Cash crops and food security

Contributions to income, livelihood risk and agricultural innovation

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Preface

Agribusiness in the Netherlands strongly depends on imports of agricultural raw materials. A considerable share of the Dutch economy is directly related to the supply, processing, and marketing of imported agricultural raw materials. These are often grown as cash crops by small-scale farmers all over the world. For decades, a specialisation into cash crops has been associated with negative consequences such as the depletion of natural resources and the reduction of local food availability. However, this paradigm is shifting. In this study it is re-assessed how and to what extent cash crop farming may contribute to food security, keeping in mind the wide variety of cash crop products and farming systems.

The report provides new insights into the relationship between cash crops and food security. Cash crops not only contribute to increased agriculture production and income of rural households, but also to sustainable intensification. Sustainable intensification will increasingly be needed in the future, when the world needs to feed 9 billion people, but in particular in Africa. Cash crops may help in accelerating these yields and help Africa on a path of sustainable intensification.

This study was commissioned by the Dutch Ministry of Economic Affairs. We thank Lucie Wassink and Gerbrand Haverkamp (department ELV, DG Agro) for their valuable comments on earlier drafts of the report.

Ir. L.C. van Staalduinen
Director General LEI Wageningen UR

Summary

S.1 Key findings

Cash crops (defined as farm output that is sold on a formal agricultural market) are an integral part of strategies to improve food security, both at the level of governments as well as farm households in developing countries with a substantial agricultural sector.

Cash crops bring substantial wage and employment opportunities to the rural economy, even if these are characterised by rather strong income fluctuations. Over time, cash crops provide a stimulus to agricultural innovation, by raising capital for agricultural investment and accelerating the build-up of institutions that enable further commercialisation. An important caveat is, however, that for cash crops to be successful, economic and environmental risks linked to cash crops have to be prevented or limited. This may require various risk-coping strategies. Many farm households balance the benefits and risks of cash crop and food crop production in their cropping decisions to sustain their livelihood and food security.

S.2 Complementary findings

Marketable surpluses of traditional plantation crops (e.g. cocoa, coffee, tea, cotton) are by far the largest category of cash crops in Africa in terms of export revenues. Other categories, such as high-value crops (fruit, vegetables, flowers) or surpluses of basic foods like maize, cassava and beans play a much less important role.

From a perspective of national food security, although traditional cash crops still form a significant part of many African economies, they have become less important in the past decades. The food import bills have increased for many African countries in the past decade, but most countries are able to pay for food imports from their non-agricultural exports, which signifies that African economies are broadening their economic activities (instead of solely relying on export crops).

Cash crop production enables farmers and farm workers to increase their living standards, thus contributing to food security. Moreover, and perhaps more importantly, the production of cash crops offers farmers opportunities for investment and improving management of their farms, stimulating agricultural innovation and increasing yields. As any farming activity, cash crop agriculture requires the management of various types of risk such as soil degradation and price variability. Communities with increased specialisation in cash crops will face a drop in incomes when harvests fail due to pests or drought, when prices slump or when they lose market access. Such a drop in income will have repercussions for their food security status.

The proposed broadening of the definition of cash crops is considered to be useful for re-defining *sustainable agricultural intensification.* Sustainable intensification provides an encompassing strategy for expanding the production of food and biomass in an open trading system, while preserving soil fertility and biodiversity and other ecosystem services for future generations, and contributing to resilient rural economies for the poor and to the health and productivity of a malnourished population. Cash crops are an integral part of a move towards the sustainable intensification of agriculture, which comprises both productivity growth with a lower environmental footprint as well as increasing opportunities for rural development and food security. The use of intercropping, genetically improved crop varieties and institutional development are among the practical and achievable activities of this strategy.

S.3 Method

This report was commissioned by the Ministry of Economic Affairs. The central question of this report is: How and to what extent does cash crops-production contribute to food security? The objectives of this report are threefold: 1) To provide insight into the complex trade-offs between cash crops and food security; 2) To evaluate risks of cash crops production, and 3) To present a vision on the role of cash crops for agricultural development, especially in Africa. The study is based on a broad-ranged literature review and data on land use, crops production and trade, in addition to food use and food price data, mainly focused on the situation in Africa.

Samenvatting

Handelsgewassen en voedselzekerheid: Aandeel in de inkomsten, risico's voor levensonderhoud en agrarische innovatie

S.1 Belangrijkste uitkomsten

Handelsgewassen (landbouwoutput die wordt verkocht op een formele landbouwmarkt) maken integraal onderdeel uit van strategieën om de voedselzekerheid te verbeteren, zowel op overheidsniveau als op het niveau van landbouwhuishoudens in ontwikkelingslanden met een aanzienlijke landbouwsector.

Handelsgewassen bieden grote kansen op het gebied van loon en werkgelegenheid voor de plattelandseconomie, ook al worden ze gekenmerkt door relatief grote inkomensschommelingen. Na verloop van tijd vormen handelsgewassen een stimulans om te innoveren doordat er meer kapitaal beschikbaar is voor landbouwinvesteringen en doordat de oprichting van instanties die de verdere commercialisering mogelijk maken wordt versneld. Een belangrijke voorwaarde is echter wel dat de economische en milieutechnische risico's van handelsgewassen moeten worden voorkomen of beperkt om de handelsgewassen kans van slagen te geven. Hiervoor zijn mogelijk verschillende risicovermijdende strategieën nodig. Veel landbouwhuishoudens wegen bij het nemen van teeltbeslissingen de voordelen en risico's van de productie van handelsgewassen en voedselgewassen tegen elkaar af om in hun levensonderhoud te kunnen blijven voorzien en voedselzekerheid te garanderen.

S.2 Overige uitkomsten

Verhandelbare overschotten van traditionele gewassen (bijv. cacao, koffie, thee, katoen) zijn in Afrika verreweg de grootste categorie handelsgewassen qua exportopbrengsten. Andere categorieën, zoals hoogwaardige gewassen (fruit, groente, bloemen) of overschotten van basisvoedingsmiddelen zoals maïs, cassave en bonen, spelen een veel minder grote rol.

Hoewel traditionele handelsgewassen nog steeds een groot aandeel hebben in veel Afrikaanse economieën, zijn ze in de afgelopen decennia vanuit het perspectief van nationale voedselzekerheid minder belangrijk geworden. De laatste tien jaar zijn de kosten voor de import van voedingsmiddelen voor veel Afrikaanse landen gestegen, maar de meeste landen kunnen deze kosten dekken dankzij de export van niet-landbouwproducten, wat betekent dat Afrikaanse economieën hun activiteiten aan het uitbreiden zijn en niet meer uitsluitend afhankelijk zijn van exportgewassen.

De productie van handelsgewassen stelt landbouwers en arbeidskrachten in de landbouw in staat hun levensstandaard te verhogen en draagt op die manier bij aan voedselzekerheid. En wat misschien nog wel belangrijker is, is dat handelsgewassen landbouwers de kans bieden om te investeren en het beheer van hun bedrijf te verbeteren. Op die manier wordt landbouwinnovatie gestimuleerd en dat zorgt weer voor een hogere opbrengst. Net als andere landbouwactiviteiten is het verbouwen van handelsgewassen onderhevig aan verschillende risico's, zoals bodemdegradatie en prijsschommelingen. Gemeenschappen die meer gespecialiseerd zijn in handelsgewassen, zullen hun inkomsten zien dalen als de oogst mislukt door plagen of droogte, als de prijzen instorten of als ze geen toegang meer hebben tot de markt. Een dergelijke inkomensdaling zal ook zijn weerslag hebben op de voedselzekerheid.

De voorgestelde verruiming van de definitie van handelsgewassen lijkt zinvol te zijn voor het opnieuw definiëren van *duurzame intensivering van de landbouw*. Duurzame intensivering biedt een overkoepelende strategie voor het uitbreiden van de productie van levensmiddelen en biomassa in een open handelssysteem met behoud van de bodemvruchtbaarheid, biodiversiteit en andere ecosysteemdiensten voor toekomstige generaties en draagt tegelijkertijd bij aan veerkrachtige plattelandseconomieën voor de armen en aan de gezondheid en productiviteit van ondervoede bevolkingsgroepen. Handelsgewassen maken integraal onderdeel uit van de overgang naar duurzame intensivering van de landbouw, die zowel een productiviteitsgroei met een kleinere milieuvoetafdruk als betere kansen voor plattelandsontwikkeling en voedselzekerheid met zich meebrengt. Het gebruik van combinatieteelt, genetisch verbeterde rassen en institutionele ontwikkeling zijn voorbeelden van praktische en haalbare activiteiten in het kader van deze strategie.

S.3 Methode

Dit rapport is opgesteld in opdracht van het ministerie van Economische Zaken. De centrale vraag van het rapport is: op welke manier en in welke mate draagt de productie van handelsgewassen bij aan voedselzekerheid? Het rapport heeft drie doelen: 1) Inzicht geven in de complexe trade-offs tussen handelsgewassen en voedselzekerheid; 2) De risico's evalueren van de productie van handelsgewassen; en 3) Een visie presenteren op de rol van handelsgewassen bij de ontwikkeling van de landbouw, met name in Afrika. Dit onderzoek is gebaseerd op een breed opgezet literatuuronderzoek en gegevens over landgebruik, de productie van gewassen en handel, alsmede gegevens over voedselgebruik en voedselprijzen, hoofdzakelijk gericht op de situatie in Afrika.

Maize plot in a village in Burkina Faso.
Photo by Gerdien Meijerink

1 Introduction

1.1 Background

Agribusiness in the Netherlands strongly depends on imports of agricultural raw materials. A considerable share (4.3%) of the Dutch economy is directly related to the supply, processing, and marketing of agricultural raw materials imported by the food and feed industry. The value of products imported by the Dutch agricultural sector has grown to €48.3bn in 2011.[1] Key imports from non-EU countries include fruit, nuts and spices, followed by coffee, tea, cacao, and margarine, fats and oils. Soybeans are among the largest imported feed stocks.

The Dutch agri-food sector is actively pursuing a policy towards more sustainable sourcing of tropical commodities, through closer connections of retailers and food and beverage companies, aiming at more sustainable production and sustainable international chain relations. Enhancing sustainable international agri-chains is also a priority of the Dutch government, which encouraged civil society and private sector to act jointly under the 2007 Schokland agreement.[2]

Sustainability in the Schokland agreement relates to the social, environmental and economic dimensions of more favourable societal impact for vulnerable groups in society. It includes long-term poverty reduction, social inclusion and the creation of assets and fair work conditions. It also points at the need for natural resource management to ensure ecosystem services are maintained for future generations. More recently, the vulnerability of households with regard to their food and nutrition status has gained centre stage in the debate. After a series of food price hikes, the awareness grew that the availability of ever-cheap food and sufficient natural resources will be under pressure in the future.

Given the Dutch policy of sustainable sourcing of raw materials (i.e. cash crops from developing countries), this study responds to questions about how this policy relates to the goal of strengthening food security, which is one of the priorities in the development assistance policy. The policy issue at hand is whether and how policy on sustainable supply chains could be conflicting with the goals of food security policy.

We address this issue by assessing the balance between agriculture for the market (cash crops) and agriculture for food consumption (food crops) at different levels, from farm household level to national level. We investigate what trade-offs exist between production of cash crops for the export markets and food security. Cash crop production for exports may provide higher incomes to African farmers than food crop production. However, such a production system creates dependencies with associated economic risks. Farmers depend for their income on markets, while harvest failures may reduce cash crop producers' food security immediately. In addition to economic risk, the emphasis on specialisation and efficiency increases the production system's sensitivity to ecological risks. These reasons lead farmers to combine cash crop with food crop cultivation. The hypothesis in this paper, therefore, is that the positive impact of cash crop production on food security outweighs the negative impact.

We take a particular interest in Africa because the continent is one of the hotspots of food insecurity, and it is a substantial exporter of commodities to Europe. Although we use data and literature on cash cropping in other regions, most of the evidence is based on Africa. Because there is a well-understood

[1] (Berkhout and Roza 2012)
[2] See www.akkoordvanschokland.nl

need to make African agriculture more productive[3], we also develop a perspective on the role of cash crops in Africa's future agricultural development.

1.2 What questions are answered by this report?

In this research we investigate the effects of cash crop production on food security. The central question of this report is:

How and to what extent does cash crop production contribute to food security?

This question is focused on the situation in Africa.

Sub-questions are:
- What is meant by cash crops and on what scale does cash cropping take place?
- What is meant by food security and what is the role of cash crops in achieving it?
- How can cash crops stimulate agricultural development?
- What are the risks in cash crop production, for whom and to what extent?
- How can the risks be reduced or prevented?
- What policy conclusions can be drawn from this research?

The objectives of this report are:
- To provide insight into the complex trade-offs between cash crops and food security.
- To evaluate risks of cash crop production.
- To present a vision on the role of cash crops for agricultural development, especially in Africa.

1.3 Brief description of chapters

Chapter 2 starts by sketching the background of this research, clarifying the definition of key terms and suggesting a framework for analysis with a focus on cash crop income. *Chapter 3* outlines the importance and role of cash crops in African economies and the opportunities of cash crops to provide income for farmer households. In *Chapter 4,* the risks of cash crop production are described, both on agro-ecological and market level, and examples of strategies to cope with these risks are presented from literature. *Chapter 5* describes a future scenario. It emphasises the importance of cash crops in the process of sustainable intensification. *Chapter 6* reports on the *conclusions* of this research.

[3] See for example the policy agenda of the Comprehensive Africa Agricultural Development Programme (CAADP), under the auspices of the African Union.

Slogan in a village in Zambia.
Photo by Gerdien Meijerink

2 Background

This chapter sketches the background of this research, clarifying the definition of key terms and suggesting a framework for analysis with a focus on cash crop income. Key elements are:

- Over time the strategy to improve food security has been shifting, focusing on food supply (1970s), on distribution (1980s) towards commercialisation of agriculture (1990s onwards).
- Cash crops are defined as crops that are marketed. For statistical analysis we define basic food and cash crops, the latter being crops exclusively grown for sale or produced with a marketable surplus.
- Cash crops generate income and therefore improve access to food for those who earn that income. The impacts of the cash crop income on food security are analysed using a simple framework including the four dimensions of food security.

