Bulletin

The Organic Research Centre – Elm Farm No. 100 | May 2010

30th Anniversary Commemorative Issue

CLARENCE HOUSE

It is a great pleasure to send the Elm Farm Organic Research Centre every possible good wish on its thirtieth anniversary. Over the last three decades it has dedicated itself to developing the organic farming sector in the face of every sort of scepticism. We all owe the remarkable team at Elm Farm an enormous debt of gratitude for their courage and commitment. I have a very particular cause to be grateful: had it not been for the help and advice of the Elm Farm Organic Research Centre (and the uniquely special Lawrence Woodward), we would not have been able to convert the farm at Highgrove to the organic system some twenty-five years ago.

In 1984, when I first visited Elm Farm, the world seemed seized by the desire to do all it could to replace Nature with man-made alternatives, and there were only a few determined souls prepared to stand in the way of this so-called "progress". The fact that sustainable agricultural practices now have the support they do is evidence of how far we have travelled and much of the credit for this must lie with Elm Farm. But the battle is far from won. We still have to demonstrate the proven benefits of truly sustainable farming. One of these benefits must surely be that sustainable farming systems can demonstrate much greater resilience to the challenges of climate change than more intensive approaches. If just some of the public and private research funds, currently invested in conventional agriculture, were directed towards finding alternative techniques to improve traditional farming methods, then we would have a better chance of a more sustainable future. But what chance is there of that happening…?

The need for Elm Farm and its work is as important now as it has ever been, and I can only pray that it continues to flourish over the next three decades and that its voice is heard with increasing strength and clarity. We need it – Nature itself needs it – so badly.

In the wake of Yom Kippur - A history of the Organic Research Centre so far

Lawrence Woodward

"We must begin to see the possibility of evolving a new life-style, with new methods of production and new patterns of consumption; a life-style designed for permanence….in agriculture and horticulture we can interest ourselves in the perfection of production methods which are biologically sound, build up soil fertility, and produce, health, beauty and permanence."

Those words of E.F. Schumacher were on the front cover of our 15th anniversary publication and on a 2003 update. The first one was called "Seeking Permanence" and the second, "Still Seeking Permanence". We've resisted the urge to use the same format for this 30th anniversary publication. Even if true, "Continuing to Seek Permanence" doesn't have the same ring. "When can we stop Seeking Permanence?" might be thought equally apt. In fact, as I have used Schumacher's words ad nausem over the years - "We're going to stop etc…" might be more popular.

When Small is Beautiful was published in 1973 the title and the idea of Intermediate Technology – if not some of the more "esoteric" and difficult to read bits – caught people's imagination. Not least because its publication coincided with the Yom Kippur War between Arab and Israeli forces in October 1973. The fighting was quickly followed by an oil embargo lasting until March 1974 to some Western states by the Middle Eastern oil producing countries.

The effect of the embargo was dramatic and brought restrictions and rationing of energy throughout that winter. The underlying economic impact lasted until the 1980s but once the oil started flowing again, followed by non-Arab oil in the North Sea and Alaska, everyone buried any awareness of the vulnerability of our society to shortages of natural resources. Not so David Astor who, as editor of The Observer newspaper and a long time friend of Schumacher, had been thinking about these issues for some time and especially since the publication in 1972 of a report called "Limits to Growth". This was the first time in the modern era that the sustainability of our economic and food system had been scientifically questioned by reputable, mainstream scientists.

"Limits to Growth" modelled different scenarios concerning the interactions of population, industrial growth, food production and ecosystem limits. Its message was stark; unless society profoundly changes its growth and consumption pattern it would, within 100 years, hit the buffers of the limits of finite natural resources.

The authors looked at many factors such as soil, water, minerals and energy but in the wake of the oil crisis David Astor put it simply; as our food supply is built on oil based inputs (fertiliser, pesticides and transport), how will we feed ourselves when the oil runs out? His great fear was that if we can't find an answer to that, the consequent social and political upheaval will be greater than anything faced by society in modern times.

So it was that David, with his daughter Alice and I, visited Schumacher in 1975. They had known each other since the 1930s and David had always been impressed with his knowledge, intelligence and clear sightedness. It was obvious from Small is Beautiful that Schumacher was one of the few people who had really thought about the conflict between growth and natural resources and the kinds of development appropriate to a world of finite and diminishing resources.

His book primarily featured intermediate technology, a new type of economics and the cultural/social relationships to go with it. We talked about these things but Schumacher's answer to David's question was unequivocal – organic farming. Technically organic farming was the only way to produce food without oil based inputs; it was an appropriate technology that could be widely applied and was not reliant on industrial or corporate interests; as it was built on the concept that human and animal health is based on the health of the soil and environment an appropriate relationship between production and consumption and the people involved could be developed through organic farming systems.

In the same year we travelled to the US to visit Dennis Meadows who led the research team which had produced "Limits to Growth". When first published in 1972, the report had a huge initial impact and the shock waves resonated with the popular media and general public as the Yom Kippur war led to the oil embargo.

The essential thesis and findings of "Limits to Growth" have never been discredited. Academic quibbles about modelling systems, queries about assumptions and calls for attention to be given to other factors or interactions have led to nothing other than different views about timings. A number of reports in the last few years have looked at the scenarios against what one author called the "Thirty Years of Reality" and have concluded that was has happened is in line with its predictions.

In 1992 Meadows and his team updated their earlier work and came to the same, but now more pressing conclusions; that major changes to current practice in the areas of population control, reduction in industrial output and the intensive development and application of technology for pollution abatement, improved land yield, soil protection and resource conservation would need to be implemented before 2015 to avoid a structural breakdown in the global economy around the mid-century.

Hearing this from Dennis Meadows in 1975, in the wake of Yom Kippur, was credible and life changing. We were not the only people to feel this but there were far too few and the numbers reduced as the effects of the oil crisis wore off. There was awareness in the communal psyche but as David Astor said the problem was just too big, too horrific for many people to acknowledge and it just invoked a sense of "unconscious despair" rather than action.

He argued that people will only consciously acknowledge such a monumental problem if they can have a glimpse of a solution. And this is why we became involved with organic farming.

In 1976 we began the conversion of a 245 acre farm in Dorset. We had a dairy herd, sheep and grew cereals in a classic 4 years grass/clover, 2 years cereals rotation. There were few organic farmers in the UK then and good advice was in short supply. The Soil Association, in a "downturn" and not even pretending to give advice, suggested we contact its erstwhile employee, David Stickland who had just founded Organic Farmers and Growers Ltd.

OF&G was then an agricultural co-operative. We became one of the first members and initially benefitted from David Stickland's advice and skill. The full story of the development of the organic sector in the UK is a convoluted one, for which there is no space here.

A critical part of the tale was the differentiation between what I sometimes call the "neo-conventional" approach and the holistic/biological approach to organic farming. The first is input focussed – replacing agro-chemicals with organic or "more natural chemical" inputs – the second is based on whole systems; managing them and working with biological processes.

The differentiation – you might call it struggle or even fight – between these two approaches still is a defining process within the organic sector. In my experience focussing on inputs leads to unbalanced systems, dilution of standards, loss of integrity and an organic farming not worthy of the name. It is also my experience that those who follow the biological systems approach are the ones that survive, prosper and deliver on the claims that are made for organic farming and food.

One of the primary reasons Elm Farm Research Centre was created was to develop, promote and advise on the whole system approach to organic farming. To do that we set up a research programme, developed and introduced an appropriate soil analysis system, created an advisory service, developed conversion planning, spent years working on standards, regulations and policy and argued with many people in and around the organic sector.

Our primary guide in this has been Hardy Vogtmann who we met by chance in 1979. By then, our conversion of the Dorset farm was proceeding reasonably well but OF&G were beginning to promote inputs that made us uneasy. Chilean Nitrate might be dug out of the ground but it was still a processed fertiliser and ultimately unsustainable; MCPA and Asulox might not have been as toxic as other herbicides but they still required an oil based process to produce them and must damage the farm and soil ecosystem.. It was only after meeting Hardy and seeing what was happening on organic farms in Switzerland that the holistic penny dropped.

Hardy was soon to become the world's first Professor of Organic Agriculture but was then running the research institute now known as FiBL near Basle. As well as setting up the landmark DOK trial (comparing organic, biodynamic and conventional methods), which is still operational, Hardy had established a wide ranging R&D programme, an advisory service, training courses and was having an influence on Swiss agricultural policy. David Astor, Alice and I, together with Christopher Bielenberg (who was to become our chairman) visited FiBL, discussed the possibilities with Hardy, and resolved to establish an educational and research charity in the UK.

