

**SUSTAINABILITY OF AGRICULTURAL SUPPLY CHAINS:
THE CASE OF ORGANIC FARMING IN GERMANY**

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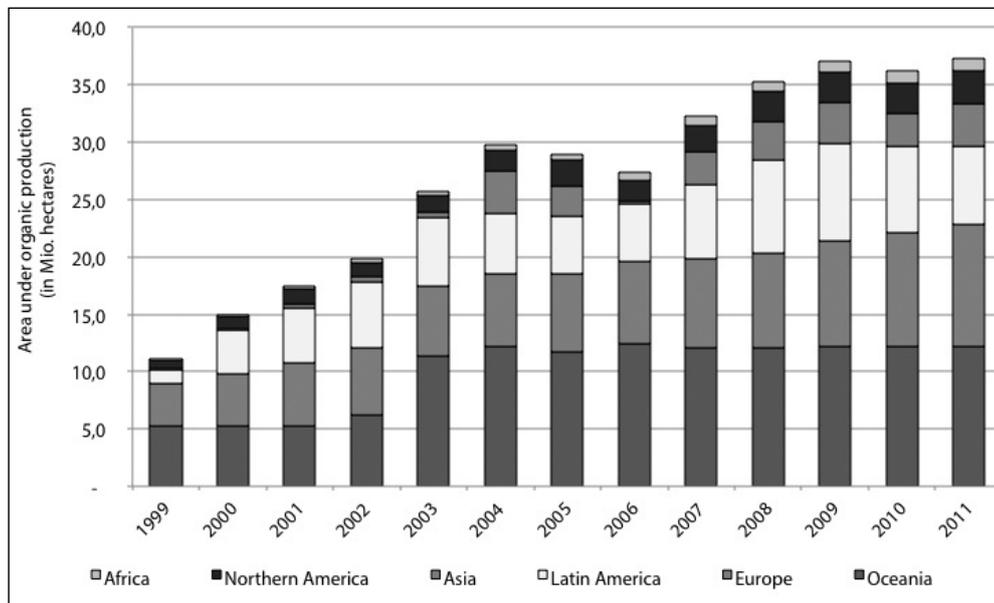
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1. Introduction

During the last twenty years, the organic farming system has become an established farming system not only in Europe and North America, but worldwide with 37 Mio. ha¹ of agricultural land under organic production in 2011 (see Fig. 1). This accounts for 0.86 % of the total agricultural land worldwide. The largest area worldwide is in Oceania (33 % of the total organic land worldwide), Europe (29 %) and Latin America (18 %) (Willer et al. 2013: 41).

Fig. 1. Organic area in different regions worldwide 1999-2011



Source: Willer and Kilcher 2012, Willer et al. 2013

¹ 1 hectare (ha) is 100 x 100 m, i.e. 10,000 m².

Besides the production, also the market for organic products is growing worldwide and becoming an important segment in the global food-market, which accounts for sales of about 46 bn. € in 2011 (Willer et al. 2013). The two largest markets worldwide are the United States and Germany with 21 and 6.6 bn. € in 2011 (Sahota, 2013).

As a system, organic farming has developed from a grass-roots movement with different technological approaches into an established environmental friendly farming system, which is subject to different types of policies within the framework of the Common Agricultural Policy of the European Union (CAP). The total sum of area payments in Germany in 2007 was about 124 Mio. €², which is about 18 % of the budget for agri-environmental programs in Germany (Nieberg et al. 2011: 247). This also highlights the importance of subsidies for organic farming. Our research question is therefore, if and how we can theoretically justify the special support for organic farming in Germany. One important argument for the special support of organic farming is the externality argument. In the following chapter we will investigate, if organic farming in Germany and Europe can be seen as a *'role model'* for sustainable farming, as it is claimed by e.g. the European Green Party (EGP 2012). Therefore, we will present in section 2 the historical background of this farming system and on the political framework of the EU supporting organic farming. Section 3 is gives a short introduction into the topic of sustainability and provides a short literature study on the environmental impacts of organic farming. The literature is focussed on the indicators of farmland birds. In section 4 the conclusions and policy implications are discussed.

