Organic cotton production and trade in sub-Saharan Africa: The need for scaling-up

Peter Ton
Consultant organic cotton, Amsterdam THE NETHERLANDS
Correspondence author peterton@xs4all.nl
Organic cotton production and trade in sub-Saharan Africa: The need for scaling-up

ABSTRACT

Cotton plays a major role in the livelihoods and living conditions of smallholders in sub-Saharan Africa. Cotton is often the only crop through which economically-poor smallholders can earn monetary income for investments in production and consumption. But cotton is also a major contaminator in sub-Saharan Africa. Cotton pesticides seriously threaten the health of men, women, children and elderly, as well as the health of domesticated animals and wildlife. Synthetic cotton inputs contribute importantly to soil degradation, water contamination and loss of biodiversity.

Organic cotton projects have been started in various sub-Saharan African countries since the mid-1990s, in order to develop viable, sustainable cotton cultivation practices. In 2001, Pesticide Action Network-UK (PAN-UK) carried out a research project on organic cotton production in five countries in sub-Saharan Africa (Benin, Senegal, Tanzania, Uganda and Zimbabwe). Particular attention was paid to the local, regional and national contexts in which the current projects operate, to understand their functioning with a view to scaling-up production and trade in the short and medium term.

Today, rain-fed organic cotton production in sub-Saharan Africa involves more than 20,000 farmers and their families, producing 8,000 tons of seed cotton on 12,000 hectares of land. Most producers (88% of total) are involved in Uganda, i.e. in no synthetic input areas. Most certified organic cotton (about 85%) is not traded as such because of lack of markets. Trade in organic cotton fiber is divided between Uganda (39%), Senegal (31%) and Tanzania (26%). In no- or low synthetic input areas (Uganda, Tanzania), production may be increased by the creation of consumer markets for organic cotton fiber. In relatively high output, synthetic input dependent areas (Benin, Senegal, Zimbabwe), organic cotton production serves as a valuable ‘nursery’ for the development of farmer-centred approaches to sustainable cotton production that can be replicated on a large scale. Long-term, program-oriented funding is required here to further develop organic cotton production as a viable alternative to conventional.

Organic cotton production is a healthy and technically-feasible alternative to conventional cotton production. Organic cotton production contributes to poverty alleviation through higher income and a lower risk of indebtedness. In relatively high output, synthetic input dependent areas, lower income groups and women seem to benefit most from the organic approach to producing cotton. Scaling-up of organic cotton production in sub-Saharan Africa is needed for technical (crop protection), environmental (health, ecology), organisational (overhead per kg of output), research (funds available) and marketing (sufficient volumes for trade) reasons.

Introduction

Organic agriculture has been taking off worldwide over the last few years, and is increasingly being perceived as a more viable and sustainable mode of agriculture than conventional agriculture. World-wide, organic production and trade have grown about 20-25% on average over the last few years. Today, an ever-increasing number of consumers in Northern markets in particular (USA, Europe, Japan) are prepared to pay a premium price for food products that originate from certified organic production.

The international market for the organic non-food crop cotton is more recent. First organic cotton experiments only began in the early 1990s in the USA and Turkey. Egypt, Peru, India and Australia followed soon afterwards. Textiles and clothing made out of certified organic cotton fiber, and labelled as such, were soon traded on Northern markets as ecological textiles or eco-textiles.

Cotton production is of huge importance to a large number of countries in sub-Saharan Africa as an export cash crop bringing benefits to rural areas. In some countries cotton is produced without the use of external synthetic inputs, but in most countries farmers rely on considerable use of synthetic fertilizers and insecticides in order to grow cotton. The specific contexts of production in sub-Saharan Africa mean that the use of synthetic insecticides causes serious health and environmental hazards to farmers, their families, their livestock and to biodiversity. Also, the use of synthetic fertilizers and insecticides is associated with soil degradation and with a general neglect of the soil’s organic matter content and structure. Finally, synthetic cotton inputs tend to be prohibitively expensive to resource-poor farmers in sub-Saharan Africa.

Since the early 1990s, the Pesticide Action Network-UK (PAN-UK, formerly the Pesticides Trust) has supported and promoted the production and trade of organic cotton and eco-textiles in sub-Saharan Africa in particular. PAN-UK is a non-profit NGO researching...
and raising awareness about the impacts and implications of pesticide use in agriculture. Cotton insecticides account for approximately 25% of all insecticides used world-wide. Organic cotton production and trade is promoted by PAN-UK as an alternative to conventional cotton production.

PAN-UK was commissioned by the Directorate-General 8 (DG8) of the European Union in 2000, to carry out a research project on the linkages between pesticides, food security and trade liberalization, and on the role of alternative organic cotton production systems especially as they affect poor farmers in sub-Saharan Africa. Additional funds were provided by the JJ Charitable Trust (United Kingdom). The Organic Cotton component of the project comprised three studies:

- **African Organic Cotton research**: An inventory of the history and state of the current organic cotton projects in five countries in sub-Saharan Africa: Benin, Senegal, Tanzania, Uganda and Zimbabwe (Ton, 2002a).


- **GM Cotton study**: An inventory of the history and state of genetically modified (GM) cotton production, and its implications for small-scale farmers (Mayer, 2002).

Here, we will present the outcomes and the conclusions of the African Organic Cotton research and some data of the International Organic Cotton Market survey.

**Experimental procedure**

**African organic cotton research**

The aim of the African Organic Cotton research was to inventory the history and current state of the organic cotton projects in five countries in sub-Saharan Africa: Benin, Senegal, Tanzania, Uganda and Zimbabwe. Particular attention was paid to the local, regional and national contexts in which these projects operate, in order to improve our understanding of their functioning with a view to scaling-up organic cotton production and trade in the short to medium term.

Country reports were drawn up in 2001 by local and/or international consultants on the basis of a Questionnaire, comprising a set of Data-sheets for quantitative data about organic and conventional cotton production, and a Check-list for qualitative data about the existing organic cotton projects, their impacts and implications. Qualitative data were gathered through key informant interviews with the organic cotton projects (producers, project managers, buyers), with conventional cotton organisations (cotton coordinating bodies), research institutes and donor agencies. The resulting data were analysed by the author, in context and in comparison.

The report Organic cotton production in sub-Saharan Africa: the need for scaling-up (Ton, 2002a) concentrates on the general performance of organic cotton projects in sub-Saharan Africa, in context and in a comparative perspective, while also providing a lot of detailed information about the individual projects. The complexity of country- and project-comparative research means that the information available about various issues was not always sufficient to allow comparative conclusions. This was particularly the case regarding the socioeconomics of conventional and organic cotton production, the functioning of organic producer organisations, and the effectiveness of the training and extension systems in place. There was also a lack of sufficiently ‘scientific’ data to judge about the viability of certain organic cotton cultivation practices that are currently being employed. No hard conclusions have thus been drawn about the viability of these particular practices and of their promotion on a large scale. Future research into organic cotton production in sub-Saharan Africa should focus on all four issues mentioned: socioeconomics, producer organisation, training and extension systems, and organic cotton cultivation practices.

**International organic cotton market survey**

Information about the production and consumption of organic cotton fiber world-wide comes from the report The international market for organic cotton and eco-textiles (Ton, 2002b). The market survey aimed for a description and an analysis of the international market for organic cotton and eco-textiles, with a view to scaling-up the production and consumption of organic cotton fiber. The survey was a follow up to an earlier European market survey carried out in 1996 (Ton, 1996), and to the chapter The market for organic cotton (Ton et al., 1999) in the book Organic cotton. From field to final product. (Myers & Stolton, 1999).

The core of the market survey lied in telephone and live interviews, between June and August 2001, with key actors involved in the various stages of both the conventional and the ecological textile and clothing sectors. Information was gathered through semi-structured open interviews, with questions being adapted to the specific position of each of the resource persons in the textile chain. Overall, almost 100 persons in 18 countries contributed to the survey.

