AFRICAN DRYLANDS COMMODITY ATLAS

COMMON FUND FOR COMMODITIES
UNCCD
FAO FIAT PANIS

Published by: Secretariat of the United Nations Convention to Combat Desertification and the Common Fund for Commodities

In cooperation with: Intergovernmental Group on Grains of the United Nations Food and Agriculture Organization, and International Crops Research Institute for the Semi-Arid Tropics.

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The views expressed in this publication do not necessarily reflect those of the CFC and UNCCD Secretariat

Foreword

Desertification is defined as land degradation in arid, semi-arid and dry sub-humid areas, resulting from various factors, including climatic variations and human activities. More than one third of the surface of the earth consists of drylands. In terms of population, one out of every five people of the world live in already degraded or desertification-prone drylands. These people include many of the world's poorest, most marginalized, and politically weak citizens. For instance, nearly 325 million people in the African continent live in drylands.

In a majority of countries affected by desertification, commodity production is the main source of income. Primary agricultural production involves a large majority of active populations. In general, farm productivity in many Least Developed Countries (LDCs) with dryland conditions has remained low, and occasional growth has been achieved mainly from increasing the area under cultivation. Low productivity can be attributed to inter alia, use of inappropriate exploitation methods and lack of adequate techniques and technologies, as well as unfavorable weather conditions. Insufficient and unstable income is often caused by low level of processing, high transaction costs and limited accessibility to markets.

African market

Despite a recent upward trend in commodity prices, the last decade has also witnessed a steady decline in the dollar values of traditional agricultural export crops from dryland LDCs and highlighted the risks of dependency upon a narrow export product base for foreign exchange earnings. Breaking the dependency on traditional primary unprocessed products and diversifying into higher value or added value exports will be of considerable importance for economic growth in the dryland LDCs. Value addition to produce from dryland areas through agro-based industries, particularly small scale industrial initiatives targeting specific commodities and regions, also represents an important aspect of support to livelihoods.

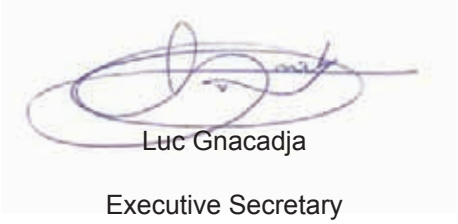
The Dryland Commodity Atlas seeks to facilitate the on-going stakeholder dialogue process and to build consensus for commodity strategies that integrate the trade potential of dryland commodities into relevant national policy areas and the National Action Programs (NAPs) to com-

bat desertification. For trade to have an impact on poverty reduction in LDCs, it needs to be an integral part of each country's development strategy, and it also needs to be integrated in the relevant commodity strategies and NAPs. This requires raising awareness and information exchange to promote active engagement on several fronts by a wide range of diverse stakeholders.

The atlas also highlights the potential for and the weakness of trade within the African continent. In this regard the lack of regional African markets and the effects thereof on farmers and herdsmen in the rural areas is clearly illustrated in the atlas. The development and creation of local and national market demand can foster specialization and diversification of new agricultural products resulting in increased income and investment capacity for rural households and can also support poverty reduction. Farmers all over the world are sensitive to market signals, and when there are sufficient incentives, they always invest effort and capital to improve land use management and the cultivation of higher value crops. Both the Common Fund for Commodities and the United Nations Convention to Combat Desertification believe that the Dryland Commodity Atlas will be a crucial and useful tool for developing the necessary awareness to support capacity building relating to trade and markets taking into account the productivity and trade in the overall national development strategies, as well as in the context of the National Action Programs to combat desertification in LDCs. We hope that the publication will enhance the understanding of national policy makers in dryland LDCs, development partners and other stakeholders on the possibilities and potential opportunities to achieve poverty reduction through environmentally sustainable and economically profitable commodity production drylands.

Amb. Ali Mchumo

Managing Director
Common Fund for Commodities



Luc Gnacadja

Executive Secretary
UNCCD

Methodology and sources

This publication was patterned on the Commodity Atlas published by the Common Fund for Commodities (CFC) and the United Nations Conference on Trade and Development in 2004, which can be accessed on the Internet at <http://www.unctad.org/Templates/webflyer.asp?docid=5221&intItemID=1397&lang=1>. The structure and style of that publication has been retained here as far as possible, and in some cases the definitions and market explanations of the full Atlas have been used.
The countries covered in this Atlas are dryland African countries designated as least developed countries by the United Nations. Dryland countries have been defined as those in which arid and semi-arid conditions prevail in more than half of their land area. These 16 countries, while differing in many respects, share a large number of common conditions as a result of their aridity and low levels of development.

The production and trade statistics in the tables were built from the Statistical Database of the United Nations Food and Agriculture Organization (FAO), available at <http://faostat.fao.org/>. As several of the countries covered by the Atlas do not appear in the FAO's "core data" series, the "old" series of TradeSTAT, ProdSTAT and Fishery Statistics were used.

Essentially, all the material used in the preparation of this volume is available to all researchers on the Internet. Only one unpublished report of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) was used (on the western African vegetable trade). While many specific websites and articles are mentioned under the rubric "Learn more" in each chapter, several broad collections should be noted (and should be familiar to agricultural trade researchers).

The Trade and Markets Division of the FAO has useful and current websites for most major commodities: <http://www.fao.org/es/esc/en/1/index.html>. The FAO biennial State of Agricultural Commodity Markets is also a useful overview. The FAO library search site <http://www4.fao.org/faobib/> is an excellent source for agricultural commodity market profiles, trade policy issues and everything else pertaining to agriculture. The World Bank collections are also available for searches on specific issues.
The United Nations Conference on Trade and Development (UNCTAD) also provides basic data on many developing country commodities at <http://www.unctad.org/Templates/StartPage.asp?intItemID=206>.

To conclude, the present study is based on the stock of technical knowledge, experience and databases accumulated by ICRISAT and other international agencies in Africa.

Acknowledgements

This Atlas was written by Samuel Cohen of Herzliya, Israel, a consultant for ICRISAT. Mr. Cohen was the Director of Trade Policy at Israel's Ministry of Agriculture and in recent years has worked in Africa as a consultant on various projects for the World Bank and the private sector.

Barry Shapiro of ICRISAT coordinated the project preparation. Dov Pasternak of ICRISAT-Niamey as well as Alphy Plakkoottam and Mark Winslow of ICRISAT provided additional support.

The original initiative and concept for the Atlas came from Douglas Pattie and Ms Satu Ravola of the United Nations Convention to Combat Desertification (UNCCD). Arnaud De Vanssay of UNCCD initially supervised the project, and was succeeded by Ndegwa Ndiang'ui, who brought the project to completion.

The CFC provided funds for the project, under the direction of Nicolaus Cromme. Charles Jama of CFC provided access to CFC projects and helpful advice on presentation.

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Bernice Keren of Kibbutz Naan in Israel provided copy-editing services, relying on her native Zimbabwean English.

A year ago, the author visited Dr. Dov Pasternak of ICRISAT at a medical clinic in Niamey, where Dov was being treated for a relapse of malaria. Common sense dictated that a few days of rest were in order, but Dov insisted on returning to work the next day. "There's a whole continent out there", he said. This volume is written with the hope that all of us who work for Africa will feel that same sense of urgency and opportunity.

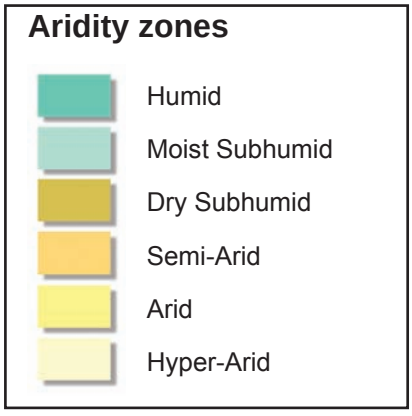
Contents

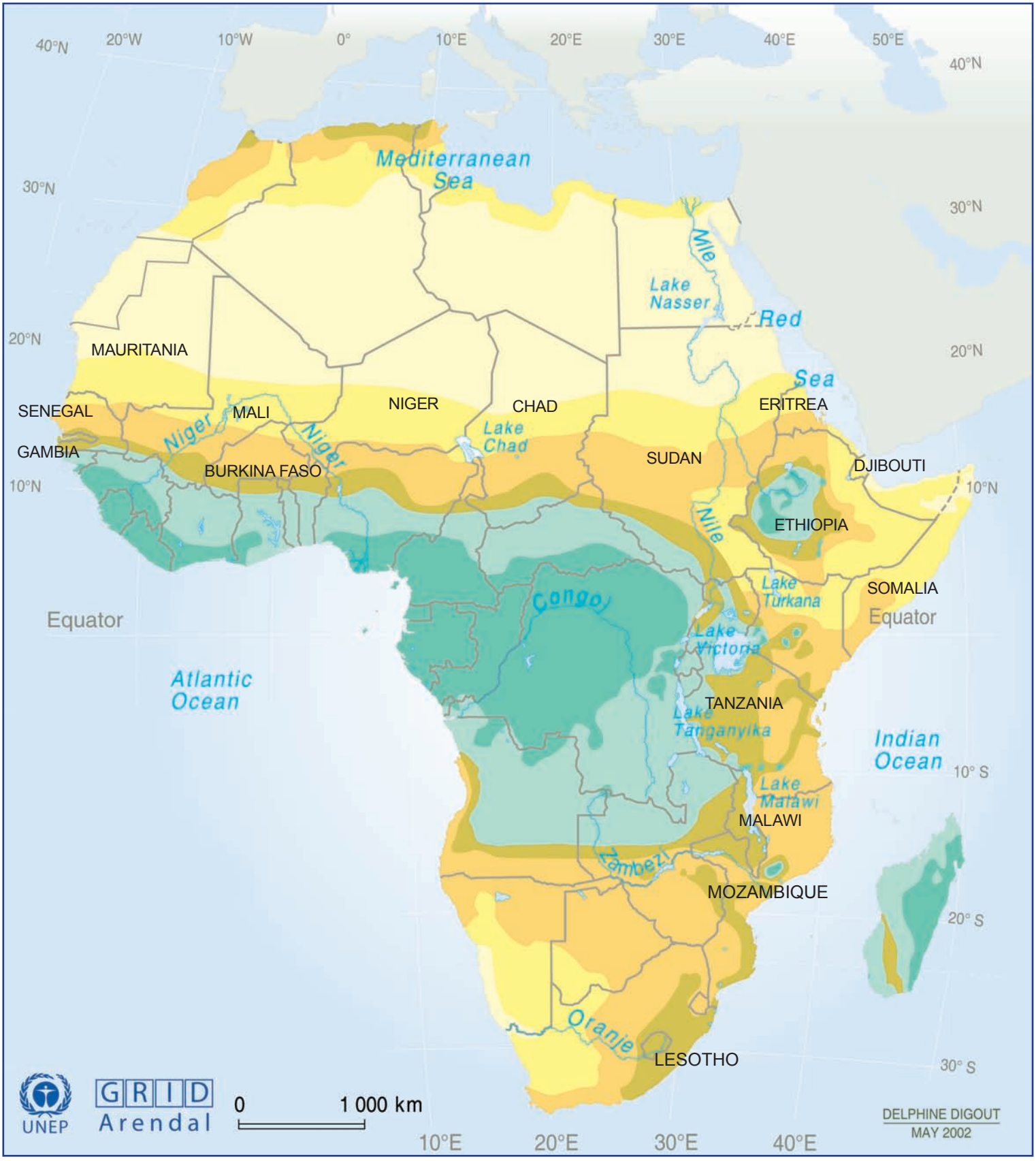
African drylands

African dryland least developed countries

African least developed countries (LDCs) with the majority of their agricultural lands in semi-arid regions:

Burkina Faso	**Mali**
Chad	**Mauritania**
Djibouti	**Mozambique**
Eritrea	**Niger**
Ethiopia	**Senegal**
Gambia	**Somalia**
Lesotho	**Sudan**
Malawi	**Tanzania, United Republic of**





Source: World Meteorological Organization (WMO), United Nations Environment Programme (UNEP), Climate Change 2001: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

Preferential trade regimes

Generalized system of preferences (GSP) for developing countries

Although international trade is based on the principle of non-discrimination for all partners, the World Trade Organization (WTO) and its predecessor have long recognized the importance of granting unilateral trade preferences to developing countries, and to LDCs in particular. Fifteen industrial country markets maintain a generalized system of preferences (GSP), which allows for duty reductions or exemptions on imports from developing countries. These schemes vary from country to country, particularly in terms of product coverage. Products that are produced in the importing country and are sensitive to import competition from developing countries are often omitted or restricted under GSP schemes. The common feature of such schemes is their unilateral nature: wealthier countries grant trade concessions to developing countries without reciprocity.

Spurred by the United Nations Millennium Development Goals (MDGs) and the political pressures of the Aid for Trade movement, the four largest developed country markets have reinforced their unilateral preferential regimes since 2000. The European Union (EU) and the United States of America have strengthened unilateral preferences in favour of LDCs and of African countries. Japan and Canada have enacted large extensions of their existing GSP preference schemes. These agreements give deeper and broader concessions to countries in greatest need of trade opportunities. There is a proposal on the table at the WTO Doha Round of trade negotiations that would grant duty-free, quota-free (DFQF) treatment for all LDC exports, but the future of the Doha Round is uncertain.

African regional agreements

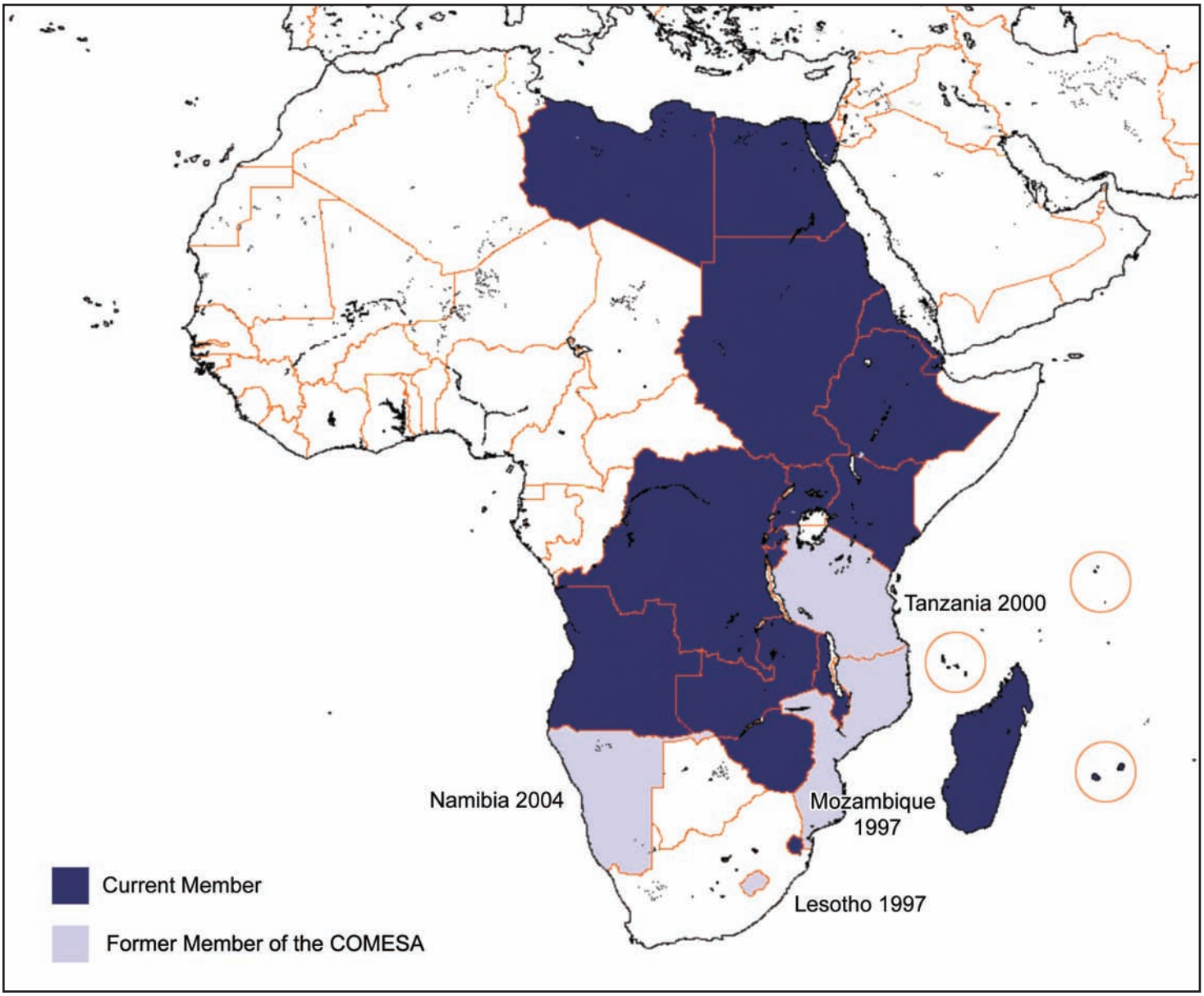
WTO rules also allow developing countries to use trade concessions to encourage trade among themselves. African countries have made extensive use of this system to create free trade zones, common markets and preferential trade blocs among themselves. Five major economic groups operate in Africa, and all African states are members of a regional group. Several states maintain membership in more than one group. While economic integration is a stated goal of all groupings, the level of formal and de facto integration, particularly in trade, varies widely throughout the continent and is seen as an area in need of further development.

The largest trade grouping is the Common Market for Eastern and Southern Africa (COMESA), with twenty member states: Angola, Burundi, Comoros, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libyan Arab Jamahiriya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia and Zimbabwe. COMESA is a preferential trading area and 13 of its members are united in a functioning free trade area.

The Economic Community of West African States (ECOWAS) has 15 members: Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. ECOWAS is structured along the same lines as the EU and has as its goal the creation of a regional common market.

The Southern African Development Community (SADC) furthers socio-economic cooperation and integration as well as political and security cooperation among 15 southern African countries: Angola, Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe. Member states of SADC also participate in other regional economic cooperation schemes and regional political and security cooperation schemes that may sometimes compete with SADC's aims. For example, Botswana, Lesotho, Namibia, South Africa and Swaziland have their own South African

COMESA MAP (source: Wikiipedia)



Customs Union (SACU). Zambia is a member of COMESA, and the United Republic of Tanzania is a member of the East African Community (EAC).

The Economic and Monetary Community of Central Africa (CEMAC) is composed of Cameroon, Central African Republic, Chad, Republic of the Congo, Equatorial Guinea and Gabon. The members of CEMAC are also members of the Economic Community of Central African States (ECCAS), which also includes Angola, Burundi, Rwanda and Sao Tome and Principe. The two organizations are expected to merge.

The EAC is an intergovernmental organization with five member countries: Burundi, Kenya, Rwanda, Uganda and United Republic of Tanzania. The EAC countries established a Customs Union in 2005 and are working towards the establishment of a common market by 2010. A monetary union and ultimately a political federation of East African States are mandated for the future.

Everything But Arms for LDCs

For African LDCs, the most significant “outside Africa” trade agreement is the Everything But Arms (EBA) initiative of the EU, enacted in 2001 as an extension of the GSP. This programme

provides for duty-free, quota-free entry for all LDCs, and eventually for all products. The only exceptions still in force are quota restrictions on duty-free rice and sugar until 2009. In the sugar sector this also affects value-added food products that include sugar.

The EBA initiative is now the most liberal unilateral trade regime available to African countries. Yet some African LDCs complain that its rules of origin and other administrative requirements diminish its usefulness for many products, particularly textiles and processed agricultural products. For all of the countries covered by this Atlas, the EBA is the effective trade regime covering their exports to the EU.

African Growth and Opportunities Act (AGOA) for African exports to the United States of America

In the United States, the African Growth and Opportunities Act (AGOA) grants duty exemptions to 37 sub-Saharan African countries on a variety of agricultural products, chemicals, steel, energy products, apparel and industrial goods as an extension of the GSP programme. In practice, the AGOA and the United States GSP are not substantially utilized by most African countries, and even less so by African LDCs. The primary effect of AGOA trade provisions is to encourage duty-free imports of energy products, such as petroleum and natural gas, from African suppliers.

EU-Africa Economic Partnership Agreements (EPAs)

For decades trade agreements between the EU and African countries reflected a longstanding special trading status between European countries and their former colonies in Africa, the Caribbean and the Pacific (ACP countries).