2.1 Changing paradigms over time

A brief history of the market and policy developments of cash crop production, particularly for export, reveals changing paradigms over time in addressing food security and nutrition.

In the 1970s, the focus was predominantly on food supply as the key determinant of food security and nutrition. The production of cash crops was seen to absorb scarce agricultural resources that cannot be used for food production. In the 1980s, the focus of food security shifted from food supply to the poor consumer, in line with Amartya Sen's work on food entitlements. Income and food prices were considered to be major determinants of food status. Hunger and malnutrition were seen as a distribution issue, strongly related to poverty. Cash crops, including export crops, were believed to be a valuable strategy to earn foreign exchange and provide resources for industrialisation. Under the influence of structural adjustment policies (the Washington consensus), many, supposedly inefficient, marketing and distribution schemes and public extension systems were liberalised. Interestingly, agricultural development in general, and further commercialisation of agriculture in particular were typically disregarded as an avenue for accelerating broad-based income growth for the poor.

In the 1990s and the first decade of the 21st century, it became clear that industry-led or export-led development strategies failed to achieve broad-based income growth in Africa. A policy bias against agricultural development often remained in place, as illustrated by overvalued exchange rates, export taxes for agricultural produce and inefficient marketing systems. For most cash crops, open commodity markets are replaced by value chains as food companies and retailers take a firmer grip of their sourcing channels to control quality and costs. These firms are more critically assessed on the social and environmental performance of their activities, and start collaborating with stakeholders to implement more sustainable sourcing practices. In the past few years a renewed attention for food security has emerged under the influence of food price hikes, and rising awareness on the importance of the agricultural sector for economic development.

2.2 Definitions of key terms

2.2.1 Cash crops and the commercialisation of agriculture

Historically, the term cash crops is equated with plantation crops such as coffee, tea, cocoa, cotton and tobacco, oilseeds, sugar cane, oil palm, rubber and fruit. Cash crops have therefore been associated with export crops. Currently, the term cash crops is used to differentiate marketed crops from subsistence crops, which are those used for livestock feed or household consumption. A differentiation of food crops with cash crops suggests that most food crops were considered not to be

traded much through markets. In practice this differentiation does not hold, particularly not in developed countries where almost all crops are grown for revenue. Also in developing countries parts of food crop production have been marketed, depending on the extent (small-scale) farmers produce a surplus for which they find demand. There are many examples of trade in food staples (grains, pulses, and roots and tubers) between surplus and deficit areas, either within or between developing countries. Referring to country studies conducted around 1980 and own analyses, Von Braun and Kennedy (1986) state that in many developing countries, 20 to 40 per cent of the basic staple food produced was marketed.

Poulton et al. (2008) point at successful African experiences in increasing the productivity of food staples in Kenya, Malawi, Zambia and Zimbabwe during the second half of the past century. In these countries the smallholder sector could benefit from sustained public expenditure on plant breeding and extension programmes, grain marketing boards that bought up maize at guaranteed minimum prices, and coordinated credit and farm input systems. As a result, maize production grew and farmers generated surpluses sold to urban areas and for exports. In the World Bank's analysis of barriers to regional trade in food staples (World Bank 2012), 'staple food basket zones' are identified in Nigeria, Northern Zambia, Eastern Uganda, most of Tanzania and Northern Mozambique, from which surpluses of cereals are exported to deficit regions in periods of food stress. These examples show that the distinction between food crops and cash crops is not a strict dichotomy as food crops can also be marketed.

For the statistical analysis in this report, we maintain a simplified definition of cash crops, which includes all plantation crops - both for consumption and for use in manufacturing, bio-based chemicals or energy with the exception of wood products - and several tree crops that are sold on the market. In addition, we define basic food on the basis of the FAO statistical handbook.

Table 1
Definition of basic food and cash crops

Basic food	Commodities ('cash crops')
Pulses	Sugar
Fruit	Oilseeds
Sugar	Fibre and tobacco [a]
Vegetable oils	Vegetables
Starchy root	Coffee, tea, cocoa [a]
Cereal: rice, maize, wheat	Other tree crops (fruit, oil palm, rubber)
	Flowers and plants [ab]
	Timber and other wood products [b]

Note: [a] = predominantly export crops, [b] = not included in the statistical analysis in this report
Source: adapted from von Braun and Kennedy (1986)

In this report we do not consider livestock products, but focus on crop production. A cash crop is defined as a crop grown for direct sale rather than for subsistence food. Arguably, the focus on distribution and marketing of farm output is a too narrow interpretation of cash crops. The wider context of cash cropping is a process of agricultural commercialisation, which implies a strengthened market orientation in farming and in many cases a movement away from extensive semi-subsistence farming to a more input-intensive farming system (von Braun 1995; von Braun and Kennedy 1986). Commercialisation will often be accompanied by a shift to high yielding seed varieties, irrigation and an increased use of fertilisers.

We distinguish two types of cash crops. First, crops that are exclusively grown for sale, which include crops that are non-food, such as cotton, coffee, cocoa or tea. Second, crops that are produced with a 'marketable surplus', which include food crops that may be consumed by the household or sold on markets, such as rice or maize, but also certain fruits and vegetables. Thus, cash crops may be placed on a continuum, from pure home consumption to pure cash crop (Figure 1). Cash crops are sold on

domestic markets and foreign markets. An export crop is a cash crop that is ultimately exported to foreign markets.

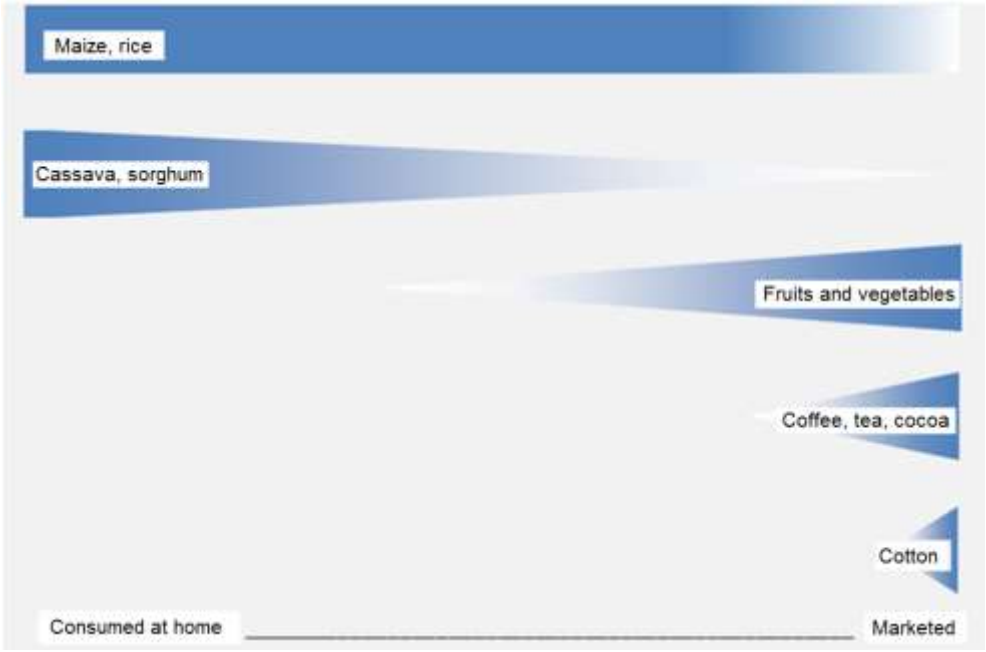


Figure 1 *Examples of continuum food crops and cash crops*

2.2.2 Food security

In the 1970s, the definition of food security was developed from the perspective of food supply to ensure that all people everywhere have enough food to eat. The importance of consumption and access was put forward in the 1980s through the concept of entitlement (Sen 1981). The term of nutrition security emerged with the recognition of the necessity to include nutritional aspects into food security. Unlike the definition of food that is mostly defined as any substance that people eat and drink to maintain life and growth, nutrition adds the aspects of health services, healthy environment and caring practices (IFAD 2013). Four dimensions of food and nutrition security may be defined (FAO 2006):

1. *Food availability*
   The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).
2. *Food access*
   Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).
3. *Utilisation*
   Utilisation of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.
4. *Stability*
   To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

2.3 A framework for analysing how and to what extent cash crops contribute to food security

To discuss the impacts of a further transition towards more cash crop production for food security it is necessary to understand the processes that determine food and nutrition security (FNS) outcomes on the four dimensions. For in-depth insights into these processes we refer to Pangaribowo et al. (2013) and other papers from the FOODSECURE project.[4]

The starting point of this report is that cash crops generate income, and therefore improve access to food for those who earn that income. Based on Shutes et al. (2013) we develop a simple framework of analysis for understanding along what channels cash crop income can have an impact on the different dimensions of food security mentioned above. The cash crop farmers or farm workers who generate an income from cash crops will have more money in their pocket to buy food. Depending on price developments, this is a direct improvement of food access. Income growth also has implications for other dimensions of food security. The key channels of impact of cash crop income on food security are summarised in Figure 2.

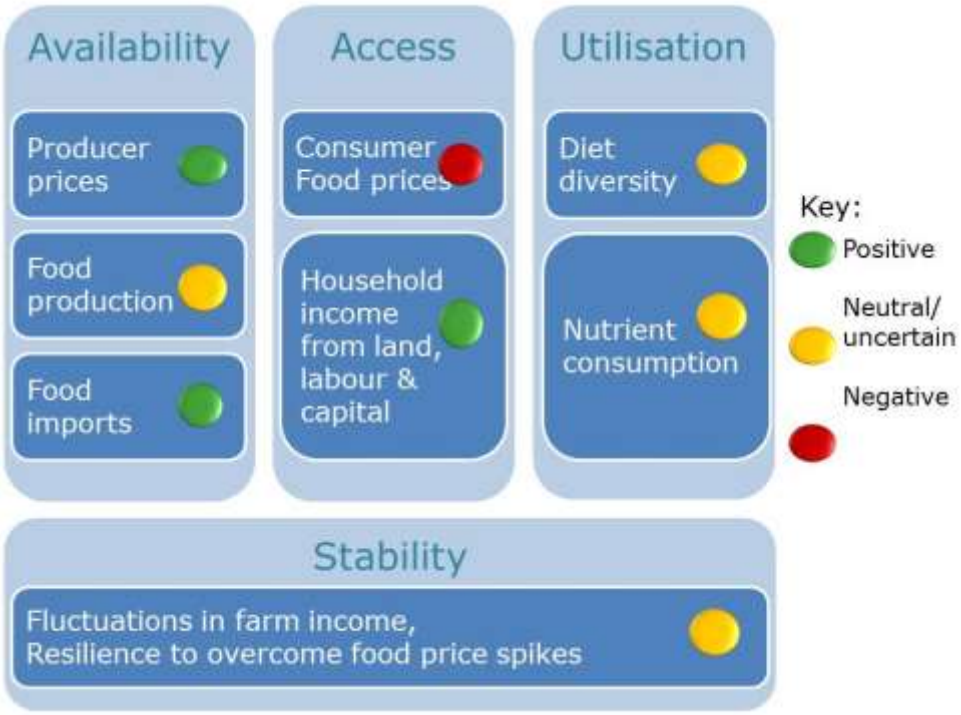


Figure 2. Channels of impact of cash crop income on the four dimensions of food security
Based on Shutes et al. (2013)

4 FOODSECURE is an interdisciplinary research project to explore the future of food and nutrition security, with core funding from the European Union. See the website www.foodsecure.eu.

Dimensions of food security explained

Food Availability consists of three factors related to the physical availability of food:

1. *Agricultural producer prices*
   Cash crop income will have a positive impact on the agricultural wages and input prices, which provides a stimulus for production expansion and raised farm income.
2. *Food production*
   On the one hand, many traditional cash crops are not strictly food (such as cocoa, coffee, tea or cotton) and will compete with food crop production. On the other hand, farm revenues from cash crops are often invested in food production, for example in the increased use of farm inputs, raising food production
3. *Food imports*
   Cash crop revenues are often a major source of export revenues with which food is imported.

Food Access consists of two factors related to purchasing power:

1. *Income*
   The farmers or workers who earn more income are able to spend more on food of a better quality.
2. *Consumer food prices*
   In poor communities, a substantial share of rising income from cash crops will be spent on food consumption. The increased food demand could result in higher food prices, which has a negative impact on households depending on the markets for their purchases of food. Cash crop production may also replace domestic food production, thus (locally) raising the prices of food.

Food Utilisation is related to what type of food is consumed:

1. *Diet diversity* and *nutrient consumption* are essential drivers of nutrition security. Income growth provides opportunities to invest in more nutritious foodstuffs and general hygiene. However, farm households may not necessarily spend additional income on improved diets and thus the outcome is uncertain.

Food stability is a dynamic dimension:

2. Income from cash crops may fluctuate, as cash crop prices are typically rather volatile, which is not conducive to a stable income. However, farmers or farm workers who earn more income (spending relatively a smaller share of their income on food) are able to invest more in assets such as in land, fertilisers or cattle, or in health and schooling. This way, they are able to improve their resilience to crises and long-term earning capability.

Woman selling fruits in a small market in Ouagadougou, Burkina Faso.
Photo by Gerdien Meijerink

3 Cash crops in African economies: some facts and figures

This chapter explains the importance of cash crops for income and export revenues at the national level for Sub-Saharan Africa and makes a number of key observations:

- Less than 10% of African crop farm land is used for cash crops (traditional, non-edible cash crops and other cash crops).
- The export value of cash crops compared to food imports has declined over the past 30 years, which can be explained by a diversification of exports of African countries. The value of total merchandise exports more than amply covers the increased food imports bill.
- Domestic production of food meets the largest part of the average daily energy needs. Imported food supplements these needs so that total food availability is more than sufficient in all but a few African countries.
- The size of Africa's cash crop economy has substantially increased in the past decade.
- Although cash crops contribute to economic growth, this is in itself not sufficient to lead to improved food security. Unequal distribution of income among and within households still leads to food insecurity. Inclusive growth is therefore required to ensure that cash crops contribute to food security.