**Certified organic cotton production**

Organic cotton production today has its roots in the progressive development of organic food consumption in Europe and the USA since the 1960s. As a non-edible crop, which has to cope with relatively high pest...
Organic cotton production and trade in sub-Saharan Africa: The need for scaling-up

Organic farming depends on crop rotation and organic fertilization for soil fertility management, and on non-chemical methods of pest control. Cotton may serve as a useful rotational crop in subtropical and tropical agricultural settings, particularly because of the plant’s morphology (deep vertical tap roots). Organic cotton production takes place within a farming system, which produces a variety of crops. Crop diversity tends to be greater in organic than in conventional systems, while crop rotation is the core of sustainable agriculture. Organic farmers are thus also dependent on a variety of markets for their crops. Crop diversity can help the organic farmer to mitigate the impact of fluctuating prices for individual crops like cotton.

Developments regarding the production of organic cotton are discussed below. However, so-called organic cotton projects may well be dependent for income on other crops in the rotation than the cotton crop alone. This is, for example, the case in the USA (cereals, fruits, vegetables, dairy products), Turkey (cereals, tropical fruits, vegetables) and Uganda (sesame). In some other countries (e.g. India and countries of West Africa), projects are much more cotton dependent when no markets are (as yet) available for the other local organic produce. This situation may result from the lack of local organic consumer markets in general or from uncompetitively priced production for export.

Organic cotton yields vary according to a range of factors, including: production system (irrigation, rainfed agriculture), means of production (manual, mechanised), capital available for investment (inputs), wages (labor), seed variety, soil characteristics, pest pressure, etc.

In some countries organic cotton yields have gradually come to equal conventional, whereas in others organic yields are significantly lower than conventional. Organic premiums are sometimes paid where organic cotton yields are similar to conventional ones. They then serve to motivate the organic farmers and to ensure continuation of their involvement in the project. But in general it is assumed that organic agriculture yields are about 20-30% less than conventional – at least during the period of conversion to organic. In fact, yield losses will be higher in relatively high-productive and input-intensive conventional growing areas than in production systems that hardly rely on the use of synthetic inputs. The quality of organic produce, however, tends to be similar to conventional.

Where yields are lower in organic agriculture, farmers are usually compensated by lower production costs, and by a price premium. Organic cotton price premiums can be up to 30% over local conventional seed cotton prices, with most organic cotton projects paying farmers 10-20% extra for certified organic seed cotton. However, occasionally overproduction or high conventional cotton prices may result in lower premiums being paid to organic cotton farmers in order to avoid financial problems further up the eco-textile chain.

Organic cotton production worldwide

Statistical data on organic cotton production are hardly available on the level of international cotton institutes, governments or trade agencies. The data here presented rely on information provided by individual actors in the organic cotton textile chain, and on additional information from non-governmental organisations (NGOs). The figures refer to the estimated volumes of organic cotton fiber that were traded as ‘certified organic’ from the field up to the spinnery. These figures should be considered as ‘indicative’.

Today, certified organic cotton is grown and traded in 10-15 countries in the world. Production is concentrated in Turkey (29% of total) and the USA (27%) (Table 1). Significant amounts of organic cotton are also produced in India (17%), Peru (9%) and Uganda (5%), and in Egypt, Senegal and Tanzania (each 3%). Sub-Saharan Africa holds a total share of 13% in the international organic cotton fiber trade.

The volume of cotton fiber that is traded on the international market as ‘certified organic’ is very small: 6,000 tons or only 0.03% of global cotton fiber production. Moreover, trade in organic cotton fiber does not show any growth since the mid-1990s, despite the globally increasing awareness about the need for organic agriculture and processing. Spectacular production growth has taken place only in Turkey in recent years, making Turkey the largest organic cotton producing country in the world. Tanzania and Senegal also experienced growth. The US production figures appear to be very volatile, and figures for Peru and Egypt seem to decrease rather than increase.

Two trends may explain the geographical changes in organic cotton fiber production. Firstly, textile and clothing companies reduced the production and overhead costs of their raw materials by sourcing in lower-wage countries with appropriate textile and trade infrastructure; in Turkey in particular. Secondly, rationalizing purchasing policies led companies to source cheaper, but good quality, medium-staple cottons rather than the longer, but more expensive, US/Californian, Egyptian and Peruvian fibers. Medium-staple cottons are adequate for the production of a wide range of regular textile and clothing items.

Some larger textile and clothing companies in the world state that not enough certified organic cotton fiber is available to meet their needs. They cite this as a barrier to ‘green’ their cotton fiber use. This may have
been true yesterday, but it certainly is not today or to-

tomorrow. Much more certified organic cotton is already

available from particular countries (Turkey, Uganda,

India) than is currently being traded up to the spinnery.

Organic cotton fiber is available in a variety of quali-

ties. Moreover, the flexibility to react to demand growth

(within 1-2 years) is high in most producing countries;

in the USA, Turkey, Uganda and Australia in particular.

Organic cotton consumption

world-wide

Markets for organic cotton eco-textiles were first

created in the early 1990s, i.e. only a decade ago.

Environmental conviction and entrepreneurial determi-

nation of mainly small-scale producers, with limited

capital resources, resulted in the first offers of organic

cotton eco-textiles to consumers. The main distribution

channel were small specialised boutiques in Europe,

the USA and Japan.

In the mid 1990s, some medium and large tex-

tile and clothing companies ventured on organic cot-

ton fiber use when ‘eco’ was fashion. Their marketing

efforts stimulated consumer awareness. However, sales

were not as high as banked upon. Investment in or-

ganic cotton fiber use requires a longer-term perspec-

tive and policy. Most of the medium and larger textile

companies involved rather evaluated organic cotton

fiber use as a short-term investment. Organic cotton

was not found to be a fast money-maker.

Over the late 1990s three major developments

occurred on the eco-textile distribution level. Firstly,

small, specialised boutiques went through rough times,

while fashion trends rather came to focus on man-made

synthetic fibers. Secondly, specialised mail order cata-

logues made eco-textiles available to consumers; in

Germany, the USA and Switzerland in particular. Cata-

logues could better transmit the environmental and

social messages of organic cotton production than could

salesmen in shops. Cost price per unit also was lower,

thus outcompeting to some extent the small, specialised

eco-textile boutiques. However, by 1999 the largest

market for eco-textiles, Germany, went through a se-

vere ‘mail order crisis’. Some of the main eco-textile

mail order companies selling in Germany suffered a

huge reduction of sales or had to stop operations com-

pletely. The reasons underlying this crisis include:

A) Over-optimistic growth expectations; B) The

high rate of items being returned by consumers (at the

company’s cost); and C) The general inconvenience of

‘shopping on distance’ (you cannot immediately see,

feel, touch, test or experience the clothing items, mak-

ing the shopping experience also much less fun for most

consumers).

Thirdly, electronic commerce set in in the late

1990s. E-commerce helps eco-textile producers to meet

globally-scattered consumer demand at relatively

low cost. E-commerce costs are lower than mail order

costs, because of lower expenses on catalogues and

mailing. Yet, the general inconveniences of ‘shopping

on distance’ apply to e-commerce as well. In any case,

today in the USA eco-textiles are primarily sold through

e-commerce. E-commerce is of lesser importance in

Europe.

A fourth development, which was and is a par-

ticular US feature, is the use of organic cotton fiber in

textile and clothing lines, without communicating this
to consumers, i.e. without selling products as eco-text-

tiles. So-called ‘blending programmes’ were developed

in order to enable medium and large textile and cloth-
ing companies to voluntarily support organic cotton

production. Blending programs focus on the increased

use of organic cotton fiber. They do not set targets re-

garding the wider environmental and social aspects of
textile and clothing production. Blending programs may

serve as a step-in approach for larger companies who

wish to gradually ‘green’ their operations and image in

view of their corporate responsibility policies.