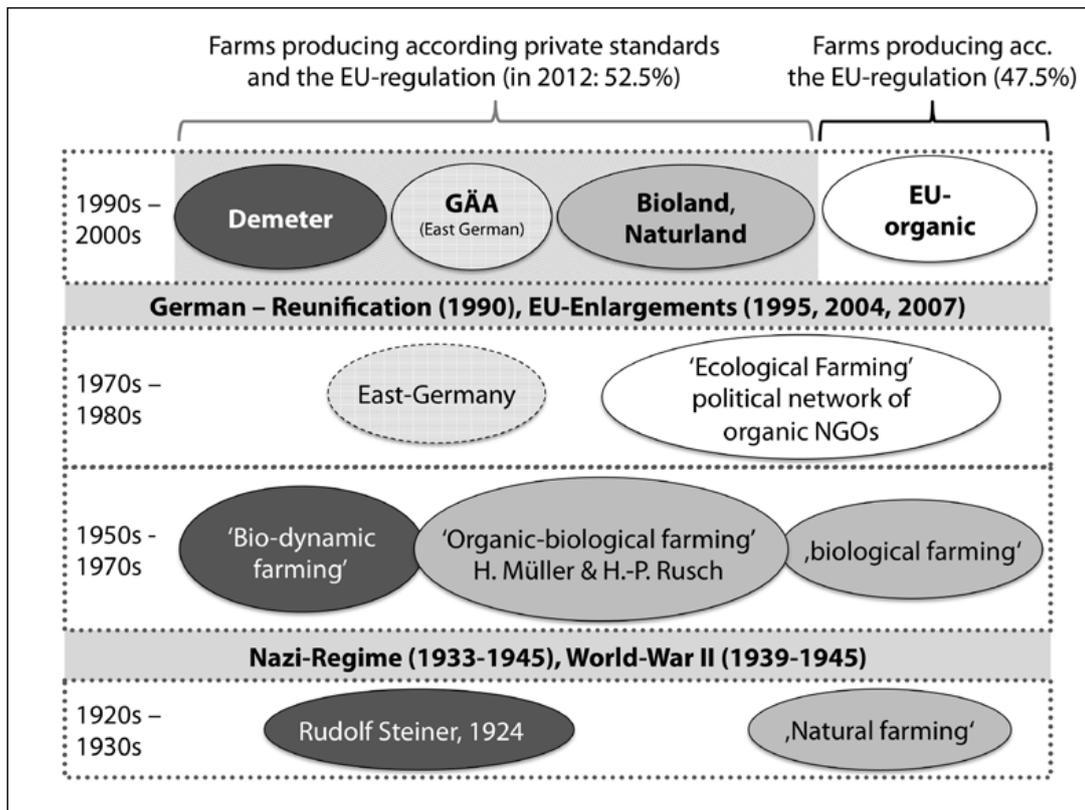
2. Organic farming in Germany - history and recent development

2.1. The historical roots of the organic farming movement

Organic farming is a farming system, which has been developed by farmers in the first half of the 20th century as a kind of grass-roots movement in European Countries like Germany, Austria, Switzerland, Sweden and England, but we can also see some origins e.g. in India (Vogt 2007). Local farming groups developed their organic standards and a founded producer associations on a regional level. Basically we can divide the original movement of organic farming into two parts, the biodynamic or *'Demeter'*-movement and the organic biological farming, later on entering into the *'Bioland'*-farmers association. The environmental grass-roots movement adopted ideas of organic farming in the 1970s and 1980s, leading to a more *'political approach'* of the organic movement. On the other hand, in the 1990s and 2000s, the organic farming system was opened towards farmers, that were mainly motivated by the special support for organic farming.

The history of organic farming in Germany with respect to the main movements can be summarized by the following Fig. 2:

¹ This sum is a combination of payments done within the budgets of the EU, the federal government and the federal states in Germany.