With the establishment of the WTO in 1995, it became clear that the EU's unilateral trade concessions to the ACP, maintained since the Lomé Convention of 1974 and its successors, would need to be revised in order to comply with the WTO principles that free trade agreements must be reciprocal and must cover substantially all trade. Since the Cotonou Agreement of 2000, the EU has sought to establish Economic Partnership Agreements (EPAs) with all ACP countries meeting WTO requirements. WTO rules allow asymmetrical schedules for trade agreements. Thus, the intention was that the EU would quickly become an open market for ACP exports, while ACP countries would have a longer period of years to adjust to duty-free imports from the EU.

These EPA negotiations were difficult from the outset and became acrimonious in 2007 when the EU set the end of that year as a final deadline for negotiating the EPAs. As of 1 January 2008, specific ACP tariffs were abandoned. One of the thorniest problems was the difference in interests between African LDCs and non-LDCs. The LDCs, which already enjoyed essentially free entry into the EU under the EBA, had little incentive in the trade sector to enter into EPAs. Yet several non-LDCs were threatened with increased duty rates on important agricultural and manufactured exports to the EU. At the same time, African LDC and non-LDC states were bound together by their own intraregional trade agreements. These agreements provided, as a rule, for a common external customs tariff, which called for a common stand among member states.

This divergence of interests among African states, and the harsh criticism faced by the EU from a coalition of Aid for Trade groups, led to uncertainty at the end of 2007 regarding the future of ACP-EU relations and a situation that has not been entirely resolved in early 2008. While the Caribbean countries have negotiated full EPAs, no African state has signed such an agreement. As a stopgap measure to avoid immediate trade disruption, 19 African countries signed "Interim EPAs". The means and the timeframe for resolution of unresolved issues in such agreements remain unclear. Of the countries in this Atlas, Lesotho, Mozambique and the United Republic of Tanzania are covered by the Interim EPA between the EU and the SADC group. However, since the three countries are also LDCs, they may choose to export any or all products under the EBA.

Erosion of preferences

The irony of trade preferences is that as overall support is reduced and overall import barriers come down or preferences are widely granted, the formal barriers to trade – duties, quotas, licensing – will have an increasingly minor role to play in trade prevention. In the EU, the EPAs will erode the EBA preferences for LDCs and, to a lesser and slower degree, Common Agricultural Policy (CAP) reform will erode preferences for all ACP countries. Thus, trade preferences, while important for maintaining existing trade, are not for the most part major trade boosters. Rules

of origin can radically decrease the usability of preferences in the case of processed products; food safety and other standards issues will continue to be problematic. And in the marketplace, commercial competition will always be a threat to suppliers who do not constantly maintain their advantage.

Citrus fruits

Fresh and processed citrus fruit is the leading fruit sector in international trade. The largest producers are the United States of America, Brazil, Spain and China. Several African countries are also major producers and exporters: Morocco, Tunisia, Egypt and South Africa.

Among the African dryland LDCs in this survey, ten report some citrus production. Most production is consumed fresh in local markets, but significant fresh exports are reported from Sudan, Ethiopia, the United Republic of Tanzania and Mozambique.

Production quantity | 2003- 2005 Av. | 1000 tons

	Burkina Faso	Djibouti	Ethiopia	Malawi	Mali	Mozambique	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Citrus fruit, nec			2	2						40	44
Grapefruit (inc. pomelos)	0					14		6	70		90
Lemons and limes	0	2	4		5	3		8	64	0	87
Oranges	1	0	15		14	13	31	9	19	1	102
Tangerines, mandarins, clementines.	0	0	9			0			1		10
Total citrus	1	2	30	2	19	30	31	23	154	41	333

Source: FAO ProdSTAT Database

All citrus trees are of the single genus *Citrus* and remain largely inter-breedable; thus, there is only one "super species" which includes grapefruits, lemons, limes and oranges. Citrus fruits are a healthy and nutritious food, high in vitamin C, and are popular sweet treats in almost all countries. As consumption levels in LDCs are low, there is considerable potential for increased consumption in these producing countries and for fresh trade among their neighbours.

Citrus processing

In wealthier countries fresh consumption is declining, while production and consumption of citrus juice, especially orange juice, is increasing. Thus, the market for processed citrus juice from the southern hemisphere is growing.

Frozen juice concentrate has the advantage of lower transport costs, as its volume is only one sixth of that of full-strength juice. Brazil dominates this market demand by shipping more than half of world trade in frozen orange juice concentrate to North America and Europe. Other developing countries are increasing exports of full-strength juice – a higher-quality product sold at higher prices. There is some interest in organic citrus juice, but market volume remains very small compared with the overall juice market.

Citrus peel yields by-products, such as essential oils for the cosmetic and fragrance industries and the solvent industry, and peels and pulp can be used for poultry and animal feed.

Citrus processing for juice in the regional African market may be a route to adding value to agricultural produce.

Trade policy

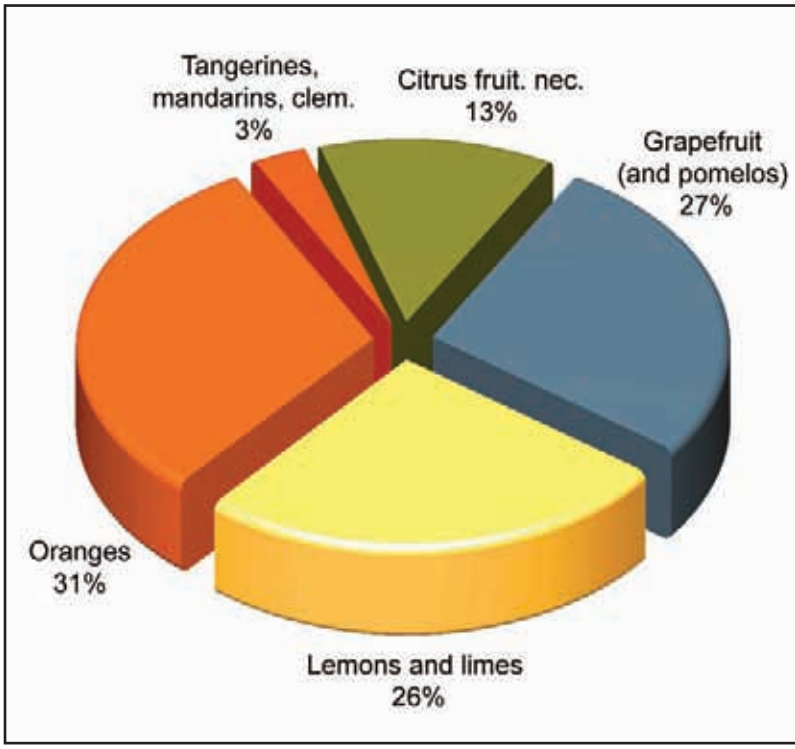
World trade in fresh citrus is between 5 and 7 million tons per year, about 10% of production. The EU and the United States are both major citrus producers and protect their own growers with import duties and a variety of domestic and export supports. However, since the 1995 WTO Uruguay Round, these import restrictions have been eased, and the reform of the EU fruit and vegetable sector will eliminate EU export subsidies on citrus in 2008. Under the EU's EBA agreement, and the United States AGOA, African LDCs are exempt from import duties in both major markets, and these markets are open to citrus products that comply with phytosanitary requirements and to companies that establish commercial links.

Price instability

As demand for citrus in the short run is relatively stable, citrus prices on local and world markets are determined by short-term fluctuations in supply. Supply from major citrus-producing areas in Florida, Spain and Brazil is highly sensitive to climatic conditions, pests and diseases, which can radically affect yields – and consequently supply and prices – from month to month and from year to year. Frost in Florida affects consumer prices in London and producer prices in Brazil. These short-term variations have far less effect on long-term supply, since a latency period of three to five years creates relatively high investment costs for citrus, thereby discouraging producers from neglecting groves.

Price risks for processed citrus can be hedged by trading orange juice futures on the New York Board of Trade, but no comparable contracts are available for fresh fruit.

African LCD Dryland Citrus Production



Niger – beginnings:

Irrigated citrus groves on the banks of the river in Niger bear very little resemblance to groves in Spain or Florida; yet a private entrepreneur has learned that commercial citrus can be a profitable business for the domestic market in Niger. Salifou Mahaman, a trained agronomist, uses 2 hp pumps to bring water from the Niger River to irrigate 10 hectares on his sloped land near the river. While commercial growers in other countries plant varieties that produce all their fruit in a few weeks, this grower sees the advantages of localized varieties that yield fruit for the market all year round. His labour costs for picking are higher, but he maintains year-round stable prices on the market.

Fruit plantation in Niger

Learn more
UNCTAD:
http://www.unctad.org/infocomm/anglais/orange/market.htm

FAO:
http://www.fao.org/es/ESC/en/20953/20990/highlight_28187en.html

United States Department of Agriculture (USDA):
http://www.fas.usda.gov/htp/fruit_veg.asp

Other fruits (non-citrus)

Fruit trees are cultivated in many drylands in areas with low rainfall, in oasis centres and often under irrigation. Mangoes (some 30 species of *Mangifera*) and guavas (over 100 species of *P. guajava*) are high-value commodities in international markets and their deep root system allows them to be grown with little rainfall. Yet the substantial potential for regional trade has not been realized.

World demand for pineapples (*Ananas comosus*) and papaya (*Carica papaya*) is large and growing, and Africa's share in the supply, though small today, has potential for growth.

Bananas and plantains (both cultivars of *Musa*) are major staple foods in many African countries, and provide both calories for subsistence and cash from sales in local and regional markets. These crops are grown in more humid areas of dryland countries or under irrigation. African producers in Côte d'Ivoire and Cameroon have developed large export markets in Europe for bananas. Sudan also reports considerable banana shipments, but the domestic and regional African market provides the best potential for other producers.

Production quantity | 2003-2005 av. | 1000 tons

	Burkina Faso	Chad	Djibouti	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep.. of	African LDC drylands
Avocados				82												82
Bananas				189			139	92		92		27	37	76	146	799
Cashew apples								123								
Dates		17	0						22		8		12	331		389
Fruit, nec.	68	63	1	160	4	13		1	3	134	43	23	129	407	256	1,304
Grapes				8											14	21
Guavas, mangoes, mangosteens	8	32	0	173	1		46	59		25		71	1	211	244	870
Papayas				246				29		41						316
Pears			0												0	0
Pineapples										14				5	78	97
Plantains							249								585	835
Total fruits	76	112	2	858	4	13	434	304	25	305	51	120	179	1,030	1,323	4,836

Source: FAO ProdSTAT Database

Desertification

Fruit-tree plantations can provide vital defence against desertification. Their foliage protects the ground from the impact of heavy rains and wind. Sloping areas are well suited to fruit trees, reducing erosion and adding organic matter. Bunding across the slope enables water harvesting to reduce drought risk, and is made even more effective by the deep, perennial root system of the trees. Vegetables and other crops can be cultivated between tree rows to generate income for the initial years until the trees bear fruit.

Moreover, high-value fruit crops provide cash income for farmers so that they can afford to take additional steps such as terracing, levelling and mulching, which preserve the land. Many fruits mature in the dry season, when other sources of income are scarce. This increases year-round employment and market value.

Exports

The global export market in tropical fruit has reached US $3 billion. Mangoes are today the leading fresh export from the African LDC drylands. Burkina Faso, Mali, Sudan and the United Republic of Tanzania each exports several thousand tons each year. Niger and Tanzania export dates (*Phoenix dactylifera*). Senegal, in some years, reports avocado (*Persea americana*) exports. Tanzania has growing processing operations and now exports over a thousand tons of dried apricots (*Prunus armeniaca*) and other dried fruits annually. Overall, there is considerable market potential for growth of exports within Africa and worldwide, if production quantities increase and quality standards and logistics improve.

Trade policy

Almost all fresh tropical fruits from Africa are accorded preferential duty-free entry into northern hemisphere markets. However, tariffs are often imposed on processed fruits and juices.

The exception is the banana trade. Bananas are by far the most valuable commodity in the international fruit trade. Major banana producer/exporter countries have long been dependent on banana income for export earnings. Since the first reform of the EU banana trade regime in 1993 and the establishment of the WTO in 1995, banana trade regulation in the EU has been mired in controversy. Should import regulations preserve trade relationships developed over decades or should markets be opened up to all exporters on an equal basis? The WTO has considered this question in several cases, and even the most recent EU banana import policy from January 2006, a tariff-only regime of €176 per ton, is still challenged at the WTO. Although ACP exporters are entitled to a duty-free, no-quota system under EPAs, and LDCs are exempt from tariffs and quotas under the EBA initiative, EU market opportunities for newcomers to the trade are severely limited. For most African LDC producers, the potential of local and regional markets for bananas in Africa and Asia appears to be more attractive.

Perhaps the biggest hindrance to the tropical fresh fruit trade is the lack of harmonized technical standards and treatment for fruit exports. This situation has been exacerbated with the phasing-out of methyl bromide.

Logistics

Trade in perishable fruit products, at the regional or international level, requires considerable investment and organization of logistics. In most cases, storage and transport of fresh tropical fruit requires post-harvest treatment such as cleaning, selection, packing, cold storage and refrigerated transport. Yet developing countries that have overcome these challenges can earn

profits through sales in developed country markets. The growth of wholesale and retail chains with international distribution capabilities has been a major factor in this process. However, the growing international market for fruits from tropical countries is highly competitive, and long-term success requires dedication and expert implementation of production practices.

Processing

Traditionally, much international trade in pineapples, guavas and mangoes has involved canned fruit, and dates have always been processed through drying. While these fruits are usually grown as staple crops for local consumption by small farmholders, commercial processing operations require large-scale production through cooperatives, contract farming or large plantations to be economic. The technology required for canning fruits is well known and not particularly complex. The crucial issue for success is often production and collection of sufficient quantities of high-quality raw material for processing. Many developing countries have successfully followed the path of establishing fruit-processing operations as an early step in industrialization.

Organic bananas

Although the organic market today accounts for less than 3% of the fruit and vegetable trade, many believe its potential will grow. New suppliers can compete in this market if they maintain high quality from the outset.

In Ethiopia and Sudan the CFC is funding a pilot programme for organic banana production and export marketing. The project will strengthen the capacity of players in the supply chain to provide state-of-the-art services and information for production, post-harvest storage and marketing.

Two pilot areas of 160 hectares will be established to grow and export certified organic bananas. The programme involves training of small and medium-size growers and their field labourers, private-sector suppliers, transport agents, field extension workers, public-sector post-harvest specialists, and public and university scientists.

Pomme du Sahel

The jujube tree, *Ziziphus mauritiana*, is grown in many parts of Africa and Asia and produces a sweet fruit about the size of a grape. A decade ago, researchers at ICRISAT, the World Agroforestry Centre (ICRAF) and the Burkina Faso National Research Organization developed a new variety by grafting Indian jujube onto a local African variety, known as *tomono* in Bambara. The new "improved jujube", known as "pomme du Sahel", is almost the size of an apple and very similar in taste. It grows well in hot Sahel conditions with light sandy soils and requires little water. New plantations are established as orchards or existing hedges are developed. First fruit is seen at six months and full production is reached in two years. Farmers who are able to provide water for irrigation and fertilizer achieve higher yields, but even rain-fed production can provide marketable crops.

The new fruit has become popular with consumers. Several thousand tons have been marketed annually in Burkina Faso alone since 2003, and the tree has been introduced successfully in Mali, Senegal and throughout the region

Ziziphus mauritiana
(Pomme du Sahel)
local variety

Ziziphus mauritiana
improved variety

Learn more

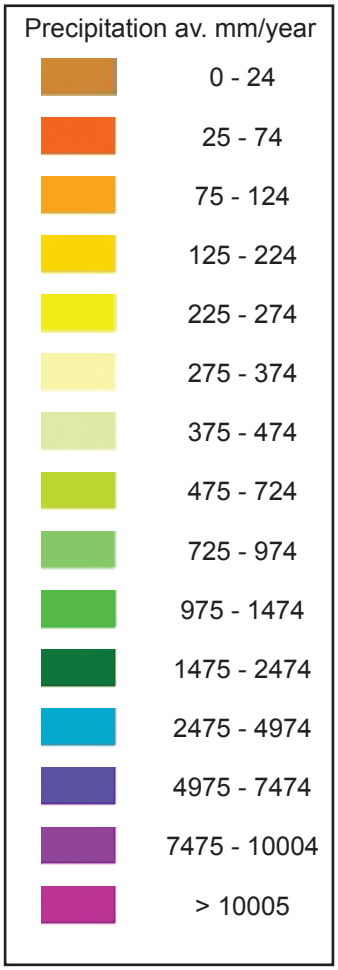
UNCTAD:
http://www.unctad.org/en/docs/ditccom20041ch21_en.pdf

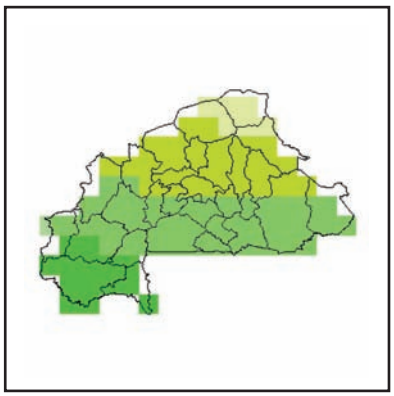
FAO:
http://www.fao.org/docrep/006/Y4343E/y4343e04.htm#bm04.1

Production in humid areas of dryland countries

In many African LDC drylands, some areas of the country are not in fact drylands, and these humid and sub-humid tropical areas have average precipitation of 1,000 mm per year or more. In these areas, production of tropical fruit, sugar crops, fishery products, rice, coffee, cocoa, tobacco, forestry products, citrus and other crops provides substantial agricultural income to the local population and the national economy. Future sustainable development in many dryland countries will require more efficient and commercial utilization of these non-desert areas to provide better income and to relieve human and agricultural pressure on marginal desert areas.

Precipitation maps of all of the 16 African LDC Drylands appear below. All but 5 - Djibouti, Eritrea, Mauritania, Niger, Somalia – show some green areas with annual precipitation above 975 mm.

