Actual and potential role of Organic and traditional Agriculture for the Conservation of Biodiversity

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In: Stolton S, D. Metera, B. Geier & A. Kärcher (eds.) 2003: The Potential of Organic Farming for Biodiversity. Münster (Landwirtschaftsverlag), p. 67-78.

The positive effect of organic agriculture (OA) on the biodiversity of cultural landscapes compared with intensive conventional agricultural systems is proofed manifold. OA therefore is more and more considered as important partner within a comprehensive, holistic strategy for the sustainable conservation[1] and development of biodiversity.

The requirements of OA as represented in the OA standards contribute to biodiversity, for example, by no use of chemical fertilisers, no use of synthetic pesticides and limited number of animals per area. As a result of these restrictions the farmer has a particular agronomic interest in a functioning, stable and diverse ecosystem of beneficial organisms.

However, with regard to biodiversity issues and nature conservation this is not sufficient. Additional measures are necessary. In respect to the future role of OA for biodiversity conservation three important questions are not yet sufficiently answered:

- What is the established contribution of OA to biodiversity conservation in relation to the aims of the biodiversity convention (CBD) and modern biodiversity conservation concepts?
- What are the mechanisms of the positive biodiversity effect of OA?
- How far could and should the contribution of OA be improved and optimised? Where are specific potentials, where basic limits?

The Bio-LEA project[2] analysed these questions through a literature review, research, by a discussion within OA representatives from all continents (Bosshard in prep.), and by on-farm pilot projects. Based on the results we deduced a strategy to improve the effect of OA for biodiversity conservation, which also respects economic sustainability. The project was sponsored by several foundations and ran from 1999 to 2002. It is located at the *Agricultural Department of High School of Spiritual Science, Goetheanum, Science Section*, Dornach/CH, and carried out by the *Research and Planning Institute Litzibuch*, Oberwil-Lieli/CH. The following main conclusions were drawn from the results:

I. The significantly higher biodiversity of organically cultivated fields compared with intensive conventional fields concerns mainly the "agronomic biodiversity", i.e. species which are typical for more or less intensively cultivated sites and which often play an important role for the ecological stability of agricultural systems ("beneficial organisms").

II. From a scientifically-based biodiversity conservation point of view the presence of *rare, endangered or endemic species* represents a main goal, not agronomic biodiversity. Decisive for the survival of those nature conservation key species is the presence and management of low or even non-productive sites and habitats on a farm. Only here can specialised organisms find conditions for survival in adequate population sizes. In this respect the production system has only a little direct influence.

III. Up to now biodiversity was not a major issue for the OA movement. The importance of biodiversity was considered relevant only as far as production purposes go, particularly within soil and in respect to beneficial organisms. Accordingly, only very few of the OA organisations standards (including the IFOAM basic standards) have particular principles aiming to conserve or raise biodiversity as an agricultural issue *per se*.

IV. But there are important indirect relations between organic principles and nature conservation. The low or non-productive habitats in a cultural landscape stay in a complex and intensive a-biotic and biotic exchange with the intensively used agricultural land: E.g. many species are not restricted to the boundaries of these habitats, but use also agricultural land e.g. for hunting, or rivers and wind may carry fertilisers and pesticides into the conservation islands. Thus organic fields with e.g. the higher density

1 Besides the conservation the development of biodiversity is, particularly in depleted landscapes, an equally important, complementary issue. In the following text we subsume both "conservation and development" in the term conservation.

2 Full name of the Project: ***Bio****cenotic and* ***L****andscape* ***E****sthetical Standards for Organic* ***A****griculture.* In this contribution only the biocenotic part is at stake.

of host and prey organisms, or the absence of synthetic agricultural pesticides increase the quality of the conservation habitats as well as the survival rate of the conservation target species living there.

V. Moreover, the effect of organic principles influences not only the quality and species pool of those "hot spots", but also supports the integration of those habitats into the farm system, i.e. as unlimited fertiliser is not available, fertilising is concentrated on the most productive sites, and space is left for low or non-productive sites.

VI. The effects mentioned in IV and V depend on the analysed species groups, crops and climatic conditions. However, they are not yet sufficient to reach the "minimal aims" of biodiversity conservation concepts, where particular measures like the establishment of ecological networks, protection or restoration measures for endangered species and habitats or management and development concepts on landscape level are demanded (see e.g. the recent eco-quality scheme "Öko-Qualitätsverordnung" in Switzerland).