Fig. 2. History of organic farming in Germany

Source: Lakner 2010, see also Vogt 2007

The Demeter-movement was founded by Rudolf Steiner in 1924, who was presenting his ideas and some guidelines of 'biodynamic farming' based on the 'Anthroposophy', which is a philosophical and spiritual movement. Before the second world war, the practical implication of this approach were tested on different farms in East Germany, and after the second world war all over West Germany. The organic-biological farming was mainly developed by Hans Müller and Hans-Peter Rusch, who developed their farming ideas based on the idea of soil fertility. This part of the organic movement mainly developed in South Germany and Switzerland and lead to the foundation of the Bioland-association.

During the 1970s and 1980s, the political motivated environmental movement also adopted the ideas of organic farming. Organic farming at that time was developing mainly in the surrounding of big cities and small university towns (see in detail Vogt 2007). The control at that time was mainly organized by working groups of farmers, who were controlling themselves within the (private) organic producer organization, such as Bioland, Demeter or Naturland. So the definition and control was organized on a private basis, i.e. a private certification standard.

2.2. The policy framework for organic farming in the EU

This system completely changed at the beginning of the 1990s, when organic farming became part of the European Common Agricultural Policy (CAP)³. As a result of political pressure from environmental NGOs and organic producer associations, in 1992 the European Union (EU) released the producer-regulation for organic plant production (EU-Regulation 2092/91) providing a legal basis for a joint production standard for the different types of organic farming systems. The regulation also became the basis for trading organic products within Europe by defining the term 'organic farming': After 1992, using the term 'organic' is only allowed if the product is produced according to the official EU-regulation. Besides this, organic farming was supported by policy instruments of the rural development programmes and area-payments were first introduced by the rural development programmes of the CAP in 1992 (EU-VO Nr. 2078/1992) (Stolze and Lampkin 2009). Nowadays, in 2011, 25 of 27 EU-members provide programs to support the organic farming system by means of area payments, which vary on e.g. grassland between 39 €/ha and 450 €/ha (Sanders et al. 2011).

As a result of political support and the introduced area payments, the control was also organized by control institutions, which have to be accredited by the state. However, many farms in addition maintain to produce according the standards of a private organic producer associations (see Fig. 2). These standards are in general more strict. The private certification bodies for organic farming are also doing a yearly control of the private regulation on the farms. Therefore, some farmers are just controlled on the basis of the EU-regulation, whereas some other organic farmer, who are member at a organic producer association, get a two-fold control from the state control body and the private certification body. The 'Association of Organic Food Producers in Germany (BÖLW)' estimates, that in 2012, 47.5 % of all organic farms produce according the EU-standard, whereas 52,5 % of the organic farms are also controlled according the private standards (BÖLW 2013).

The control bodies are implementing a strict control regime. A large investigation of the organic certification system in the years 2007-2009 shows that up to 50 % of farms are subject to '*slight sanctions*'. But in most of the years the share of farms with cases of '*severe non-compliance*' is below 3 % (Gambelli et al. 2012: 12)⁴.

Therefore, this strict and to a large extent reliable control-regime can be regarded as one of the reasons for a higher trust of consumers for the organic production system.

³ This regulation refers to organic arable production. Another regulation for animal production, EU-VO 1904 was released in 1999. Both regulations were updated and merged in 2007 with EU-regulation EU-VO 834/2007 (Stolze and Lampkin 2009).

