Towards modern sustainable agriculture with organic farming as the leading model

A discussion document on Organic 3.0

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Figure 1: The development of organic agriculture (also see Chapter 3)

Organic 1.0	**Organic 2.0**	**Organic 3.0**
An idea is born	The idea grows into a global standard	Guarantor of sustainable agriculture and food beyond the niche
1900 - 1970	1970 - 2015	2015 -
Back to nature. "Life reform". "The Agriculture Course". Organic-biological method. The Limits to Growth.	Certifier standards. IFOAM Standards. EU Organic Regulation. Codex Alimentarius. Harmonization of 80 governmental regulations. Global trade in organic products.	Comprehensive culture of innovation. Continuous improvement towards best practice. Transparent integrity. Alliances and partnerships.

1. Summary

At the Biofach 2014 trade fair the International Federation of Organic Agriculture Movements (IFOAM Organics International) launched the idea of Organic 3.0. This move stemmed from the widespread sentiment that despite its great successes organic agriculture is still confined to a niche while at the same time having to better adapt to future challenges. The discussions following the launch led to reflection on the development of organic agriculture to date, and to a dynamic engagement with potential future prospects.

The challenges the organic farming and food sector must face include, in particular,

- **only weak growth in agricultural production**, primarily in Europe, which is among the strongest markets for organic products;
- **as yet underutilized potential, or lack of potential, of organic farming to address sustainable food security;**
- **increasing competition from other sustainability initiatives;**
- **transparency and safety of value chains;**
- and the need to work on **improved and more nuanced consumer communication**.

It is clear that to date organic farming has been a sideline to the general development of the farming sector and that it is not a significant broadscale solution to the impending challenges. For organic agriculture to emerge from its niche, it needs more innovation, alliances with other social and economic initiatives of similar orientation, and different communication strategies.

We are of the opinion that the people forming the organic movement should consciously and actively face these challenges, as it is essential for the acceptance of the future direction of organic farming that any new course is set from within the movement.

In its discussions of originally four future scenarios, the team of authors identified the idea of **Organic 3.0 as a dynamic development concept towards best practice** as a viable way forward.

This concept defines the entry level, i.e. the minimum requirements for organic farming, based on particular public services (public ecological and social goods) as well as high levels of environmental protection and animal welfare – all grounded in natural and social science evidence.

These entry thresholds are set out in national organic farming regulations. Additional services in ecology, animal welfare, product quality or those relating to social, cultural and ethical values are guaranteed by private labels, special standards or benchmarking systems.

It is essential for the future of organic farming – under both minimum requirements and private labels – that these entry thresholds always take their orientation from best practices, that they are holistically and sustainably positioned, and that they are

being advanced through a comprehensive culture of innovation. This requires substantially higher levels of research funding, both for applied innovations in cooperation with farmers, the food industry and consumers, as well as for developments originating from fundamental research. As modern agricultural research generates a host of new knowledge and techniques, one of the authors' proposals is for an "**innovation commission**" **which assesses new developments and techniques as to their compatibility with the ecological and social principles, and which makes recommendations for their implementation**. While such an innovation commission should be established at the international or European level (e.g. IFOAM, IFOAM-EU), it could commence work in the German speaking area as part of a pioneer phase. It is already foreseeable that this innovation commission will need to deal with a large number of issues.

Organic 3.0 will be characterized by nuanced communication focused on quality and sustainability. Transparency and safety with regard to promised services and qualities will gain in importance and must be improved in order to increase product sales. To this end, **quality assurance in organic agriculture must be modernized** and **new directions in communications must be developed**. Significance will attach to the question as to which holdings in what kind of landscape structures and in what kind of value chains are to be associated with Organic 3.0. This is a key question not only with regard to communications; it will also facilitate the conversion of sustainable conventional holdings to organic farming.

With a view to sustainability, Organic 3.0 will continue its pioneering role but, with its holistic approach, will join the ranks of other sustainability initiatives.

It remains the objective of organic agriculture to become a strong, broadscale sustainability strategy and, by providing additional services, to simultaneously serve diverse markets. This is also to safeguard the structural and size diversity of operators in production, processing and marketing. In terms of production, we are increasingly in competition with a range of other agricultural systems. With this discussion on Organic 3.0 our aim is to illuminate the current situation and the reasons as to why organic agriculture has not to date decidedly won the contest of agricultural systems. At the same time however we wish to draw attention to the fact that this contest has only begun and has not yet been decided. We are of the opinion that the people involved in the organic movement should consciously and actively face up to this challenge and that they should also more vigorously tackle, together with the scientific community, our weaknesses as outlined in this discussion paper.

We hereby present this finalized discussion paper for broader discussion in our organizations. The paper may or may not be used later to develop organizational positions.

2. Introduction

At the Biofach 2014 trade fair, the topic of Organic 3.0 was presented to the public without prior substantive discussion in the organic movement. Much prominence was given to repositioning in the market and to recognizing major consumer trends. However, other developments, such as the revision of the EU Organic Regulation, the proliferation of global sustainability certifications, and the stagnation in farm conversion to organic agriculture, highlight the fact that the organic movement and the organic sector are primarily facing major **substantive** challenges.

It is for this reason that individuals representing the organic sector organizations Bio Austria, Bioland, Bio Suisse and Naturland together with the Research Institute of Organic Agriculture (FiBL) wish to make this contribution to the discussion on the movement's future development. All five organizations have contributed to shaping organic agriculture.

This paper aims at giving transparent insights into both the players' internal perspective and the external scientific perspective, and to derive from these perspectives potential future responses. The paper is designed as a contribution to a lively discussion, not a position set in stone or a blueprint for successful development.

Following the presentation of the first draft of this paper on 6 February 2015 at Biofach 2015 the discourse continued. The first draft had sparked intensive and open discussions, as intended. The authors now present a second draft which is much more advanced and contains new elements.

While "Organic 3.0" was quickly established as a new term, its practical implementation in the work of farmers, into legislation, the organic sector, organic trade and consumer communication will be a slow and arduous process.

3. The development phases of organic agriculture

Organic agriculture has its roots in traditional agricultural practices and social movements of the first half of the 20th century. These roots were very heterogeneous and their prime commonality was their disapproval of the chemical-technical intensification of agriculture at large (Vogt, 2000).

The Organic 1.0 phase was characterized by numerous farmer's groups working together with pioneer personalities for the benefit of soil fertility, environmental protection, nature conservation, diversity, animal welfare, healthy nutrition and family farming. The emergence of organic agriculture is a classic example of **social innovation**. Farmers, consumers, dropouts, lateral thinking scientists, various social groups, market sellers and people setting up organic food shops were developing alternative solutions to an alarming societal problem (see *Silent Spring* by Rachel Carson, 1962).

The establishment in 1972 of IFOAM in Versailles marked the beginning of the second phase of organic farming (Organic 2.0). One of the main objectives of the establishment of IFOAM was to set out minimum standards for organic farming and thus to afford a certain level of protection to the term "organic". For this reason, third party audits were firmly established in the standards (Schmid, 2007).

A number of representatives of the German, French and British organic associations used the IFOAM Standard to assist the EU Commission in its endeavour to protect consumers from fraudulent use of the term "organic". In 1992, following a drawn-out legislative process, this resulted in the EU Organic Regulation, which was directly transposed into law in all EU member states. Since then the establishment of national legislation on organic farming has become the global norm (Huber et al., 2015).

International harmonization of statutory as well as private standards will in future become even more important, as demand-led and supply-led markets have increasingly been drifting apart. The 80 countries which, as of 2014, have national

Box 1: Development and expansion

Pioneer organic farmers sold their products directly on their farms or at the local markets. The 1950s saw the first supra-regional deliveries of organic products directly to households. During the 1970s, health food shops began to appear all over Europe. Processing and trade gained in importance. The 1991 EU Organic Regulation aimed at providing a legal definition of organic agriculture and protecting consumers from fraud. Between 1990 and the present, the European market for organic products has grown by an estimated 5000%.

The global market in certified organic products is valued at €56.4 billion in 2015. Of this, North America accounts for €26.7 bn (USA: €24.3 bn), Europe for €24.3 bn (EU: €22.2 bn) and the rest of the world for €5.4 bn.

