

Trends in the crop sector

Cereals are overwhelmingly the major source of food supplies for direct human consumption. Of the 2.4 billion tonnes of cereals currently produced, roughly 1.1 billion tonnes are destined for food use, around 800 million tonnes (35 percent of world consumption) are used as animal feed, and the remaining 500 million tonnes are diverted to industrial usage, seed or are wasted. Thus, events in the cereal sector have critical implications for world food supplies.

The growth rate of world cereal production fell to 1 percent per annum in the 1990s, down from 1.6 percent in the 1980s and almost 3 percent in the 1970s. Over 2000-03, growth had dwindled to a fifth of a percentage point per annum, but since that time the rate of output has dramatically increased to the realm of 2.5 percent.

Transient factors, sometimes taking several years to dissipate, have temporarily altered the underlying trajectory of global growth in the cereal sector. These factors can work either direction. For instance, whereas in the 1960s, growth was being propelled by the Green Revolution, in the 1990s demand fell in the transition economies, where such demand had previously been kept artificially high for decades through subsidies on food consumption. Demand also grew more slowly in the second half of the 1990s, as the East Asian economies that were hit by economic crisis; while weather problems, low prices and an abundance of stocks depressed growth at the beginning of the following decade. In recent years, global demand growth is expected to have slowed owing to economic downturns in many major consuming countries.

Overall, however, a set of longer term influences, are limiting demand growth, especially in the food sector. These include slowing population growth, a lower scope for expanded dietary intake in the populations of wealthy countries and entrenched poverty. Such factors prevent hundreds of millions of people from effectively expressing their food needs.

Map 38:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.RI.QP, p. 276](#) 

- 672 million tonnes of rice (paddy) were harvested in 2010
- Rice is the principle staple in Asia, where production is rising in the South but falling in the East
- Rice is also a highly sought after staple in many parts of sub-Saharan Africa

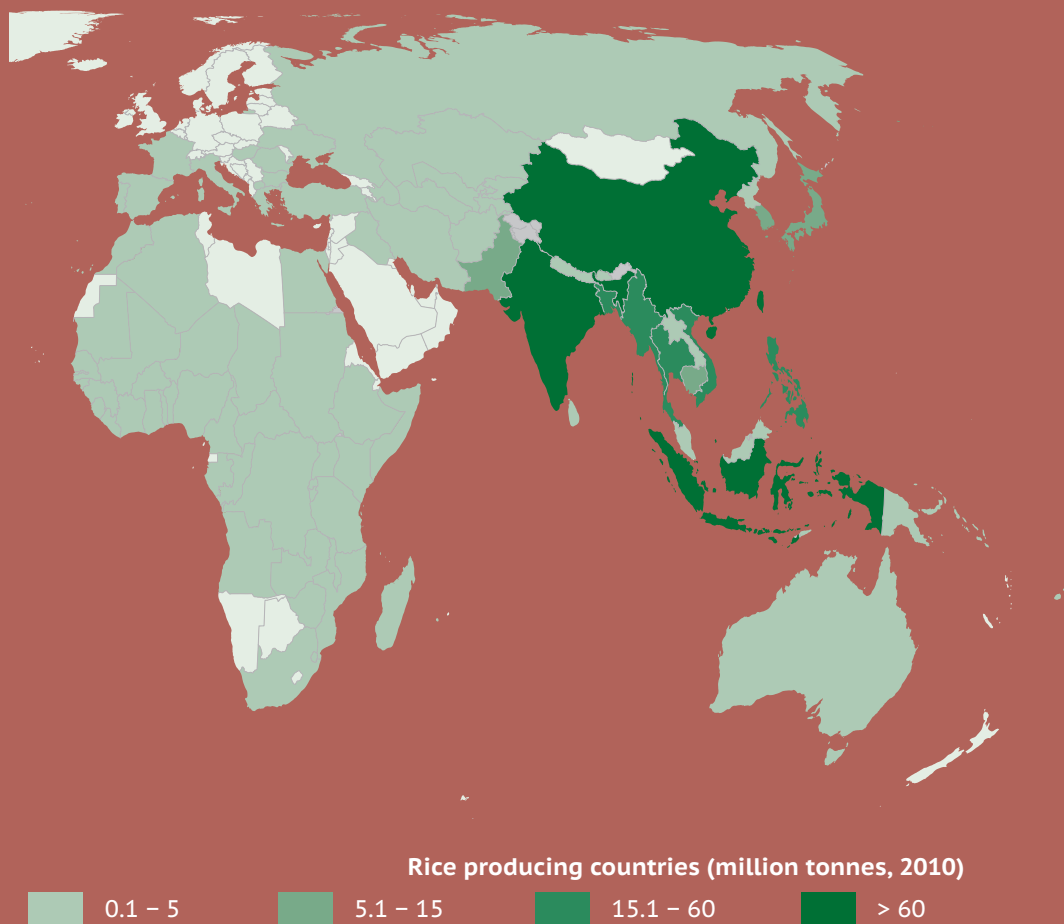
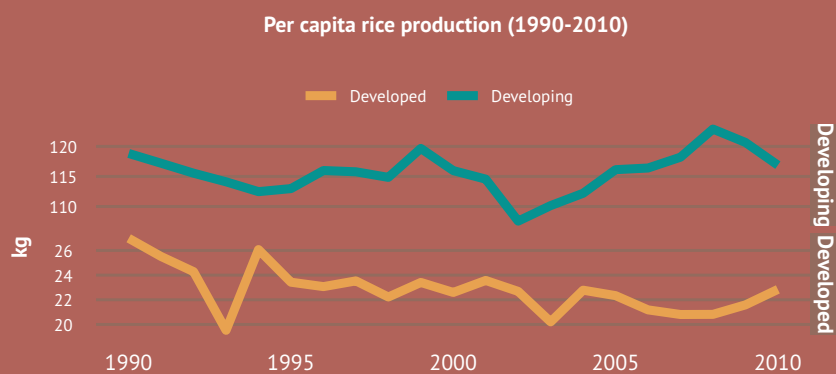


Chart 71: Despite falling per capita consumption in China, rice is still the preferred or only available domestic staple in many countries in Asia, providing support to production



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.RI.QPPC](https://doi.org/10.1017/9781107304423.010), p. 276 

In recent times, cereal production has been significantly altered by structural changes in the non-food sector that have given rise to fast growth. These changes include the meeting of feed requirements of rapidly rising and intensifying livestock sectors and demands for cereals as feedstocks in the bio-based economy, especially in the fuel ethanol sector.