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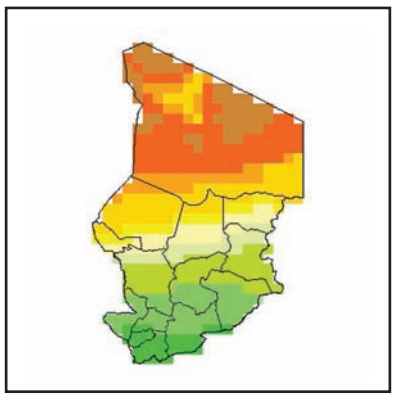
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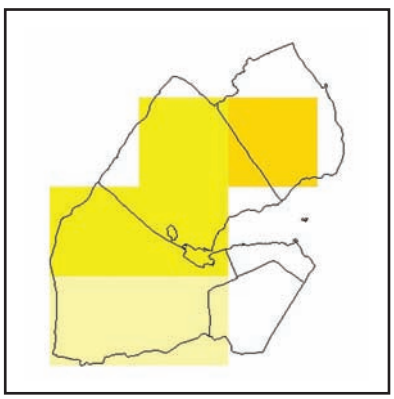
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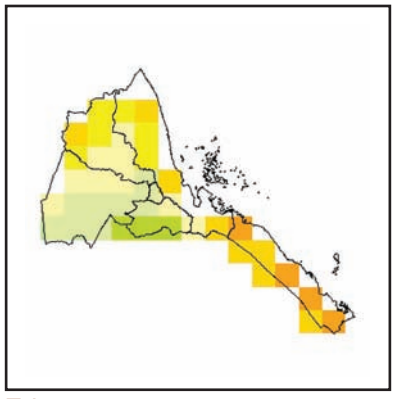
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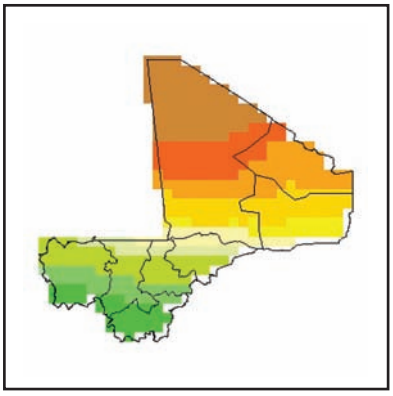

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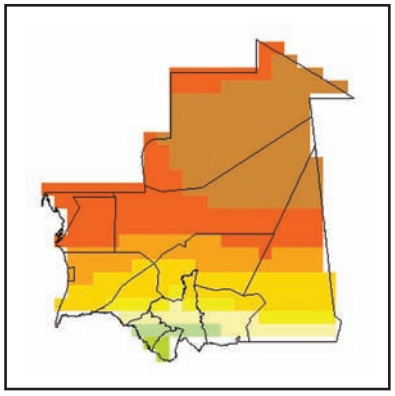

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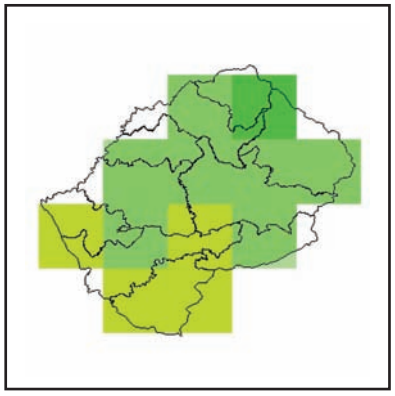
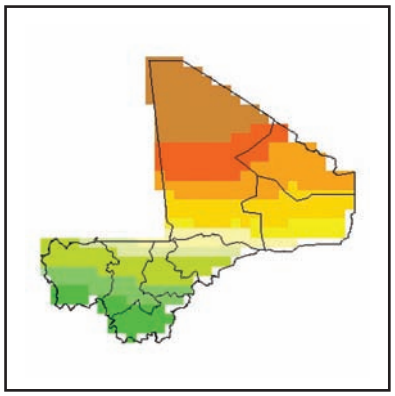


Lesotho

Malawi



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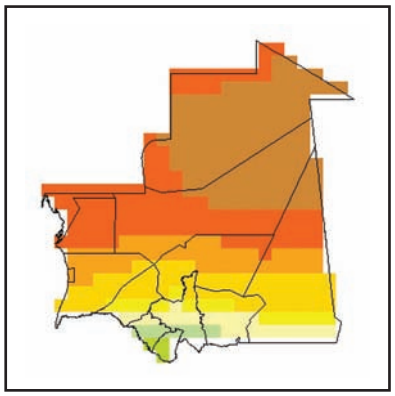

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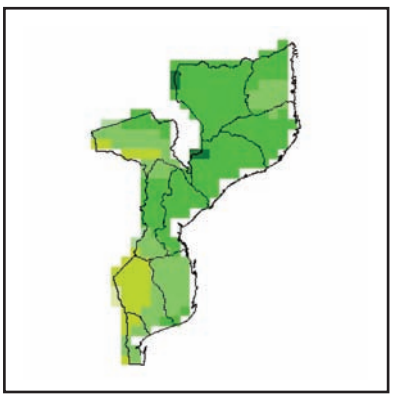

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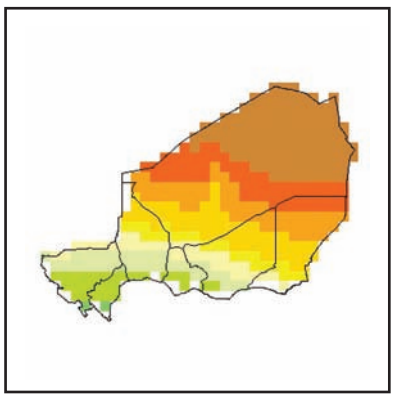

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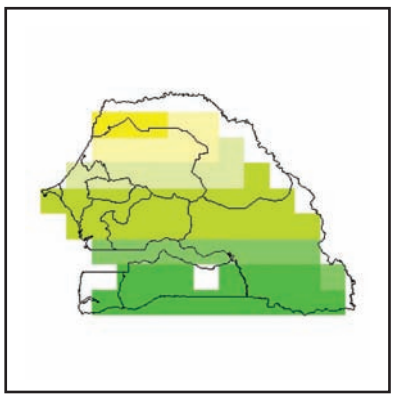

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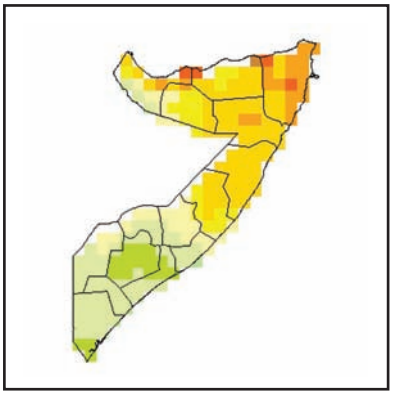
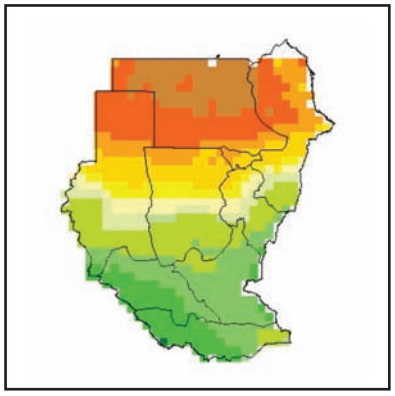
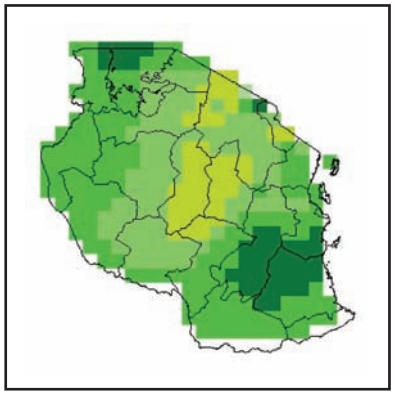


Somalia



Sudan



United Republic of Tanzania

Coffee

Coffee is produced in over 60 developing countries and accounts for the bulk of export earnings in several African countries: Burundi (75-80%), Ethiopia (65-70%), Rwanda (60-65%) and Uganda (60-65%).

Two coffee species are commercially significant. Robusta coffee (*Coffea canephora*) accounts for a third of world production and is suited to the semi-humid areas of dryland countries. It requires an average temperature of 24° C to 26° C and 1,000 mm to 2,000 mm of rainfall. Arabica coffee (*Coffea arabica*), which accounts for two thirds of world coffee production, is an upland species requiring an average temperature of 18° C to 25°C and annual rainfall of 1,500 mm to 2,000 mm. Both species are indigenous to Africa.

Production quantity | 1000 tons | Average 2003-2005					
Coffee	Ethiopia	Malawi	Mozambique	Tanzania, United Rep. of	African LDC drylands
	183	2	1	49	235

Export quantity |1000 tons| Average 2003-2005					
Coffee	148	2	0	44	195

Source: FAO ProdSTAT Database

International trade

Since the late 1950s the international market has been plagued by several periods of excess supply and resulting price falls for producers. Since 1962 six periodic International Coffee Agreements under United Nations auspices have attempted to stabilize world markets through the use of reporting systems, export quotas and quality standards and the promotion of consumption. These agreements, the most recent of which dates from 2001, are administered by the International Coffee Organization (ICO) based in London.

The most recent coffee crisis began in 2000 as production increased twofold from 1997 to 2002 in Brazil (owing to new plantations) and Viet Nam, the second and third largest coffee exporters after Colombia. The large surplus in the international coffee market depressed export prices to as low as $0.45 per pound, and only in 2007 did prices rover to over $1.00 per pound.

World demand

With worldwide exports totalling $10 billion to $12 billion a year, coffee is the second largest commodity in world trade, after oil. Europe is the largest market for coffee, absorbing 40% of world demand, followed by the United States (25%) and Japan (10%). A variety of niche markets are emerging alongside traditional coffee markets. Quality is influenced not only by the species (for instance Arabica or Robusta) and variety (such as Blue Mountain or Bourbon) but also by the roasting method. For example, washed Arabica tends to be more popular than unwashed Arabica. Changing consumer preferences are complemented by new sectors

(such as speciality and gourmet coffees and fair-trade and organic sectors). In these new sectors, product quality and differentiation are transforming consumer habits in an increasing number of countries.

Processing and marketing industry structure

In the past decade, the proportion of value added to coffee in the industrialized world has increased significantly. The share of producer country earnings in the retail market had decreased drastically by the early 2000s to between 6% and 8% of the value of a packet sold in a supermarket, and to even less in the booming coffee shop market. The coffee industry is quite concentrated, with half a dozen growing and buying groups controlling most world trade, and half a dozen roasting groups packaging for the retail trade and dominating that sector.

Sustainable agriculture

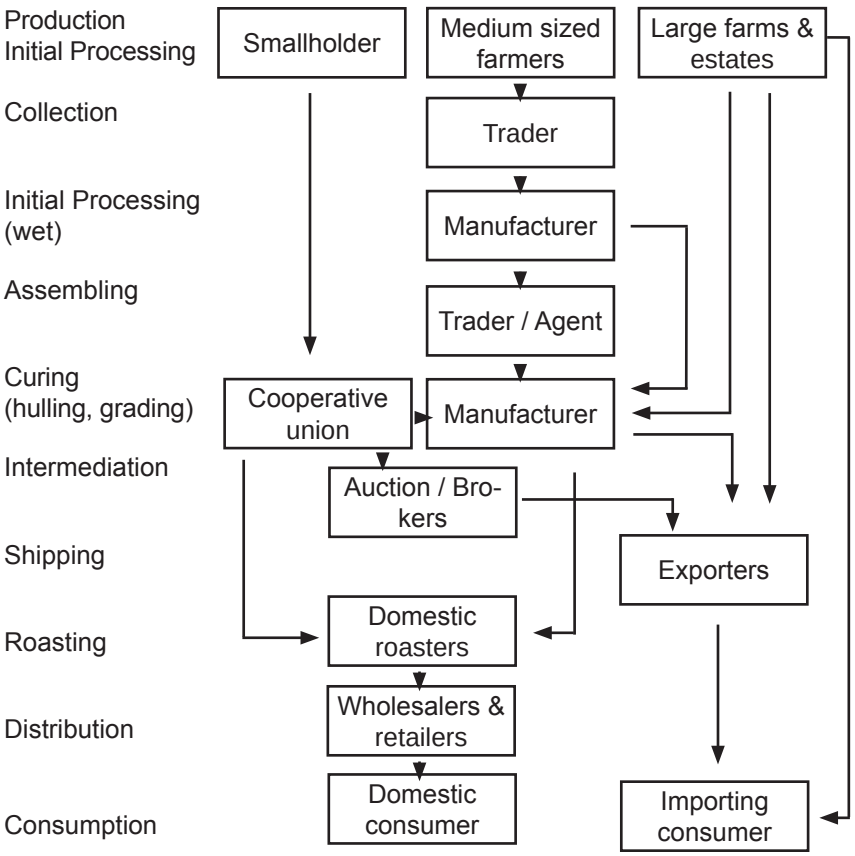
Under the United Nations Rio Principles, coffee is an evergreen broad-leaved perennial shrub or tree making a substantial positive contribution to carbon sequestration, which also stabilizes soils and in many cases protects original biodiversity in growing areas. This represents a huge positive contribution to the environment, and the problem of pollution caused by wet processing is relatively localized. Socially, coffee generates substantial rural employment, sustains many communities and is a source of social stability under normal economic conditions. Economically, coffee represents a vital source of income to some 25 million farmers worldwide. A significant trend arising from recognition of the coffee price crisis has been the development of a variety of initiatives designed to encourage sustainability in coffee production. These range from the equitable trading schemes of the Fairtrade Labelling Organization (FLO), which pay growers specific premiums above market prices, to schemes encouraging methods of cultivation and processing that have beneficial effects on the environment.

African example

Starbucks, which has established new retail coffee shops in 37 countries since 1996, has recently embarked on a programme to support the coffee sector in Africa. According to the company's business reports, Africa is home to the world's finest coffees, and the company is emerging as the continent's biggest buyer. In 2006 Starbucks paid $1.42 per pound for premium coffee, 36% per pound more than the average market price of $1.0.

In the United Republic of Tanzania, Starbucks has entered into a partnership with the Association of Kilimanjaro Specialty Coffee Growers (KILICAFE), a small-scale farmers' group launched in 2001, providing fee-based credit and marketing services to growers. The association is Tanzania's largest farmers' unit, with about 80 farmer member groups representing more than 7,000 smallholder farmers from the Kilimanjaro, Mbinga and Mbeya growing regions. Starbucks is also Tanzania's biggest coffee buyer and supporter of KILICAFE. Since entering into the partnership, Starbucks has tripled coffee orders from KILICAFE, directly influencing the income of over 10,000 smallholder coffee producers.

Coffee Marketing Chain



Source: The Economics of Coffee, De Graaff, 1996 and www.unctad.org

Learn more
International Trade Centre (ITC):
http://www.intracen.org/thecoffeeguide/welcome.htm

ICO :
http://www.ico.org

Cotton

Cotton is a soft, staple fibre that grows around the seeds of the cotton plant (*Gossypium sp.*). It is grown in about 100 countries, but six countries – China, United States of America, India, Pakistan, Uzbekistan and Egypt – account for over three quarters of the world's 24 million tons of cotton lint. Out of 85 cotton-producing countries in 2006, 80 were developing countries, 28 of which were LDCs. In West and Central Africa, over 10 million people are dependent on cotton exports for their livelihood. Among the LDCs in this Atlas, four countries are heavily dependent on cotton because of the crop's major contribution to national export earnings: Burkina Faso: 40%; Chad: 37%; Mali: 29%; Somalia: 22%.

Production quantity | 2003-2005 Av. | 1000 tons

COTTON	Burkina Faso	Chad	Ethiopia	Gambia	Malawi	Mali	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Cotton lint	208	69	21	0	17	250	24		21	2	84	98	793
Cottonseed	312	114	40	0	29	310	53	5	30	4	173	199	1,269

Source: FAO ProdSTAT Database

Cultivation and harvest

Successful cultivation of cotton requires a long frost-free period, ample sunshine and moderate rainfall, usually from 600 mm to 1200 mm. In Australia, the United States and other countries, cotton is grown in drier areas where irrigation systems are used.

Cotton can be picked by hand or mechanically. Handpicking in low-wage developing countries often produces cleaner and higher-quality cotton, at lower production costs than mechanized cotton. Yet in all areas cotton growing requires a large input of chemicals to fight diseases and pests, especially the boll weevil. Considerable pre-harvest financing is needed to buy these chemicals, and this constitutes a major problem for small-scale and poor farmers.

Genetically modified cotton varieties are resistant to some insects and can withstand the application of herbicides. These varieties are planted in about 20% of all cotton areas.

Cotton products

One hundred kilograms of raw cotton contain about 35 kg of fibre and 60 kg of cottonseeds. Fiber and seeds are separated by ginning, losing some amount to processing and dirt. Usually, about 85% of the commercial value is derived from the fibre, which is spun into yarn. The seeds are used for extracting edible oil and the by-product of the oil extraction process – cottonseed meal – is used as animal feed. Quality of cotton fibre is determined by three factors: the colour of ginned cotton, the purity (absence of foreign matter) and quality of the ginning process, and fibre length.

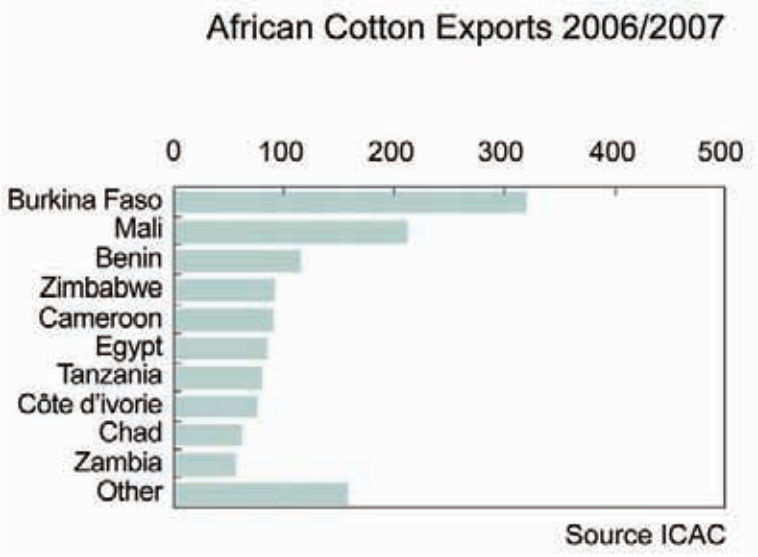
Productivity (2005/06)

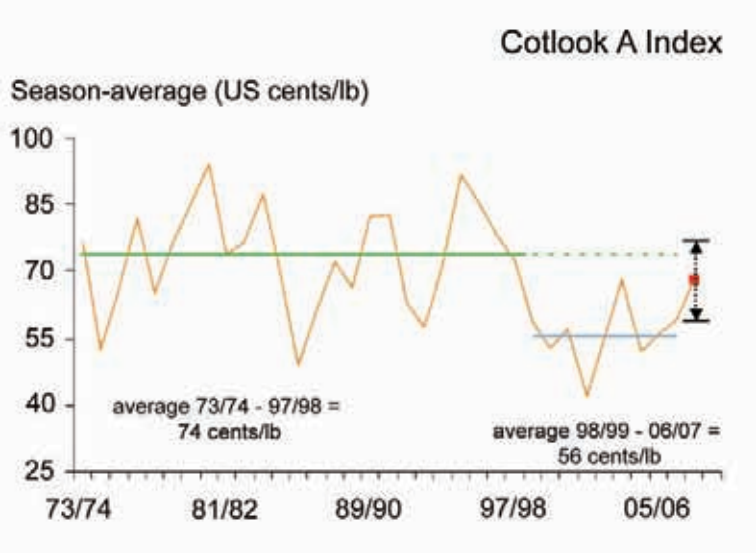
USA	African Franc Zone
· <25.000 cotton farms	· <2 million
· 80% irrigated	· 100% irrigated
· Mechanized, capital intensive	· Manual, labor intensive
· Ginning ratio 37%	· 42%
· 5.2 million tons lint	· 0.9 million tons lint
· 930 kg lint/ha	· 390 kg lint/ha
· 215 tons lint per farm	· <0.5 tons lint per farm
· 900 ginneries	· 85 ginneries

Trade policy

There is no duty on raw cotton imports into any developed country. However, production subsidies to cotton growers in developed countries, particularly in the United States and the EU, are the subject of intense international debate. This support encourages cotton production in areas where it is not efficient, leading to reduced prices and harming low-cost cotton producers in other countries, especially in West and Central Africa. According to a 2001 study, the estimated cost of producing one kilogram of cotton was $0.51 in China, $0.64 in Benin and $1.49 in the United States. Yet the United States remains the world's largest exporter, accounting for $4.2 billion out of $9.6 billion global exports in 2004.

Brazil has filed a formal complaint at the WTO regarding United States cotton subsidies. A WTO assessment issued in 2005 found that such subsidies violated WTO regulations. The





United States has since eliminated some but not all of the subsidies. Benin, Burkina Faso, Chad and Mali launched an initiative in the WTO Doha Round demanding elimination of cotton subsidies, compensation for the harm caused by them and assistance for development of their cotton sector. As the Doha Round remains unconcluded, this issue is far from being resolved.

African cotton

West Africa has a long tradition of cotton exports, but apart from the subsidy issue, African cotton production faces other serious constraints: as major cotton-producing regions are landlocked, transportation costs are high. Uneducated farmers, with inadequate extension systems and lacking equipment and chemical inputs, produce low yields. With inefficient and insufficient infrastructure for local processing and textile production, producers are export-dependent price takers. Undervalued local currency, lack of technical and market expertise, and political instability all exacerbate the situation. Many analysts contend that African production requires radical transformation through major capital investment to establish commercially oriented, cooperatively organized and irrigated systems to compete in the world cotton market in the long term.

International Cotton Advisory Committee (ICAC)

ICAC is an association of 43 governments with an interest in cotton production, export, import and consumption. ICAC was founded to promote international cooperation in cotton affairs, and its role is to raise awareness, provide information and serve as a catalyst for cooperative action. It provides statistics, identifies emerging changes in the structure of the world cotton market, serves as a clearing house for technical information and a forum for discussion of cotton-related issues, and represents the international cotton industry before United Nations agencies and other international organizations.

Price variability

Average prices exceeded $3 per pound of lint at today's dollar rate in the early 1950s and amounted to between $1 and $2 in the 1970s (http://www.icac.org). The average Cotlook A Index (the accepted indicator of average prices for lint cotton delivered to Far Eastern ports) in 2006/07 is estimated at $0.58 per pound.

According to the ICAC, the long-term decline in real commodity prices is linked to technology change in agriculture and competition with substitute fibres, and possibly also to reduced prices for cotton products at the retail level. Biotech cotton technology is also reducing risk and cost, leading to increases in areas and production. Bio-cotton varieties are expected to account for 40% of the world cotton area (which includes major developing country producers China and India) and almost half of production in 2007/08. Incremental advances in proven technologies such as irrigation management, pesticide formulations and pesticide applicators, low-till and no-till production systems, crop rotation and other management techniques are also contributing to lower production costs and expanded cotton production.