In 2014, some 43.2 million hectares of land were under certified organic management by about two million farmers (Willer & Lernoud, 2015). In the EU, 5.7% of the agricultural area are under organic management, with the shares in the US and worldwide being 0.6% and 1% respectively.

Organic agriculture has been mainstreamed only in a few small regions: In the Swiss Canton of Grisons it accounts for 63% of the agricultural area, and 49% in the Austrian state of Salzburg.

If the global organic acreage increased by an average of 10% per year, its overall share in the agricultural area would rise from 1% to 2% over a ten year period.

organic farming standards are interested in negotiations on achieving compliance or equivalence of these standards with a view to facilitating mutual trade.

The first phase of organic agriculture (Organic 1.0) was economically insignificant. It was only due to standardization (Organic 2.0) that organic foods (later followed by feeds and textiles) have become globally traded commodities over the past 25 years, showing considerable growth (Box 1, Table 1).

4. Future challenges for organic agriculture

The organic farming sector is facing numerous challenges. If and how the sector as it is currently defined in law and in the private sector can meet these challenges is the subject of a discourse taking place among the organic producer organizations and their partners in manufacturing and trade as well as in the scientific community.

The challenges to be faced by the organic farming and food sector are (1) the currently weak **growth in agricultural production**, (2) the **potential of organic agriculture to provide food security**, (3) **competing with other sustainability initiatives**, (4) the **transparency and safety of value chains**, and (5) the **need to improve consumer communication**.

The importance of developing responses to these challenges from within the movement became evident when the EU Commission tabled its ill-considered proposals for a revised Organic Regulation in 2014. Bioland, Naturland, Bio Suisse and Bio Austria with their membership of roughly 28,000 organic operators are facing these challenges and devote financial resources and personnel to the steady advancement of organic agriculture.

4.1 Challenge #1: Weak growth in agricultural production

Over the past 15 years the demand for organic products in western European countries and in the United States has increased at significantly higher rates than organic agricultural production in the same areas (Table 1). Over the past eight years there has been a discernable global shortage of organic supplies (Table 1). According to several studies, the hesitation on the part of farming families or farm managers to convert to organic farming has four prime causes (Kuhnert et al. 2013, Sanders et al. 2012, Acs et al. 2009, Hirschauer & Mußhof 2008).

Table 1: Disparate development of production and markets (Willer & Lernoud, 2015)

Country	Cumulative growth in area 1999-2014	Cumulative market growth 1999-2014
Germany	141%	434%
France	254%	383%
Austria (2002-2013)	24%	223%
Switzerland	62%	237%
World (1999-2013)	292%	374%

Firstly, one major problem is the fact that shortages in domestic production do not automatically result in higher prices. Producer countries with significantly lower operating costs (e.g. due to greater access to land resources or lower labour costs) depress prices in countries with demand-led markets. Exporter countries and regions include for example Ukraine, Romania and North Africa. In Germany for example imports have in some instances resulted in organic farm profits dropping below those achieved on non-organic farms (see Box 2).

Secondly, to make matters worse, governmental direct payments to farmers do not fully compensate for the public goods generated by organic agriculture or the environmental damage abatement costs incurred. Several studies have conservatively estimated the damage caused by conventional farming to be in the region of between EUR 80 and 340 per hectare of arable land or pasture (Pretty et al., 2002).

Box 2: Financial performance of organic farms

According to a study assessing farms in the US, Greece and Spain, organic farms are 22–35% more profitable than conventional farms (Crowder & Reganold, 2015). While the differences are smaller in Switzerland and Austria, organic farms nonetheless come out more favourably. In Germany, however, per-hectare profits are higher on conventional farms (792 €/ha v. 651 €/ha) (BMEL, 2015).

A third significant cause of sluggish progress in domestic production is slow innovation in the organic sector. Not all enterprises are on a similarly sound agronomic footing and there are major gaps in terms of research and extension. While in both crop and livestock production the yield gap between organic and conventional production has increased over the past 20 years, at the economic level the price premia and organic farming premia have not compensated for this divergence for all the products concerned (see Box 2). Only comprehensive innovation can address this trend, which is why there is great emphasis on innovation in the concept for Organic 3.0. A comprehensive culture of innovation would not only render organic agriculture more economically viable, but it would also help to fill with enthusiasm for organic agriculture a greater number of young and tech-savvy farmers.

Last but not least, farmers regard as burdensome the organic standards and inspections and also see these as restricting their entrepreneurial freedom, making them stop short of converting to organic agriculture (Kuhnert, 2013).

4.2 Challenge #2: The potential of organic agriculture to provide food security

Critics of organic agriculture see its lower productivity as its most significant drawback and are sceptical of a further expansion of organic agriculture despite its ecological benefits. Scientific meta-analyses aggregating numerous field trials and organic-to-conventional yield comparisons have already shown that when best practices are used, organic yields are 20-25% lower than those in conventional farming (Seufert et al. 2012, de Ponti et al. 2012). The yield gap between diverse organic crop rotations (→ organic best practice) and conventional monocultures (→ conventional bad practice) was significantly smaller at an average of 10% for the system as a whole (Ponisio et al. 2015). However, these figures are not entirely reflective of reality given that there is normally a wider distribution of yield results on commercial farms as compared to field experiments run under optimum conditions. This is primarily true for organic farms as it is more difficult for them to correct management errors and unfavourable pedological or climatic conditions. For example, it has been shown that conventional crop rotation yields in favourable

arable areas are more than twice as high as their organic counterparts at similarly low nitrate leaching rates (Loges et al. 2005). Therefore, the organic sector can not shy away from a serious debate on the question of productivity – even more so considering that, because of its restrictions on direct interventions in crop and livestock production, organic agriculture is subject to lower yield stability and greater yield fluctuations.

While both the World Agriculture Report (IAASTD, 2008) and the United Nations Special Rapporteur on the right to food, Olivier De Schutter (De Schutter, 2014), make clear recommendations in favour of agroecological farming methods, they mention organic agriculture, as the most restrictive concept, only in passing.

According to FAO estimates, the global level of (conventional) agricultural production is sufficient to feed up to 11 billion people. However, a major problem is its disparate regional distribution which is directly linked to poverty. Moreover, there are alarming inefficiencies in the downstream economic sectors:

- Major losses at the levels of food storage, transport, sales and consumption;
- Use of plant-based foods to produce fuel;
- Use as feedstuff to meet fast-growing demand for meat, eggs, dairy products and fish.

No matter which production system is used, it is always a difficult challenge to get the food grown in the fields directly and as loss-free as possible to the people consuming it. Organic agriculture does not have an inherent advantage in this respect.

However, on the positive side, numerous case studies conducted in sub-Saharan Africa have shown that for subsistence farmers organic agriculture is a genuine and highly sustainable intensification strategy. Under these conditions significant yield increases can be achieved – more than 100% on average (Hine et al., 2008) – using simple techniques such as crop rotations, mixed cropping, legumes, applying livestock manure, good composting techniques, providing support for beneficials as well as simple habitat design to repel pests (push/pull), and soil and field management measures to catch and direct rainwater. Such techniques require a high level of knowledge in rural communities.

4.3 Challenge #3: Competition from other sustainability initiatives

Ecological, social and economic sustainability are prominently incorporated into the principles of organic farming. The national standards however, and therefore also the inspection measures, are largely limited to rules on permitted farm inputs and farming techniques. Requirements with respect to environmental impacts or rules on social conditions for farmers and farm workers as well as workers in processing and trading enterprises however are thus far only partially regulated, and only in private standards. Similarly, measurable criteria for the health and well-being of farm animals are not widely established. The four German-language organic associations have

however introduced indicators of animal welfare into their inspections. Good governance requirements have not yet been developed.

The positive **ecological** performance of organic agriculture is undisputed in the scientific literature. On average, organic farms host a greater diversity of flora and fauna, have greater soil fertility and higher soil carbon sequestration, emit lower levels of greenhouse gases, contribute less to the eutrophication of surface waters and to nutrient leaching into groundwater, and do not burden ecosystems with pesticides. Moreover, their soils are of higher biological and physical quality, are less susceptible to erosion, have better water retention and more efficient nutrient uptake. Relevant scientific literature is referenced in Niggli (2014).

