust; Cuthbert Horn Trust; Daylesford Foundation; Doves Farm Foods; Ekhaga Foundation; Englefield Trust; Ernest Cook Trust; Glyme Farm; Goodwood Estate; Gordon Palmer Memorial Trust; Greenham Common Trust; Hamstead Marshall Village; Hankham Organic; Kennet Valley Woodturners; Little Sunflowers; Meadowbrook Trust; Mitchell Trust; Newton Investments; St Nicolas Church Newbury; North Wessex Downs AONB; Oakdale Trust; Organic Farmers & Growers Ltd; Paget Trust; Mr & Mrs JA Pye Charitable Settlement; Prince of Wales's Charitable Foundation; Rainbow Wholefoods; Ratcliff Foundation; Rushall Farms; Sheep-drove Trust; Shimpling Park Farm; Triodos Bank; Wallbourne Ltd; Woodford Family Trust; Woodland Trust.

## 2015 summary

Recognising the situation, the Trustees agreed a budget for 2015 which anticipated a £50k trading deficit, but with a significantly expanded fundraising effort intended to address the funding gap. However, at £0.88m, income generated from donations and grants, investments and charitable activities was down 13% on the preceding year. Income from research and information projects fell by 17% to £0.71m, representing 81% of total incoming resources.

Voluntary donations increased by 7% to £121k, while investment and estate income increased by 6.5% to £48k. The receipt of voluntary donations was again helped by the £25k challenge fund offered by the Mr & Mrs JA Pye Charitable Settlement.

Expenditure at £1.12m was down 5% compared with 2014. Expenditure on charitable activities fell by 7% to £1.09m, with expenditure on research projects down by 14% to £0.67m, reflecting the reductions in projects secured. Expenditure on information service projects was similar to 2014 at £0.40m. Total staff costs fell only slightly to £0.71m, as reductions in staffing were not able to follow reduced project funding immediately.

Fundraising costs at £23k and project bidding costs at £50k were both higher than the previous year. The expenditure on fundraising represented 19% of the voluntary donations, and that on project bidding 5% of the new project funds secured during the year.

The trading and depreciation deficit (net outgoing resources) increased to £242k, continuing the run of earlier deficits, offset to a limited extent by the sale of further land (0.8 ha), which generated a net gain of £42k. As a result, the net overall deficit for the year (net movement in funds) was £196k.

Despite these losses, tangible fixed asset values increased by £60k thanks to the land disposals and the completion of the new livestock building. However, the net current liability and negative reserve situation worsened significantly.

This outturn for the year was much worse than budgeted. The failure to secure income from UK statutory sources during 2015, adverse movements in Euro exchange rates, and a smaller than planned increase in voluntary donations, meant that project income targets were not achieved. While the loss of expected income was mitigated to an extent by lower expenditure, other factors including the resolution of a VAT arrears issue identified in 2014, the closure of our offices at Wakelyns Agroforestry and the associated staff redundancies caused unanticipated increases in costs.

## The future

*As the 2014 and 2015 results demonstrate, the major challenge ORC faces is to grow its project activity so that more funds are available to cover overhead costs, as well as significantly increasing regular support from donors. The economic environment and government austerity policies during the past several years have not been conducive either to growth in voluntary donations or to increased statutory funding, although strategies to diversify funding sources, particularly from the EU, have yielded some success. Given the income insecurity, the Trustees have concluded that major restructuring is required, and initiatives are being actively pursued in 2016 to address this.*

Copies of ORC's Report and Accounts for the years ended 31 October 2014 and 31 October 2015 are available upon request from [comment@organicresearchcentre.com](mailto:comment@organicresearchcentre.com) or the Charity Commission website for Progressive Farming Trust Ltd. Charity No. 281276.

