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Organic agriculture in Africa: A critical review from a multidisciplinary perspective

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Abstract

Organic agriculture seems to be a profitable enterprise for small scale farmers in developing countries, also in Africa, to enter high value markets in the Northern hemisphere and overcome the crises of declining terms of trade on global agricultural produce markets. It is also seen as a way to overcome food security problems, induced by low yields and declining productivity of African smallholder agriculture.

This paper discusses the present situation on European organic markets and their potential for small scale farmers in Africa, finding that although markets in the North are still growing, they might be limited in the long run. Barriers to entry are many, including the lack of affordable certification bodies in Africa, poor infrastructure and experience in organic production and marketing, as well as regulation in European markets, and increasing risks and competition associated with the process of market saturation.

Organic agriculture has not yet proven to solve the problems of food security and declining terms of trade in Africa. It is also clear that there is a lot of inequity in the organic chains, and that so far only the relatively large scale farmers in Africa, as well as middlemen and traders along the chain, profit from commercial organic agriculture, similar to findings from conventional commercial agriculture.

Organic agriculture is being researched by international agricultural research organizations, and it is found to be less yielding and more risky than integrated approaches that combine organic and synthetic inputs. This research has to be still extended, and research gaps, especially in terms of costs and benefits, have to be closed to get a final picture on how to integrate and optimise the various approaches.

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Keywords

food security, integrated agriculture, niche market, Sub-Saharan Africa, sustainable agricultural production, terms of trade

1 Introduction

1.1 Aim of the study

Organic products are doubtlessly occupying a rapidly growing niche on the Northern hemisphere's food markets. As organic food products are earning high price premiums, they have attracted the attention of many stakeholders involved in developing countries' agriculture, as there seems to be a niche for developing countries' producers to share these price premiums and to have a market opportunity that outperforms the presently declining world market options for conventional food products.

The above statements hold especially for African smallholder farmers. Many see a niche for organic production in Africa, where input use is still low if not totally lacking, and where farmers are struggling to gain comparative advantage on highly competitive regional and global markets. Scialabba (2000) states that apart from the quest for niche markets, other concerns determine the choice to convert to organic farming. These include natural resource conservation, the need to find alternatives to low access to synthetic agricultural inputs, food self-sufficiency and the need to achieve wider and sustainable rural and social development through its potential to generate employment. This argument goes beyond the "niche market argument" and it implies that organic farming can contribute to overcoming Africa's agricultural problems, making a virtue out of the problem of lacking inputs.

However, there are many open questions as to whether organic agriculture as per its European and North American definition is feasible for African farmers in their ecological, social and economic environment, whether the potential benefits from niche markets can compensate the potential risks, and whether organic agriculture contributes to growth and equity of livelihoods in African countries and improved food security, in other words, whether organic agriculture is a concept that can be used to reach the goals of increased and sustainable agricultural production in Africa.

Questions related to the above are those on the equity of the distribution of profits along the organic food commodity chain, and last but not least, to what degree the present growth of the organic food market in developed countries will sustain and hence amortize the high investments in organic agricultural production in the long run.

This contribution tries to answer the above questions from an African perspective. The next section will discuss definitions of organic agriculture, and the implications of these definitions for the analysis of African organic vs. conventional agriculture. The third chapter gives an overview on the global organic food markets with a focus on European markets, including a brief analysis of their structure and the regulations that may affect trade and trade margins for developing countries. The subsequent section attempts a critical discussion of organic agriculture in Africa, its opportunities, challenges and risks. The last chapter concludes the contribution

and gives recommendations to policy makers and researchers to efficiently address the issue of organic farming in Africa.

1.2 Definitions and perceptions of organic agriculture

Ideas on organic agriculture reach back to the first half of the twentieth century, with the concept of biodynamic farming being defined as a "sustainable, ecologically stable, self-contained unit, biologically complete and balanced—a dynamic living organic whole". This wide definition allows for an indefinite number of organic farming systems, but lacks precision (Goldberger 2005). The most widely used definition of organic agriculture today has been set up by the International Federation of Organic Agriculture Movements (IFOAM), which states (Goldberger, op.cit.):

“Organic agriculture is an agricultural production system that promotes environmentally, socially and economically sound production of food and fibres, and excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, livestock feed, additives and genetically modified organisms. Utilizing both traditional and scientific knowledge, organic agricultural systems rely on practices that promote and enhance biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain or enhance ecological harmony. The purpose of organic agriculture is to optimise the health and productivity of interdependent communities of soil life, plants, animals, and people.”

Parrot and van Elzakker (2003) identified four different organic agricultural categories in Africa, according to their dependency on formal development aid and institutions:

1. Commercialised, certified organic agriculture without any significant development funding. This is generally practiced on large-scale farms and oriented towards organic markets in industrialized countries.

2. Export oriented certified organic agriculture, supported by development funding, and aimed at improving incomes of small farmers.

3. Poverty reducing and environment conservation oriented agriculture based on organic principles, assisted by development agencies. This system addresses soil degradation and water scarcity as well as food security, and usually supports local initiatives.

4. Organic agriculture initiatives developed by farming communities and local organizations without foreign assistance, as a means of addressing pressing social, economic and environmental problems.

Parrot and van Elzacker (op. cit.) also criticize the approaches in particular to non-certified and informal organic agriculture in the African context as merely being low-input, or non-chemical input based agriculture, often not being based on systematic approaches, and ready to be called a “failing form of organic farming”. Further, Parrot and van Elzakker (op.cit.) criticise the missing link between organic farming in practice and agricultural research, accusing researchers, in particular agronomists and agricultural economists, of simply optimising single crop

production functions. However, a look into the vast amount of available literature on integrated farming systems, and cropping systems agronomics and economics research, in particular in West Africa but also more recently in East Africa, easily proves this wrong. In fact there is a lot of information available on the performance of agricultural systems under different traditional, conventional, integrated and organic approaches (see Schlauderer 1997, Buerkert et al. 1998, Bernard et al. 2000, Abele 2001, Forum for Organic Resource Management and Agricultural Technologies 2005) At the same time, Parrot and van Elzakker (op.cit.), admit the failure of the organic movement to provide documented and peer reviewed evidence of the achievements of organic agriculture in enhancing farm productivity, food security and the self regenerative capacity of farm ecosystems in Africa, while claiming that in fact organic agriculture by the above definition – or at least a kind of "de facto organic agriculture" – can increase food security and is therefore not only a viable way to commercialise and generate income for the export sector but also a way to overcome domestic food shortages.