VII. Until now, most organic farmers have realised an important part of these measures voluntarily. Quantitatively this individual engagement seems to be significantly more important for the biodiversity on farms than the effect of particular organic principles (see fig. 1). The same view of life that leads a farmer to the decision to farm organically might be related with a higher consciousness, knowledge and motivation to a more biodiversity friendly farming behaviour.

VIII. Therefore OA in the present form seem to provide by its principles a most suitable and important system *fundament* for a biocoenotically sustainable agriculture. But the full biodiversity potential of agriculture can only be realised when OA is combined with particular additional measures.

IX. The additional measures can be realised within other agricultural production systems too. But because the system approach of OA, which aims to support ecosystem functioning on field and landscape level, provides a particularly suitable fundament for high biodiversity, additional measures are more effective and easier to realise within OA than in conventional farming systems.

In co-operation with farmers and in discussion with organic certification organisations the Bio-LEA-project outlined strategies for a systematically better realisation of the biodiversity potential of OA. Four fields of particular improvements have been identified based on an analysis of the individual measures realised by farms with high biodiversity performances (list ranged according to decreasing importance):

1) Restoration and/or integration of species rich low productive, non-productive or non-farmed habitats on farm area with priority of nature conservation.
2) Implementation of particular measures on small parts of areas with production priorities or at the margins of those areas to enhance biodiversity, to establish ecological networks and to improve landscape quality, e.g. by the establishment of species rich field margins or the delimitation of particular buffer zones beside species rich habitats or water courses.
3) Optimisation of cultivation measures towards biodiversity conservation on plots with production priorities in harmony with production requirements, e.g. adaptation of cultivation sequence to the breeding behaviour of birds, or minimising pollution.
4) Generally supporting or raising farmers knowledge and creativity in developing and implementing farm-specific, individual biodiversity measures.

An improvement in four areas can, in principle, be supported or realised by:

- education/information/motivation; and/or
- standard setting/regulations, eventually in combination with subsidiary payments and/or additional labelling.

Experiences mainly in Switzerland, where a sophisticated system of biodiversity standards is implemented for the whole agriculture (integrated and organic production) since the beginning of the 1990s, show that education and motivation are important. But standards are much more effective, particularly when directly combined with economic incentives, to motivate farmers to consider landscape and biodiversity as an important product of agriculture. Moreover, the standards catalysed an important process of subsequent actions and measures, like biodiversity education programmes for farmers and advisers, biodiversity research and monitoring projects, conceptual improvements of the standards, practical improvements of the efficiency of particular cultivation measures etc.

Therefore the Bio-LEA project identified a key role in the formulation and implementation of new biodiversity and landscape standards within the IFOAM Basic Standards (IBS). While in the basic IBS-chapter "The principle aims of organic production and processing" the protection of plant and wildlife habitats is declared as a

principle of organic agriculture, the present standards itself do not reflect this adequately[3]. This gap has to be filled.

Today, the biodiversity movement is generally only at an initial stage of ascertaining what concerns the establishment and the implementation of concepts, principles and standards to measure, promote and label biodiversity issues. In an agricultural context, three main challenges arise for the formulation of sound, broadly accepted standards4.

1. Farm economy

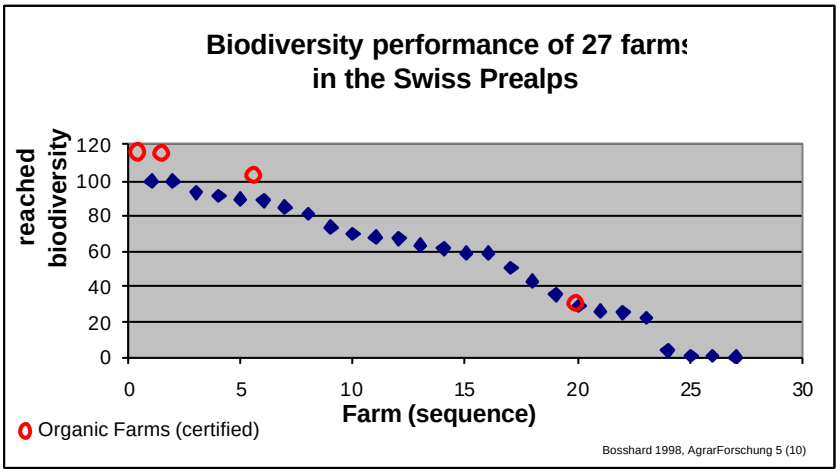
The economic situation of OA in many countries is critical, particularly when compared with conventional agriculture. Therefore it is a prerequisite that new standards must not harm the economic situation of a farm. This was one clear result of recent discussions in an international framework within IFOAM (Bangkok Nov. 2001, Tholey-Theley Dec. 2001, Warsaw March 2002) about possible biodiversity and landscape standards.