## Statement of financial activity for year ended October 2014

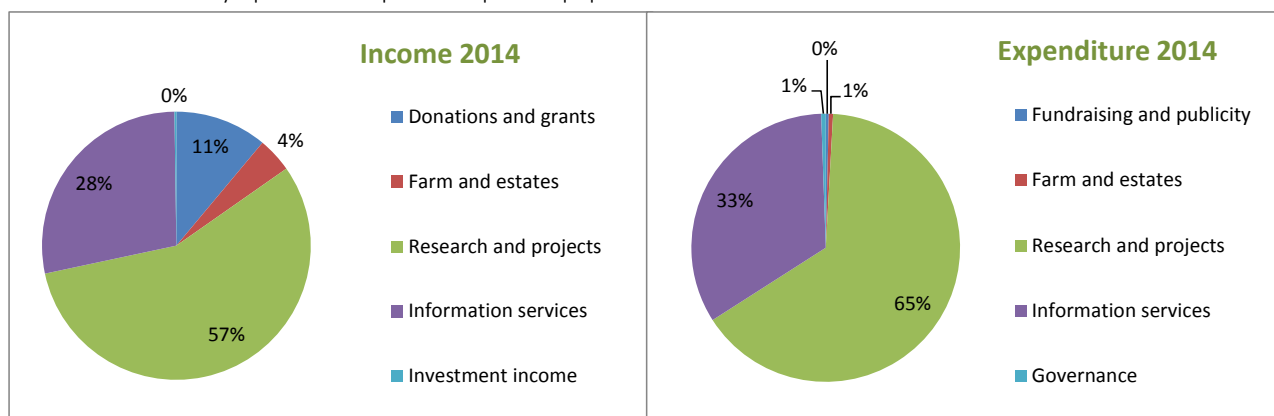
Values (£)	Funds	Unrestricted	Designated	Restricted	Total (2014)	Total (2013)
<b>Incoming resources</b>						
Donations and grants		95,359	-	17,381	<b>112,740</b>	157,753
Farm and estates		42,565	-	-	<b>42,565</b>	39,653
Research and projects		732	-	573,385	<b>574,117</b>	580,782
Information services		59,226	-	226,782	<b>286,008</b>	183,413
Investment income		2,457	-	-	<b>2,457</b>	6,644
<b>Total</b>		<b>200,339</b>	<b>-</b>	<b>817,548</b>	<b>1,017,887</b>	<b>968,245</b>
<b>Resources expended</b>						
Fundraising and publicity		4,237	-	-	<b>4,237</b>	6,610
Farm and estates		6,128	-	-	<b>6,128</b>	2,105
Research and projects		157,502	-	613,805	<b>771,307</b>	775,689
Information services		151,391	2,510	243,185	<b>397,086</b>	246,126
Governance		6,566	-	-	<b>6,566</b>	7,125
<b>Total</b>		<b>325,824</b>	<b>2,510</b>	<b>856,990</b>	<b>1,185,324</b>	<b>1,037,655</b>
<b>Net incoming/outgoing resources</b>						
Before transfers		( 125,485)	( 2,510)	( 39,442)	<b>( 167,437)</b>	( 69,410)
Gross transfers between funds		( 11,481)	-	11,481	-	-
Gain/loss on investment assets		291,806	-	-	<b>291,806</b>	19,084
<b>Net movement in funds</b>		<b>154,840</b>	<b>( 2,510)</b>	<b>( 27,961)</b>	<b>124,369</b>	<b>( 50,326)</b>

Notes: Income and expenditure are divided into project funds in three categories:

**Unrestricted:** without stipulation on use.

**Designated:** where the charity itself restricts use to a particular purpose.

**Restricted:** restricted use by stipulation of the sponsor for a particular purpose.



## Balance sheet as at 31st October 2014

	2014	2013
<b>Fixed assets</b>	<b>2,334,418</b>	<b>2,246,871</b>
of which Land (historic cost)	719,177	750,000
Buildings (historic cost)	1,541,607	1,426,319
Investments (market value)	65,083	62,755
<b>Current assets</b>	<b>305,117</b>	<b>113,417</b>
of which Stocks	6,919	4,301
Debtors	254,603	101,431
Cash at bank/in hand	43,595	7,685
<b>Creditors</b> amounts due within 1 year	<b>( 415,336)</b>	<b>( 292,713)</b>
<b>Net current liabilities</b>	<b>( 110,219)</b>	<b>( 179,296)</b>
<b>Total assets less current liabilities</b>	<b>2,224,199</b>	<b>2,067,575</b>
Amounts falling due after one year	( 311,292)	( 328,979)
<b>Provisions for liabilities</b>	<b>( 49,942)</b>	-
<b>Net assets</b>	<b>1,862,965</b>	<b>1,738,596</b>
of which Restricted	16,993	44,954
Designated	91,393	93,902