Table 1. Definitions of organic agriculture as used in this paper

Term	**Definition**
Formal/certified organic agriculture	Organic agriculture practised in accordance with stringent principles that meet national and/or international requirements (categories 1-4)[a]
Commercial organic agriculture	Formal agriculture that aims at commercial trade and export (categories 1-2)[a]
Informal organic agriculture	Low- or no-input organic agriculture, not practised on the base of the above principles but out of lack of inputs and resources
De facto organic agriculture	Agriculture using integrated approaches, often combining organic and synthetic inputs

[a]Parrot and van Elzakker (2003) identified four different organic agricultural categories in Africa, according to their dependency on formal development aid and institutions: 1) commercialized, certified organic agriculture without any significant development funding; 2) export oriented certified organic agriculture, supported by development funding, and aimed at improving incomes of small farmers; 3) poverty and environment oriented agriculture based on organic principles, assisted by development agencies; 4) organic agriculture initiatives developed by farming communities and local organizations.

The above review again strengthens the outline given in the first section, i.e. that organic agriculture in Africa has to be analysed along two major lines: first, the commercial, Northern market oriented line and its opportunities and threats, and second, the line of the potential of organic agriculture for sustainable domestic agriculture in Africa, the latter including an assessment of recent research approaches to the viability of organic and de facto organic agriculture.

As we will look at the whole of the above systems in this paper, it is necessary to pre-define some of the terms we will use in order to have a clear picture to what the specific sections refer to (Table 1).

2 Organic agriculture from a global perspective

2.1 The world market for organic food and its development

Table 2 shows the present status and potential development of organic food markets in Europe, Japan and the US. Organic food markets are still a small niche of the total food markets in developed countries, and although growth rates are expected to be 10 – 20 % in the medium term, the resulting market share will be not more than 4 – 5 %.

Table 2. Overview of world markets for organic foods and beverages

Market	Retail sales (million USD) 2000	% of total food sales	Expected growth in the medium term (%)
Germany	2,100-2,200	1.6-1.8	10-15
U.K	1,100-1,200	1.0-2.5	15-20
Italy	1,000-1,050	0.9-1.1	10-20
France	800-850	0.8-1.0	10-15
Switzerland	450-475	2.0-2.5	10-15
Denmark	350-375	2.5-3.0	10-15
Austria	200-225	1.8-2.0	10-15
Netherlands	275-325	0.9-1.2	10-15
Sweden	175-225	1.0-1.2	15-20
Belgium	100-125	0.9-1.1	10-15
Other Europe[a]	400-600		
Total (Europe)	7,000-7,500		
U.S.A	7,500-8,000	1.5-2.0	20
Japan[b]	2,000-2,500		
Total	**17,500**		

Figures are rough estimates.
[a]Finland, Greece, Portugal, Ireland, Spain and Norway.
[b]Figures for Japan are uncertain and include non-certified products.
Source: International Trade Center 2002

After experiencing a rapid growth in the nineties which for some countries (Netherlands, France, Belgium) still persists, organic markets are now growing at a slower pace in many other countries, in particular some of the high income countries of Europe. Market growth seems to be linked to consumer preferences,

in particular growing health awareness, sometimes raised by food scandals, such as the dioxin scandal in Belgium or the livestock diseases in other countries, whereas factors impeding organic market growth are lack of information on organic products, and in particular the prices that restrict consumers' purchasing power and willingness to pay. Related to that is the fact that consumers of organic products often look for produce with a long shelf life, such as cabbage or potatoes, which makes perishable and expensive tropical fruits less attractive (FAO/ITC/CTA 2001). The above observations underline the fact that the markets for organic products, especially from the tropics, remain a niche market. Nonetheless, this niche will still grow and at present, the demand still exceeds the supply.

2.2 Barriers to entry on European organic markets

EC regulation 2092/91 sets minimum standards for products to be called "organic" on the European market, but allows for more stringent national requirements. Therefore, despite the existence of this common EC regulation, there does not seem to be a uniform EC market for organic products. Although certified organic fruit and vegetables can circulate freely across EC countries, there are still differences among EC countries (UN 2000, FAO/ITC/CTA 2001).

Certified organic agriculture in Europe, more than in any other region in the world, is highly subsidized and protected through legislation and direct payments (Willer and Yussefi 2006). For example, European Union regulations and policies provide financial support to national governments for sustainable agriculture and rural development since the 80s. In the 90s, with the Common Agricultural Policy (CAP) under pressure to remove European subsidies on conventional farming, financial support was provided specifically for converting to and maintaining organic practices, in view of the environmental benefits of organic farming. In Austria, Denmark and the Netherlands, farmers receive payments based on the area under organic farming, and assistance is provided in developing marketing systems and providing producer and consumer advisory services (UN 2000). There is a question as to whether the subsidized organic market growths in Europe have a pull effect on organic products from the tropics, such as consumers buying packages of tropical fruits and European vegetables, but there is also reason to believe that in many cases European fruits and even vegetables are substitutes to tropical fruits or vegetables from the tropics, except for a few cases like cotton as a non-food item, medicinal herbs, or coffee (see also below Table 4: Organic produce from Africa).

Trade of organic produce within the EC is increasing. For example, the Netherlands, France and Italy export large amounts of fresh produce to net organic importing EC countries, including the UK, Denmark and Belgium. Again, policies and subsidies are encouraging this intra-EC trade in organic produce, fuelling increased production within the EC in the foreseeable future (UN 2000, FAO/ITC/CTA 2001). Organic consumers tend to protect their domestic market. Since the organic sector in many countries is still dominated by a few players, market transparency is far from optimal. If imports are needed, produce originating from nearby countries is favoured. An extreme case is Switzerland, where the major domestic organic label (Biosuisse) prohibits plane transport of organic products (FAO/ITC/CTA 2001), in effect giving the label a Switzerland-wide monopoly in terms of overseas imports. This makes for tough competition for non-

EC members. Furthermore, the organic consumer his/herself displays distrust towards imported organic products (FAO/ITC/CTA 2001).