At the same time discussions by expert groups revealed an impressive list of examples from all over the world of biodiversity measures that are able to support farm income: e.g. biodiversity measures as a basis for ecotourism in a region in Kenya or the impressive example of Forest Garden Products, an IFOAM member organisation in Sri Lanka that has developed a sophisticated system of synergies between biodiversity issues and production purposes (see paper above). In moderate climate regions there is also no lack of good synergy examples, some based on subsidiary payments (as a "special case" for richer countries but with an increasingly high importance on the sustainability and "survival" of agriculture particularly in Europe), others on the reduction of work load or on the prevention of degradation effects in mountain grasslands by non-adapted fertilising.

Farms that have a particular engagement in biodiversity conservation do not necessarily have lower profitability than those without the biodiversity concentration, indeed they can show better economic success. An example is provided in the study referred to in figure 1. Here three of the four organic farms which were part of the "biodiversity top class" had the highest cow density of *all* farms in the region. This means, that on those farms high production was realised *together* with a particularly high biodiversity. The main reason in this case was that these farms realised the concept of "differentiated cultivation intensity", i.e. rather than fertilise their land uniformly, they fertilise with a high precision according to the production capacity of every plot. On "bad" sites, they realise an extensive cultivation with a high biodiversity, while at the best sites the yield is maximised. So this system prevents the meadows from a the degeneration of the turf, which in subalpine regions is a widespread consequence of a non-adapted, too high fertilisation. This degeneration decreases the yield and quality (and species richness) of meadows significantly on many conventional farms, resulting often in lower yields than "differentiated cultivation intensity" systems.

Figure 1
Realisation of the farm specific biodiversity potential on 27 farms the Swiss Prealps

Three organic farms (red circles) are within the "top group", while one farm shows a bad biodiversity performance and is lower than the average of conventional farms (blue squares). The different performance of the farms is mainly an effect of individual practices and is only attributable to a very small extent of farming guidelines. From Bosshard 1998, adapted.



3 In the section "3.4. landscape/farmscape" there is only one standard saying "The certification body's/ standardising organisation's standards shall include relevant measures for the provision and improvement of landscape and biodiversity."

2. Need for a regional approach

A further challenge of formulating biodiversity and landscape standards is provided by the high variety of climatic conditions, conservation priorities, species compositions, cultivation methods, traditions and farm structures in different regions of the world. Each landscape and, in the extreme, even every farm needs its own specific measures to conserve its particular biodiversity. The new standards therefore should focus on the need to develop nationally and regionally adapted solutions (i.e. national or even regional standards) and should give clear guidelines how to identify and to realise or optimise the regionally or locally specific landscape potential for biodiversity.

3. Identifying general principles

It is also necessary to identify fundamental, generally valid principles (standards). Such general, measurable standards for species conservation and habitat management are difficult to formulate due to the above-mentioned variety of conditions and priorities. A good example for a fundamental principle of OA in the field of a-biotic sustainability is the principle of closed nutrient cycle. Some fundamental principles concerning biodiversity standards are included in the standard proposal (annex 1).

Perspectives

Bio-LEA (**Bio**cenotic and **L**andscape **E**sthetical Standards for Organic **A**griculture Project)
criteria list for the screening the most suitable standards and recommendations

The standards should be as far as possible (listing not reflecting priorities):

- simple (with regard to administration, farm implementation and control)
- have no negative and preferably have positive effects on the farm economy (synergies)
- LEA -relevant (touching key processes or functions of LEA-aspects)
- concrete (leading to visible and measurable actions)
- promoting the understanding and motivation of farmers regarding LEA-aspects on farm-level
- easily to communicate (consumers, politicians)
- generally implementable in the given scale (i.e. in every landscape type within the given perimeter, every farm type and under the different prerequisites of available data)
- suitable to develop into regionally adapted and farm-specific measures

The importance of good biodiversity standards will increase over the next years for three main reasons:

1) In countries where OA realises a higher farm income than conventional agriculture (as in some European countries), an increasing number of farmers will convert to OA for economic reasons. They often do not share the biocentric world view which is typical for organic farmers. Accordingly they lack a personal motivation to do more than necessary concerning biodiversity issues, and the amount of "black sheep" organic farmers with low or negative performance for biodiversity (see figure 1) will increase[5].

2) The importance of agricultural subsidy payments linked with particular external positive effects of agriculture will increase (WTO green box; increasing consciousness of society for the necessity to pay for good landscape quality as an external effect of agriculture). Thus good biodiversity standards might and should be linked with particular payments, which could improve the economic situation of farms significantly.