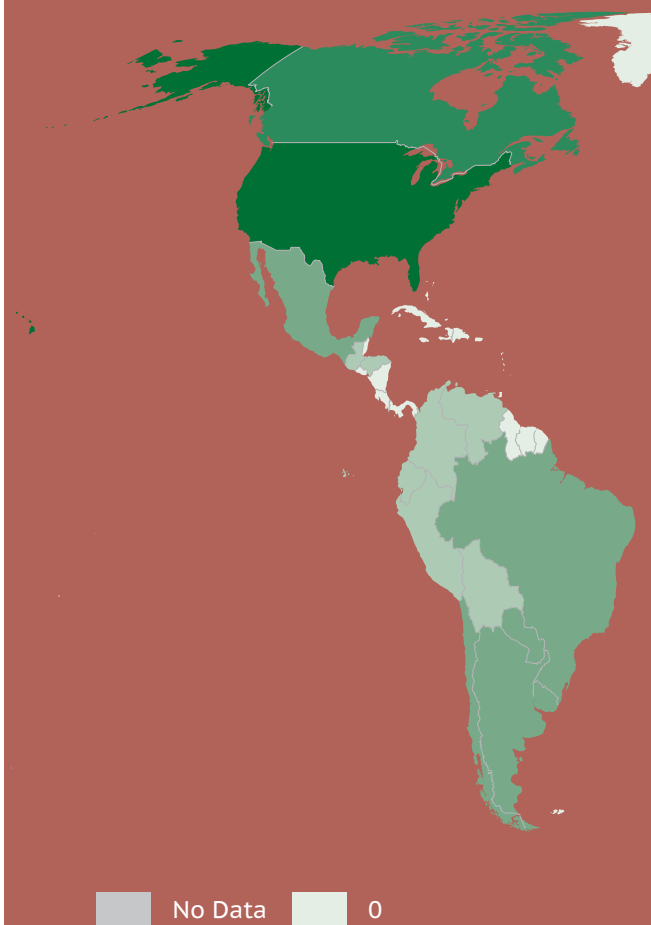
The geographical concentration of major grain supplies against the geographical dispersion of demand suggests that trade will continue to be important in fulfilling grain requirements, particularly for **wheat** and **maize**. With production mainly located in the temperate zones of developed countries, rising requirements in developing countries has meant rising dependence on exports by them.

While **rice** is produced in vast areas of the world, the physical requirements for growing this crop are limited to certain zones. Economically viable cultivation typically requires high average temperatures during the growing season, abundant supplies of water applied in a timely manner combined with smooth land surfaces to facilitate uniform flooding and drainage, and a subsoil stratum that inhibits the percolation of water.

The bulk of world rice production is destined for food use, although some quantities are used in domestic animal feeding. Rice is the primary staple for more than half the world's population, with Asia representing the largest producing and consuming region. In recent years, rice has also become an important staple throughout Africa.

At the global level, the growth of demand in rice has been tailing off, as evidenced in several large producing and consuming countries of South and East Asia, as consumption has shifted to other foodstuffs in line with income growth. Given the importance of these regions in world rice consumption, these declines are reflected in the aggregate trends of the world.

Map 39:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.WT.QP](https://www.fao.org/faostat/tables/en/P3.FEED.FAO.ESS.WT.QP), p. 278 

- World output of wheat stands at around 651 million tonnes
- Mainly grown in temperate climates, China is currently the world's largest wheat producing country

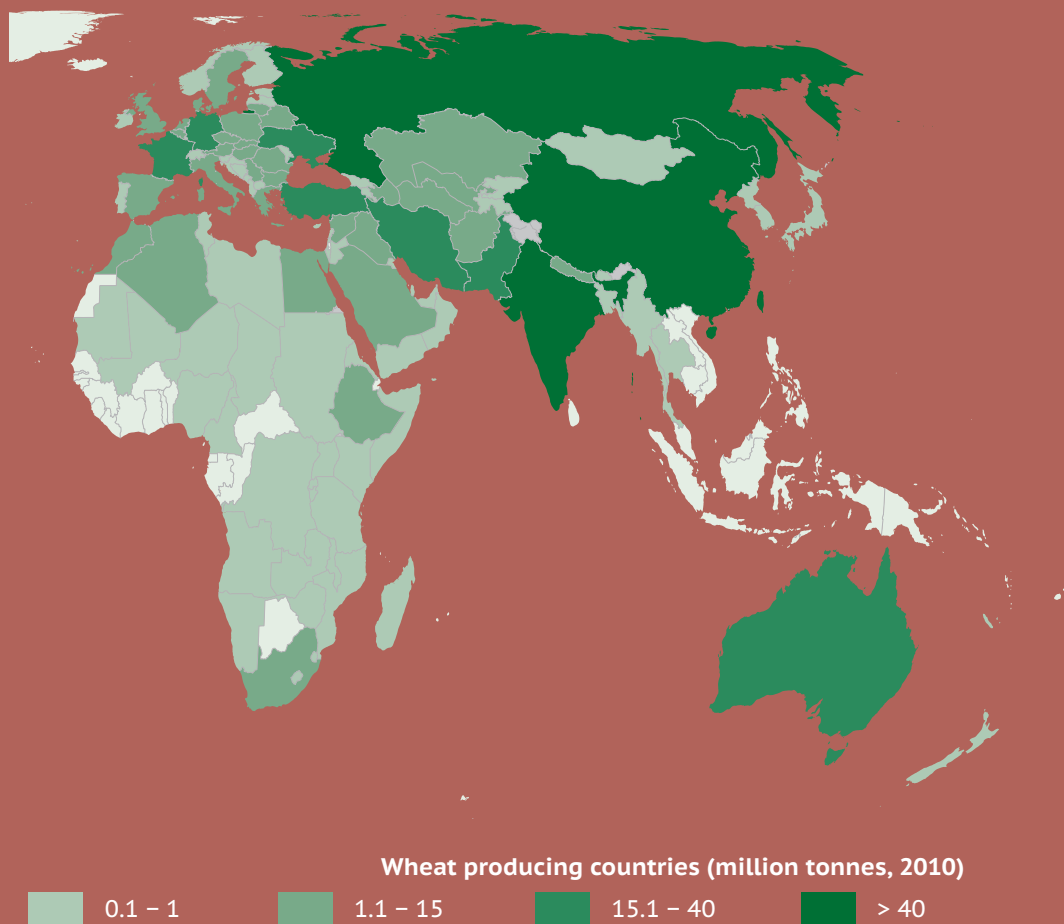
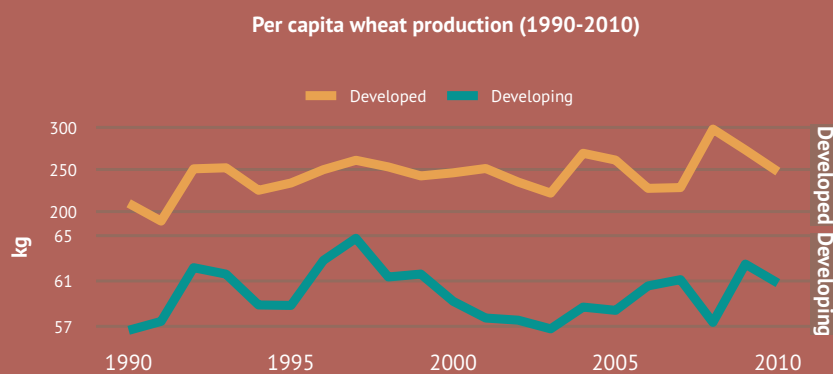


Chart 72: Agroclimatic conditions favour the cultivation of wheat in developed countries, where it constitutes the major staple



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.WT.QPPC](#), p. 278 

More of the earth's surface is covered by **wheat** than with any other food crop. Wheat is the third most-produced cereal after maize and rice, but in terms of dietary intake, it is currently second to rice as the main food crop, given the more extensive use of maize as an animal feed.

