



Official Participant

Rapporteur report back from Expo Scientific Event

Event Title :	Agroecology and ecological intensification for a sustainable food future	Date:	13 – 14 July 2015
Event Organiser:	JRC – Maria Luisa Parrachini and Marco Bertaglia		
Event Target Group:	Researchers, policy makers and other Stakeholders concerned with agriculture and its environmental and social impacts		
Rapporteur:	Allan Buckwell		

1. Which research themes are concerned? (Tick all relevant areas)

- A: Improve public health through nutrition – healthy and sustainable consumption **yes**
- B: Increase food safety and quality **yes**
- C: Reduce losses and waste – more efficient food chain - **yes**
- D: Manage the land for all ecosystem services – sustainable rural development **yes**
- E: Increase agricultural outputs sustainably – sustainable intensification **yes**
- F: Understand food markets in an increasingly globalised food system **Yes**
- G: Increase equity in the food system **yes**

2. What are the challenges and why do they exist?

This event was conceived to examine the potential applicability of agroecology and the related concept of ecological intensification to the conditions of agriculture in the European Union, could it be mainstreamed for EU farming?

Interpreting these concepts in the broadest way it is claimed that they can contribute towards all of the seven themes embraced in the Scientific Committee paper, that is the consumption, production and trade issues as well as some of the social concerns too.

The concept of agroecology was created and much of the early work on it was conducted in the context of Latin America and the event was privileged to have one of its pioneers, Miguel Altieri, as a keynote speaker. However there has been a strong resonance to and development and application of agroecological principles in many (most?) parts of the world. In Europe, until the recent and striking decision of the French government, there has been no officially encouraged drive to encourage agroecology. But of course there is a long and rich tradition of development of alternative agricultural production systems which embrace many if not all of the principles of agroecology – which we could refer to as ecological intensification including bio or organic farming. There are also many examples where individual, or groups of, farmers have explicitly developed farm systems based on agroecology. The programme included a Belgian example (Graux Estate – Simon and Peeters), an Italian case study (at Corbaribio – Minconetti) and a series of examples assembled in France (Solagro – Pointereau). The French decision to set the ambitious target of having 50% of farms operating according to agroecology by 2025 was explained by Guilhem Brun from the French Ministry of Agriculture. Other presentations examined opportunities and obstacles to mainstreaming agroecology and the implications for policy, research and farming (Schmutz), whether ecological intensification can

simultaneously increase biodiversity and crop yield (Smith), and Wezel presented a comprehensive review of the potentials and constraints for agroecology in the EU context.

These reviews were complemented by organisational views from the EU Commission, DG Agri (Visek) and from the FAO (Batello).

The core of the argument about agroecology is that current conventional agriculture as it has evolved in the 20th Century has over-simplified, over-intensified, and reduced diversity at every level (around crop roots, in fields, farms, regions and continents) and in the process caused considerable damage – not least to biodiversity and climate, caused water pollution and nutrient excess, and contributed to soil erosion. The argument is that these problems have arisen because the agricultural systems developed have not followed what are claimed to be the scientifically based principles of agroecology. Of course those who provided the research basis of conventional agricultural systems, the crop and animal breeding, the crop protection, animal health and management systems will claim they too have followed sound scientific principles - including trying to understand the ecology of agriculture and the insects, fungi, weeds, microbes seen to compete with crop production.

The strong claims are made for Agroecology by Altieri were based on the experience gained in the region in which it is most prevalent and successful – in (parts of) Latin America – Altieri claims (a) that the conventional model of ‘industrial agriculture’ is doomed (“heading for an iceberg”, he says), and (b) that agroecology can be the best adaptation to (and mitigation of) harmful climate change, the best way to restore biodiversity around agriculture, and genetic diversity in agriculture, to restore soil organic matter and fertility, reduce water pollution. Furthermore it is claimed that farming systems following the principles of agroecology can increase crop yields for the overall system, reduce labour (this was less clear), and certainly reduce fertiliser, crop protection and cultivation costs, they are claimed to provide higher quality products which will increase selling prices of products and thus improve profitability potentially by both lower costs and higher revenues.