While organic agriculture has been proven to provide greater sustainability on average, the **individual** level of excellence is strongly dependent on holding structure and management. In general, just as in conventional agriculture, there is a significant spread from well to badly managed farms. It is for this reason that in 2013 IFOAM issued its Best Practice Guideline for Agriculture and Value Chains as developed by the Sustainable Organic Agriculture Action Network (SOAAN). The document divides sustainability into five dimensions and addresses a total of twenty facets and numerous indicators of these dimensions.

Outside of the organic sector, there has been a significant increase in national and private production and marketing schemes which have adopted environmental and social minimum standards for producers and downstream value chains. In certain instances they are alliance partners of organic agriculture (see Box 3) while at the same time in the marketplace they are competitors with trademarks and advertising claims. Externally imposed framework conditions (see 5.4) which currently impede organic agriculture (e.g. lack of ecological accounting, massive food waste, and the lack of strict linkage between direct payments and environmental performance) can only be fought by alliances. This does, however, presuppose future transparent identification of the level of excellence of the various schemes and their sustainability impacts, which in turn requires generally applicable evaluation standards for agricultural holdings and value chains all the way to the consumers, such as the FAO's SAFA sustainability assessment guidelines.

Box 3: Sustainability initiatives

Based on agroecology, a discipline established by Miguel Altieri (Altieri, 1995), numerous schemes have been developed for farmers. Worldwide there are now more than 400 sustainability labels. While many of these can rightly be termed "greenwashing", some do significantly improve environmental, social and economic sustainability and are, in terms of their impacts, on a par with organic agriculture (COSA, 2013, Potts et al., 2014, UNFSS, 2015).

Label schemes with high growth rates include UTZ, Rainforest Alliance and Fairtrade. Within the ISEAL Alliance those labels cooperate with organic farming associations (ISEAL Alliance, 2015).

For the organic sector to expand from its niche it thus needs more and better alliances, including those with other social and economic initiatives of similar orientation in the farming and food sector. However, there must be a common

language between the organic sector and these partners, given that pioneer movements tend to be beset by boundary issues and fears.

4.4 Challenge #4: Transparency and safety in value chains

Organic agriculture has been a leader in quality assurance systems for decades. Today the sector has various methods at hand which are adapted to different socio-economic situations (see Box 4). However, these control systems are increasingly reaching their limits. This is due in part to the need to continuously incorporate new requirements, such as animal welfare standards or documented sustainability, while at the same time the international flows of goods occasionally fall victim to criminal activity given that fraudulently declared goods can yield high profit margins. An important prerequisite to growth in the organic sector is the consumers' ability to place their trust in a functioning inspection and quality assurance system. Short value chains call for different measures than long ones. The Hazard Analysis and Critical Control Points (HACCP) methods practised today must be modernized greatly, without massive increases in the costs to certification agencies or in the burden (preparation, presence) to farmers.

Box 4: Control systems in organic agriculture

With very few exceptions, organic farms worldwide are subject to independent process control (Standard EN 45011 and ISO/IEC 17065 respectively). Group certification schemes are in place for small and micro-producers, primarily in developing countries. These consist of internal control systems monitored by independent certification agencies. Moreover, for some years now 46,000 ha of land have been certified under Participatory Guarantee Systems (PGS) which are particularly suited to short distances between producers and markets (Kirchner, 2015). In this manner, farmers, traders and consumers together generate mutual trust.

4.5 Challenge #5: The need to improve consumer communication

Consumers have always played the most significant role in the expansion of organic agriculture, and have thus contributed to the advancement of organic farming.

The growing distance between producers and consumers also means that expectations are sometimes out of kilter with changing realities. Negative reports in the media often result not only from failings in quality assurance systems but also from fundamental misconceptions as to the real nature of modern organic agriculture. With increasing growth these misconceptions will also increase and trade advertising as well as the media consciously feed these misconceptions. These include for example the incorrect and unconstructive notions that all organic farms are small, that products are primarily marketed at the regional level, or that all calves suckle their mothers for weeks. If the media strongly feed such images, over-reaction and over-regulation may result. One example of this is the unrealistic EU Commission proposal to prohibit the marketing as organic of products containing pesticide residues above the threshold value for infant foods (0.01 mg/kg). This proposal had been made on foot of methodologically questionable consumer surveys.

Consumer communication must therefore be nuanced and sophisticated. It must take both sides seriously and create a deep and realistic understanding of the concept of organic agriculture and its advancement. It also requires research, given that practitioners, marketing experts and consumers all use different languages, and given that it is impossible to rapidly alter deep-rooted expectations and desires. Generally farmers are good communicators; they can give authentic accounts of their work. Social media and other methods of customer information open up new opportunities in addition to the direct contact with farmers.

5. Potential pathways for the development of the organic farming sector of the future

A number of different scenarios were presented and discussed in the first draft of this paper (see First Draft, 6 February 2015[1]). The different scenarios were closely associated with the question of a vision for the organic sector. Just as the IFOAM Principles (IFOAM, 2015) were developed in a discussion process between all the organic associations worldwide which took several years, the authors of this paper can not present a vision – this must rather be developed through an extensive process of debate.

5.1 A vision for organic agriculture

In the authors' opinion this discussion on a vision for the sector must take consideration of the following aspects: If organic agriculture self-identifies as a **market niche** (see Scenario 2, Section 5.2) targeting a certain stratum of consumers, then any possible changes must be approached very carefully. From today's perspective there is no reason to believe that this market niche will not continue to grow over the next ten to twenty years (Box 5). In "mature" organic markets such as Denmark, Luxembourg, Switzerland, Austria and Germany, market shares of up to 10% are foreseeable. There is also considerable growth in several other markets, such as France, the US, Sweden, South Korea, Japan and China, partly due to consumer reaction to environmental problems, potential health hazards, quality issues in the conventional trade, a rejection of industrial livestock production or lack of transparency when it comes to GM food. Moreover, in developing countries elites are emerging which similarly strengthen domestic organic markets.

It is of limited relevance to a legally protected market niche as to whether its agri-food model is for the masses or not. A niche does not necessarily need to be able to deal with all the global challenges. Assurances, however, given on the basis of principles and standards, must be honoured with transparency. Looking at the current EU Commission proposals and many of the comments coming from national governments as well as the European Parliament, it appears that they largely pursue the market niche model. Organic farming has been a sideline to the general development of the farming sector and it is not a significant broadscale solution to the impending challenges. The trend is for the two systems, i.e. organic and conventional agriculture, to diverge more and more from each other as they pursue very different

Box 5: The function of niches

The function of niches is not just to serve certain market segments. A niche can also serve society as a "protective space for innovative ideas": *«Within this protective space, niche actors can nurture the path-breaking innovation so it becomes more robust through performance improvements and expansions in supportive sociotechnical networks»* (Smith & Raven, 2012).

[1] http://www.fibl.org/de/service/nachrichtenarchiv/meldung/article/bio-30-soll-quantitaet-mit-qualitaet-kombinieren.html

objectives. Over time this may make it increasingly difficult for new farms to convert from conventional to organic agriculture.

A different picture emerges if the organic sector self-identifies as a **model for farming of the future** or as the gold standard for sustainability (see recommendations by the German Council for Sustainable Development dated 11 July 2011). While a model does not necessarily have to completely replace the current farming system, it must contain all the essential elements needed to point the general farming sector in the right direction. The organic farming sector does indeed do this to a significant degree, using proven techniques and measures, such as crop rotations, mixed farming enterprises, organic fertilizers, systems-based robustness and resilience, preventive measures in plant and animal health, biological crop protection etc. However, organic agriculture is also governed by special provisions which are explicable only against the background of the sector's history and which are often rooted in specific ideologies and therefore cannot serve as a model for the farming sector at large. Correspondingly, the United Nations Special Rapporteur on the right to food, Olivier De Schutter, favours – as mentioned above – agroecological farming, not organic farming, as a model for the necessary turnaround in agriculture policy. The above-mentioned techniques and measures essentially form the common ground between agroecology and organic agriculture. Agroecology is however more open to technology than organic agriculture, as long as the technology serves the objectives of agroecology (Niggli, 2015).

