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Grain Legumes Production, Consumption and Trade Trends in Developing Countries

S Nedumaran, P Abinaya, P Jyosthnaa, B Shraavya, Parthasarathy Rao and Cynthia Bantilan

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S Nedumaran, P Abinaya, P Jyosthnaa, B Shraavya, Parthasarathy Rao and Cynthia Bantilan

This work has been undertaken as part of the CGIAR RESEARCH PROGRAM ON Grain Legumes

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Introduction

Grain legumes play an important nutritional role in the diet of millions of people in the developing countries and are thus sometimes referred to as the poor man's meat. Since legumes are vital sources of protein, calcium, iron, phosphorus and other minerals, they form a significant part of the diet of vegetarians since the other food items they consume don't contain much protein (Latham, 1997). Legumes are multipurpose crops and are consumed either directly as food or in various processed forms or as feed in many farming systems (Gowda et al., 1997). The legume crops are often grown as rotation crops with cereals because of their role in nitrogen fixation. However, over the past few decades, the yields and production of legume crops have been stagnant in the developing countries. Agricultural research and development efforts in many of these countries have concentrated on increasing cereal yields and production and lowering crop losses in order to achieve food security. Due to the diverse roles played by grain legume crops in farming systems and nutritional security, the research on legume crops will have significant impacts on nutritional security and soil fertility, especially in the developing countries.

The recent rise in prices has led to an increase in demand for legumes worldwide through both income and population growth. The increasing demand for livestock feed in developing countries is a significant change in the demand structure. In addition, the significant demand of soybean in the bio-diesel industry due to the recent policies in Europe and the US has also contributed to the increase in the demand and prices of legumes as substitute crops. These factors indicate that, in the near future, there will be substantive shifts in the utilization patterns and price structure of grain legumes.

However, pulses lag behind cereals in terms of area expansion and productivity gains. The main reason for this lag is that pulses are considered secondary to cereals in terms of consumer preferences and consequently, research activities focus more on cereals. Due to the high cereal productivity, pulses are being pushed to marginal areas of cultivation having low rainfall and poor soil fertility. Other reasons responsible for the lag include highly unstable prices of pulses due to high variability in their yield and high competition from cereal crops, such as rice and wheat, due to the government price support policy.

Among pulses, oilseeds especially soybean are preferred to food legumes (Bejiga, 2000) in some regions because of its multiple uses. Soybean are considered to be unique because of its high level of protein content that accounts for almost 40% of its weight. Therefore, unlike other beans, soybean can be a substitute for proteins in the vegetarian population in developing countries (Henkel, 2000; Rao et al., 2010). Moreover, the grain legume crops have potential health benefits, which include reducing cardiovascular, diabetic and cancer risks.

The main objective of this study is to analyze the global and regional trends in production, consumption and trade of grain legume crops since 1980s. The following regions are included for the trend analysis: South and South-East Asia (SSEA), Central and East Asia (CEA), Middle-East and North Africa (MENA), Sub-Saharan Africa (SSA), and Latin America and the Caribbean[1] (LAC). Developed countries are included under the heading Developed World, which includes Europe, North America, Australia, New Zealand, and Japan, to enable a comparative analysis.

1. For the regional classification, refer Appendix

Data and Methods

The secondary data available at the Food and Agriculture Organization (FAO) Corporate Statistical Database (FAOSTAT) for the period of 1990-2009 was used in the study for the analysis of data. Hence, the accuracy of the results presented here are directly dependent on the FAO data source and the classifications therein. Despite the many limitations and weakness of the FAO data (Akibonde and Maredia, 2011) on grain legumes, this report used the FAOSTAT as the primary source of time-series secondary data. This study focuses on the following six grain legume crops: Dry bean (*Phaseolus spp.*), dry broad bean (*Vicia faba*), chickpea (*Cicer arietinum*), dry cowpea (*Vigna ungiculanta*), pigeonpea (*Cajanus cajun*) and lentil (*Lens culinaris*). In addition, soybean (*Glysine max*) and groundnut (*Arachis hypogaea*) are also discussed as part of grain legumes in this report, although FAO distinguishes them as oilseeds. In many developing countries, these grain legumes have become the main component of farming systems and food of poor producers and consumers. The Dry bean category in FAO includes all species of *Phaseolus* and *Vigna*, and hence, due to vast categories of beans, the data are not strictly comparable across countries and regions. The common beans, mung beans, and common dry bean, also collectively known as Dry bean, are mainly grown in Central America, South and South-East Asia, and Sub-Saharan Africa, respectively.

When the analysis was carried out for this study, the export data was available until 2009, and the consumption data was available till 2007. Detailed consumption data was available in FAOSTAT only for dry bean, groundnut and soybean that have been analyzed in this study. For all other crops, domestic availability (the sum of production and net trade, ie, production + (export-imports)) has been calculated to serve as a proxy for demand. Simple statistical measures such as the mean, coefficient of variation (CV = standard deviation/mean) and the compound annual growth rates (CAGR) have been computed to analyze the trends. In order to further analyze the consumption patterns,[2] per capita availability of each grain legume per year has been calculated. The availability of the crops differs from consumption with regard to stock variation from year to year, seed and wastage. Both these components represent the combined usage of the crop in terms of food, feed, and other utilizations. Therefore, an increase in consumption/availability trend can represent feed usage to livestock of the pulse crop rather than direct consumption as food. In the case of groundnut and soybean, both being oilseeds, the consumption demand represents the demand for oil and meal as livestock feed. Groundnut is processed to produce oil as its primary end-product whereas soybean is processed to produce soy meal for livestock with soy oil as an inexpensive by-product (Goldsmith, 2008). Since 2007, about 15% of the soybean oil demand in the US is used for the production of bio-diesel (Goldsmith, 2008), and this proportion is likely to increase as with more demand of renewable energy.

Grain legume crops area, yield and production: global context

Since 1980, the global production of all the grain legume crops, namely chickpea, pigeonpea, cowpea, dry bean, faba bean, lentil, soybean and groundnut, has increased at the rate of more than 1% per annum. Cowpea production has experienced the highest growth (4.7% per annum between 1994–95 and 2008–10) as some new regions have recently embarked upon its cultivation (Table 1) although the yield levels continue to be low. The area under soybean has expanded quite rapidly

2. Per capita availability = (production + imports -exports)/population

in Latin America and South Asia, leading to a production growth rate of 4.3% per annum (Table 1). Lentil and pigeonpea production have also increased over the 15-years period, growing at the rate of 2.2% and 2.0% per annum respectively (Table 1).

Globally, soybean, faba bean, and groundnut have the highest yields, ranging between 1.5 tons/ha and 2.4 tons/ha (Table 1). Chickpea, pigeonpea, lentil and Dry bean have yield levels of about 850 kg/ha. Cowpea, a food and feed crop, has comparatively low yields at 0.5 tons/ha, but its yield levels are growing at an average rate of 2.9% per annum (Table 2). The crop yields in the developing regions are very low. However, in the case of chickpea, dry bean, lentil, pigeonpea and soybean, some developing regions have exceeded the developed countries in terms of yield levels. In 2008–10, the cowpea yield in developed countries was around 3.4 tons/ha, which is far higher than the average cowpea yields in developing regions. Asia and Latin America had about one-third of the cowpea yield levels in developed regions. Yields in Africa are about one-tenth of those levels (Table 4). This might be due to the cowpea being cropped mainly in marginal areas in Africa. Globally, the yield increase has been the highest in the case of cowpea at nearly 50% between 1994–96 and 2008–10 from a low base. However, the yield increase has been the lowest in the case of soybean and faba bean (Table 1). The area expansion has been the highest in the case of soybean at 60% from a high base (Table 1). Consequently, soybean and cowpea portray the highest production growth rates of 4.3% and 4.7% respectively in the world (Table 1). Bean, which are the third most important crop in terms of production, have attained a yield gain of 20% between 1994–96 and 2008–10 (Table 1).

Table 1. Global legumes area, production and yield

	Dry bean	Chickpea	Cowpea	Pigeonpea	Lentil	Faba bean	Soybean	Groundnut
Area harvested (million ha)								
1994–96	25.9	10.9	8.2	4.1	3.4	2.3	62.0	22.1
2008–10	27.4	11.5	10.4	4.7	3.7	2.5	99.4	24.0
% change	6	5	27	15	10	8	60	9
Growth rate (%)	0.7	0.2	1.7	1.1	0.8	0.6	3.5	0.4
Production (million tons)								
1994–96	17.1	8.1	2.7	2.8	2.8	3.6	131.2	29.4
2008–10	21.7	9.9	5.3	3.7	3.7	4.2	238.6	37.4
% change	27	23	91	35	35	18	82	27
Growth rate	1.9	1.3	4.7	2.1	2.3	1.4	4.4	1.7
Yield (kg/ha)								
1994–96	659	739	339	684	822	1,565	2,115	1,331
2008–10	793	864	508	800	1,003	1,701	2,399	1,558
% change	20	17	50	17	22	9	13	17
Growth rate	1.2	1.1	2.9	1.0	1.5	0.8	0.9	1.3

Note: Percentage change and growth rate pertains to the period between 1994 and 2010. Also, growth rate is an annual figure.

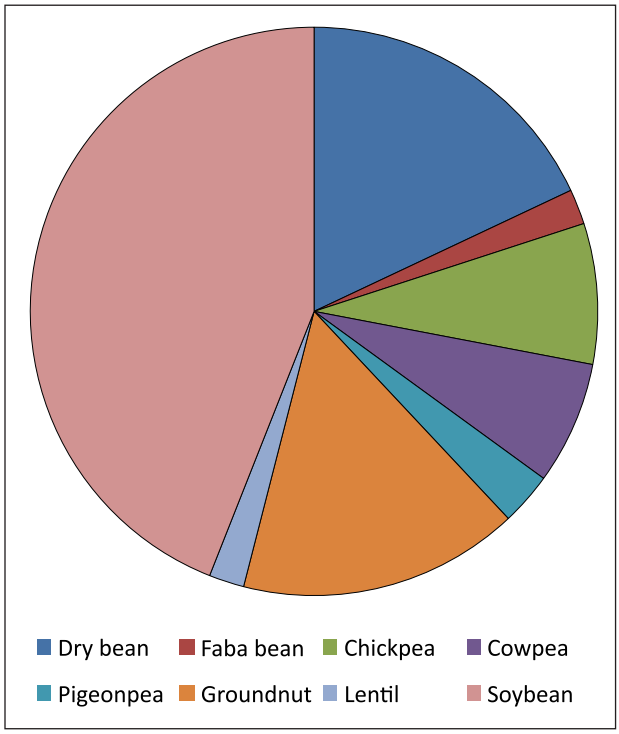


Figure 1. Area shares (in %) of legumes in the developing world in 2008–10.

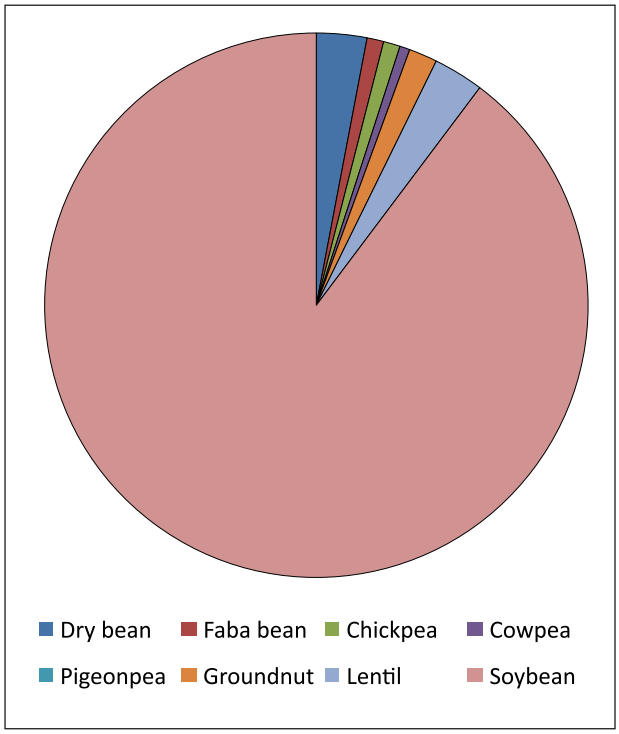


Figure 2. Area shares (in %) of legumes in the developed world in 2008–10.