This was in 1980. During that year and 1981 we established the charity, bought and moved to Elm Farm creating Elm Farm Research Centre in the process and began to bring together farmers and researchers to help us develop and implement an R&D programme here.

For the first phase we copied and imported ideas that were working on organic farms in Germany and Switzerland. Some things like proper and effective composting worked well. Others didn't; for example the extensive use of green manures over winter that would be killed by frost in time for spring sowing generally failed because we simply did not have hard enough winters. Similarly using the "N min" method to measure nitrate leaching requires a period of frozen soil to work effectively. We rarely got that.

Gradually we developed our own ways of doing things, recruited our own researchers and advisers, and extended our network so that today people who have been employed by us, trained by us or associated with us can be found in Universities, research institutes, advisory work and organic businesses throughout the UK. In most cases they have carried with them and are promoting the whole system, biological approach that links organic principles and practice. This, together with the enduring links we have with good and innovative farmers who are running sustainable whole farm systems, is probably the greatest achievement of our first 30 years and the one of which I am most proud.

Hardy Vogtmann also introduced me to the wider international organic movement in the shape of IFOAM (the International Federation of Organic Agriculture Movements) and that brought a greater understanding of the systems approach and the realisation that organic agriculture is more than a farming technique. This was also understood by others and importantly for the UK by the growers who were forming the Organic Growers Association. There were others too like the Gears at HDRA.

We have tried as an organisation to follow three guidelines; to work for change in agriculture and the food system through R&D, technology transfer and policy but to do so on the basis of sound information and evidence; to hold fast to the principles and concepts of organic agriculture and work for their practical application; and to work with farmers, landowners, policy makers and citizens in a participatory way.

There is much still to be done; not least to develop the science and application of the concept of health that is the ultimate justification for the organic approach – "the health of soil, plant, animal and man is one and indivisible".

Were David Astor to pose the question today that he asked in the immediate wake of Yom Kippur, it might be somewhat different. So much time has been wasted since then the world is in a more parlous state now.

I'm sure that Schumacher's answer would be more or less the same because the fundamental conflict between our lifestyles and our resources remains; we must replace our growth and consumption based economy "by evolving a new lifestyle, with new methods of production and new patterns of consumption: a lifestyle designed for permanence".

For thirty years and more we have been trying to bring this about. We will continue to try until we succeed.

Proper organic - Re-asserting our principles to build sustainability

Nic Lampkin

At first sight, the development of the organic sector in the United Kingdom, and internationally, appears to be a success story. There has been significant and continuous growth over the last two decades, both in the area of land under organic management and in the market for organic food.

At the same time, the institutional support for the organic movement has been strengthened, in a regulatory sense through the new EU organic regulation applying from 2009, and in terms of policy support for organic farming particularly through the EU's Rural Development Programme and national/regional action plans for organic farming. In the UK, organic farming now covers about 4-5% of the land area (over 8% in Wales), while in some other EU countries and Switzerland, organic farming exceeds 10% and is as high as 40% of the land area on a regional basis.

Clouds on the horizon

At the same time, there are a number of clouds on the horizon that threaten to undermine or reverse the progress that has been made:

- The focus on the market, and on certified organic production, has become dominant for many, so that it has become an end in itself, rather than a means to support organic land management based on organic and agro-ecological principles delivering a range of environmental sustainability, health and quality goals.
- The recession, which has impacted on the organic market quite significantly, has disrupted the previous growth trends and undermined confidence, although there is evidence in late 2009/early 2010 that the situation is stabilizing and some confidence is returning.
- For many policy makers, there continues to be confusion about whether support for organic farming is about supplying a market niche, or a real contribution to meeting their policy goals. With the emergence of serious policy concerns relating to climate change and food security, as well as soil, water and biodiversity conservation, the relevance of organic land management is not (or barely) recognized. Even where it is, the limited extent of the adoption of organic practices is seen as problematic. Defra is actively cutting back its support for organic farming. In many recent policy documents, organic is not even worth a mention, even though there is a common desire, at least in words if not actions, for sustainability and health outcomes.
- The dominance of corporate interests, both in the organic marketplace and in the debate on future development paths for agriculture and food, also means that the emphasis on organic and agro-ecological principles is down played, and that there is a renewed confidence amongst those promoting an industrial/technological approach to addressing the key policy issues.
- Many producers who have converted to organic production have only really encountered the inspection process and the rulebook. The opportunities to engage with the underlying organic/agro-ecological principles, and with agro-ecosystem management approaches as a way of dealing with production problems, are extremely limited. As a consequence, the development of systems that are just certification compliant, reliant on substituting one slightly more acceptable input for an unacceptable one, is perhaps inevitable, but means that the systems in place are not delivering the ecosystem services and public benefits that many believe they should be.

Effective dissemination

The challenge for ORC in the next few years is to turn this process around by supporting with high quality research the development of sustainable farming systems based on organic/agro-ecological principles, capable of making a real contribution to addressing local, national and global food security, climate change, biodiversity/resource conservation and socio-economic concerns. The achievement of this will involve not just research, but effective dissemination of information and communication:

- With producers to upgrade and operate their farms successfully for public as well as private benefit;
- With supply chain businesses to really understand what it is they are selling when they engage with organic food and to survive in an economic environment dominated by large corporations;
- With consumers to better understand and commit to what they are buying;
- With citizens and policy-makers to really understand and engage with the solutions that are needed, and the potential of organic farming, to address the issues that they are concerned about.

This cannot be achieved by ORC alone – there is a need to build collaborative alliances with traditional and non-traditional partners. However, all of this needs to be done on the basis of a clear commitment to our core organic/agro-ecological principles.

The challenge for ORC in the next few years is to support, with high quality research, the development of sustainable farming systems based on organic, agro-ecological principles.

Visionary people at the Organic Research Centre

Lawrence Woodward

Nic Lampkin

Lawrence Woodward has been synonymous with the Organic Research Centre since it was founded. Over more than 30 years, he has brought to the role of Director a remarkable sense of vision and clarity on the balance between principles and practice and a drive that has ensured the organisation has consistently "punched above its weight".

Having dropped out of University to follow the idea of self-sufficiency, his knowledge of agriculture and organic farming is both self-taught through trial and error and learnt from farmers. Stimulated by a strong interest in the history, philosophy and potential of organic farming, Lawrence is a voracious reader of books, scientific articles and newspapers. He is able to get to the heart of the issue and identify key aspects that others are slow to spot. As a result, Lawrence and the Organic Research Centre have been at the forefront of many policy debates, taking critical positions on for example Foot and Mouth vaccination, organically-farmed salmon and the inconsistency of assuming continued economic growth in the face of the decline in non-renewable resources such as oil.

ORC's involvement with standards, policy and government has been led by Lawrence. At times, his critical perspectives have not endeared him to others in the organic movement, but his strong commitment to organic principles, and to the need for evidence on key issues, have also won respect more widely and contributed to maintaining the independence and impartiality of the Organic Research Centre.

As we reach the 30th anniversary of the founding of the ORC, Lawrence's role is changing. His employment as Director of the Organic Research Centre is ending on 31st May 2010. I will be following in his footsteps with some trepidation, conscious of his legacy and the many personal relationships, in particular with organic producers and sponsors, that he has developed over the years, and aware that my more formal academic background doesn't make up fully for his creative intellectual flair. I know that Lawrence will continue to support the work of the Organic Research Centre in his private capacity. We can be sure that he will not sit back and allow the principles and ideals he has championed for so long to be quietly sidelined.

David Astor CH

Lawrence Woodward

David Astor, was the initial funder and founding trustee of Elm Farm Research Centre. He was a human landmark of the 20th century. Born near the beginning of it and surviving its end, he knew or had met many of its leading figures; he participated in many of its key events and was, indeed a significant player himself.

One of David's most important gifts was his clear vision of the big political and social picture and his ability to link activity at the micro or human level to that global overview. He realised what many people still haven't grasped, that is the dire social and political consequences of approaching the "limits to growth". As early as 1975 he was talking about the social upheaval that will occur if our political and economic systems do not recognise and come to terms with reduction, degradation and limits of finite and vulnerable primary resources. His fear, that a failure to grasp this will lead to a new totalitarianism, grew with the passing years.