3.1 Contribution of cash crops to export revenues and food security

Figure 3 shows that African crop land is mostly used for the cultivation of (basic) food crops. The non-edible cash crops cocoa and fibre crops (mostly cotton) make up less than 5%. The same applies for fruits and vegetables, which are both cash and food crops. Cereals (mostly maize) and roots and tubers (mostly cassava and yam) make up almost half of the total arable land use in Africa. Coffee and tea make up even smaller shares than 1 or 2% of land use in Africa.

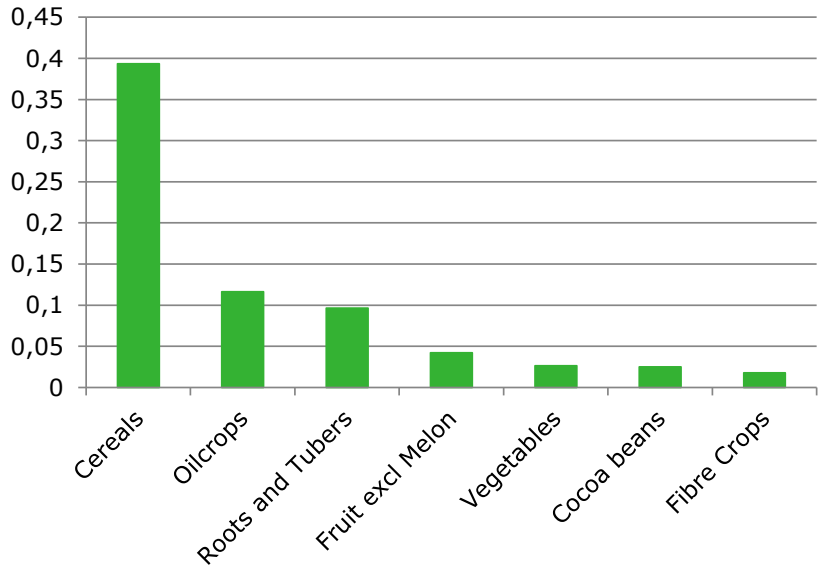


Figure 3 Crop land use in Africa (in share of arable land) (2010)
Source: FAOStat 2013

Cash crops may contribute to food security at a national level through the exports of cash crops that generate foreign currency and income to import food, or invest in domestic production. Agricultural exports contribute substantially to the economy of many African countries (Figure 4). The main export crops are fruits and vegetables, spices, coffee, tea and cocoa, fibre crops (mostly cotton) and tobacco. Together these traditional cash crops generate over 80% of the dollar value of agricultural exports (FAO 2013a).

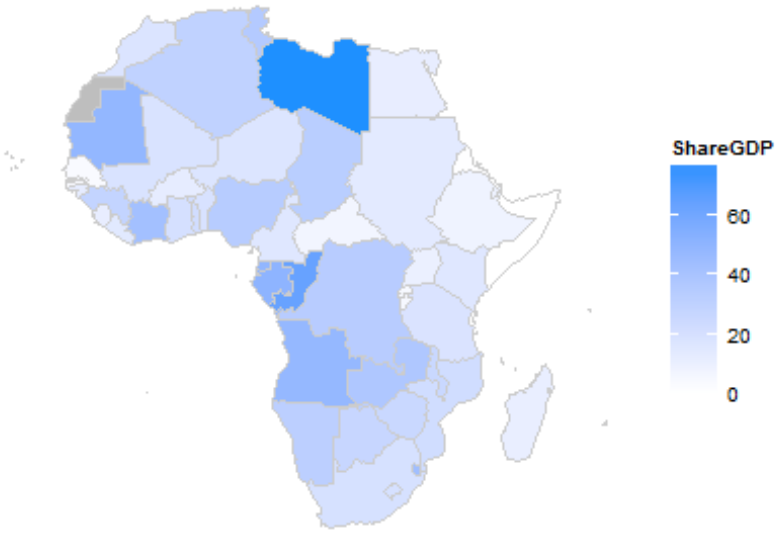


Figure 4 *Value of agricultural exports as a share of GDP (2010)*
Source: FAOSTAT 2013 and World Bank data (2013)

Population growth has outpaced production growth in Africa for decades, which has resulted in a greater dependence on world food markets. Cereals, vegetable oil and sugar are the main staple foods that African countries import from world markets. For instance, between 1990 and 2010, Nigeria's cereal imports expanded to 600,000 tonnes, a sixfold increase in two decades. The import volume tripled in Tanzania, the second largest importer in Sub-Sahara. Steep price increases on the world market have pushed up the import bill even further, particularly during the price peaks of 2007-08 and 2011-12. Although Africa's import bill for basic foods has increased in the past decades, the share of food in total imports has declined because of faster growth in energy and merchandise imports. The data also suggest there has not been a major import surge of luxurious, processed foods. The pattern is consistent for North Africa and Sub-Saharan Africa.

The nominal export revenues of cash crops have shown considerable growth. Figure 5 shows that exports of coffee, tea, cocoa and spices have been increased in the past 50 years, both in terms of value and quantity. Highly fluctuating prices determine the volatility in export value: while quantities (in tonnes) have increased in the past thirty years, the dollar value has fluctuated. Especially in reference years 1990 and 2000, prices and the dollar value were low, whereas the year 2010 shows the impact of high international prices as quantities were much lower yet the export value much higher compared to 2000. Similar patterns have occurred in exports of fruit and vegetables, tobacco, cotton and other textile fibres, sugar, and oilseeds (See Appendix A).

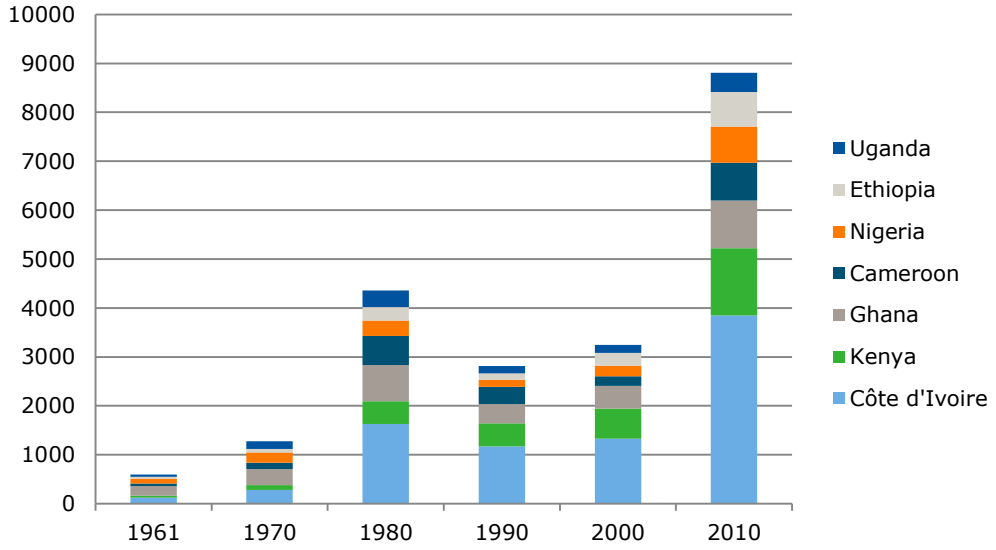
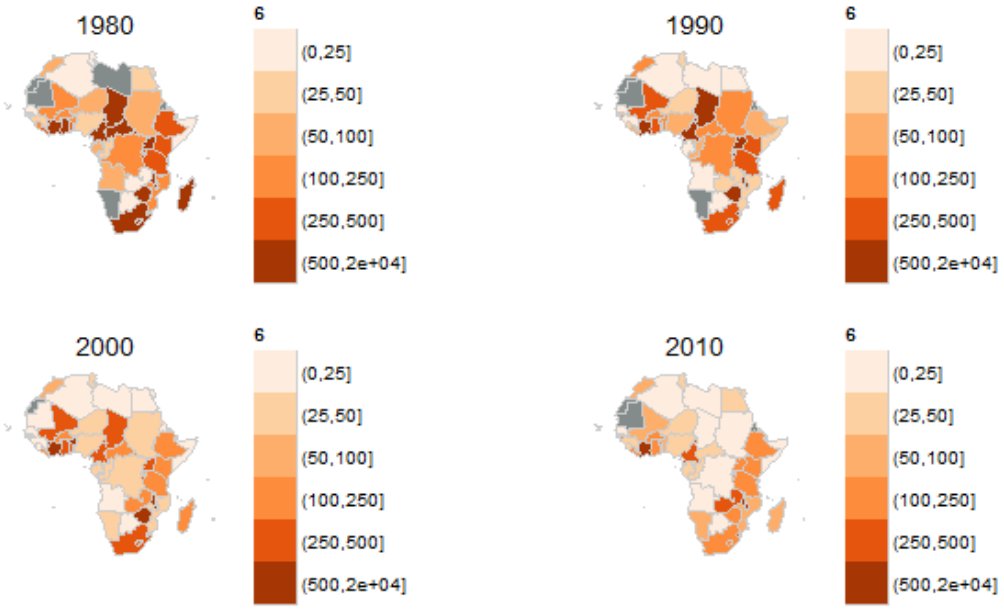


Figure 5 *Value of exports of coffee, tea, cocoa and spices (in billion USD and tonnes) 1960-2010 for top-7 exporters*

Figure 6 shows that export revenues from cash crops as a share of import value of basic foodstuffs in most countries have declined since the 1980s and that only for a few countries the share is over 100%. This does not imply a decline in food security, as
Figure **7** shows, but a broader orientation of exports. Instead of relying solely on agricultural exports, African countries have diversified. All African countries are more than able to cover their food import bills by their earnings from total merchandise exports (FAO 2013a).



Export value of cash crops as percentage of import value of basic food (see text for definition)
Note: grey values means no data are available
(Source: FAO 2013a; authors' calculations)

Figure 6 *Value of cash crops exports generate sufficient revenues to finance Africa's rising import bill for basic food*

Figure 6 above showed that relatively little land is used for traditional cash crops and not likely to reduce food security in a significant way.
Figure **7** confirms this[5]; it shows that the average available energy from food (in terms of calories per day per person[6]) is more than sufficient for most countries, even those who have been affected by civil wars, such as Liberia (2,261 kcal) and Guinea Bissau (2,476 kcal). Food supply of Burundi (1,604 kcal), Eritrea (1,640 kcal) and Zambia (1,879 kcal) is below the required 2,000 kcal per day per person (data for Democratic Republic of the Congo and Somalia are missing). The production of cash crops therefore does not appear to be conflicting with food security, if we simply equate food security with food availability in Africa (the average available energy from food expressed in calories at a country level). There are important limitations to such a national level perspective because of in-country restrictions to food trade. About 40% of African population live in urbanised and peri-urban areas (FAO 2013a), which are well-connected to trade routes. Many of the more remote rural areas have poor infrastructure in terms of food storage, roads and trading services. In areas that are not connected well to national food markets, local food availability is important for food availability (see Chapter 4).

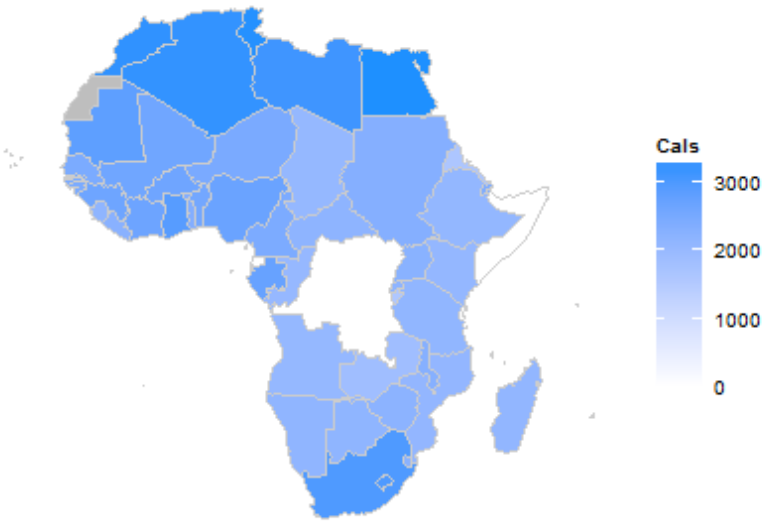


Figure 7 *Supply of kilocalories per day per person per country (2009) (Source: FAO 2013a; authors' calculations). White regions are missing. Food supply is defined as domestic food production (not exported) plus food imports.*

The bulk of the energy intake from food in Africa is provided by domestically produced crops, mainly wheat, maize, rice and millet. It is estimated that African farmers provide farm output to the amount of 1,800 kilocalories per person per day, still well below the targets of 2,000-2,500 kcal per day. The rest is imported. African cereal producers supply 50% of total energy intake (FAO 2013a). Around 90% of the total available energy is supplied by just a few crops and only 10% by livestock (i.e. meat and dairy). This leaves clear concerns about the quality of the diet in Africa, and thus the food utilisation dimension of food security is an issue.

[5] Because of the lack of consistent nutritional information in developing countries, food availability data based on national food balance sheets (FBS) are often used for the analysis of nutrient availability. Scholars have noted, however, that there is large inconsistency between analyses of undernutrition based on FBS-based information and results from household food nutrition consumption surveys, and childhood anthropometrics. None of the three methods comes without conceptually and empirical flaws, which brings de Haen, Klasen, and Qaim (2011) to the worrisome conclusion that "the true extent of food insecurity and undernutrition is unknown".

[6] According to the Food and Agriculture Organization of the United Nations, the average minimum daily energy requirement is about 1,800 kilocalories (7,500 kJ) per person.

Although overall food supply including imports is sufficient in most African countries, food insecurity and under-nutrition is prevalent in many parts of Africa as a result of local shortages in food supply and compromised access to food and utilisation of food. According to recent estimates of undernourishment (based on average daily energy intake and requirements), on average 1 in 4 Africans that live south of the Sahara were undernourished in the years 2011-2013 (FAO, IFAD, and WFP 2013). The pattern among key producers of traditional cash crops is mixed. A simple comparison of data on the prevalence of undernourishment data for key Sub-Saharan exporters of traditional cash crops reveals that some countries face severe challenges in undernourishment, while other countries perform better than average.