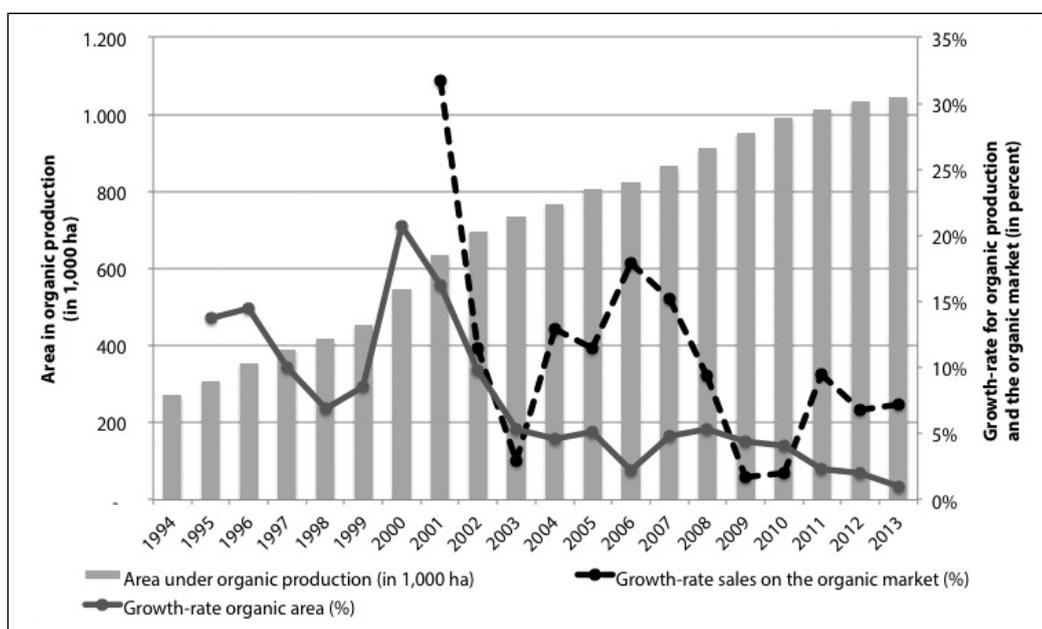
⁴ In Switzerland in 2007 and 2008, the share is 3.2 % and 4.1%, in a lot of years and countries the share is even below 1 % (See Gambelli et al. 2012 for more details).

2.3. The market for organic products

The market for organic products in Germany has gone through some major changes during the last 20 years. Starting as a small *'niche market'* for food with a special attribute for environmental sound production (Latacz-Lohmann & Foster 1997), the development lead organic products into the direction of high-quality food. The market of organic products in Germany is the second largest in the world: The per capita expenditure for organic products in Germany increased on average from 42.4 €/person in 2004 to 81.0 €/person in 2011, which is above the average within Europe, but in other countries the consumption intensity is higher: Consumers in Denmark, Switzerland and Austria spend 162, 177 and 127 €/person per year for organic products, whereas German consumer spend about 81 €/person per year for organic products (AMI 2013: 30).

Besides the large market growth in Germany, the growth-rates of organic production was lagging behind the market growth. The growth-rates the organic sector in terms of organic farms was below 5 % in the years 2006-2011. An increased share of organic raw-products were imported to Germany (AMI 2011). Fig. 3 shows the growth of production and consumption of organic products in Germany:

Fig. 3: Growth of the organic sector at the farm-level and at the market-level in Germany 1994-2011



Source: own calculation ZMP [a], [b], AMI 2010 and 2012, and BÖLW 2013

Figure 3 documents an organic market in Germany which is growing faster than the production. Market-growth exceeded the growth of production in most of the years after 2004, finally leading to an increased share of imports of organic products from other

EU-countries but also from outside Europe (BÖLW 2011, AMI 2011). Also the motivation of consumers to buy organic products and the market structure have substantially changed in the last twenty years. In the 1990ies consumers were interested in buying 'environmental friendly' products (Bruhn 2001), whereas the consumers in the years 2000 tended to also buy organic products as 'healthy and tasty products' (Roitner-Schobesberger et al. 2008). Nowadays, more recent marketing research is showing consumers as individuals purchasing products with additional attributes like 'animal welfare', 'regional production' and 'fair prices to farmers' for an increased willingness to pay (Zander and Hamm 2010).

During the last 20 years, the marketing channels of the organic market within Germany have drastically changed: In the 1990s organic products were mainly marketed via specialized organic food-stores, weekly markets and healthy food-stores, farm-shops and other forms of direct-marketing (Latacz-Lohmann and Foster 1997, Michelsen et al. 1999). In the years 2000 the supermarkets increased their engagement in the organic sector and increased their market-share from 28 % (1997) up to 50 % (2012) (ZMP 2003: 18, AMI 2013: 9). The specialized organic food stores are still an important part of the organic market with a constant market share of about 31 % in 2012, the other marketing channels (direct marketing, bakeries/butcher shops and healthy food stores have lost some of their market share in the last 10 years. This part of the market still accounts for 18 % in 2012 (ibid.).