Yet many stakeholders in the organic sector have emphasized that the organic movement has always advocated **sustained change in the entire agri-food sector** and that it can only remain credible if it continues in that endeavour. The authors are similarly convinced that organic agriculture has excellent potential to a) utilize the agricultural landscape in a more environmental friendly fashion and increase its ecosystem health, b) increase added value for farmers as well as downstream and upstream operators and retain this added value in the regions, and c) improve overall the quality of employment and cooperation in rural areas.

In June 2015 in Riga, the IFOAM-EU Group similarly agreed that organic agriculture as a widely-adopted sustainability strategy is its vision, and set a target of 50% of agricultural land managed in keeping with organic principles in Europe (IFOAM-EU, 2015). **An organic farming sector with such a great potential defines itself differently from an organic farming sector targeting a market niche.** It aligns itself more closely with agroecological concepts and makes greater use of diverse innovation pathways. The present concept paper is a first contribution to the implementation and concretization of the vision paper published by the IFOAM-EU Group.

5.2 Concept for Organic 3.0

The first draft for Organic 3.0 (see footnote on page 15) presented four scenarios for discussion. These scenarios will be briefly summarized below.

A conservative advancement of organic agriculture in its current guise was described as **Organic 2.1**. The second scenario, **niche organics**, strongly focussed on a sophisticated clientele desiring the special qualities inherent in organic products and supporting the value-base of organic agriculture. This scenario would entail additional requirements in standards and certification and stronger rules would need to replace those compromises that currently persist on economic grounds. The third scenario, termed **productive greening**, would put organic agriculture worldwide on a pathway of swift growth so as to make it a true alternative able to address the global challenges, instead of having it linger in its niche. The focus in this scenario was on a comprehensive strategy of innovation which draws more heavily, albeit judiciously, on scientific-technological progress. The fourth scenario **combined scenarios 2 and 3**, using the productive greening approach as an entry point into organic agriculture, advantageously based on existing legal regulations, with **best practice** building on this foundation in the form of a quality and value niche.

The many discussions held since have shown that there is much sympathy for this fourth scenario (sustainable greening plus quality and value niche). However, the idea of having two organic levels did not resonate well with the majority.

Therefore, the authors will now advance the idea of a polymorphic organic farming sector without further invoking the "two levels". However, it is important to highlight the need for a precisely defined entry level (minimum requirements of organic agriculture) and the need for ongoing dynamic development towards best practice (see Figure 3).

The concept of ecological or eco-functional intensification developed by the IFOAM-EU TP Organics platform excellently positions organic agriculture as a greening strategy for agriculture as a whole. This concept opens up prospects for increased productivity in organic agriculture without comprising its sustainability traits. Conventional farming can only become more ecologically sustainable if it reduces its dominant dependence on external material flows and inputs such as fertilizers and pesticides. Organic agriculture on the other hand can increase its productivity in an environmentally friendly manner by further improving its usage of material and nutrient cycles and internal resources (e.g. soil fertility, biodiversity, traditional knowledge, farm management) (see Figure 2).

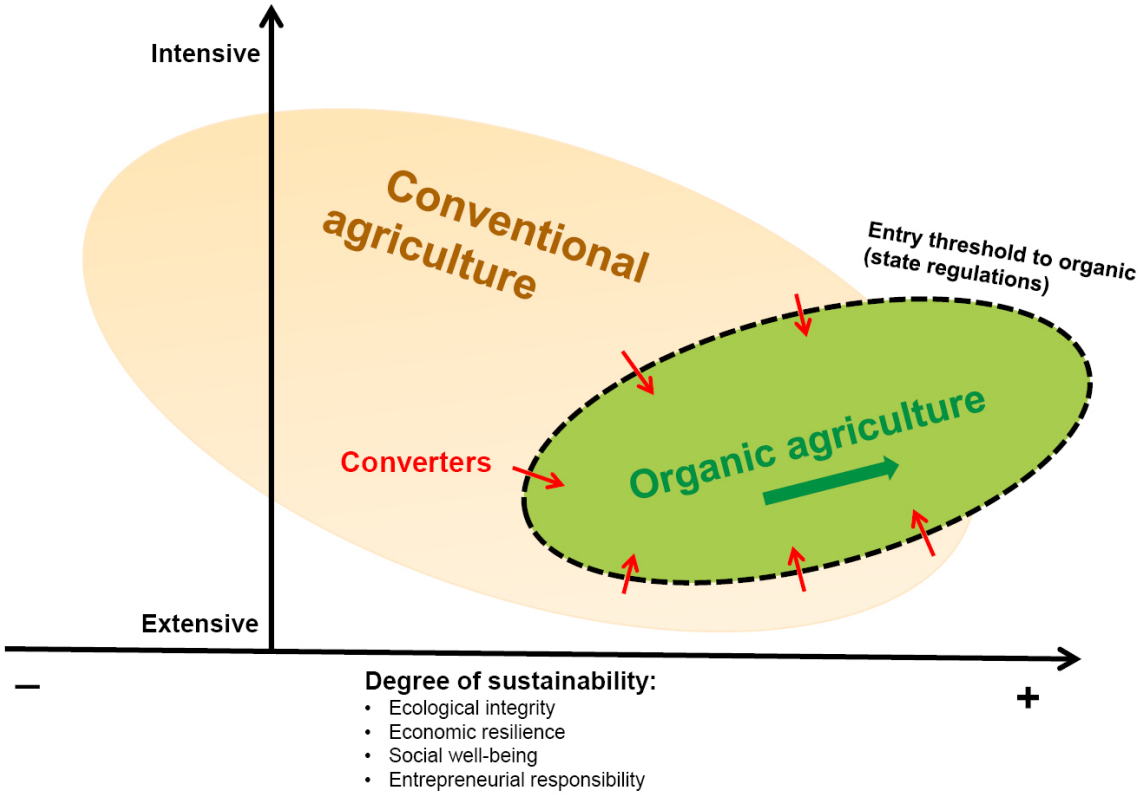

Figure 2: The concept of ecological or eco-functional intensification strengthens productivity and reduces dependence on external material flows and farm inputs. Only organic agriculture consistently and successfully pursues this concept.

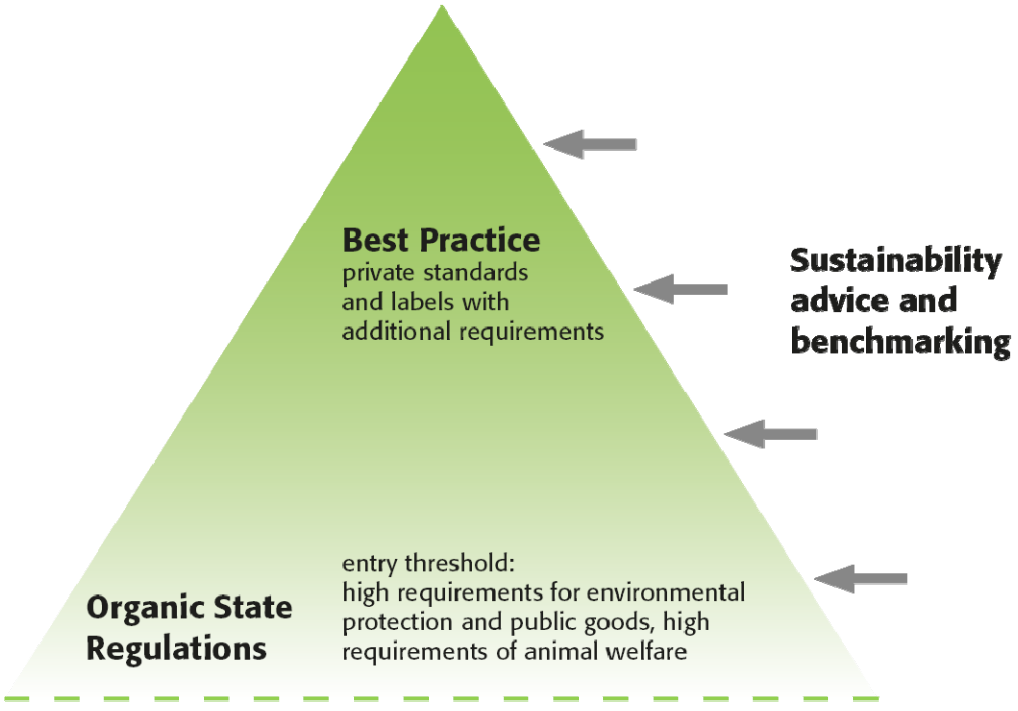

Figure 3: Organic 3.0 as a concept of dynamic development towards best practice.