3 African commercial organic agriculture

3.1 Overview on organic agriculture in Africa

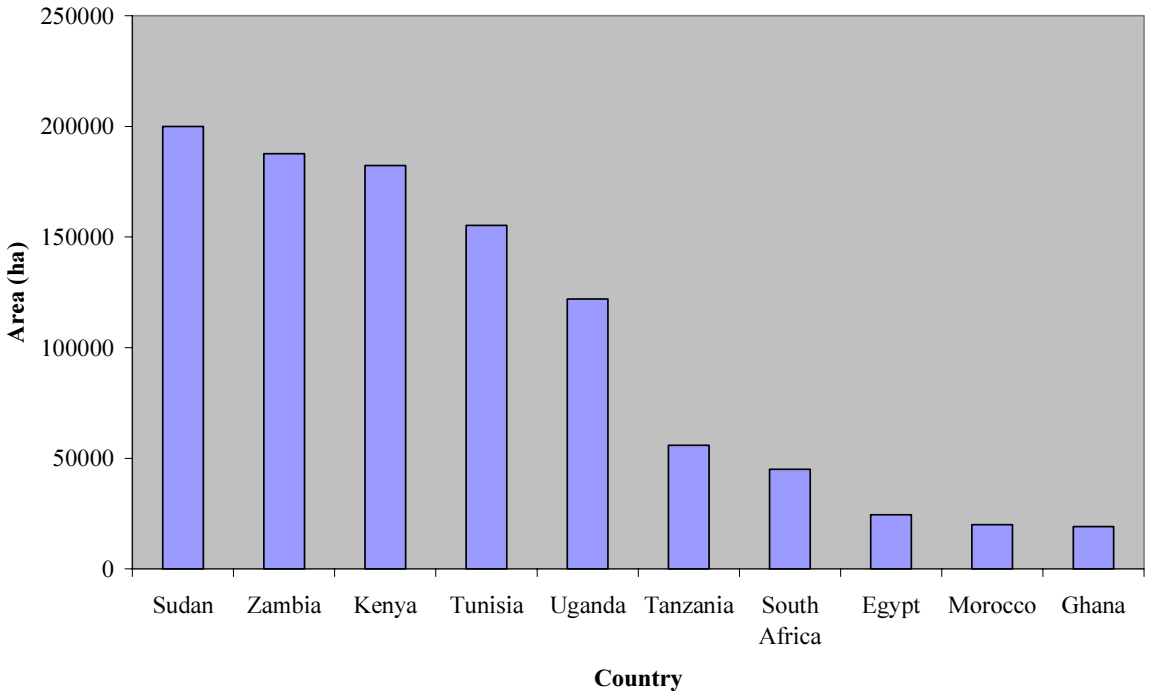
According to Yussefi (2006), 31.8 million hectares of land are currently under certified organic agriculture worldwide. Africa has the least of the shares, estimated at 1.2 million ha, equivalent to 3% of the world's total organic farmland. Regarding the number of organic farms, Africa has 19% of the world total. Table 3 compares the key statistics on organic agriculture in Africa with those of other continents.

Table 3. Key statistics on organic agriculture in Africa and other continents

Continent	Area (million ha) and share (%)	Organic farms (%)	Organic arable land (%)	Organic permanent crops (%)	Organic permanent grassland (%)	Wild collecti on (%)
Africa	1.2 (3)	19	2	21	0	34
Europe	6.5 (21)	27	65	33	31	3
Asia	4.1 (13)	21	13	3	31	33
S. America	6.4 (20)	31	3	41	33	30
N. America	1.4 (4)	2	17	2	5	0
Australia	12.2 (39)	0.5	0	0	0	0

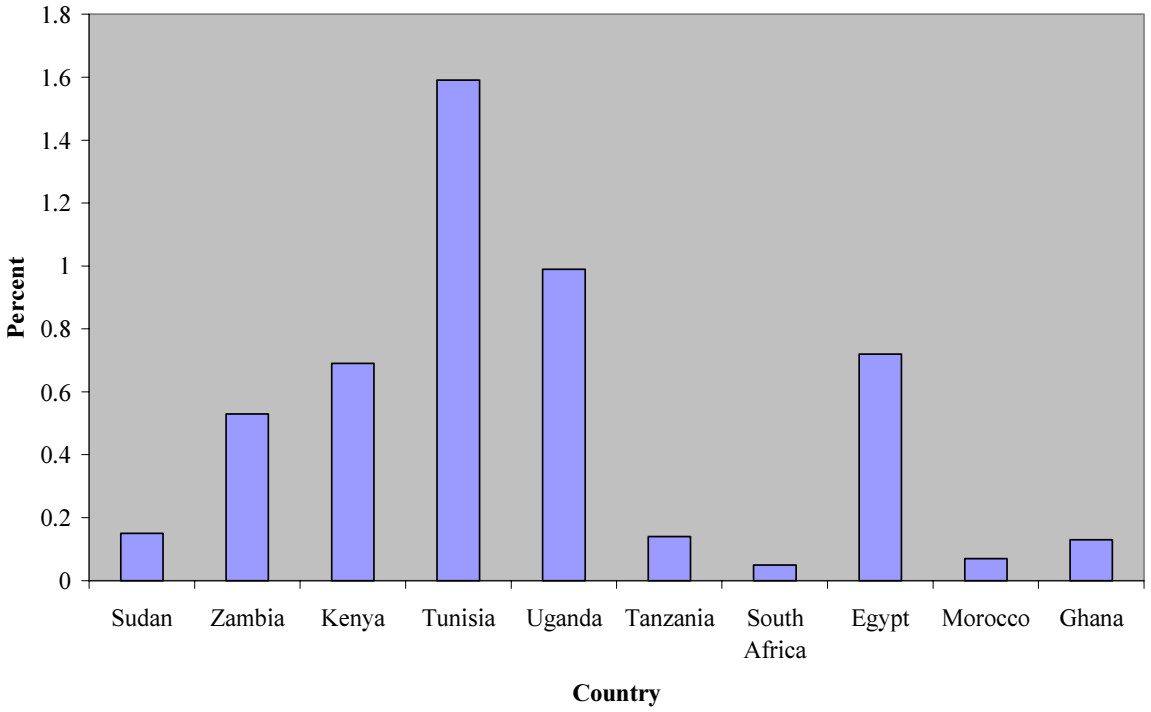
Source: Yussefi (2006). Figures in parentheses are percentages of the world total.