**Statement of financial activity for year ended October 2015**

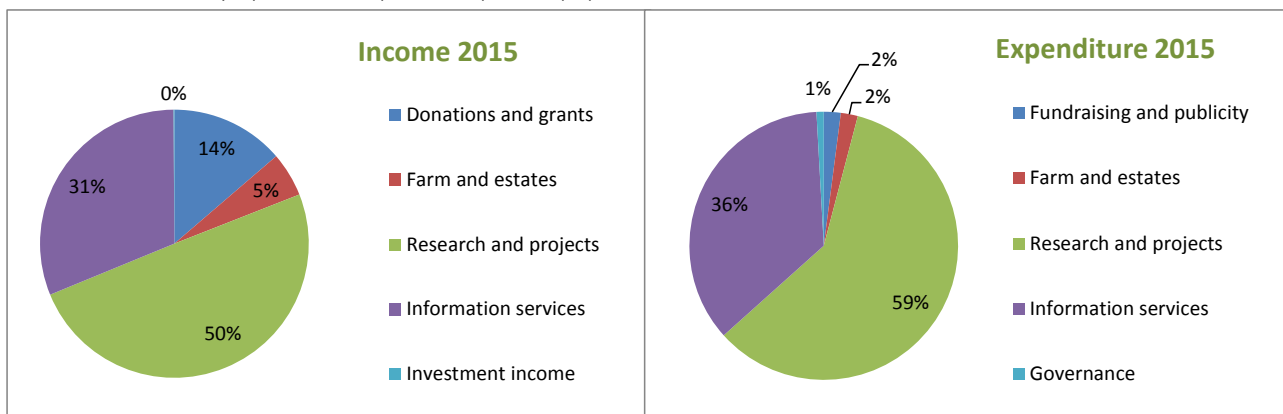
Values (£)	Funds	Unrestricted	Designated	Restricted	Total (2015)	Total (2014)
<b>Incoming resources</b>						
Donations and grants		120,754	-	-	<b>120,754</b>	112,740
Farm and estates		47,074	-	-	<b>47,074</b>	42,565
Research and projects		783	1,165	437,534	<b>439,482</b>	574,117
Information services		52,148	-	222,412	<b>274,560</b>	286,008
Investment income		870	-	-	<b>870</b>	2,457
<b>Total</b>		<b>221,629</b>	<b>1,165</b>	<b>659,946</b>	<b>882,740</b>	<b>1,017,887</b>
<b>Resources expended</b>						
Fundraising and publicity		22,890	-	-	<b>22,890</b>	4,237
Farm and estates		23,074	-	-	<b>23,074</b>	6,128
Research and projects		166,176	6,513	494,044	<b>666,733</b>	771,307
Information services		171,001	-	231,365	<b>402,366</b>	397,086
Governance		9,754	-	-	<b>9,754</b>	6,566
<b>Total</b>		<b>392,895</b>	<b>6,513</b>	<b>725,409</b>	<b>1,124,817</b>	<b>1,185,324</b>
<b>Net incoming/outgoing resources</b>						
Before transfers		( 171,266)	( 5,348)	( 65,463)	<b>( 242,077)</b>	( 167,437)
Gross transfers between funds		( 67,756)	-	67,756	-	-
Gain/loss on investment assets		46,028	-	-	<b>46,028</b>	291,806
<b>Net movement in funds</b>		<b>( 192,994)</b>	<b>( 5,348)</b>	<b>2,293</b>	<b>( 196,049)</b>	<b>124,369</b>

**Notes:** Income and expenditure are divided into project funds in three categories:

**Unrestricted:** without stipulation on use.

**Designated:** where the charity itself restricts use to a particular purpose.

**Restricted:** restricted use by stipulation of the sponsor for a particular purpose.

**Balance sheet as at 31st October 2015**

	2015	2014
<b>Fixed assets</b>	<b>2,338,719</b>	<b>2,334,418</b>
of which Land (historic cost)	716,786	719,177
Buildings (historic cost)	1,612,930	1,541,607
Investments (market value)	9,003	65,083
<b>Current assets</b>	<b>217,909</b>	<b>305,117</b>
of which Stocks	1,560	6,919
Debtors	197,760	254,603
Cash at bank/in hand	18,589	43,595
<b>Creditors</b> amounts due within 1 year	<b>( 529,088)</b>	<b>( 415,336)</b>
<b>Net current liabilities</b>	<b>( 311,179)</b>	<b>( 110,219)</b>
<b>Total assets less current liabilities</b>	<b>2,027,540</b>	<b>2,224,199</b>
Amounts falling due after one year	( 360,624)	( 311,292)
<b>Provisions for liabilities</b>	-	( 49,942)
<b>Net assets</b>	<b>1,666,916</b>	<b>1,862,965</b>
of which Restricted	19,286	16,993
Designated	86,045	91,393