The Organic 3.0 entry level is defined by high levels of services for the common good (social and ecological public goods), high environmental standards, and high animal welfare requirements (Figure 3). This is the level which should be defined by legal standards such as the EU Organic Regulation. What is important, however, is that this entry level be based on scientific evidence emanating from the natural and social sciences – evidence that is both theory-based and has been tested empirically. Restructuring in the farming sector as is currently under discussion (e.g. livestock production, reduction in pesticide usage, soil protection, protection of drinking water) could thus implicitly lead to a significant expansion of organic agriculture. Be this as it may, the legal definition of organic agriculture is not static but denotes the current best sustainable practice.

Private standard schemes should continue to stand for services going beyond this level, as already being delivered by individual organic associations. These special services include ecology, animal welfare, product quality, and social, cultural or ethical values. Such services are already being delivered. Examples include Community Supported Agriculture, the keeping of horned cattle, refraining from the use of cell fusion in plant breeding, or particularly gentle processing methods. In some instances such services play a significant role in marketing and communication. They also include particular regional adaptations, for example in livestock production (e.g. 100% pasture-raised, or silage-free feeding) or supra-regional innovations in breeding (dual-purpose breeds, maintenance breeding of heritage vegetable cultivars).

These special services are being communicated in advertising; they are also defined in the organic associations' standards and are audited as part of the organic inspections. It is expected that farmers, processors and traders will provide a greater diversity of services in the future, which will also bring about an expansion in the diversity of certification programmes or additional services in the area of benchmarking using comprehensive sustainability indicators.

Organic 3.0 as a dynamic development concept towards best practice could in fact, at the entry level, become a model for the farming sector as a whole. It also has the potential to contribute to broadscale ecologicalization and food security. Differentiation within the organic sector by means of special additional services guaranteed through labels, private standards or benchmarking can serve a variety of market and consumer needs which will always represent certain market segments or niches.

In the following chapter we will examine the prerequisites and conditions necessary for the implementation of such an Organic 3.0 concept.

5.3 Framework conditions for the implementation of Organic 3.0

The advancement of the Organic 3.0 concept and its implementation are subject to certain prerequisites and conditions which will be described below. Some of these are externally determined conditions and their regulation is outside of the remit of the organic farming associations. Others are internal, i.e. self-determined conditions, and these can primarily be changed through the work and conceptual advancement of the organic sector associations (see Fig. 4).

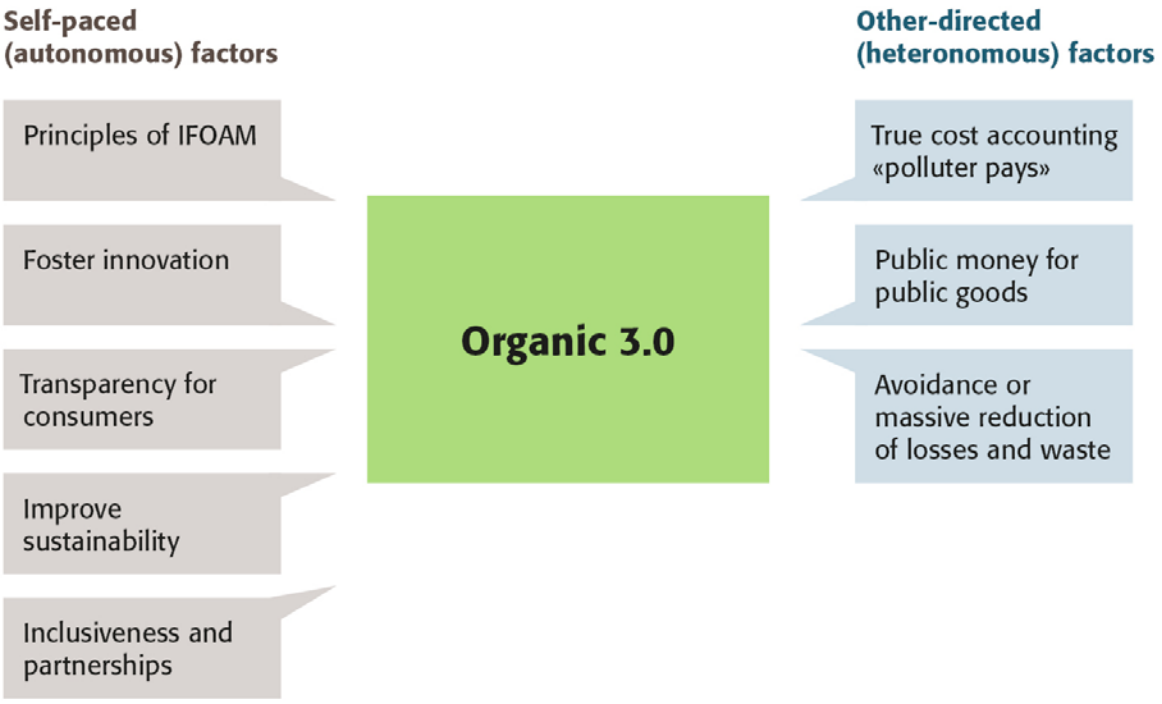

Figure 4: Framework conditions for the advancement of organic agriculture from Organic 2.0 to Organic 3.0.

5.4 External framework conditions

5.4.1 Polluter pays principle to reflect true costs

The macro-economic costs of farming must be internalized. Organic production and organic food will always be the more expensive option as long as the use and pollution of soils, water, air and biodiversity are free of charge. Sustainable farming and nutrition can basically only become mainstream if abatement costs (negative externalities) are correctly reflected in the price of food.

Current agricultural practices are nowhere near sustainable in their resource use. Loss of soil organic matter, soil erosion, more extreme flood events due to reduced soil water retention on intensively farmed soils, greenhouse gas emissions, reduced biodiversity, nitrate leaching, pesticide emissions and undesirable residues in food are among the outcomes. The polluter pays principle, which posits that costs arising must be borne by those who caused them, is not consistently applied in these cases. The

external costs of farming have already been documented in detail for the UK, the US and Germany (Pretty et al., 2002). A recent study looking at the situation in Austria has shown that societal costs and benefits of agriculture are not properly reflected in the national accounts. Even at a conservative estimate and not considering the full range of external costs, the adverse environmental impacts of Austrian agriculture cost the country some EUR 1.3 billion per year. In contrast, organic agriculture achieves higher societal benefits than conventional agriculture at relatively low societal cost. Broadscale conversion to organic agriculture would reduce the downstream costs of agriculture by about a third (Schader et al., 2013).

From the perspective of the organic associations tangible measures must be taken, such as the taxation of nitrogen, energy, CO_2 and pesticides, in order to further internalize externalities and fully utilize the demonstrated potential of organic agriculture.

Such measures would increase the economic comparative excellence of organic farming. But the impact on conventional farming and, by extension, on the environment would be even greater. For example, if the price of crude oil rose significantly (as a result of an energy tax in the medium term, and due to peak oil in the long term), conventional farmers would grow more legumes, like their organic colleagues. A pesticide tax would make classic organic measures more attractive for conventional holdings, such as crop rotations, strips sown in wildflowers and herbs or undersown crops to support beneficials, mechanical or sensor-controlled weed management, or disease and pest-resistant crop cultivars. The internalization of environmental costs would therefore be in the interest of both the organic sector and integrated agriculture.

5.4.2 Public funding only for public goods

While it is possible, in part, to quantify abatement costs, it is practically impossible to put a figure on public goods (positive externalities) such as landscape qualities, humus formation, species diversity, or animal welfare. Sustainability indicators (see 5.5.4) will make it easier in future to evaluate, quantify and guarantee the provision of such goods. It can reasonably be expected that as part of the next Common Agricultural Policy (CAP) reform the as yet rather tentative attempts at remunerating farmers for providing such goods through the "greening" measures will be developed towards more nuanced direct payments. Swiss agricultural policy has already introduced such measures and remunerates farmers for several high quality agri-environmental measures, such as the establishment of habitat networks on farmland, or animal welfare.