Europe is still the biggest market for organic cot-
ton eco-textiles. Today, organic cotton fiber consump-
tion is estimated by the author at 3,500 tons or almost

60% of total organic cotton fiber use. Use is biggest in

Germany (some 1,750 tons), followed some way be-

hind by Switzerland (750 tons), United Kingdom (about

250 tons) and Sweden (150 tons). The US market is

estimated to equal about 2,000 tons of organic cotton

fiber. The Japanese market is currently good for about

220 tons of organic cotton fiber per year. Local mar-

kets in countries like Turkey, India, Egypt, etc. are still

virtually non-existent.

The 2001 international market for organic cot-
ton eco-textiles is pretty much stagnant. Healthy growth

is reported in the USA (22% per year over 1996-2000)

(OTA, 2001). Yet, this is a slowdown from an earlier

1998 survey which suggested 42% average annual

growth in the period 1992-1997, and it is also much

lower than the average annual growth of the US or-

ganic industry in general (36% over 1996-2000). Eco-
textile growth is also reported in the much smaller Japa-

nese market. European demand is likely to have fallen

in recent years, due to the ‘mailorder crisis’ in Ger-

many. Eco-textile sales in Switzerland also seem to be

under pressure.

As yet, there are only a few large textile and cloth-
ing companies involved in eco-textile sales (Table 2).
The volumes they purchase increase steadily. In an over-

all stagnant market, their estimated market share in-
creased from almost one-third in 1998 to almost a half

in the year 2001 (Table 1). This tendency is likely to

continue in the near future.
Organic cotton in sub-Saharan Africa

Organic cotton production figures
Certified organic cotton production is a recent phenomenon in sub-Saharan Africa. Organic cotton production is therefore experimental by definition. Production only began in 1994/95, with the simultaneous installation of organic cotton projects in Tanzania and Uganda. Now, production takes place in Benin (1 project), Senegal (2), Tanzania (1), Uganda (2) and Zimbabwe (1). Non-certified organic cotton production is reported to occur as well in: Benin (2 projects), Kenya, Mali and Mozambique.

Today, more than 20,000 farmers and their families are reported to be involved in certified organic cotton production on about 12,000 hectares of land (Table 3). Uganda alone accounts for the involvement of almost 18,000 producers, i.e. 88% of the total number. They are spread out over more than 350 villages which are all in the Apac, Lira and Soroti districts in Northern Uganda.

Uganda is the biggest producer of certified organic cotton fiber in sub-Saharan Africa (287 tons, or 39% of the total). The second largest producer is Senegal which accounts for 31%. Here, about 1,750 producers grow an estimated 497 tons of seed cotton or 226 tons of organic cotton fiber. Tanzania also produces significant amounts of fiber (187 tons or 26%), but it does so with only 450 producers in only three villages.

Most noticeable in Table 3, however, is that three-quarters of the certified organic seed cotton produced in sub-Saharan Africa is not being ginned and marketed as such. Large-scale ‘side-marketing’ occurs in particular in Uganda (an estimated 88% in 2000/01), but problems of organic cotton side-marketing have also been reported in other years in Tanzania and Zimbabwe.

The reported average organic seed cotton yields range from about 350 kg/ha in Senegal (Senegal 1), Tanzania and Zimbabwe to 600-800 kg/ha in Uganda. Note, however, that the organic seed cotton yields in Uganda are rough estimates through lack of detailed project figures. The apparently high average organic seed cotton yield in sub-Saharan Africa (667 kg/ha) results primarily from these Ugandan estimates. Average yields of 350-500kg/ha are more common elsewhere.

Organic cotton producers
We do not have detailed data available about the composition and stratification of organic cotton producers as compared to conventional, but there are no hard indications that their farm size, household size or socio-economic position would differ that much from those of conventional producers.

A socio-economic study carried out in Benin in 1999/2000 (Tossou, 1999), however, indicated that organic producers in Central Benin tend to be somewhat older and very familiar with the conventional production system. Actually, quite a number of them abandoned the conventional system several years ago, because of repeated bad experiences with non-payment and/or overt fraud and corruption by the boards of their village producer group Groupement Villageois (GV). The lack of reliability of the conventional cotton production sector (late payments, no payments) also seems to have favoured the expansion of the organic cotton project in Tanzania.

The inadequate functioning of the GV boards in Benin is also reported to be a push factor for the involvement of women in organic cotton production (Ton, 2001). Women tend not to be eligible for membership of these village producer groups, and they are underrepresented in the GV boards as well. Women thus have to rely on their husbands to obtain conventional cotton inputs (seeds, fertilizers, insecticides). But both the village producer groups and the national cotton coordinating bodies have an interest in limiting the input supply to a minimum. If effective demand during the cotton growing season outstrips supply, women are amongst the first to go without inputs. Organic cotton production provides women with an interesting alternative since virtually all organic inputs can be obtained locally at low cost or at no cost at all.

As organic cotton production requires almost no expenses on inputs at all, there is a much lower need for input credits. In the conventional system, quite a number of producers are obliged to grow cotton in the current season in order to pay off their input credit loans from previous seasons. The risk of indebtedness is quite high as the credit loans are being awarded before or early on in the season, whereas a range of unfavorable production conditions (drought, flooding, illness, etc.) may appear later on in that same season. The input credit loans are not adjusted for climatic or personal adversities throughout the season, so that a lot of less fortunate producers end up receiving little or no cash payments when their seed cotton is sold.

Health considerations also play a major role in the involvement of producers in organic cotton production. Poisoning by conventional cotton insecticides may lead to short-term illness, may induce long-term health impacts, or may even result in sudden death. Cotton insecticides in use in sub-Saharan Africa include a wide range of extremely toxic active ingredients (Table 4). Half of these ingredients are not approved, or have even been banned, in a range of Northern countries (Table 5). These include: betacyfluthrin, chlorpyrifos, cyfluthrin, endosulfan, fenvalerate and lambdacyhalothrin. Carbaryl, cypermethrin and dimethoate are possibly carcinogenic to humans, i.e. they are suspected of causing cancer. Moreover, 10 out of the 13 active ingredients listed in Table 5 are...
suspected endocrine disruptors. Endocrine disruptors affect parts of the body’s hormone systems and can lead to an increase in birth defects, sexual abnormalities and reproductive failure (PAN-UK, 2001b).

In francophone West Africa, cotton represents close to 90% of the insecticide market (Airault, 1999). Cotton insecticides are usually the only insecticides which are available there on a credit loan basis. As a result, part of the cotton inputs is used for other purposes than the ones for which they were intended. The use of cotton insecticides in vegetable production, food storage, fishing etc. poses serious health hazards in and outside the cotton-producing areas, as was sadly witnessed in Benin in 1999/2000 and beyond when the re-introduction of endosulfan as a cotton insecticide caused the death by pesticide poisoning of dozens of persons (Ton et al., 2000; Tovignan et al., 2001). This alternative and inappropriate use of cotton insecticides must be taken into account by cotton research institutes when selecting pesticides for large-scale application. It should also be a prime incentive for cotton farmers and cotton research institutes to engage in the experimentation of non-chemical, organic crop protection practices.

Other factors that may explain the involvement of producers in organic cotton production include: A) The higher organic seed cotton price, B) Favorable payment conditions (cash upon delivery), C) The attention received through visits from field agents and others, D) Other indirect benefits of participation in a project (training, exchange visits, etc.), E) Comparative advantages of certain groups of farmers for organic production (i.e. favoring the participation of semi-nomadic herders or other cattle owners, as they have cattle manure available for soil fertility management). These factors may be particularly important where and when organic cotton production yields lower net average seed cotton income than conventional production.

**Production practices and input use**

The inputs used in organic cotton production consist of: seeds, organic fertilizers and organic crop protection inputs. The seeds are usually provided on a credit basis by the organic cotton project. The project negotiates the cotton seeds with either the state-led cotton marketing board, the national cotton research institute or a producer organisation, depending on the local situation. The seeds should not be treated chemically. Alternatively, improved cattle manure or compost may be produced on-farm. Improved cattle manure here refers to manure that has been obtained from cattle enclosures or ‘kraals’ and is mixed with litter, cotton stalks or other vegetative residues. Compost may be made from a wide variety of sources, but it is not yet a very common practice in sub-Saharan Africa as it requires a lot of labor, water and care to obtain a high-quality compost.