Dry bean[3]

Area, production and yield

Among the grain legume crops, dry bean have the highest area share after soybean at 27 million ha in 2008–10 (Table 1). Its production has grown annually at the rate of 1.9%, mostly due to yield gains. However, dry bean had one of the lowest yields at 793 kg/ha in 2008–10. These low global yield levels are due to the poor performance of developing countries, which produce more than 95% of total dry bean, compared to the average yield of bean in developed countries, which is 133% higher than that of developing countries. Unlike other legumes, the intensity of diseases is quite high in bean (Beebe, 2006). Hence, in addition to developing high yielding varieties, more research should focus on biotic stress-resistant varieties and demand for specific commercial types. The existing information indicates a huge yield gap between the potential yield of improved varieties and the currently obtained yield by farmers, implying that the realized yield potential is low and the problem lies with other additional inputs to close the gap (Graf et al., 1991).

3. Dry bean include all types of Phaseolus beans. Akibonde and Maredia (2011) reported that the composition of and the importance of Phaseolus beans grown in top dry bean producing countries are different. In South Asian countries, such as India, Myanmar, and Pakistan, black gram (Vigna mungo), mung beans (Vingna radiate), and moth beans (Vigna aconitifolius) are of major importance. In China, mung beans are a major type of Dry bean followed by common beans (Phaseolus vulgaris). In all countries in Sub-Saharan Africa and Latin America and Caribbean, common beans are the most important and may be the only type of dry bean produced.

Table 2. Dry bean area, yield and production

	CEA	LAC	MENA	SSA	SSEA	DW	World
Area harvested (million ha)							
1994–96	1.6	8.3	0.2	3.5	10.8	1.3	25.9
2008–10	1.2	6.8	0.1	5.8	12.2	1.1	27.4
% change (1994–2010)	−25	−18	−34	64	13	−16	6.0
Growth rate (%/year for 1994–2010)	−1.8	−1.2	−3.0	3.7	1.5	−1.6	0.7
Production (million tons)							
1994–96	1.8	5.2	0.3	2.1	5.4	2.1	17.1
2008–10	1.9	5.9	0.3	3.8	7.6	2.1	21.7
% change (1994–2010)	6	12	3	82	41	−4	27
Growth rate (%/year for 1994–2010)	0.5	1.1	0.1	4.4	3.0	−0.8	1.9
Yield (kg/ha)							
1994–96	1,086	635	1,285	592	502	1,604	659
2008–10	1,530	866	1,997	657	629	1,845	793
% change (1994–2010)	41	36	55	11	25	15	20
Growth rate (%/year for 1994–2010)	2.4	2.3	3.1	0.7	1.5	0.9	1.2

Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle-East and North Africa, SSEA-South and South-East Asia, SSA-Sub Saharan Africa, DW-Developed world

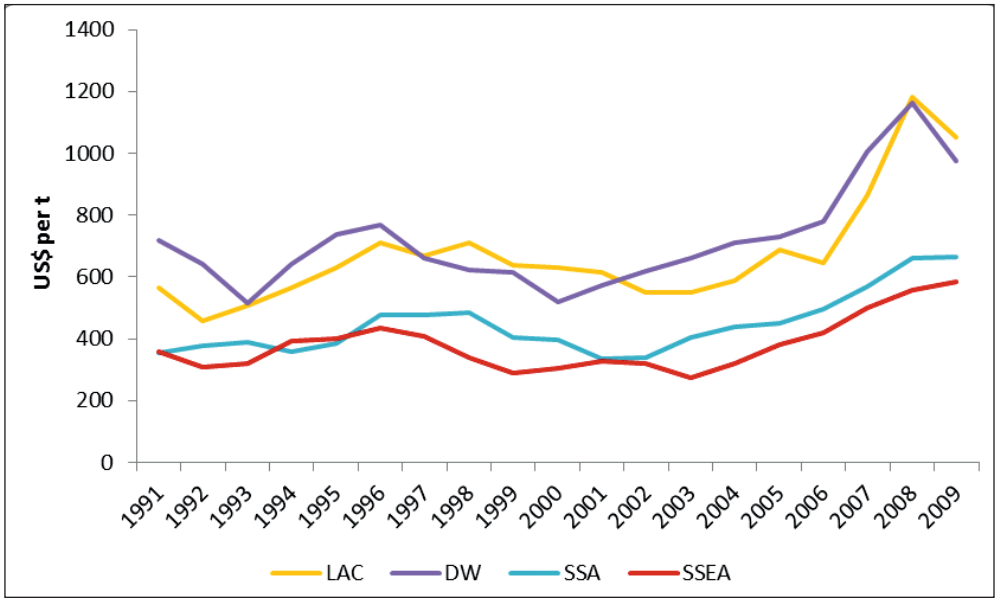
India, Brazil, Myanmar and Mexico together account for about 60% of the total area under dry bean, producing a total 11 million tons of dry bean (Table A.3). India has the highest area under dry bean production with 8.3 million ha but produces only 3.4 million tons whereas Brazil produces nearly the same quantity with 3.8 million ha area (Table A.3). However, in Brazil, the variability of yield, as measured by the coefficient of variation, is 26%, which is the highest among the top bean-producing countries (Table A.3). USA had the highest yield of almost 2 tons/ha with a low yield variability in 2008–10, followed by China, Myanmar, Argentina and Indonesia, which have yield rates exceeding 1 ton/ha.

Latin America, South Asia and South-East Asia have shown positive trends in production both from a high base with increasing yields. The production in Sub-Saharan Africa has increased at the rate of 4.4% per year between 1994 and 2010 largely due to area expansion and slight increas in yield (Table 2). East Asia and the developed countries showed fluctuating production trends with declining area and rising yields between 1990 and 2010.

Generally, dry bean yield has increased across all regions in the world. Except for Africa and South and South-East Asia, the area under dry bean production has portrayed a declining trend in all the regions. In the developed countries, the yield has increased at an annual rate of 0.9% and the area has diminished at the rate of 1.6% per annum between 1994 and 2010, resulting in a production reduction of 80,000 tons (Table 2).

Producer prices[4]

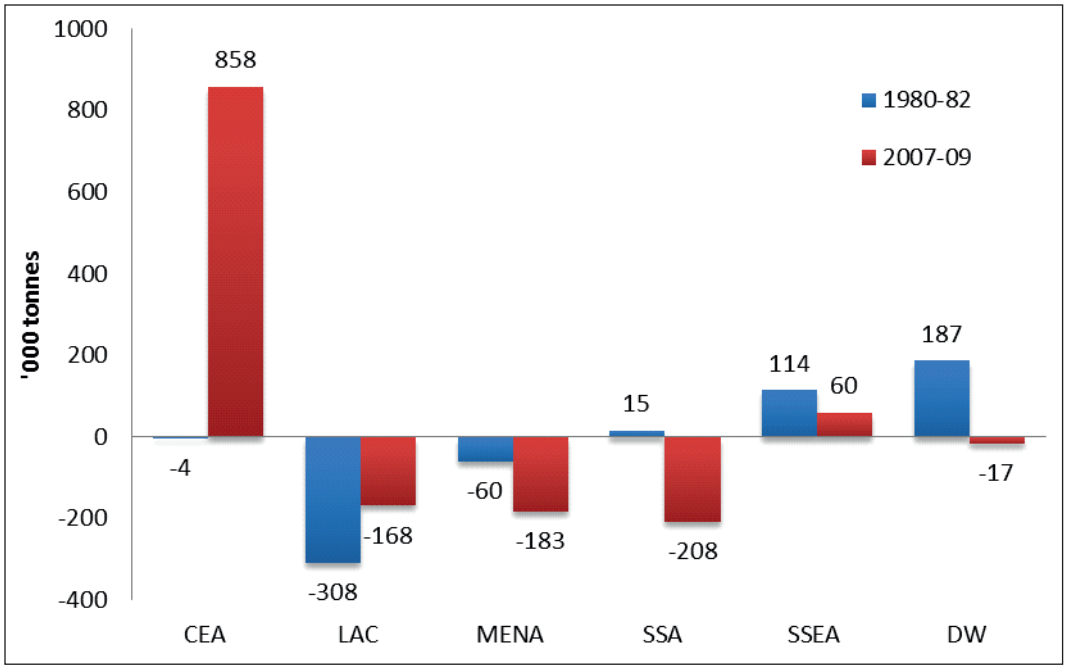
All the regions portrayed a downward trend in the producer price of dry bean in the 1990s and an upward trend in the next decade. However, India, which is the major producer of dry bean, had the lowest price with an increase of only 2.8% per annum between 1991 and 2009. In 2009, the producer price was US$430 per ton in India. Philippines and Cambodia have more than double the prices in India. It was observed that Iran and Maldives, which have a relatively lower area share within South and South-East Asia, have shown extremely high prices that may be due to the exchange rate fluctuations and not production constraints. Therefore, they have been excluded from the calculation of the regional average of dry bean producer prices. Latin America and the Caribbean countries are the biggest producers of dry bean regionally, with Brazil and Mexico together contributing about 16% towards the total production. Between 2006 and 2008, the producer price of dry bean rose by 83% in that region and slightly dropped in 2009 to US$1052 per ton. Some countries, such as Puerto Rico, Jamaica, Belize, Dominican Republic, Greece, Austria, Congo and other small-scale producers of dry bean that have a lower area share but can affect the regional level trend with extremely high prices, have been excluded from the regional producer price trend calculation.



Note: LAC-Latin America and Caribbean, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 3. Trends in Dry bean producer prices across regions.

4. The regional producer prices are calculated by averaging the prices available at the country level for all crops. The data on the farm-gate prices is available for the period between 1991 and 2009 from FAOSTAT.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle-East and North Africa, SSEA South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

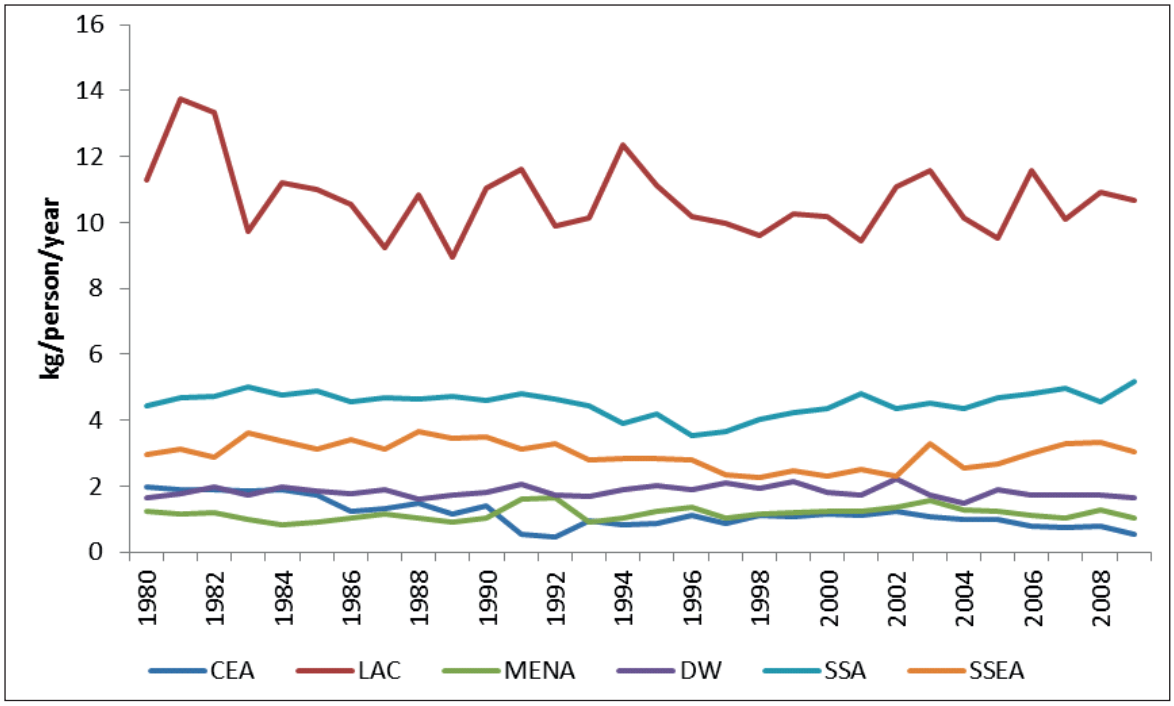
Figure 4. Trade in Dry bean across regions.