Farm incomes will be impacted strongly by both the polluter pays principle and the remuneration for positive externalities. Modern "ecological accounting" could play a key role in advancing organic agriculture.

5.4.3 Reducing losses to increase the efficiency of the food value chain

As macro-economic sectors, agriculture and the food value chain are hugely inefficient. According to an FAO study, the cost of global food wastage alone (harvesting losses, losses during storage and transport, losses arising in processing, sales and at household level) amounts to some USD 2.6 trillion per year. This figure includes the economic, environmental and social costs of food wastage. It amounts to 4% of global GDP (FAO, 2014a, FAO 2014b, FAO 2014c).

This inefficiency in the agri-food sector is a challenge that must be addressed in all production and marketing systems, including the organic sector. Farmers can only be freed from the pressure to increase productivity if

- harvesting losses in the field are lowered,
- storage and transport are improved,
- less grain is fed to livestock for the production of meat, eggs and dairy products,
- fodder cropping is improved and thus also the efficient conversion of green forage into dairy and meat products,
- agricultural land is not primarily devoted to the production of energy crops,
- food wastage is reduced in processing, the retail trade and at the household level,
- people's eating habits change. The latter aspect however is strongly impacted by socio-economic factors (poverty, social rank, social values) but not by the farming sector *per se*.

5.5 Internal framework conditions

5.5.1 The four IFOAM Principles provide the framework for Organic 3.0

The IFOAM Principles are paramount to the discussion on organic agriculture of the future. The four principles are the Principle of Health, the Principle of Ecology, the Principle of Fairness, and the Principle of Care (IFOAM, 2015). It will be the task of Organic 3.0 to develop indicators and parameters to give more concrete expression to these principles.

Among the most important elements of the IFOAM Principles are 1. the holistic systems approach, 2. closed cycles, 3. the exclusive use of natural substances as farm inputs, 4. rigorous regard for animal welfare, and 5. the farm managers' high level of independence and autonomy.

1. No other farming method tackles the **holistic systems approach** as consciously, in both theory and practice, as the organic sector. Most of the political or economic agricultural support measures as well as the many sustainability labels' rules and recommendations tend to be either sectoral or limited to particular sections of the production process. They rarely embrace production measures, operations, or value chains in a comprehensive manner. For the organic sector, industrialization of

production with a view to exploiting economies of scale and greatly simplifying marketing and logistics structures is out of the question.

2. Closed-loop cycles resulting from **close linkage between crop and livestock production** are a further specific characteristic of organic agriculture which must be strengthened in future. Studies have shown that mixed farming is the most appropriate strategy to avoid environmental eutrophication resulting from excess nitrogen and phosphorus inputs (Grandstedt, 2006). Organic agriculture of the future will always be based on closed-loop cycles at individual farm level using classic mixed farming approaches, or cycles closed at the regional level using inter-farm cooperative mechanisms. In the future, closed-loop cycles should also endeavour to include consumers and society at large (see Box 6).

3. The **exclusive use of natural substances** is not born out of dogma but is an approach based on professional/technical facts and should be implemented even more rigorously in Organic 3.0.

Especially in horticultural specialty crops (specifically grapes, fruit, berries, vegetables, potatoes, hops, olives, nuts and ornamental plants) preventative and systems-oriented farming measures are not sufficient to maintain high yields and avoid major annual fluctuations in yields. In addition to plant-breeding efforts with a focus on resistance traits or at least tolerance traits, biological crop protection measures are therefore of great importance. Scientific meta-analyses of factors ensuring good yield performance in farming systems including organic systems have demonstrated the significance of good pest and disease control.

Box 6: Phosphorus cycles

Closed-loop cycles on organic farms primarily involve combinations of crop and livestock production. In some cases, compostable garden and household food waste is also recycled to farms. Other nutrients arising at the household level can not be recycled. The issue of phosphorus recycling is however increasingly gaining in economic significance on account of both the progress made in phosphorus recovery and the current political and legal environment.

Processes for the recovery of phosphorus from sewage sludge have become very sophisticated and are now regularly combined with decoupled heavy metal removal processes and tertiary wastewater treatment.

Phosphorus recovered from sewage sludge may also be a solution for organic agriculture. It has the potential to replace the annual mineral fertilizer imports of the entire farming sector.

The ban on chemical plant protection products in organic agriculture is a knock-out criterion that must remain non-negotiable into the future. Similar considerations apply to animal welfare as well as processing and packaging of organic products. As some of the inputs used in specialty crops are outdated or of concern, their potential replacement with near-natural substances should be considered (bionics; von Gleich, 2007). Thus far the concept of bionics has barely been discussed in the organic sector, or if it has, a rather negative stance has been taken.

4. **Animal welfare** is a key element of the IFOAM Principles. It is to be given even greater weight in Organic 3.0 than under the existing organic regulatory system. This is of great importance not least owing to the fact that animals are an integral part of sustainable systems (cycles) and because without livestock meadows and pastures as hotspots of biodiversity would vanish. Additionally, ruminants make it possible to

utilize for human nutrition those lands that are not suited to tillage farming or vegetable production. Sustainable livestock production also takes centre stage in the conflict between arable land use for food or feed ("plate v. trough" debate). The many reasons why livestock-free organic farming is permitted only in exceptional cases bring with them a high obligation to treat farm animals responsibly and with great respect. The standards governing livestock health, animal welfare, transport and slaughter should therefore be further improved. Certification must ensure that these aspirations are indeed enforced.

5. Historically, the development of organic agriculture has strongly been characterized by farmers' and (small) entrepreneurs' **responsibility and self-determination**. This is true in particular with regard to organic standards, cultivation techniques, livestock keeping, processing and the food trade. Numerous developments in upstream areas such as plant breeding, appropriate or improved agricultural engineering solutions, adapted inputs etc. have also emerged from the innovations of individuals. Organic 3.0 should not only continue this tradition but should reaffirm it in some areas. It is very important for farming families to be again granted more individual responsibility and given more room for manoeuvre. Standards should not become straightjackets but should be an incentive to autonomously develop solutions, or better still, to do so in cooperation with other partners (Padel et al., 2009).

A comprehensive culture of innovation for organic agriculture and food culture must not result in unilateral economic dependence or restrict the freedom of choice. This is why the sector is strictly opposed to, for example, patents on plants or animals. The organic sector fosters innovation in close cooperation with small and medium-sized enterprises, thereby contributing to economic diversification and resilience.

5.5.2 Organic 3.0 incorporates a holistic and comprehensive culture of innovation

Sustainability can only result from a holistic strategy of innovation. Therefore it is important to firmly establish a comprehensive and easy-to-grasp innovation strategy in Organic 3.

One can broadly distinguish three categories of innovation:

- **Social innovation**;
- **Environmental innovation** or ecological modernization;
- **Technical or technological innovation** (innovation in the areas of products, services, procedures and processes).

Organic agriculture never banks solely on technological innovations as these may increase vulnerabilities and result in dependencies. In the areas of social innovation and ecological modernization, farmers themselves are often agents of innovation. They can control the innovations and are not at the mercy of cost- or capital-intensive external services or inventions. Moreover, dominant technological innovations have often proved dead ends. As part of a comprehensive culture of innovation, technical and technological innovations are used wisely and are carefully integrated with ecological and traditional knowledge.

Comprehensive innovation which makes organic agriculture more attractive to young farmers, offers economic advantages and brings a new wave of farm conversions will need more funding for research and extension. With its European Innovation Partnership (EIP) the EU has taken a first step in this direction. EIP is the first instrument to finance bottom-up multi-actor approaches. However, such projects must also be granted more funding under national research programmes. At the same time, fundamental research must also engage more strongly with the "organic system". This may trigger technical and technological innovations of benefit to that system.

Box 7: Responsible use of techniques and technologies in accordance with IFOAM Principles:

The Principle of Care states that precaution and responsibility are the key concerns in agricultural management. Techniques and technology choices must give priority consideration to potential impacts on animal welfare, the environment, food quality as well as socio-economic concerns. Examples would be the aim to abandon ploughing in organic agriculture in favour of reduced tillage (higher humus formation, lower energy consumption, more earthworms), the fostering of the relationship between humans and livestock (stress reduction during transport and at slaughter), the appropriateness of technology upgrades so as not to result in greater farm debt, the rejection of patents on seed, new breeding methods to also be open to small and medium-sized breeders, or innovations respecting the provisions of the Protocols on biodiversity and biosafety (Nagoya/Cartagena).