As a hardy crop, which can grow in a wide range of environmental conditions and that permits large-scale cultivation as well as long-term storage of food, wheat has been key to the emergence of city-based societies for millennia. Currently, around 70 percent of this crop is used for food, 19 percent for animal feed and the remaining 11 percent is used in industrial applications, including biofuels.

Growth in global consumption of wheat has been facilitated by imports, particularly by developing nations. These countries include both the many tropical non-producing countries as well as those that face increasingly binding land and water constraints to increase production, especially in the Near East.

With an ability to grow in diverse climates, **maize** – the world's primary coarse grain – is cultivated in most parts of the world, although the vast quantity of production is concentrated in the Americas, especially the United States of America. In that country, transgenic (genetically modified) maize accounts for 85 percent of plantings.

Overall, the pattern of the world coarse grains economy has undergone drastic change in the location of consumption. The major export markets have shifted increasingly to the developing countries. Pronounced growth in animal feed usage has been a major driving force in developing countries, especially in China.

Currently, about 55 percent of world consumption of coarse grains is used for animal feed, but in many countries (mainly in sub-Saharan Africa and Latin America) they are also directly used for human consumption. At the global level, about 17 percent of aggregate consumption of coarse grains is devoted to food, but the share rises to as much as 80 percent in sub-Saharan Africa. There, maize, millet, sorghum and other coarse grains (e.g. tef in Ethiopia) account for 3 out of every 4 kg of cereals consumed as food.

Rising industrial utilization of coarse grains has provided strong support to the sector, led by the growth of maize-based ethanol in the United States of America. At present, almost 40 percent of the crop – 111 million tonnes – is used for biofuel production, which represents an eight-fold increase in the span of just ten years. Though for every tonne of maize processed for ethanol, around a third is returned as a by-product in the form of distillers grains, which can directly displace maize.

Map 40:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.CG.QP](https://www.fao.org/faostat/tables/en/P3.FEED.FAO.ESS.CG.QP), p. 271 

- 1.1 billion tonnes of coarse grains were produced in 2010 for the global food, feed, industrial and energy sector
- Maize is the most important coarse grain, accounting for 74 percent of aggregate output

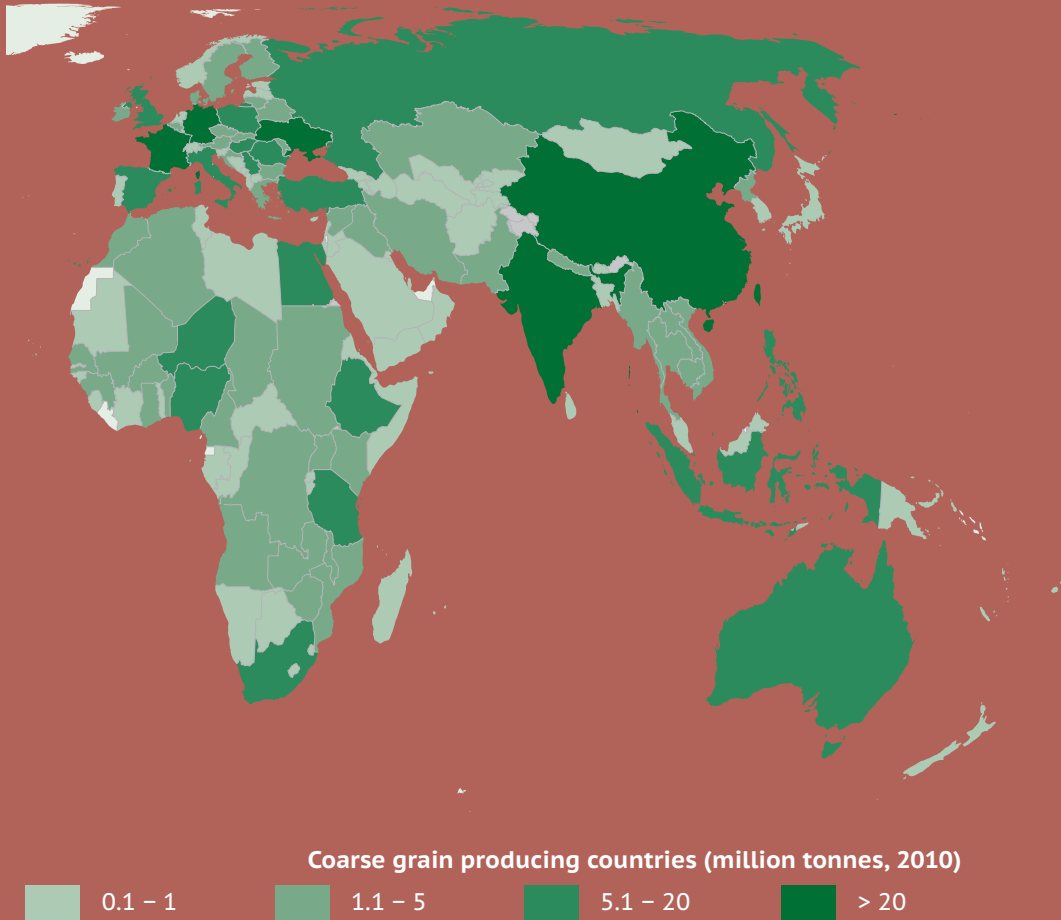
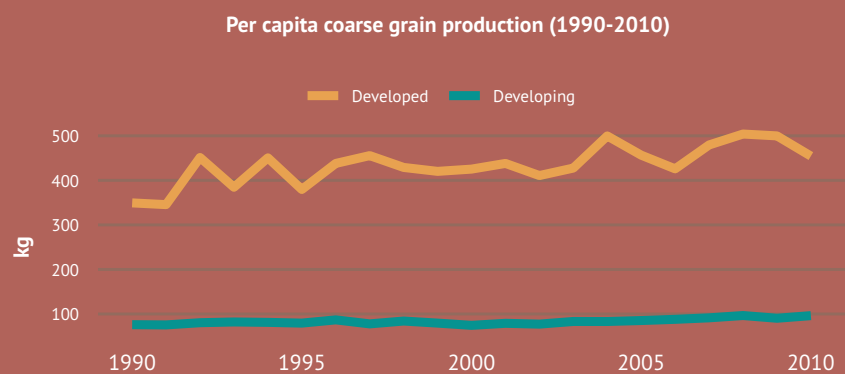


Chart 73: Non-food uses of coarse grain, especially as a feedstock in bioenergy production, has provided support to production in developed countries on a per capita basis



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.CG.QPPC](https://doi.org/10.18125/FAO/ESS.CG.QPPC), p. 271 

In recent decades, the **oilcrops** sector has been one of the most vibrant in world agriculture. Over the past 20 years the sector grew at 4.3 percent per annum compared with an average of 2.3 percent per annum for all agriculture. The major driving force has been the growth of food consumption in developing countries, mostly in the form of vegetable oil but also direct consumption of soybeans, groundnuts, etc., as well as in the form of derived products other than oil.

Food demand in developing countries has accounted for around 40 percent of the increases in world output during the last two decades (with output measured in oil content equivalent). China, India and a few other countries represent the bulk of this increase. In addition, the strong growth in demand for protein products for animal feed has been a major supporting factor in the buoyancy of the oilcrops sector.

The rapid growth of the oilcrops sector illustrates the synergy of the two fastest rising components of food demand: demand for oils favouring all oilcrops with the potential for rapid production expansion (e.g. oil-palm), and that for livestock products favouring oilcrops with high protein oilmeals for feed (e.g. soybeans).