Figure 1: Ten countries with the largest organic land area in Africa (ha)



Source: Yussefi (2006)

Figure 2: Organic land's share of country's total agricultural area



Source: Yussefi (2006)

Table 4. Organic produce from Africa

Product	Country
Fresh vegetables	Egypt, Kenya, Madagascar, Malawi, Morocco, South Africa, Tunisia, Uganda, Zambia
Bananas	Cameroon, Ghana, Senegal, Uganda
Citrus fruits, grapes including wine	Egypt, Morocco, South Africa
Fresh fruits (avocadoes, mangoes, pineapples, papaya, etc.)	Cameroon, Egypt, Ghana, Madagascar, Senegal, South Africa, Tanzania, Uganda
Dried fruits	Algeria, Burkina Faso, Egypt, Madagascar, Morocco, Tanzania, Tunisia, Uganda
Coffee	Cameroon, Ethiopia, Kenya, Madagascar, Tanzania, Uganda
Tea	Tanzania, Uganda
Cocoa	Cameroon, Ghana, Madagascar, Tanzania
Sugar	Madagascar, Mauritius
Cotton	Benin, Egypt, Senegal, Tanzania, Uganda
Coconut oil	Mozambique
Palm oil	Ghana, Madagascar, Tanzania
Olive oil	Tunisia
Ground nut (peanuts)	Zambia
Tree nuts (cashew, shea)	Kenya, Malawi, Morocco, Tanzania
Sesame	Burkina Faso, Uganda, Zambia, Zimbabwe
Herbs (culinary)	Egypt, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Morocco, Mozambique, South Africa, Tunisia, Zambia, Zimbabwe
Spices (culinary)	Cameroon, Egypt, Ethiopia, Madagascar, Malawi, Mozambique, South Africa, Tanzania, Uganda, Zimbabwe
Medicinal/therapeutical herbs and spices	Egypt, Morocco, Namibia, Tunisia, Zambia
Essential oils	Madagascar, Tanzania
Honey	Algeria, Malawi, Tanzania, Tunisia, Zambia
Other forest products	Uganda, Zambia, Zimbabwe
Cereals	Egypt

Source: Parrott and Kalibwani 2005

From Table 2, it is evident that Africa's formal organic sector is lagging behind others. In addition to having the smallest share of organic farmland, it has the second lowest share of organic arable land and does not have any organic permanent grassland. This is attributed to the fact that a large proportion of what would qualify as organic production is not certified and that the domestic market for the certified one, with the exception of South Africa and Egypt, remains small (Yussefi, op cit). Nonetheless, organic production in Africa is gradually increasing especially in the southern countries. Currently, 23 African countries are engaged in certified organic agriculture, out of which 14 have more than 900 ha of organic land. Figure 1 shows the ten countries with the largest organic land in Africa. Sudan leads with 200,000 ha, while Ghana, which is the 10th, has 19,132 ha.

However, in terms of the share of a country's agricultural area, Tunisia has the highest, with 1.59% as shown in Figure 2.

Looking at the two figures, there is no clearly discernible pattern between organic land holding and its share of agricultural land. According to Scialabba (2000), the major motivation for many developing countries (including those in Africa) to produce organic food and fibres is to tap market opportunities in developing countries. A case in point is Tunisia, whose proximity to the European organic market has triggered the Tunisian government to implement measures, including subsidies, aimed at encouraging farmers to adopt organic farming. This explains its relatively large organic land holding and the fact that its organic sector has the highest share of agricultural land. The table below shows the diversity of organic produce that is supplied by African countries. The range goes from cash crops like coffee, tea, cotton and sugar, across fruits and vegetables, up to processed fruits and vegetable oil (Table 4).

3.2 Efficiency and equity in African commercial organic value chains

The following section discusses competitiveness, equity, as well as constraints and risks along the certified organic value chains. The problem in this field is the lack of quantitative and comparable data across value chains and regions, so that we have to rely on case studies of which we think that they best describe the situation in the African commercial organic agri-food sector.

3.2.1 Competitiveness, constraints and risks along the organic value chains

Competitiveness of organic agriculture is often indicated through price premiums for farm gate prices, in some cases also through higher yields compared to traditional (no or low input) systems. However, data availability for benefit/cost ratios is limited, and it can only be hypothesized that the price premiums lead to better benefit/cost relations (Parrot and van Elzakker 2003). Other case studies deny the higher yields, finding that yields, despite higher than under declining traditional systems, are lower under organic management than under integrated management, i.e. a combination of organic and synthetic fertilizers (Mucheru et al. 2005, Okalebo and Woomer 2005, Omare and Woomer 2005). A third group of case studies finds somewhat similar yields between conventional and organic farming, assuming that profitability of organic farming is consequently higher or at least equal to conventional farming Kandil et al. (2002).

Yet it has to be considered that in organic agriculture, despite the fact that input costs may be lower due to abolishment of external synthetic inputs, management costs are supposed to be significantly higher, partly because of increased pest and disease management, and the application of organic manure. Another problem seems to be the sustainability of systems, as none of the so far considered examples are based on long-term systems or research trials, so even if yields are competitive and equal to conventional agriculture, they might decline over time, which has actually happened in some cases (Parrot and van Elzakker 2003).

Table 5. Competitiveness of organic bananas from Uganda vs. Ecuador

	Uganda (Price in US cent)	Ecuador (Price in US cent)	Advantages/ constraints of Uganda vs. Ecuador
Fresh bananas, farm gate price	11.10	27.00	Lower production costs than competitor
Transport and handling from farm to collection center	9.22	0.00	High handling costs
Boxes/packaging material	7.78	7.78	
Transport and handling to airport	1.48	2.56	
Airfreight	170.00	40.00	High air freight rates
Total costs cif Europe (Hamburg)	199.58	77.33	
Transport to ripening chamber	10.67	10.67	
Ripening	11.93	11.93	
Delivery to retailer	0.44	0.44	
Total costs retail store Europe	222.63	100.38	
Retail price Europe	300.00	300.00	
Profit margin	77.37	199.62	

Source: Mwadime 2004, Fischer 2004, Spilsbury et al. 2002, FAO 2004.

However, organic agriculture in Africa can be competitive not only in terms of internal competitiveness with traditional production, but also competitive in terms of being able to compete with global organic market competitors. In table 5, an example is depicted of a comparison between organic bananas produced in Uganda and Ecuador which highlights at the same time competitiveness and constraints. It shows that primary production of organic bananas in Uganda can compete with the one from Ecuador. However, the competitiveness is reduced significantly by high transport and handling costs from farms to collection centres, probably due to the scattered small scale farm structure and poor infrastructure, and especially the high air freight rates from East Africa to Europe. These are more than four times higher than the ones from South America and are consequently a considerable drain on the comparative profit margin reduction. The constraints quantified in the case study below quantified constraints are summarized by Parrot and van Elzakker (2003) as: “Poor quality and badly maintained roads and vehicles, rail links and rolling stock all pose problems for

transportation. Lack of refrigeration, erratic power supplies, poor communications, underdeveloped banking and credit systems and, sometimes, political and economic instability, all raise serious and often insuperable problems".