We, the organic associations and research institutions propose the establishment of an "innovation commission" at either European or international level. This commission would focus strongly on **sustainability and risk assessments of innovations** (see Box 8). Such a commission could be established in the German speaking area (Germany, Luxembourg, Austria, Switzerland and South Tyrol) as part of a pioneer phase. In the absence of a formalized approach there is a risk of the organic sector being steamrolled by the rapid progress of scientific-technical innovation. Moreover, opinions could begin to diverge and individual uncoordinated initiatives could result. There is no shortage of issues that need to be addressed. Researchers in the organic sector in particular tend to be somewhat overwhelmed in the face of the multitude of research fields opening up (see Box 8).

Box 8: Issues that must be addressed. **An innovation commission would have its work cut out. Some examples:**

- Phosphorus fertilizer use (recovery from sewage sludge, animal sources, new extraction methods for highly alkaline or highly acidic soils).
- Nitrogen from urine processing, bacterial cultures, or solar-run Haber-Bosch processes.
- Dissemination of information and communications technologies (ICT), Big Data, precision farming and robotics in organic agriculture.
- Application of nanotechnology, for example in packaging or for the formulation of organic crop protection products.
- Potential applications of new breeding techniques in organic agriculture (Andersen et al., 2015).
- Significance of new marker-based breeding techniques (genome-wide selection) for breeding programmes strongly relying on the "breeder's eye" (crop and livestock production).
- Ban on cell fusion: Scope, approach, timeframe.
- Alternatives to orthodox veterinary medicine (e.g. antibiotics).
- Robotics and monitoring techniques in livestock management.
- Amino acids and feed additives manufactured by fermentation.
- Precision livestock management: individual feeding techniques.
- Natural herbicides (e.g. plant extracts, fungi etc.)
- Novel insecticides based on RNAi technology to combat invasive pests such as *Drosophila suzukii.*
- Insect-based protein production.

5.5.3 Organic 3.0 relies on transparent communication along the entire value chain and improves quality assurance

In Germany, Austria and Switzerland it is already evident that a dynamic strategy of differentiation in consumer communication is successful: Organic certifying associations such as Bio Suisse, Bio Austria, Bioland or Naturland continuously advance their standards and differentiate themselves from the minimum statutory requirements on the basis of quality. Moreover, the associations support their clients in continuous development towards best sustainable practice. Evidently consumers are well able to handle different levels of organic quality and value. Organic products certified to stricter conditions and standards are purchased by the same consumers who also buy products certified to the EU Organic Regulation. Most people are able

to comprehend that a statutory standard should set the baseline rules for all organic food and farming while private labels may exceed this baseline with targeted claims.

These examples show that transparent and differentiated consumer communication is possible. Moreover, it is unnecessary to invoke unrealistic, i.e. overly idealizing or antiquated images to promote organic agriculture.

Research on how to frame a common "language" shared by agriculture, ecology, agricultural science, food science and consumers is highly significant for the successful expansion of sustainable food systems.

Quality assurance and certification must be advanced in tandem with the differentiation of services and characteristics of organic operators and organic products. Most certification agencies already practise *HACCP (Hazard Analysis and Critical Control Point)*. In most cases this includes chemical analyses (soil, products) in addition to process-related documentation. Moreover, certification agencies conduct detailed chain-of-custody inspections. International flows of goods are however susceptible to criminal activity given that fraudulently labelled goods may yield substantial profits. An important prerequisite to growth in the organic sector is the consumers' ability to place their trust in a functioning inspection and quality assurance system. This trust should not be disappointed.

Today's inspection systems suffer from a reform backlog. For cost reasons certification agencies around the world are not in a position to fund much innovation. The application of new techniques is in its infancy and their application in organic farming is as yet largely untested (see Box 9). New analytic methods and monitoring systems, while being very expensive in terms of initial assessment and introduction, will swiftly simplify quality assurance and help save cost and manpower.

Data and information networks will also play a key role in the future. Quality assurance players (certification agencies, monitoring agencies, commerce) do not sufficiently "talk" to each other, in other words their data are not compatible and thus escape possible plausibility checks, a situation which often results in significant breaches in quality assurance.

Box 9: Potential methods for inspection and certification

The most advanced analytical methods can not only provide information on the characteristics of a final product but they can also characterise the production method, a feature of great significance for the organic sector. Analytics can for example determine the production location and provide insights on fertilizer or feed composition etc. (Hermanowski et al., 2013). Such methods include, for instance, stable isotopes, amino acid and fatty acid patterns, and ICP mass spectrometry. Satellite imagery interpretation may also be useful, as may be the use of spectral photometry with the aid of UAV (unmanned aerial vehicle) drones to avoid fraud and ensure chain-of-custody monitoring and plausibility assessment (Jung et al., 2014).

5.5.4 Organic 3.0 should incorporate sustainability more comprehensively

There are now a number of analyses, supported by a majority of the scientific community and other experts, which address the global challenges arising from the

need to feed a growing world population. These include for example the Millennium Ecosystem Assessment Report (2005), the International Assessment of Agricultural Knowledge, Science and Technology for Development Report (IAASTD, 2009) and the publication by Rockström et al. (2009) in Nature. Organic 3.0 must be assessed with a view to its capacity and relevance for solving these problems. The analyses mentioned above also propose solutions to these problems, with the most concrete proposals given by the IAASTD Report. Agroecological and systemic solutions are generally favoured, one of them being organic agriculture.

The further development of organic agriculture must be assessed against clearly-defined criteria, indicators and parameters of **sustainability**.

Unlike the conventional sector, Organic 3.0 will not only pursue a strategy of increased efficiency but will also integrate the concept of sufficiency (see Box 10). The organic sector must also define precisely what kind of farms, landscape structures and value chains it wishes to promote (see for example the vision put forward by Bioland). Guidelines for comprehensive sustainability assessments include SAFA (FAO, 2015) and SOAAN, the latter being a sustainability guideline developed by IFOAM (SOAAN, 2013). Farm management consultancy tools such as RISE, SMART or the Sustainability Flower would help optimize operations. Such computer-aided tools make it possible to use indicators and parameters to analyse agricultural and processing operations in all their complexity.

Box 10: Efficiency v. sufficiency

Ever since Rio, there has been debate on whether ecological sustainability could more likely be achieved by **sufficiency** (Sachs, 1993; von Weizäcker et al., 1995; Princen, 2005) or **efficiency**. Sufficiency in this context is taken to mean a strategy of frugality, voluntary reductions in consumption, or the imposition by law of quotas for resource consumption and environmental pollution. In ecological accounting, **foreseeable shortages** must be taken into account in order that efficiency improvements are not rendered ineffective. Sufficiency objectives would prevent, for example, a situation where food produced using less energy and labour leads to more wastage or obesity as a result of the food being less expensive (rebound effect).

The discussions on Organic 3.0 should consider sufficiency even more strongly than hitherto:

- Phosphorus (the first element to become scarce) should also be recycled from human waste.
- Careful composting and nutrient cycling in crop-livestock systems should be enhanced.
- Wastes should be used to produce insect-based protein feed.
- Crop nitrogen needs should be met using clover in mixed cropping.
- Reduced tillage should further reduce soil carbon losses.
- Beneficial soil micro-organisms (e.g. mycorrhizal fungi or PGPRB) should be used as low-energy fertilizers.
- Greatly improved health strategies for crops and livestock should result in higher yields while reducing land consumption.

Optimization based on sustainability assessments includes not only ecological impacts but also **social aspects of farm families and farm workers, good governance, and economic prosperity**. Operator certification would come to include such tools, always with a view to avoiding the operators' "conventionalization". The sector will always have a holistic and comprehensive

understanding of sustainability. A reductionist view considering only individual criteria such as greenhouse gas emissions, energy consumption, soil erosion or farm working conditions does not suffice to assess organic agriculture.