3) Biodiversity is being established as an important marketing instrument (e.g. "bird friendly coffee").

The following measures should accompany the development and implementation of new biodiversity and landscape standards:

- National pilot projects should be initiated where national standards are developed in an exemplary way.
- The education of advisers will play a crucial role. They should be able to recognise potential for biodiversity conservation on individual farms and develop or identify solutions that are agronomically and economically sound or which bring economic or agronomic advantage to the farm.
- At the same time programmes should be established for the better education of farmers in the field of species knowledge, landscape ecology, landscape aesthetics and similar issues.

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4 Some more prerequisites beeing respected in the standard proposal (annex 1) are listed in the box on page xx [Bio-LEA criteria list...] .

5 However, in the long term organic requirements, knowledge and experiences bring many farmers to new viewpoints and new convictions. Experiences also show that "economic hard-liners" become more and more aware that only a holistic approach respecting the rules of nature (including high, stabilising biodiversity for pest control) will assure a successful organic production, and that the implementation of the mere standards is not sufficient.

- For the development of a future strategy it should be noted that the motivation and the points of view of conservationists on the one hand and farmers as producers on the other hand differs considerably concerning biodiversity issues, as shown in Table 2. It is important to realise those differences and to create a constructive discussion about the respective issues.

Conclusion

When the UK Soil Association states: "Organic farming is the best way of reversing the decline in biodiversity" (www.soilassociation.uk/home), we have to reply based on the analysis of this project that: Organic farming has a high and possibly decisive *potential* for reversing the dramatic decline of biodiversity in the cultural landscape. But distinct efforts must be taken to better develop it. A combination of present organic principles with particular biodiversity conservation measures seems to open new and important synergies between agriculture and biodiversity issues.

A key role will be played by a respective adaptation of the standards on the basic (IFOAM) level as well as on national or even regional levels.
The perspectives of good biodiversity and landscape standards are promising, since:

- Available experience shows that there is a considerable and divers synergy potential between biodiversity conservation and farm income.
- Biodiversity standards can be considered as a very effective "starter kit" motivating people to think about conservation issues in agriculture on different levels. Biodiversity standards are able to trigger a process of biodiversity-agriculture-related innovations not only on-farm, but also in the field of education, research and practical cultivation measures,
- Biodiversity issues based on the measurable and controllable performances of farmers are more and more important as a basis for financial farm subsidies and, at least in some countries, for consumer decisions for buying organic products. Measurable biodiversity performance is a potentially strong PR and marketing instrument. Therefore the importance of biodiversity measures for farm economy and the public appreciation of OA will increase.

The sound development of good, sustainable, measurable biodiversity standards has a fundamental importance as basis for a future co-operation between OA and conservation endeavours, for the justification and adaptation of agri-political measures supporting OA, as well as for the ongoing modernisation and establishment of OA.

Table 2
Interests of conservationists versus interests of farmers - and identification of (non)synergetic fields. A contingency table.

What are the issues?	Conservation of biodiversity		Organic agricultural production		Possible synergies to analyse and develop
Aims	Impor-tance	Remarks	Impor-tance	Remarks	
Conservation of rare or endangered native species	+++++	Central issue. For most important species only possible on special, low productive, unproductive or even uncultivated sites	+	Positive as far as no negative consequences	Payments for conservation activities
Conservation of sustainable populations of all native species in a region	+++	Recent, but more and more important aim. Whole landscape focus, with cultivated areas of high importance	+	Positive as far as no negative economic consequences	Payments for conservation activities as well as for particular cultivation methods
Recreation of biodiversity (e.g. by restoration of species rich sites or reintroduction of species like lynx)	+ to +++	A relevant issue in only some industrialised countries	o to +	Nothing against as far as no negative consequences, in some cases positive for enhancement of benef. organisms	Payments for conservation activities. In most cases difficult to find an overlap.
Landscape amenity (as far as aspects additional to landscape ecology concerned)	+ to ++	Only a relevant issue in some industrialised or tourist countries	o	Nothing against as far as no negative consequences	Payments for conservation activities. In tourist regions an effective synergy. Direct marketing possible in combination with holidays on farm
Promotion of beneficial species	o or +	Usually not relevant for conservationists	+ to ++	For organic farming an important issue	Only little overlap, try to maximise side effects and mutual conscious raising
Rich and active soil biota	o	No consciousness, because no knowledge on soil biodiversity	+++	Central issue for organic farming	Only little overlap, try to maximise side effects and mutual conscious raising
Diversity of crops	+	Mosaic structure increases habitat quality	++ to +++	Important in arable crops	Important synergies for some species
Genetic diversity and adaptivity of native species	++	Ensuring population sizes that allow long-term survival by ensuring habitat quality, minimum areas and ecological networks	o		(difficult to raise synergies)
Genetic diversity of cultivated plants and breeds	o or +		+ or +++	Different engagement	Clear synergies possible