In addition, the lack of local certification bodies imposes significant constraints and risks to organic agriculture in Africa. They increase the costs of certified organic production, as certifiers have to be flown in. So far, only Tunisia has its own European-standard certification bodies (Parrot and van Elzakker, op. cit.). The costs of certification have to be seen as investment costs and hence risks, for if the investment costs are not amortised by the revenues, e.g. in the case of harvest failures or a sudden shortfall of market outlets, investments in certification are lost and hence the respective farmers are prone to a significant investment risk.

In addition to the mere infrastructural factors affecting organic exports, there are a number of agronomic and, above all, institutional constraints that affect the performance of commercial organic agriculture, as listed below (FAO/ITC/CTA 2001). Although these examples are drawn from case studies in Madagascar, Cameroon and Zambia, it can be assumed that similar constraints apply to the establishment and sustainability of commercial organic agriculture elsewhere in Africa. Such constraints are:

- Lack of experience of intensive organic production in general and especially of fruits and vegetables
- Lack of experience in handling and exporting of fresh produce
- Lack of professional management
- Diseconomies of scale in exporting small quantities, e.g. for test exports
- Poor communication between foreign importers and exporters
- Competition from technically more advanced neighboring countries (e.g. South Africa)
- Poor negotiation skills and judgment of negotiation power of exporters, e.g. cases where prices are increased significantly after first successful trial shipments, and markets were lost
- Lack of familiarity with international markets, including knowledge of the organic market place overseas
- Lack of information for the potential importers, for example, on timing of production (which is locked into the main harvest), and estimated quantities of supply and prices.
- Lack of up-to-date market information
- Lack of governmental action to support exports
- Lack of knowledge on improving soil fertility, pest and disease control

It is however visible that most of these constraints are not "natural" or "naturally fixed", but can be removed by training, research and development measures specifically targeting organic exporters. A few exemptions are transportation infrastructures and long distances to markets, which cannot be shortened – except if new markets open up, like the Middle East for Africa, or growing domestic or intra-African markets, as well as local or export infrastructure and logistics (e.g. airfreights), which are subject to a more complex overall economic system.

3.2.2 Equity along the organic value chains

Equity in this section is discussed in three dimensions: first, the equity in terms of farm size and number of farms in the African organic sector, which indicates equity between organic and non-organic farmers, second the distribution of revenues along the value chains, which indicates equity across different vertical actors, and third, gender equity.

Whereas organic farming in the developed countries is perceived as being characterized by few but large farms, the perception of organic agriculture in developing countries and in particular in Africa is that it is undertaken on many relatively small farms, which may be correct in relation to global farm sizes. From this perception, the assumption of importance in generating alternative employment for poor households in these countries is derived. Table 6 summarizes the number of organic farms in 14 African countries. Uganda, Kenya and Tanzania have the highest number of organic farms. A look at the average farm size gives a first hint on equity in terms of whether organic farms are "average or even small sized", not in global terms, but in terms of African farms. It can be seen that with a few exceptions (Benin, Mozambique, Senegal), organic farms are considerably bigger than the assumed average of less than one hectare in most African countries. This holds in particular for the big schemes in Sudan, Tunisia and South Africa, but also for many other countries. For example in Western Uganda, the average farm is less than one hectare (Okech et al. 2004), whereas the average Ugandan organic farm is 3.6 hectare. In Kenya, farm sizes are at average 2 to 3 hectares (Qaim 1999), whereas the "organic" average in Kenya is slightly above 6 hectares, double the size of the average Kenyan farm. It can be concluded that in most cases, organic farming is not undertaken by the average farm, but by relatively large farms in an African context, although compared to farm sizes in developed countries such farms may be considered as small. An exemption may be common outgrowers' schemes, which mostly combine large commercial farms for basic production and employ small farmers around the base farm to supply either constantly or periodically to cover shortages. The above observation of inequity is supported by a look of distribution of farm land across farmers in North Africa ((Parrot and van Elzakker 2003). It is observed that e.g. in Egypt, 0.02 percent of the farmers are commercial organic farmers, while this group of farmers holds 0.19 percent of the total agricultural land in Egypt. The same magnitude of relations is given for Morocco (0.01/0.14) and Tunisia (0.08/0.36). This again means that not the average farmers, but most probably relatively large farmers in Africa are practising commercial organic agriculture.

The aspect of distribution of profits along value chains can be exemplified by once more looking at the distribution of profits along the market chain for Ugandan organic bananas (Table 7). It is clear that, although farm gate prices increase for organic bananas, profit increases are much higher at the end of the chain, which implies that the major share of the increased margin goes to exporters, importers, and European traders. This holds both for relative and absolute values. As a conclusion, there potentially is inequity in the share of profits along the chain, in favour of middlemen and organizers of the chain in African countries as well as Northern traders and retailers. Such middlemen are needed in the organic chain in order to organize certification and appropriate transport and handling, and market linkages in import countries. However, also in conventional chains, farmers often

get a much lower share of the market price than any other actor (Abele et al. 2003).

Table 6. Number and size of organic farms by country

Country	Number of farms	Area (ha)	Average farm size (ha)
Egypt	460	15,000	33.33
Algeria	n.a.	1,400	n.a.
Ghana	n.a.	19,132	n.a.
Sudan	650	200,000	307.69
Zambia	2,425	187,694	77.40
Zimbabwe	10	1,000	100
Kenya	30,000	182,000	6.07
Tunisia	608	155,323	255.47
Uganda	33,900	122,000	3.60
Tanzania	30,000	55,867	1.86
South Africa	250	45,000	180.00
Morocco	12,051	20,000	1.66
Senegal	3,000	2,500	0.83
Mozambique	5,000	600	0.12
Mali	n.a.	170	n.a.
Benin	650	400	0.62
Malawi	13	325	25.00
Mauritius[1]	3	175	58.33
Burkina Faso	n.a.	30	n.a.
Madagascar	n.a.	129	n.a.
Niger	n.a.	12	n.a.
Togo	1	90	90.00
Rwanda	10	50	5.00

Source: Yussefi (2006), based on data from Parrot and van Elzakker (2003)

Table 7. Prices and margins for conventional and organic bananas from Uganda to Europe

	Conventional by sea (US cents/kg)	Organic by air (US cents/kg)	Absolute increase (US cents/kg)	% increase
Raw material, farm gate price	7	11	4	59
Retail price Europe	170	300	130	76
Profit margin European retailer	37	77	40	107

Source: Abele et al. unpubl. data, based on base year 2004.