3. Sustainability organic farming systems

Organic farming is sometimes regarded as '*role model*' to correct market-failure in agriculture (EGP 2012). A political assessment of organic farming systems can be done within the sustainability framework. In the following chapter we will give a definition of sustainability. Usually sustainability is measured by indicators. In the following chapter we will assess the existing literature on the impact of organic farming on farmland bird species as an example for sustainability indicators in agriculture.

3.1. The theory of the sustainability framework

The term '*sustainability*' has a long history and the meaning of the term has been subject to changes in the public perception, especially during the last 30 years. A first definition of the term appears in the 18th century in the forest economics in Saxony, where wood was a scarce resource for the silver-mining and metallurgy industry. Hans Carl von Carlowitz (1645-1714), who learned forest-economics in England and who had to administrate the state-forests, defined the term sustainable yield as '*the maximum wood-yield in the presence without risking future yields*' (Christen 1996: 67). The environmental movement took the sustainability-concept and added the term development in order to connect a certain philosophy of environmental policy with the aspects of development policy. We can find a more recent definition in the so called 'Brundland-Report' for the United Nations (UN) in

1987 ('Report of the World Commission on Environment and Development: Our Common Future'), where sustainable development is defined as '*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*' (Eblinghaus und Stickler 1996). This definition entered the political mainstream after the Rio Summit 1992, when 'sustainable development' was put on the political agenda.

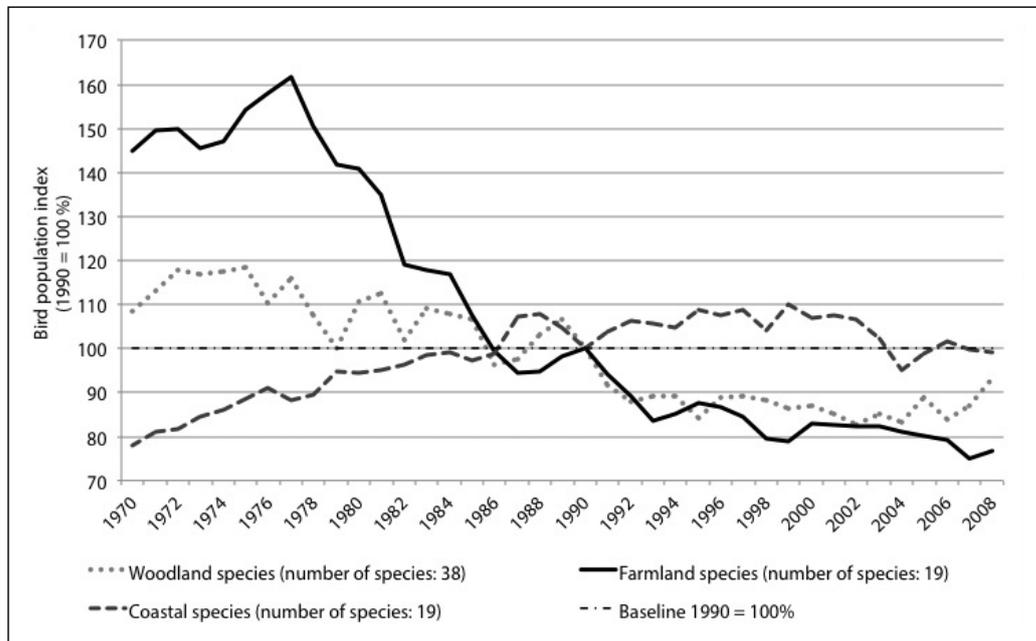
In the following years, also economic actors as e.g. Siemens, BMW or RWE used the term as a management instrument to introduce environmental management, but also to advertise their strategy for an environmental sound and social responsible firm-development. Therefore, the sustainability concept seems to be flexible enough for being used by any political actors. Besides this, the term often suggests, that a political compromise can be found without taking into account bargaining power of actors in the political process (Eblinghaus und Stickler 1996). Eblinghaus und Stickler (1996) claimed the term for being abused for '*own purposes*' and to dominate the political discourse in the public. In terms of measuring sustainability, there is a broad literature which has developed different measuring-systems, a first approach was provided by the OECD (2001).