In fact, the demand for protein meals for animal feed has also contributed to changes in the geographical distribution of oilseeds production. The latter has shifted towards countries that could produce and export oilseeds of high protein content, in which oilmeals are not by-products but rather joint products with oil, e.g. soybeans in South America.

In addition, support policies of the European Union (EU) also helped shift world production of oilseeds in favour of rapeseed and sunflowerseed.

Overall, four oilcrops (oil-palm, soybeans, rapeseed and sunflowerseed) now account for 75 percent of world production. For several countries, including some major producers, these fast expanding oilcrops were once hardly cultivated at all, or only in insignificant amounts.

Map 41:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.OS.QP](https://www.fao.org/faostat/tables/P3.FEED.FAO.ESS.OS.QP), p. 274 

- 168 million tonnes of oilseeds and oil-bearing crops were gathered in 2010
- This volume represents a significant increase compared to the level two decades ago
- Soybeans, rapeseed and sunflower are the major oilcrops in temperate zones, while palmoil fruit is the major oil-bearing crop in the tropics, increasingly cultivated in Southeast Asia

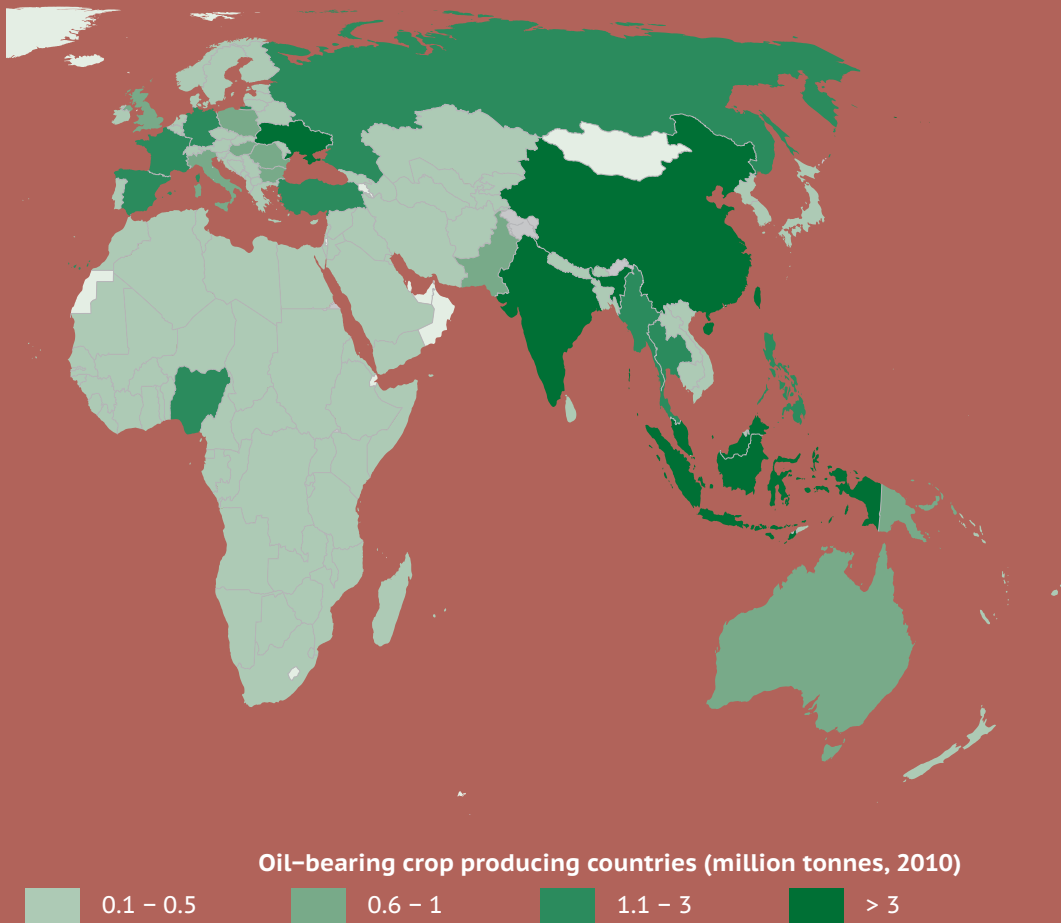
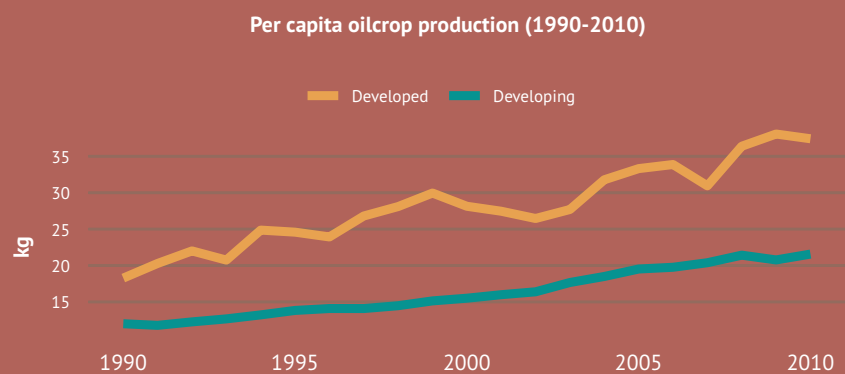


Chart 74: Rising food and industrial usage has resulted in the oilcrop sector being one of the most dynamic among commodity sectors



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.OS.QPPC](#), p. 274 

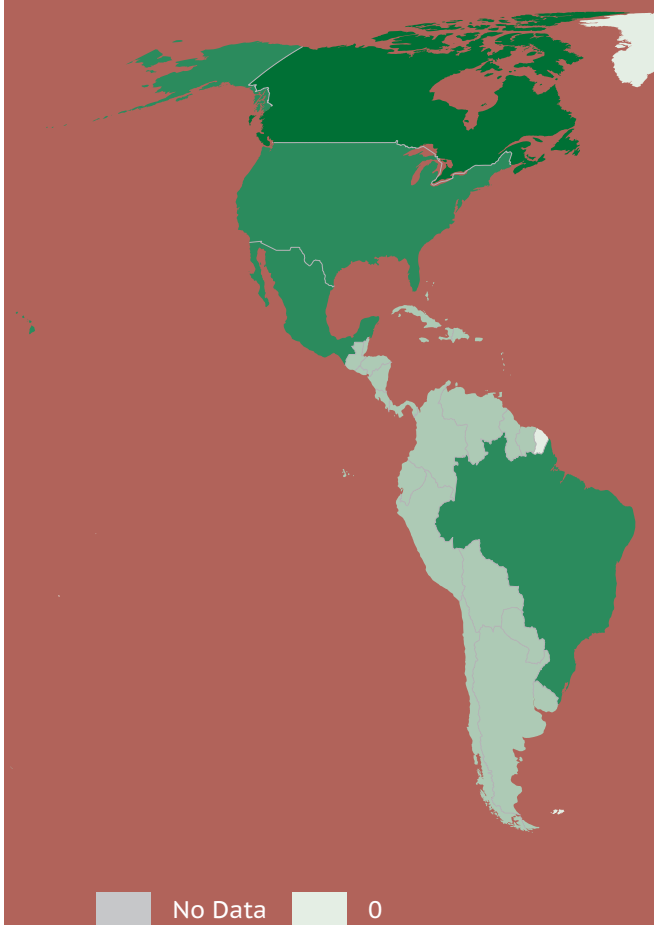
Although the oilcrops sector is increasingly dominated by a small number of crops and countries, the more traditional oilcrops continue to be a major element in the food supply and food security situation in many countries. Examples include groundnuts and sesame seed in the Sudan and Myanmar, coconuts in the Philippines and in Sri Lanka, olive oil in the Mediterranean countries, cottonseed oil in the countries of Central Asia and those in the Sahel.