Learn more
ICAC:
http://www.icac.org

UNCTAD:
http://www.unctad.org/infocomm/anglais/cotton/sitemap.htm

International Food and Agriculture Trade Policy Council
(IFATPC):
http://www.wilsoncenter.org/index.cfm?fuseaction=events.event_summary&event_id=202906

Fishery products

Worldwide supply and consumption of fish has increased by about 50% in the last two decades to over 100 million tons. The developing world has been responsible for nearly all of this growth. More specifically, China's growth has dominated the increase in fish products, and China now reportedly accounts for over a third of world fish consumption. However, since the 1990s marine fishing has stagnated, and growth in overall fish production has been almost entirely due to the global boom in aquaculture, especially in developing countries. Aquaculture now represents 43% of fish production.

World fish consumption averages about 13.4 kg per capita. In sub-Saharan Africa per capita consumption of fish has lagged behind, decreasing from a high of 9.9 kg per capita in 1982 to the most recent estimate of 7.6 kg in 2003. Yet in Mauritania and neighbouring countries, fish is the major source of animal protein and consumption exceeds the world average.

Production quantity | 2003-2005 Av. | 1000 tons

	Burkina Faso	Chad	Djibouti	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Inland fisheries	9	70			10	3	0	57	102		14	52	50	0	56	300	723
Marine fish			0	6		30				173	14		369	29	5		626
Marine crustaceans and mollusks				0		1				18	16		20	1		2	57
Total	9	70	0	6	10	34	0	57	102	191	44	52	439	30	61	301	1,406

Source: FAO ProdSTAT Database

African maritime fishing

Maritime fishing by African fleets provides many important benefits and advantages, but the potential is even greater. Fish resources from African states' economic enterprise zones, in the Atlantic and Indian Oceans, are believed to be under-exploited. In the current situation of growing demand, the presence in Africa of a small but skilled fishing fleet, growing professionalism and proximity to the European market provide ideal conditions for the export of high-value products.

There is a full agenda for the development of maritime resources. National fleets and landing facilities need to be upgraded and processing and storage infrastructure to be greatly expanded. Improvement of animal health controls and inspection is necessary for exports.

Conservation of fish stocks and the marine environment is essential for the long term. Around the prawn fisheries of Mozambique and the United Republic of Tanzania in the western

Indian Ocean, regional coordination is being strengthened to reduce the by-catch, i.e. the unwanted organisms dumped back into the sea once the targeted prawns have been removed. Further development of maritime fishing will require stronger regional monitoring and surveillance systems.

Another issue of concern has emerged in low-income country fishing communities throughout the world. In the past decade, AIDS-related illness and mortality figures have been devastatingly high in some fishing communities. Research and interventions relating to social, economic and healthcare structures are necessary to maintain healthy human populations in fishing communities.

Inland fisheries

Africa's rivers and lakes have long been a major food source throughout the continent, supplying one million tons of freshwater fish per year. In the dryland countries, the Niger River provides perch in Niger and Mali. The Senegal River and Gambia River basins have a wide variety of catfish, carp and other freshwater fish. In the east, the Zambezi River, Lake Victoria, Lake Chad and Lake Malawi are all major inland fisheries and are commercially exploited. Preservation of fish stocks is also important for the preservation of biodiversity.

The sub-Saharan region continues to be only a minor player in aquaculture, despite its natural potential. For over fifty years international resources have been directed, in fits and starts, to aquaculture development, but the sector still consists primarily of subsistence, secondary or part-time activities on small farms. Nigeria, Madagascar, the United Republic of Tanzania and South Africa have established some operations, but few commercial plans have been realized. The African Union's New Partnership for Africa's Development (NEPAD) attaches importance to aquaculture, both on small farms and

Fishery export value $1000	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mauritania	Mali	Mozambique	Niger	Senegal	Sudan	United Republic of Tanzania	Total
Fish, fresh, chilled, frozen	55		290		358			2,605	306	105,004	457	107,413	216,488
Fish, dried, salted, brine, smoked	93	9	60		9		162	689	4,579	4,744	25	570	10,940
Fish meal			12	359		11,906	8			864		156	13,305
Crustaceans, mollusks, etc.	169		366					53,398		73,002	56	13,448	140,439
Total	317	9	728	359	367	11,906	170	56,692	4,885	183,614	538	121,587	381,172

Source: FAO ProdSTAT Database

in larger commercial enterprises, for economic development and food security, and the sector is becoming a major focus for development activity.

Growth in aquaculture production in Africa will depend heavily on reaching the high initial investment level by public and private means. The sector will face competition from other users for finance, land and water. Aquaculture requires a highly technical production system, and research, training and extension will be essential in order to move beyond today's partial mastery of fish farming techniques. Supply chains for fish fry and feed and for processing will also have to be developed.

At the same time, questions continue to be raised in the international development community regarding the tensions between aquaculture as a commercial export-oriented activity and subsistence fish farming for food security. Land use and ecological controversies regarding aquaculture have also emerged. Regulations governing the general management of aquaculture, including aspects such as the use of drugs and chemicals, also need to be developed and enforced.

Trade

The global fish trade has doubled in the past two decades and now accounts for nearly half of all fish production.

Food fish are primarily traded as fillets, cleaned and packaged frozen fish, and canned fish, although the chilled fish trade is growing very fast. If fishmeal is included, more than 90% of the fish trade consists of processed commodities.

The direction of net trade by quantity of total food fish changed dramatically during the 1990s. Developing countries as a whole moved from being net importers from developed countries to being net exporters to developed countries. This must surely be one of the most noteworthy changes in the direction of trade between developed and developing countries for any natural resource commodity. Africa has been a net exporter of fish since 1985 but part of the shift has been due to reduced per capita consumption. Until 1985 factory ships of the former Union of Soviet Socialist Republics (USSR) and Eastern Europe dumped massive quantities of cheap frozen fish in West Africa.

For several dryland countries, particularly Senegal and Mauritania, marine fishery represents critical export income. Development of maritime fishery exports can bring income – and dependence. For decades Mauritania has been a major exporter of fishmeal (dried fish powder for feed). The trade accounts for about 80% of all agricultural exports. Now the country is developing additional processing facilities for more value added products. Senegal's export earnings from marine fishery – which includes returns from numerous processing facilities – accounts for about 50% of total agricultural exports.

Low-value food fish from capture constitutes sub-Saharan Africa's largest source of fishery production and is the only commodity category in respect of which sub-Saharan Africa supplies a significant share of the global total. Anchovies, herring, mackerel and miscellaneous marine and freshwater fish are the largest species within this category, and a large proportion of the fish exported becomes fishmeal for feeding other fish and cattle. But for Senegal, Mozambique and the United Republic of Tanzania high-value fish and shrimp exports are a major source of export earnings. Most recently, Gambia is also replicating the development of shrimp fisheries.

Aquaculture research

Learn more

FAO:
ftp://ftp.fao.org/docrep/fao/009/a0619e/a0619e00.pdf

FAO
State of World Fisheries and Aquaculture (SOFIA) :
http://www.fao.org/docrep/009/a0699e/A0699E00.HTM

Consultative Group on International Agricultural Research (CGIAR):
http://www.worldfishcenter.org/v2/index.html

Cereals

Cereals are cultivated as staple foods, and are widely traded worldwide. The value of global trade has reached $30 billion for over 200 million tons. Wheat, maize and rice are the three leading cereals, but in Africa and in the LDC drylands in particular, maize, sorghum and millet are the most important cereals, with rice and wheat in second place.

In years without serious food crises, Africa's 145 million tons of cereal production accounts for about three quarters of its apparent cereal consumption. Low yields of cereals throughout Africa, and in the LDCs in particular, are a prime cause of chronic and acute food and nutritional deficiencies. Insufficiency of grain in Africa is a continuing liability in the development of other agricultural sectors, particularly livestock, poultry and the processed food industry.

Production quantity | 2003-2005 Av. | 1000 tons

Cereals	Burkina Faso	Chad	Djibouti	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC dry-lands
Barley				10	1,287		0			1						4	1,303
Cereals, nec		299			2,381	1			0			1	1			15	2,698
Fonio	9								23			1					32
Maize	649	142	0	3	3,187	31	81	1,657	515	9	1,363	2	400	239	53	2,947	11,277
Millet	1,106	464		12	345	127		20	1,131	2	46	2,478	520		603	170	7,025
Oats					51		0										51
Rice, paddy	88	122			16	24		63	865	79	184	70	238	14	24	752	2,536
Sorghum	1,521	532		74	1,901	30	13	42	674	60	320	767	153	139	4,056	733	11,014
Wheat		2		3	2,034		9	1	7	0	1	7		1	394	88	2,549
Total cereals	3,372	1,561		103	11,202	211	103	1,783	3,215	151	1,913	3,327	1,313	392	5,130	4,709	38,485

Source: FAO ProdSTAT Database

Millet and sorghum

The major grain staples differ among the African LDC drylands. Millet and sorghum are the predominant food grains in the western Sahel countries and Sudan. About 75% of sorghum and millet is consumed in the household, most popularly as porridge. Sorghum and millet stalks (stovers) are important as animal feed in mixed farming.

The millets include species of several genera, mostly belonging to the subfamily *Panicoideae* of the grass family *Poaceae*. Sorghum is one of these grasses. The small grains are able to withstand relatively long rain intervals of over two dry weeks in their growing season, making small grains a safety net crop for dryland subsistence farmers in arid and semi-arid regions throughout the world. However, the lack of a developed trading and market system for these grains currently limits the income that they can provide for farmers with surplus produce. Thus, there is little incentive for farmers to spend money on inputs, such as small dose fertilization, which could dramatically increase yields.

Maize

Maize (*Zea mays)* is the major cereal crop for Ethiopia, Mozambique and the United Republic of Tanzania (and for the continent as a whole) and is important in several other drylands. In the past two decades maize production has expanded rapidly in several southern African countries with sufficient water resources. Most African maize is consumed in households as mash or porridge, but in many areas people mill their grain and use it in baking. A considerable amount of maize is consumed fresh, both on and off the cob, roasted or boiled as a snack food.

Some 95% of maize produced in Africa is grown by small and medium-scale farmers who cultivate up to 10 hectares. Yields on these farms are usually low, averaging 1.2 metric tons per hectare (mt/ha). The productivity range of maize farmers in Africa is very wide. Subsistence farmers of coastal West Africa struggle to produce 700-800 kg/ha on farms as small as half a hectare. Prior to recent problems in Zimbabwe, the country's large-scale commercial farmers used to harvest some of the highest cereal crop yields in the world, regularly topping 10 mt/ha on farms larger than 1,000 ha. Increased yields of maize in drylands, through greater use of inputs, have great potential for increasing overall agricultural income and nutritional security.

Rice

For several LDC drylands, rice is a multi-purpose crop. For many farmers, rice is a secondary crop relied on as an additional source of income, a niche crop in low-lying areas of small farms and a crop for consumption on special occasions.

Oryza glaberrima is the major African rice species, but the Asian rice species O. sativa has also been grown for centuries. Paddy rice is grown under a variety of systems in low-lying flooded areas. In some dryland areas, notably the areas administered by the Office de Niger in Mali, rice is irrigated by flood canals from rivers in the desert. Upland rice farmers in drylands are at risk from rain intervals and pests.

Because of its wide popularity as a food item, rice is among the most liquid of all crop assets in Africa. Rice consumption in Africa has a high-income elasticity, and increases in projected demand in Africa are tightly linked to increased urbanization and economic growth, partly due to ease of preparation among smaller, labour-limited households. These patterns are most evident in West Africa, where several pockets of rapid economic growth have fuelled an increase in demand for rice – including imports from Asia.

NEW RICE FOR AFRICA

Since its creation in the mid-1990s at the Africa Rice Center (WARDA), New Rice for Africa – NERICA – offers a new opportunity for upland and dryland rice farmers in sub-Saharan Africa. NERICA varieties can provide higher yields, shorter development time, resistance to local stresses and higher protein content than traditional rice varieties. Specific NERICA varieties are also being tested for irrigated rice systems.

Trade policy

Decades of large farm subsidies in a number of major grain-exporting countries generated excess production, which kept world prices low. Most countries in Africa could not compete with such low prices and in effect became major importers. Cereals are still among the most heavily subsidized food crops. Since the Uruguay Round Agreement on Agriculture (1994) world trade in agricultural products has moved towards gradual reform and liberalization of policies, with cuts in import tariffs and export subsidies and some reductions in internal agricultural support. Further steps in this direction are being sought in the WTO Doha Round.

Many analysts believe that Africa can and should become more self-sufficient in cereals. Several policy changes are needed for this to occur: subsidy programmes in developed countries must be curtailed to prevent grain surpluses; African governments must use the remaining measures open to them to discourage cereal imports, thus increasing some food prices for urban populations; physical input resources, financial backing and technological training must be made more available to African cereal producers.

The future prospects for major cereal exports from Africa are as yet uncertain. However, African LDC rice exports to the EU have been free of duty since 2001 and quota restrictions on this concession will be abolished in 2009.

Grains in market

Sorghum field

Learn more

UNCTAD:
http://r0.unctad.org/infocomm/anglais/rice/characteristics.htm

WARDA:
http://www.warda.org

FAO:
http://www.fao.org/ES/ESC/en/15/53/index.html

BIOFUEL POSSIBILITIES

The caloric energy of many plant products can be converted into biofuel for small and large-scale energy requirements. As oil prices increase and the environmental danger of greenhouse gases becomes more apparent, many countries are seeking to exploit agricultural resources to produce renewable biofuel energy sources that reduce dependence on fossil fuels.

Biofuels contribute to environmental protection because they do not add to carbon dioxide (CO_2) emissions. Yet critics contend that some biofuel production systems may use as much fossil fuel as they produce.

Crop production for biofuel expands the agricultural market by increasing non-food demand, thus raising commodity prices and farm income. Facilities for conversion of crops into biofuels also create new jobs in the rural economy. For countries where agricultural prices are low and food supply is abundant, agricultural production for biofuel may be economically attractive.

Farmer with Jatropha plant with seeds

In the African context, however, and particularly in low-income food-deficient dryland countries, concern is growing that use of food crops for fuel increases competition for scarce resources, diverts resources from food supply and increases costs of food imports. Moreover, large-scale economic production of grains or oilseeds in African drylands would probably require completely new commercial plantations, with major investments in land development, irrigation infrastructure and continuing input supply.

Commercially, the most widely used plants today are maize and sugarcane, which are converted into ethanol, and oilseeds, which are converted into biodiesel. Development is under way to utilize more biomass from these crops and others, including sorghum, cassava and grass stalks.

Ethanol

Today ethanol is the leading biofuel, with Brazilian sugarcane being the largest and most economic source. Sugarcane can produce several times more energy and fibre per hectare than any other crop. Over the past three decades Brazil has developed an integrated system of intensive sugarcane production, using drip and other irrigation systems, with delivery to efficient factories, supplying an established distribution system. Today nearly 50% of Brazil's transportation system runs on sugarcane ethanol. The United States and Canada, the Ukraine and other temperate zone countries use maize and other grains for ethanol production. Costs are considerably higher, but still competitive with gasoline (petrol) if oil prices remain over $70.

Biodiesel

Biodiesel, produced from oil-bearing plants, is the second leg of the biofuel sector. Palm oil is the leading crop source for biodiesel and is grown and processed widely in Malaysia, Indonesia and other tropical areas. In Europe, the Russian Federation and North America rapeseed, sunflower and soybean are all grown for biodiesel

In Africa, the Jatropha plant (*Jatropha curcas*) may be an alternative route to biodiesel production. The oil-bearing perennial shrub has long been widely planted as hedgerows in Sahel regions. It is drought-resistant and can grow in saline, marginal and otherwise infertile soil, requiring little water and maintenance.

In Asia, particularly in India, recent large-scale plantations intended for commercial processing of jatropha into transport fuel have attracted attention. The ecological and economic feasibility of these projects has yet to be proven. However, smaller-scale projects in India and Africa suggest that householder plantations and processing at the village level can provide fuel for household energy for cooking or for running a small motor to supply electricity for lighting and pumps for drinking water and irrigation.

Learn more
CFC biofuel study:
http://www.common-fund.org/?nid=56

Livestock products

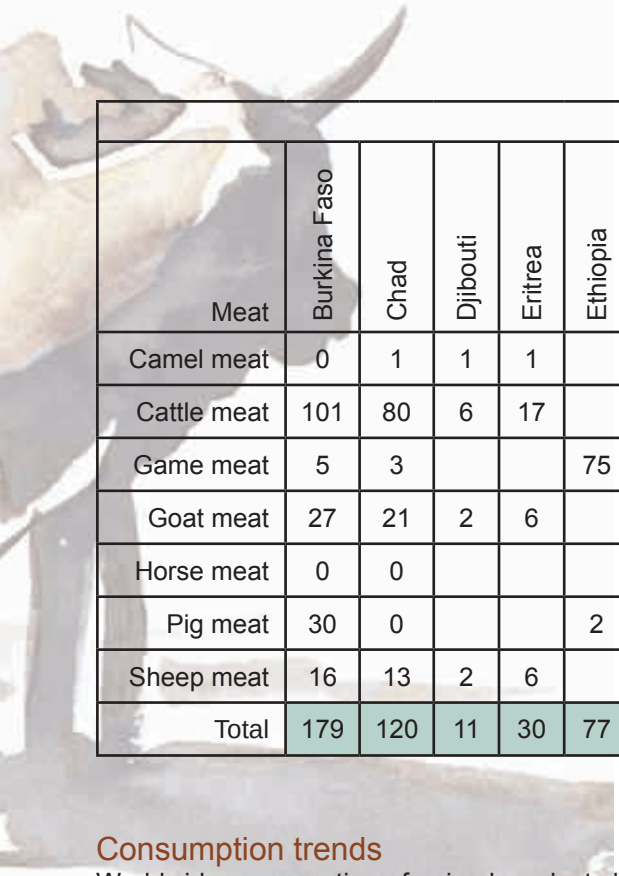
Meat is produced in all countries. Worldwide, pork and beef are by far the most widely produced meats, while the sheep and goat sector has been contracting in the last decade.

Livestock production is a major agricultural activity and source of income for all African LDC drylands, with beef, sheep and goat meat being the most common sectors. Pastoralism, the extensive, mobile grazing of livestock on open rangelands, which is practised in drylands throughout the world, is the key to the African production system. According to recent estimates, there are about 50 million pastoralists/agro-pastoralists in sub-Saharan Africa. In the high-risk Sahel environment and in south-eastern Africa, livestock holdings serve as insurance against erratic rainfall and are often the only available store of wealth.

Sheep and goats maintain an important position in Africa because of their hardiness even under harsh rearing conditions. In African LDC drylands, sheep and goat meat accounts for 38% of total meat output and serves as an important source of food security for many vulnerable families.

Traditional livestock production systems do not keep pace with the protein needs of growing populations. Many traditional breeds have been selected for hardy survival, not for production of meat and milk. Modern nutrition-based feeding systems are not used. Livestock research and development findings have not reached the roaming herds.

Moreover, traditional livestock practices have failed to provide adequate income for grazers. Extreme poverty is estimated at 25% to 55% among African pastoralists. While international trade in livestock and meat is increasing, and regional demand in Africa is growing, African producers are essentially isolated from the world market and have only marginally developed the potential of their own urban markets.



Production quantity | 2003-2005 Av. | 1000 tons

Meat	Burkina Faso	Chad	Djibouti	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Camel meat	0	1	1	1					8				0	44			55
Cattle meat	101	80	6	17		3		16	103	23	38		45	66		246	744
Game meat	5	3			75	1			18			15	0		9	16	142
Goat meat	27	21	2	6		1		6	48	14	2		10	42	154	31	365
Horse meat	0	0							1	0		1	7				9
Pig meat	30	0			2	0	3	23	2		13	1	10	0		14	98
Sheep meat	16	13	2	6		0		0	35	25	1		16	48		10	173
Total	179	120	11	30	77	6	3	46	214	62	54	17	87	201	163	317	1,412

Source: FAO ProdSTAT Database

Consumption trends

Worldwide consumption of animal products has increased in recent decades and is expected to increase further as a result of rising incomes. There has been some shift towards poultry and a decline in the production of beef. Livestock consumption in Africa has decreased on a per capita basis since 1978 but has increased overall since 2000 and projections show a significant increase in demand for livestock products over the next 30 years, mostly as a result of population increase. If assumptions of increased per capita income materialize, demand for livestock products will grow faster than demand for other foodstuffs. Given effective policies and structural environment, this demand can be met largely by in-region production, and it is one of the few opportunities to improve livelihoods for the region's poor population, many of whom are livestock owners.