For the practical sustainability assessment, there are different indicators to measure economic, social and ecological sustainability in the context of agriculture. In the following, we will provide a short overview on the existing literature for one sustainability indicator: We will assess the impact of organic farming on the population of 'Farm-' or 'Agricultural Birds'. Most of the literature resources are studies from Germany or from Europe, and partly from North America. This selection can be justified, since both regions are moderate climates and Europe and the USA are the biggest regions in terms of organic production and markets.

3.2. Indicators for sustainability of organic farming?

One important sustainability and biodiversity indicator is the abundance and diversity of the so called 'farmland-birds'. This group of birds summarizes species, which have their main nesting and foraging habitats within agricultural eco-systems. As a sustainable indicator, farmland birds are especially relevant, since birds are at the end of the trophic chain and birds are mobile and can search for appropriate plots for nesting and breeding or for seed-rich habitats for foraging. Besides this, birds in many European country are popular and potentially attract the interest of the public, which is true especially in Great Britain, where many studies were published on the issue of birds and agriculture (see Ormerod and Watkinson 2000). The acceptance of sustainability indicators can be crucial for influencing the political process. In United Kingdom the species richness of birds is therefore one sustainability indicators of the government (DEFRA 2010). In the following we will explore some literature comparing organic and conventional farming systems with respect to bird abundance and species. Figure 4 shows the development of species-abundance and richness of birds in United Kingdom form 1970 to 2008, highlighting the decline of the group of farmland birds:

Fig. 4. Bird population indices of farmland birds (a), woodland birds (b) and seabirds (c) from 1970 to 2008 in United Kingdom



Source: DEFRA 2010, all observations are index-figures for a species index with 1990 = 100 %

The figure indicates, that bird-species with a focus in agricultural habitats are constantly declining in United Kingdom, which is also true for the rest of Western Europe (Donald et al. 2001). Similar statistics with almost the same result are also available for Germany (Federal Office for Statistics 2012).

Donald et al. (2001) observe similar effects of technical progress in the agriculture in the Middle and East European Countries before the EU-accession in 2004. Therefore, a long-term decline of farmland birds is expected also in the new EU-members (Donald et al. 2006) and for post-soviet states in central Asia (Kamp et al. 2011).

The long-term decline shows the classical Common Agricultural Policy as one main driver for a long-term Biodiversity decline in rural area, with the classical intervention price system, which gave incentives to produce intensively even for the last unit. This type of market failure provides a necessary argument a policy intervention due to negative external effects. In order to correct market failure (e.g. by supporting organic farming) we also need the *sufficient argument*, showing that a policy intervention potentially corrects the market failure due to external effects. In this case, it is therefore crucial to investigate the question, whether and to what extent organic farming can provide improvements for the environment, which is in this case measured by the indicator farmland birds.

The relevant literature in this field of research provides studies which are different with respect to methodology, special focus on a single or more farmland species. Besides special case studies, there are also some meta-analysis on farmland birds available.

Scientific projects focussing on bird-species investigate the abundance of birds and/or the diversity of bird species on field or farm level. The abundance and diversity of birds on organic fields/farms is often found to be higher than on conventional fields/farms (as e.g. in Chamberlain et al. 1999, Freemark & Kirk 2001, Beecher et al. 2002, Smith et al. 2010, Fischer et al. 2011). Also specialized investigation on single species of interest find advantages for organic farming practices, e.g. in Petersen et al. (1995) and in Bradbury et al. (2000) for the Yellowhammer and in Wilson et al. (1997) for the skylark.

The typical plant production in organic farming often works with lower seed densities, which provides a better environment for nesting for ground-nesting birds (Kragten et al. 2008). An Investigation in South England shows that organic fields provide more insects, which are the potential feed for young birds ('Chick Food') (Moreby & Sotherton 1997). On a more general level, organic fields and/or farms have a higher biodiversity throughout different taxa and species (for an overview see Hole et al. 2005). Arable plots on organic farms offer more and diverse food resources resulting in a higher species richness, which was found in different studies. The authors therefore conclude, that farmland birds might find better and more diverse food resources on organic fields (Fischer et al. 2010).