This was the genesis of Progressive Farming Trust/Elm Farm Research Centre. The name has a small touch of irony because David's father, who was a junior Minister of Agriculture as well as a huge landowner, once wrote a book called "Progressive Farming" extolling the virtues of agro-chemicals.

David provided the initial and core funding for EFRC. He also provided contacts and a name that gave much needed credibility not only to this fledgling institution but also to the UK organic movement. He made available his house in Oxfordshire and hosted ground breaking meetings; where international researchers in organic agriculture met with leading conventional scientists from the UK, where UK organic farmers came together for the first time to discuss R&D and a strategic way forward, where British Organic Farmers was formed.

He agreed to be President of the Soil Association during a difficult period of readjustment. He encouraged many of the new, at that time young, organic pioneers to put their ideals into practice and to make organic farming count.

Jack and Graham Pye

Lawrence Woodward

Jack Pye, together with his wife Mary, was a major funder of a range of charitable causes, including conservation and various organic, nutritional and whole food initiatives.

During the 1960s Jack provided significant support for the Soil Association and sat on its Council. When it finally became clear that the SA could not continue to fund the world famous Haughley Experiment, Jack took it over and ensured its survival for another decade.

He was self-educated and had a fierce appetite for knowledge especially relating to health and wellbeing. It was his curiosity that led him to make several visits to the newly formed Elm Farm Research Centre. Jack was keen to support us and couldn't understand why we didn't ask him for money – an unusual situation for him. Eventually, he decided that we needed a laboratory and insisted on providing the equipment and building.

Following his death in 1984 his son Graham picked up our cause and continued to support us until his own early death in 2009. For all of that period we were always able to count on Graham and his wife Yvonne, not just for money but also for steadfast loyalty, good sense and fun loving friendship.

For us the support of the Pye Charitable Trust has been important because their regular donations were always without reservation or strings. We have been immensely fortunate to have had Jack, Mary and Graham Pye as friends and patrons and we are pleased that Yvonne is to continue in that role.

The audacity of the obvious

The key role of biodiversity in ORC's Crops and Agroecology research programmes

Thomas Döring, Jo Smith & Martin Wolfe

"So in the general economy of any land, the more widely and perfectly the animals and plants are diversified for different habits of life, so will a greater number of individuals be capable of there supporting themselves."

"Farmers find that they can raise most food by a rotation of plants belonging to the most different orders: nature follows what may be called a simultaneous rotation."

(Charles Darwin, On the Origin of Species by Means of Natural Selection, 1859)

How different must English farmland have looked when Charles Darwin published these words more than 150 years ago? How buzzing it must have been, how colourful, how diverse and how messy. Today's agricultural landscape, in contrast, presents itself with a deathly tidiness of uniform monocultures, the sight of a few weeds on its clean coat of crops is as rare as it is shocking.

Separating agriculture and nature

Over the past sixty years, the massive intensification of farming practices has resulted in an increasing separation of agriculture and nature, with wildlife forced into shrinking remnants of natural habitats surrounded by industrial farmland. The decline of common farmland species, such as the lapwing, corn buttercup, the ruderal bumblebee, is well documented. This drastic and continuing loss of biodiversity was already apparent and highly topical when the ORC was founded thirty years ago. Although biodiversity is high on today's agenda in political and scientific debates, three decades on the trend of declining biodiversity in agriculture is far from being reversed.

In view of these dramatic developments, it is clear that efforts to protect biodiversity must be increased. Wild plant and animal species have an intrinsic value, and species that are lost are, in many cases, lost forever. Monitoring biodiversity is a key instrument in conservation strategies of farmland inhabiting species. That's why the ORC engaged in the regular monitoring of birds, moths, butterflies, terrestrial invertebrates and vegetation at Sheepdrove Organic Farm over several years. The ORC was also involved in a national project on biodiversity on a large number of farms which showed that organic farms generally support higher levels of biodiversity than do conventional farms.

One of the reasons why biodiversity is in decline might be that the current attitude towards diversity is still dominated by suspicion and unease. We simply have become too used to landscapes entirely bare of hedges or trees, to virtually weed free fields, and to strictly uniform crops. What is required to bring back and foster biodiversity in agriculture is the courage to deviate from the mindset of "one size fits all", from the oppressive norm of monocultures, and from the view that somehow biodiversity gets in the way of efficient agricultural production.

Darwin realized that diversity supports productivity. Since then, his view has been backed up by developments in ecological theory and has been tested and confirmed by a large number of ecological and agricultural experiments. A system with more elements will be more stable and ultimately more productive than a simple one. An example is the response of wheat variety mixtures to fungal pathogens, which in comparison to single unmixed varieties show lower disease levels.

A further example comes from findings from a recently finished ORC-led project on wheat, which compared different breeding approaches. Rather than just looking at the amount of yield, we also analysed how stable the yield was between geographic locations and over time. In line with ecological theory, we found that a breeding approach based on large genetic diversity tended to produce a more stable yield than pure-bred monocultures of wheat varieties.

Functional biodiversity and ecosystem services

One of the more recent ideas that refine Darwin's thoughts is that it is not necessarily the identity of the species in diverse mixtures that determine the effect of diversity. Instead, it is their function in the ecosystem. This idea is applied in a current project on legumes, led by ORC (Legume LINK project). With the aim of optimizing the performance of the fertility building phase in the rotation, this project explores how different legume and grass species can best be combined in a mixture. A generic all-species mixture of twelve legume species and four grass species already shows great advantages over single species, for instance in terms of establishment, crop cover and weed suppression. Importantly, however, the further selection of legume and grass species to design an optimal and tailored ley mixture will be based on the functional properties of the species, such as their speed of establishment, their competitiveness, and how quickly they decompose in the soil.

A further aspect of biodiversity that has emerged in recent years is the widening range of functions that are being considered. The ecological processes that sustain human well-being, such as pollination, nutrient turnover, the regulation of climate, water, soil, and air quality can all be seen as providing ecosystem services that are influenced by biodiversity. In recent years the consequences of the loss of biodiversity for the well-being of the environment, and ultimately, society, have come under the spotlight. The provision of various ecosystem services has become the focus of researchers and policy makers alike, with the realisation that maximising food production has compromised the delivery of other ecosystem services.

In line with these developments, a recently started PhD project at the University of Reading, co-supervised by the ORC, will assess the legume mixtures mentioned above with respect to their value for pollinators and soil invertebrates.

Agroecological approaches continue to provide the framework for our future research activity. We plan to increase our understanding of the interactions among multiple ecosystem services in organic systems in order to avoid trade-offs and maximise positive interactions. Within the wider research community, much effort is being focused on developing methods to place values on the delivery of ecosystem services such as carbon sequestration, regulating water quality and supporting biodiversity. It is now essential to find ways of accounting for the provision of non-market products from the farming system, to be able to measure overall productivity.

Diversification at different levels

Biological diversity is not just about mixing different species. In fact, biodiversity can be increased at all scales, from the microscopic world of genes up to the level of landscapes. At the genetic level, i.e. within a single crop species, we study the effects of moving away from pure-bred lines towards genetically highly diverse composite cross populations. These populations are currently being investigated in another ORC led LINK project (Wheat Breeding LINK). Because of their inherent diversity, they show the apparent ability to respond to the environment over time. One of the most exciting questions we are going to explore in the next few years is whether our wheat populations are able to adapt to the site conditions of the individual farms where they are grown.

At the species level, the effect of increasing biodiversity has been studied by the ORC in various intercropping systems, such as different vegetable as well as wheat-clover systems. In addition, the ORC is dedicated to include some rare and neglected crop species into its research programme, such Emmer or Einkorn. These two cereal species will be studied in a recently started EU project. The project, called SOLIBAM ("Strategies for Organic and Low Input Breeding and Management"), will look at the effects of employing diversity at various levels in the agroecosystem, and will also include several vegetable species such as broccoli and field beans. At the farm and landscape-scale we investigate how temporal and spatial heterogeneity can be increased through the integration of trees and agriculture.

This agroforestry approach increases productivity compared to monoculture systems, as the trees acquire resources that the crops alone would not. In addition, agroforestry systems support increased diversity of products, including food, fuel, timber, fodder and forage, medicinal products, and ecosystem services, depending on the design and management of the system. The role of agroforestry in protecting the environment and supporting many ecosystem services is a key benefit and includes regulation of soil, water and air quality, enhancement of "wild" biodiversity, pest and disease control, together with climate change mitigation and adaptation through carbon capture and sequestration.