Animal health

Improved overall animal health throughout Africa is critical to development of the livestock sector. Every year there are reports of outbreaks of rabies, brucellosis, lumpy skin disease (LSD), foot and mouth disease (FMD), peste des petits ruminants (PPR), sheep pox and goat pox, heartwater, blackleg and contagious bovine pleuropneumonia (CBPP), theileriosis (East Coast fever) and trypanosomiasis (sleeping sickness). Rift Valley fever occurs sporadically. Primarily, these diseases depress livestock productivity by affecting weight, reproduction rate, milk and meat yield, and animal mortality. Secondly, the presence of these diseases blocks opportunities for export to disease-free countries. Finally, some livestock diseases can be transmitted to humans.

At the international level, the International Office of Epizootics (IOE) is the coordinating body of all national veterinary services. On the African continent, the African Union has established the Interafrican Bureau for Animal Resources (IBAR). With FAO and World Bank support, these organizations are strengthening national veterinary capabilities. There is a tradition of success, which motivates the continent's animal health community: a thirty-year campaign of vaccination against rinderpest has nearly succeeded in eradicating the disease on the continent.

Trade

Several African LDC drylands have for decades maintained a significant export trade in livestock. Producers from the Horn of Africa, Eritrea, Ethiopia, Somalia and Djibouti (as well as

Kenya) have all supplied cattle to Saudi Arabia and other Middle Eastern countries. However, repeated incidences of Rift Valley fever in the 1990s and more recently have made this trade highly unreliable.

In the west, Mali, Burkina Faso and Niger all export livestock to their southern coastal neighbors. While some of the trade is recorded, officials believe that substantial quantities of livestock are simply herded across the borders and are not reflected in government statistics.

African livestock and livestock products have generally been barred from entering EU and United States markets owing to the prevailing situation of animal disease in the producing regions. The WTO Agreement on the Application of Sanitary and Phytosanitary Measures allows each country to establish its own regulations, provided that they are justified by safety concerns. Concerns over food safety, animal diseases, the environment and animal welfare, as well as changes in consumer preferences, have led to increasingly stringent regulations in these major importing blocs. This export barrier has in turn deterred development of commercial livestock operations and logistical infrastructures.

Livestock production is subsidized by major developed countries, but the level of production subsidies has been reduced since the Uruguay Round, and international trade is less affected by export subsidies. However, developed countries continue to direct major funding to animal health control and in many instances compensate farmers for losses incurred as a result of animal disease. These subsidies allow developed market producers to remain dominant in their home markets.

Several studies have identified domestic and intraregional livestock trading in Africa as a promising option to improve the income of livestock keepers in arid and semi-arid regions. Sahelian countries are low-cost producers of ruminant livestock, while those on the coast are major importers of livestock and livestock products owing to the increasing demand from rapidly growing urban centres.

At present the cross-border livestock trade is limited by high transportation and handling costs, high direct, indirect and illicit taxes, and poor market information. Lack of capital and poor access to credit also hamper commercial actors in the sector. Movement restrictions, imposed to prevent the spread of contagious livestock diseases, and diverse zoo-sanitary legislation act as further constraints on intraregional trade.

Throughout the continent, initiatives are under way to develop this potential. The West African Economic and Monetary Union (UEMOA) cooperates with an FAO Pro-Poor Livestock Policy Initiative (PPLPI) to facilitate intraregional trade through harmonization of zoo-sanitary legislation and to enhance the implementation capacity of national animal health services. In the Horn of Africa, the Intergovernmental Authority on Development (IGAD) also has an active livestock policy initiative.

Live animal exports — 1000 animals, average 2003-2005

	Burkina Faso	Djibouti	Eritrea	Ethiopia	Mali	Niger	Somalia	Sudan	Tanzania, United Rep. of	Total
Camels		10			2		1	56		69
Cattle	19	35	-	1	56	37	105	-	3	256
Goats	15	150	5	1	21	154	822	92	1	1,261
Sheep	27	17	2	6	122	70	385	1,238		1,867
Total	61	212	7	8	201	261	1,313	1,386	4	3,453

Source: FAO ProdSTAT Database

Hides and skins

Hides and skins have traditionally been a major by-product of livestock raising in Africa and an important export item. But given the competition from other world regions, unprocessed African skins – often with little quality control – fetch poor prices. Improvement of the trading systems can increase the value of these products.

In four West African livestock-producing countries, Burkina Faso, Mali, Niger and Senegal, the CFC is funding a programme to enhance the quality and image of African hides and skins by improving their grading and quality. The project is co-financed by the Government of the Netherlands and implemented by the United Nations Industrial Development Organization (UNIDO), in collaboration with the Office Malien du Bétail et de la Viande (OMBEVI). A similar programme is under way in the United Republic of Tanzania.

The project provides technical support for the introduction of an incentive-based buying system linked to quality and grades to replace the current system based on quantity. Grading will be linked to the established quality standards of the international trading system and prices will be geared to international demand, including use of web-based trading.

Improvement of the design and production of leather products after the tannery stage has even greater potential for adding value to products. The CFC is implementing such a programme in Ethiopia, Kenya, Sudan and Zimbabwe.

Livestock herders

Dairy trade policy

In the meat sector, relatively low subsidies in developed countries pose only a minor threat of growing competitive imports. However, the African dairy sector is often considered vulnerable to subsidized supplies of surplus milk powder in international markets. Although EU subsidies on milk production have been reduced by the Uruguay Round and subsequent CAP reforms, they continue to represent at least 25% of the international market price for European milk exports. African countries are concerned to protect their markets against floods of imported milk powder under African-EU Economic Partnership Agreements.

Pastoral sustainability

Observers of pastoral livestock production systems in the African LDC drylands have noted the vulnerability of pastoralists whose livelihoods are dependent on the vagaries of the weather, animal disease and alternative crop supplies. The crucial policy question is whether it is preferable to invest in pastoral development or more appropriate to design exit strategies for pastoralists, allowing them to abandon livestock keeping.

On the one hand, pastoralism is the best if not the only way to make productive and sustainable use of natural resources in arid and semi-arid areas, which would otherwise remain unexploited. Pastoralists now produce a large share of the sub-Saharan meat supply and are as efficient per unit of land as modern ranchers.
At the same time, risk management strategies have become increasingly ineffective in recent decades and poverty is increasing among pastoral populations. There is a strong argument for addressing mounting human and livestock pressure in the drylands by means of strategies that support the adoption of alternative income-generating activities by some pastoral/agro-pastoral people. The question of how to ensure sustainable pastoral livestock production in these regions remains unresolved.

Learn more

FAO:
http://www.fao.org/world/regional/raf/workprog/agric/animal_en.htm

World Bank Alive:
http://www.alive-online.org

Alive Forum Policy Note:
http://www.aliveonline.org/data/files/policy%20note%20no%205%20-%20trade%20-%20draft%201%20(gb).doc

International Livestock Research Institute (ILRI):
http://www.ilri.org

African Union–Interafrican Bureau for Animal Resources:
http://www.au-ibar.org

Livestock breeds:
http://www.ansi.okstate.edu/breeds/region/f-africa.html

Poultry products

Worldwide, the poultry sector has led the growth in livestock production, with poultry accounting for nearly 50% of meat production gains over the past decade. Since the 1990s disease outbreaks in cattle, particularly BSE, have led to a shift in consumption and trade demand from beef to pork and poultry. Since 2004, however, the threat of avian flu has created a crisis in the global poultry industry.

While open grazing of livestock is directly dependent on pasture and rainfall, poultry production in much of the world has become highly commercialized if not industrialized – being far more closely linked to the market price of feedstuff than to the weather. With increasing productivity in the sector, as production units become more integrated, concentrated and better managed, poultry meat is produced at a lower cost than competing meats.

Production quantity | 2003-2005 Av. | 1000 tons

Poultry meat	Burkina Faso	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Chicken meat	30	2	50	1	2	16	35	4	42	30	27	4	29	47	319
Duck meat									1					1	2
Turkey meat											0				0
Total poultry meat	30	2	50	1	2	16	35	4	43	30	27	4	29	49	321

Source: FAO ProdSTAT Database

Production quantity | 2003-2005 Av. | 1000 tons

Eggs	Burkina Faso	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Hen eggs, in shell	44	2	37	1	2		10	5	14	11	25	3	47	35	234

Source: FAO ProdSTAT Database

Commercial production systems

Developing countries have shared in the commercialization of poultry. Output in developing countries has increased by 8% over the decade (double the growth rate in developed countries) and now constitutes more than half of global production. Commercial enterprises use modern techniques for integrated production of purebred chicks, production of broilers and layers in custom-built poultry sheds under veterinary supervision, manufacture of custom-mixed poultry feed calculated to provide proper nutrition at the lowest price, and timed slaughter and sale of flocks. With some investment costs, poultry, primarily broiler chickens, are produced and ready for market after six to eight weeks. Breeding flocks can also produce surplus eggs for sale.

Several African countries, including those in LDC drylands, maintain substantial commercial poultry industries. Dryland areas are particularly appropriate for these commercial poultry operations, and local feedstuffs, including sorghum and maize, can be well utilized. Local breeding hatcheries and feed mills can be developed.

Village production

Throughout Africa, traditional household and village poultry production continues to be a supplementary source of income for most rural households. Production is based on the scavenging indigenous chickens found in virtually all villages. These systems are characterized by low output per bird: it often takes six months for a bird to reach marketable weight. Few surplus eggs are available for sale. Because of high mortality rates for chicks, most eggs are left to hatch under the hens. In most of the LDC drylands, village household chickens have no regular health control programme, may or may not have shelter, and scavenge for most of their nutritional needs. Nevertheless, over 70% of poultry products and 20% of animal protein in most African countries come from this village sector.

Parallel systems

These two production systems can continue to exist in parallel. Commercial production is primarily geared to supermarket and urban marketing, and birds are often slaughtered, cleaned and refrigerated before sale. Village poultry production generally consists of live birds sold in local or district markets. Only some reach urban markets through traders. Price differentiation is also common: in most African regions indigenous village poultry fetch higher market prices than commercial broilers. This is not surprising: in western Europe, free-range chickens can command twice the price of battery chickens.

Development of both production systems can generate major income for LDC drylands. Commercial enterprises serving urban populations

Traditional chicken keeping

can provide employment and added-value products for the national economy. Modest improvements in village poultry production, such as shelters, some veterinary services and supplementary feed would have a positive impact on household food security through increased dietary intake and enhanced income generation. Small cooperative marketing systems can also improve income opportunities for household production.

Poultry trade policy

Global exports of chicken and turkey meat are valued at over $3 billion. Brazil accounts for over 40% of that trade, with the United States following close behind. Among livestock sectors in developed countries, the poultry sector is one of the least protected by tariffs. The EU uses minimum price mechanisms to support internal prices and EU poultry producers are eligible for export refunds of up to €300 per ton, depending on market conditions, but after many years, EU poultry imports and exports are generally in balance. In any case, veterinary issues generally impede sub-Saharan animal product exports to the EU.

Although United States exporters receive no direct subsidies, support mechanisms for feedstuffs contribute to low-cost commercial production systems. Efficient producers in the United States sometimes promote exports to African markets. These imports, as well as those from Europe, are often perceived as dumping by African producers. In several cases during the 1990s, affected producers claimed that the subsidies created import surges and seriously damaged their local markets. FAO studies found a variety of reasons for the presumed import surges. Despite past threats, African governments have policy measures available in most cases to prevent unfair import competition.

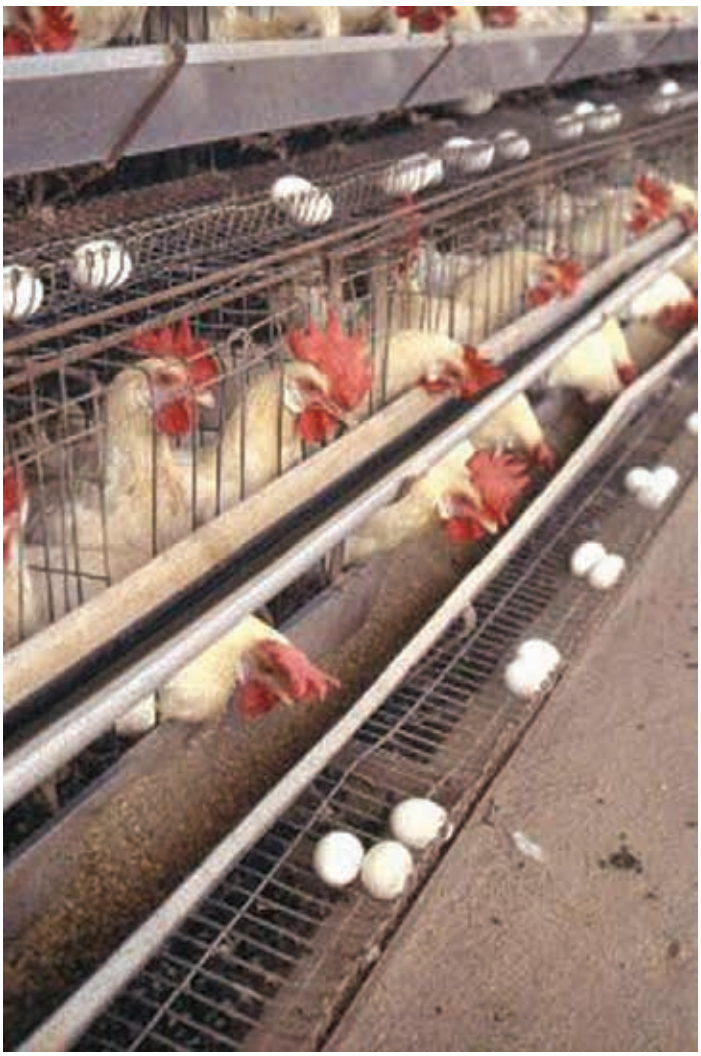
Veterinary issues

Veterinary treatment and supervision is vital to the success of commercial poultry enterprises. Production of poultry in intensive conditions requires high standards of hygiene and often pharmaceutical treatment. Several poultry diseases, particularly Newcastle disease, are endemic to Africa and reduce productivity. Since 2004 outbreaks of avian flu in Asia, Europe and Africa have destroyed flocks and hampered trade worldwide. Nevertheless, effective veterinary control has reduced occurrences and mitigated the consequences, so that the African poultry industry can continue to exploit its potential to supply the growing African population.

Learn more

World Poultry:
http://www.worldpoultry.net/search?_searchquery=africa&x=14&y=8

ILRI:
http://www.ilri.org



Commercial poultry industry

Nuts

In botanical terms, a nut is a dry fruit with a seed wall that becomes very hard. In popular usage, the term is applied to many seeds that are not true nuts. Any large oily kernel found within a shell and used in food is usually called a nut. Agriculturalists distinguish between nuts, which grow on trees, and oilseeds, including groundnuts (peanuts), which do not.

While several types of nuts are cultivated in Africa and almonds are a major crop north of the Sahara, it is the cashew nut (*Anacardium occidentale*) that ranks among the major export crops in eastern and southern Africa. The crop is grown mainly by smallholders with less than two hectares per household. It is estimated that almost one million smallholders grow cashew in the region, with southern Tanzania and Mozambique as leading producers.

Production quantity | 2003-2005 Av. | 1000 tons

Nuts	Burkina Faso	Ethiopia	Malawi	Mali	Mozambique	Senegal	Tanzania, United Rep. of	African LDC drylands
Almonds, with shell	2							2
Cashew nuts, with shell	4				64	6	82	156
Chestnuts			0					0
Nuts, nec		74		1		3	6	84
Total nuts	6	74	0	1	64	9	88	242

Source: FAO ProdSTAT Database

Production and export

About 770,000 tons of cashews, worth about $1.4 billion, are exported every year from all suppliers. In the early 1970s, eastern and southern African countries dominated world cashew production, with about 70% of total supply. Today, production has declined in Africa and increased in Asia and South America, and Africa's share is only 30% of world supply. Much of the decline is attributed to institutional and policy failures, as marketing structures were dismantled, reinstituted, privatized, localized and nationalized. In recent years, however, production has recovered in some countries and the crop is still regarded as an important cash crop in eastern and southern African countries. Efforts have recently been made to revamp the cashew industry. The CFC is seeking to increase production and processing in seven countries (see box below).

Action to enhance the quality and quantity of raw nuts is constrained by several factors: inadequate availability of good planting material; pests and diseases such as the mealy bug and powdery mildew disease; inefficient extension and training; low nut quality and consequent low profitability.

Processing

In the early 1980s governments took steps to stem shipments of raw cashew abroad and to add value to national economies by establishing large processing plants. Processing capacity in eastern and southern Africa reached 275,000 tons. However, most factories are large obsolete government-owned mechanical facilities, which are expensive and inefficient to operate. Most of these facilities were no longer operating by 2002. Thus, after a decade of considerable domestic processing, over 90% of the crop in the United Republic of Tanzania is again exported raw to India.

Some small-scale (manual) processing plants are emerging. With international support, these facilities are encouraging quality production, maintaining quality control, and looking for product and by-product diversification. Efforts include processing of juices, wine and gin from the cashew apple, the plum-sized fruit which is often discarded. The processed nut (kernels) also has by-product potential and could be used, for example, in producing dried fruits, jams, chutneys and livestock feed. In addition, the cashew nut shell liquid (CNSL) can be utilized in the manufacture of paints, building materials and brake linings and in other industries.

Nut exports	Burkina Faso	Djibouti	Gambia	Malawi	Mali	Mozambique	Niger	Senegal	Sudan	Tanzania, United Rep. of	Total
Almonds, shelled	7		0	1							8
Almonds, with shell					1					0	1
Brazil nuts, shelled	4									0	4
Brazil nuts, with shell										0	0
Cashew nuts, shelled	3			0	0	14				29	45
Cashew nuts, with shell	4		9		2	33		1		52	100
Hazelnuts, with shell										0	0
Karite nuts (shea nuts)	15				3					2	20
Nuts, nec		0		2		0	0	0	2	1	5
Prepared nuts (exc. groundnuts)				0						0	0
Total	32	0	9	2	6	47	0	1	2	84	183

Source: FAO TradeSTAT Database

Cashew improvement in eastern and southern Africa

The CFC is funding a regional programme for cashews which will improve planting material and production practices and seek to increase incomes through better quality control systems. A regional quality standard system will be developed to serve international market requirements. Tanzania's Naliendele Agricultural Research Institute is implementing the programme, with FAO support. Kenya, Madagascar, Mozambique and Tanzania are the focus countries, with Ethiopia, Uganda and Malawi also involved.

Cashew nut below cashew apple

Shea nuts and butter

The shea tree (*Vitellaria paradoxa*) or karite in French grows naturally in dry savannas, forests and parklands in a "shea belt" running from western Senegal through Burkina Faso to north-western Uganda and extending to the Ethiopian foothills. It thrives where annual rainfall ranges from 500 to 1,200 mm. In summer, the tree produces a plum-sized fruit with an oily nut. These shea berries are harvested by hand and the nuts are processed traditionally to produce shea butter. In the region, this butter is widely used as a cooking fat and as a skin treatment. It has also long been collected and used by the cosmetic industry, and in recent decades is becoming known in the food industry as a substitute for cocoa butter.

There is now considerable international interest in exploiting the economic potential of the shea tree because of its potential to provide farmer income without disrupting the ecological system. Currently, it appears that the prevalence of the tree far exceeds the area commercially exploited, but population pressure and parasites are increasing tree mortality. CFC sponsors a programme in Senegal, Mali, Burkina Faso, and Niger to developed standards and quality levels of products suitable for the international market.

Shea butter

Learn more

Cashew:
http://www.actahort.org/books/108/108_39.htm

http://www.fao.org/inpho/content/documents/vlibrary/ac306e/ac306e00.htm#Table%20of%20Contents

Shea:
http://www.fao.org/docrep/w3735e/w3735e00.HTM

Oilseeds and oils

After cereals, vegetable oils and oilseeds are the second largest group of internationally traded agricultural commodities in terms of value. Many of these crops play a dual or triple role in agricultural systems: the seeds can be eaten directly or pressed for oil after processing, and the remaining oil cake can be used as animal feed. Vegetable oils are used widely in the food industry for margarine, bakery and confectionery products, soups and cooking oils, as well as for soaps and cosmetics. With the exception of soybeans, over 90% of oilseed is produced in tropical and subtropical countries.