Trade

Trade in drybean has increased in South and South-East Asia in 2007-09 relative to sitation in 1980-82. Imports have increased to reach 1 million tons in 2007-09,while the exports have increased by 73 % to reach 1.06 million tons in 2007-09 (Table A11). With the exception of South and South East Asia and Central and East Asia trade deficit has increased in all regions and they have become net importers of drybean in 2007-09 relative to 1980-82.

Consumption

In the case of dry bean, every region shows an upward trend except Central and East Asia (Figure 5). In the Middle-East and North Africa, since production has not increased at the rate of consumption growth, a wide production deficit has been found. In 1992, dry bean consumption was at its highest level at 0.49 million tons, and the deficit was at 0.22 million tons (Figure 5). In Central and East Asia, the consumption decreased from 2 million tons in 1980 to 1 million ton in 2007 (Figure 5). Since bean production shows a modest growth during the same period, an increase in the production surplus can be observed compared to the early 1990s.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle-East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 5. Trends in dry bean per capita availability across regions.

Latin America and the Caribbean are the largest consumers of dry bean in the world. However, the availability of dry bean has declined in this region due to urbanization, rising incomes and shift in consumption patterns away from the traditional staples, particularly among the young population. The variation in incomes between the rural and urban households had also influenced the consumption, with the urban population consuming lesser bean than the rural population (Pascal, 2002). Between 1980 and 2009, the average per capita bean availability has been around 10.7 kg per annum, and the co-efficient of variation has been about 10% (Table A.2 in Appendix). The level of consumption of dry bean had fallen in most other regions. The next largest consumer is Sub-Saharan Africa, where the consumption had remained almost stagnant between 1980 and 2009. In South and South-East Asia, where the average consumption is around 3 kg/person/year, the consumption level had fallen at the rate of 0.6% per annum (Table A.2 in Appendix). The largest fall in consumption level has occurred in Central and East Asia, where the consumption has declined at the rate of 2.8% per annum between 1980 and 2009, and the variability of consumption is also observed to be high at about 37% from year to year (Table A. 2 in Appendix).

Chickpea

Area, production and yield

Chickpea is grown all over the world in about 57 countries under varied environmental conditions. South and South-East Asia dominates in chickpea production with 80% of regional contribution. The yield level in South and South-East Asia has increased by 13% from 717 kg/ha in 1994–96 to 812 kg/ha in 2008–10, growing at an annual rate of 0.8% (Table 3). Although developed countries

do not contribute much towards chickpea production, the yield is particularly high in some Eastern European countries. China also showed a high yield level at 3344 kg/ha in 2008–10. ICRISAT has released high-yielding, short-duration chickpea varieties that are resistant to *Fusarium wilt* in Southern India. The area under chickpea has increased six-fold in the last 10 years from 95,000 to 884,000 metric tons. Andhra Pradesh has the highest chickpea yields averaging 1.4 metric tons per ha. Almost 80% of the chickpea area in Myanmar during 2008–09 was covered by ICRISAT-bred chickpea varieties.

Table 3. Chickpea area, yield and production

	CEA	LAC	MENA	SSA	SSEA	DW	World
Area harvested (million ha)							
1994–96	0.0	0.1	1.0	0.3	9.0	0.3	10.9
2008–10	0.0	0.1	0.6	0.4	9.7	0.5	11.5
% change (1994–2010)	176	−31	−35	19	8	60	5
Growth rate (%/year for 1994–2010)	5.3	−2.4	−3.0	1.3	0.4	2.2	0.2
Production (million tons)							
1994–96	0.0	0.2	0.9	0.1	6.5	0.2	8.1
2008–10	0.0	0.1	0.7	0.3	7.9	0.7	9.9
% change (1994–2010)	186	−28	−18	111	22	154	23
Growth rate (%/year for 1994–2010)	7.8	−2.3	−1.4	5.5	1.2	6.3	1.3
Yield (kg/ha)							
1994–96	1,154	1,507	862	524	717	816	739
2008–10	1,159	1,594	1,079	939	812	1,339	864
% change (1994–2010)	0	6	25	79	13	64	17
Growth rate (%/year for 1994–2010)	2.3	0.0	1.7	4.2	0.8	4.1	1.1

Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle-East and North Africa, SSEA South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

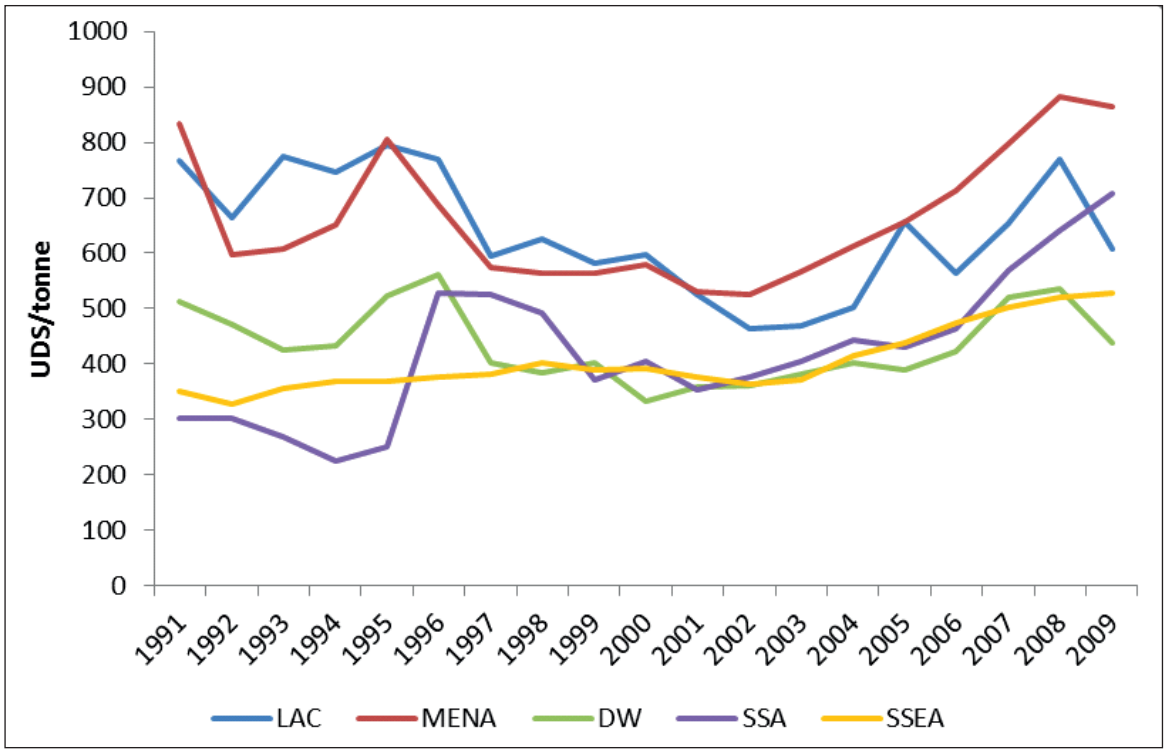
India is the single largest producer of chickpea in the world, accounting for 68% (7.9 million ha) of the total area under chickpea (Table A.4). It produced about 6.8 million tons in 2008–10 (Table A.4). Pakistan and Turkey are the other important producers of chickpea in Asia, contributing about 1.1 million tons of production together (Table A.4). The average global chickpea yield is about 1 ton/ha, but the average yield in South and South-East Asia is only 812 kg/ha (Table 3). Though the production is low in other developing countries, such as Turkey, Myanmar, Ethiopia, and Mexico, the yield levels exceed 1 ton/ha (Table A.4). The yield rates are above 2 tons/ha in Yemen and Russia. Similar or higher yield levels prevail in most developed countries (Table A.4).

South and South-East Asia showed positive production area and yield trends. In the 15-year period between 1995 and 2010, the production had increased by 22% in this region (Table 4). Sub-Saharan Africa and Central and East Asia regions showed annual production growth rates of 5.5% and 7.8% between 1994–2010 respectively (Table 3).

The highest yield increase was observed in Sub-Saharan Africa at about 80% between 1994–96 and 2008–10 (Table 3). Central and East Asia showed a strong upward trend in the area under production and, therefore, production also follows suit from a low base. Area decline is observed in Latin America and Caribbean and Middle-East and North Africa.

Producer prices

India is the largest producer and consumer of chickpea in the world and its trend is largely reflected by the South and South-East Asia regions (Figure 6). Hence, it is pertinent to focus on India because data for other major chickpea producers, such as Pakistan and Myanmar, are not available within the region. Between 1991 and 2009, the producer price in India had risen by 6% to reach US$342 per ton, which is one of the lowest prices in the world (Figure 6). Similarly, Iran also showed a high deviation from the average prices as in the case of dry bean and so was opted out of the regional analysis. Turkey and Morocco are the other important producers of chickpea in the developing world that showed high prices as reflected by the regional trend in Middle-East and North Africa (Figure 6). In Turkey, the prices rose 2.6 times in 2009 compared to the level in 1991 so as to reach US$930 per ton.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle-East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

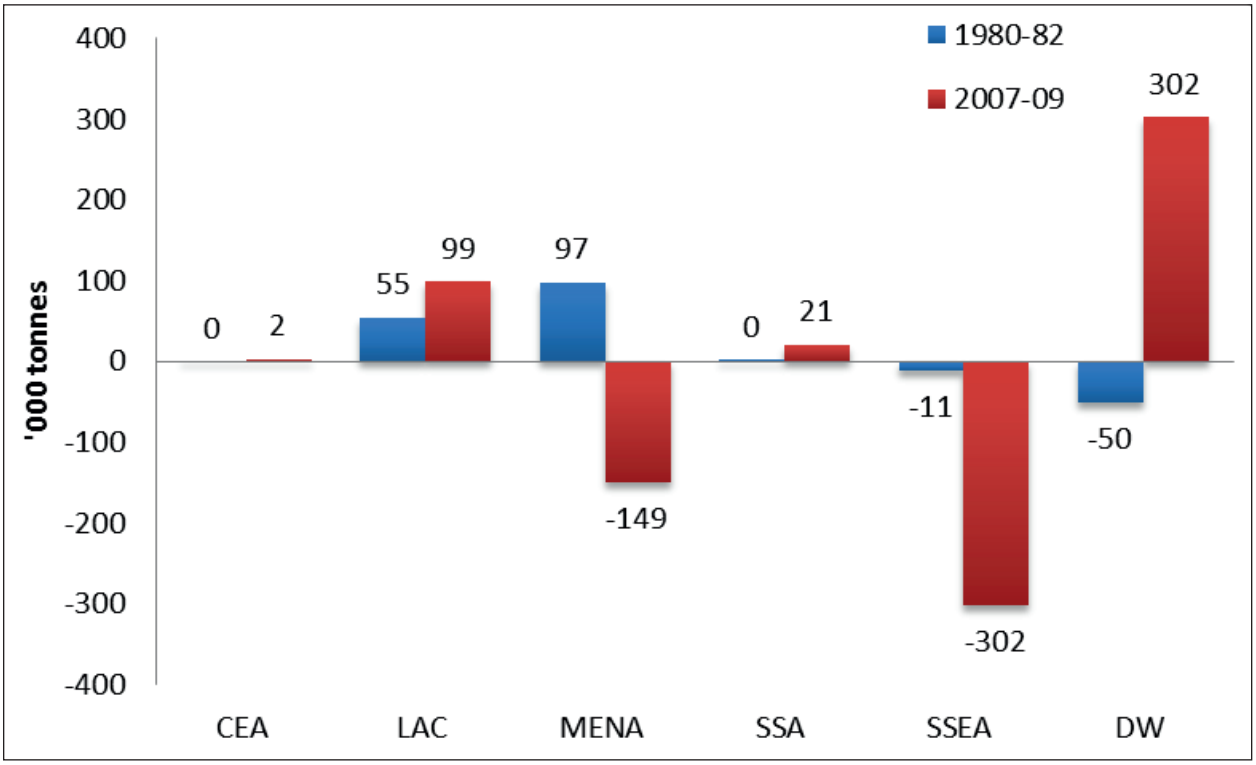
Figure 6. Trends in Chickpea producer prices across regions.