Annex 1: Existing Paragraph in IFOAM Basic Standards (IBS) and Proposal for amending Biodiversity and Landscape Standards

Existing Paragraph in the IBS

3.4. Landscape/Farmscape
General Principles
Organic farming should contribute beneficially to the ecosystem.

Recommendations
Areas which should be managed properly and linked to facilitate biodiversity:
- Extensive grassland such as moorlands, reed land or dry land
- In general all areas which are not under rotation and are not heavily manured: extensive pastures, meadows, extensive grassland, extensive orchards, hedges, hedgerows, groups of trees and/or bushes and forest lines
- Ecologically rich fallow land or arable land
- Ecologically diversified (extensive) field margins
- Waterways, pools, springs, ditches, wetlands and swamps and other water rich areas which are not used for intensive agriculture or aqua production
- Areas with ruderal flora.

The certification programme should set standards for a minimum percentage of the farm area to facilitate biodiversity and nature conservation.

3.4.1.
The certification programme standards shall address measures for the provision of and improvement of landscape and biodiversity .

Proposed motion text to amend the existing text above:

Proposal for recommendations
[in addition to the existing text, see above]
Standard setting organizations provide the necessary help/assistance to realise the standards below (by e.g. short written guidelines with good examples and/or by the advisers)

Proposal for Standards
[instead of the existing text, see above]

2.1.2. Each organic production entity identifies and implements at least one measures each a) on farm and b) on field level which promotes biodiversity and landscape amenity significantly and which also brings economic or other advantages (synergies).

2.1.3. Environmentally sensitive areas, such as wetlands, native grasslands, orchards and rivers, shall be managed with particular care according to the needs of these ecosystems. They should be protected with an appropriately broad, effective buffer zone against input of fertilisers or other undesirable materials or practices.

2.1.4. Standard setting organizations develop further criteria and guidelines on a national and/or regional level for promotion of biodiversity and landscape amenity.

Explanatory notes
A number of IFOAM Member Organisations feel that the existing text in the IBS is not sufficient and that it could bring IFOAM in a less favourable position compared to other environmentally friendly programmes and the claims that the organic farming movement is making towards the public. Therefore the author, together with the Research Institute for Organic Agriculture in CH-Frick, have proposed a new section in the IFOAM Basic Standards for discussion at the IFOAM General Assembly in August 2002.

The proposed IBS text is a result of an international workshop in November 2001 in Bangkok. The proposed text identifies some of the most basic principles and possibilities that could be achieved by farmers on a locally adapted level under every climatic condition. We believe that each farmer should at least be able to implement

one measure on a farm and field level to promote biodiversity and landscape amenity without economic disadvantage. It is our strong believe - and the workshop in Bangkok brought together an impressive variety of examples from all over the world - that many synergies are possible between agronomic aspects (e.g. control of pests) and farm economy (e.g. reducing work demand) on the one hand, and on the other nature conservation as well as landscape development.

We think that in this area regional variations are very important. This should be taken up by standard setting organisations.

Workshop Discussion

The discussion centred on the question of whether: *Organic agriculture has fully developed its potential for biodiversity conservation?*

There was some disagreement on whether education and guidelines are the right catalyst for change or whether change should be led by standards development. Key points included:

- That it is important to consider the whole range of biodiversity, from the soil to ecosystem.
- There was debate on the commitment and knowledge of organic farmers in relation to biodiversity conservation, and agreement that there maybe regional differences.
- It was suggested that the IFOAM principles do not necessarily reflect the IFOAM standards, and thus there is a need to develop and further clarify the biodiversity intent of the standards.
- There was agreement that the challenge is to define best practice – it was noted that it is much easier to regulate against poor practice, but what is needed is a process to develop best practice, and it was reinforced that this process should be developed very closely with farmers and farmer knowledge.
- There was a warning of the problems that can become apparent when imposing rigid standards, with an example from Italy. There was also a more positive example of the biodiversity planning process in Sweden.
- Finally, it was noted that it will only take a small number of organic farms to be perceived as not fulfilling their potential for biodiversity conservationists, for conventional farmers to make considerable political mileage from this potential failure.

The workshop was concluded by agreement to set up an email discussion forum to develop these ideas further. The deadline for a motion to be submitted to IFOAM is the end of March.