In some studies wintering farmland birds are more often found on organic fields during the winter-time (Neumann et al. 2008, Chamberlain et al. 2010, Eyre et al. 2012), or in early spring (Moorcroft et al. 2002). Nevertheless, the literature provides mixed evidence on this issue, depending from the specific field management within every system. Fischer et al. (2010) found no difference between the systems in the winter-season. This is due to the fact, that some birds are more dependent open soil and seed from cultivars or weed during the winter-time, which is connected with winter stubble fields. Organic farms more often produce summer grains, resulting in winter-stubble which is of advantage for species that are dependent from winter forage. Other bird species profit from weed and small insects in early spring, which might also come together with the organic farming system, however both measures can also be found on conventional farms (see Moorcroft et al. 2002).

Overall, most of the studies show slight or distinct advantages of organic farming systems. Nevertheless, some authors point out, that this is strongly dependent from the landscape structure and diversity surrounding the farm of interest (Vickery et al. 2002, Benton et al. 2003, Gabriel et al. 2010). Farmland birds are rather dependent from landscape diversity than from management practices (Smith et al. 2010). Some studies also see advantages in landscape elements (e.g. hedges) for organic farming systems, but this is not necessarily an advantages of organic farms even if some organic farms show a more diverse landscape (Chamberlain et al. 1999).

Landscape is an indicator, which has to be evaluated on a larger scale and which can be hardly influenced by just one single farm/farmer, but rather by all farms/farmers of a village or a district. Therefore, we might tend to expect the abundance of many agricultural bird species in villages or districts, there farms take joint efforts to create and improve agricultural landscape on a larger scale.

Some authors point out, that biodiversity can also be protected by agri-environmental programs or by the so called set-aside area within the Common Agricultural Policy (CAP), which also provide advantages for bird species (Vickery et al. 2002). The main purpose of the measure was to reduce over-production within the EU, which was still an issue in the early 1990s. Farmers at that time had to take 10-33% of the area on each single farm out of production, which also had a positive effect on biodiversity. This measure was abolished after the CAP-reform in 2008. This issue once again might become relevant, since the Common Agricultural Policy will introduce the so called 'Greening of direct payments' after 2013 (Heinrich et al. 2013a), which has as one element the so called 'ecological focus area (EFA)' on 7% of the agricultural farm area. Therefore, the new ecological focus area might have the similar effect than the classical set-aside regime of the CAP before 2009.

A study of Kleijn et al. (2006) investigates different agri-environmental schemes including organic farming within Europe. The authors find the organic farming system as one of the program with a distinct positive effect on biodiversity, which was not the case for all types of programs (Kleijn et al. 2006). Therefore we can conclude that organic farming is one of the *good practice examples* to secure biodiversity within the framework of the Common Agricultural Policy (CAP) of the European Union.

The assessment of the indicator 'farmland birds' is just one case for an overall environmental assessment of organic farming. We can also find an extensive literature of studies, which try to assess the overall environmental impact of organic farming by means of different indicators (e.g. Stolze et al. 2000 or Mondelaers et al. 2009). Fig. 5 shows a large literature assessment on the environmental performance of organic farming:

But even in a situation without the EU 'set aside'-regime, which has been finished after 2008, there is utilized agricultural area in Germany, which is not in production. Besides this, environmental harms usually comes related to area, therefore, one could argue, that environmental performance can still be measured related to area and not to output. But finally, it is out of scope of this article to finally discuss, whether to take land or output as a reference for measuring environmental performance.

One conclusion from the presented literature is that in most studies organic farming has a slightly or significantly better environmental performance, especially with respect to the presented biodiversity indicator farmland birds.

4. Discussion and Conclusions

According to the presented literature, organic farming in the European context has some potential to improve the environmental balance in rural area. The support for organic farming as a farming system might therefore be justified, since organic farming provides a number of environmental services in just one system. Dabbert and Häring (2003) point out, that this might also reduce transaction costs. Using an agri-environmental program for each single environmental service might produce more administration (i.e. transaction) costs, which is another good argument for supporting organic farming 'as system'.