Trade

Globally, the trade in chickpea has constantly increased since 1980–82. Particularly notable are the developed countries that have become net exporters of chickpea in 2007-09 from being net importers in 1980-82 (Table A.12). More than 60% of the chickpea produced in the developed countries are traded (Table of A.12). In contrast, South and South-East Asia has also increased their chickpea exports several folds to reach 0.2 million tons in 2007–09, but the percentage traded as against production is just 2.5% (2008–10) (Table A.12). The import of chickpea has also increased three-folds during the same period to reach 0.5 million tons in 2007–09 (Table A.12). Middle-East and North Africa has witnessed a drop in production, rise in import of chickpea and fall in exports during the same period between 1980-82 and 2007–09. Latin America and Caribbean countries have almost doubled its exports in 2007–09, exporting over 80% of its production in 2007–09 (Table A.12 and Table 3).

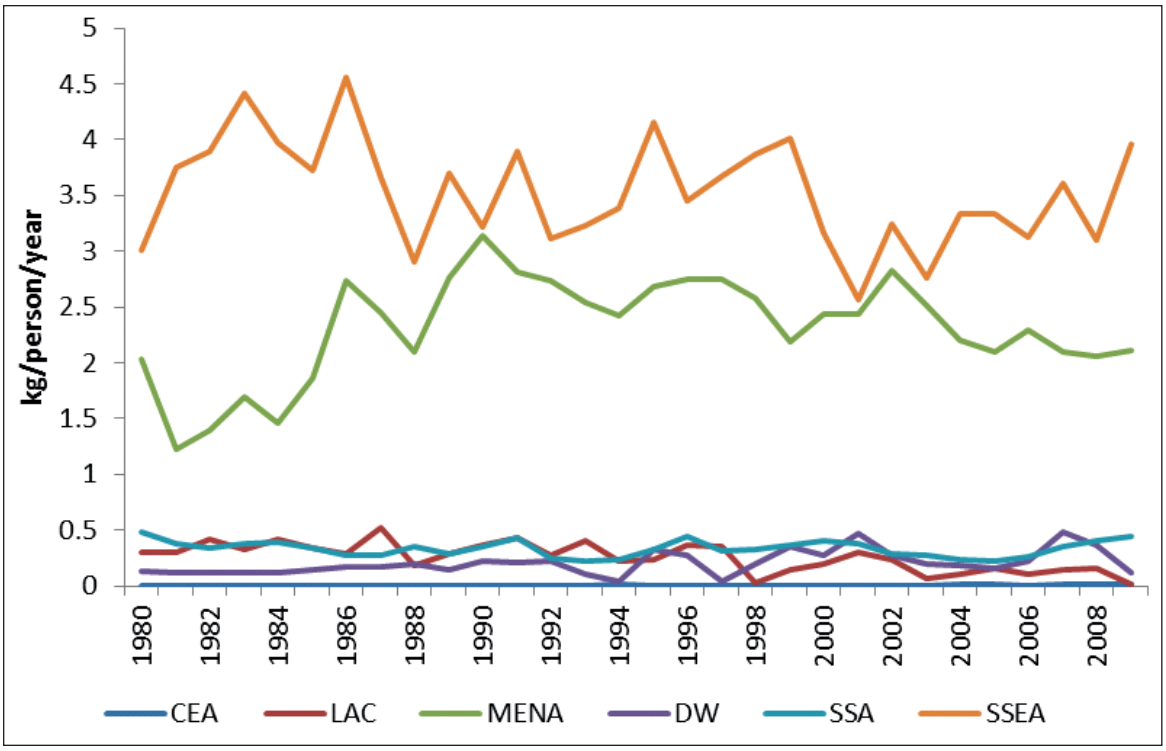
Consumption

South and South-East Asia regions are the single largest producer and consumer of chickpea in the world. Per capita availability has been highly fluctuating and has slightly fallen over time. This is due to the high population growth in India, where the production is less than the demand. Production has grown by 1.2% per annum between 1990 and 2010. Middle-East and North African regions also showed a fluctuating demand with a modest increase of 0.9% per annum between 1980 and 2009. Though consumption levels are higher compared to the level two decades ago, the recent studies



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 7. Trade in Chickpea across regions



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 8. Trends in per capita availability of chickpea across regions

show a declining trend. Area under chickpea has decreased over the years and production has fallen, and the imports in the region amount to 25% of the total production in 2009. The average consumption in Middle-East and North Africa was around 2.3 kg/person/year between 1980 and 2009 (Table A.2 in Appendix), which is the highest barring South and South-East Asia. In the developed countries, Latin America and Sub-Saharan Africa, the consumption levels are low, ranging between 0.21 kg/person/year to 0.33 kg/person/year (Table A.2 in Appendix). The consumption level of chickpea has increased at the rate of 2.6% per annum in the developed countries. However, both Latin American and developed regions showed high variability in consumption of chickpea of more than 50% (Table A.2 in Appendix).

Cowpea[5]

Cowpea are one of the most important grain legume crops grown in the semi-arid tropics covering Asia, Africa, southern Europe, and Central and South America. Cowpea, a drought-tolerant and warm-weather crop, are well-adapted to the drier regions of the tropics where other food legumes do not perform well (Akibonde and Maredia, 2011). Cowpea is grown over 10 million ha of land in the developing countries of Asia, Africa and Latin America (Table 4). Globally, the area under cowpea cultivation has expanded by 27% between 1994–96 and 2008–10, leading

5. Akibonde and Maredia (2011) reported that FAO data does not include any cowpea area in Brazil and India, which account for at least one million ha of area under cowpea. So, it is important to note this limitation of FAO data on which the analysis for this report is based.

to a 90% increase in production (Table 4). Globally, cowpea yield has increased at an annual rate of 2.9% from a low base of 339 kg/ha in 1994–96 (Table 4). During 2008–10, Sub-Saharan Africa had produced 2.6 million tons of cowpea contributing to 94% of total cowpea production (Table 4). Since 1970, the International Institute of Tropical Agriculture (IITA) in Nigeria has worked on developing and distributing improved cowpea materials and new germplasm lines to over 60 countries. Considerable progress has been made in cowpea breeding, and a range of varieties has been developed by combining diverse plant types and maturity with resistance to several diseases, insect pests, and parasitic weeds (Singh, 1997).

Table 4. Cowpea area, yield and production

	LAC	MENA	SSA	SSEA	DW	World
Area harvested (million ha)						
1994–96	0.0	0.0	8.1	0.0	0.0	8.2
2008–10	0.0	0.1	10.0	0.1	0.0	10.4
% change (1994–2010)	22	5531	24	113	61	27
Growth rate (%/year for 1994–2010)	1.4	36.7	1.6	5.7	2.9	1.7
Production (million tons)						
1994–96	0.0	0.0	2.6	0.0	0.0	2.7
2008–10	0.0	0.0	4.9	0.1	0.0	5.3
% change (1994–2010)	64	750	86	260	145	91
Growth rate (%/year for 1994–2010)	3.7	14.6	4.5	9.8	5.0	4.7
Yield (kg/ha)						
1994–96	712	2,031	329	697	2,318	339
2008–10	953	312	491	1,193	3,474	508
% change (1994–2010)	34	−85	49	71	50	50
Growth rate (%/year for 1994–2010)	2.2	−16.2	2.9	3.9	2.1	2.9

Note: LAC Latin America and Caribbean MENA Middle East and North Africa SSA Sub-Saharan Africa SSEA South and South East Asia DW Developed world

Area, production and yield trends

Sub-Saharan Africa dominates in cowpea production with 96% (4.9 million tons) area share (Table 4). The largest producer of cowpea is Nigeria that holds 3.1 million ha of land under cowpea, producing 2.5 million tons in 2008–10 (Table A.5). Niger falls behind in production although it holds a higher share of land area than Nigeria due to a low yield level of 267 kg/ha (Table A.5). The yield level is low and highly variable with a co-efficient of variation of 41% in the last three decades

(Table A.5). Burkina Faso, Cameroon, Kenya, Mali, Senegal, and Tanzania are the other prominent cowpea producers in Africa. Except for Cameroon, all other countries show poor yields of cowpea. Among the top producers, Myanmar is the sole producer of cowpea in Asia. It had about 1.4% of total land area under cowpea and showed a yield level of 1.1 tons/ha in 2008–10 (Table A.5).

Generally, the area under cowpea has increased with many new countries contributing to the total production from the last decade onwards. Middle-East and North Africa began cultivating cowpea since 2002, and, in 2008–10, the region had about 0.1 million ha of land under cowpea cultivation (Table 4). Sub-Saharan Africa has increased its land under cowpea at the rate of 1.6% and yield at the rate of 2.9% annually (Table 4). South and South-East Asia showed a strong upward trend in area under cowpea from a low base. The yield has climbed up in all the regions except in Middle-East and North Africa. It has grown at the highest pace in South and South-East Asia at 3.9% per annum between 1994–95 and 2008–10 (Table 4). Developed countries in the world have experienced a yield growth rate of 2.1% and an area growth rate of 2.9% per annum (Table 4).

Producer prices

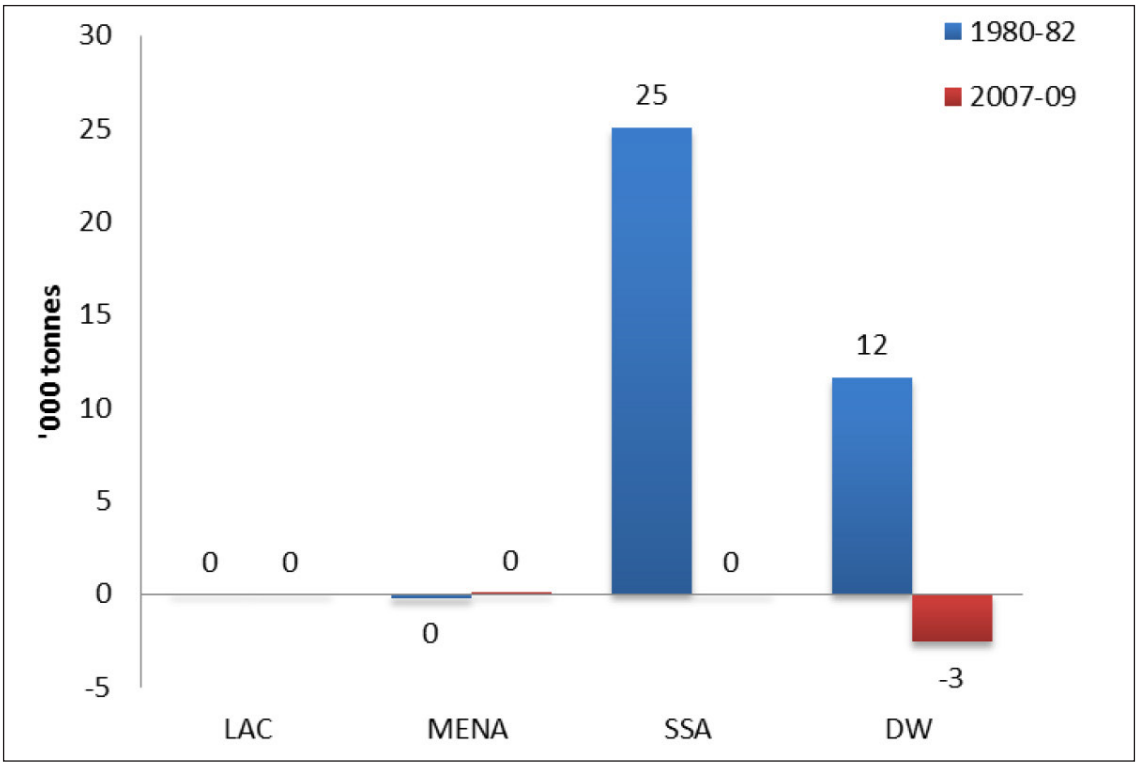
Sub-Saharan Africa is the single largest producer of cowpea in the world and consequently, has the lowest prices globally with a production of 4.9 million tons in 2008–10. From US$287 per ton in 1991, the producer prices in Sub-Saharan Africa has increased to US$500 per ton in 2009 at the rate of 2.7% per annum. However, this figure excludes the unusually higher prices of Nigeria at almost US$2000 per ton in the early 1990s. Other cowpea-growing regions include South and South-East Asia; Myanmar is the largest producer in this region, but no reliable data is available for the country. Latin America and the Caribbean, whose prices significantly dropped to US$240 per ton in 2004, showed an upsurge in prices reaching US$455 per ton in 2009 even with the exclusion of Jamaica, which showed extremely high prices unlike other countries. The developed world, which showed the highest prices in the world, has a steeply increasing trend in prices after 2000, which may be due to increasing demand for animal feed.