Our flagship site, Wakelyns Agroforestry, is pioneering in its multi-functional approach to agroforestry. Willow and hazel coppice, hardwood and fruit trees provide a wide range of products, including bio-energy, to complement the organic crop rotation in the alleys between the 'production hedges'. The cropping alleys are mostly 12m wide to encourage interaction between trees and crops. The farm also provides an oasis for wildlife in the industrial farming landscape, with the residence of top predators like the breeding barn owls indicating a healthy and diverse ecosystem.

In 2009, a new programme began investigating the potential for agroforestry to reconcile productivity with environmental protection. Funded by the Ashden Trust, this programme aims to increase our agroforestry effort. The first year of the project included a review of the research literature to identify research gaps, research into tree-crop interactions at Wakelyns, and a baseline biodiversity survey of a new agroforestry system at Whitehall Farm in Cambridgeshire.

In this second year we are establishing a network to promote eco-agroforestry (integrating agroforestry with organic and agro-ecological principles) into the mainstream through research, dissemination and policy change. We are also carrying out research into pest and disease control and other ecosystem services in agroforestry systems.

Understanding the mechanisms

Increasing biodiversity does not mean a wild and random mixing of species or genes. Arriving at a targeted, well-designed and functional system requires detailed knowledge of the interactions between different elements in a mixture. The mind-boggling complexity of diverse systems calls for a clear and tidy mind as well as strong analytical skills. Understanding these complex systems would not be possible without our links to other research institutions, both in the UK and other countries.

On the other hand, we would not be able to conduct meaningful agricultural research without our network of participatory farmers and growers. Integrating fundamental ecological science and applied agricultural research is a powerful approach. It is strenuous, challenging, and time consuming - but also hugely rewarding.

Using and enhancing diversity in agro-ecosystems, within and among crops, brings an abundance of benefits. It reduces the reliance on synthetic inputs while maintaining overall high productivity and it makes the production system more stable, more reliable and more resilient to environmental changes. So obvious are the advantages of increasing biodiversity in farming systems that it is almost embarrassing to promote it, was it not for the fact that so many people slavishly follow a monoculture-based approach.

Slowly, the agro-ecological ideas employed in the ORC's research programme are now moving towards wider acceptance in agricultural science and application. But, 150 years after Darwin made his insights on diversity known to the public, the promotion of biodiversity in agriculture still requires some audacity. We are prepared to take that on with gusto.

(A fully referenced version of this article can be found at www.organicresearchcentre.com)

Organic communication – loud and clear

From the outset, the communication of organic ideas and principles, and issues relating to the sustainability of food systems, to a wider public including producers, researchers, opinion leaders and policy-makers has been a core part of the Organic Research Centre's mission and activity.

This has included presentations at conferences, the organisation of specialist national and international research colloquia and conferences on issues as diverse as soil analysis, food quality and health, comparison of farming systems, alternatives to GM, and animal health and welfare. Technical events have also been a key feature, along with more recently the annual conferences for organic producers and continuing engagement with the media as well as the publication of the Bulletin and papers and articles in other journals and periodicals.

Organic advisory and information services

For many producers, getting access to information on how to convert to organic production and then manage successful organic systems has been particularly challenging, particularly when conventional advisory services, agricultural colleges and universities were not providing any serious information on organic farming to farmers or students.

The Organic Advisory Service was developed during the 1980s, with Mark Measures playing a leading role, in response to a real desire for information from new and potential organic farmers at a time when information was scarce and genuine organic advice hard to come by. The OAS pioneered the idea of conversion planning in the UK, and developed conversion plans for many farms that are today in the forefront of organic production. The OAS, now led by Roger Hitchings, has continued to provide a wide range of services over the years including continuing assistance with conversion planning, delivery of training, farm visits, demonstration farms, project work and agricultural appraisals to assist planning applications.

The OAS was well placed to take on delivery of the government-funded Organic Conversion Information Service (OCIS) when it was launched in 1996, initially in partnership with the Soil Association, which provided the helpline service. This service supplied in the region of 9,000 free visits to farmers and growers in England between 1996 and 2006 when it closed. The OAS contributed to a similar service in Wales, in partnership with ADAS and Organic Centre Wales.

In 2008, a new OCIS was launched under the management of Natural England and the OAS was successful in winning the contract, including the helpline. Interest in the service is running at a relatively low level at present, but is expected to increase as the organic market recovers from the worst impacts of the recession.

In Wales, the Organic Research Centre is an active partner in Organic Centre Wales, based at Aberystwyth University, which came into being in 2000 with support from the Welsh Assembly Government. OCW provides a single point of contact in Wales for a wide range of services to producers, processors and consumers. As a partner, the Organic Research Centre supports the delivery of OCIS in Wales and the Farming Connect Organic Development Programme, including demonstration farms, technical events, technical guides and other activities, and contributes to the Better Organic Business Links (BOBL) project, which aims to support the development of organic supply chains in Wales. The OAS is also an approved contractor for the provision of Farming Connect whole farm plans.

In part due to financial problems created by the Foot and Mouth outbreak in 2001, the nature of the Organic Advisory Service has changed, with many of the services now being provided by freelance consultants rather than a dedicated team employed directly, and producers also now have access to organic information from other consultancy firms.

Reflecting this, the Defra/EU rural development-funded Organic Inform (www.organicinform.org) project was set up in 2006 and concluded in 2009. This aimed to provide a central source of information on-line and supported the establishment of the Organic Growers Alliance and the re-establishment of annual conferences for organic producers.

New initiatives are currently under development that envisage greater collaboration and partnership with other information providers, including Abacus and Duchy College, as well as support for the development by Mark Measures of the Institute of Organic Training and Advice (IOTA), to accredit and update organic consultants and trainers, wherever they are working.

Transatlantic Partnership

Enhancing educational opportunities for students in the field of organic and sustainable agriculture, and sharing experiences between North America and Europe, are key goals for this exciting international project funded by the Partridge Trust and started in 2008. Our partners in this project are the College of the Atlantic in Bar Harbour, Maine and the University of Kassel in Witzenhausen, Germany. Activities supported include faculty exchanges, the development of distance learning modules, the hosting of interns and the development and delivery of intensive courses.

In August 2009, 11 students (7 from the US and 4 from Germany) took part in the first intensive course - 'Our Daily Bread', based at Elm Farm, Wakelyns Agroforestry and Witzenhausen. During the three weeks with us, the students were treated to an intense programme of lectures, seminars, workshops and visits designed to cover many aspects of wheat production and bread making, and had to take full responsibility for their own cooking and housekeeping in the Elm Farm farmhouse and conference centre. The course will be repeated this year with a student group that will include UK students.

In March 2010, we welcomed the first interns from the College of the Atlantic, here to work on projects as diverse as seed variety regulatory issues, the ORC library and the history of apple production in Maine and England. We are planning to extend and formalize the intern programme to provide more opportunities for UK and other European students, with training and other support included.

Schools education programme and farm trail

Our education programme also recognizes the need to support schools and the general public with information about food production and healthy diets, and to provide opportunities to visit farms and to get hands-on experience with growing food. The farm trail at Elm Farm has been redeveloped with improved access and information material (supported by Biffa and the North Wessex Downs AONB) and is open to the public at any time, or as part of guided walks held during the year (in 2010 on 13th June, 17th July and 12th September).

The newly re-instated garden facilities, created largely by volunteer labour, also provide ideal opportunities for hands-on experience. Children from our local village primary school have visited after school with teachers and parents, to sow seeds and plant vegetables in the raised beds, and we have contacts with a number of other West Berkshire primary schools that are keen to involve children in food production. Gardening however requires work throughout the growing season and many schools find it a challenge to provide regular transport. We are therefore seeking funds to employ an education officer to visit schools and advise on the principles of organic production for vegetable growing in school grounds.

Half of the raised beds are also accessible for disabled adults and children, although our gardening work with disabled adults over six very successful years was suspended during the redevelopment of buildings. We also used the farm trail with these clients, knowing that the therapeutic benefits of farm visits are beyond doubt. We have well established relationships with local organisations working with the disabled and we fully expect to renew our horticultural therapy activities with them.