In the West African organic cotton projects (Benin, Senegal) it is also quite common to collect animal droppings from the nearby village or hamlet, and to transport these on the head or by bicycle to the organic cotton field. This requires a lot of labor, but the work coincides with the usual visits producers make to their fields. Other sources of fertilization include the use of household waste and ashes obtained after cooking.

In other circumstances organic producers may prefer to ‘import’ organic fertilization inputs from nearby villages or towns. This is, for example, the case in Central Benin where most organic cotton producers apply so-called tchutchuko (residues of oilpalm nut processing) to their fields. In Northern Benin, some producers make use of locally-available guano (bat droppings) to fertilise their organic cotton fields. Both the tchutchuko and the guano are quite rich in nitrogen and phosphate and are sold on local markets at affordable prices.

Ugandan producers however, i.e. 88% of all producers involved (!), do not fertilize their organic cotton fields at all. Soils in Northern Uganda are claimed to be sufficiently rich to do without any active organic fertilization at all. There is little risk of soil depletion if soils are naturally fertile, if fallow periods are sufficiently long, and if crop rotational systems are well-developed. Organic fertilization is not common either in Zimbabwe, where the organic cotton project works in an area that was first-exploited in the early 1980s. In the longer term, however, organic producers in Zimbabwe will be obliged to invest in organic fertilization as their soils are not as rich as they are, for example, in Uganda.

The Tanzania organic cotton producers also have quite fertile lands. There is enough land available to rotate cropland, and livestock is sufficient to collect significant amounts of animal manure in ‘kraals’. The producers were not formerly used to actively fertilizing their cropland with animal manure. Today, the animal manure is transported to fields by ox-carts and spread with hand hoes before land preparation begins. The organic cotton project also promotes an improved crop rotation including legumes, to maintain and improve soil fertility, to reduce the infestation with cotton pests, and to reduce the occurrence of the weed Striga in cereal production.

**Crop protection** is a key issue in organic cotton production as in conventional cotton production. There is most to fear from the various cotton bollworms (Table
Organic cotton production and trade in sub-Saharan Africa: The need for scaling-up

In organic agriculture, the emphasis should be on preventive cultivation practices that favor predator populations and limit pest pressure. A lot of common cultivation practices already have a positive preventive impact on pest build-up. These include ploughing (with animal traction) or manual field preparation, timely sowing, crop residue management, etc.

Additional organic cultivation practices may be recommended by individual organic cotton projects to prevent pest pressure, for example, intercropping with maize, sorghum (Zimbabwe), sunflower or cowpea (Tanzania), the manual collection of bollworm larvae (Benin), etc. Intercropping enhances biological diversity in the field, and thus helps to keep useful predator populations in place when cotton pests show up during the course of the season.

However, cotton is quite a difficult crop to grow as it is susceptible to attack by insect pests. Amongst other factors, this is due to its long cultivation period (five to six months), which makes it highly susceptible to pest build-up. Organic cotton producers will therefore often have to apply curative crop protection methods as well. Apart from the above mentioned manual collection of bollworm larvae, organic growers often use natural botanical sprays. These tend to be homemade and based on (a mixture of) the natural insecticidal properties of: neem (*Azadirachta indica*), paw paw (*Carica papaya*), garlic (*Allium sativum*), red pepper (*Capsicum frutescens*), tobacco (*Nicotiana*), African Mahogany tree (*Khaya senegalensis*), and/or a wide variety of other locally-available plants. These homemade botanical sprays consist of a dilution in water of stamped seeds, leaves or bark. The solution obtained may also be mixed with cow urine, natural soap, etc.

Technically, natural botanical sprays do not produce similar results to those obtained with synthetic insecticides. However, they usually do not cost anything much but the labor involved in collection and spray preparation. Neem seeds or cow urine may have to be bought by producers on local markets (Benin, Senegal), but their value is negligible (about 10%) as compared to the costs of synthetic insecticides. The economic threshold of cotton crop damage is therefore much lower than it is in conventional cotton production. It is quite common for conventional producers in input-intensive production areas (Benin, Senegal, Zimbabwe) to spend about 30% of their gross income from seed cotton on the reimbursement of input credits. As organic producers do not share that fate, they may usually content themselves with yields which are about 25-30% lower than is usual in conventional production.

Industrial formulations of organic crop protection inputs are little used in organic cotton production in sub-Saharan Africa. In Tanzania, industrial formulations of pyrethrum (*Crysanthemum*) or neem (*Azadirachta indica*) are sprayed once the threshold for economic damage is reached. Yet, in Senegal (Senegal 1) experiments with the use of *Bacillus thuringiensis* (Bt) sprays were soon abandoned, as the Bt-sprays were prohibitively expensive to producers.

### Control and certification

Each organic cotton project needs to ensure the organic quality of seed cotton production. An Internal Control System (ICS) is therefore required which is maintained and updated on a regular basis through information gathered by the project’s field agents. The data gathered at project level include: the farmer’s name, village name, year of entrance in project, cotton crop acreage, acreage for each of the other crops, field history over the last four years, sowing date, fertilization methods, crop protection methods, seed cotton production, etc. Other data gathered by field agents during their regular visits to the organic producers may include issues like: land preparation, amounts of organic fertilizers applied, origin of organic fertilizers, expenses on fertilizers, the type of natural botanical ingredients used, the date of sprays, expenses on crop protection methods, harvest estimates, etc. The data gathered through the ICS may both be used for certification, for research purposes and for internal project management.

The Internal Control System established in this way is a major feature of independent control and certification by third-party bodies. The more detailed and reliable the ICS, the easier and less expensive is the external control and certification.

All organic projects researched rely on European control and certification agencies. Four out of the seven organic cotton projects discussed (in Benin, Senegal (two projects) and Zimbabwe) are certified by the French EcoCert, having an international office in Germany. The largest projects (Uganda and Tanzania), however, are certified by other European inspection bodies: SKAL (the Netherlands; Uganda 1), KRAV (Sweden; Uganda 2) and IMÖ (Switzerland; Tanzania). EcoCert tends to work with local African inspectors, which considerably reduces the costs incurred for salary and travel expenses. KRAV Kontroll is said to be planning to use local Ugandan inspectors.

The costs of organic certification are considerable. For the larger projects, the certification costs tend to be limited to an estimated 2-10% of overall organic cotton fiber costs. However, this percentage is much higher in the smaller projects (Benin, Senegal 1, Uganda 2, Zimbabwe), where certification costs may well constitute some 20-50% of the overall organic cotton fiber value. In the latter case, organic certification is only a feasible and cost-effective option if the costs are covered beforehand either by a committed buyer or a donor agency. Note that the relative costs of certification are lower where other rotational crops in addition to cotton can be marketed as certified organic produce, as in the case of Uganda with organic sesame.
Price-setting and marketing

The processes of purchase, transport and ginning are not fundamentally different in organic cotton production from conventional production. The main divergence lies in the need for organic cotton to be dealt with completely separately from conventional cotton, in order to be marketable as certified organic cotton fiber. Specific measures need to be taken - at some cost - by project management, transporters and ginneries to prevent any 'contamination' with other cottons.

The marketing of certified organic cotton fiber from sub-Saharan Africa is almost entirely in the hands of Europe-based traders. More than 90% of organic cotton fiber is marketed and traded by three operators who each hold between one-third and one-quarter of total volumes: Bo Weevil (the Netherlands; 37%), Ecotropic (United Kingdom; 31%), and REMEI (Switzerland; 26%). Local African retailers of organic cotton are OBEPAB (Benin) and ENDA-Pronat (Senegal).

The prices paid to producers for certified organic seed cotton are based on the local conventional and organic seed cotton prices (Table 7). The organic premiums paid are usually fixed as a percentage above the local conventional price. Organic premiums may be paid to compensate for yield losses due to less effective crop protection, and/or to motivate the producers involved. In Benin and Senegal, the conventional and organic seed cotton prices are generally announced in advance of the growing season. However, in the privatised cotton sectors in Tanzania, Uganda and Zimbabwe, organic producer prices can only be fixed at purchase, as conventional seed cotton prices tend to fluctuate along the season.