Trade

The recent data showed that the cowpea trade has reduced to a great extent. In 1980–82, it was exported by Sub-Saharan Africa to a small extent of 25,000 tons, which has also dropped to nil in 2007–09 (Figure 9). However, between 1980–82 and 2008–10, the production of cowpea had increased invariably across the globe. Developed nations that were net exporters in 1980–82 had also become net importers in 2007–09.

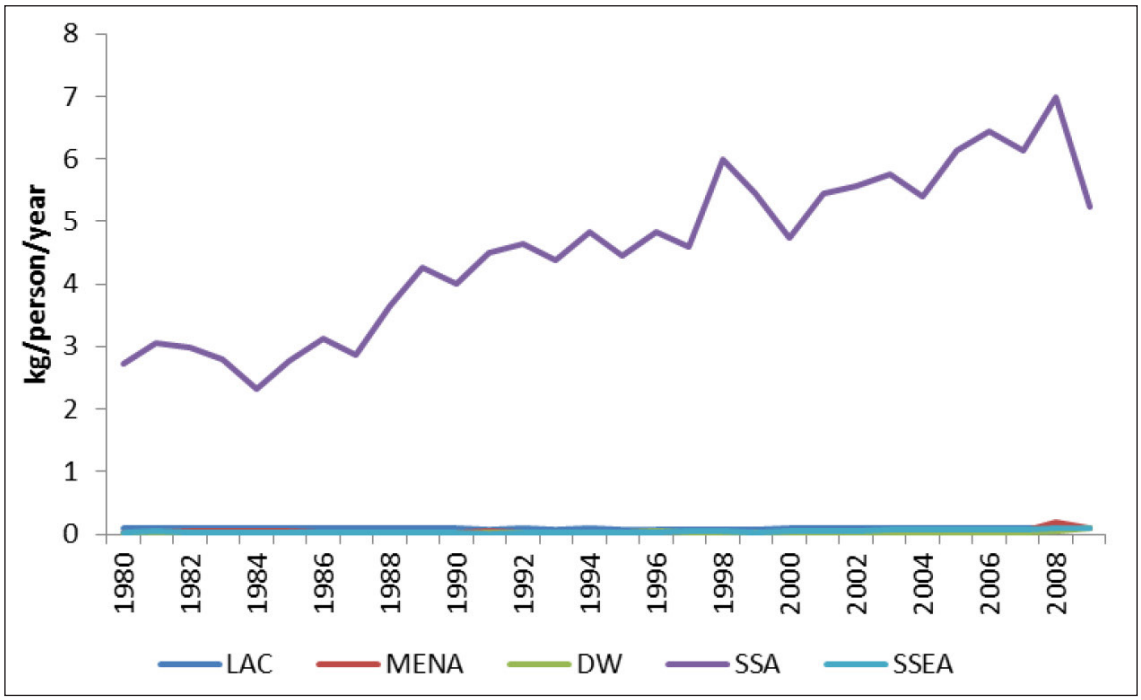
Consumption

Cowpea is an important legume in Sub-Saharan Africa compared to other regions, where the consumption has grown at the rate of 3.2% per annum between 1980 and 2009 (Table A.2 in Appendix). The average level of consumption is 4.5 kg/person/year in Sub-Saharan Africa (Table A.2 and Figure 10). South and South-East Asia also showed a significant rise in consumption demand at 4.6% per annum (Table A.2 in Appendix). Developed countries also exhibited a similar trend, growing at the rate of 5.5% per annum. Latin America showed a marginally falling trend in the consumption level at 0.1% per annum (Table A.2 in Appendix). Generally, cowpea consumption has been found to be quite unstable compared to other crops.



Note: LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSA-Sub-Saharan Africa, DW-Developed world

Figure 9. Trade in cowpea across regions.



Note: LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSA-Sub-Saharan Africa, DW-Developed world

Figure 10. Trends in per capita availability of cowpea across regions.

Pigeonpea

Area, production and yield

Pigeonpea is an important grain legumes crop of rainfed agriculture in the semi-arid tropics of Asia and Eastern and Southern Africa. The Indian sub-continent, Eastern Africa, and Central America/ Caribbean region are the world's main pigeonpea-producing regions. Pigeonpea crop is cultivated either as a sole crop or as an inter crop with cereals such as sorghum and maize or other legumes, including groundnut. Pigeonpea production is mostly concentrated in South and South-East Asia with 4.1 million ha of land during 2008–10, yielding an output of 3.3 million tons (Table 5). The yield, however, is the highest in Latin America and Caribbean with 760 kg/ha in 2008–10, but the area had contracted by 23% in size over the years from 0.05 million ha in 1994–96. Yield growth is observed to be the highest in Sub-Saharan Africa with 1.7% per annum between 1994–96 and 2008–10. India is followed by Myanmar in South Asia, which has an area share of 12.6% while producing 0.7 million tons of pigeonpea (Table A.6). Malawi and Kenya are the other important producers of pigeonpea in the world, together producing 0.2 million tons (Table A.6). Among the top six producers of pigeonpea in the world, Uganda and Myanmar have high yields of 1 tons/ha and 1.2 tons/ha respectively, but these yield rates are highly fluctuating (Table A.6). In India, the yield was 731 tons/ ha in 2008–10, which has been quite stable over the years (Table A.6).

Table 5. Pigeonpea area, yield and production.

	LAC	SSA	SSEA	World
Area harvested (million ha)				
1994–96	0.0	0.3	3.6	4.1
2008–10	0.0	0.5	4.1	4.7
% change (1994–2010)	−23	40	13	15
Growth rate (%/year for 1994–2010)	−1.3	2.4	1.0	1.1
Production (million tons)				
1994–96	0.0	0.2	2.5	2.8
2008–10	0.0	0.4	3.3	3.7
% change (1994–2010)	−20	73	32	35
Growth rate (%/year for 1994–2010)	−0.8	4.2	1.9	2.1
Yield (kg/ha)				
1994–96	735	621	689	684
2008–10	760	769	804	800
% change (1994–2010)	3	24	17	17
Growth rate (%/year for 1994–2010)	0.5	1.7	0.9	1.0

Note: LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa.

Area under pigeonpea in Sub-Saharan Africa has grown at the rate of 2.4% per annum and in Asia at 1% per annum between 1990 and 2010 (Table 5). In contrast, the Latin America and Caribbean region has registered a decrease in area under pigeonpea at 23% between 1994–96 and 2008–10 (Table 5). The highest yield increase has been observed in Sub-Saharan Africa, where the yield has increased at the rate of 1.7% per annum (Table 5). This has led to a 73% increase in pigeonpea production in this region between 1994–96 and 2008–10 (Table 5).

Myanmar shows a strong positive trend in area under pigeonpea and its yield between 1980 and 2010. India shows an upward trend in yield, but this trend is highly fluctuating. Tanzania, which has an area share of 1.5%, shows the lowest yield variability of 7% (co-efficient of variation) between 1980 and 2010 and the yield level is also as high as in India (Table A.6).

Producer prices

South and South-East Asia, particularly India, which is the highest producer and consumer of pigeonpea, shows a highly increasing trend for producer prices at the rate of 4.8% per annum. Philippines, which is a small producer of pigeonpea, showed high prices and thus, has been excluded from the regional price trend. In 2009, producer price in South and South-East Asia was US$675 per ton (Figure 11). In Sub-Saharan Africa, after the sharp rise in producer price in 1996 (from US$ 196 per ton in 1995 to US$540 per ton in 1996), it has shown a stagnant price trend thereafter. Even with the exclusion of Jamaica and Puerto Rico, Latin America shows prices peaking in 2009 at US$1554 per ton, which might be attributed to the reduced production in the region in the last two decades.

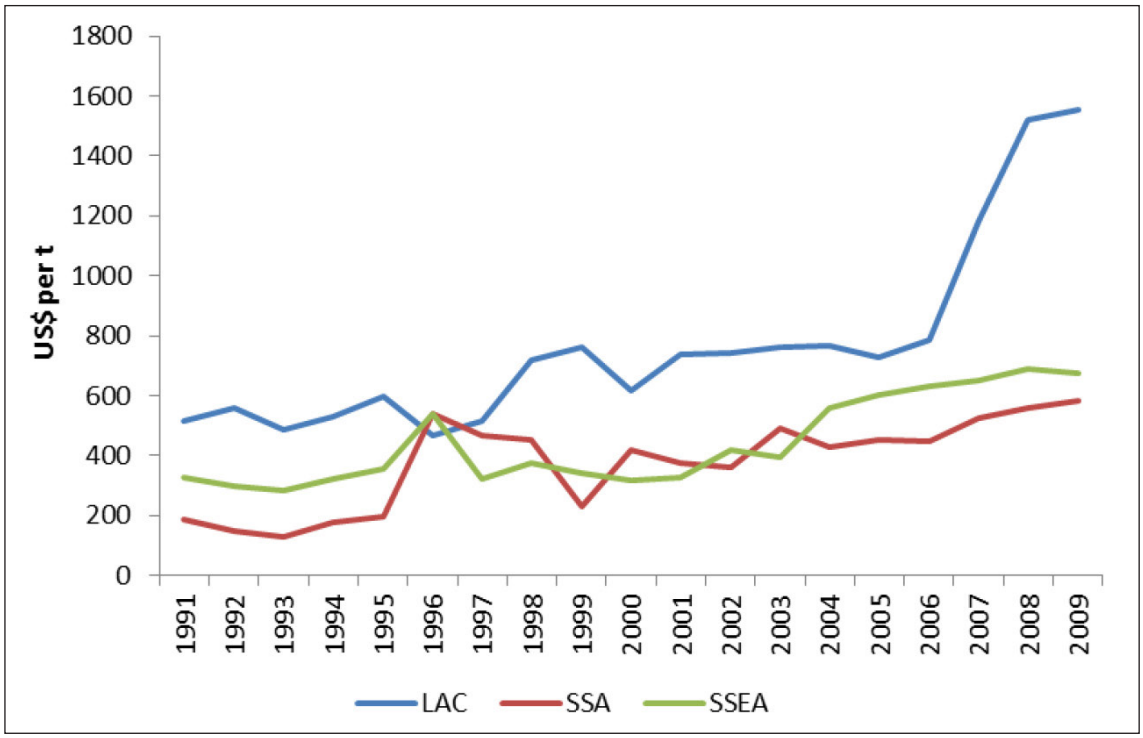


Figure 11. Trends in pigeonpea producer prices across regions.

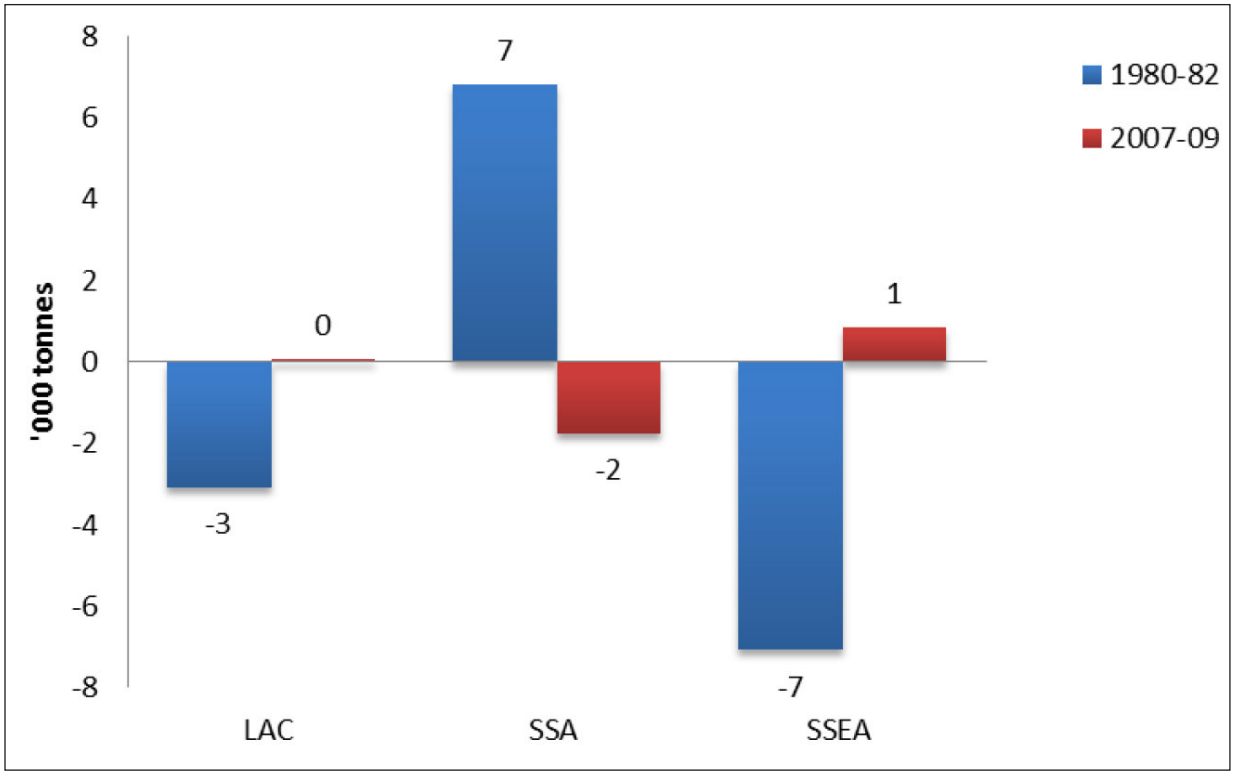
LAC-Latin America and Caribbean, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa.