The evidence behind these claims is based on analyses of agroecology mostly from Latin America, and rather more anecdotally from case studies in Europe.

Altieri’s narrative on agroecology reaches far beyond the pure ecology of agriculture, he has it arising from a grass-roots, social movement of farmers and peasants seeking social justice and trying to resist what they see as the over-powerful operations of multinationals who he says ‘control’ (I would say exert oligopoly power in) the markets for fertilisers, seeds, crop protection products, agricultural machinery and food processing and distribution in much of the world. Altieri’s version of agroecology therefore extends much wider than just primary food production. It embraces an emphasis on establishing shorter, more local food chains, seeking to embrace the processors and distributors margins on food production. It then talks about food quality and improving diet. It is therefore posits a very different international context than the adherence to freer trade as embraced by the EU (and for that matter the big agricultural exporters of Latin America).

It goes further in criticising the bias in private sector R&D towards the ‘industrial’ model of agriculture, but claims that publicly paid R&D in agriculture shows the same bias seen as nurturing the industrial model of farming and with a current over-emphasis on biotechnology.

This narrative therefore has the modern high-input / high-output agriculture (where inputs refer only to the specific inputs of fertilisers, crop protection chemicals and mechanisation) as responsible for the pollution and biodiversity degradation of agriculture. It goes further and holds the research establishment and the industries which support this approach as responsible for bringing about these challenges, and dominating, some say, over-dominating, the direction of agricultural research budgets. This is seen as a top down – take it or leave it - approach to farming technology. In contrast the agroecology approach starts with the practices of traditional farmers. It tries to understand the practices which were successfully applied for centuries and which therefore could be claimed to have been completely in-tune with nature and

sustainable – but ‘pushed out’ by ‘modern agriculture. Agroecology tries to understand the principles underpinning these systems.

This rapporteur has tried to summarise and not caricature the concept. It was clear that the ‘Andean’ model of agroecology embracing the social movement, and the whole food chain is not the only way to interpret the concept. The European case studies presented had a very different social and institutional (land tenure) setting, but they certainly included the bottom-up participative approach as well as the key principles of mixed crop-livestock farming (and afro-forestry), encouraging genetic diversity and mixed cropping systems.

Some speakers pointed out that historic farming systems did not hold all the answers, the conditions of rural life were not all beneficial, they were associated with poverty, poor work and social conditions, and lower life expectancy.

3. What will happen if the challenge is not addressed?

- Short Term Consequences
- Long Term Consequences

According to the supporters of agroecology:

Short term – continuing: biodiversity degradation, soil erosion, fall in soil fertility, pollution of water and atmosphere, and production of unhealthy (or less healthy than it could be) food.

Long term –the collapse of industrial agriculture. Nothing less. This was not debated, although it could be and perhaps should be.

5. What were the suggested solutions, research insights and/or policy proposals? Were specific new research or development actions identified?

The above narrative of Agroecology followed the Altieri approach based on Latin America where it truly arose as a bottom up social movement to combat the deep inequities of access to land and resources , and the extreme imbalances in market and political power. However the bulk of the discussions at the event concerned alternative interpretations of agroecology, and perhaps a transitional route towards agroecology via a path of ecological intensification. Much of the formal and informal discussion at the event considered how these ideas might contribute to the future development of European agriculture. These showed up in the case studies and analyses of Schmutz, Smith, Wezel, Peeters and Simon, Pointereau and Minconetti.