Secondary school pupils have also been engaged in the conduct of scientific projects at Elm Farm, including investigations of microbial activity in organic compost and the use of parasites to control slugs on lettuces. We are planning to develop this work further by developing educational resources on organic/agro-ecological alternatives to GM aimed at the Key Stage 3 and GCSE science curricula.

New buildings from old

For most of the last 30 years, visitors to Elm Farm will have found the organisation operating from cramped offices in the farmhouse. Outside, apart from the old soil lab block, which was refurbished in 1984 with support from JA Pye, the traditional barns were looking increasingly sorry for themselves. This included a Grade II listed barn dating from the late 18th century, with the surrounding sheds built in the 1830s.

Now, visitors will find there has been a complete transformation. The sheds have been converted into office accommodation, the barn refurbished as a conference centre with modern facilities and a link block between the two recreated to house the reception.

The whole of the refurbishment project has been carried out to high ecological standards, using original or recycled materials wherever. Heat is sourced from the ground outside and from solar water heating. Rainwater is captured and reused. Electricity is now from 100% renewable sources supplied by Green Energy. Bat access routes have been provided throughout, and a dedicated bat attic provided above the conference centre, in order to retain the five species of bats found to be inhabiting the barn before refurbishment.

The project, led throughout by Pat Walters from the Organic Research Centre side, took 10 years from start to finish, with committed support from architect Jo Saady and her Ecological Architecture company. Once the plans had been agreed, initial funding identified and planning permission obtained, the project had to be put on hold for 12 months while a bat survey was carried out and plans revised to accommodate the bats that were identified.

In 2007, the conversion of sheds into offices (Phase 1) was started, and involved lifting up the frame to insert new foundations, as well as a complete recovering of the roof with handmade clay tiles. In autumn 2008, the new office block was opened and work on Phase 2, the conversion of the main barn into a conference centre started.

As the beams were exposed and their condition became clearer, significant remedial work was required, but the project was completed on time in summer 2009. On May 24th 2010, the buildings were officially opened by HRH Prince Charles.

The conference centre is now fully operational and used for both internal and external events, including not just meetings and workshops but also village barn dances, orchestral rehearsals and art exhibitions. Our long term plan is that the conference centre should become a centre for food and sustainability education, with a dedicated programme of public events and activities, workshops and short courses, to support our efforts to communicate the organic message.

Meanwhile, the farmhouse, the hub of the Organic Research Centre for so long, is also being gradually refurbished to provide additional office space, meeting rooms and self-catering accommodation for staff, interns and students.

Further developments are likely to be needed as the organisation grows, the major constraint being access to financial resources to support the significant capital expenditure involved. Even the developments to date have been part-financed by borrowed money (made available by the Pye Trust and Triodos Bank). Offers of support for this bricks and mortar work are always welcome.

GM cropping – the wrong answer for future agriculture

The arguments against GM crops have moved on from the frightening spectre of "Frankenfoods" and health scares. Quite simply, the GM route reinforces an outdated model of industrial energy-reliant agriculture, wholly unsuitable for dealing with the scenarios that climate change and expensive, scarce oil bring for global food production and security.

The IAASTD report of 2008 (International Assessment of Agricultural Science and Technology for Development) concluded that for food and crop production, "business as usual is no longer and option". It called for a shift to agro-ecological systems. In fact large parts of the IAASTD report favoured organic farming – much to the anger of the United States and the GM lobby.

Since 1992 the Organic Research Centre has been actively involved in the GM debate and in its impact on organic farming and the wider environment. We have argued for the precautionary principle to be applied and for the proper ring-fencing of organic farms and organic produce.

We have presented information to Government through expert groups, consultations and through their own commissioned research; taken part in debates; analysed and communicated scientific information and highlighted key developments to the organic sector as they occur. In addition we have developed ways that the organic sector can self help, particularly in tackling the vulnerability to GM contamination in the area of seed production and plant breeding.

The consistent message that we have driven home in the press and elsewhere is that in an increasingly hungry and oil-deprived world the GM route simply reinforces industrial, input and energy-reliant agriculture. And worse than that, the life science and agrochemical companies behind the advance of GM technology have an interest only in high input, patentable systems, despite hiding behind promises of philanthropic good for the under-nourished and poor of the developing world.

A letter from the ORC published in the Financial Times in 2008 in response to an article claiming wonder yields from GM crops is typical of our on-going efforts.

"The take-home message from your article would appear to be that tomorrow (one day soon) a new generation of genetically modified crops will deliver the magical yield increases and crop ability to thrive in adverse conditions that we were promised by life science companies 20 years ago. The world will be awash with cheap food, hunger will be banished."

The truth is that these companies - Monsanto, Syngenta and so on - have so far failed to deliver crops capable of thriving in drought, salt or nutrient deprived conditions. Doubts about future delivery are fuelled by the over-hyped promise of their first generation herbicide tolerant and pest-resistant crops, which has not been met.

Truly independent observers such as the International Assessment of Agricultural Science and Technology for Development (IAASTD) this year published a 2,500-page report based on peer-reviewed publications which concluded that the yield gains in GM crops "were highly variable" and that in some places "yields declined". Asked at a press conference if GM crops were the answer to world hunger, IAASTD director Prof Bob Watson (now chief scientist at the Department for Environment, Food and Rural Affairs) said: "The simple answer is no."

"Efforts now need to be focused on developing production systems that are ethically and environmentally sustainable, based as far as possible on local resources. Food security, self-sufficiency and value for money, rather than a spurious notion of cheapness, will be important for the future. We should concentrate on developing a food system based on those and not seek to cling to a dysfunctional food system by relying on the dysfunctional technology of GM crops," says Lawrence Woodward, ORC director.

In 2006 we produced a detailed analysis of the flaws in Government plans for co-existence in England between GM crops and conventional/organic farming (and again in 2009 for Wales). In fact, so vociferous was the campaign against co-existence, after nearly five years of rumination the Government is yet to deliver a workable regime.

The key co-existence issues to consider, we said, are that a voluntary regime with no legal teeth is unacceptable; that GM contamination would become routine; that seed regulations should permit zero GM contamination; that liability and compensation arrangements are set to be inadequate; that a GM (public) register is needed to keep track of where GM cropping is taking place.

All these issues, and more, were brought to the fore in a major London conference in November 2008. The QE2 Conference Centre in Westminster saw over 130 delegates and speakers from across the world in hot debate about the failure of GM crop technology to deliver anything on the promises of 20 years ago. In stark contrast speaker after speaker pointed to agro-ecological approaches (including organic agriculture) as extremely attractive sustainable farming and food options, especially in a world fast running out of oil.

As the debate stands at the moment, it is worth re-capping on the arguments and questions still to be answered on a GM approach.

1) What is the problem requiring solution by the GM approach?

There is a strong tendency to adjust the definition of the problem towards the kind of solution that GM is thought to be able to solve. But world food problems are complex, requiring many different kinds of solution. The GM approach may have some relevance to some small fraction of the problems – but so small that the required investment is unlikely to be justifiable. Much of the current 134 million hectares of GM crops could have been covered by conventionally-bred crops with no loss to the farmer or consumer.

2) Ethical considerations

Many people object to GM crops on ethical grounds. There is a concern about interfering with the integrity of living organisms, particularly if those organisms then reproduce. There are also many farmers and growers who prefer not to use GM technology and are concerned, therefore, by inadvertent contamination by GM plants through a wide range of effects in areas with large concentrations of GM use.

3) Interference and unexpected outcomes

Transgenic genetic modification is an imprecise science and many have led to unexpected consequences of various nature. This has been due largely to different aspects of the techniques involved in the transformation process itself, though methods are improving. Such improvements have come about in part through the strong opposition to the GM approach. Currently, for example, there is interest in the use of only moving genes between sexually compatible organisms (cis-genesis) rather than between sexually incompatible organisms (trans-genesis) as a way of limiting possible side-effects.

However, the lack of targeting and precision of placement of the introduced DNA still raises uncertainty about potential side-effects. In this sense, the idea of 'substantial equivalence' (that if something has the same characteristics and composition then it is equivalent) is highly dubious; it dismisses the fact that we do not know what the effects may be of apparently undetectable changes to DNA structures. It is also dangerous to argue that the apparent absence of measurable effects over a small number of generations means that there are no effects at all.

4) Monoculture

The most important problem in practise is that the high investment required to generate GM crops necessitates the major companies involved in producing them to lock the farmer, the consumer and, indeed, the companies themselves into large-scale monoculture of those crops. The processes of evolution mean, inevitably, that this creates new problems, through new forms of insect pests, diseases or weeds.