Trade

Among all the pulses, the production of pigeonpea is the lowest in the world, mostly concentrated in Asia and Africa, in 2010 at around 3.6 million tons (Table A.11). Trade is minimal and very erratic. In 2007–09, there was no trade of pigeonpea in Latin America and Caribbean. Sub Saharan Africa has become a net importer and South and South East Asia has become a net exporter (Figure 12 and Table A.14).

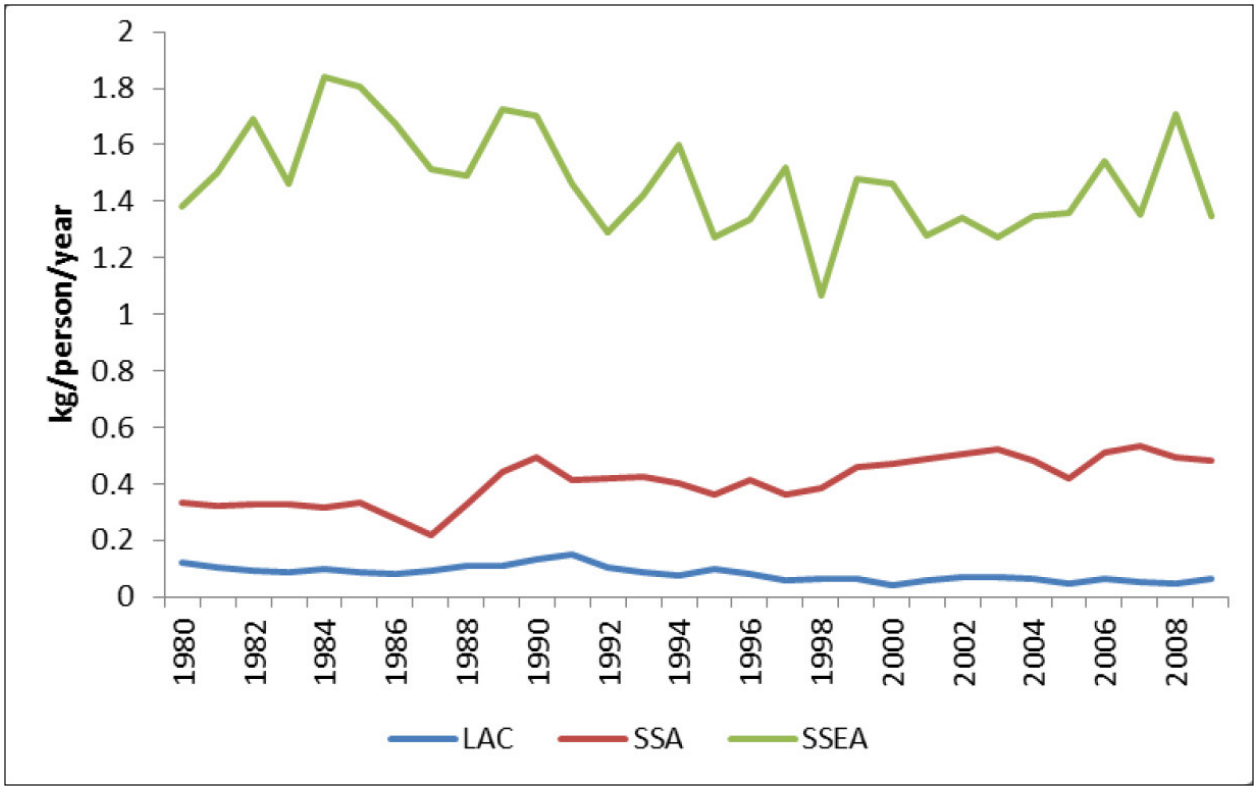
Consumption

Pigeonpea is consumed only in the developing regions of Asia, Africa, and Latin-America. The largest pigeonpea consumer is South and South-East Asia, where a slight decline has been observed at 0.6% per annum between 1980 and 2009 (Table A.2 in Appendix). A significant jump is found in Sub-Saharan Africa where the average consumption has been around 0.41 kg/person/year and an annual growth rate of 1.9% was registered in the last three decades (Table A.2 in Appendix). The consumption level is quite unstable and on a declining trend in the Latin America and Caribbean region, where the consumption averaged at around 0.1 kg/person/year (Table A.2 in Appendix and Figure 13).



LAC-Latin America and Caribbean, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa

Figure 12. Trade in pigeonpea across regions.



LAC-Latin America and Caribbean, SSEA-South and South east Asia, SSA-Sub Saharan Africa

Figure 13. Trends in per capita availability of pigeonpea across regions.

Lentil

Area, production and yield

Lentil crop is relatively tolerant to drought environment and is grown throughout the world. Globally, the lentil crop was grown on 3.7 million ha of land during 2008–10 with a production of 3.8 million tons (Table 6). Though South and South-East Asia holds the highest area share, the developed countries (mostly Canada, USA and Australia) contribute the most towards total production at about 51% with an area share of 36%. The lentil yield in South and South-East Asia was 668 kg/ha in 2008–10 whereas in the developed regions, it was about 50% higher (Table 6). In Latin America and Caribbean, the production has dropped by almost 60% between 1994–96 to 2008–10 (Table 6). In Middle-East and North Africa, production dropped by 52% in 2008–10 compared to the level in 1994–96 (Table 7). The yield level shows that lentil is one of the lowest yielding grain legumes crop in the developed world, with an average yield of 1.4 tons/ha in 2008–10 (Table 6).

Table 6. Lentil area, yield and production.

	CEA	LAC	MENA	SSA	SSEA	DW	World
Area harvested (million ha)							
1994–96	0.1	0.0	0.8	0.0	1.8	0.4	3.4
2008–10	0.0	0.0	0.4	0.1	1.7	1.3	3.7
% change (1994–2010)	−31	−52	−53	45	−5	189	10
Growth rate (%/year for 1994–2010)	−3.0	−4.5	−4.3	3.2	−0.1	7.2	0.8
Production (million tons)							
1994–96	0.1	0.0	0.8	0.0	1.2	0.5	2.8
2008–10	0.1	0.0	0.4	0.1	1.2	1.9	3.7
% change (1994–2010)	23	−60	−52	169	0	236	35
Growth rate (%/year for 1994–2010)	1.7	−5.8	−3.1	7.0	0.1	8.0	2.3
Yield (kg/ha)							
1994–96	1,139	888	996	593	638	1,221	822
2008–10	2,006	756	1,006	1,094	668	1,410	1,003
% change (1994–2010)	76	−15	1	85	5	15	22
Growth rate (%/year for 1994–2010)	4.8	−1.4	1.2	3.7	0.2	0.7	1.5

Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Among the developing countries, India was the largest producer of lentil in the world with an area share of 35.6% and yield of 666 kg/ha during 2008–10 (Table A.7). Among the developed countries, Canada was the largest producer of lentil, with an area share of 26% and yield of 1505 kg/ha (Table A.7). Canada also exceeded India in production, producing 1.5 million tons compared to the 0.9 million tons produced in India (Table A.7). However, it should be noted that the yield variability is lower in India by 50% compared to that in Canada (Table A.7). Other prominent producers of lentil are Turkey, USA and Nepal with a production of more than 0.1 million tons. Turkey showed a downward trend in area under lentil cultivation between 1980 and 2010, falling from 0.9 million tons in 1980 to 0.1 million tons in 2008. India is also found to have a downward trend in area under lentil cultivation since 2006. The area under lentil cultivation in Nepal showed a stable positive trend from a low base. Among the developed countries, Canada and USA showed significant positive trend in area since 2008.

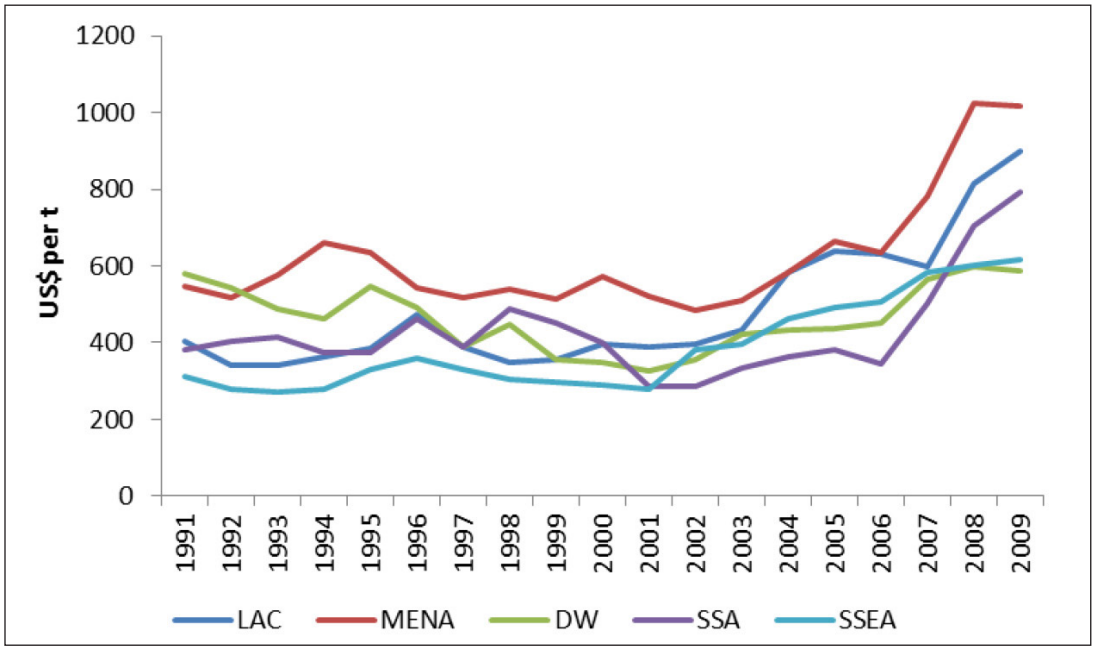
Regionally, South and South-East Asia dominated in lentil cultivation, holding 48% of the total lentil area (Table 6). This was followed by the developed countries, such as Canada and USA, with a 14%

share in total lentil area harvested (Table A.7). However, the area under cultivation has fallen in developing regions except for Sub-Saharan Africa, where the yield has also grown at the rate of 3.7% per annum (Table 6). Production increase has been the highest in developed countries at the rate of 8% per annum, with Canada at the forefront (Table 6). In Asia, the production has either fallen or has remained stagnant except in Central and East Asia, which showed some promising trends in production though from a low base.

The main reason for the stagnant production trends in Asia has been the low yield levels in India. In contrast, the yield has increased substantially from 593 kg/ha to 1094 kg/ha between 1994–96 and 2008–10 in Sub-Saharan Africa (Table 6). Middle-East and North Africa have shown a modest increase in yield, relatively growing at an annual rate of 1.2% (Table 6). However, the inverse area trend in this region has brought down the production by 52% in the last 15 years (Table 6).