Gender equity is supposed to be higher in organic farming, both commercial and non-commercial, than in conventional farming (Goldberger 2005, Parrot and van Elzakker 2003, Woomer et al. 2005, Kibwage and Momanyi 2005). Goldberger (op. cit.), however stated that adoption according to gender varies across technologies. Another concern is that during the transition from subsistence to commercial organic agriculture, gender equity changes in disfavour of women, as men gain control over commercialisation and the respective cropping systems. This argument is fostered by the above observation that often larger scale farms are engaged in African commercial organic agriculture, and that women are assumingly not holding these larger scale farms, nor do they have access to resources like credit or others.

4 Organic agriculture, overall agricultural trade and food security

Whereas the previous section has discussed organic agriculture as per the first category – commercial organic agriculture for organic niche markets in developed countries – this section will discuss the issue of the contribution of organic agriculture to food security and overall livelihoods of the African rural population. It will also discuss the above addressed “research gaps” in organic agriculture in Africa, whether they really exists and ways to overcome them.

It is certainly beyond the framework of this review paper to go into an in-depth analysis of trade and food security issues in relation to organic agriculture, first of all due to the often stated weakness of data on organic agriculture and its actual performance, secondly due to the complexity of such interrelations, which can only be depicted in a multivariate statistical assessment for which there is no framework. However, we can ask the following questions: Are countries where organic agriculture is practiced as a whole better of in terms of food security, dependency on food aid, and agricultural trade?

To look at these issues, it is necessary to discriminate between those Sub-Saharan Africa countries which have a long established commercial and non-

commercial organic sector (long term organic, LTO), those who have newly emerged in this field (short term organic, STO), and those without organic agriculture (rest of Africa, ROA). It can be assumed that those who have a longer tradition in organic agriculture are better off than the others, if organic agriculture really has a large impact on the overall performance of the agricultural sector. Table 8 indicates the time elapsed since the establishment of the organic sector in the respective countries.

Table 8. Organic agriculture in Sub-Saharan Africa: timelines

Country	Organic agriculture since (estimates)
Countries with long term organic agriculture (LTO)	
Zambia	1990
Zimbabwe	1990
Kenya	1987
Uganda	1994
Tanzania	1991
South Africa	1970
Senegal	1986
Mali	1988
Burkina Faso	1991
Madagascar	1990
Countries with short term organic agriculture (STO)	
Ghana	1999
Benin	1996
Malawi	2000
Mauritius	1999

Source: Estimates according to Parrot and van Elzakker (2003)

Defining food security as the availability of calories per capita per day (and well aware that this does not necessarily cover the whole range of food security), we find that neither the countries with long term organic agriculture nor those with recent establishments are better off than the ones without established organic agriculture. Figure 3 shows that all of the countries are in the same range with a few downward outliers like the Democratic Republic of Congo, Burundi or Eritrea, which are or have been distressed countries. It seems that there is little or no relationship between the practice of organic agriculture and food security on country level. Reasons for this could be that the formal organic sectors in these countries are still too small to really contribute to increased food security, be it that even non-commercial organic agriculture is not practised by really vulnerable groups, or be it that in most of the countries, organic agriculture focuses on cash crops and not really on genuine and domestic food crops.

Figure 4 shows the dependency of the three country groups on food aid since 1993. Especially since the mid nineties, Sub-Saharan Africa is increasingly depending on food aid, which holds especially for the non-organic group of countries, but also for the group of long term organic farming countries. The only

country group that is seemingly better off in terms of food security are the countries that have recently established organic agriculture.

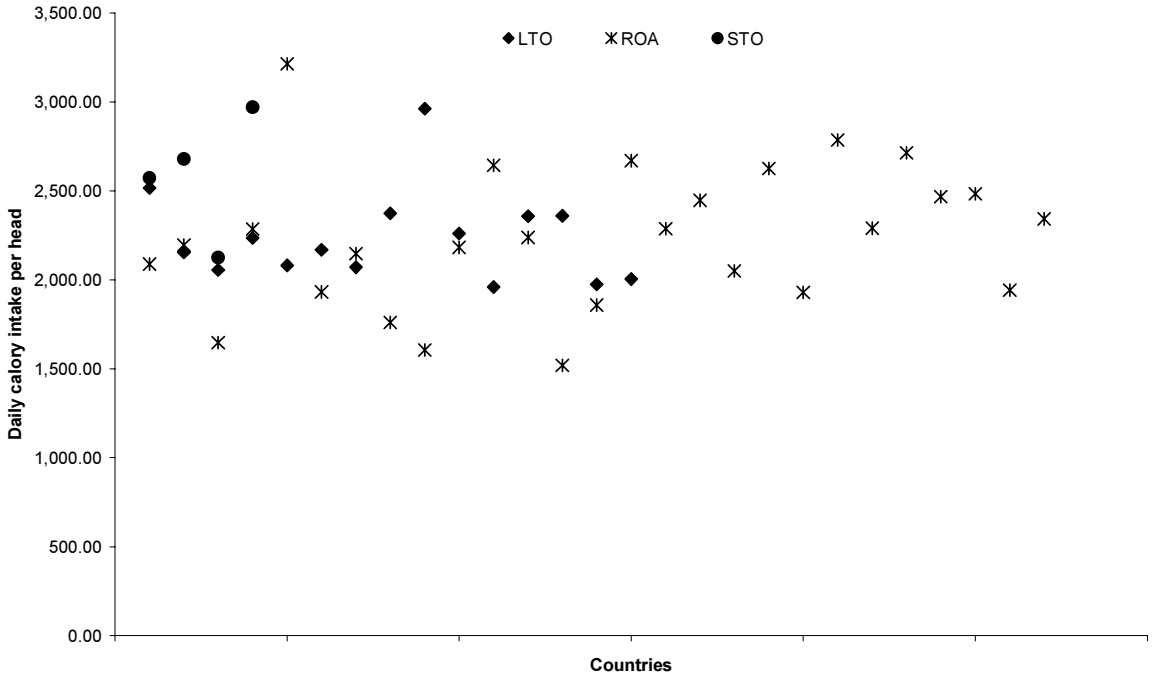


Figure 3. Daily calorie intake in Sub-Saharan Africa (Source: FAO 2006).