Table 2.
Prevalence of undernourishment in key export countries of traditional cash crops

Country	Proportion of undernourished in total population	Sectors in which country is a leading African exporter
Ethiopia	37.1	Fruit and vegetables
Former Sudan*	36.0	Cotton and other textile fibres
Tanzania	33.0	Tobacco
Zimbabwe	30.5	Tobacco
Mozambique	29.3	Tobacco
Cote d'Ivoire	20.5	Coffee, tea, cocoa; Fruit and vegetables
Malawi	20.0	Tobacco
Kenya	15.7	Coffee, tea, cocoa; Fruit and vegetables; Tobacco
Cameroon	13.3	Coffee, tea, cocoa
Nigeria	7.3	Coffee, tea, cocoa
Ghana	<5	Coffee, tea, cocoa
Sub-Saharan Africa (average)	24.8	--

Source: (FAO, IFAD, and WFP 2013), Appendix 1

3.2 Cash crops, inclusive growth and strengthened food security

The size of Africa's cash crop economy has substantially increased in the past decade. The rate of agricultural growth has accelerated recently, from an average of about 2.5 per cent in the 1980s and 1990s to 3.1 per cent in the 2000s and 3.7 per cent in 2007-10 (Binswanger-Mkhize 2011). As livestock sector development is still in its infancy in Africa, much of the acceleration can be attributed to growth in crop production and sales, on domestic, regional and global markets. Overall macroeconomic growth, which outpaced the agricultural performance, has been fuelled by the strengthening of democracy and institutions and a decline of conflict, macroeconomic stability, and the rise in capital investment and remittances.

Several factors have worked in favour of further expansion and commercialisation of the crops sector. Agricultural policies have improved, becoming less distortive (e.g. less industrial protection and export taxation), which, in turn, have improved price incentives for farmers. Higher international commodity prices have created opportunities for import substitution and regional trade. The growth in export agriculture has been supported by the rise of global value chains and the strengthened position of African suppliers in integrated supply chains for traditional commodities, fruit and vegetables and flowers (Swinnen 2007).

The prospects for further agricultural growth are positive (see for example AGRA 2013). This does not provide guarantees, however, for a strengthening of food security. Although agricultural growth has a stronger potential to improve livelihoods at the base of the socioeconomic pyramid than growth in many other sectors (World Bank 2007), the impact on food security is uncertain.

Recent analysis by IFPRI examines what kind of agricultural growth has the biggest potential to improve livelihoods (Diao et al. 2012). It finds that export crops and food staples will contribute to

economic growth in different and country-specific ways. Export crops typically have higher value and growth potential than food crops, but in several countries food staples are more effective at generating economy-wide growth and reducing national poverty: Tanzanian livestock, Mozambican roots, and all staple foods in Nigeria, Uganda, and Zambia are more effective at generating economic growth than those countries' export crops. Therefore, the impact of growth in cash crops for domestic staple markets and for export markets of food security will also differ.

In general, there is a positive association between economic growth and food security status, which implies that income growth is a strong driver of reducing undernourishment and food insecurity (FAO, IFAD, and WFP 2013)[7]. However, economic growth may not reach everyone automatically and in equal terms. Therefore, changing the distribution of income at the household level is a necessary factor for understanding differences in the status of food security (Laborde, Tokgoz, and Torero 2013). Figure 8 presents the level of GDP per capita in USD and the level of the IFPRI Global Hunger Index for a selection of low and middle income countries. The Global Hunger Index (GHI) is a mixed indicator for long-term food insecurity. In richer countries, there is less hunger and a lower GHI because households have greater earnings and resilience. In these countries the level of public services such as health and education also increases with GDP.

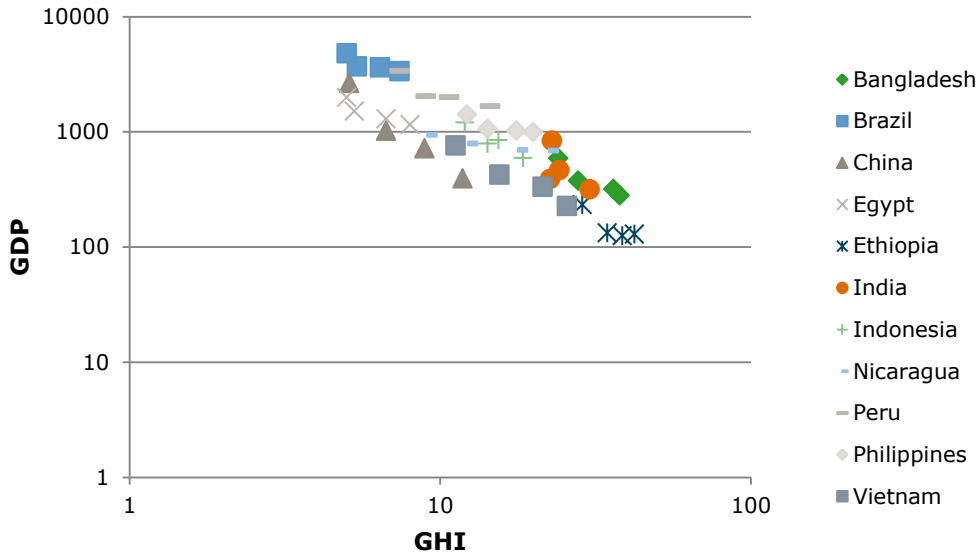


Figure 8 *Relations between Global Hunger Index and GDP per capita (selected countries from 1990 to 2012)*
Source: Laborde et al. (2013), based on the Global Hunger Index and World Bank GDP data

A more differentiated pattern emerges when we analyse the changes in income and GHI over the past 15 years instead of the levels (Figure 9). Economic growth is not a sufficient condition for improvement of food security. India is a key example of the disconnection between economic growth and food security improvement. Ethiopia has realised a reduction of about 25% in the GHI between 1997 and 2012 in a time that national income doubled, but is outstripped in GHI improvement by Bangladesh which had also doubled income and managed to reduce GHI by one-third. At the very minimum the income distribution among - even within - households has to be taken into account, in addition to factors that determine the country-specific food security challenges. The explanation of

[7] Pointing at evidence from countries in East and Southeast Asia, Timmer (2005) states that even in countries with relatively low levels of per capita income, government interventions to enhance food security can lift the threat of hunger and famine. Achieving food security at the societal level is not just the result of one-way causation from economic growth, but stems directly from a set of government policies that integrates the food economy into a development strategy that seeks rapid economic growth with improved income distribution. With such policies, economic growth and food security are mutually reinforcing.

these differences goes beyond this report; we simply observe that inclusive growth is a critical determinant of food security.

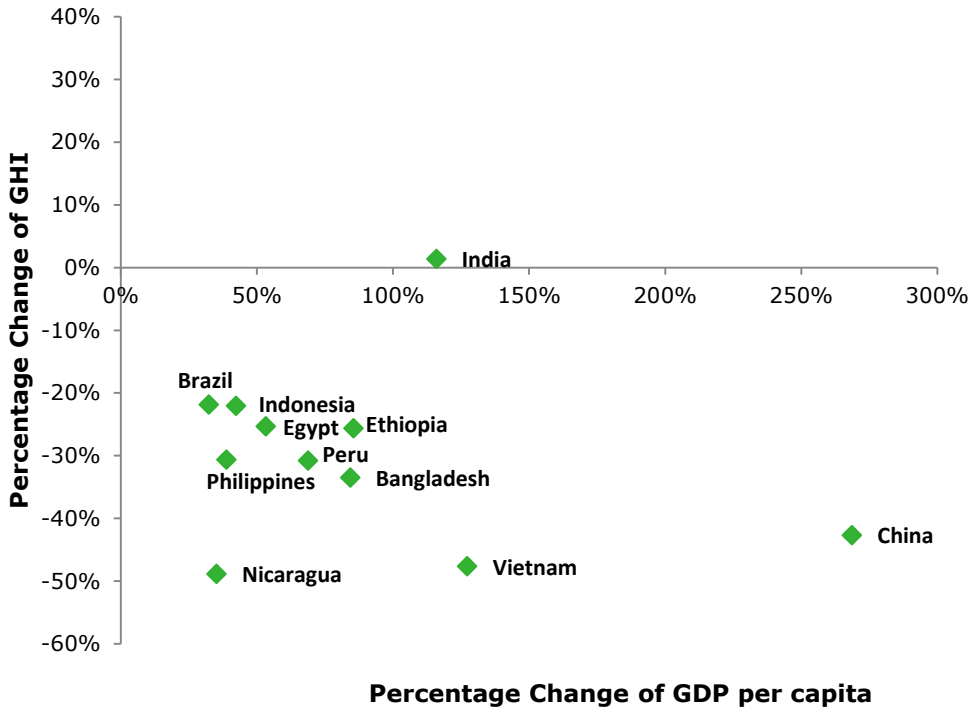


Figure 9 *Change of Global Hunger Index versus GDP per capita over past 15 years*
Source: Laborde et al. (2013), based on the Global Hunger Index and World Bank GDP data

Price information on a vegetable market near Morogoro, Tanzania.
Photo by Helene Daviron-Benz

4 Risks associated with cash crop production

This chapter explains the risks associated with cash crop production and makes a number of key observations:

- Cash crop agriculture requires the management of various types of risk such as soil degradation and price variability.
- Farmers employ several adaptive and risk reducing strategies, for instance by diversifying cropping patterns to cope with risks of harvest failures (due to pest and diseases, drought), price slums, loss of market access and income decline.
- Risks linked to markets are related to market governance. A market structure with one or only a few outlets create farmers' dependency. Adequate infrastructure and strong institutions (e.g. market information systems) are key in reducing transaction costs, improving market integration and reduce price volatility.

4.1 Income risks

Risk, defined as a probability that a loss occurs, is a key concept in discussing the effects of cash crops on food security. In this chapter, we discuss different types of risks associated with cash crop production, what these risks imply for food security and what coping strategies aimed at reducing the identified risks may be, using examples from the literature.

In many developing countries, the degree of uncertainty and risk is high; stemming from climatic variance (unanticipated events), as well as price variance (prices may fluctuate daily). In many developing countries, risk management mechanisms are underdeveloped. For instance, farmers and traders are able to survey their business risks only with appropriate levels of information on market prices, on product quality and on market prospects (forecasts). Such 'basics' are often lacking or incomplete in African countries.

Producers are heterogeneous in their asset endowments and access to input and output markets. Moreover, smallholders have different levels of risk aversion. As a result, farmers will react differently to cash crop production opportunities and derive different welfare effects from participation in cash crop production. Key in a smallholder decision to engage in commercially oriented agriculture is the probability that commercial production will yield sufficient profit to meet the household consumption needs through purchased goods.

From the literature, the most critical factors associated with smallholders adoption of commercial production of cash crops appear to be their level of risk aversion, education level, estimated profits, distance from nearest buyer, the capacity to make the necessary investments to access markets, sufficient assets (land and non-land) to meet quality and consistency requirements, access to inputs (including credit and information) and the availability of local markets to purchase food (Schneider and Gugerty 2010).

The institutional environment in a country, often linked to GDP, is an important factor in determining the overall level of risk a farmer faces when growing cash crops. Well-functioning markets with low transaction costs, good information, secure property rights and enforcement will reduce transaction risks. Conversely, risks may be increased by lack of economic development in a country, including infrastructure (roads, ports etc.) and institutions (risk management, financial services). Risks may also be increased by government policies, such as unpredictable trade policies (net taxation of cash crops, export bans), pricing policies etc. (Moïsé, E. et al., 2013). In the same vein, government policy reform

may provide farmers with opportunities to grow new profitable cash crops, such as the granting of tobacco production quota to smallholders proved to be in Malawi (Zeller, Diagne, and Mataya 1998).

Note that important distinctions between various risk management options exist. First, farmers themselves can implement various risk management strategies, such as diversifying crops and livestock, and to increase the area under food crops. Second, risk management strategies may be provided by third parties (government or private sector) such as crop or livestock insurance, or support policies (Beekman and Meijerink 2010).

Whereas various different risk factors exist associated with cash crop production, we synthesise and summarise these into two major categories: risks that are linked with biophysical or agro-ecological features and those linked with markets. We discuss these two categories, clarify the impact on food security and show how producers, traders and governments could cope with these risks.

4.2 Agro-ecological conditions

4.2.1 Long maturation period of the cash crop causes a period without income to be bridged

Some cash crops have a long maturation period. Examples are tree crops such as coffee, cocoa or tea, which require several years to produce marketable produce. This means that the farmer is less flexible in changing the composition of crops. This inflexibility to respond to market signals (prices go up or down) adds to the risk profile of the crop. Furthermore, certain cash crops only produce a harvest once a year, instead of throughout a (long) season. This is linked to the agronomy of the different cash crops. Bananas, for instance, can be harvested throughout the year, generating a more or less stable income flow. By contrast, cotton is harvested once a year. Coffee has one harvesting season, but which may last several months; cocoa harvesting is spread over several months once or twice a year. Whether a farmer’s income flow is lumpy or spread out over the year affects his ability to pay for food expenses and to invest in the farm, and therefore affects the risk on indebtedness.

Many traditional cash crops are perennial crops with a maturation period of several years and an economic cycle of 10-15 years. Productivity is not equal throughout the life cycle of plants, which creates risks for farmers' livelihood. The common strategy in the farming system to stabilise revenues is to have a continuous replacement of plants on a single plot.

Klasen et al. (2013) describe how an entire community of Sulawesi coffee farmers faced livelihood risk due to a decline in the productivity of their ageing trees and low global coffee prices (see box with Example no 1 below). The income decline affected food security, in particular because a macroeconomic downturn reduced the opportunities for wage labour off the farm. This example shows that rural communities have the capacity to adapt and innovate in response to declining productivity and international prices (by shifting the cropping pattern). Non-agricultural activities provided income during the maturation period of the new crop, while annual crops were produced for food security reasons. Both were buffers or safety nets helpful in making the cash crop shift possible.