Producer prices

Lentil producer prices show a clear upward trend across all regions (Figure 14). Major lentil producers are South and South-East Asia region and Middle-East and North Africa region, where the former showed lower prices than the latter throughout the entire period. In 2009, producer price was US$616 per ton in South and South-East Asia and US$1015 per ton in Middle-East and North Africa. In Turkey, the producer prices have increased at the rate of 5.3% per annum between 1991 and 2009 to reach US$1285 per ton. Similar increases have been found in Morocco, Egypt and Armenia, which have relatively lower production than Turkey. Cyprus and Iran have been excluded from their regional price trend calculations for significant deviation from the normal price levels in their respective regions.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

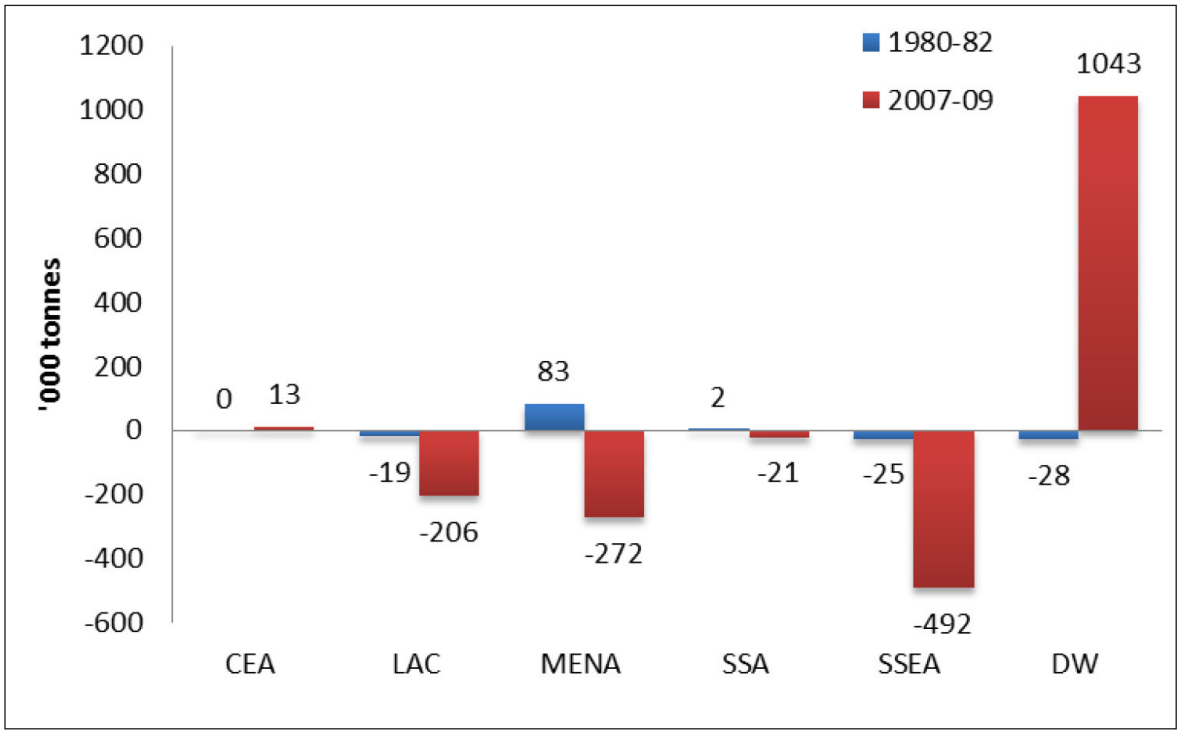
Figure 14. Trends in lentil producer prices across regions.

Trade

Both lentil exports and imports showed increasing trends between 1980 and 2009. We found that both lentil production and exports have increased by 236% and 246% respectively in the developed countries between 1995 and 2000 (Table A.15 and Table 6). In some developed countries, the imports, which are about one-fifth of their exports, are observed to have marginally increased (Table A.15). In South and South-East Asia, the imports have grown more than the exports (Figure 15); imports have grown by 240% reaching 0.5 million tons in 2007–09 and the exports have increased by 26% to reach 0.03 million tons in 2007–09 (Table A.15).

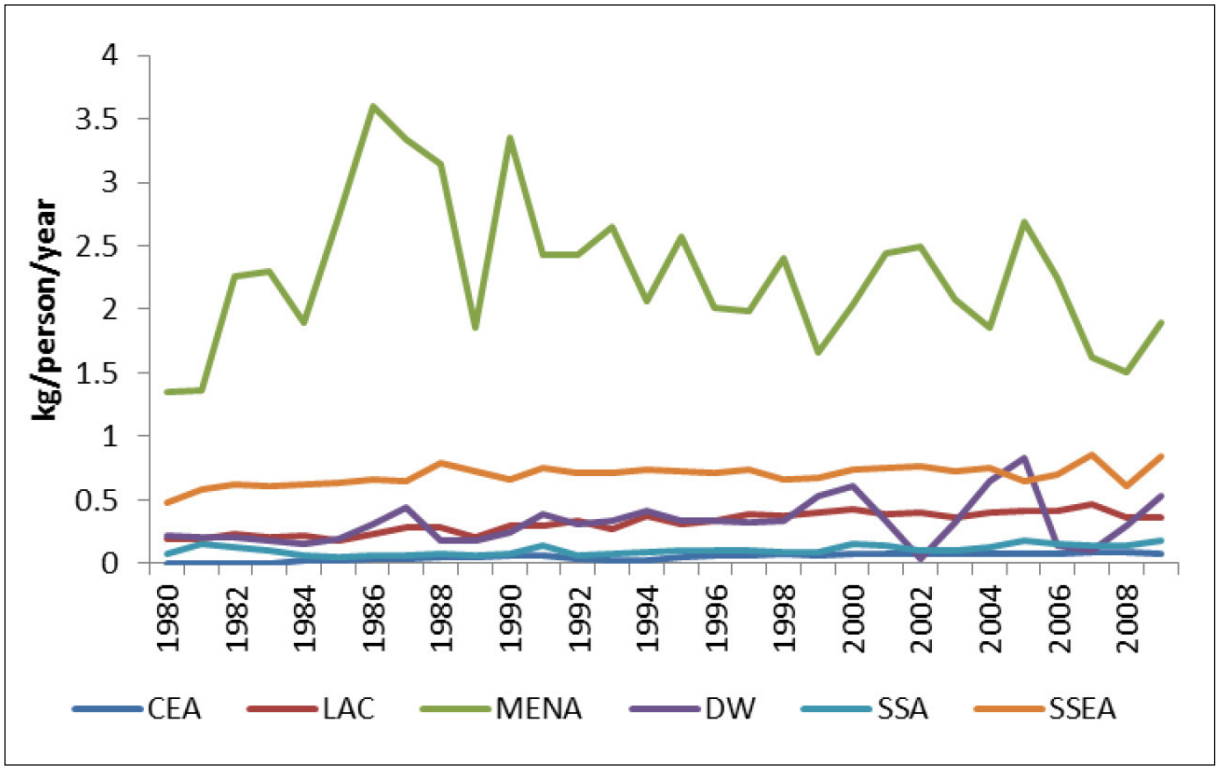
Consumption

Lentil consumption is the highest in the Middle-East and North Africa at 2.3 kg/person/year (Table A.2 in Appendix). In all other regions, lentil consumption is quite low, ranging between 0.05 and 0.7 kg/person/year (Table A.2 in Appendix). However, significant positive movements were observed in Central and East Asia at 4.4% per annum, Latin and Caribbean at 2.9% per annum, Sub-Saharan Africa at 2.5% per annum, and developed countries at 1.4% per annum (Table A.2 in Appendix). South and South-East Asia show a stagnant trend in consumption with relatively low variability (Figure 16).



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 15. Trade in lentil across regions.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 16. Trends in per capita availability of lentil across regions.

Faba bean

Area, production and yield

Faba bean, also known as the broad bean and field bean, originated from North Africa and West Asia. These beans are a hardy crop and can withstand cold climates. Faba bean is grown on 2.5 million ha of land globally, with Central and East Asia contributing 36% and Sub-Saharan Africa about 21% (Table 7) of the total area under faba bean cultivation. China is the largest producer of faba bean in the world where the production has fallen significantly. In Central and East Asia, the area has declined by 12% from 1 million ha in 1994–95 to 0.9 million ha in 2008–10, whereas the yield has increased from 1805 kg/ha to 1910 kg/ha (Table 7). Sub-Saharan Africa, the area has grown at the rate of 3.1% per annum, leading to a production increase of 90% (from 0.34 million ton to 0.64 million ton) between 1994–95 and 2008–10. Moreover, the yield has also grown at an annual rate of 2.1% during the same period (Table 7). Morocco, Egypt, and Sudan are the other main producers of faba bean (Table A.8). The developed regions have also expanded their area share and improved their yield levels by nearly one-third over the last 15 years (Table 7).

Table 7. Trends in faba bean area, production and yield.

	CEA	LAC	MENA	SSA	SSEA	DW	World
Area harvested (million ha)							
1994–96	1.0	0.1	0.4	0.3	0.0	0.3	2.3
2008–10	0.9	0.1	0.4	0.5	0.0	0.4	2.5
% change (1994–2010)	−12	6	2	53	−31	35	8
Growth rate (%/year for 1994–2010)	−1.0	1.0	−0.1	3.1	−1.8	2.7	0.6
Production (million tons)							
1994–96	1.8	0.1	0.7	0.3	0.1	0.5	3.6
2008–10	1.7	0.9	0.7	0.6	0.0	0.9	4.2
% change (1994–2010)	−7	58	−1	90	−12	71	18
Growth rate (%/year for 1994–2010)	−0.3	3.4	−0.1	5.3	−0.1	4.2	1.4
Yield (kg/ha)							
1994–96	1,805	700	1,614	976	540	1,826	1,565
2008–10	1,910	1,047	1,572	1,215	688	2,320	1,701
% change (1994–2010)	6	50	−3	24	27	27	9
Growth rate (%/year for 1994–2010)	0.8	2.4	0.0	2.1	1.7	1.4	0.8

Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA South and South east Asia, SSA-Sub Saharan Africa, DW-Developed world

Compared to all the other legumes, the yield levels of Faba bean are extremely high . Among the top producers, China and Sudan have the highest yield levels of 1.9 tons/ha (Table A.8). In other regions, the yield levels are mostly just above 1 tons/ha among the top producers, except for Morocco, which has a yield level of 736 kg/ha with high yield variability (Table A.8).

Developed countries, such as Australia and France, are also among the top faba bean producing countries (Table A.8). France proves to be the most efficient country in faba bean production having the highest yield level of 4 tons/ha (Table A.8); however, the crop is used as livestock feed. Regionally, Central and East Asia has the highest area under faba bean, accounting for 36% of the total area under the crop, which is dominated by China in that region (Table 7). In Sub-Saharan Africa and the Middle East and North Africa have prominent shares in the total area under faba bean cultivation, as they together hold about 35% of the total rea (Table 7). The yield was found to have risen modestly in Central and East Asia compared to its levels in 1995. However, the production shows a declining trend, falling at an annual rate of 0.3% due to area contractions in the last two decades (Table 7). In Sub-Saharan Africa, the area under cultivation shows an upward trend with a growth rate of 3.1% per annum between 1994–96 and 2008–10, and the yield has increased significantly (Table 7). The production has moved in line with the area, growing at the rate of 5.3% annually (Table 7).