However, according to the literature on farmland birds, also specific targeted agri-environmental programmes are necessary in order to achieve the objectives in nature protection, especially for single endangered species (e.g. in Vickery et al. 2002). Besides the specific agri-environmental programmes, there are also more broad approaches to become more environmental friendly in conventional agriculture: The so called 'Greening of Direct Payments' (suggested in the CAP-Reform 2013) can in the long run potentially improve the environmental balance of conventional farming. On the short-run, the expectations are towards the implementation of the CAP-reform are rather low (Lakner et al. 2013).

Interestingly, the share organic farming in East Germany has sharply increased with the introduction of the rural development programmes after 1992, which shows the impact of those policy measures. Due to a strong growth of the organic market in Germany, the rate of farms reconverting to conventional farming has shown to be rather small in comparison to other European countries (Sahm et al. 2012). Without the organic area payment, organic farming have on average about 8% lower profits than conventional farms, which is not a lot given the fact, that yields are much lower organic farming. This and a rather low reconversion rate indicate, that the organic sector in Germany is a stable farming sector, which is not only the results of farmers being '*lured by high subsidies*', but of a stable and growing market for organic products. In countries with high rates of reconversion, farmers report missing markets and perceived low prices for organic products as two main reasons for a reconversion to conventional farming (Sahm et al. 2012). Therefore domestic markets

are very important for the development of organic sectors. Overall, this might support the argument, that a stable market contributes much more to profitable organic farming than any type of area payment. On the other hand, high prices cannot fully compensate for the higher expenses for organic farming, since without area payments, profits on organic farms are slightly lower than on conventional farms.

As a policy recommendation, policy instruments should be adjusted to the overall framework. The support of organic farming within the EU, using the instrument of area-payments is also due to the general framework of the Common Agricultural Policy (CAP), which uses the instrument of direct payments per hectare. The main argument within the EU to support organic farming is the environmental balance of organic farming. Nevertheless, it is not recommendable to directly implement the same policy in other regions or countries, because area-payments itself can potentially distort land markets. So the design of a policy supporting organic farming, should take into account the instruments of the national agricultural policy of a country. One main instrument to support organic farming is (of course) the release and implementation of a production regulation for organic farming. A recent study of Heinrich et al. (2013b) could show, that organic farming grew more in countries having released an organic production regulation. Other instruments, such as a direct support of certification systems, or education and extension measures are potentially less market distorting and therefore recommendable.

Often organic farming has been criticized for producing with too low yields. The British commission Foresight (2011: 82) therefore excluded organic farming as one option for a sustainable development, whereas the IAASTD (2008) was strongly arguing in favour of organic farming. However, different studies investigating the yield potential of organic farming show different results with respect to the yield potential. Badgley et al. (2007) found a higher yield potential of organic farming in developing countries, whereas de Ponti et al. (2010) and Seufert et al. (2012) did find the opposite. Therefore, there seems to be some research needed, in order to get a more precise picture on the yield-potential of organic farming. Apart from Europe and Japan, it is not usual to directly support organic farming, even the USA just support the organic certification system, but not with area-payment. If we can exclude direct payment as a potentially distorting factor, the decision to convert to organic farming will mainly be an economic decision: Farmers will have to decide, whether organic farming is an option, with respect to yield potential, potential markets and prices.

For a sustainable development of organic farming in transformation or developing countries, it seems to be important to develop a domestic market. The organic market in Costa Rica might therefore be a case of special interest (Chapter Losilla et al.)

Even if we can find similar development-paths in some EU-countries, in most European countries the supermarkets play a dominant important role in the organic market. For transformations countries such as Chile, Argentina or Brazil it is of interest, if the market

development goes straight through the supermarkets or if marketing of organic products are marketed via more 'traditional sales channels' or if farmers are also developing their own market channels. This is especially interesting, if farmers can win a larger share of the value added by developing independent sales channels (Chapter von Meyer-Höfer et al.).

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