In Benin and Senegal the organic premium prices tend to be 20% over the conventional price. In Tanzania, organic producer prices over 1994/95-1998/99 were 10% higher than the conventional price. Since 1999/2000, the project pays 15% premium for in-conversion seed cotton and 20% for certified organic seed cotton. In Uganda, the organic premium prices have fluctuated quite a bit over the same period, ranging from 10% to 35%. However, it should be noted that there were no reliable statistics available with respect to the average conventional seed cotton prices paid in Uganda. The only price that is recorded in Uganda is the so-called 'indicative' seed cotton price established by the coordinating body Cotton Development Organisation (CDO) in advance of the season. No buyer is bound to pay this price, and in fact higher prices tended to be paid in recent years due to surplus capacity of the Ugandan ginning mills. Consequently, the organic premium prices paid to producers may have been somewhat lower than stated in Table 7. The small organic cotton project in Zimbabwe has turned out to be the least reliable partner for producers as far as organic premium prices are concerned. Organic premiums were only paid to them in two out of five seasons.

Yet, note that the absolute and the relative seed cotton prices are not the only concerns of organic producers. Equally important are timely payments. In Tanzania, some cotton growers tended to have to wait for seed cotton payments for two to three years. Taking account of inflation, the effective payments made thus had only half their original purchasing power. Delays in payment also occurred sometimes in Benin, Senegal and Uganda – even though delays in payment were months rather than years.

Organic cotton projects tend to be quite reliable in terms of timely seed cotton payments. First, they are in more direct contact with the producers involved than in conventional production. Secondly, the organic cotton buyers are bound to maintain strong and reliable contacts with the organic producers, since high overhead and certification costs have already been met before seed cotton purchase. Large-scale side-marketing to obtain cash rapidly, is the fear of any certified organic project. The economic threshold for unrest amongst producers is therefore much lower in organic cotton projects than in conventional cotton production.

Organic cotton production: the need for scaling-up

In this section we will first summarise the current state of organic cotton production in sub-Saharan Africa and then we will discuss the reasons for and the ways in which current organic cotton projects could be strengthened, i.e. scaled-up in qualitative terms. We will then elaborate on the need to scale up organic cotton production in sub-Saharan Africa in quantitative terms.

Current organic cotton production

Certified organic cotton production has become a reality in sub-Saharan Africa over the last decade. Rain-fed production began in Tanzania and Uganda in 1994/95. Senegal and Zimbabwe followed the next season, and Benin a year later. Today, more than 20,000 farmers and their families are involved in organic cotton production, producing 8,000 tons of seed cotton on some 12,000 hectares of land. Most producers (88% of the total) are in Uganda.

Organic cotton production is a healthy, environmentally-benign and technically-feasible way of producing cotton. Producers, their families and their livestock are no longer exposed to the health and environment hazards of the conventional cotton production practices. Synthetic cotton insecticides in particular are associated with large-scale poisoning and death in various countries of sub-Saharan Africa. Synthetic fertilizers are associated with soil degradation and with a virtually complete neglect of the soil organic matter.
Organic cotton production and trade in sub-Saharan Africa: The need for scaling-up

Organic cotton production, however, actually provides free environmental goods and services to society at large.

Organic cotton production is also of socio-economic interest to a significant number of producers. In production areas where hardly any synthetic inputs are used, i.e. in Northern Uganda, all organic cotton producers profit from price premiums of 10-35% depending on years, whereas their yields and labor charge are reported to be similar to those in conventional production. In low synthetic input production areas, i.e. in Western Tanzania, the organic producers also do not experience yield losses. The organic price premiums they receive, i.e. 10-20%, are here in part required to compensate for a higher labor charge in organic fertilization and crop protection.

In high output and synthetic input dependent production areas (Benin, Senegal, Zimbabwe), the organic price premiums paid to farmers are generally needed to compensate for lower average seed cotton yields and for the higher labor charge of fertilization and crop protection. Conventional cotton producers in these areas tend to spend about 30% of their gross seed cotton income on the reimbursement of cotton input credits.

Organic producers use and add value to locally-available resources rather than using expensive synthetic ones. On the producer level, this leads to a significantly reduced risk of indebtedness as no input credit loans are needed. At the national level, the substitution of synthetic input use by organic inputs that are available locally, may contribute to a significant reduction in costs of the import and distribution of synthetic inputs – once organic production takes place on a large scale.

To conclude, organic cotton production in sub-Saharan Africa is a healthy and promising alternative to conventional cotton production. Organic cotton production contributes to poverty alleviation. Most organic producers involved in the current projects benefit from a higher income. All organic producers become independent of expensive synthetic inputs, resulting in a significant reduction of the risk of indebtedness. In synthetic input dependent areas, lower-income groups and women seem to benefit most from the organic approach to producing cotton.

**Strengthening organic cotton production**

In no or low synthetic input production areas in Uganda and Tanzania, organic cotton production can be strengthened through the development of international and local markets for organic cotton fiber. In fact, about 85% of the certified organic cotton fiber produced in Uganda is not purchased as such from the organic producers, due to lack of markets and limited crop finance. Similar problems were reported from Tanzania and Zimbabwe in some years. Once market demand for African certified organic cotton fiber increases, the problem of crop finance at harvest time is likely to be resolved quite quickly.

Organic cotton production in sub-Saharan Africa as it is today can most certainly improve its performance. Lessons have been learnt by the current projects on a range of topics; most of which would be of use in the design of sustainable cotton production on a large-scale in sub-Saharan Africa. All current projects are in fact experimental ones, set up by civil society with very limited amounts of funds, which also limited in-depth research on technical, socioeconomic, health and environmental issues. So far, funds available have always been short-term and project-oriented. What is needed is long-term, program-oriented funding in order to further develop this new approach to sustainable cotton production in sub-Saharan Africa.

**Technically**, organic cotton yield losses are still considerable in areas of relatively high output and synthetic input dependent cotton production. Methods and technologies are available to improve technical crop performance, but it requires a lot of time, energy and funds to adapt them to local conditions. Continuing investment in the build-up of appropriate, farmer-centred, participatory training and extension systems is required. The concept of so-called Farmer Field Schools (FFS) is to be recommended, if adapted to local production conditions. Issues that are at stake here include at least: the literacy rate of producers, the site of FFS training and extension, the attention given to crop-specific issues in cotton production, the use of training tools that are locally-available, etc.

Technical organic cotton issues that need to be elaborated further include: crop rotation, mixed cropping or intercropping, soil fertility management, the use of trap crops, pest and predator monitoring and evaluation, and the use of natural botanical sprays in cotton crop protection. Experimental research on these issues should take a farmer-centred, participatory organic systems approach. Specific attention should be paid to gender issues and to the socio-economics of solutions envisaged.

**Socio-economically**, organic cotton production is doing fairly well. Organic cotton production has become a viable alternative for conventional production for a significant number of producers. Little work has been done so far to document and quantify the socio-economics of organic cotton production. However, the strong interest of both organic and conventional cotton producers, men and women, in participating in the organic cotton projects indicates that this mode of cotton production appeals to their needs.

In-depth research into the socio-economics of organic cotton production is required. The following issues should be studied in more detail: the direct and indirect benefits of participation in organic cotton
projects, the risk of indebtedness in conventional agriculture, the socio-economic characteristics of organic and conventional producers, the role of gender in organic and conventional cotton production, and the socio-cultural contexts in which organic and conventional cotton production take place. Such research would help to understand in more detail what are the precise ‘push’ and ‘pull’ factors that motivate cotton producers in each of the production areas to grow organically.

Regarding health and environment, organic cotton production undoubtedly does much better than conventional production. Yet, the comparative health and environmental impacts of organic and conventional cotton production are little studied thus far. Monitoring and evaluation of these impacts will be of huge importance for the design of sustainable cotton production systems that optimise the use of local resources (natural, human, financial) in agricultural production.