Example no. 1: Sulawesi's strong response to a coffee price shock

In the years 1997-1998 Indonesia experienced a major economic, financial, and political crisis. The real wages in the urban formal sector declined by 40%. Rural areas (60% of the population and 80% of Indonesia's poor) were severely affected. A survey study based on three rounds (2001, 2004 and 2006) reveals that household incomes for a group of Sulawesi cash crop farmers increased substantially in the post-crisis period. They show that the growth in household incomes can be primarily attributed to increases in the value of agricultural production (both in terms of output and yields) which is caused largely by shifts from coffee to cocoa farming.

During the 1990s, when global coffee prices were low, coffee farmers around the world replanted their trees. Farmers expected that after 3-5 years, when the trees grow fruits, the market conditions would have recovered. Interestingly, rural households in Indonesia did not only replace old coffee trees, but also started to produce and intensify the production of cocoa. In the wake of the economic crisis farmers started to either plant cocoa on new plots or to gradually switch from coffee production into the production of cocoa. In the early 2000s Indonesia has become world's second largest producer of cocoa after Côte d'Ivoire. The primary driver of income growth for farmers with perennial crops was due to the shift to cocoa.

One reason for the shift to cocoa was that farmers already had knowledge on cocoa production and that distribution channels existed in some areas of the country. So, the risk of adopting new crop varieties was mitigated by making use of existing experience and knowledge on farming practices in other parts of the country.

The income growth earned by shifting to cocoa in Sulawesi was not continuous during the period 2001-2006. From 2001 to 2004 incomes stagnated due to the restructuring of farm activities. In 2004 households were still in the middle of the transformation process. Nevertheless, food security was attained by maintaining a stable area of food crops like rice and maize on 50% of their land. The temporary fall in cash income from farming was compensated by additional non-agricultural labour, for example in small trading shops, restaurants and construction. By 2006 the shift to cocoa appears to have been highly rewarding: the cocoa yields (in value terms) are on average about 90% above those from coffee, and farm income increased by 25% with only small increases in the total cash crop area. The price differences of cocoa between 2001 and 2006 were rather small and therefore they do not explain much of the observed increase of the cocoa income.

Source: Klasen, Stephan, Jan Priebe, and Robert Rudolf. 2013. 'Cash Crop Choice and Income Dynamics in Rural Areas: Evidence for Post-Crisis Indonesia'. Agricultural Economics 44 (3): 349–364.

4.2.2 Specialisation into cash crops may lead to monoculture with higher risks of outbreaks of pest and plagues

The emphasis on specialisation and efficiency in cash crop production increases the production system's sensitivity to ecological risks, such as plant diseases, with the risk of decreasing productivity and quality of the produce. These are reasons why farmers combine cash crop with food crop cultivation (see e.g. Longhurst 1988; World Bank 2007; Gladwin et al. 2001). In regions that specialise in a particular crop or cash crop, the prevalence, or worse, the outbreak of pests and plagues could lead to substantial income risk. The relation between mono-cropping of cash crops and pressure of pests and diseases can be both negative and positive. A negative relation is that overexploitation of soils, overuse of insecticides and degraded ecosystems, all lead to a decline in natural resilience and increased susceptibility to pests and plagues. A positive relation is that cash crops bring more robust genetic stock, the expertise for integrated pest management and other farming practices. Examples 2 and 3 below are illustrations of this.

In case of outbreaks, a large share of the rural population may be affected due to loss of jobs, wage reductions, or harvest failures. The FEWS network has documented how an outbreak of coffee rust

affected livelihoods among farm communities in Central America because harvest dropped in two years to 15-40% below normal (FEWS NET 2013), see box with example no. 2 below.

Example no. 2: Coffee rust in Central America results in food access risk

Coffee production in Central America is a key source of seasonal unskilled labour demand and therefore of income for poor households in Central America. It employs 1.4 million of the 34 million people in El Salvador (16% of the unskilled labour demand), Guatemala (32%), Honduras (27%) and Nicaragua (33%). Approximately 80% of this labour demand takes place during October to February, with a peak in December and January.

Coffee rust is a fungus that develops on the leaves of a coffee plant. When left untreated, an affected plant will start to defoliate. The following year the plant will produce fewer flowers, leading to fewer coffee cherries with smaller size and weight. Coffee rust also renders plants more vulnerable to other infections. In 2012, an outbreak of coffee rust spread over a large area covering Mexico to Colombia.

Impacts of coffee rust on production and income
Guatemala, Honduras, El Salvador and Nicaragua export approximately 90% of their annual coffee harvest, and are therefore vulnerable to fluctuations in global coffee prices. Compared to 2011/12 levels, the 2012/13 harvest are likely to decline by up to 15-25% and in 2013/14 up to 30-40%. Since it takes three years from the time of infection to restore normal coffee tree production, harvests in 2014/15 are also likely to be below average, with recovery starting only in 2015/16. At the same time, export prices are expected to decline, due to recent reductions in coffee Arabica prices on key international reference markets, which fell by over 35% over the course of 2012.

This reduced output due to coffee rust in combination with falling prices is expected to significantly reduce income earning opportunities. Compared 2011/12, household-level income in Central America will likely decline by approximately 15-20% in 2012/13 and 30% in 2013/14. This impact on household incomes is likely to reduce food access for households that rely on coffee revenues for the next two years. Households will be forced to rely more heavily than usual on staple food harvest and will be more vulnerable to increases in food prices.

Food insecurity expected in areas dependent on the coffee sector
The methods for estimating the prevalence of coffee rust varies by country. Guatemala has enacted programmes to provide fungicide, El Salvador also included foliar fertilisers for coffee farmers, and Nicaragua has also recently launched a campaign to train experts and growers to treat the spread. Nevertheless, a decrease in harvests, incomes and food security is expected in areas that are less diversified and where the coffee rust outbreak is more severe. Guatemala and Honduras are of particular concern, given that they have a higher proportion of people dependant on the coffee sector.

Source: FEWS NET. 2013. 'Coffee Sector Shocks and Projected Food Security Impacts in Central America'. Special Report Central America. Washington D.C.: Famine Early Warning Systems Network.

Introducing cash crops in a new crop mix may lead to displacement of food crops and a negative impact on food availability of smallholders. This does not necessarily imply negative consequences for food security. Goshu et al. (2012) show that for smallholders in rural Ethiopia (in four districts, two farming systems) there is a positive relation between crop diversification, daily calorie intake and dietary diversity level. The results also indicate that when farmers diversify into crops with a higher commercial status, they generally have higher annual incomes, better diet quality diversity and increased access to food.

In a cash crop production system, diversification with more food staples may be considered to reduce market risks associated with cash cropping. For instance, although cocoa production forms the backbone of many West-African economies and provides a livelihood to nearly 2 million smallholder

farmers, it provides low incomes because productivity is generally low (C&CI 2012). Various stakeholders are working together with governments, member companies, development donors and others in West-Africa to further enhance food security of cocoa farmers. The World Cocoa Foundation (WCF), for instance, is a public-private partnership that has developed programmes to teach cocoa farmers basic production and business practices (C&CI 2012). Good agricultural practices (GAPs) include planting shade trees for cocoa, such as oil palm, fruit and coconut trees. Products from these shade trees provide additional food for the household and additional income. Good agricultural practices also include proper use of fertilisers and pesticides for the cocoa and shade tree production. These measures have resulted in productivity increases, more marketable surplus and increased incomes that may be used to cover household expenses on food, school fees and healthcare. Farmers are diversifying their sources of income to include other tree products, cassava and even livestock while maintaining cocoa as the primary cash crop. Diversification as a means to food security was demonstrated recently in Ghana when many farmers witnessed a reduction in income from cocoa because of heavier than normal rainfall, but saw their overall incomes increase as a result of crop diversification (C&CI 2012).

Example no. 3: Maize disease creating a poverty trap for farmers in Eastern Africa

The following feature, not from a scientific source but from an FAO field report, shows the effects of plant disease, and provides us insights into farmers' coping strategies.

Spreading from Kenya across the rest of East and Central Africa, the Maize Lethal Necrosis Disease (MLND) is a serious risk to food security in the region. It affects the maize yields of small-scale farmers.

MLND attacks Kenya's maize and wheat belt
Small-scale farming is the main source of livelihoods for a majority of the population in the Rift Valley, with maize as staple food. MLND hit farmers for the first time in 2012. The resulting 40% yield loss doubled maize prices. With a 40% yield loss and maize prices almost doubling, the impact was significant.

Small-scale farmer and Bernard Kones explains in the FAO field report: 'We sell half of our yields to gain extra income but the four bags we harvested last year were not even enough to feed all of us'. When MLND infected the maize plants, Mr Kones and his family lost 75% of their maize harvest. The family sold 6 of their 15 cows to meet household needs and pay for school fees.

Another small-scale farmer, John Ngeno, lost his whole maize harvest due to MLND. He managed to cushion the effect of his losses by finding a causal job, which enabled him to diversify his income. Mr Ngeno told the FAO 'For the first time I worked as a seasonal labourer at a large-scale farm where I helped with weeding. I made less money than by farming but I decided to invest it in a little shop. Now I sell sugar, flour, cooking oil, sodas, batteries, soap….' To prevent a second lost harvest, he has planted his crops earlier.

Although these farmers managed to cope with the loss of a significant part of their maize harvest, the MLND will create a poverty trap for these farmers and force them to change their farming and eating habits.

(FAO 2013b)

4.2.3 Soil fertility

In the 1980s and 1990s, as more data on the soil nutrient status in Africa became available, awareness and concern grew over soil nutrient mining, (Pol, van der 1992; Smaling, Nandwa, and Janssen 1997) which means that farmers were exhausting the soils by harvesting and selling crops but not replenishing the soils with fertiliser. As Smaling et al. (1997), have described the problem:

> *'As the world population keeps growing, balanced ecosystems are on the decrease and nutrient ledgers all over the world have become increasingly imbalanced. Great nutrient surpluses and subsequent undesirable emissions to the environment now occur in many farming systems in temperate regions, and increasing soil-nutrient depletion and crop yield declines are reported in the tropics, particularly in rainfed Sub-Saharan Africa.'*

Although policy-makers and extension workers put much emphasis on the use of mineral fertilisers, many farmers do not use them. A few studies point out that farmers may not buy fertilisers because they are expensive compared to the crops grown and sold by the farmer, or the right fertilisers may not available at the right time or in the right amount (de Jager, Mokwunye, and Smaling 1998). As a consequence, in the 1990s the emphasis shifted to the concept of Integrated Nutrient Management (INM), defined as the best combination of available nutrient management technologies, i.e., those that suit local biophysical conditions and are economically attractive and socially relevant. These include manure from livestock, re-using materials such as crop residues as organic fertiliser etc.

With INM, the debate has shifted from a global broad-brushed, generalised focus on soil depletion to a focus linked to specific regions, crops and farming systems (Scoones 2010). At the same time there still seems to be a concern with cash crops as risk factors: cash crops and the nutrients they embody are removed from the farm and thus represent a net outflow of nutrients. On the other hand, the income that is earned from cash crops can be used to buy mineral fertilisers.

Research conducted in the 1990s and early 2000s in Africa shows that the relation between soil nutrient depletion and cash crops is not clear-cut. A series of NUTMON projects collected a vast amount of data on crop cultivation and soil fertility management practices by farmers in different African countries (e.g. Kenya, Uganda, Ethiopia, and Burkina Faso)[8].Figure 10 shows the relationship between the net farm income (in USD) and the nutrient balance (of nitrogen N). There is no clear relationship visible: most farm households hover around a neutral balance: the amount of N extracted from the soil is offset by the amount put back into the soil. There are several extremes, but it is noteworthy that there are very few farm households who appear to be mining their soils through cash crops; i.e. very few households have a high net farm income and a negative N balance. There are, however, more farm households who have a relatively low net farm income and a negative N balance, which may be an indication that they are unable to purchase fertilisers or use manure from livestock activities.

[1] See for more information about the projects www.nutmon.org

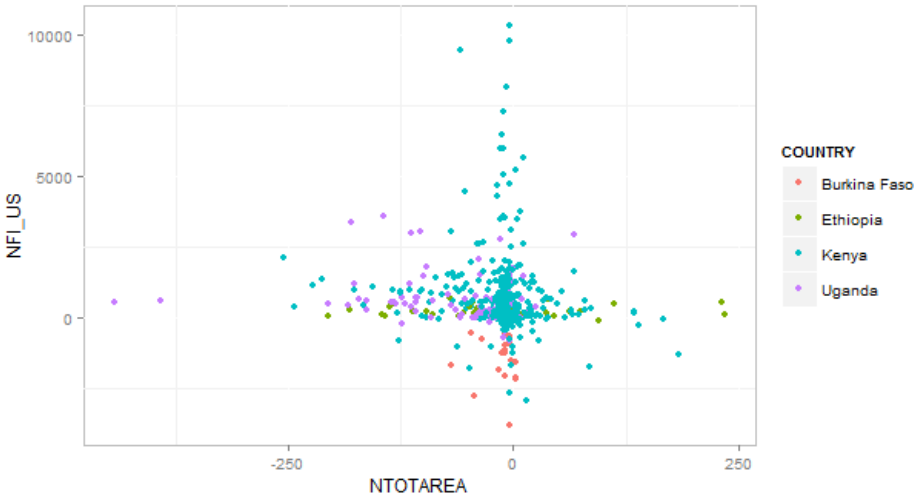


Figure 10 *Relation between net farm income (in USD) and net soil nutrient balance (in kg of N per hectare) in Burkina Faso, Ethiopia, Kenya and Uganda*
Source: NUTMON databases, calculations by the authors (N=567 farm households)

When we plot the relationship between net farm income and the use of inorganic fertiliser, there seems to be some relation between the net farm income (logged to scale extreme values) and the use of inorganic fertiliser (in N per farm household); however, the relationship is not clear-cut. There are many farm households that have a high net farm income but that use very little fertilisers.