Production quantity | 2003-2005 Av. | 1000 tons

Oilseeds	Burkina Faso	Chad	Eritrea	Ethiopia	Gambia	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Castor oil seed				15					0				1	3	19
Coconuts									266		5	11		371	653
Copra									49					30	79
Groundnuts	275	450	1	31	112	148	218	1	112	228	582	6	700	53	2,918
Linseed			0	118											118
Melon seed		20					4	3			2		46		74
Mustard seed				2											2
Oil palm fruit					35						72			67	174
Oilseeds, nec	70		18	151		2	85		30				50	24	430
Palm kernels					2						6			8	16
Rapeseed				24											24
Safflower seed				6										5	11
Sesame seed	18	35	10	109	2		6		9	35	24	26	334	46	654
Soybeans	6			2										1	9
Sunflower seed						4			12				12	28	55
Total oilseeds	369	505	30	458	151	154	313	4	479	263	690	43	1,143	635	5,237

Source: FAO ProdSTAT Database

World trends

A number of countries – developed and developing – depend on imports of oilseeds and derived products to satisfy domestic demand. These markets are particularly complex: in terms of supply, crops are both annual and perennial, while demand tends to be influenced by factors ranging from competition with feed grains to demand for livestock products and the need for edible and industrial oils.

Twelve vegetable oils are traded internationally. The four most important – soybean, palm, rapeseed and sunflower oil – account for more than three quarters of world consumption. There are also established markets for oil from palm kernels, cottonseed, groundnuts (peanuts), coconuts, olives, castor seed, sesame seed and linseed. World trade in vegetable oils as a group has grown slowly since the mid-1990s. Trends within the group, however, have varied considerably. World exports of soybeans have increased (although exports of soybean oil have grown only slightly) together with exports of rapeseed, palm and palm kernel oil, while exports of groundnut and coconut oil have stagnated.

African context

Groundnuts and groundnut oil have historically been the important products in this sector in Africa, with sesame seed also a major product for several countries, and with Sudan ruling world trade in melon seed. Until the 1990s Gambia, Mali, Niger, Nigeria, Senegal and Sudan were all major groundnut and groundnut oil exporters. Today, only Senegal and Gambia have been able to maintain a substantial export market, exporting nearly 50,000 tons (about 15% of the world market) of groundnut oil and cake for an income of $50 million. The United Republic of Tanzania reports exports of 9,000 tons of fresh groundnuts and Malawi exports of 5,000 tons.
In other countries, export income from groundnuts has declined on account of, on the one hand, economic and institutional pressures which have made the production uneconomic and, on the other, health concerns which keep a large proportion of African groundnuts out of European trade because of high, or at least untested, aflatoxin levels.

Adding innoculant to peanuts before planting

Sub-Saharan Africa is a net importer of edible vegetable oil, protein cake and most of the meal required for the poultry industry. Nevertheless, local consumption and regional trade continue to ensure that oilseed and oil production have an important place in the agricultural economy. The drylands have agro-climatic potential for increased production of annual oil-bearing crops such as sunflower seeds and soybeans. Market demand on the continent for these crops is substantial. There is a growing understanding that national requirements for edible oil and protein cake can be met by engaging smallholder farmers in the production of annual oilseeds. Such production would permit development of the crushing industry, a basic first step for development of a food industry. In turn, this activity would create or sustain jobs to produce both oil and feed cake.

Other oil seeds

Sesame production remains a successful crop for LDC drylands. All but two countries produce the crop, and Sudan (over $100 million) and Ethiopia (up to $50 million) are major exporters, with Tanzania, Burkina Faso and Mozambique also reporting significant exports.

Other specific oilseed production is also a source of income. Sudan exports about 75% of the world's melon seeds, earning up to $10 million. Niger seed (noug or *Guizotia abyssinica*), mustard seed and linseed have also found export markets, with Ethiopia as the main exporter. These activities can be replicated in other dryland countries.

Cotton is not planted for its edible oil but rather for the fibre. However, substantial tonnages of cotton seed are a by-product; and the oil, after crushing and refining, makes a substantial contribution to the supply of national vegetable oils in Burkina Faso, Mali and other cotton-producing countries. The pressed cake is also an im-

portant raw material for animal feed.

Soybean represents a special opportunity in many countries. In the industrialized world, the oil is viewed almost as a by-product. The seeds are needed to make high-protein feed cakes. Yet demand for African soybeans is substantial only in the case of South Africa, and representatives have travelled as far north as Uganda to seek contracts for production of surpluses for export.

Soybeans are a little-known exotic crop for most smallholder farmers. In addition to economic incentives, adoption of the crop is enhanced when household utilization is encouraged together with production practices. Soybeans can provide high protein nutrition and there is growing consumption directly after crushing and cooking.

The coconut palm and oil palm are concentrated along the eastern coast (coconut palm) and in certain high-rainfall areas on or near inland lakes (oil palm). While these are not dryland crops, they provide vital income for countries such as Tanzania, Mozambique and Gambia, which have small humid regions.

Peanut harvest in Senegal

Vegetable oil production

Production quantity | 2003-2005 Av. | 1000 tons

Vegetable oils	Burkina Faso	Chad	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Coconut oil										28					20	47
Cottonseed oil	46		5				1	50		5	1	3	0	22	19	151
Groundnut oil	8		2	32			24	17	1	18	24	88		202	8	423
Linseed oil		0	19													19
Maize oil										20					21	41
Palm kernel oil											0	3			4	6
Palm oil				3								6			6	15
Rapeseed oil			8													8
Safflower oil			5													5
Sesame oil		1								1			9	54	7	72
Sunflower oil							1			4				4	10	19
Other vegetable oils	11	5	24		1		1	18		11				13	9	92
Total oils	65	6	62	35	1		27	85	1	86	25	99	9	295	103	898

Source: FAO ProdSTAT Database

Trade policy

International trade in vegetable oils is affected by agricultural support schemes in developed countries, which have at times led to surpluses that have led in turn to depressed prices. Tariffs on imported vegetable oils and oilseeds are also high in many countries. For African LDC producers, oilseed development can be considered as import substitution for oils and animal feed.

During the last two decades, trade in oilseeds and products has grown considerably, encouraged mostly by economic expansion in many regions. Most of this expansion has emanated from importing developing countries, with Asia playing a central role in recent years. With regard to oils and fats specifically, imports have surged in many developing nations as domestic demand expands faster than production. This process has been aided to some extent by increased market liberalization. In recent years a number of importing countries have shifted from imports of oils or meals to purchases of oilseeds so as to promote domestic processing and added value.

The oilseed sector is particularly affected by concern over genetically modified organisms (GMOs). Cultivation of GMO oilseeds, particularly soybeans, has rapidly expanded in recent years and accounts for the bulk of production in certain countries. This has led to separate markets for GMO and non-GMO crops, including a variable price differentiation.

Learn more
UNCTAD Atlas:
http://www.unctad.org/en/docs/ditccom20041ch23_en.pdf

http://www.fao.org/es/ESC/en/15/120/index.html

Roots and tubers

Roots and tubers are any growing plant that stores edible material in a subterranean root, corm or tuber. Root crops are essential components of the human diet in many African countries, providing energy in the form of carbohydrates. Starchy root crops are low in protein: 1-2% compared with about 7% in staple grains. However, given the scale of daily consumption of root crops, their protein contribution is often significant.

The production advantage of tuber and root crops is that they are tolerant to highly erratic rainfall and depleted soil, and tubers can be left underground for two years or more. Yet the yield of many tubers is considered to be far below their agro-botanical potential, and major research efforts are invested in increasing the yields of hybrid varieties. These crops also suffer severe yield losses due to a wide range of pests and diseases, inappropriate germplasm and post-harvest damage. As tubers are cultivated from other tubers (e.g. seed potatoes), crop diseases are passed on from one year to another and from one region to another. Innovations geared towards better seed supply, increased yields and mechanization are important for development of the sector.

Root and tuber crops, unlike cereals and legumes, remove substantial amounts of nutrients from the soil. Higher yields thus lead to soil nutrient depletion, unless soil and nutrient management strategies are applied. Poor crop husbandry in no-input or low-input smallholder systems aggravates yield losses due to late or insufficient weeding, low planting densities, inappropriate intercrops, untimely planting and harvesting, and poor processing techniques.

Until recently, root crops were regarded primarily as subsistence crops and, except for temperate zone potatoes, played only a minor role in international trade. Moreover, cassava production costs are comparatively high in the sub-Saharan region, compared to those of the major exporters – Thailand and Indonesia.

There is a consensus among African market analysts regarding the great potential for nationwide and regional trade in roots and tubers as a source of affordable foods for growing urban populations. This trade could lead to substantial increases in producers' income. Most roots and tubers (other than cassava) also have the advantage of relatively simple storage needs and available transport systems, and the crops are processed into a wide variety of food products. The current low yields, high production costs and resulting low productivity in many root and tuber systems contrast sharply with the economic opportunities.

Production quantity | 2003-2005 Av. | 1000 tons

Roots and tubers	Burkina Faso	Chad	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Cassava	2	322			8		2,123	31		8,007	125	288	83	11	6,145	17,145
Potatoes	1	28	15	490		93	1,562	67	2	81	7	6		343	228	2,922
Roots and tubers nec			85				0			6						91
Sweet potatoes	47	68		453				95	2	67	43	27	7	9	1,013	1,832
Taro (cocoyam)		38														38
Yams	48	230		196				30	2					141	10	659
Total roots and tubers	97	687	100	1,138	8	93	3,685	224	7	8,161	175	322	90	505	7,397	22,687

Source: FAO ProdSTAT Database

Cassava

Cassava (*Manihot esculenta*) is widely cultivated in most tropical countries on the equatorial belt and is adaptable to a wide range of ecosystems. Its tolerance to drought and poor soils and its high flexibility with respect to planting and harvesting time enable it to play an essential role in food security. Nevertheless, a recent survey has indicated that this is not the only role played by cassava: an average of 40% of cassava per field is planted for the purpose of sale. Cassava production in Africa has increased steadily in the last 30 years, and cassava and yams are the only crops to have kept up with the rate of growth of the population.

Almost all cassava grown in Africa is for human consumption; in South America and Asia, however, whole cassava plants are ground and used as cattle feed. Throughout Africa, 30% is consumed after peeling, cleaning and boiling, while 70% is processed into a wide array of food products.

Popular products include dry chips and flour, cooked pastes, roasted or steamed granules and beverages. Cassava is commercially processed into gari, a free-flowing, granular, fermented and gelatinized cassava product eaten as a staple food in West Africa. Kwanga is a popular fermented cassava product in Central Africa, particularly in the Congo and the Democratic Republic of the Congo, and in Cameroon, where it is called miondo and bobolo. Biscuit factories mix cassava flour and wheat flour in biscuit production, and cassava starch is produced industrially.

Cassava leaves constitute a highly prized vegetable. Cassava leaves and roots have a 7-10% protein content and, if properly processed, can provide a major nutritional supplement.

In terms of trade, most African cassava products are consumed today within the countries in which they are produced. However, there is a small but growing regional trade in dried cassava chips and other industrial products. On the international market, Thailand and Indonesia export nearly a third of their production to Europe, and exports to other Asian markets are increasing.

Potatoes

Potatoes (*Solanum tuberosum*) are a major crop in temperate climates and a critical food crop in several developing countries too. Developing countries account for approximately one third of worldwide potato production. In the LDC drylands, Malawi produces about half of all potatoes, and the crop is grown in all countries.

Though commonly consumed fresh, the potato tuber is quite versatile and may be used frozen, fried or dehydrated (flakes). Potatoes are also used for seed and animal feed.

Promotion of the crop involves greater productivity, lower production costs and better storage conditions. Integrated pest management (IPM) has proved extremely successful in South America and North Africa. Sustained expansion of these techniques, combined with cultural pro-

duction practices (improved seed) and post-harvest handling (rustic storage) will result in larger quantities of produced and marketed potatoes in sub-Saharan regions.

Over the years, traded potato supply and demand have followed divergent paths. The global volume of the potato trade is roughly 20 million tons, about half of which is processed, but this represents only 6% of world production. Because of seasonal conditions, many countries are both large exporters and importers. Potatoes for seed constitute a significant proportion of the world potato trade and of trade between national regions.

Over the past two decades, potato production in the African context has been unusual. Africa has shown the highest rate of crop area growth, but productivity is lower than in Asia and Latin America. In North Africa, demographic and income growth has contributed to a more profitable crop. In sub-Saharan Africa, rural demographic growth and the capacity to partially replace seasonal cereal shortages have contributed to the potato crop's spread. Egypt and South Africa are the main producers on the continent, but the potato area is increasing in LDC drylands as well.

Most potato exports from Africa are interregional, with Ethiopia exporting about 5,500 tons and Tanzania about 1,500. Ethiopia has considerable potential for increasing production and exports if clean seed becomes more widely available and quality standards can be maintained.

Sweet potato

Sweet potato (*Ipomoea batatas*) has become well established in East Africa and in other relatively humid areas of equatorial Africa due to its high yield in relation to land and labour, its ability to grow in relatively poor soils and its high carbohydrate and vitamin content. This is not specifically a dryland crop, but several dryland countries, particularly Tanzania, Ethiopia, Chad and Mozambique, produce large quantities of sweet potato in humid areas and use the food as a staple. Sweet potatoes can be dried and processed into many products, similar to other potatoes. Sweet potato is being developed to address vitamin A deficiency, a major disease factor for the immune system.

Yams

Yams (*Dioscorea spp.*) are annual or perennial tuber-bearing and climbing plants. Worldwide, yams are second to cassava as the most important tropical root crop and are a staple crop in many parts of Africa and South-East Asia. However, since they require an annual rainfall of about 1,000 mm, spread over five to six months, and deep, fertile, friable and well-drained soil, they are grown in only limited areas of LDC drylands. Chad, Ethiopia and Sudan are significant producers. Consumer demand for yams is generally very high in sub-Saharan Africa and yam cultivation is profitable despite high production costs. Africa is responsible for most of the world's production of yams (about 96%), with Nigeria alone accounting for nearly 75% of the total.

Besides their importance as a food source, yams also play a significant role in the socio-cultural lives of some producing regions, for example the celebrated New Yam Festival in West Africa.

Ensete

Cultivation of ensete (*Ensete ventricosum*) is limited to Ethiopia, where it is a staple food crop for the population of the southern highlands. It resembles a banana plant and is often called the "false banana". Ensete does not produce an edible fruit and is harvested as a food source before flowering. The starchy portions of the swollen pseudo-stem and the underground corm are edible. An estimated seven to eight million people in southern and south-western Ethiopia depend on fermented starchy staples prepared from ensete. There is no recorded international trade in the product.

Learn more

Cassava
International Institute of Tropical Agriculture (IITA):
http://www.iita.org/cms/details/cassava_project_details.aspx?zoneid=63&articleid=267

Roots and tubers in Africa
International Food Policy Research Institute (IFPRI):
http://www.ifpri.org/2020/BRIEFS/number66.htm

Potato
International Potato Center (CIP):
http://www.cipotato.org/pressroom/press_releases_detail.asp?cod=17&lang=en
POTATOES

http://www.potato2008.org/en/world/index.html

Pulses

Pulses are the edible dry mature seeds of leguminous crops, excluding those harvested for fresh products which are classified as vegetables. Pulses are produced worldwide. Pulse crops, especially in developing countries, are planted on marginal land and grown under rain-fed conditions, which accounts for their low yields and large year-to-year production variability. However, these nitrogen-fixing legumes also work to improve crop fertility, and are essential in rotation systems with grain.

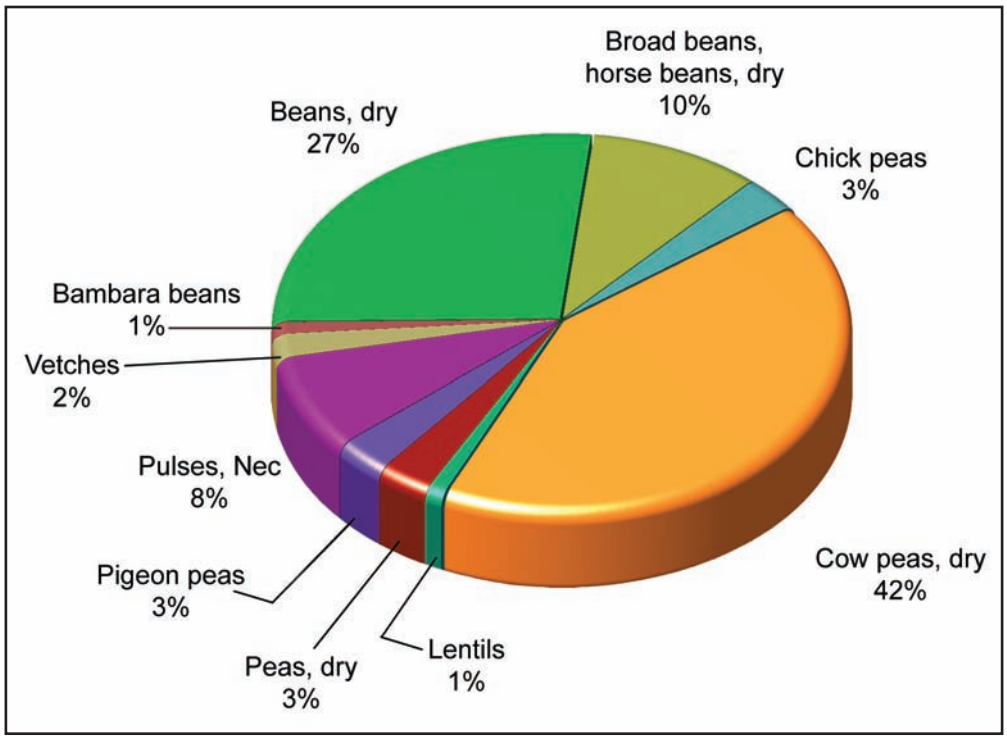
Over 60% of pulses produced are for human consumption. Pulses are also used as feedstuff, especially cowpeas in Africa and dry peas in the developed world. Worldwide, some 25% of total pulse production is used to feed livestock, particularly pigs and poultry.

Nutritionally, pulses have a high protein content and are a good source of energy. Beans are also one of the best non-meat sources of iron. Pulses are of particular importance for food security in low-income countries, where they can contribute about 10% of daily protein intake and 5% of total calorie intake.

Production quantity | 2003-2005 Av. | 1000 tons

Pulses	Burkina Faso	Chad	Djibouti	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Bambara beans	34								25								60
Beans, dry		78	2	0	156		3	90		10		9		18	13	301	680
Broad and horse beans, dry				2	499										152		653
Chick peas				2	172			34				0			12	30	251
Cow peas, dry	393								120	8		492	47			51	1,109
Lentils				0	51			2									53
Peas, dry				1	199		1	5		11		1				31	248
Pigeon peas																49	49
Pulses, nec	25	43			17	3			0	7	205	12	0		72	30	415
Vetches					117												117
Total pulses, legumes	452	121		5	1,212	3	4	131	146	35	205	514	47	18	249	492	3,634

Source: FAO ProdSTAT Database



Pulses Production in Africa

Cowpeas

Cowpeas (*Vigna unguiculata*) are the most commonly grown legume and, economically, the most important in all of Africa. The West African LDC drylands, together with Nigeria, are the largest producers. While cowpeas are grown primarily for fodder in Niger and Mali, in Nigeria and East Africa the bean is an important staple food. It is often grown intercropped with millet or other taller plants. While cowpea is frequently considered a subsistence crop, some studies suggest that as much as 50% of cowpeas are sold to market. The income-generating aspect of bean production is becoming more significant, principally near urban markets, where populations increasingly rely on beans as an inexpensive source of protein.

Beans

Dry bean seeds (*Phaseolus vulgaris*), are grown primarily for human consumption. Green leaves, green pods and immature seeds are also sold. Dry beans have the advantage of a long storage life and good nutritional properties and are easy to store and prepare for eating. Consumers have various preferences as regards seed colour and size of seed coat, but all dry beans have a similar composition and the same nutritional value.

There are also numerous types of broad beans and horse beans, which generally have a larger seed than dry beans and a broader pod.

Bambara beans are differentiated from other beans in that they grow below ground, like groundnuts. In use and taste, however, they are very similar to dry beans and become soft like other beans when cooked.

Chickpeas

Chickpeas (Cicer arietinum) are a fast-growing plant produced primarily in temperate climates and used for human consumption. In North Africa and the Middle East they are ground into humus paste as well as being eaten boiled.