5.5.5 Partnerships between organic agriculture and other sustainability labels

In future, it will be essential for the organic sector to work more closely together with other initiatives towards the goal of remodelling farming. While during the pioneer phase of organic agriculture many topics tackled by the sector were undisputed unique selling points (e.g. soil fertility, environmental protection, animal welfare, healthy food), the phase of market establishment and expansion was characterised by demarcation and image-building. Meanwhile the sector has become a much stronger force in the markets, in agricultural policy, in society, and in the research and extension structures. Due to this strengthened position, Organic 3.0 will focus more strongly on partnership alliances with initiatives and organizations working towards similar objectives (Box 3). These partnerships will be used both to voice common concerns in agricultural policy or in the markets, and to improve the organic sector's permeability for farmers and other operators who wish to enter the sector. However, partnerships also entail the need to clarify both commonalities and differences. Guidelines and standards for sustainability assessments must therefore be harmonized. Scorecards tailored to individual production or marketing methods that give preference to one's own label or brand amount to little more than "greenwashing".

There are already some good approaches to closer cooperation. The IFOAM-EU Group has organized a number of conferences on the topic of agroecology which functioned as platforms for a diverse and openly-defined assemblage of movements and farmers' groups. Closer cooperation between the different strands of the sustainability movement is also emerging under the aegis of the United Nations Forum for Sustainability Standards (UNFSS). This includes projects run by IFOAM (e.g. GOMA[2]). Such partnerships have the potential to be very positive for the further development of both organic agriculture and the organic marketplace.

[2] http://www.goma-organic.org/;

6. Final considerations: Embracing the contest between agricultural systems

The debate on the future of farming left its niche in the professional community long ago. Society is actively and competently engaging in the discussion. Therefore there is a general awareness of inconsistencies and potentially conflicting objectives arising if the status quo in organic agriculture were to be maintained. "The organic model is not very useful if only a small proportion of farmers participates in it. Ways must be found to 'green' the entire agricultural sector", writes a German nationwide daily newspaper (Maurin, TAZ, 2015). Given the stagnating organic acreage, this sentence is indicative of the organic sector's central dilemma over the last decade:

The farming sector must change because it does not meet core societal expectations. Organic agriculture offers a way out, but its acceptance in the farming community is too low at present. Calls for a third pathway are coming to the fore again, i.e. for a strategy that renders the entire agricultural sector more sustainable. Science policy panels, in particular, devote a great deal of attention to agricultural systems of the future. However, the efforts so far to actually walk that path have not been successful: Pesticide usage has increased despite integrated crop protection; livestock production has become increasingly industrialized despite animal welfare initiatives; species diversity is on the decline despite conservation management agreements.

Because the future of farming is being discussed widely and affects everyone, and thus also all political and economic decision-makers, we are now in the midst of a contest between future agricultural systems. In our opinion, organized organic producers should actively embrace and spearhead this contest.

It has been possible for open competition between the systems to arise in recent years because the gap between the objectives of industrialized farming and the aspirations of society at large has continued to widen, and changes are mostly introduced by way of corrective measures. Both practitioners and the scientific community have long been aware of many of these conflicting objectives, but the conflicts had to exceed a certain level of intensity before they impacted on the wider public debate.

Many of the conflicting objectives that drive the contest between systems can be condensed into a single key statement:

Total systemic outcome of the agricultural system

versus

Simplification of the agricultural system through continuous optimization of a single branch of production

Especially in intensive livestock production regions the conflict between these objectives has exceeded both the perception threshold and the action threshold. The

production of cheap meat and eggs has been optimized but other system services, such as clean water and clean air or the ethically acceptable treatment of farm animals, have been left behind. Moreover, many people's perceived quality of life in such regions has declined so strongly that modern farming is seen in an increasingly negative light instead of being perceived as an active contributor to a liveable environment.

One of the reasons why the conflicting objectives were ignored for so long is the undisputed successes achieved in simplifying and optimizing individual enterprises such as maize or poultry production; food has become unbeatably cheap as a result of the industrialization of farming.

It appears that this shortcoming is finally being recognized in the political sphere, in science and also in the wider public debate. Terms that were coined a long time ago, such as "system service" or "multifunctionality of agriculture" now feature as strongly in the debate on the future of farming as does the sector's competitiveness.

As authors of this discussion paper we would like to place the current and future role of organic agriculture in the context of the overall debate on farming of the future:

- Is organic agriculture a framework for labelling and consumer protection in an exclusive niche market? This is the approach currently being pursued by parts of the EU Commission as part of their review of the EU Organic Regulation.
- Or is organic agriculture a practical answer to the question of how to bring about the most competitive future agricultural system?

For the organic movement of the 1960s and 70s, which we, the authors, represent, the answer was clear: The focus was not primarily on selling organic products but on developing and establishing an alternative agricultural system that is not exposed to the general trend towards industrialization. It may not have verbalized as such, but from the outset the focus of this farmer-led movement has been on the overall services provided by the system for nature, farmers and the public. Commercial sales only developed significantly following the introduction of statutory protection for organic product labelling which in turn encouraged policies for the protection of both the consumer and the exclusive market niche occupied by organic products. The stakeholders in the organic sector continue to be motivated by the desire to restructure the agri-food sector into a system which sustainably safeguards and enhances the natural resource base on which life depends rather than consuming it.

Just like any other competition, a contest between agricultural systems needs benchmarks, rules, and a jury that determines the winner. Nowadays, discussions and texts elaborating on these benchmarks and rules for the contest between agricultural systems use terms such as sustainability, strictly closed-loop systems, ethologically sound livestock management, climate change, system services, resource efficiency, urbanization, changed consumer expectations and so on. Organic agriculture is only mentioned as an aside, if at all. The search for solutions is dominated by other concepts such as local adaptation, aquaponics, urban farming, vertical agriculture,

robotics and also by the hope that biotechnology might be able to tackle the system's problems.

Given that organic agriculture, in terms of acreage, has yet to emerge from its niche, more effective strategies for a sustainable future agricultural system are now being sought and researched. These strategies do indeed incorporate elements of organic agriculture, such as site-adapted crop rotations, material and energy cycles at farm level, biological crop protection, preventative animal health strategies, or regional-level protein feed supply with livestock production being linked to the available land base. However, the question of what constitutes a comprehensive functional farm-to-fork system (and back!) remains unanswered.

Neither science nor policy will decide the winner of this contest – the decision will be made by the consumers and even more so by the farmers themselves. Day after day farmers make investment decisions that tie them to certain production systems, often for 15 years or longer.

Now that agricultural policy and the scientific community have begun to openly discuss systemic issues, organic agriculture as a coherent system is already present in the marketplace, presenting itself to the jury of producers and consumers. One might therefore ask why our 40 year head start in terms of development and experience has not long ago decided the contest for the agricultural system of the future in our favour. It would be fair to say that no research project in the world can make up for four decades of practical experience and innovation plus market establishment towards a functioning, comprehensive system.

With this discussion on Organic 3.0 our aim is to illuminate the current situation and the reasons as to why organic agriculture has not to date decidedly won the contest between agricultural systems. At the same time however we wish to draw attention to the fact that this contest has only begun and has not yet been decided. We are of the opinion that the people involved in the organic movement should consciously and actively face up to this challenge and that they should also more vigorously tackle, together with the scientific community, our weaknesses as outlined in this discussion paper.

Together we can ensure that Organic 3.0 will win the contest of agricultural systems and that it will become the reference standard for a globally functional systems approach in farming (and also in nutrition) which is committed to the responsible, low-risk application of practical experience, new knowledge and innovative technology and which is dedicated to the common good.

7. Outlook

As a group representing the four major organic farming associations in the German speaking area, together with FiBL we have worked on this paper for over a year. In many discussion rounds we have explored where we are as a movement, where we want to go, and how we see the role of our movement in the years to come.

We hereby present this finalized discussion paper for broader discussion in our organizations. The paper may or may not be used later to develop organizational positions. We also aim to discuss the questions posed and propositions presented above in our umbrella organizations, i.e. the German Organic Food Industry Federation (BÖLW) and the IFOAM EU Group, given that our organizations' contributions are highly relevant in the European debate on the future of farming in general and organic farming in particular.

We hope that upon completion of our discussions on Organic 3.0 our movement will be strengthened and will enter the engagement with conflicting interests in society and industry with a clear agenda.

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