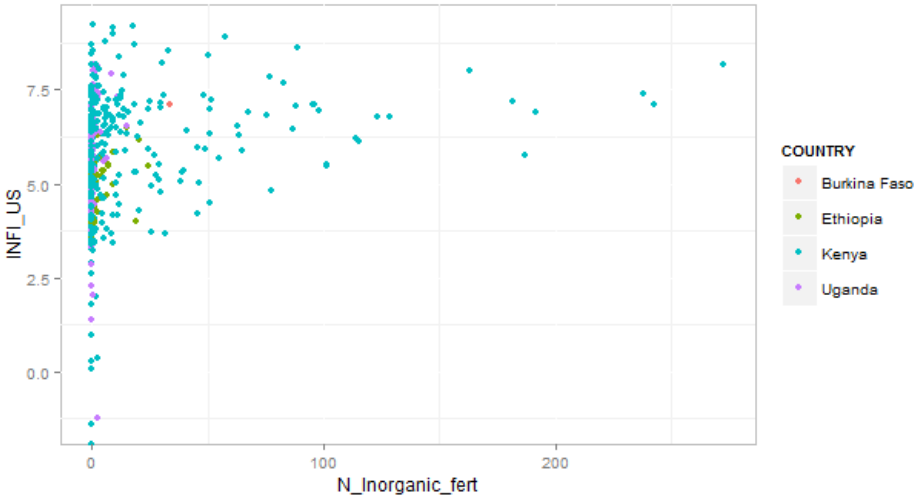


Figure 11 *Relationship between net farm income (in USD, logged lNFI_US) and inorganic fertiliser (N_Inorganic_fert, in kg N per farm)*
Source: NUTMON databases, calculations by the authors (N=155 farm households, by taking the log of net farm income, the negative values are removed)

4.3 Risk factors linked to markets

4.3.1 Introduction

To generate wealth and prosperity, a country needs political and economic institutions that support an efficient functioning of markets. Weak institutional structures are an important reason why agricultural growth in large parts of Africa has been disappointing with low or negative per capita growth over many decades (see World Bank World Development Reports 2002 and 2008). Institutions coordinate, facilitate low-cost and provide incentives for exchange and resource management. Institutions therefore reduce risks related to markets. Weak institutions result in a strong subsistence orientation with high proportion of cultivated areas devoted to low-yield staple food production, as for higher value crops for market farmers (and traders) need linkages with input, credit and output markets, access to information and enforced property rights. Kirsten (2009) shows the importance of enhancing institutional capacities for agricultural development in Africa. As cash crops are marketed products, institutional capacities determine the success of cash crop production to contribute to food security.

4.3.2 Market structure: one market outlet creates farmers' dependency

When there is only one market outlet on which farmers depend this constitutes a major risk. Examples are the cocoa, coffee or tea boards or cooperatives that buy up all the produce and set prices. Other examples are cash crops produced under contract farming arrangements, usually for fresh fruits and vegetables, where the produce is sold to supermarkets or exporters and has no local market. Having one, well-established market outlet saves transaction costs; farmers do not need to find out the best price, negotiate etc. Sometimes the sole buyer offers a range of services as well, such as supply of inputs (seeds, fertiliser) and training. However, in such a situation there is a risk that the buyer determines prices at levels that do not cover farmers' production costs. If farmers lack bargaining power, they may lose most of their margins.

Porto et al. (2010) study how the internal structure of export markets and level of competition affect poverty and welfare in remote rural Africa. In twelve case studies (focusing on the commodities cotton, coffee, tobacco and cocoa), they explore the role played by the structure of competition in export agricultural supply chains, using modelling tools to simulate various changes in competition and their impact on farm prices and household incomes. They find that many of the sectors have only a few firms competing for the commodities produced by many smallholders. This structure leads to oligopsony power: firms have market power over farmers and are able to extract some of the surplus that the export market generates. The authors show that more competition among processing and exporting firms is beneficial for smallholders, since farm-gate prices tend to be higher and farmers earn higher incomes. The authors also investigate the mirror situation and conclude that a reduction in competition among upstream firms (e.g. through merging) would imply a loss of farmers' income and, hence, an increase in poverty. Policies to foster competition in the chain could counteract the impacts of a few firms having market power over farmers.

Schneider and Gugerty (2010) emphasise the benefits of farmers cooperatives and/or associations, as coordination among farmers through these organisations can significantly reduce the transaction costs for both the farmers and the firm purchasing their input by bundling transactions. Producers' organisations can manage the frequency of interactions between firms and producers and facilitate more cost-effective service delivery of the purchasing company to farmers (e.g. extension to improve productivity and quality of the produce). IFAD (2008) shows the important role of producer organisations in the economic success of high-value crops in smallholder farming systems in East and North Africa.

4.3.3 Poorly integrated markets increase transaction costs of trade

Cash crops, by definition, are traded at a market place. Well-functioning markets aggregate demand and supply across actors distributed in space. In addition, information on prices, surpluses and shortages are transmitted quickly and with low cost. At the national level, well-functioning markets ensure that macro-level economic policies (such as exchange rate, trade, and fiscal or monetary

policy) change the incentives and constraints faced by micro-level decision-makers such as farmers (Barrett 2005). Poorly integrated markets entail high transaction costs of finding trading partners, information on prices, bringing produce to the market etc. They also lead to local surpluses or shortages and thus to regional price differences.

To achieve well-functioning markets, investments in rural infrastructure (rural roads, electrification and telecommunications) and market information systems (e.g. SMS services) are needed (Moïsé and Bris 2013). In addressing the challenge of increasing transparent market information in Africa, mobile phone-based services are increasingly used. Maritz (2011) provides several examples of how farmers benefit from better price information by using mobile-based market information applications which enable farmers to get in contact with clients, with service providers (for transport, credit, advice) and that gives them higher prices for their products. Farmers and traders benefit from investments in physical as well as in virtual market places for agricultural commodities. The latter refers to trading agricultural products via a commodity exchange through futures and options contract transactions, of which there is only one in Sub-Saharan Africa (JSE in South Africa).

There have been quite a number of agricultural commodity exchanges initiatives in the region recently, some more successful than others (Beekman and Meijerink 2010). A rather recent example of success is the Ethiopian commodity exchange (ECX) established in 2008, with coffee, oilseeds and pulses the major commodities traded (but also wheat and maize are being exchanged). The ECX offers services offered linked to sampling, grading, weighing and certifying. The ECX has already proven to be an institution that adds importantly to market efficiency and transparency: in the third year of its operation over 500,000 tonnes was traded, with a value of USD1.1bn (Gabre-Madin 2012).

4.3.4 High price variability

Figure 12 shows the different types of volatility, which can be explained by the type of cash crop. Bananas and oranges have regularly fluctuating prices, linked to supply of bananas or oranges from certain major producing areas. The price of coffee (especially Robusta) is more erratic, and has to do with failed coffee harvests in key producing areas (e.g. Brazil and Vietnam). For instance, a major frost during the growing season in Brazil can induce price peaks, such as in 1986 or 1994. Tea is less prone to such harvest losses, and is grown in more areas, reducing the likelihood of harvest failure affecting prices.

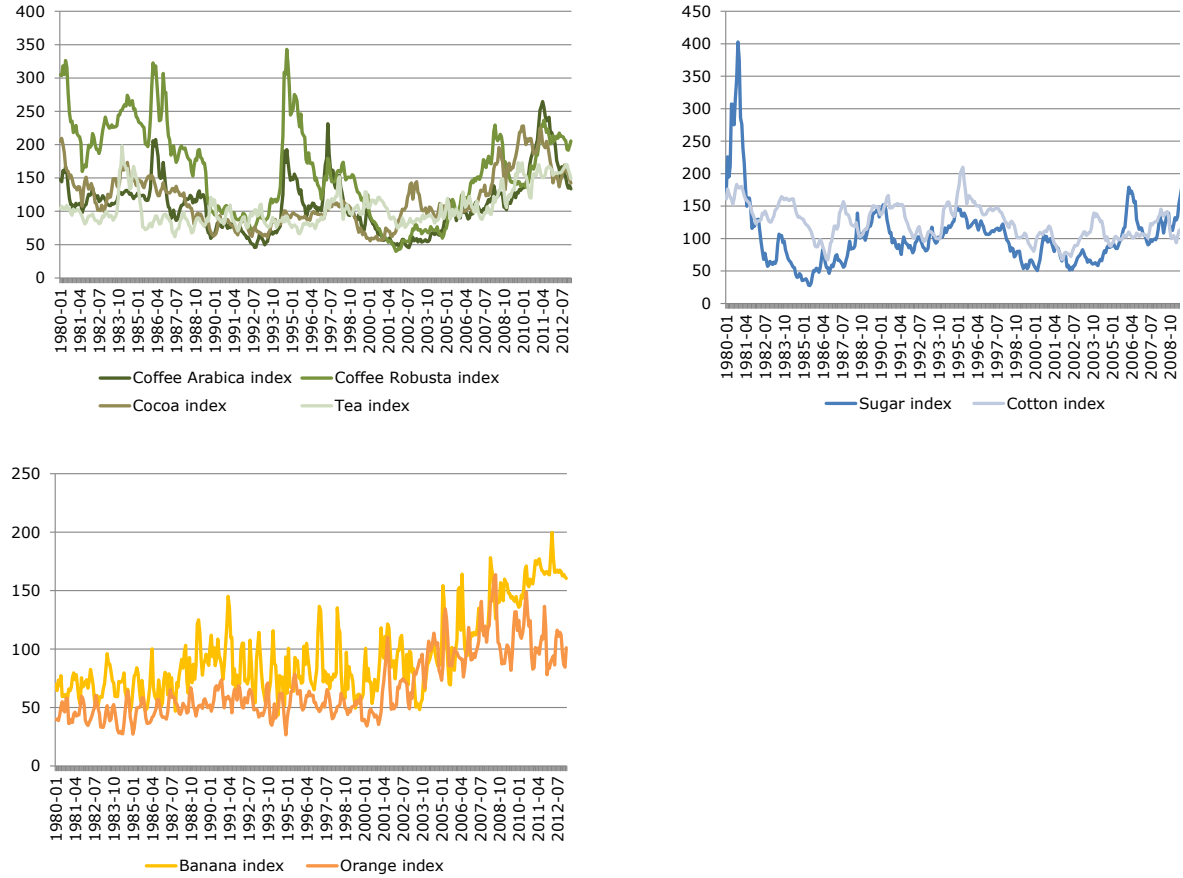


Figure 12 *Volatility of cash crop prices*
(Source: IMF 2013)

The range of possible risk management tools' to reduce price variability effects on income and food security is wide. In an overview study, Beekman and Meijerink (2010) discuss the possibilities of price and/or income stabilising instruments in the African context. Examples of private mechanisms for price stabilisation are warehouse receipt systems, farmers' cooperatives and contract farming, whereas income stabilising instruments could be insurances and credit provisions. However, all such instruments need a certain level of infrastructure and (among others financial, legal, governance) institutions in place. In many countries these are weak, reducing options to apply price and income stabilising mechanisms.

Price variability, though, is not exclusively reserved for cash crops like coffee and tea; also basic foods and other commodities are subject to harvest failures or abundance, and are affected by policy interventions that lead to price swings. When food prices increase, revenues from cash crops may act as a financial buffer to ensure food security at both household levels as national level (by enabling adequate import levels). The example below elaborates this role of cash crops in times of volatile food prices.

In a response to the food price crisis literature that followed the steep rise of global food prices in 2008 and 2011, Dimova and Gbakou (2013) challenge some of the stylized facts of the disproportionally negative implications of rising prices of food on the poor, and the subsequent policy advise to enhance domestic food availability by boosting food staple production. The authors study the welfare implications of the rapid increase of the rice price in 2007/2008 for Côte d'Ivoire. This country is among the least developed economies, a net food importing, though predominantly agricultural economy, with comparative advantage in cash crops such as cocoa, palm oil, rubber, cotton, and coffee. Rice is the country's key imported staple food.

The authors investigate the impact of the price increase of rice on consumption patterns and find that while middle income urban households are adversely affected by rising rice prices, relatively poor rural households benefit. These rural households are involved in the production of local foods and cash crops. With rapidly increasing rice prices, consumers switch to locally produced alternatives, which lead to further income redistribution from net consumers toward net producers of staples. Furthermore, based on the household survey data analysed, Dimova and Gbakou (ibid) conclude that cash crop production provides a buffer to households against skyrocketing food prices. The ability to generate income from tropical cash crops not only improves the welfare of rural households, but also helps smooth the consumption of urban households. The latter is explained by the observation that a significant part of urban households report farming as their main occupation, and others are involved in income generating agricultural marketing activities.

4.4 Conclusion

Many factors affect cash crop revenues and income, and households' food security. Among them are biophysical features of the crop such as a long maturation period and sensitivity, and pests and diseases. Farmers employ several adaptive and risk reduction strategies, for instance by diversifying cropping patterns to cope with risks of harvest failures and income decline. Others are risks linked to markets. Cash crop sectors are often concentrated with a few firms buying from a large number of smallholders. Some studies argue that farmers would benefit from more competition among processing and exporting companies and from increasing their bargaining power, for instance through establishing cooperatives. Adequate infrastructure and strong institutions (e.g. market information systems) are key in reducing transaction costs and improving market integration. Price volatility is inherent to agricultural production; price and income stabilising mechanism to cope with price variability again need adequate infrastructure and institutions in place. Where these are weak, investments are needed to enhance agricultural development that contributes to food security.

Children near a village in Zambia.
Photo by Gerdien Meijerink

5 Future scenario: Cash crops in sustainable agricultural intensification

This chapter explores the way forward for cash crop production, based on an evolving debate around sustainable intensification. It makes the following key observations:

- In Africa food demand will be increasing over the next decades while supply growth will be insufficient or even declining.
- Sustainable intensification - aiming to reconcile production and protect the environment - is a practical approach for African farmers to cope with food insecurity. Examples are micro-dosing of fertilisers, intercropping, genetic crop improvements, extension and establishing farmers' marketing associations.
- Cash crops are an essential part of sustainable intensification as income generated with cash crops provides farm households with means to save and invest in a more productive farm, and cash crops may have a catalytic effects on agricultural innovations as they add value and productivity in rural areas.