Dry peas

Dry peas (Pisum sativum) are grown widely in temperate climates for high protein fodder. African production is both for human consumption and for fodder and provides several LDC drylands with significant export earnings.

Trade

Global trade in pulses has been showing an upward trend since 1980, with an annual growth rate of 7%. About 15% of world production goes into international trade. Dry peas are the largest-traded pulse, with a 37% share of the total pulse trade, followed by dry beans (28%), lentils (9%) and chickpeas (8%).

Pigeon peas for export

High-quality dry beans are exported from African LDC drylands to European markets and generate export earnings of about $15 million for Ethiopia and $5 million for the United Republic of Tanzania. Tanzania also records export earnings of $14 million for dry peas and up to $10 million for chickpeas. Ethiopia and Mali also export dry peas for about $500 a ton. In addition, there is considerable informal trade in cowpeas from Niger and other West African countries to their neighbours which is not recorded in international statistics.

Export quantity + food aid (1000 tons) | Average 2003-2005

Pulse exports	Burkina Faso	Djibouti	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mozambique	Niger	Senegal	Somalia	Tanzania, United Rep. of	Total
Beans, dry	0	4	47		0	1	0	3	1	0		10	67
Broad beans, horse beans, dry			6										6
Chick peas		3	3			2	0				0	27	35
Flour of pulses			0										0
Lentils		0	1								0	1	3
Peas, dry		0	6			9	0	4	0			26	45
Pulses, nec		1	0	0		2		2	1	0	0	1	7
Total	0	8	64	0	0	13	0	9	1	0	0	67	163

Source: FAO TradeSTAT Database

Learn more
FAO:
http://www.fao.org/inpho/content/compend/toc_main.htm

Spices

A spice is a dried seed, fruit, root, bark or vegetative substance added to food in small quantities to enhance flavour or aroma. Some spices can be used as a preservative for preventing bacterial growth. Many of these substances are also used for other purposes such as medicine, religious rituals, cosmetics and perfumery or are eaten as vegetables. In other words, spices are defined by their use and not by agricultural criteria.

The spice trade is, in a sense, the charter member of the global economy, dating back thousands of years. It is the very nature of the spice industry to carry goods that are perceived as having particular exotic, faraway and rare qualities of taste, colour and aroma. Because of their relative unavailability in northern regions and urban areas, many spices attract high prices per kilogram. But because specific qualities are valued, the quality and origin of each production batch often determines prices. At any given time, the international market unit price of unprocessed nutmeg, cloves, ginger or pepper can vary by 100-300%, depending on the source and quality.

Production quantity | 2003-2005 Av. | 1000 tons

	Burkina Faso	Djibouti	Eritrea	Ethiopia	Malawi	Mali	Niger	Senegal	Sudan	Tanzania, United Rep. of	African LDC drylands
Anise, badian, fennel, coriander				0	0						0
Chilies and peppers, dry		0		117	2	3	0	4	8	7	141
Cloves										12	12
Ginger				2							2
Hops				25							25
Nutmeg, mace and cardamoms				0	0					1	1
Pepper (*Piper spp.*)				0	1	0	2				3
Spices, nec	6		1	1	1		5				13
Vanilla					0						0
Total spices	6	0	1	145	4	3	7	4	8	20	197

Source: FAO ProdSTAT Database

Ginger

Ginger (*Zingiber officinale*) is the underground stem (rhizome) of a perennial herb and is used as a spice and a preserve. The knobby rhizome is dug up when the plant's leaves and stems wither, 6 to 12 months after planting. It is then prepared for market by either scalding to produce black ginger or by scraping and washing to produce white ginger.

Peppers

Black pepper and white pepper are both obtained from the small dried berry of the *Piper nigrum vine*. For black pepper, berries are picked while still green, allowed to ferment and then sun-dried until they shrivel and turn brownish-black. Black pepper has a hot piney taste. For white pepper, the berry is picked when fully ripe. The outer layer of shrunken skin is removed, leaving the dried grayish-white kernel. It has a milder, more delicate flavour than black pepper.

Hot red pepper is the dried fruit pod of chili peppers (*Capsicum frutescens*), one of the most pungent capsicums. Paprika is also the product of a pepper, the sweet *Capsicum annum.*

Cloves

Cloves are the dried unopened nail-shaped flower buds of the evergreen tree *Syzygium aromaticum*. They are reddish-brown and have a strong aromatic flavour and aroma. Cloves are an important ingredient in the spice blends of northern India and are widely used in Europe and America.

Processing

The high consumer price of spices represents, to a large extent, value added in the processing stages rather than in agricultural production. Some Asian and South American spice producers have recognized this and have established processing factories, often in cooperation with international spice marketers. The constraints involved in grinding before shipping include not only the administrative problem of assuring the quality standards required by food regulatory agencies, food industries and consumers, but also the chemical problem of preventing loss of essential aroma during shipment. Aromatic herbs and spices suffer rapid oxidation and flavour degradation when ground or stored in warm or humid air. Modern grinding techniques use inert refrigerants such as liquid nitrogen, liquid or solid carbon dioxide, and refrigerated storage.

The effects of these constraints are illustrated by export statistics: the United States imports about 15,000 tons per year of unground cin-

Export value (1,000 US $) | 2003

Spices export value	Burkina Faso	Djibouti	Ethiopia	Gambia	Malawi	Mali	Mauritania	Niger	Senegal	Sudan	Tanzania, United Rep. of	Total
Anise, badian, fennel, coriander			1,108		1	2				256	14	1,381
Cinnamon (canella)		3	0			50					2	55
Cloves		9	1				19	1			10,125	10,155
Ginger		213	1,639					19	0		22	1,892
Hops			268									268
Nutmeg, mace and cardamoms			161						1	7	73	242
Pepper (*Piper spp.*)			1,931		1,138	10		129	2		246	3,456
Spices, nec	5		1,279	0	56	1		16	86		33	1,477
Vanilla			29			0						29
Total	5	224	6,416	0	1,195	63	19	165	89	263	10,515	18,954

Source: FAO Trade STAT Database

namon and cassia but less than 300 tons of ground products; India exports about 40,000 tons of whole pepper and less than 100 tons of ground spice; 99% of cloves are shipped whole and virtually none as ground spice. Until these patterns are altered, the returns to developing countries from the spice trade will remain less than optimal.

Trade

Spices are, by definition, a cash crop produced or collected for sale. Wherever there is spice production, there is usually an active local market as well as exports. However, since local purchasing power is often low, prices for export far outstrip local market prices.

Several African LDC drylands and other African countries have developed fine reputations for supplying export-quality spices that attract high prices. Tanzania's evergreens supply over $10 million worth of cloves for export each year. Many Ethiopian spices are highly valued in North Africa and Europe, and exports of anise, ginger, chili peppers and other spices are a $6-million dollar export business.

Fresh nutmeg from Zanzibar

Spices in the market at Ouagadougou

Learn more

ITC:
http://www.intracen.org/mds/spices_and_herbs.htm

Spice trade:
http://www.tradeaid.org.nz/Food%20For%20Thought/Spices/History%20of%20the%20Spice%20Trade

Spices:
http://www.theepicentre.com/Spices/spiceref.html

Vegetables

Vegetables are an essential source of vitamins and nutrients in a balanced human diet. Widespread nutritional disorders, including birth defects, mental and physical retardation, weakened immune systems and blindness are caused by diets lacking in vitamins and minerals. Low vegetable and fruit intake is a major contributing factor to micronutrient deficiencies.

The vegetable sector in Africa is severely underdeveloped, and vegetable consumption remains extremely low. While annual per capita vegetable consumption in the developed world is 134 kg and the average for all developing countries is 124 kg, vegetable consumption in Africa is about half that amount: 57 kg per person. There are many reasons for this low consumption: low incomes, dietary traditions, poor year-round availability of fresh vegetables, faulty marketing systems and lack of infrastructure.

Production

The major temperate-climate vegetables – tomatoes, capsicums, onions, cabbages, melons (as well as potatoes) – are the main vegetable crops of Africa and the LDC drylands. But a host of other indigenous vegetables are also produced in different locales. Production systems for vegetables vary from crop to crop and from region to region. Most producers in the LDC drylands are smallholder farmers, but there have been several experiments involving state-run and cooperative irrigated plots. Access to water, either from sporadic rainy seasons or from irrigation systems, is critical for vegetable production in arid areas. The most prominent irrigation systems are surface irrigation using pumped water, gravity systems or hand-carried water buckets. Sprinkler and drip irrigation methods are used by larger commercial export farmers but are only beginning to appear in smallholder fields.

Traditional vegetable varieties are sufficiently hardy to produce subsistence yields under harsh conditions; however, more commercial production requires greater inputs of improved seeds, fertilizers and pest control. Today there is a two-tier system in much of the region: commercialized vegetable production geared to export markets using purchased inputs and expertise, and traditional subsistence farming using few inputs. Efforts are under way to expand the commercial systems as well as to upgrade the traditional farmers' gardens.

Exports to Europe

During the 1990s a number of African countries took advantage of increased demand from and access to the EU to diversify their agriculture, producing new crops to meet European demand. South Africa, Côte d'Ivoire, Zambia and Kenya became leaders in non-traditional crop exports, while Uganda, Ethiopia and Zimbabwe all achieved rapid growth. Exports of fresh vegetables from sub-Saharan Africa to industrialized countries climbed by 150% between 1989 and 1997. North African exports of fresh vegetables also grew dramatically.

The LDC drylands are part of this development. Exports of green beans from Ethiopia, Senegal, Gambia, Niger, Burkina Faso and the United Republic of Tanzania exceed $12 million a year. Fresh tomato exports from Senegal and Ethiopia are a $6-million business. Green peas from Tanzania and dry onions from Niger and Ethiopia are million-dollar export products.

Encouraged by the early success of several countries and sectors, every developing country with a favourable climate has written a programme for non-traditional export crop

Production quantity | 2003-2005 Av. | 1000 tons

	Burkina Faso	Chad	Djibouti	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Beans, green	7				3				1			23	6			1	41
Cabbages and other brassicas			0		163			39				142	20				363
Carrots and turnips			0		12							20	7				38
Chilies and peppers, green	7		0		73				3			20			8		111
Cucumbers and gherkins			0		1										166		167
Eggplants (aubergines)			0										13		252		265
Garlic					79							9			18	2	108
Leeks, other alliaceous veg.					2							3					5
Leguminous vegetables, nec					3			0				5				1	10
Lettuce and chicory			0		2							47					49
Maize, green																30	30
Okra	26		0										36		223		285
Onions (inc. shallots), green	17		0		20							2			1		39
Onions, dry		14			207			45	28		3	328	44	8	59	49	785
Other melons (inc. cantaloupes)			0												29		29
Peas, green					1			0								4	5
Pumpkins, squash and gourds			0					0			1		26		70		97
Tomatoes	7		1		42			35	55		8	126	83	22	529	141	1,048
Vegetables, nec	165	81	24	23	433	9	18		250	4	105	40	45	54	643	953	2,847
Watermelons			0						291	0			305	7	152		755
Total vegetables	229	95	26	23	1,041	9	18	120	628	4	116	764	584	90	2,150	1,181	7,078

Source: FAO ProdSTAT Database

development. Many African countries view this as a means of improving the livelihoods of small farmers and creating new employment opportunities. However, in the commodity chain of the international fresh fruit and vegetable trade, composed of retailers, importers, exporters and growers, it is the retailers – large supermarket chains – that call the tune. Their interest in traceability, uniform production, consistent supply and quality control has favoured more centralized production systems. In the fresh vegetable sector (particularly in Kenya, the market leader), there is a clear trend away from smallholder production and towards large-scale farming for export on exporter-owned and -leased lands.

It is questionable whether this pace of export growth from Africa can continue. Relatively slow growth in the consumption of fresh produce is expected in Europe because of limited population growth and the current high level of consumption. While LDCs and ACP countries will maintain free access to the EU, trade liberalization in the horticultural sector from 2008 will also improve access for non-preferential countries. New exotic products and niche markets such as organic and fair-trade paths may be strengthened, but these are small fractions of the main markets.

The international fresh produce market is very dynamic and innovations are constantly emerging. African vegetable farmers face a variety of constraints, such as labour shortages, water control and transportation infrastructure. Vegetables require more care and investment than grain crops, so that yields need to be safeguarded against drought, and effective post-harvest practices are required. To succeed in the market, exporting countries have to periodically review and evaluate every phase of the production system. Agricultural resources of soil, water systems and cultivars must be updated. Infrastructure requirements such as input suppliers, roads, vehicles and cold storage must be developed and maintained. Cooperatives, banks and research and extension services must operate smoothly. Policies on land use, subsidies and taxes must be adopted. In sum, horticultural export systems spur a country to establish all the systems needed for modern commercial agriculture.

African markets

In the rush to export to Europe, African domestic and regional vegetable markets have often been overlooked. Local, district and national markets provide the first outlet and are the primary clients for increased vegetable production. Investment is needed to upgrade this market infrastructure: from the most basic village market, which can benefit from a concrete floor, roof cover and direct water supply, to shaded packing sheds, roads and small trucks to carry produce from villages to urban areas, refrigeration facilities and national market information systems. Some of these facilities first sprang up to service international export initiatives. The larger need is for further development of domestic infrastructure to serve growing urban populations.

In both East and West Africa variations in climate zones between inland and coastal areas and differences in population densities encourage regional trade in many crops in different seasons. Much of this trade is considered informal and is grossly underreported in the statistics. On both coasts, free trade areas have been established to facilitate this trade.

Although the institutional arrangements are in place, several serious constraints limit market development: shortage of packing and storage facilities, absence of quality standards and commercial grading, hierarchical and non-competitive market practices, lack of accurate information on demand and market prices, and weakness of credit and financial transfer systems.

Export value (1000 US $) | Average 2003-2005

Vegetable export values	Burkina Faso	Djibouti	Ethiopia	Gambia	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Sudan	Tanzania, United Rep. of	Total
Beans, green	651		4,773	1,320	19	15			1,371	3,813	45	612	12,619
Cabbages and other brassicas	2		116		3	1						394	515
Chilies and peppers, green			4	170			85		17	12	3	105	397
Cucumbers and gherkins			54						5	5		43	107
Frozen potatoes	1		119	1						15		7	142
Garlic	0	30	21						32	12		7	103
Homogenous veg. prep												130	130
Leeks, other alliaceous veg.			99						106			69	276
Leguminous vegetables, nec	22		420						17	108		462	1,030
Lettuce and chicory			242		1	0				174		27	444
Maize, green												363	363
Onions, dry		23	966	4		10			2,567	13	15	300	3,899
Other veg., otherwise prep., not frozen		251	16		104	90				51		32	545
Other melons (inc. cantaloupes)			10				133	21		424	128	22	739
Other vegetables, dry	760	4	23		48	62			15	43	9	43	1,009
Paste of tomatoes	23	34		51		8			72	148		109	448
Peas, green			53	36	4				3	6		3,276	3,378
Potatoes			1,241	10	17	35			1			410	1,734
Tomatoes	418		941	3	10				12	4,670		79	6,131
Veg. prod for feed			0				1	96				22	119
Veg. in temp preservatives				8		43					6	49	106
Vegetables, frozen	6		507	215	45	36		51	9	61		304	1,240
Vegetables, nec	1		150	72		10			1	709	4	1,360	2,307
Watermelons	0		1			1		1		294	15	19	362
Total	2,023	342	9,803	1,890	295	314	220	195	4,296	10,647	227	8,364	38,685

Source: FAO TradeSTAT Database

Above all, the difficult transport situation between areas up and down both coasts appears to be a significant obstacle to trade. Horror stories abound of official and unofficial highway checkpoints, border controls, passage fees, customs duties, inspection delays, gendarmerie charges, impassable roads, mechanical breakdowns and outright banditry on African trade routes. Success in overcoming these obstacles may be the determining factor for the development of greater intra-African trade in perishable vegetables (and in other products too.)

Yet the constant demand for this produce will continue to encourage traders. The examples of West African vegetable trade flows in the box below are a starting point for expansion. On the east coast and in southern Africa, the latest trend is the development of large-format supermarkets in urban areas. As in developed markets, the development of a retail organization is likely to spur the organization of a supply chain for perishable vegetables.

West African fresh vegetable trade

COUNTRY	IMPORT PRODUCT	SOURCE
BURKINA FASO	Tomatoes	Ghana
	Onions	Niger
	Potatoes	Mali, Netherlands
GHANA	Tomatoes	Burkina Faso
	Carrots	Togo
	Egg plants	Burkina Faso
	Onions	Niger, Burkina Faso, Netherlands
	Potatoes	Netherlands, Burkina Faso, Mali
TOGO	Spices	Morocco, Algeria,
	Tomatoes	Burkina Faso, Ghana
	Onions	Niger, Burkina Faso
	Potatoes	Netherlands, Burkina Faso, Mali
	Peppers	Ghana, Côte d'Ivoire
BENIN	Tomatoes	Burkina Faso, Ghana,
	Carrots	Togo,
	Peppers	Togo, Ghana, Nigeria
	Onions	Niger,
	Potatoes	Netherlands, Mali

Source: ICRISAT/ ANCPIP

Learn more
World Vegetable Center (AVRDC):
http://www.avrdc.org

FAO:
http://www.fao.org/docrep/007/y5445e/y5445e00.HTM

ICRISAT :
http://www.icrisat.org/Vision/p2_chapter4.htm

African Market Garden

Mr. Mandela of Ouahigouya, Burkina Faso, is one of more than a thousand farmers throughout the western Sahel who have adopted a gravity-based drip irrigation system for vegetable farming, developed by scientists at ICRISAT-Niamey in Niger. In what is known as the African Market Garden (AMG) system, water flows under gravity pressure from a tank reservoir placed a metre or more above the level of the field. The amount of water that the crop loses through evaporation is delivered to the roots of crops through tubes laid along the rows in which the plants grow. The controlled rate of flow prevents excess water from leaching nutrients from the soil.

In the 2005/06 season Mandela planted two crops of onions on his 1,000 m² AMG, which gave him a gross income of $5,600. His neighbour, using the conventional system, was able to produce only one crop of onions which brought him just about $2,000. With the extra money Mr. Mandela was able to buy a new 9,000 m² plot to expand his AMG.

The AMG system can grow a mix of vegetables (onions, peppers, tomatoes, lettuce, potatoes) chosen to tolerate the Sahelian heat. With the irrigation system, farmers can grow higher-quality crops all year round, more than doubling the length of the growing season and the annual yield per hectare, and increasing food and income.

The AMG with the drip irrigation system in place

The African Market Garden

Sugar

Sugar cane (*Saccharum officinarum*) belongs to the grass family, and is a perennial crop. It requires a tropical climate with abundant sunlight and abundant water. In dryland countries it is typically grown in humid areas or alongside rivers where it can be irrigated by flooding.

Sugar cane typically takes about 12 months to reach maturity. Unlike many other crops, it re-grows from the roots, "ratoons", so that the plant lasts several cycles and is usually replanted only once every five years.

Most cane is milled using the centrifugal method, which yields an impure brown sugar known as raw sugar. Raw sugar can be consumed directly but most of it is processed into various types of white sugar.

The main by-products of sugar cane processing are molasses, a sweet thick syrup, and bagasse, the cane fibre that remains after extraction of the sugar juice by crushing. In most sugar-processing factories, the bagasse is burned to heat the boilers used for further sugar processing.

Almost all sugar produced in the African LDC drylands comes from cane, but Sudan and Ethiopia also produce some sugar beet, an annual root crop.

Consumption trends

World sugar consumption has increased steadily by about 2% per year for over two decades. In 2007 it was expected to reach nearly 154 million tons, with almost the entire increase coming from developing country consumers. In developed and transition economies, sugar consumption is flat or declining. Although one major factor is concern about the negative health effects of excessive consumption, the United States and the EU still encourage production at protected prices. The other factor reducing sugar consumption in the developed world is the market cost of other sweeteners, which can be lower than that of sugar. The best example is high-fructose corn syrup, which has replaced sugar in almost all sodas. In effect, subsidized corn syrup is capturing a market share previously held by protected sugar.

Historically, sugar prices were among the most volatile in world trade owing to a relatively small international market, large subsidized and protected domestic markets of major consumers, and important preferential trade agreements. Since the 1990s and the end of Cuba's preferential agreement with the Soviet Union, prices have stabilized. New demand for sugar as a biofuel crop and higher market prices in the past two years are encouraging sugar producers to expand their cane and beet sugar crops worldwide.