Health and environmental issues that require monitoring and evaluation in cotton production in sub-Saharan Africa include: the rate of poisoning and death related to the use of synthetic insecticides (humans, livestock), the economic costs of poisoning and illness following insecticide applications, the impacts on cotton pests and predators of synthetic and natural botanical insecticide sprays, the impacts on other non-target living organisms of synthetic and natural botanical insecticide sprays, and the evolution of soil fertility under organic and conventional cotton production systems.

Finally, organic cotton projects should be supported to venture into the marketing and trade of other crops in the organic rotation system. The marketing and trade of organic food crops for international and local specialty markets, will reduce the overhead costs of project management and certification (in terms of costs per kg of output). It will also help to make the individual projects less dependent and less vulnerable to fluctuations in the international organic cotton market prices.

External support from NGOs, traders, retailers, national and international governments and donor agencies is required to strengthen organic cotton production in sub-Saharan Africa, along the lines mentioned above.

**Scaling-up organic cotton production**

**Market-oriented organic cotton production**

Current organic cotton production in sub-Saharan Africa has been motivated by two major factors:
1. A growing market for organic cotton and eco-textiles, in Northern countries.
2. The perception that organic cotton production could provide useful lessons for more sustainable cotton production in sub-Saharan Africa on a large scale.

Today, the existence of a growing market for organic cotton and eco-textiles cannot be used to justify organic cotton production and trade. The international market for organic cotton fiber is still very small, with a total of 6,000 tons of fiber per year, and it has actually been stagnating over the last five years, after rapid initial growth in the early-1990s.

This does not imply that consumers are not interested in buying organic cotton eco-textiles at premium prices. It just means that consumers have not been buying them so far. Reasons that may explain for this lack of purchase include:

A) The lack of availability of organic cotton eco-textiles to consumers in the usual points of sale of textiles and clothing.
B) The complexity of, and the competitiveness in, the cotton textile supply chain, which oblige actors to purchase, process and trade large volumes of cotton fiber and goods in order to break even, in a situation where consumer demand for eco-textiles is still limited.
C) The lack of economies of scale in eco-textile processing, trade and marketing, which results in fairly high-priced, up-market end-products which appeal to only a small group of consumers.

In fact, markets for organic cotton and eco-textiles are still to be developed – both in Northern countries and in the South. Individual companies and some national and international NGOs are working hard to develop these markets, through new marketing strategies, company restructurings, consumer awareness campaigns, etc.

Today, most organic cotton production in sub-Saharan Africa takes place in areas where no synthetic inputs were used, i.e. in Northern Uganda. The Ugandan projects are market-dependent. They do not change the way cotton is produced in the field and make it more sustainable in ecological terms. Ugandan production is dependent on the availability of a consumer market that is prepared to pay a premium price for the certified organic produce. If market demand were to grow over the next couple of years, both Ugandan cotton projects would be able to provide large quantities of certified organic cotton fiber without major investment.

Scaling-up organic cotton production in Uganda is thus dependent on the creation of new consumer markets for certified organic cotton fiber and eco-textiles. The active involvement of Northern NGOs, traders, retailers, textile and clothing trade organisations, and national and international governments is needed to create new markets for sustainably-produced, organic and fair-traded cotton products. Commercial and non-commercial efforts should work together in order to overcome the critical thresholds that so far block large-scale consumer demand for organic cotton and eco-textiles, i.e. the availability of affordable organic
cotton products (fiber, yarns, fabrics, end-products) to textile and clothing processors and end-consumers alike.

**Sustainability-oriented organic cotton production**

The need for sustainable cotton production is felt widely in sub-Saharan Africa, but little success has been reported so far in making conventional cotton production more sustainable on a large-scale. Certainly, Integrated Pest Management (IPM) in cotton should be promoted. IPM is defined here as an approach to pest management which aims to develop the right combination of control measures which are cost effective and safe for the farmer and consumer, but at the same time are ecologically sustainable. The emphasis of most IPM systems, and particularly those on cotton is on the reduction or, where possible, the elimination of the use of pesticides (Little, 2001).

Experiments in IPM cotton are being carried out in various countries. Yet, tangible results have not yet been obtained on a large-scale in sub-Saharan Africa. The factors that may explain for this lack of success include (Little, 2001):

A) Much IPM knowledge remains at the level of researchers, and is not transferred to the farm level where it can be put into practice.

B) The failure to create the information flow between researchers and farmers has also allowed the research agenda to become isolated from the real needs of farmers, particularly smallholders and those in marginal rain-fed areas.

C) Pest management recommendations are generally developed for larger-scale, monocropped and irrigated cotton under favourable climatic and soil conditions and may not be appropriate or feasible for farmers in mixed cropping systems (e.g. Uganda - PT) and areas of low rainfall and soil fertility (e.g. the other research countries - PT), which grow much of the world’s cotton.

D) Extension services have tended to place the emphasis on message-based technology transfer methods, but failed to provide them with the rationale behind the recommended practices or an understanding of the ecology of their cotton field.

A complicating, and to some extent contradictory, characteristic of most IPM approaches is that they accept the use of synthetic inputs in cotton production. Yet, once synthetic inputs are applied, the ecological benefits of the previous efforts for natural ecological field management tend to be lost. The IPM acceptance of synthetic input use ‘as a last resort’, frequently ends up in using synthetic inputs while taking additional measures to limit the costs of synthetic input use. An example of this is the IPM approach followed in Benin, the so-called *Lutte Étagée Ciblée* (Katary et al., 2002). Here, first sprays in the season are made with the broad-spectrum active ingredient endosulfan, which is extremely hazardous to both humans, livestock and the environment. The season is then continued with other insecticide sprays, based on insect pest monitoring. As a result, pest monitoring is most intensive after the killing of significant populations of natural enemies of the main cotton pests.

The interesting and challenging characteristic of the organic approach to cotton production is that synthetic inputs can not be used as a ‘magical’ solution to solve problems of soil fertility and crop protection. Farmers thus are independent of the synthetic input trade, credit loan systems and synthetic input promotion campaigns. They run less risks in terms of indebtedness, and they are more actively engaged in the search for alternative solutions to problems of soil fertility and crop protection. The wide interest expressed by both participating and non-participating producers in the organic cotton production areas testifies for the desire of significant numbers of producers to learn how to produce cotton organically.

The experiences to date with organic cotton production in sub-Saharan Africa are sufficiently encouraging to aim for scaling-up production in relatively high output and synthetic input dependent production areas, i.e. in West Africa and Southern Africa. The same holds true for low input production areas in East Africa.

At this stage of the sector’s development, scaling up of production would mean that the number of entire villages growing cotton organically in sub-Saharan Africa increases from the current number of tens of villages to several hundreds of villages. Scaling-up may or may not be based on the current organic cotton projects, depending on their performance and management. New projects in- and outside the research countries are needed anyway to increase the impact of organic cotton production on the conventional cotton sectors in sub-Saharan Africa.

Scale is important for all organic cotton projects in sub-Saharan Africa. Some of the current projects have been of critical mass and of too short a life-span to effectively impact on the conventional cotton sectors. This is at least the case for Central-East Senegal (Senegal 1) and Northern Zimbabwe.

Scaling-up of organic cotton production in sub-Saharan Africa is needed for technical, environmental, organisational, research and marketing reasons. Technically, organic fertilization and crop protection will be most effective in zones (villages, regions) where no conventional cotton production is taking place. Ecological imbalances will be reduced and organic plots will thus not act as refuges for conventional cotton pests. The positive impact of organic production methods on the health of humans, livestock and the environment will also become more profound and measurable in exclusive and contiguous organic cotton production areas.

On the organizational level, larger projects may be more demanding to manage, yet project costs will
be reduced significantly in terms of overhead costs per kg of output (training and extension, ICS, certification, transport, trade). Organic cotton projects of a larger size may use more funds (in absolute terms) for research, the results of which are essential to impact on the conventional cotton sectors. Direct collaboration with local research institutes and other service providers will be facilitated once projects are of a larger scale. This will also facilitate the elaboration and distribution of training and extension tools and methodologies relevant to the agricultural sector in sub-Saharan Africa at large.