5.1 The need of paradigm change to ensure food security in Africa

The Green Revolution, which took off in the 1960s, seems to have passed by Africa, where crop production and yields have more or less stagnated. Productivity gains (for land and labour) have lagged behind global averages. They even tapered off in recent years. There is a clear gap compared to yields in other regions such as China and Southern Asia (Figure 13).

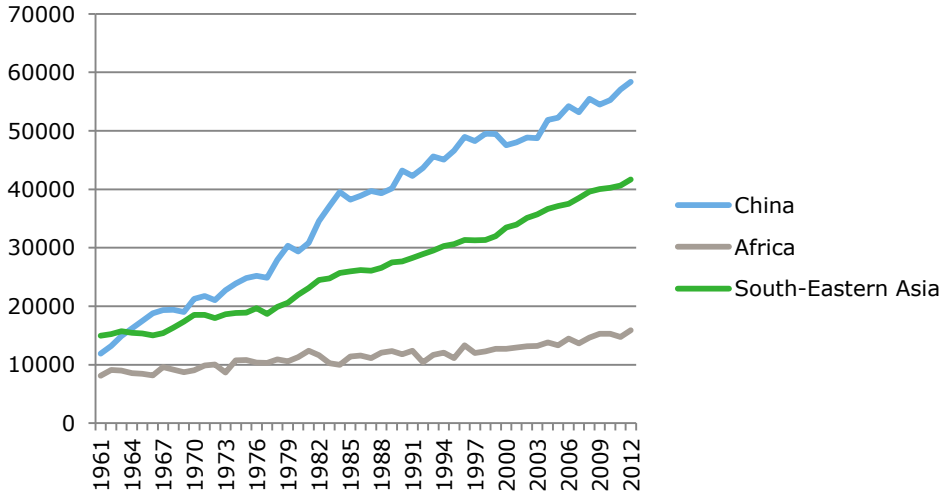


Figure 13 *Cereal yields (hg/ha) in China, Africa and South-Eastern Asia between 1961 and 2012 (FAO 2013a)*

The stagnation in crop production and yields in Africa may be explained by several reasons, e.g. decreasing availability of natural sources (decline in land quality), water scarcity (in Sub-Saharan Africa only 4% of cultivated land is irrigated), industrialisation, climate change, urbanisation, lack of capital to invest, poor management of markets and related institutions, or lack of appropriate technological knowledge. The effects are mostly felt by the rural poor.

A recent report by the Montpellier Panel (2013) gives an overview of demand- and supply-related food challenges for Sub-Saharan Africa (SSA), which are summarised in Table 3.

Table 3

Overview of demand- and supply-related food challenges for sub-Saharan Africa compiled by the Montpellier Panel.

Demand Challenges	Supply Challenges
✓ Over 200 million people, nearly 23%, of the African population, are now classed as hungry. ✓ Despite declines up to 2007, hunger levels have been rising 2% per year since then. ✓ 40% of children under the age of five in SSA are stunted due to malnutrition. ✓ SSA has a population of around 875m, with an average annual growth rate of 2.5%. ✓ The population in SSA will almost double by 2050, to close to two billion people. ✓ Between now and 2100 three out of every four people added to the planet will live in SSA. ✓ 50% of the population will live in cities by 2030. ✓ Declines in total fertility rates in SSA are occurring later and slower than in Asia and Latin America. ✓ Incomes are rising with GDP per capita in SSA expected to reach $5,600 by 2060, and diets already beginning to change.	✓ On present trends, African food production systems will only be able to meet 13% of the continent's food needs by 2050. ✓ More than 95 million ha of arable land, or 75% of the total in SSA, has degraded or highly degraded soil, and farmers lose eight million tons of soil nutrients each year, estimated to be worth $4 billion. ✓ Nearly 3.3 % of agricultural GDP in SSA is lost annually because of soil and nutrient loss. ✓ Cereal yields have increased by over 200% in Asia and Latin America but only by 90% in Africa, between 1961 and 2011 ✓ In SSA only 4% of cultivated land is irrigated. ✓ In SSA only about seven million ha of new land have been brought into production between 2005 and 2010. ✓ Between 1991 and 2009 per capita arable land fell by about 76m2 per year. ✓ Under moderate climate change with no adaptation, total agricultural production will reduce by 1.5% in 2050.

The Montpellier Panel Report, p.5

This table shows that 'demand is increasing while supply is insufficient or even declining.' (ibid, p.5). In Africa, the context has radically changed since the Green Revolution of the 1960s. Food production and population growth are growing increasingly apart, despite of Africa's enormous agricultural potential. If the current rate of crop yield growth continues in the future, African farmers would be able to meet only 13% of Africa's calorie needs in 2050. To achieve food security in the future, a transition in the African agricultural and food system appears necessary.
In this section we examine the potential contribution of commercial agriculture to agricultural change in Africa. A natural frame for this discussion is the discussion on 'sustainable intensification' which has evolved from ecological theory to a more encompassing concept on for ecological protection, resource efficiency and livelihoods in agriculture.

5.2 Sustainable intensification: a Trojan horse?

The debate on sustainable intensification for African agriculture is not without controversy. Sustainable intensification, first introduced by Pretty (1995), aims to reconcile food production and protection of the environment. Originally it means 'a way of bringing often divergent priorities together, such as addressing declines in land and agricultural productivity, pollution and food insecurity' (Tabo 2013).

However, critics challenge the concept as concealed advocacy for industrial agriculture in a developing country context.

A recent report from the Montpellier Panel, *Sustainable Intensification, a new Paradigm for African Culture* (The Montpellier Panel 2013), by a group of international experts, gives new meaning to the sustainable intensification-concept as a practical approach for African farmers to cope with food insecurity. The panel defines sustainable intensification as 'the goal of producing more food with less impact on the environment, intensifying food production while ensuring the natural resource base on which agriculture depends is sustained, and indeed improved, for future generations.' This definition involves producing more crops, better nutrition and higher rural incomes from the same set of inputs - such as land, water, credit and knowledge - while reducing environmental impacts on a sustained basis. The panel emphasized that none of the components of their new paradigm for sustainable intensification are new. New in the report is the way in which they are combined as a framework towards appropriate solutions to Africa's food and nutrition challenges.

In the Montpellier Panel-report 2013, two parts of sustainable intensification may be distinguished: intensification and sustainability. The first means increasing farm outputs (e.g. yields, crop production, income, food quality) per unit of input (e.g. land, water, labour, fertilisers, manure, pesticides, technology). The report defines the whole range of input and output factors to lay out a practical comprehensive framework to combat poverty and food insecurity. With this framework, the panel removes the connotation of intensification with increasing crop yields through heavy chemical use. But intensification must also be sustainable to address both resource scarcity and lack of access to farm inputs, e.g. by prudence in use of inputs and outputs, reducing waste, recycling, equity on markets and access to technology. Sustainable intensification encompasses a range of goals that must be achieved simultaneously. The overall framework is reproduced in the figure below:

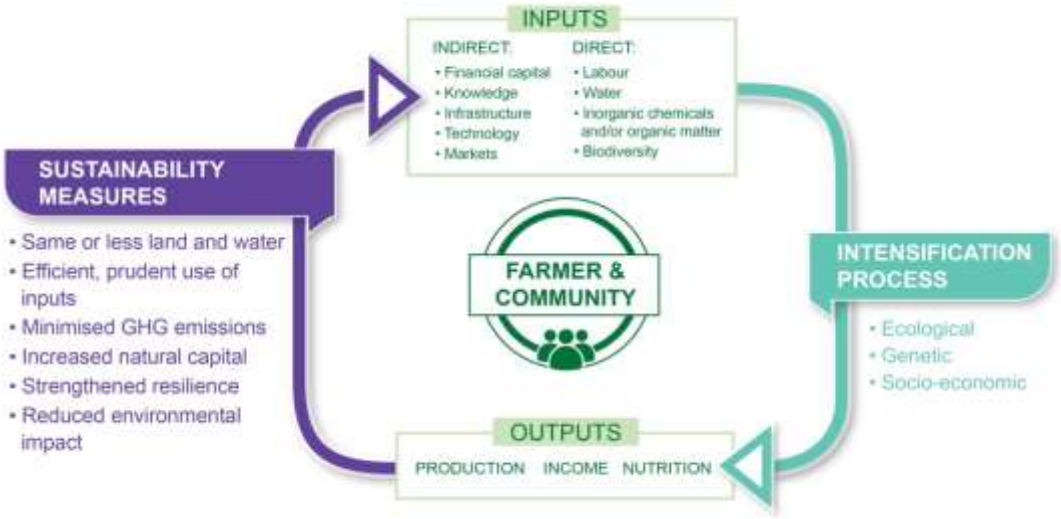


Figure 14 *Framework for sustainable intensification in Africa*
Source: The Montpellier Panel Report, 2013, p.12

In this diagram:

- *Production* is the total amount or yields of food per unit of input (resulting from methods to improve high yielding and better crop cultivation or livestock husbandry);
- *Income* is the amount of net income, generated per unit of input (resulting from access to fair and efficient output markets, greater market and price information, shifts from low value to high value crops or livestock, diversification of income generating activities, e.g. increasing non-farm income);
- *Nutrition* is the human consumption of nutrients per unit of input (resulting from new varieties of staple crops or breeds of livestock with improved nutritive value and diversification of production towards higher overall nutritive value).

In addition to increasing land productivity, increasing income for farmers 'is also essential to purchase food, education, medicine and other goods and services essential for their livelihoods and developments' (The Montpellier Panel 2013). Income increases the access to healthy and nutritious food. As described in previous chapters, income also helps households to bridge a lesser period, and provides capital for farmers to invest in their farms.

The outline of sustainable intensification is not a large theoretical mammoth, but a variety of practical and achievable activities. Many of this can be generated by farmers themselves. They consist of three parts:

1. *Ecological intensification*: the utilisation and intensification of processes to create sustainable forms of crop and livestock production (e.g. intercropping).
2. *Genetic intensification*: the concentration of beneficial genes within crop varieties and livestock breeds, by existing methods and new game-changing technologies (e.g. developing drought-tolerant maize.
3. *Socio-economic intensification*: the process of developing innovative and sustainable institutions on the farm, in the community and across regions and nations as a whole (e.g. better access to reliable markets, knowledge, grain-banks, etc.).

Sustainable intensification by this manner is achievable for African smallholder farmers, and builds on many of their traditional practices (see box below). It includes: 'micro-dosing' by which smallholder farmers use the cap of a drinks bottle to measure out small amounts of fertilisers, boosting yields significantly while keeping costs down for farmers and reducing the risk of fertiliser runoff into waterways; combining mixed field and tree crops, such as nitrogen-fixing varieties; harvesting and managing scarce water for supplementary irrigation; and promoting regeneration of diverse natural species in common lands.

Examples of sustainable intensification in action

- Microdosing of fertilisers in Niger, Mali and Burkina Faso, using the cap of a soda bottle to measure precise amounts of nutrients for each seed hole
- Planting of Faidherbia trees, a leguminous tree which curiously sheds its leaves in the wet season – providing a natural nutrient source to crops, such as maize, planted underneath and allowing for sunlight to pass through during the growing season
- Conservation Farming in Zambia as a replacement for the traditional long fallow system of the region
- New Rice for Africa (NERICA), a cross-fertilisation between Asian and African rice species, resulting in Uganda being able to reduce its rice imports by half and an increase in farmers' incomes
- Farmers' cooperative associations, such as Faso Jigi in Mali which assists smallholder producers of cereals and shallots in marketing their products and receiving higher prices because the association offers centralisation of stocks, better quality of storage facilities and accessibility.

In: New paradigm for African agriculture sees sustainable intensification in a new light (International Institute for Environment and Development (IIED), 18 April 2013

5.3 'New sustainable intensification'

Cash crops contribute to increased agriculture production and income of rural households, and therefore are important for food security and a necessary element of the new sustainable intensification. We discuss two arguments that underpin this claim.

The first argument is that livelihood, food consumption and nutrition are affected by increased cash cropping. As shown in the examples throughout this paper, cash crop farming is not without risks. But all farming is risky business. Several studies have reported the positive effect of cash crop on farmers' income, including recent contributions by Negash and Swinnen (2012) on castor, and Chege et al. (2013) on horticulture farmers. The observations are much along the example of the Sulawesi cocoa farmers in chapter 4. Most rural households are net buyers of food and use (cash) income to buy food. Cash cropping may contribute to stabilizing incomes and mitigating seasonal or temporary risk of food availability and access.

Bertelli and Macours (forthcoming), however, argue that the assumption of positive impact of cash crop on food security may not hold under particular constraints in the farming system. For example, in a process of commercialisation, the costs of hiring agricultural labour to work on weeding and harvesting could rise faster than the revenues from farming. In addition, producer prices may not follow consumer food prices on the market. The existing empirical evidence of the impacts of cash crops on nutritional outcomes and food insecurity is fairly mixed (Bertelli and Macours, forthcoming). An instructive example is that of a group of cocoa farmers in Côte d'Ivoire who faced a dramatic drop in farm returns after the government halved the administered cocoa price in less than a year (Cogneau and Jedwab 2012). Before the crisis, cocoa farmers earned 25% more than the non-cocoa farmers, yet after the price crisis incomes of both groups of households had dropped to subsistence levels. However, Cogneau and Jedwab (ibid) assess that the group of cocoa farmers did not show significantly worse results in term of child nutrition after the crisis. The slump had affected all groups equally hard in their socioeconomic conditions. A productive safety net remains a necessary service, therefore, also in regions benefiting from favourable market prospects.

The second argument is that cash crops, through the income they generate, provide farm households with the means to save and invest in a more productive farm and accelerate a process of agricultural commercialisation. The commercialisation of small-scale farmers with profit potential is an important component of a transition towards future food and security (Fan et al. 2013). Worldwide around half a billion farms are smaller than two hectares, and these farms are becoming smaller in many countries. Small farms are estimated to produce four-fifths of the developing world's food. Moreover, they are home to approximately two-thirds of the world's three billion rural residents, of whom the majority lives in absolute poverty, and constitutes half of the world's undernourished people.