All agreed that agroecology is not a recipe for farming. The nature of any agroecological system will be highly context specific – climate, soils, other aspects of the environment, farm structures, land tenure, governance institutions, culture and history. All agreed that agroecology is a set of **principles**. *It seeks to be the science of how agricultural ecosystems work, in the same way that ecology is the science of how natural ecosystems work.* Examples of the principles are: the farming is based on local knowledge, it always integrates crop and livestock farming – often with agro-forestry too, it is based on wide genetic diversity and diversity of crops at farm and field level, and it works explicitly with natural cycles (N, P, C and water) cycles). From these principles are derived the **practices** to follow them in any particular farming context, and these practices themselves should support certain **processes** (nutrient cycling, natural weed and disease control, soil fertility building, and sound water management) which in turn should be checked by indicators – both for farmer control and for science to see how the system is operating. Another way of characterising agroecology (following Wezel) is to note that it is, or can be, a **scientific discipline** (the ecology of agricultural cropping), it can be/leads to **a set of practices**, and it can be **a social movement**. Wezel’s implication is that it does not have to be all three.

Agroecology (AE) vs Ecological Intensification (EI). Ecological intensification can be seen as a somewhat more partial, or less comprehensive, less holistic approach, but which could, nonetheless improve the (environmental) performance of an agricultural system. It too is based on the AE principles. It therefore

shares the core foundation of agroecology but stops short of the full food chain and social integration which some claim are the core and intrinsic part of agroecology. Both AE and EI differ from the kinds of schemes which have been developed in European agriculture in recent decades (eg integrated farming, conservation farming, and even organic farming) in that these systems do not subscribe to the full set of AE principles. Perhaps this is a contested statement. One way of characterising this is that these schemes provide agricultural practices which may well help biodiversity, but they do not set about to create the maximum beneficial effect of biodiversity on the agricultural practices. A graphic example of this is the use of field margins of flower-rich strips round large arable fields. The beneficial impacts on this via natural pest protection, below ground soil fauna and microbial interaction effects and pollution buffering effects are exhausted a few metres into the crop away from the buffer. This is why there is a strong tendency in agroecology to have crops inter-mixed in relatively narrow strips – necessitating quite different approaches to the cultivation, harvesting and other management and marketing of the crops.

What repeatedly came out of the discussion were some strong lessons for research.

- First, it was alleged by several speakers that there has been and remains a systematic bias in research funding for conventional agriculture (despite its shortcomings) and against agroecology.
- Second, agroecology research has to operate in a participative way building in, if not starting from the farmer input.
- It has to be holistic, and therefore trans-disciplinary.
- Some suggested that in Europe, in the absence of the bottom-up social movement driving towards agroecology, this will have to be replaced by a more concerted research effort to provide the evidence for the benefits of AE in EU conditions. This in turn may need both the scientific derivation of predictions from the AE principles, then predictive modelling of these effects, and eventually empirical analysis of cases in the field. There is certainly a necessity to develop indicators and evaluations of agroecology and ecological intensification in practice, and from such analyses to produce well-founded benchmarks to guide future developments.
- Two further intriguing research related questions emerged.
 - First, that it may be there is a structural problem for researching the development of agroecology systems which is that such systems will not in general be patentable. Therefore the developers will not be able to recoup their research investment. This perhaps suggests there has either to be a strong willingness for participatory farmer led (and paid-for) research, and/or much of this research will have to be publicly funded.
 - Second, who will develop the multiplicity of seeds/genetics which characterise the much larger genetic diversity of agroecological systems?

6. What are the expected benefits and risks of such initiatives?

The potential benefits are an agricultural system more in tune with nature, making more enduring use of ecosystem services and yet contributing to the basis of the provision of those services, which will therefore be less polluting, less extractive, less damaging of biodiversity. The full agroecology model also claims to deliver better quality food to more local consumers and will be healthier. This is claimed because it is grown on more fertile soils which have not been depleted of soil biodiversity, and the beneficial microbes, minor nutrients and trace elements as may be the case in foods grown on depleted soils. The result should be more satisfying to consumers.

One risk could be the political risks of trying to encourage, incentivise, induce, or mandate the switch of EU agriculture to agroecology when the evidence base, knowledge base, advisory assistance to persuade farmers to do it are insufficient.