Finally, the international market for organic cotton and eco-textiles is oriented towards hundreds of tons of cotton fiber rather than the tens of tons which are currently produced in each of the smaller projects in sub-Saharan Africa. Small quantities make it very difficult for medium and large scale textile and clothing companies to start and engage in the processing, marketing and trade of organic cotton eco-textiles.

Scaling-up is also required in order to interest national and international governments and donor agencies in organic cotton production as a viable alternative to conventional cotton production. Funding can be obtained more easily for larger projects aiming at policy-influencing and sustainable trade, than for smaller projects. Organic cotton production needs to expand in order to become a viable and convincing alternative to conventional cotton production in sub-Saharan Africa.

Conclusions

Certified organic cotton production is a recent phenomenon in sub-Saharan Africa. Organic cotton production is therefore experimental by definition. Today, rain-fed organic cotton production in sub-Saharan Africa involves more than 20,000 farmers and their families, producing 8,000 tons of seed cotton on 12,000 hectares of land. Most producers (88% of total) are involved in Uganda; i.e. in no synthetic input areas. Most certified organic cotton (about 85%) is not traded as such because of lack of markets. Trade in organic cotton fiber is divided between Uganda (39%), Senegal (31%) and Tanzania (26%). In no- or low synthetic input areas (Uganda, Tanzania), production may be increased by the creation of consumer markets for organic cotton and eco-textiles. PAN-UK, London, UK.

Organic cotton production contributes to poverty alleviation through higher income and a lower risk of indebtedness. In relatively high output, synthetic input dependent areas, lower income groups and women seem to benefit most from the organic approach to producing cotton. Scaling-up of organic cotton production in sub-Saharan Africa is needed for technical (crop protection), environmental (health, ecology), organisational (overhead per kg of output), research (funds available) and marketing (sufficient volumes for trade) reasons.

References

- Pesticide Action Network-UK & CABI Bioscience, United Kingdom.

See: http://www.getipm.com/articles/benin-
Organic cotton production and trade in sub-Saharan Africa: The need for scaling-up


Table 1. Organic cotton production world-wide (in tons of fiber; 1992/93-2000/01).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>500</td>
<td>500</td>
<td>750</td>
<td>400</td>
<td>300</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Egypt</td>
<td>50</td>
<td>150</td>
<td>600</td>
<td>650</td>
<td>625</td>
<td>500</td>
<td>350</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>India</td>
<td>200</td>
<td>250</td>
<td>400</td>
<td>925</td>
<td>850</td>
<td>1,000</td>
<td>825</td>
<td>1,150</td>
<td>1,000</td>
</tr>
<tr>
<td>Peru</td>
<td>200</td>
<td>675</td>
<td>900</td>
<td>900</td>
<td>600</td>
<td>650</td>
<td>650</td>
<td>500</td>
<td>550</td>
</tr>
<tr>
<td>Senegal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>50</td>
<td>125</td>
<td>200</td>
</tr>
<tr>
<td>Tanzania</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Turkey</td>
<td>125</td>
<td>200</td>
<td>600</td>
<td>725</td>
<td>850</td>
<td>1,000</td>
<td>1,200</td>
<td>2,000</td>
<td>1,750</td>
</tr>
<tr>
<td>Uganda</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>75</td>
<td>300</td>
<td>450</td>
<td>250</td>
<td>200</td>
<td>275</td>
</tr>
<tr>
<td>USA</td>
<td>1,000</td>
<td>1,950</td>
<td>2,400</td>
<td>3,350</td>
<td>1,550</td>
<td>1,300</td>
<td>1,900</td>
<td>2,900</td>
<td>1,625</td>
</tr>
<tr>
<td>Others</td>
<td>-</td>
<td>101</td>
<td>475</td>
<td>446</td>
<td>322</td>
<td>252</td>
<td>110</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>2,075</td>
<td>3,826</td>
<td>6,150</td>
<td>7,482</td>
<td>5,507</td>
<td>5,562</td>
<td>5,435</td>
<td>7,365</td>
<td>5,950</td>
</tr>
</tbody>
</table>

Growth (in %, compared to previous year)

85 61 22 -16 1 -2 36 -29

(Source: Ton (2002b), The international market for organic cotton and eco-textiles).

Table 2. Organic cotton consumption of main textile and clothing companies involved (estimates; 1997-2001).

<table>
<thead>
<tr>
<th>Company</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP-Schweiz (Switzerland)</td>
<td>400</td>
<td>500</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>Hess-Natur (Germany)</td>
<td>250</td>
<td>280</td>
<td>300</td>
<td>175</td>
</tr>
<tr>
<td>LeviStrauss (USA)</td>
<td>150</td>
<td>175</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nike (USA)</td>
<td>100</td>
<td>325</td>
<td>450</td>
<td>550</td>
</tr>
<tr>
<td>OTTO-Versand (Germany)</td>
<td>50</td>
<td>150</td>
<td>500</td>
<td>700-800</td>
</tr>
<tr>
<td>Patagonia (USA)</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Total</td>
<td>1,750</td>
<td>2,130</td>
<td>2,450</td>
<td>2,775</td>
</tr>
</tbody>
</table>

Growth (in %, as compared to previous year)

22 15 13

(Source: Ton (2002b), The international market for organic cotton and eco-textiles).
### Table 3. Certified organic cotton production (2000/01).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Benin</th>
<th>Senegal 1</th>
<th>Senegal 2</th>
<th>Tanzania</th>
<th>Uganda 1</th>
<th>Uganda 2</th>
<th>Zimbabwe</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of producers</td>
<td>283</td>
<td>322</td>
<td>1,420</td>
<td>450</td>
<td>12,017</td>
<td>5,921</td>
<td>47</td>
<td>20,460</td>
</tr>
<tr>
<td>Number of villages</td>
<td>22</td>
<td>n/a</td>
<td>n/a</td>
<td>3</td>
<td>266</td>
<td>88</td>
<td>5</td>
<td>n/a</td>
</tr>
<tr>
<td>Area (ha)</td>
<td>168</td>
<td>53</td>
<td>1,065</td>
<td>1,676</td>
<td>7,859</td>
<td>1,121</td>
<td>18</td>
<td>11,960</td>
</tr>
<tr>
<td>Seed cotton (tons)</td>
<td>72</td>
<td>18</td>
<td>479</td>
<td>575</td>
<td>755</td>
<td>72</td>
<td>2</td>
<td>1,973</td>
</tr>
<tr>
<td>Side-marketed (tons)</td>
<td>-</td>
<td>-</td>
<td>n/a</td>
<td>35</td>
<td>5,365</td>
<td>601</td>
<td>5</td>
<td>6,006</td>
</tr>
<tr>
<td>Total seed cotton (tons)</td>
<td>72</td>
<td>18</td>
<td>479</td>
<td>610</td>
<td>6,120</td>
<td>673</td>
<td>6</td>
<td>7,978</td>
</tr>
<tr>
<td>Seed cotton yield (kg/ha)</td>
<td>431</td>
<td>345</td>
<td>450</td>
<td>364</td>
<td>779</td>
<td>600</td>
<td>355</td>
<td>667</td>
</tr>
<tr>
<td>Ginning outturn (% fiber)</td>
<td>41.6</td>
<td>42.9</td>
<td>45.5</td>
<td>32.5</td>
<td>34.0</td>
<td>34.0</td>
<td>38.0</td>
<td>36.2</td>
</tr>
<tr>
<td>Fiber production (tons)</td>
<td>30</td>
<td>8</td>
<td>218</td>
<td>187</td>
<td>263</td>
<td>24</td>
<td>1</td>
<td>731</td>
</tr>
<tr>
<td>% of Fiber production</td>
<td>4</td>
<td>1</td>
<td>30</td>
<td>26</td>
<td>36</td>
<td>3</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note:* A) Zimbabwe data: 1999/00 season; and B) Senegal 2: estimated by the author, except for fiber production and ginning outturn.