Subsistence farmers are exposed to an emerging set of risks, in relation to climate, health, price, and financial drivers. These upcoming risks will aggravate the vulnerability of small-scale farms, and call for differentiated strategy of agricultural transformation. Fan et al. (2013) puts forwards that a desirable pathway for smallholders who face manageable constraints - such as limited access to capital - is to commercialise agriculture around marketed food and non-food crops. Policy changes will be required to strengthen the enabling environment, by improving markets for land, credit and agricultural input. There is some empirical evidence that productivity growth of food crops has been driven by investments in cash crop production, in particular for bioenergy crops (e.g. Batidzerai, Faaij, and Smeets 2006; van der Hilst 2012). Another positive example from bioenergy is the Biocarburant project.

Example of productivity spillover: Mali Biocarburant Foundation

Mali Biocarburant SA (MBSA) is a private company with smallholders as shareholders. The smallholders produce biofuel to supplement their income while respecting the environment. MBSA has created Koulikoro Biocarburant SA and Faso Biocarburant that locally produces and sells biofuels.

- MBSA aims to improve the value chain for biofuels by supporting small holders in all their farming activities in the following way:
- Intensify and diversify agricultural production systems (improved varieties, crop rotation, water harvesting techniques, fertility management etc.);
- Assist farmers to prepare documents and negotiate credit for agricultural inputs;
- Improve access to markets by supporting cooperatives to contract the sale of surplus cereals;
- Add value to pro poor carbon credits;
- Acquire knowledge and stimulate innovation by organizing farmers around farmer field schools for learning by doing experiments (horticulture and cereals);
- Linking farmers to research organisations, agricultural credit banks, seed and input suppliers, markets etc.

In: (Verkuijl 2012)

The third argument is that cash crops may have a catalytic effect on agricultural innovations by adding value, increasing productivity in rural regions, and developing institutions to support further growth. Achieving increased yields of food crops is often hampered by numerous constraints[9]. In addition, many small-scale farmers may have good reason for not aiming at maximising yields. Instead, they aim to optimise yields given price ratios between inputs and yields. They also take into account the risks involved in using credit in agriculture in climates with erratic rainfall or numerous pest and diseases (e.g. Koning et al. 2008), and may invest less because of these risks. The present yield gaps[10] observed in many parts of the world may be thus explained by variety of reasons. Closing yield gaps will only be achieved at a very slow rate (Lobell, Cassman, and Field 2009; Fischer, Byerlee, and Edmeades 2009).

Improving agricultural productivity plays a leading role in (economic) development in rural areas (Meijerink and Roza 2007; World Bank 2007). Raising agricultural productivity through improved technologies remains a key determinant in stimulating agricultural development. Innovation at the farm level, for example by improved agricultural practices or better organization is part of this process. Farmers have become increasingly involved in the research and extension process. Capacity building of farmers (e.g. through farmer field schools), research and technology development is required to adapt current technologies to specific circumstances of farmers, but the process is often knowledge intensive and difficult to scale up.

[9] Often mentioned constraints are lack of inputs (seeds, fertiliser, agrochemicals), lack of investment potential of farmers to buy inputs, lack of economic feasible use of inputs, lack of credits, lack of stable markets, lack of infrastructure to access input-output markets, lack of farmer organisations to facilitate transactions, or lack of technical assistance. Not all the constraints mentioned may be lifted by investment in cash crops alone.

[10] The yield gap measures the "gap" between what yield is potentially possible (given certain conditions) and what yield is actually obtained

Wider benefits for rural development may only be achieved when the linkages with the non-farm economy are strong and well developed (Meijerink and Roza 2007; Kuiper, Meijerink, and Eaton 2008). Potential linkages exist on a number of levels. Farm households interact with traders and, primarily through their involvement in supply chains, with agro-processors and firms in the distribution of food and produce. Farm households also hire seasonal farm labour, which may create off-farm labour and strengthen the linkages or urban and rural linkages. Linkages are also created via trade with other regions or even through exports. When agricultural products are a tradable product, farmers stand to gain from having wider commercialisation possibilities beyond selling the produce locally at a low price.

Vegetable cropping mixed with maize in Tanzania (Morogoro).
Photo by Helene Daviron-Benz

6 Conclusions

For decades, a specialization of low-income countries into cash crops has been associated with negative consequences such as the depletion of natural resources and the reduction of local food availability. However, this paradigm is shifting. In this study we have re-assessed how and to what extent cash crop farming contributes to food security, keeping in mind the wide variety of cash crop products and farming systems.

The main channel by which cash crops affect food security is through income: farmers or workers earn an income by growing cash crops with which they may purchase a wide variety of food. Cash crops thus improve the food access dimension of food security. Income growth also has implications for the other dimensions of food security (food availability, utilization and stability) but these effects are indirect.

We find that on a national level, food availability in terms of average energy supply is currently not compromised by cash crop farming. Less than 10% of crop farm land is used for cash crops; the remaining crop farm land is cultivated for food crops. Although the food import bills of African countries is, on average, increasing, total merchandise exports bring in more than sufficient foreign reserves, which may be used to finance the import bills.

Several factors negatively affect cash crop revenues and income levels. Cash crops cultivated as a monoculture may be more susceptible to pests and diseases. Cash crop sectors are often concentrated with a few firms buying from a large number of smallholders, and prices often fluctuate heavily under the influence of policy change and the global commodities market. Adequate infrastructure and strong institutions (e.g. market information systems) are key in reducing transaction costs and improving market integration. The food security risks associated with cash crops are manifold, yet literature shows various strategies at farm, sector or business and policy level to cope with these risks.

By contributing to increased agriculture production and income of rural households, cash crops also contribute to sustainable intensification. Cash crops may have a catalytic effect on agricultural innovations because they add value and increase productivity in rural regions, and help develop institutions to support further growth. This argument is quite recent, and did not feature in past discussions about the relationship between cash crops and food security. However, sustainable intensification will increasingly be needed in the future, when the world needs to feed 9 billion people. This will be especially a challenge in Africa, where yields are lagging behind. Cash crops may help in accelerating these yields and help Africa on a path of sustainable intensification.

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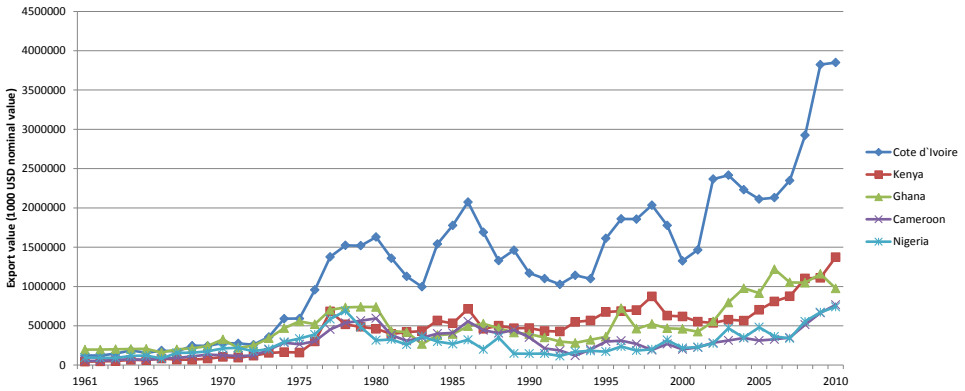
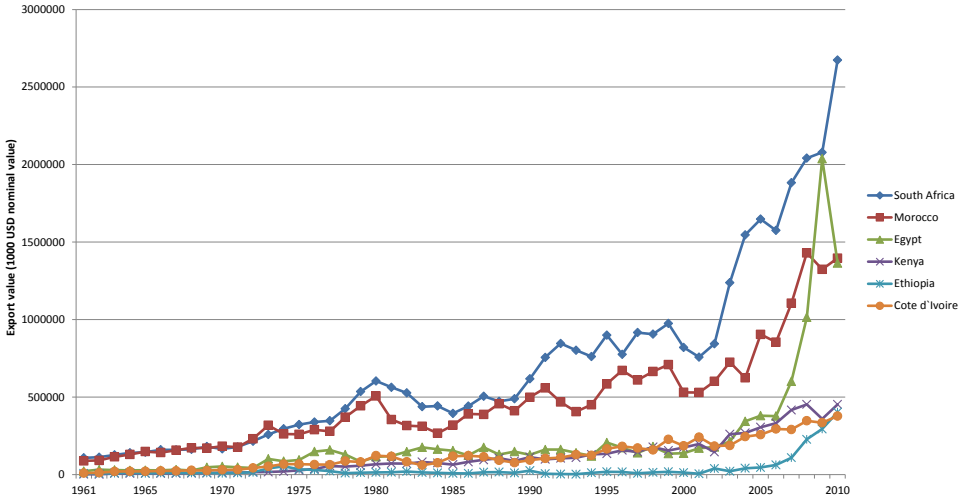
Appendix A. Export crop revenues in Africa's main export countries

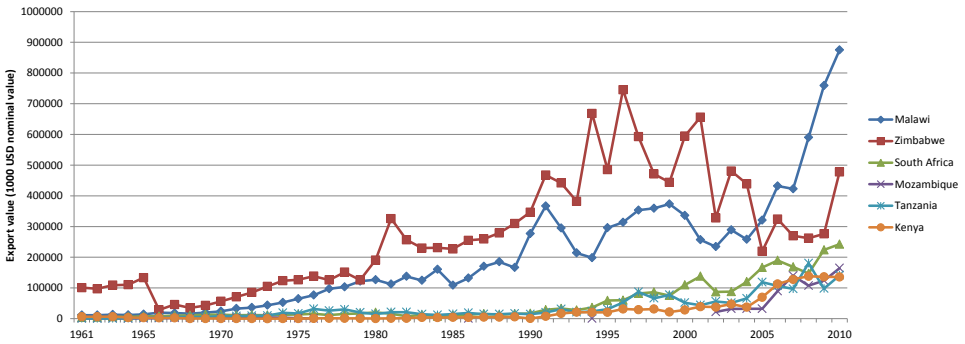
Coffee, tea, cocoa



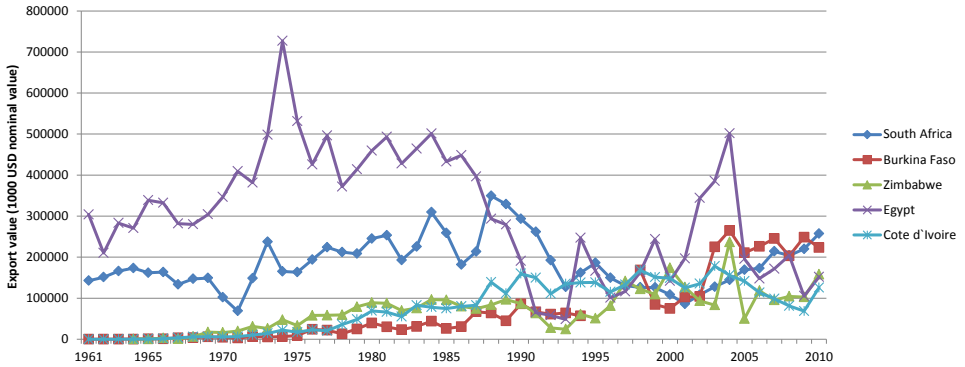
Fruit and vegetables



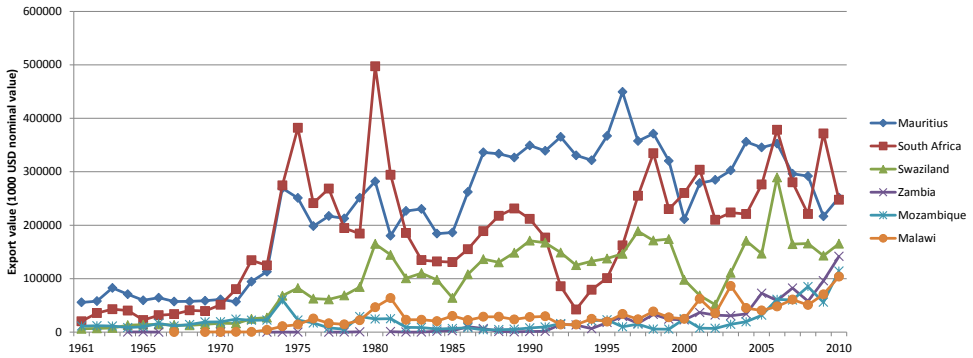
Tobacco



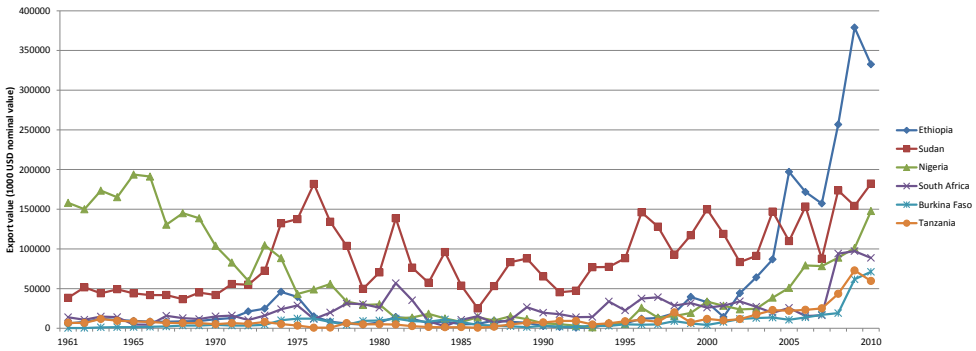
Cotton and other textile fibres



Sugar



Oilseeds



Source: Comtrade

Note: values are USD1,000 in nominal values

To explore the potential of nature to improve the quality of life

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LEI Wageningen UR carries out socio-economic research and is the strategic partner for governments and the business community in the field of sustainable economic development within the domain of food and the living environment. LEI is part of Wageningen UR (University and Research centre), forming the Social Sciences Group together with the Department of Social Sciences and Wageningen UR Centre for Development Innovation.

The mission of Wageningen UR (University & Research centre) is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine specialised research institutes of the DLO Foundation have joined forces with Wageningen University to help answer the most important questions in the domain of healthy food and living environment. With approximately 30 locations, 6,000 members of staff and 9,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the various disciplines are at the heart of the unique Wageningen Approach.