It seems at first blush that agroecology demands more knowledge than conventional farming. As well as the

usual knowledge of cultivation, harvesting, breeding, feeding, managing and marketing crops and animals agroecology also requires understanding of the subtle and complex principles of ecology of soil, crop plants, farm animals and the pathogens, parasites, weeds which co-exist with agriculture. Plainly the designers of the case study agroecology systems portrayed at the event (Simon, Peeters, MInconetti, Pointereau) did have this expert knowledge. How many farmers across Europe have had any ecology in their training? But perhaps just as the users of plant protection and animal health products in agriculture do not require higher degrees in biochemistry, it will not be a prerequisite that the farmers following sound agroecology principles have higher degrees in ecology. That said, starting with the simplified agricultural systems which have evolved over the last several decades, the diversity and thus complexity at multiple levels which are core principles of agroecology – are likely to require more knowledge intensive management, and then marketing of a wider range of products. There is a significant transition process to be mastered if agroecology principles are to be come mainstreamed into EU agriculture. It will be interesting to watch how the French approach this task.

Another risk is that the gains in productivity, and the reductions in costs and increases in revenues claimed for agroecological systems simply don't materialise. This would potentially bring about higher EU food prices or imports or both. The impacts on the public costs of supporting agriculture would be intriguing to analyse. Taking the claims of agroecology at face value, if it really did simultaneously improve productivity, profitability and environmental performance, then the public costs of support might even fall. Analysis of such questions is simply beyond current capabilities. There is neither the data nor the analytical models which integrate economic and ecological principles. (Note the author makes this assertion about analytical capabilities, ie modelling agricultural systems, based on his experience on the scientific committee of a FP7 project SATBBE which looked at the state of the art in systems analysis of agricultural systems examining the bio-based economy, and found that the environmental dimension is not well modelled.)

This points to an important and recurring point which came up at the event. This concerns the establishment of an evidence base on agroecology. This will be necessary first to guide farmers who wish to move towards agroecology in both the technicalities of how to do it and the likely economic impacts. Second it will be necessary to guide policy on whether and how to incentivise a move in this direction and to deal with likely impacts of such a policy move. The latter requires the development of analytical tools to assess the likely market reactions on factor markets (land, labour, machinery, fertilisers and so on) as well as product markets of a wholesale switch to agroecology. These are not trivial tasks and would require significant resources and time.

7. Does this event address research challenges others than those in the discussion document ?

It certainly takes a much more integrated approach to issues C, D, E and G in the Sci Cttee document. We did not explicitly contemplate a wholesale switch towards agroecology in EU agriculture and the research needs of such an approach. I asked the event participants to look at our document and offer their criticisms/comments – especially on the research questions and approach.

I suspect there may be some criticism that our document does not consider agroecology fully or seriously enough.

8. Did this event point out gaps in the private and public research infrastructure/systems which should be addressed?

Yes, see 5 and 6 above.

There was strong support in this event for the Sci Cttee recognition that a more holistic approach has to be taken which is trans-disciplinary, and also that the gap between the research community and farmers has to be closed with more active farmer participation.

The agroecology supporters would be more insistent that farmers have to be actively engaged from the outset in the research process. The top down approach in which farmers are informed that they will be told the right way to grow their crops and all they have to do is to follow the instructions on the packet is NOT the approach. How to do this with a highly fragmented agriculture is not a trivial question.

9. What best practices were mentioned at this event?

This event was fundamentally about system change, moving to agroecology principles and emphatically not about just moving to a miscellaneous set of better or best practices.

Finally note that whether and how agroecology or ecological intensification could fit into the CAP was frequently referred to. It is clear that CAP adaptation can only move incrementally, but there is no reason in principle why CAP could not assist a move towards agroecology if European citizens and farmers thought this would be the right thing to do.

10. What follow-up actions emerged from this event?

To ensure we look again at whether and how we dealt with agroecology in our report, and the research questions it throws up.

An excellent feature of the programme was a two hour panel session which examined five questions (annexed) on the applicability of agroecology in the EU, which attracted contributions from a great many of the audience as well as all the speakers. It is intended that JRC will try and capture these debates and conclusions and produce a paper to which participants can contribute so take the issue further. This could be a useful part of expo 'legacy'.