Another major driving force has been the non-food industrial use of vegetable oils, with China and the EU being major contributors to this growth. In terms of actual oil produced and used, the world currently uses some 40 percent of supply for non-food applications. Two decades ago the share was less than half of this. The main industrial products involved include paints, detergents, lubricants, oleochemicals in general and, increasingly, biodiesel. These are commodities for which world demand can be expected to grow much faster than the demand for food.

Pulses are an important constituent in local food crops in developing countries. They are a key source of protein in the diets of the world's poorest countries. In farming systems, pulses represent an input-saving and resource-conserving technology though biologically fixing nitrogen to reduce the need for chemical fertilizer and reduce soil pathogens. A substantial part of the historical growth in Australia's cereal yields, for example, is attributed to the introduction of legumes in rotation systems.

The nutritional and environmental benefits of pulses are being realized in sub-Saharan Africa, where per capita production has increased by almost 4 kg per annum in the last decade. However, at the global level, changes in consumer preferences, feed rations and the relegation of pulses to secondary crop status in the agricultural policies of other developing regions, notably Asia and Latin America and the Caribbean, has left the global level of production growth markedly stagnant and lagging well behind population growth.

Map 42:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.PS.QP, p. 275](#) 

- Around 68 million tonnes of pulses were produced in 2010
- Production is geographically diverse where the crop plays varying roles in food and animal feed economies
- In India, the commodity forms an important staple as a source of protein in vegetal-based diets

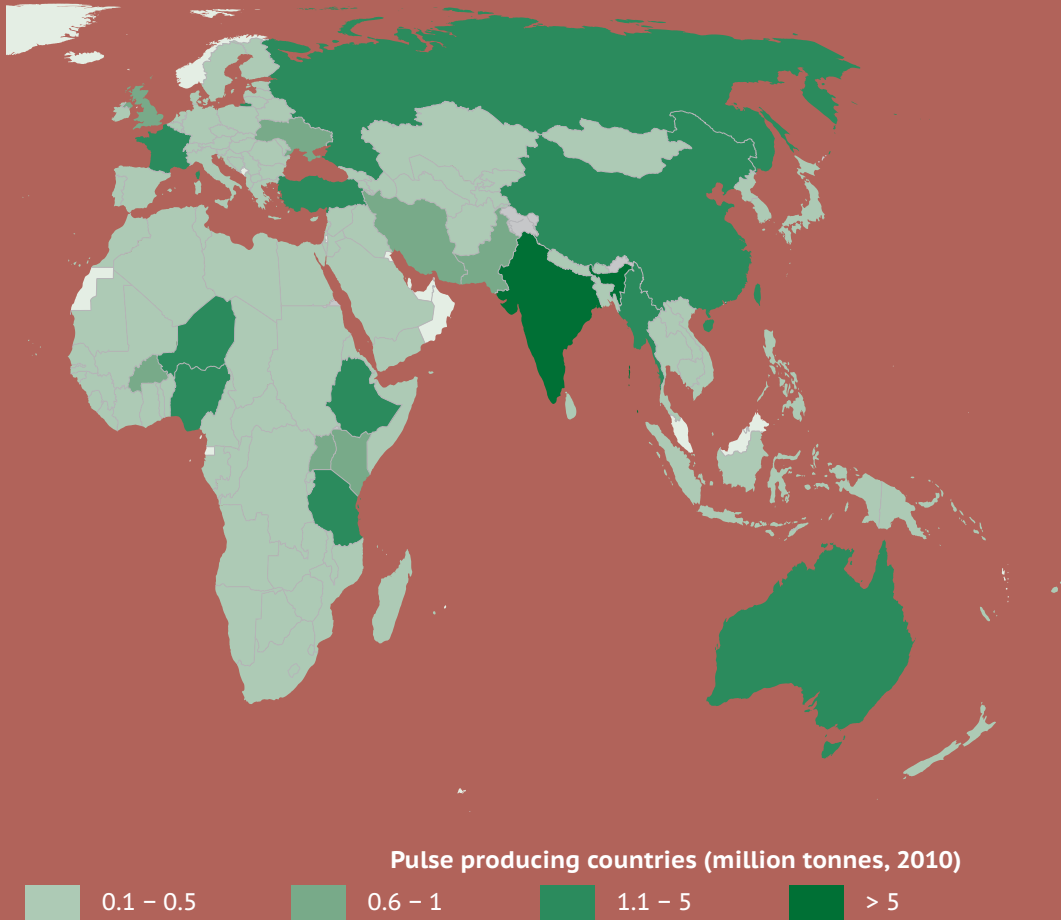
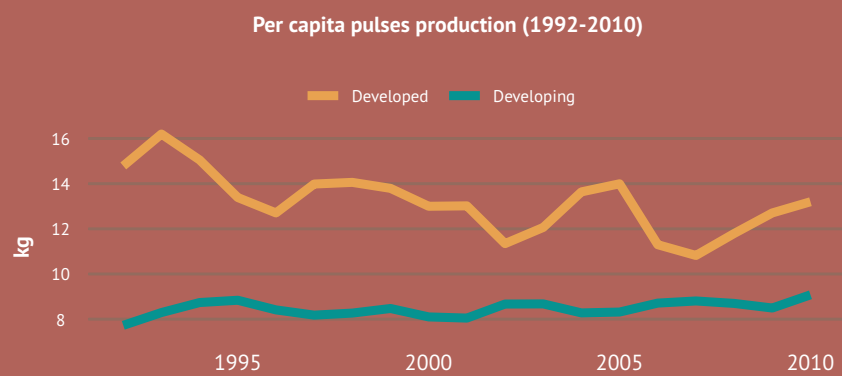


Chart 75: Pulse production in developed countries has not kept pace with population growth, reflecting its diminishing role in diets and as an animal feedstuff



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.PS.QPPC](https://doi.org/10.181256/P3.FEED.FAO.ESS.PS.QPPC), p. 275 

Root crops have traditionally been the mainstay of food consumption in several countries with low overall consumption levels, mainly in sub-Saharan Africa and in Latin America and the Caribbean. What happens to the production of these crops is an important determinant of changes in national average food consumption.

Few commodity groups exhibit such divergent trends in production across regions and economic status as do root crops. For instance, in Europe per capita production of potato (a major regional staple) has been in long-term decline, while production growth of the same commodity in Africa and Asia has registered robust growth in the past decade or so, albeit from a much smaller base. By contrast, sweet potato has undergone a precipitous decline: per capita production currently stands at one-third of the level of the late 1970s, a trend that reflects a rapid fall in demand for the commodity in China (especially in animal feeding).