Although a more detailed data breakdown would throw a better light on food security issues (e.g. in sub-regions within countries, individual households of practitioners/non practitioners of organic agriculture) it is clear that there is no relationship on a national level between efforts to establish formal organic agriculture and food security, and we will discuss in the section on agricultural research below whether there is a chance at all to significantly increase food production without external synthetic inputs.

To further assess the possible effect of organic agriculture on the economic performance of the agricultural sector, we assess the monetary trade balance in terms of exports minus imports. This gives not only an indication of the deficits or surpluses in agricultural trade and their development, but also indicates the development of terms of trade over time. Here we find that trade balances are positive for the countries with a formal organic sector, both the longer term established and the short term established, while those for countries without any formal organic agriculture are negative throughout the considered time period. What is alarming is that all the trends significantly go the same downward direction, which indicates that there are declining terms of trade, and that this process cannot be stopped by commercial organic agriculture in its present form and scale.

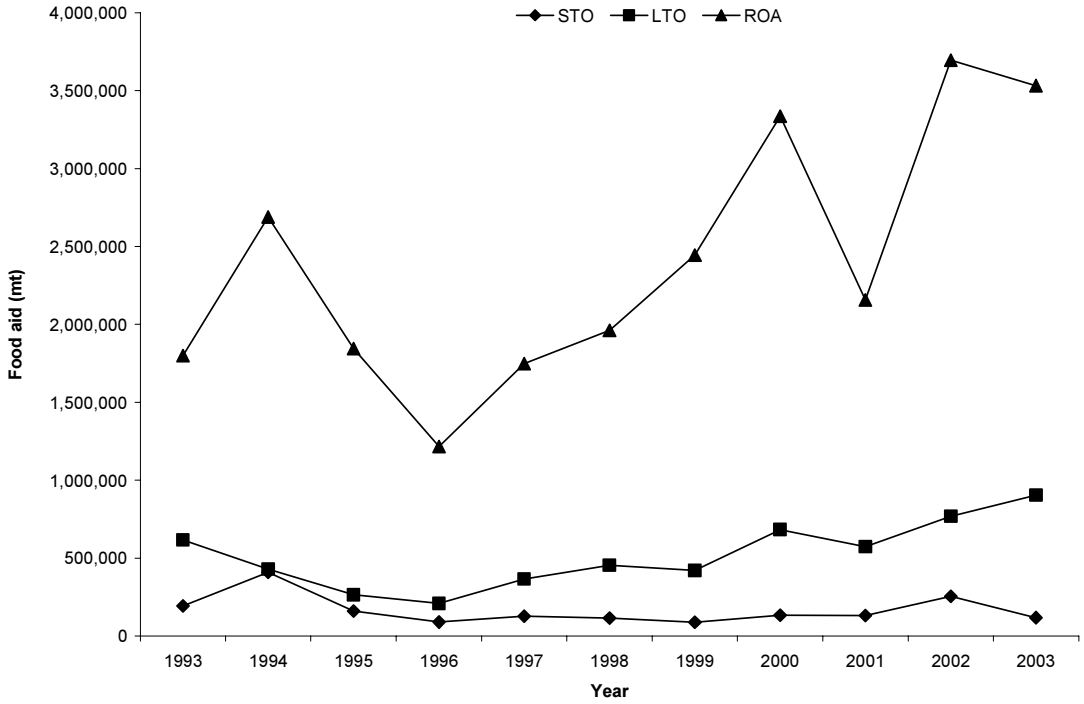


Figure 4. Dependency on food aid (Source: FAO 2006).

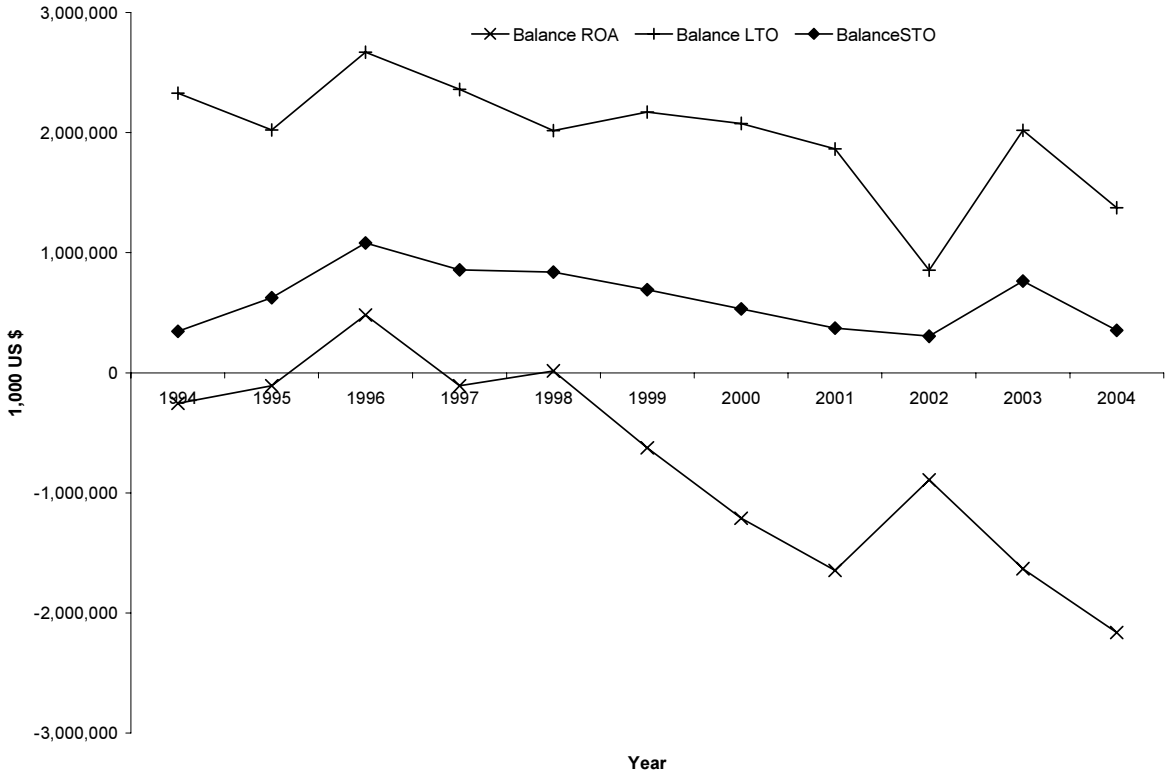


Figure 5. Agricultural trade balances (Source: FAO 2006).