The current, twofold, solution from the companies is to further modify the existing varieties by adding ('stacking') one or two more new genes, each of which attracts a further charge from the company, and which increases further the number and range of pesticides needed to support production of the monocultures. Furthermore, the scale of monoculture means that some of the supporting chemicals that are used, such as herbicides, create large-scale selection for weeds that are increasingly becoming tolerant of, or resistant to, those herbicides.

It is important to underline that the problems of monoculture will occur even if the targeting of genetic modification in crop plants could be carried out with perfect precision.

5) The best solution?

Most problems faced by crops are complex, affected by environmental variation and, if such problems are biological, by genetic variation in the other organisms involved. Furthermore, such problems do not occur singly but are numerous and dynamic. Therefore the solution is also likely to be complex and varied.

This means that a number of approaches will be needed and in the case of breeding a number of genes rather than the golden bullet of a transgene. Ideally, this will include a range of genes within individual plants together with a number of plants with different ranges of genes i.e. a population.

Using a population of plants in this way extends the total range of genes involved and the potential interactions among those genes. For example, drought is a complex problem which, unpredictably, may affect different parts of the plant and stages of crop development at different times and intensities in different seasons and places.

It is likely to be accompanied by many other problems such as resource availability and particular pests and pathogens. Effective management of such a complex of problems requires the simultaneous activity of many genes including the potential for complementation among individual plants able to thrive in different combinations of factors. Such crop complexity will decrease the need for external, synthetic solutions.

6) Loss of biodiversity and patenting of genes

Substantial development of monoculture through the GM approach has the obvious consequence of a reduction in biodiversity, both in the crops being replaced and among the organisms associated with those crops. The process of patenting genes has a similar, secondary, consequence by restricting the crop resources readily available to breeders for new varieties and farmers.

Perhaps the time has come to ask if undue focus on GM foods and crops is diverting our attention and resources from the development of truly reliable alternatives of sustainable (organic) agriculture which are capable of feeding those soon-to-be nine billion hungry mouths on our crowded planet?

Not so long ago the then chairman of Natural England, the late Sir Martin Doughty, presented a powerful summary of the situation in this country –

"We need to be mindful of the lessons of the past before rushing headlong to embrace genetically modified crops as the solution to rising food prices.

The evidence of field-based trials on GM crops previously proposed for commercial release in England demonstrates that they can have a detrimental indirect impact on farmland biodiversity. We clearly face a huge challenge in reconciling the surging global demand for food with the need to conserve and enhance our natural environment.

"However, there is little evidence to date that the current generation of biotechnology products will help. The precautionary principle compels us to understand the full impact of each GM crop on a case-by-case basis before commercial release. GM crops can in no way be seen as a quick fix."

GM technology has failed to fulfil almost every over-hyped promise it made on its introduction. It continues to serve its commercial owners rather than the world's farmers or the world's hungry.

Livestock systems - An overview of our engagement at Sheepdrove

Poultry production in the UK has developed into a highly specialised and industrial process with little regard for the behavioural and physiological needs of the birds. In 2002 Sheepdrove Organic Farm set out to produce table birds in a different way. ORC designed and implemented a multifunctional silvopoultry production system on the farm.

This provided conditions that allowed birds to express their basic behaviour: supplied additional food sources for both nutritional and health benefits from a wide range of trees, shrubs, herbs as well as grass/clover leys; and provided an enriched landscape for the farm to encourage biodiversity.

Improvement to the system

The system at Sheepdrove was working well, but we wondered if we could simulate the birds' natural environment even more closely. We considered a Multi-age Flock; natural flocks of chickens are comprised of birds of varying ages. The older hens teach the young chicks how to forage – what's best to eat in the different seasons and where best to find it.

As organic livestock, including poultry, are not routinely vaccinated, having 'mother' hens would bring young chicks into well-controlled contact with micro organisms and could help develop the general immune system. This is known as Hygiene Theory[1]. The trials proved successful in that no bullying was reported, no reduction in health or welfare was found, and the birds grew well. The system could be implemented effectively in small - scale production but practicalities probably make it difficult on a larger scale.

In the light of Organic Standards moving toward 100% organic rations for poultry, we decided to see whether it could be done. Many feed companies and farmers were sceptical. We found that a 100% organic ration is possible without reducing the birds' welfare or health. It take a bit longer to finish the birds and we found differences in costs of production with our trials showing sometimes 100% organic was cheaper (the birds ate less organic feed but still finished fine) and other times a little more expensive.

As time has moved on, the economic and environmental climate has changed. As organic systems aim to operate in an ecological and economical way it seems illogical (and not sustainable) to import feed grown and processed thousands of miles away when a range of good quality cereals can be grown organically in the UK. Therefore we looked at how much home-grown cereal can be substituted for expensive (literally costing the earth) bought-in compound feed.

We found that a 30% substitution was possible and that carcass quality, weight and conformation were not affected, and neither was the birds' health or welfare. Using Sheepdrove as our example over a year this would reduce its carbon footprint by nearly nine tonnes. As this trial was so successful it was implemented as standard within the commercial system and extended to the pigs as well.

As much of the farm wheat was now going to the chickens we also trialled Triticale. Again there were no carcass quality, conformation differences and welfare was not affected. The savings both in terms of energy and money are potentially significant.

The Future

Plans are underway to broaden our Livestock programme. We are particularly hoping to re-engage with the dairy sector, having been instrumental with the set up of OMSCo; widen our poultry expertise to encompass layers and other fowl such as geese and turkeys; and branch out to other ruminant production.

We are also drawing together the Agroforestry and Livestock programmes to research production of 'animals in trees', an area for which we have high hopes.

[1] Bestman, M.W.P. & J.P. Wagenaar (2003). Farm level factors associated with feather pecking in organic laying hens. Livestock Production Science 80: 133-140.

The Sheepdrove Trust & ORC crops.

The Sheepdrove Trust has been crucial in the development of our innovative crops programme. Work funded by it has included the first rigorous variety trialling of cereals under UK organic conditions. Varieties were selected for inclusion in the trials based on popularity with organic farmers as well as new varieties where conventional trial results might suggest that they would be suitable varieties.

These trialled conducted over 3 years included both winter and spring varieties of wheat, barley, triticale and oats. Results from the trials were disseminated to organic farmers. As a development of this work we started to look at diversity with 3-way mixtures of wheat varieties that were grown and resown over a number of years and showed some improvements over single varieties. This work and our thinking behind it led us to producing "varieties or mixtures" with a much wider diversity that has resulted in the wheat populations that have been developed through government and industry funding, including on-going collaboration with Sheepdrove.

Tiny virus – big effect
FMD and the ORC

Foot and mouth disease (FMD) is still regarded as one of the world's worst animal plagues. But how did this label become attached to a curable disease that poses little threat to human health? Why in the catastrophic epidemic of 2001 did the Government fall back on Victorian trade restrictions and mass slaughter?

As veterinary historian Abigail Woods has concluded, FMD in Britain has become a "manufactured plague".

On February 20th 2001 Government vets confirmed foot and mouth disease in pigs awaiting slaughter at Cheales abattoir in Essex. It was a black day for British livestock farming and – as it turned out – it was also a black day for the whole of the British economy. By the time the outbreak was over in September 2001 over 10 million animals had been culled and the costs had reached £8 billion. The entire disease eradication effort was predicated on the need to control UK livestock exports – a trade worth just £1.3 billion a year.

So how did this disease control effort go so badly wrong and what was ORC's involvement in the sorry saga and in campaign's for more civilized approaches since?

As global trade increases and brings about ever greater movement of goods, people and livestock, it also brings about the globalization of disease. The old methods of disease control in our livestock – isolation and slaughter to maintain desease free areas – are inadequate and unacceptable. Vaccination – which is safe, humane, scientific and effective – must become the central strategy of global disease control.

It was the lack of deployment of FMD vaccination in 2001 that led to so much unnecessary slaughter. Instead the reliance was on computer model driven culls of suspected infection, dangerous contacts, neighbouring farms and even under the guise of a "welfare scheme".