The continued turbulence in global markets for traded food staples constantly reminds many vulnerable countries to look toward indigenous crops, such as cassava, as an alternative to potentially expensive and price-volatile imported cereals. As a “crisis crop”, cassava roots require few inputs and can be left in the ground for well over a year and harvested when food shortages arise or when prices of preferred cereals become prohibitive. In addition, ongoing long-term programmes for cassava’s commercialization have made it among the fastest growing food staples in Africa.

Government food-security initiatives with the support of the international community have also played an important role in cassava production growth in the continent. Support often takes the form of distribution of high-yielding and disease-resistant planting material, extension activities, as well as measures to strengthen the cassava value chain, notably food processing for value-added cassava products. In Asia, the rising use of cassava in biofuel production and industrial applications that employ starch, has resulted in cassava’s rapid growth in the region as well.

Map 43:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.RT.QP](https://www.fao.org/faostat/tables/en/P3.FEED.FAO.ESS.RT.QP), p. 276 

- 726 million tonnes of roots and tubers were collected from world soils in 2010
- Given agroclimatic constraints, potato is the main root crop cultivated in temperate zones, while in the tropics, a broad array is cultivated but cassava is the major root crop
- Cassava’s twin role as a food security and industrial crop has fuelled production growth in developing countries

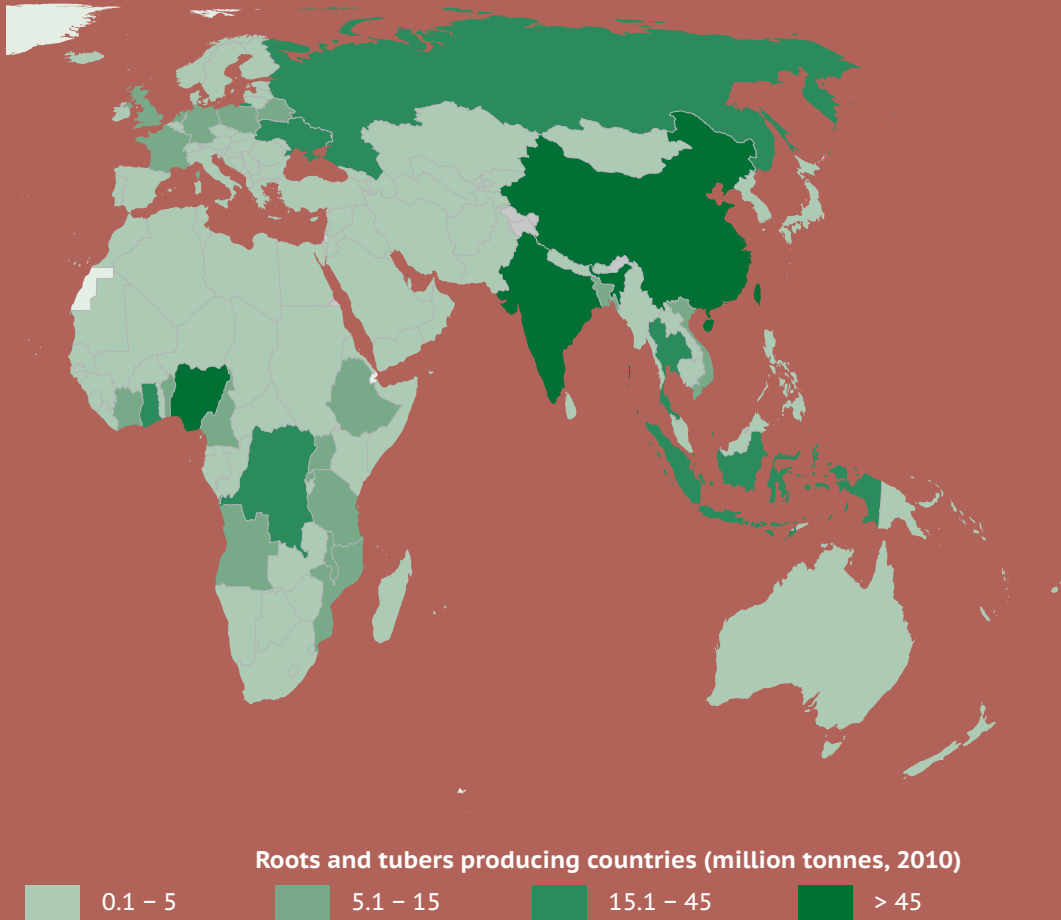
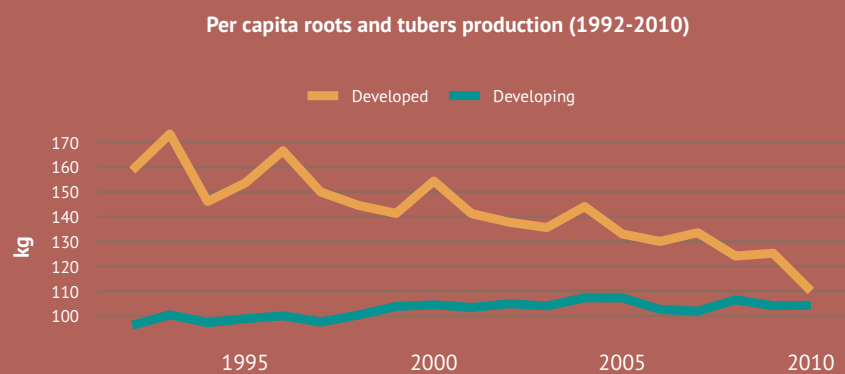


Chart 76: Falling per capita consumption of potato is reflected in declining rates of production in developed countries



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.RT.QPPC](#), p. 276 

Global **fruit and vegetable** production has experienced a remarkable increase, growing at annual rates of around 3 percent and 5 percent, respectively, in the past two decades – rates of growth that exceed most other food crops. In 2010, almost 600 million tonnes of fruit and almost 1 billion tonnes of vegetables were gathered throughout the world.

World production has largely been fuelled by an area expansion in Asia, especially in China. With an average annual growth rate of above 8 percent over the previous 20 years, China has emerged as the world's largest fruit and vegetable producer, with global output shares of around 20 percent in the case of fruit, and over 50 percent with regard to vegetables. The familiar tendency of stagnant production growth in developed regions also prevails in the fruit and vegetables sector.