(Source: Elaborated by the author, based on Country reports.

### Table 4. Main insecticides in use in conventional cotton production (2000/01).

<table>
<thead>
<tr>
<th>Country</th>
<th>Name</th>
<th>Active ingredient (WHO class)</th>
<th>Provenance</th>
<th>Producer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>Phaser 350 g/l</td>
<td>endosulfan (II)</td>
<td>Ivory Coast</td>
<td>Aventis</td>
</tr>
<tr>
<td></td>
<td>Cotalm D 15/300 g/l</td>
<td>lambdacyhalothrin (II) / dimethoate (II)</td>
<td>Germany</td>
<td>ALM</td>
</tr>
<tr>
<td></td>
<td>Dursban B 18/200 g/l</td>
<td>cyfluthrin (II) / chlorpyrifos-ethyl (II)</td>
<td>Germany</td>
<td>ALM</td>
</tr>
<tr>
<td>Senegal</td>
<td>Callisulfan 536 EC 36/500 g/l</td>
<td>endosulfan (II) / cypermethrin (II)</td>
<td>France</td>
<td>Calliope</td>
</tr>
<tr>
<td></td>
<td>Supercal P 286 EC 36/250 g/l</td>
<td>profenofos (II) / cypermethrin (II)</td>
<td>France</td>
<td>Calliope</td>
</tr>
<tr>
<td></td>
<td>Decis</td>
<td>triazophos (Ib) / deltamethrin (II)</td>
<td>France</td>
<td>Calliope</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Bulldog</td>
<td>betacyfluthrine (II)</td>
<td>Germany</td>
<td>Bayer</td>
</tr>
<tr>
<td></td>
<td>Decis 0.3 ULV</td>
<td>deltamethrin (II)</td>
<td>France</td>
<td>Roussel-Uclaf</td>
</tr>
<tr>
<td></td>
<td>Cypercal D</td>
<td>cypermethrin (II)</td>
<td>France</td>
<td>Calliope</td>
</tr>
<tr>
<td>Uganda</td>
<td>Ambush Super 25 g/l</td>
<td>Lambdacyhalothrin (II)</td>
<td>Uganda</td>
<td>Twiga</td>
</tr>
<tr>
<td></td>
<td>Fenkill 10 EC</td>
<td>fenvalerate (II)</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Fastac</td>
<td>cypermethrin (II)</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Carbaryl</td>
<td>carbaryl (II)</td>
<td>Zimbabwe</td>
<td>ZFC</td>
</tr>
<tr>
<td></td>
<td>Fenkill</td>
<td>fenvalerate (II)</td>
<td>Zimbabwe</td>
<td>ZFC</td>
</tr>
<tr>
<td></td>
<td>Marshall</td>
<td>carbasulfan (II)</td>
<td>Zimbabwe</td>
<td>ZFC</td>
</tr>
</tbody>
</table>

(Source: Country reports and PAN-UK, 2001a).
### Table 5. Characteristics of the main active ingredients in use in conventional cotton production in sub-Saharan Africa (2000/01).

<table>
<thead>
<tr>
<th>Active ingredient</th>
<th>Group</th>
<th>WHO Class</th>
<th>possibly carcinogenic</th>
<th>endocrine disruptor</th>
<th>not approved or banned in Northern countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>betacyfluthrine</td>
<td>synthetic pyrethroid</td>
<td>II</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>carbaryl</td>
<td>carbamate</td>
<td>II</td>
<td>x</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>carbosulfan</td>
<td>carbamate</td>
<td>II</td>
<td>?</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>chlorpyrifos</td>
<td>organophosphate</td>
<td>II</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>cyfluthrin</td>
<td>synthetic pyrethroid</td>
<td>II</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>cypermethrin</td>
<td>synthetic pyrethroid</td>
<td>II</td>
<td>x</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>deltamethrin</td>
<td>synthetic pyrethroid</td>
<td>II</td>
<td>?</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>dimethoate</td>
<td>organophosphate</td>
<td>II</td>
<td>x</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>endosulfan</td>
<td>organochlorine</td>
<td>II</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>fenvalerate</td>
<td>synthetic pyrethroid</td>
<td>II</td>
<td>?</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>lambda-cyhalothrin</td>
<td>synthetic pyrethroid</td>
<td>II</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>profenofos</td>
<td>organophosphate</td>
<td>II</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>triazophos</td>
<td>organophosphate</td>
<td>Ib</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

(Source: PAN-UK, 2001a).

### Table 6. Cotton bollworms to monitor in organic cotton production areas.

<table>
<thead>
<tr>
<th>Country</th>
<th>Cryptophlebia leucotreta</th>
<th>Diparopsis spp.</th>
<th>Earias spp.</th>
<th>Helicoverpa armigera</th>
<th>Pectinophora gossypiella</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin (Central)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal (Central-East)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal (South-East)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanzania (West)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uganda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Elaborated by the author, based on: Country reports and ICAC, 1999).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>FCFA</td>
<td>135</td>
<td>165</td>
<td>200</td>
<td>200</td>
<td>225</td>
<td>185</td>
<td>200</td>
</tr>
<tr>
<td>Senegal</td>
<td>FCFA</td>
<td>150</td>
<td>170</td>
<td>170</td>
<td>185</td>
<td>185</td>
<td>185</td>
<td>185</td>
</tr>
<tr>
<td>Tanzania</td>
<td>TSh</td>
<td>197</td>
<td>160</td>
<td>170/200</td>
<td>170</td>
<td>165/200</td>
<td>n/a</td>
<td>150/165</td>
</tr>
<tr>
<td>Uganda</td>
<td>Ush</td>
<td>300</td>
<td>300</td>
<td>320</td>
<td>400</td>
<td>300</td>
<td>240</td>
<td>350</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Z$</td>
<td>n/a</td>
<td>n/a</td>
<td>5.85</td>
<td>7.80</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Organic premium (in % above conventional price)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin 1</td>
<td>FCFA</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>20</td>
<td>11</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Benin 2</td>
<td>FCFA</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Senegal 1</td>
<td>FCFA</td>
<td>-</td>
<td>30</td>
<td>30</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Senegal 2</td>
<td>FCFA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Tanzania</td>
<td>TSh</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>15/20</td>
<td>19/21</td>
</tr>
<tr>
<td>Uganda 1</td>
<td>Ush</td>
<td>11</td>
<td>11</td>
<td>25</td>
<td>13</td>
<td>10</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>Uganda 2</td>
<td>Ush</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Z$</td>
<td>-</td>
<td>20</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Organic producer prices in local currency

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin 1</td>
<td>FCFA</td>
<td>-</td>
<td>-</td>
<td>240</td>
<td>240</td>
<td>250</td>
<td>210</td>
<td>240</td>
</tr>
<tr>
<td>Benin 2</td>
<td>FCFA</td>
<td>-</td>
<td>-</td>
<td>240</td>
<td>240</td>
<td>270</td>
<td>210</td>
<td>240</td>
</tr>
<tr>
<td>Senegal 1</td>
<td>FCFA</td>
<td>-</td>
<td>221</td>
<td>221</td>
<td>221</td>
<td>221</td>
<td>221</td>
<td>221</td>
</tr>
<tr>
<td>Senegal 2</td>
<td>FCFA</td>
<td>-</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Tanzania</td>
<td>TSh</td>
<td>217</td>
<td>176</td>
<td>187/220</td>
<td>187</td>
<td>198</td>
<td>160</td>
<td>178/200</td>
</tr>
<tr>
<td>Uganda 1</td>
<td>Ush</td>
<td>332</td>
<td>332</td>
<td>400</td>
<td>450</td>
<td>330</td>
<td>312</td>
<td>473</td>
</tr>
<tr>
<td>Uganda 2</td>
<td>Ush</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>450</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Z$</td>
<td>-</td>
<td>7.02</td>
<td>9.36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

(Source: Country reports).