Sugar export value $1000	Burkina Faso	Djibouti	Ethiopia	Gambia	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	Total
Sugar, refined	4,789	546		26	6,631	210	13	2,098	275	463		1,337	5,719	22,107
Sugar, raw centrifugal	10,743		11,153	25	66,131	26	22	19,217	1	21	572	12,553	3,167	123,631
Molasses			383		74			2,134		1,134	4	6,456	800	10,985
Sugar confectionery	18	108		6		986		26	2	493	6	1	958	2,604
Total	15,550	654	11,536	56	72,836	1,225	35	23,475	331	2,113	583	20,346	10,730	159,473

Source: FAO TradeSTAT Database

Exports

Sugar is a major source of export earnings for many of the LDC drylands. Malawi, Sudan, Mozambique and the United Republic of Tanzania are among the 15 lowest-cost producers in the world. In Mozambique sugar exports represent over 35% of agricultural export earnings and in Malawi 25 %.

The EU is an attractive destination for sugar exports, with domestic prices currently double those of imports. African LDCs have benefited from duty-free entry to the EU under a quota since 2001 under the EBA initiative, and the quota will be lifted entirely in 2009.

EPAs will also allow duty-free entry to the EU. With the reform of sugar support programmes in the EU, European production is expected to fall and duty-free imports to increase. Internal sugar prices are also expected to fall as a result.

International Sugar Organization (ISO)

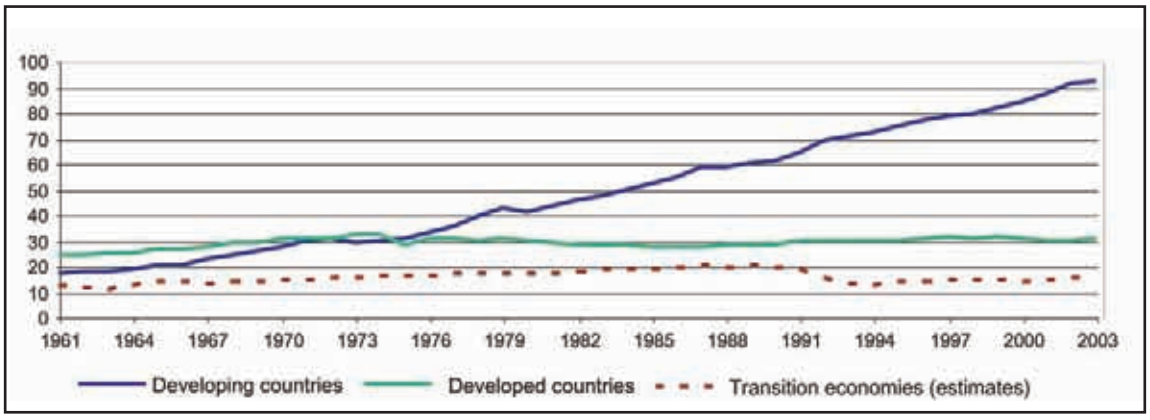
The ISO is an intergovernmental organization which administers the 1992 International Sugar Agreement (ISA). The Organization's mandate is to improve conditions in the world sugar market through debate, analysis, special studies and transparent statistics such as sugar production, usage, trade and price series.

Learn more

ISO:
http://www.sugaronline.com/ISO/isohome.asp

UNCTAD:
http://www.unctad.org/infocomm/francais/sucre/plan.htm

Sugar consumption, 1961–2003 (million metric tons)



Source: FAO, UNCTAD and USDA

Forest products

Forests are both economic and ecological resources. This dual function presents a challenge for communities and countries, which must use forests sustainably for economic benefit while maintaining their ecological functions. In dry tropical zones recurrent drought periods, together with population growth, have thrown ecosystems into turmoil. Gathering of fuel wood and extraction of other products from the forests have intensified around large towns. Traditional resource management systems are no longer able to cope effectively with these new situations. Overgrazing is increasing and fuel wood requirements are constantly rising. The preservation and sustainable utilization of forests in drylands is a key factor in the fight against desertification.

The percentage of forest cover varies greatly among the LDC drylands considered in this Atlas. Niger, Somalia, Djibouti, Lesotho and Mauritania all have less than 1% of forest cover and Ethiopia has less than 5%. In these drylands, bushland and shrubland are the dominant forest type. Gambia (48%) and the United Republic of Tanzania (43%) have the highest forest cover.

Production quantity | 2003-2005 Av. | 1000 tons

Wood products	Burkina Faso	Chad	Eritrea	Ethiopia	Gambia	Lesotho	Malawi	Mali	Mauritania	Mozambique	Niger	Senegal	Somalia	Sudan	Tanzania, United Rep. of	African LDC drylands
Industrial round wood	1,098	747		2,916	7		390	409	5	1,191	411	754	82	2,050	1,616	11,676
Wood charcoal	496	346	160	3,221	51	85	427	110	152	100	484	110	766	850	1,328	8,686
Total wood	1,673	1,109	162	6,300	165	85	1,009	536	158	1,453	899	927	890	3,084	3,598	22,049

Source: FAO TradeSTAT Database

Wood products

The most widely used product from forests is wood, used as timber, fuel wood, pulp and paper, and providing some 3.4 billion cubic metres of timber-equivalent per year worldwide. After a 60% increase between 1960 and 1990, wood consumption recorded no further growth during the 1990s, largely owing to the more efficient use of timber and paper recycling.

There is a huge demand for wood as fuel in low-income countries, and African LDC drylands in particular. For most of the population of Africa, wood is the main energy source for heating and cooking. While collection of wood for fuel

Charcoal manufacture

is generally a less important cause of deforestation than forest clearance for farming, it is a prime cause of the loss of African tropical forests, particularly in the areas around towns and cities which still rely on wood for energy. In the Sudan and Sahelian regions there has been a decline in consumption of wood products from 1 to 0.74 m3 per person per year in recent years. It is assumed that this reduction is due to the shortage of fuel wood around urban areas.

The second major use of wood is as industrial roundwood, a category that encompasses building material, paper and packaging. African nations produce industrial roundwood primarily for their own building needs. Industrialized nations both produce and consume more than twice as much industrial roundwood as developing countries.

Non-wood forest products

In most tropical countries non-wood forest products (NWFPs) play an important role in the daily life and wellbeing of the local population. In particular, rural and poor people depend on NWFPs as sources of food, fodder, medicines, gums, resins, construction material and other necessities. NWFPs may be gathered from the wild or produced in forest plantations or agroforestry schemes and from trees outside forests. In addition to local consumption, many NWFPs are also important traded commodities that can be found in local, regional and national markets. Traded NWFPs provide employment and income. Some internationally traded NWFPs, such as gum arabic, beeswax, aromatic oils, exudates such as frankincense and medicinal plants command high prices and contribute to national economic development. Some of these products (such as shea nuts and cloves) have been discussed already as part of their commodity group.

The use of traded NWFPs depends on national or international demand and has a history of encouraging substitutions. Famously, strategic shortages of rubber during the Second World War led to the development of the plastics industry. A few years ago world demand for cork vastly exceeded supply. As a result, artificial cork stoppers became accepted in the wine industry and cork demand fell drastically. Similarly, the food industry found substitutes for gum arabic after serious supply problems in the 1970s.

Most NWFPs are collected as common goods with free access and few restrictions. However,

Removals of non-wood forest products		Ethiopia	Niger	Senegal	Sudan
Food	(t)	n.a.	n.a.	5,000	n.a.
Raw material for medicine and aromatic products	(t)	n.a.	n.a.	400	n.a.
Raw material for colorants and dyes	(t)	n.a.	n.a.	10	n.a.
Raw material for utensils, crafts & construction	(t)	n.a.	4,079	205	n.a.
Exudates (gums and resins)	(t)	6,557	5,000	1,200	n.a.
Living animals	(units)	n.a.	n.a.	725,000	663,712
Hides, skins and trophies	(units)	n.a.	n.a.	n.a.	1,388,515
Wild honey and beeswax	(t)	n.a.	n.a.	900	n.a.
Bush meat	(t)	n.a.	n.a.	90	664

Source: FAO, Global Forest Resources Assessment 2005

there is a tendency in the case of some valuable and rare NWFPs to move from common to private property. In Burkina Faso, for example, wildlife is increasingly considered as private property. In Chad conflicts have arisen between farmers and nomads over the exploitation of gum arabic. Traditionally, gum tapping has been carried out by pastoralists; however, in view of the increasing prices paid for gum, a growing number of farmers are becoming interested in collecting gum on their own territory, and new arrangements have to be negotiated to clarify property rights.

There is very little statistical data on the exploitation of and trade in NWFPs. Unlike timber and agricultural products, there is no regular monitoring of NWFPs at the national level. Information is therefore limited to select NWFPs that are nationally important and extrapolations are often made on the basis of case studies. But just like timber, these non-timber resources can also be over-harvested, especially when local products gain access to large urban markets. Without statistics it is difficult to judge when that point will be reached.

Medicinal plants

The traditional use of medicinal plants is common in African countries, and the most important plants used in traditional medicine can be found in local and national markets. In Burkina Faso, Niger, Ethiopia and the United Republic of Tanzania, and probably in other countries as well, over 80% of the population use medicinal plants. Medicinal plants are used directly by the people themselves and by traditional healers. In Ethiopia, for example, over 600 plant species are used directly as medicinal plants. In fact, the use of medicinal plants is an important component of the national healthcare system. The importance of traditional medicine is highlighted by the number of traditional healers as compared with Western-trained medical doctors; some studies show a ratio of almost or more than 100 to 1.

Some medicinal plants are also used by the modern pharmaceutical industry. The high demand for specific species and their products (e.g. *Prunus africana*, *Warburgia salutaris*) leads to higher prices (which do not automatically correspond to higher benefits for collectors) and over-exploitation of the resources. To overcome dependence on the wild resource and its irregular supply and chemical composition, there is a tendency to domesticate highly valuable medicinal plants and find synthetic substitutes.

In Tanzania, important exported medicinal plants include *Cinchona sp*. This exotic species is grown in plantations for its bark, which is exported for several hundred thousand dollars. Over $1 million of *Prunus africana* bark is exported from other African countries for use in a variety of Western pharmaceuticals.

Honey and beeswax

Wild honey and domesticated honey from bees are important products in Ethiopia, Sudan, Tanzania and Mozambique; and Ethiopia is one of the five biggest wax-producing countries.

Honey is sweet, thick, supersaturated sugar solution manufactured by bees to feed their larvae and for subsistence in winter. It can be collected from bee colonies found in forests or from man-made hives which attract and keep bees. In the African producing countries, it is primarily a small-scale rural agricultural industry, used as a source of cash income for peasant farmers.

Bassari wicker beehive

Ethiopia reportedly has the largest bee population in Africa, with over 10 million bee colonies, three quarters of which are man-made. The productivity of honeybees in traditional hives is low: 5-6 kg of honey are harvested per hive/year. Improved frame hives can double productivity. Current honey production is about 25,000 tons per year. About 80% of Ethiopian honey is used to produce *Tej*, alcoholic mead consumed locally. Very little of the honey meets international market standards. However, as domestic prices are close to international levels, production for export is not a major concern. Some supplies are exported for consumption in neighbouring countries.

Bee products do not come without some costs to forests. Bee hunting is said to contribute to degradation of forests and woodlands owing to

the use of fire, with its high risk of starting bushfires. Even domesticated bee production has a downside. Beehives are constructed from the bark of the *Podocarpus sp.* tree, which is said to be under pressure as a result.

Gums and resins

Gums and resins, also know as exudates, are polysaccharide gums extracted from wild tree bark, sap, roots, fruits, flowers, and seeds of a diversity of plant species and then processed. These products have a variety of uses in the food, pharmaceutical and cosmetics industry.

The most widely utilized exudate is gum arabic. The term "gum arabic" includes two different types of gum which are produced and marketed in roughly equal quantities on the world market. Hard gum, known as "hashab" in Sudan, "kitir" in Chad and "first quality" in Mali, is exuded from the *Acacia senegal* tree.

The other type of gum, known as "talha" in Sudan and Chad and as "second quality" in Mali, is a flaky or crumbly variety that originates from another type of acacia tree, the *Acacia seyal.* Gum from the *Acacia seyal* has made its appearance more recently on the world market.

Gum arabic can be collected from wild trees, but the tree can be cultivated in plantations to improve yield and consistency. Sudan has a long history of organized production and export of gum arabic and accounts for about 40% of world exports. Every acacia tree in Sudan is under the recognized ownership of somebody who has the right to look after and tap the tree. The initial pre-export processing and marketing are in the hands of a public monopoly, the Gum Arabic Company, which sets the local and export price for the commodity.Chad is also a major producer, accounting for almost 20% of world exports. Among the LDC drylands, Senegal, Mauritania, Mali, Burkina Faso, Niger, Ethiopia, Somalia and the United Republic of Tanzania are all reported as gum producers, but quantity and quality vary greatly.

Olibanum or frankincense (*Boswellia papyrifera*), myrrh (*Commiphora myrrha*) and opopanax (*Commiphora sp.*) are other important exudates. Olibanum and myrrh are used in an unprocessed form for fragrance and flavour purposes. Sudan and Ethiopia are the most important providers of olibanum to the world market, while Somalia is the world's biggest exporter of myrrh and opopanax resins. In Ethiopia, it is estimated that over 20,000 seasonal workers engage in tapping and grading of olibanum, and exports are apparently valued in millions of dollars.

Fodder

Forage collected and grazed from forest areas is an important source of additional fodder, especially during the dry season. During this season, tree forage contributes 25% of the fodder supply for ruminants in Niger and similar amounts in neighbouring countries and in the east.

Learn more
NWFPs:
http://www.fao.org/docrep/003/y1515b/y1515b00.HTM

Beekeeping:
http://www.beesfordevelopment.org

Gum arabic:
http://www.worldbank.org/afr/rd_meeting/2002/arab_rpt_chniml.pdf

Tobacco

Tobacco (*Nicotiana tabacum*) is the world's largest cultivated non-food crop. Because it is essentially a weed, tobacco is grown mostly on marginalized land that is too poor and offers very little nutrition for most other food crops. Tobacco can tolerate wide variations in rainfall patterns while still yielding a commercially viable crop. In many developing countries tobacco is a highly profitable cash crop for both large and small farmers.

Production quantity | 2003-2005 Av. | 1000 tons

	Malawi	Mozambique	Tanzania, United Rep. of	African LDC dry-lands
Tobacco, unmanufactured	70	12	36	123

Tobacco has been grown in Africa for over a hundred years. Among the LDC drylands, Malawi, the United Republic of Tanzania and Mozambique are the major producers, with some production in Burkina Faso, Mali and Ethiopia. Uganda, Zambia, South Africa and Kenya are also significant African producers. Zimbabwe was a major tobacco producer a decade ago, but almost all of its 1,500 commercial growers have left, with many re-establishing themselves in neighbouring countries.

In Africa the vast majority of tobacco growers are smallholders, cultivating tobacco on plots of under one hectare. As tobacco is solely a cash crop, the industry is well organized in African countries and farmers tend to be well equipped with technology and skills. Many areas operate a system of contract farming: marketing or manufacturing entities provide inputs, set the price and contract smallholder farmers to produce cash crops. The advantages of these systems are that they offer smallholders an employment opportunity to engage in modern technical agriculture. Yet a World Bank study reported that these farmers nevertheless remain in poverty.

Consumption trends

Because of proven health dangers and under the impact of the anti-smoking lobby in industrial nations, most developed countries have strengthened anti-smoking education, imposed limits on advertising and demanded the placement of health warnings on cigarette packages. In high-income countries smoking is declining. As a result, cigarette manufacturers are increasingly targeting developing countries. Worldwide, smoking is on the rise among males in most low- and middle-income countries and among women. Thus while demand by major trade partners such as the United States and the EU is expected to weaken in the longer term, tobacco production is also expected to decline in developed countries, giving an opportunity for expansion of production in Africa.

At the same time, there is increasing international pressure on all countries, including African LDCs, to discourage tobacco consumption. In 2003 African delegates signed the Framework Convention on Tobacco Control (FCTC) of the World Health Organization (WHO). Once in force, the Convention requires countries to ban or set tough restrictions on tobacco advertising, sponsorship and promotion within five years. The Convention includes mechanisms to provide long-term support for countries in which tobacco farming is an economic mainstay. The World Bank and the EU have urged producer countries to reduce dependence and invest in rural development, and have offered assistance for crop diversification.

The campaign against tobacco is not limited to the dangers of smoking. Some lobby groups claim that the tobacco industry in Africa is characterized by precarious labour conditions, including the use of child labour and exposure to highly toxic products. Tobacco also allegedly contributes to deforestation through the burning of fuel wood for curing the tobacco leaf, the use of wood to construct curing huts and the need to clear land for cultivation.

Malawi

The global campaign against smoking poses a daunting challenge for Malawi, a country almost entirely dependent on tobacco for government revenue, employment and development financing. After the Government, the tobacco industry is the second largest employer. Tobacco accounts for over 56% of all agricultural export earnings and hence of total export earnings.

In the very long term, it is likely that tobacco production will not be a sustainable activity. Until then, however, tobacco in Malawi will remain the dominant and profitable cash crop. Declining production in developed countries strengthens demand for Malawi's tobacco, major infrastructure investments are in place, and extension and input systems for tobacco are the envy of every other sector. To address the challenge, the Malawian Government recently issued a draft economic strategy to encourage eventual diversification into alternative cash crops and the development of other sectors, such as mining and tourism.

Partnerships that pay

Lemson David has worked for Moçambique Leaf Tobacco (MLT) for the last seven years as a leaf technician. He visits the tobacco farmers in his area throughout the season to provide information and services on all stages of growing tobacco. But recently, as a result of a partnership with ICRISAT, David has started to teach his farmers how to grow groundnuts as part of the crop diversification effort.

By partnering with MLT, ICRISAT was able to work with large numbers of farmers and rapidly spread new varieties. For example, David gave each farmer in his area (around 2,000 farmers) 40 kg of groundnut seed from ICRISAT. He asked them to sell the remainder of their yield after keeping enough seed for the subsequent season.

As a nitrogen-fixing crop, groundnut is a good choice to grow after tobacco. “Farmers are starting to notice differences in soil fertility”, David says. “Tobacco only provides a monetary benefit, but with groundnut they benefit from soil fertility and food as well.”

Learn more
UNCTAD:
http://www.unctad.org/infocomm/francais/tabac/plan.htm

World Bank:
www1.worldbank.org/tobacco/pdf/country%20briefs/AfricaRegion.doc

Acronyms

ACP	Africa, Caribbean, Pacific
AGOA	African Growth and Opportunities Act
ANCPIP	Association des Professionnels de l'Irrigation Privée et des Activités Connexes (Burkina Faso)
AVRDC	World Vegetable Center
BSE	bovine spongiform encephalopathy
CAP	Common Agricultural Policy
CBPP	contagious bovine pleuropneumonia
CEMAC	Economic and Monetary Community of Central Africa
CFC	Common Fund for Commodities
CGIAR	Consultative Group on International Agricultural Research
CIP	International Potato Center
CNSL	cashew nut shell liquid
COMESA	Common Market for Eastern and Southern Africa
DFQF	duty-free quota-free
EAC	East African Community
EBA	Everything But Arms
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EPA	Economic Partnership Agreement
EU	European Union
FAO	United Nations Food and Agriculture Organization
FCTC	Framework Convention on Tobacco Control
FLO	Fairtrade Labelling Organization
FMD	foot and mouth disease
GMO	genetically modified organisms
GSP	generalized system of preferences
IBAR	Interafrican Bureau for Animal Resources
ICAC	International Cotton Advisory Committee
ICO	International Coffee Organization
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFATPC	International Food and Agriculture Trade Policy Council
IFPRI	International Food Policy Research Institute
IGAD	Intergovernmental Authority on Development
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IOE	International Office of Epizootics
ISO	International Sugar Organization
IPM	integrated pest management
ITC	International Trade Centre
KILICAFE	Association of Kilimanjaro Specialty Coffee Growers
LDC	least developed country
MLT	Moçambique Leaf Tobacco
NAP	National Action Programme
NEPAD	New Partnership for Africa's Development
NERICA	New Rice for Africa
NWFP	non-wood forest product
OMBEVI	Office Malien du Betail et de la Viande

PPLPI	Pro-Poor Livestock Policy Initiative
PPR	peste des petit ruminants
SACU	South African Customs Union
SADC	Southern African Development Community
SOFIA	State of World Fisheries and Aquaculture
UEMOA	West African Economic and Monetary Union
UNCCD	United Nations Convention to Combat Desertification
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WARDA	Africa Rice Center
WHO	World Health Organization
WTO	World Trade Organization

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