Summing up this section, we state that formal organic agriculture in its present form and scale in Sub-Saharan Africa has had no or at best little visible impact on the overall performance in terms of food security and terms of trade, although in the latter category, those countries having a formal organic sector seem to be slightly better off – yet with negative trends of the same magnitude. However, there is no way to establish a causal relationship between the existence of the formal organic sector and the performance. This basically means that most probably the formal organic sector is much too small to have a positive effect on food security or trade on a national level. The example of the STOs shows that they already had been better off before going into formal organic agriculture, which may even turn around the cause-effect relationship: Better off countries with well functioning conventional agriculture and agricultural trade are more likely to engage in organic agriculture than those with distressed agriculture. Its is however clear that the engagement in organic agriculture has not been able to mitigate negative trends in overall agricultural and trade performance, most probably simply because it is still a too small segment within the whole sector.

The next section will discuss research findings that might indicate whether these trends can be turned around by applying organic agriculture on a larger scale, both commercial and non-commercial. It may also give a hint as to why the segments are still considerably small, by looking at their potential efficiency in terms of increasing food production.

5 Organic agriculture in African research

In this section we first discuss the above cited research rift between research for conventional agriculture in Africa and research into formal organic or “de facto” organic agriculture. This rift is particularly clear with respect to soil fertility management. Among the main constraints of agriculture in Sub-Saharan Africa are poor soils. As traditional farming practices become untenable under growing population pressure, overexploitation of soils, and subsequent soil depletion is threatening the future of African agriculture (Blackie 1994, Breman et al 2001, Heerink 2005). In Sub-Saharan Africa, due to government-induced price increases, the removal of subsidies and market liberalisation, inorganic fertilizer use has actually declined from 16 kg/ha in the beginning of the 80s to less than 14 kg/ha at the end of the 90s, attributing to declining soil fertility (Heerink, 2005). Organic fertilizers can contribute to increasing nutrient availability and water retention capacity as well as increased soil stability, especially in sandy soils and soils low in organic matter. Unfortunately, organic fertilisers are usually not as cost-efficient in providing the main nutrients and are usually not available in sufficient quantities (Sanders *et al.* 1996, Sanders 2002). Rock phosphates, for example, are poorly soluble. Adding these phosphates to compost heaps does not enhance the short-term availability of phosphorus (Vanlauwe and Giller, in press). Organic resources can also potentially stimulate harmful pests and diseases (Vanlauwe and Giller, in press). Inorganic fertilizers rarely damage the soil when properly used. Inorganic fertilizers are being used in Sub-Saharan Africa, often with favourable value-to-cost ratios. Contrary to some reports, these fertilizers are not cause of eutrophication in Sub-Saharan Africa (Vanlauwe and Giller, in press). The integrated soil fertility management (ISFM) paradigm is currently adapted by the science community specializing in tropical soil fertility management. A fundamental aspect of ISFM is the synergism among its components (Breman

1997, Kauffman et al. 2000, Koning et al. 2001). Application of organic fertilizers can increase both nutrient and water use efficiency, and therefore make application of inorganic fertilizers much more attractive to farmers, and vice versa (Vanlauwe and Giller, in press). ISFM advocates the utilization of locally available resources, the combined application of organic resources and inorganic fertilizer, and enhancement of the use efficiency of both types of inputs (Vanlauwe, 2004), rather than exclusion based on principle. Nowadays, in the research community, it is acknowledged that the way forward for soil fertility management is to combine mineral and organic inputs (Vanlauwe *et al.* 2002).

Examples for such synergies are many and have already been cited in the above section on efficiency of organic agriculture. Especially data on the technical coefficients (inputs, yields) of organic vs. integrated approaches have been well documented by the agricultural research community. Analyses, however, often lack monetary data, mainly cost/benefit assessments of integrated vs. pure organic agriculture and of their related technologies, for example biological control of pests (Coulibaly et al. 2005). The lack of monetary data is understandable for the cases of private enterprises who might not be willing to reveal their figures, but less understandable for other parts of the sector like development projects etc. However, it has to be said that the data gap rather exists on the organic agriculture side, and to a much lesser extent on the side of conventional agricultural research.

6 Conclusions

6.1 Commercial organic agriculture in Africa

Commercial organic agriculture may be a profitable option for African farmers, however, seemingly it is not the small scale farmers who benefit, but larger farmers, and their organising enterprises. Benefits from commercial organic farming seem to go to a large extent to middlemen, organisers and traders, and hence there is no difference between the commercial organic sector in Africa and other commercial agricultural sectors.

The above mentioned actors face markets in particular in Europe, which are still not saturated and rapidly growing. Yet these markets are niche markets, and limited in the mid- to long term, due to limited consumers' readiness to pay high prices, and lack of information among consumers. Access to these markets is impeded through various barriers, starting with strict regulations that differ across consumer countries, subsidies paid to European organic growers, but most of all institutional and infrastructural problems in Africa, and high investment costs of establishment of organic farms. Especially the latter impose considerable risks to commercial organic farmers in Africa. Increasing competition and declining prices in the long run, induced by market saturation will definitely affect African organic farmers most, as they are already the most vulnerable producer group in the global organic sector.

Many of the risks and constraints affecting commercial organic agriculture can be removed by objectively validated research and development, as well as policy activities, such as. the improvement of infrastructure and the establishment of certification bodies in African countries. Other constraints, such as long distances to markets can only be removed by the establishment of new markets for organic products in Africa, or nearer locations like the middle East.

6.2 Non-commercial organic agriculture

Organic agriculture for non-export purposes, i.e. organic agriculture as a means to improve food production in Africa has not yet induced the desired results on a macro economic scale. Reasons for this may be many. Obviously, one reason might be that organic agriculture is still in its infancy in most of the African countries. However, agricultural research has provided evidence that pure organic agriculture does not have the potential to increase productivity as needed, and that integrated agriculture, combining organic and non-organic inputs is superior in terms of yields and sustainability. The often claimed research gap as stated by the supporters of organic agriculture does not exist, in fact there is a considerable amount of research results available to support the above argument of integrated agriculture. It is objectively validated research on organic agriculture that is still lacking, especially in terms of cost/benefit analysis, which would finally give a clear picture on how to optimise integrated organic and non-organic approaches. Here the ball lies clearly in the court of those who support merely organic approaches to link up with international agricultural research to close these gaps. Unless this is done, organic agriculture remains a niche often only for commercial producers, for niche markets outside of Africa, with an uncertain future.

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