During March and April 2001 we were asked by several of our farmer clients - who were appalled by the slaughter policy - to investigate possible alternative policies in FMD control. Subsequently we were very active in pulling together and presenting the case for the use of vaccination alongside the use of slaughter. During this period we assembled scientific evidence to support the pursuit of a Judicial Review of MAFF's policy by Peter Kindersley of Sheepdrove Farm. We also published information about vaccination, set up two widely used websites on the disease and outbreak and attended key meetings at 10, Downing Street to brief the Prime Minister of the day, Tony Blair.

But vaccination was not deployed in 2001, and neither was it used in the smaller outbreak in Surrey in 2007 when FMD escaped from the IAH laboratory site at Pirbright. We believe that even the narrowest employment of the vaccination tool – ring vaccination where all vaccinated animals are eventually destroyed (an option we do not support) - would have significantly reduced the carnage of 2001. In Holland, this use of vaccination allowed the slaughter of animals and disposal of carcases to be carried out in a planned and orderly way.

A proportion of animals would still have to be slaughtered in situ and disposed of quickly nearby, but the massive pyres burning for days and the disposal pits that blighted the British countryside would be consigned to history.

If vaccination is scientifically based; if very large amounts of money are spent in developing, testing and storing vaccines; and if vaccination works as it demonstrably does, why is the UK Government so reluctant to use it? The answer seems to lie deep in the murky waters of trade regulation. Powerful lobby groups such as the National Farmers Union argue that the use of vaccination would lock the UK out of international trade for an extended period. They argue that consumers would resist buying produce from vaccinated animals and that virus testing would be unable to discriminate between vaccinated and infected/virus exposed animals.

All of these arguments have been demolished. The world veterinary body, the OIE, has brought export controls on countries deploying vaccination regimes in line with those that don't. Consumers already consume produce that is routinely vaccinated for a range of livestock and poultry diseases and sensitive DIVA (Differentiating Infected from Vaccinated Animals) tests are available for field use.

It came as no great surprise in 2006 when the looming threat of another serious trans-boundary disease – Avian Influenza H5N1 – prompted Government to once again threaten draconian action, and no vaccination. ORC was active once more in campaigning for vaccine use to avoid the alternatives of mass poultry slaughter and the prospect of all poultry being shut up inside.

Our publication at the time - Vaccination Nation – concluded that Defra should agree a preventive vaccination plan for free range and organic birds; submit such a plan to Brussels well ahead of the disease's arrival and spread; and ensure the sufficient availability of vaccine to carry out a preventive vaccination campaign.

Luckily H5N1 didn't become endemic in the UK in 2006, though it gave the likes of Bernard Matthews a nasty shock. But still the concern remains to this day, that Defra hasn't changed its mindset on vaccination, prevention and control of serious trans-boundary disease.

In June 2008 ORC held an organic animal health colloquium in Oxford. To the list of FMD and Avian Flu, we added Bluetongue, Bovine TB, Johne's disease and sheep scab. Delegates concluded that under these numerous threats, novel approaches and real leadership are needed to ensure that truly organic livestock farming does have the prospect of a healthy future.

Vaccination has to be part of the armoury (effectively deployed across the UK to control Bluetongue), but so does natural immunity, biosecurity, good stockmanship and positive health.

Mass slaughter and blazing funeral pyres are images of the Dark Ages. We aspire to live in a modern, enlightened world. We must allow our livestock to do the same.

Climate change and food security – can we afford organic farming?

Climate change and food security are both issues that have come much higher up the political agenda in recent years. For some they are providing the opportunity to argue for further intensification and industrialization of agriculture, in order to increase output to meet future food needs and to use productivity increases to reduce climate changing emissions per unit of food produced. If these interest groups are right, then organic farming, with its lower apparent productivity, has no role to play and may be positively harmful.

From a climate change perspective, agriculture, and particularly livestock production, is a significant contributor to greenhouse gas emissions. The main sources are: carbon dioxide releases linked to fossil energy use, decomposition of organic matter and deforestation; methane releases from paddy rice cultivation, enteric fermentation in ruminant livestock and manures and nitrous oxide releases from fertiliser manufacture/use and manure applications.

Methane and nitrous oxides are particularly important as they are, respectively, 23 and 297 times more potent than carbon dioxide. These agricultural components account for more than 50% of methane, 80% of nitrous oxide and 95% of CO_2 emissions linked to land use.

Livestock related emissions may account for 18% of total human-derived emissions (10% of CO_2, 35% of CH_4, 60% of NO_X), but there are big differences between species and production systems. When combined with food processing, distribution, retailing and domestic cooking and consumption, the contribution to GHG emissions is well over 35%.

Reducing greenhouse gas emissions

Organic farming can reduce greenhouse gas emissions, in particular by relying on biological nitrogen fixation and biological pest control and not using fossil energy to manufacture nitrogen fertilizers and pesticides. Although more diesel may be used for mechanical weed control, this is frequently outweighed by savings elsewhere.

Nitrogen fertilizer applications and cultivations can also breakdown soil organic matter leading to increased emissions, but in organic systems these are counter-balanced by the use of organic manures and the fertility building phase in the rotations which capture carbon and rebuild soil organic matter.

In the UK and many other industrialized countries, organic yields are typically lower than non-organic, primarily due to differences in the intensity of nitrogen use to feed plants. While resource use and emissions may be lower on a unit land area basis, if the yield differences are too great, this may not apply on a per unit food produced basis. In studies of organic crops, for example, energy use and emissions per kg cereals produced are typically lower, while the values per kg of potatoes produced are often higher.

This issue is even more pertinent with respect to ruminant livestock – methane emissions are relatively constant on a per cow basis, as is diesel use per ha, so if yields and stocking rates can be increased, then emissions per litre milk can be reduced.

But there is a need to look at the issue on a whole system basis. Organic systems may generate lower yields of specific commodities, but they are also generating a wider range of ecosystem services including nitrogen and carbon fixation.

In addressing the climate change challenge, there is a need to recognize that agriculture is different from other industrial processes – it is (or should be) fundamentally engaged with managing biological processes and nutrient cycles, including nitrogen and carbon cycles where there is a continuing interplay between fixation from and release back into atmospheric reserves.

Addressing food security concerns

This agro-ecological, cyclical perspective lies at the heart of organic farming and represents a real alternative to the continued intensification and industrialization of agriculture. It is also a key reason why organic/agro-ecological perspectives are widely recognized as relevant to addressing food security concerns in developing countries. By working more effectively with resources already present on (or above) the farm, there is significant potential to increase productivity, particularly where fertilizer, pesticide and seed inputs may by unavailable or unaffordable.

Even in industrialized countries, while the yield gap between organic and non-organic yields of winter wheat, for example, may as high as 40-50%, the fertility building clover/grass ley provides a better and higher yielding feed source for ruminant livestock than wheat, so that the total system productivity of UK organic systems is typically only 10-20% lower than conventional.

However, there will still be a need to focus not just on how much food can be produced, but also how it is utilized. Feeding food suitable for direct human use to animals is a key challenge, and the issue of an ever increasing proportion of livestock products in the diet cannot be ignored, also with respect to its impact on human health.

Waste in the food system, whether in the form of un-harvested crops, grade-outs, processing losses, retailer waste or the very high level of domestic food waste, also needs to be addressed. The current policy and industry fixation on producing more food, without addressing how what we already produce is being used, is simply incompatible with ensuring that future food needs can be met sustainably.

There are still weaknesses in organic systems that need to be addressed if we are to meet the climate change and food security challenges. There needs to be a recognition at government and industry level that there is not only one route - one development path - to solving these challenges. Supporting a range of alternative development paths, including organic systems, is an important way of maximizing potential benefit and of reducing the risks if the dominant path fails to deliver.

Future proofing - Environmental and economic sustainability of organic farming

The term sustainable has become so widely used in current policy that it is almost meaningless. Many farming systems, not just organic farming, lay claim to the title sustainable agriculture, but in reality no farming system can be perfectly sustainable and many fall far short of the ideal.

Improving the sustainability of resource use on organic farms

The Organic Research Centre has initiated and participated in several relevant projects. The Defra-funded project 'Quality and Environmental Benchmarking for Organic Agriculture' has helped to clarify what public goods and services are provided by organic systems and how these can be measured on farms. This has built on work pioneered by Mark Measures with the Organic Systems Development group of Organic Advisory Service producer clients.

The Energy, Emissions, Ecology and Agricultural Systems Integration (EASI) Programme, funded by private donations, has developed a tool allowing farmers to assess their greenhouse gas emissions, compare energy use with industry benchmarks and assessing the implications of a change in practice, such as installing a wind turbine. The tool has been tested on a range of organic farm types.