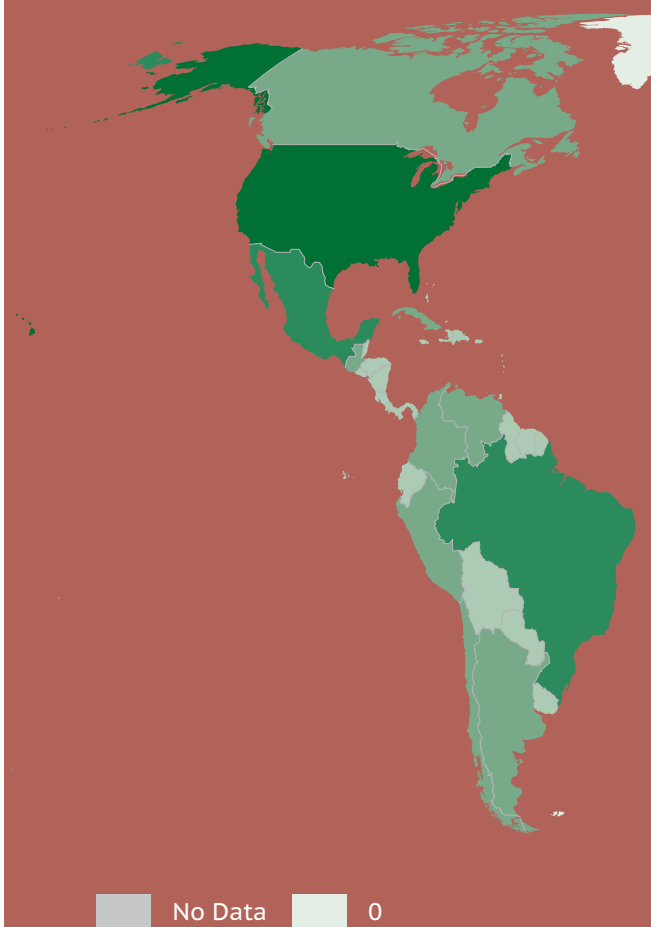
Strong growth rates in fruit and vegetable cultivation have also been recorded in food-insecure and low-income regions, such as in sub-Saharan Africa and in South Asia. This is testament to the fact that horticultural crop production generates high economic returns per unit of land, offering promising income prospects, especially for smallholders and when land is scarce. In addition, being labour intensive, the horticulture sector can contribute to poverty reduction by providing paid employment opportunities.

The high value of fruits and vegetables is limited not only to their monetary value, as they play a highly important role in improving the diets of people around the world. The World Health Organization (WHO) estimates that low fruit and vegetable intake contributes to approximately 16.0 million disability adjusted life years (DALYs, a measure of the potential life lost due to premature mortality and the years of productive life lost due to disability) and 1.7 million of global deaths are attributable to low fruit and vegetable consumption. Moreover, inadequate intake of fruit and vegetables is thought to cause around 14 percent of gastrointestinal cancer deaths, approximately 11 percent of ischaemic heart disease deaths and around 9 percent of stroke fatalities worldwide.

WHO/FAO recommends a minimum of 400g of fruit and vegetables per day (excluding starchy root crops) for the prevention of chronic diseases such as heart disease, cancer, diabetes and obesity, as well as for the prevention and alleviation of several micronutrient deficiencies, especially in less developed countries.

Meeting the rising global demand for fruits and vegetables creates new opportunities for poor farmers in developing countries, but to fully reap the benefits of cultivating these highly perishable crops, improving supply chain efficiency, reducing post-harvest losses and investments in infrastructure are necessary in many of them.

Map 44:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.VG.QP](https://www.fao.org/faostat/en/#data/P3.FEED.FAO.ESS.VG.QP), p. 278 

- Worldwide in 2010, over 600 million tonnes of fruit and around 1 billion tonnes of vegetables were gathered
- With annual growth rates in the proximity of 5 percent, horticulture is one of the most dynamic sectors in world agriculture
- The high value of fruits and vegetables is not just limited to their monetary value, as they play a highly important role in improving the diets of people around the world

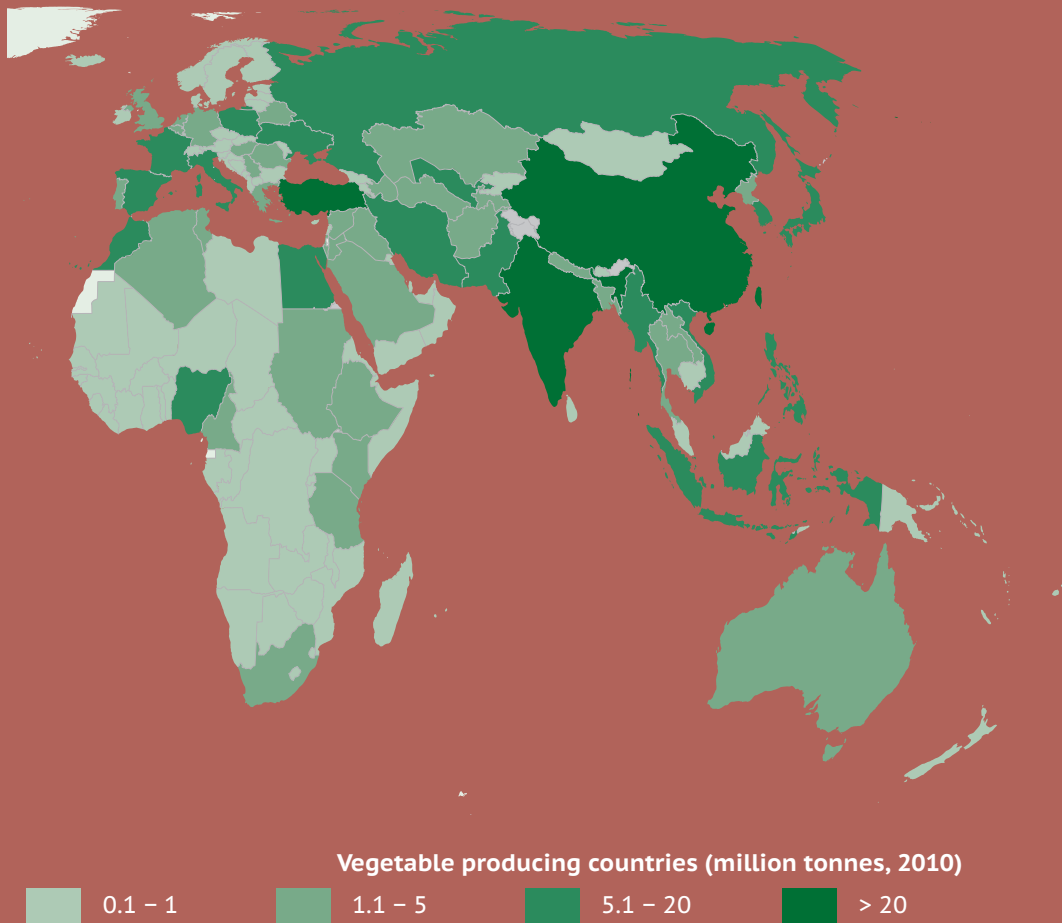
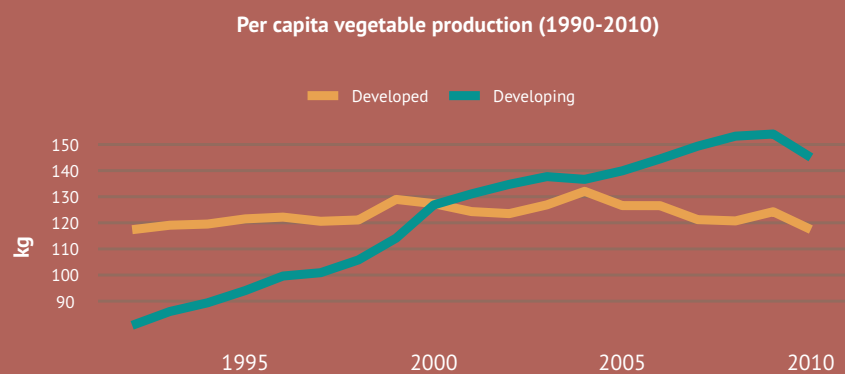


Chart 77: World vegetable production has largely been fuelled by an expansion in China, but high growth rates are being recorded in low-income and food-insecure regions



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.VG.QPPC](#), p. 278 

Currently, 166 million tonnes of **sugar** (raw equivalent) is produced in 120 countries. Over 70 percent of sugar is derived from sugar cane and the remainder from sugar beet.

Sugar beet is a hardy biennial crop that is suited for cultivation in temperate climates, especially in the North. Forty countries or so are engaged in commercial sugar beet cultivation, with France standing currently as the world's largest producer followed by the United States of America. Sugar beet production at the global level is in long-term decline, falling from a peak of 314 million tonnes at the end of the 1980s to around 228 million tonnes in 2010, by and large a reflection of policy reform in the EU.

Sugar cane is a genus of tropical grasses requiring strong sunlight and abundant water for normal growth. In contrast to sugar beet, sugar cane cultivation has undergone strong growth, with total acreage doubling in the past 25 years, leading to a world production level of around 1.7 billion tonnes in 2010.

The global expansion of sugar cane has been in response to rising demand for sugar in food consumption and as a feedstock for ethanol production. Roughly 100 countries produce sugarcane on a commercial basis, with 18 countries devoting more than 10 percent of their cropland to sugar cane production, while in six countries sugar cane covers more than one-third of all cropland.

The bulk of the increase has come from the developing countries, with Brazil fuelling much of this growth. Sugar cane production in Brazil has increased rapidly, doubling alone in the past decade. The worldwide expansion in sugar cane cultivation has resulted in a substantial loss of biodiversity, arguably more than any other single crop. Significant areas of tropical rain forest and tropical seasonal forest have been cleared for sugar cane cultivation as well as low-lying and alluvial areas, which not only results in the direct loss of habitats and species, but creates wider impacts on ecosystem functioning, including changes to hydrology and greater soil erosion.

Further reading

- [FAO Food Outlook \(www.fao.org/giews/english/fo/index.htm\)](http://www.fao.org/giews/english/fo/index.htm)
- [FAO World agriculture: towards 2030/2050 Interim report: Prospects for food, nutrition, agriculture and major commodity groups \(www.fao.org/economic/esa/esag/en/\)](http://www.fao.org/economic/esa/esag/en/)
- [Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases \(www.fao.org/DOCREP/005/AC911E/AC911E00.HTM\)](http://www.fao.org/DOCREP/005/AC911E/AC911E00.HTM)

Map 45:



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FTW.FAO.SU.QP, p. 277](https://www.fao.org/ftp/ftw/ftw_su_qp/p3_ftw_fao_su_qp_p_277) 

- Over 166 million tonnes of sugar (raw equivalent) were produced throughout the world in 2010
- In Brazil, the world's leading producer, well over half of the crop is used in the production of ethanol
- Higher production volumes in India, on the other hand, reflect the importance of sugar in domestic diets

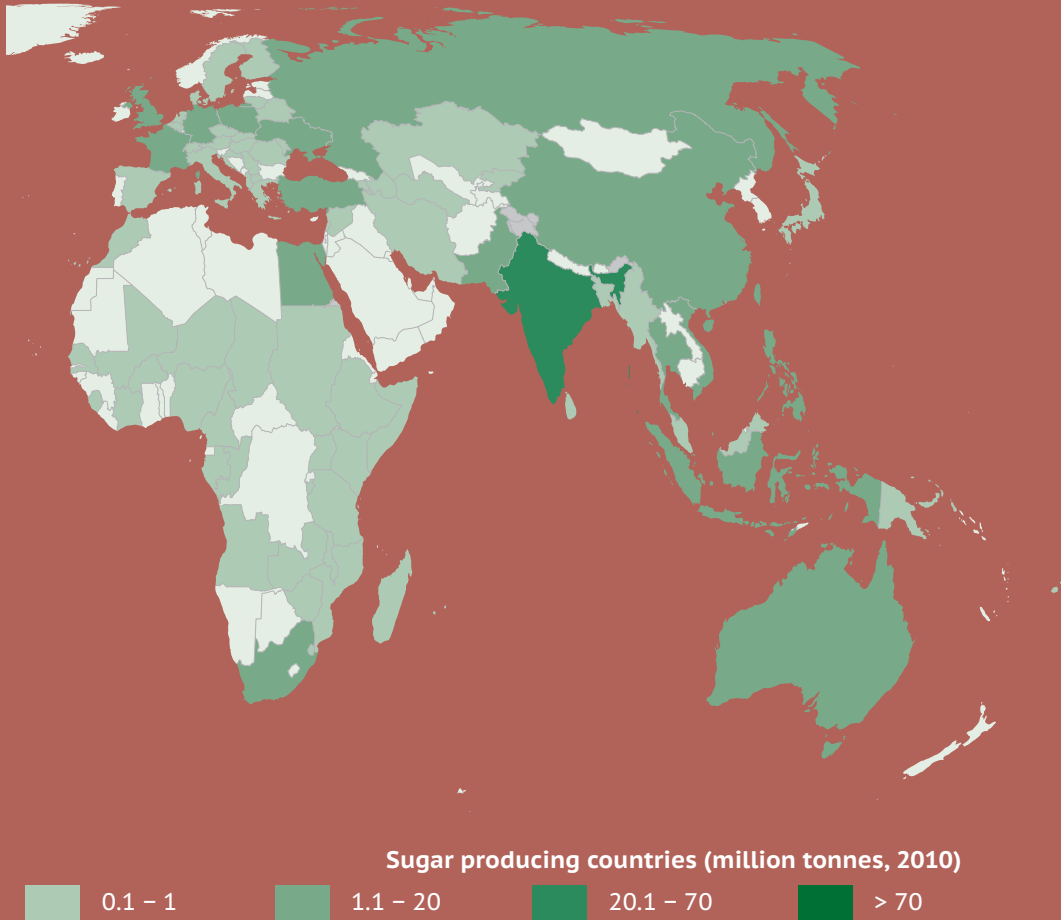
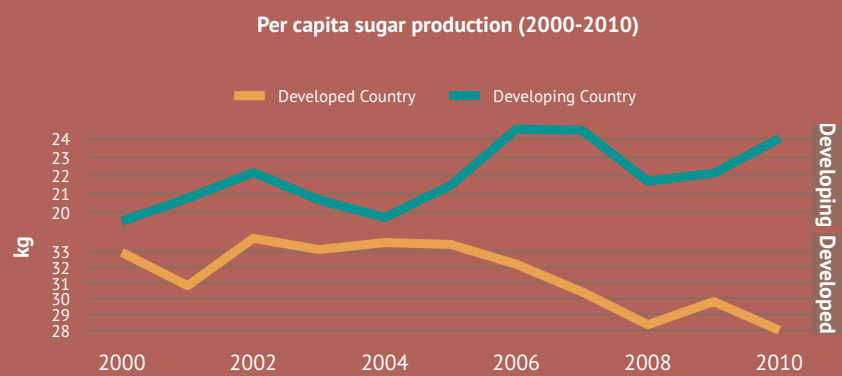


Chart 78: Food, energy and international market needs are driving a considerable expansion in sugar (cane) production in developing countries



Source: FAO, Statistics Division (FAOSTAT)

Metalink: [P3.FEED.FAO.ESS.SU.QPPC](https://doi.org/10.181256/P3.FEED.FAO.ESS.SU.QPPC), p. 277 