Through this work, we have developed strong links with other researchers and are now engaging in other projects in this area, including a new Defra-funded Agricultural GHG Inventory Research Project, which aims to improve the accuracy of data on agricultural greenhouse gas emissions. ORC is also involved in a new Defra-funded project led by Warwick HRI which aims to improve methodology to compare the characteristics of both organic and non-organic farming systems.

Farm incomes and costs of production

While reducing environmental impact and cutting resource use are important, the profitability of farming is critical to its sustainability: if businesses cannot survive all other efforts may be in vain. Since the late 1970s, researchers at Aberystwyth University (including Nic Lampkin and Susanne Padel who are now at the Organic Research Centre) have been funded by MAFF and now Defra to survey and report on the financial situation of organic farmers in England and Wales. Since the late 1990s detailed annual reports have been produced by this team (available on the Defra website organic statistics page). https://statistics.defra.gov.uk/esg/index/list.asp?i_id=130

Contrary to many popular perceptions, this work has demonstrated that in most cases organic farming is as profitable or more profitable than comparable conventional farms, and that incomes on organic farms have been maintained in 2008/9 despite the recession.

Alongside this work, Aberystwyth University and the Organic Research Centre have collaborated on the production of the Organic Farm Management Handbook since the mid 1990s. The handbook, sponsored by Triodos Bank, provides detailed data on yields, prices, costs of production and gross margins for organic crop and livestock enterprises and much else of relevance to organic businesses.

Jointly with other partners (Organic Centre Wales, Soil Association and FIBL) we are also working to improve the availability of information about markets and consumers to organic businesses. This is particularly relevant given the impact that the recession has had on the organic market, although the signs that the market has stabilised and is starting to grow again in 2010 are encouraging.

Organic principles in the market place

The development of a specialist market for organic products has only been made possible by the definition of production standards that differentiate organic from non-organic products, protect consumers and bona fide producers from fraud and build trust between them. The organic sector has been at the forefront of the development of standards and inspection systems to support more sustainable production. Since 1991, the basic rules for organic farming have been legally protected in the European Union. Nobody may sell a product as organic without following the rules and without being inspected by an accredited organisation.

However, many values that are important to producers and consumers –for example those expressed in the IFOAM Principles of Organic Agriculture – Health, Ecology, Fairness and Care are not covered by the European Regulation or by inspection/certification procedures. For example, reduced environmental impact and improved animal welfare are aims and likely outcomes if organic standards are followed, but there are few specific rules relating to these issues.

The agro-ecological systems approach, fairness and social justice are more difficult to inspect than a tally of which inputs have or have not been used. This discrepancy between the expectation and the standards is sometimes seen as threat to the integrity of organic farming, but it can also be seen as an opportunity for true organic producers if they succeed in communicating what they do.

Our work in relation to consumers and markets explores how the broad range of values expressed in the IFOAM Principles of Organic Agriculture can be communicated. In two European projects, funded by the EU Commission (CertCost – www.certcost.org) and the other (Farmer consumer partnerships – http://fcp.coreportal.org) funded by the CORE-Organic ERANET Partnership (with the UK work funded by Defra), we are aiming to achieve a better understanding of what consumers know and like about organic farming, why they buy organic products, what values and characteristics they would be willing to pay more for, and to carry out an economic analysis of organic certification systems.

Our research has shown, for example, that organic consumers appear willing to pay more than the average price for organic products that state clearly where they come from, and they might also be willing to pay more for animal welfare and for fair prices to reach organic farmers.

A bringer of change – Elm trees and Elm Farm

Thomas Döring

"There are no trees more typical of rural England than the elms. They belong, not to the forests, but to the farmlands, towering above lanes and hedgerows and standing sentinel on village greens."
Barbara Briggs (1936)

When the Organic Research Centre was founded around 30 years ago, it was seen as an appropriate gesture to mark the event with the planting of a tree. Since the place on which the organization was about to take roots was previously called "Elm Farm", it was natural to choose an elm tree for this occasion.

This choice could perhaps not have been more appropriate. Indeed, the elm, as indicated by the quote above, has a special relationship with British farming. It is, however, not merely a landscape feature, but also a useful tree, and full of deep cultural meanings.

The two most important elm species in the UK are the English Elm (Ulmus procera) and the Wych Elm (Ulmus glabra), the latter one with usually much larger leaves. A prominent feature of elm leaves is their asymmetry, along with being teethed. The fruits are winged, helping them to disperse with the wind. What makes elm biology especially interesting, but also intricate, is the tendency of elm species to hybridize. In many cases, botanists will only be able to make a best guess as to which species of elm they have encountered. Fascinatingly, with this ability of hybridization, elms are evolving fast, adapting to an ever changing environment. Among the drivers of this evolution appear to be the devastating sweeps of Dutch elm disease, a fungal disease transmitted by a bark beetle.

In the past, elm leaves have been frequently used as livestock feed. Elms are therefore a good starting point for thoughts on agroforestry systems. Agroforestry, i.e. the integration of trees and other perennials into farming systems, plays a prominent role in the research programme of the Organic Research Centre, and its main research farm is even called "Wakelyns Agroforestry". Elm wood has been utilized for various purposes. Valued for its resistance to decay under wet conditions, it was used for coffins, bridge foundations, and water pipes. Elms even had medicinal relevance, as the boiled up inner bark was used to treat sore throats.

Beyond the more practical aspects of utilizing various parts of the elm tree, however, the elm is also a powerful symbol. And the symbolisms attached to the elm prove more than apt for the Organic Research Centre. Because of its winged fruits, the elm tree was traditionally associated with Mercury, the winged messenger god and bringer of change. Founded in times when organic agriculture was still a revolutionary idea, the Organic Research Centre has always striven to bring about much needed ecological change in agriculture, and to disseminate novel ideas as widely as possible. The elm and its fruits may therefore serve as appropriate icons of the Organic Research Centre's disinclination to accept the status quo.

A further appropriate metaphor emerges in the modern world in the ability of elms to hybridize. Elms thereby elude strict classification and defy thinking in boxes, but also show us examples of tremendous natural diversity. For an organization that likes lateral thinking and celebrates biological diversity in many of its research projects, the elms (in the plural) therefore provide another reason to stand as a suitable symbol.

Finally, the elm was a symbol of death in ancient times. This connection, at first, is of course quite alarming. However, a closer look reveals that also this link can become a source of inspiration. One of the deeper motivations for the organic movement is the acknowledgement that eternal, limitless growth is impossible. The refusal to deny such limits brings with it the need to recognize the importance of closing resource cycles, one of the key features of organic agriculture.

For most of the past 30 years, the Organic Research Centre has been known to many people simply as "Elm Farm", with an elm tree as the main feature of the organization's logo. That elm tree planted three decades ago at the entrance gate of the headquarters is still there, thriving, and dispersing its winged fruits. Long may it flourish.

Organic Research Centre 30th Anniversary Events

Friday 16th July
Open Day at Elm Farm

Catch up with old friends - see our work, visit the new conference centre and offices and talk about organic principles, best practice and the implications for research and policy. There will be a programme of events, field visits, food and drink in a friendly and informal atmosphere throughout the day. Please register your interest via elmfarm@organicresearchcentre.com or call us on 01488 658298.

Saturday 17th July – Community Open Day and Food Festival at Elm Farm

Celebrating the best local and organic produce with a food festival in the courtyard, events during the day (including a 'bug hunt' on the farm trail as part of the Hungerford Community Arts Festival www.hadcaf.co.uk) and other attractions.

17th/18th January 2011 – Special 30th Anniversary Organic Producer and Research Conference

Held at Cotswold Water Park Four Pillars Hotel near Cirencester. Our annual conference promises to be better than ever, with a new venue and new ideas, but with the same commitment to putting organic producers first and providing a friendly, sociable environment for sharing views and experiences. Please register your interest via elmfarm@organicresearchcentre.com or call us on 01488 658298.

The Organic Research Centre – Elm Farm • Hamstead Marshall • Nr Newbury • Berkshire • RG20 0HR • United Kingdom
Tel: +44 (0)1488 658298 Fax: +44 (0)1488 658503 Email: elmfarm@organicresearchcentre.com
Web: www.organicresearchcentre.com • www.organicinform.org | Registered Charity Number: 281276 Company: 1513190