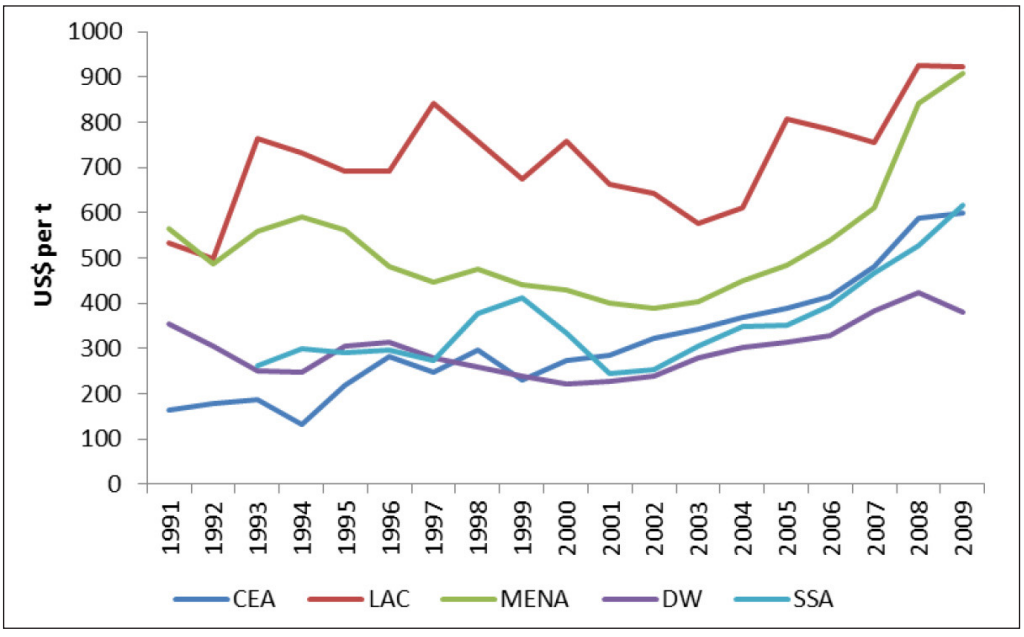
Middle East and some regions of Africa, which contribute around 17% of the total production, showed a slight dip in production due to the decreasing trends in the area under cultivation (Table 7). In the developed regions, the production has gone up especially due to yield improvements.

Producer prices

Dwindling faba bean production levels in Central and East Asia have led to the increase in producer prices in the world over the years. In 2008–10, Latin America produced low quantities of faba bean at about 0.2 million tons compared to Central and East Asia, which produced about 1.7 million tons (Table 8). Therefore, Latin America experienced high producer prices, varying between US$500 per ton and US$900 per ton during the last two decades. In the developed countries, the producer price of faba bean was US$381 per ton in 2009 when the production is around 1 million ton. In the Middle East and North Africa, where production has fallen at the rate of 0.1% per annum, the producer prices have risen at the rate of 3.33% per annum between 1995 and 2009 (Table 7 and Figure 17).

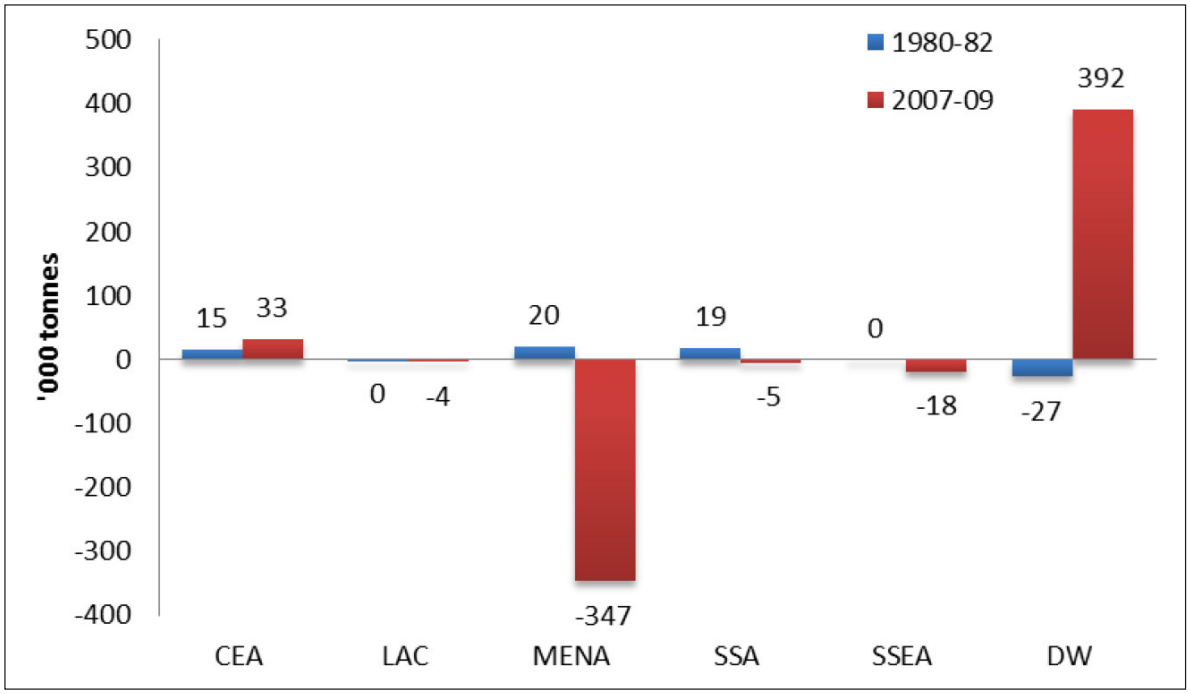
Trade

Looking at the global export quantity of total pulses including both focused and non-focused pulses, we found that the global pulse export has increased by 51% to reach 12 million tons in 2009 compared to the export quantity of 8 million tons in 1995. Faba bean, bean, lentil, groundnut and soybean are found to be exported in larger quantities in 2007–09 compared to 1980–82. In the case of faba bean, Central and East Asia region, which was its leading exporter with 0.2 million tons in 1980–82, has been replaced by the developed countries with 0.51 million tons in 2007–09 (Table A.16 and Figure 18). The import of faba bean by Middle-East and Northern Africa has increased by 140% from 0.24 million tons in 1980–82 to 0.37 million tons in 2007–09 (Table A.16).



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 17. Trends in faba bean producer prices across regions.

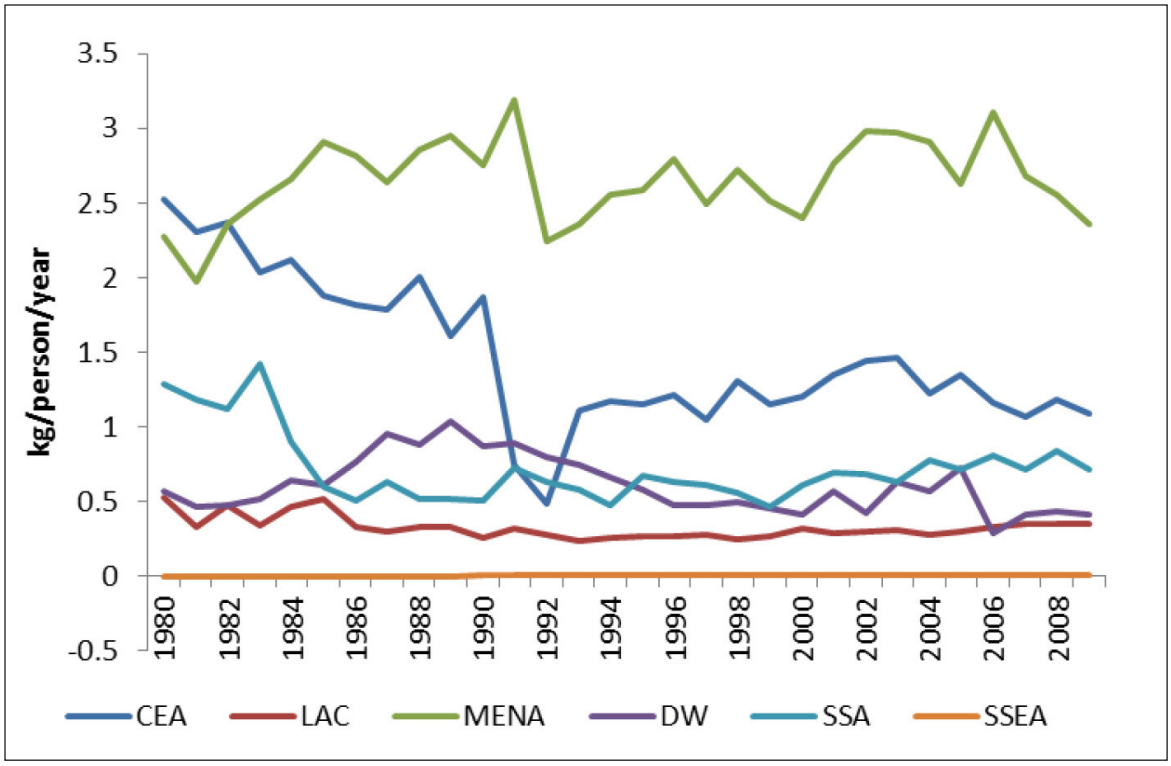


Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 18. Trade in faba bean across regions.

Consumption

The Middle-East and North Africa has the highest faba bean consumption, averaging 2.7 kg/person/year (Table A.2 in Appendix). This is the region where the import of faba bean is the highest, mainly compared to the developed countries. The production of faba bean can be improved to meet its growing demands in Middle-East and North Africa. The rising incomes and growing population could have stimulated the demand in that region. South and South-East Asia had started producing faba bean only from 1988 onwards, where the consumption has increased tremendously by 6.7% per annum. However, the variability in consumption stands at almost 77%, and the level of consumption growth is too low at 0.01 kg/person/year (Table A.2 in Appendix). Therefore, this region shows a huge consumption growth potential. In the developed world, the consumption has fallen over the years (Figure 19). The largest fall had occurred in Central and East Asia at 2.3% per annum where the average consumption is relatively high at 1.5 kg/person/year (Table A.2 in Appendix). Developed countries also showed a fall in consumption at 1.6% per annum (Table A.2 in Appendix).



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 19. Trends in faba bean per capita availability across regions.

Soybean

Area, production and yield trends

Soybean is a multi-purpose crop, grown mainly for its oil and feed uses apart from being processed into a variety of products for human consumption. Among the pulses, soybean dominates with the highest area of 99 million ha in 2008–10 (Table 8), which denotes a 45% area share globally compared to 32% in 1994–96. Soybean yield has also increased from 2,115 kg/ha in 1994-96 to 2,399 kg/ha in 2008–10 (Table 8). Nevertheless, the area expansion has been the main driver of production growth. Most of the soybean research are concentrated in Sub-Saharan Africa. Since the 1970s, soybean breeders at the International Institute of Tropical Agriculture (IITA in Ibadan, Nigeria, have been successfully working on developing improved varieties of soybean that can fix more nitrogen from the atmosphere without rhizobium inoculation. These improved varieties are also high yielding, store well, and are resistant to pod shattering. USA dominates in soybean production, having about 30 million ha of land under cultivation and contributing about 87 million tons towards the total production (2008–10) (Table A.9). The yield level is also the highest in USA at 2.8 tons/ha (Table A.9). About 40% of the area under soybean lies in Latin America in Argentina and Brazil (Table A.9). These two countries produce more than 100 million tons of soybean (Table A.9), followed by India and China that have relatively low yield levels. Though China has less land area under soybean than India, its yield levels are 60% higher compared to that in India, producing 15 million tons in 2008–10 (Table A.9).

Table 8. Soybean area, yield and production

	CEA	LAC	MENA	SSA	SSEA	DW	World
Area harvested (million ha)							
1994–96	8.7	18.1	0.6	0.8	6.8	27.4	62.4
2008–10	9.3	42.6	0.3	1.2	10.8	35.3	99.4
% change (1994–2010)	8	135	−53	40	58	29	60
Growth rate (%/year for 1994–2010)	0.6	6.8	−5.5	2.9	3.1	1.4	3.5
Production (million tons)							
1994–96	14.8	39.3	0.1	0.5	7.1	69.0	131.2
2008–10	15.7	112.6	0.0	1.4	11.9	96.7	238.6
% change (1994–2010)	7	186	−36	148	65	40	82
Growth rate (%/year for 1994–2010)	0.3	8.2	−2.8	6.4	3.6	2.1	4.4
Yield (kg/ha)							
1994–96	1,702	2,176	2,328	691	1,046	2,518	2,115
2008–10	1,685	2,638	3,210	1,219	1,095	2,736	2,399
% change (1994–2010)	−1	21	38	76	5	9	13
Growth rate (%/year for 1994–2010)	−0.3	1.3	2.9	3.4	0.5	0.6	0.9

Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

The global soybean production has increased at the rate of 4.4% per annum between 1994–95 and 2008–10 (Table 8). Regionally, production is more concentrated in America and Asia. Soybean production has grown at the highest pace in Latin America at the rate of 8.2% per annum between 1994–95 and 2008–10 (Table 8). Sub-Saharan Africa had about 1.2 million ha of land under soybean cultivation in 2008–10 with substantial yield improvements from 690 kg/ha to 1220 kg/ha between 1994–95 and 2008–10 (Table8). However, both Asia and Africa are lagging far behind developed countries in soybean yield.

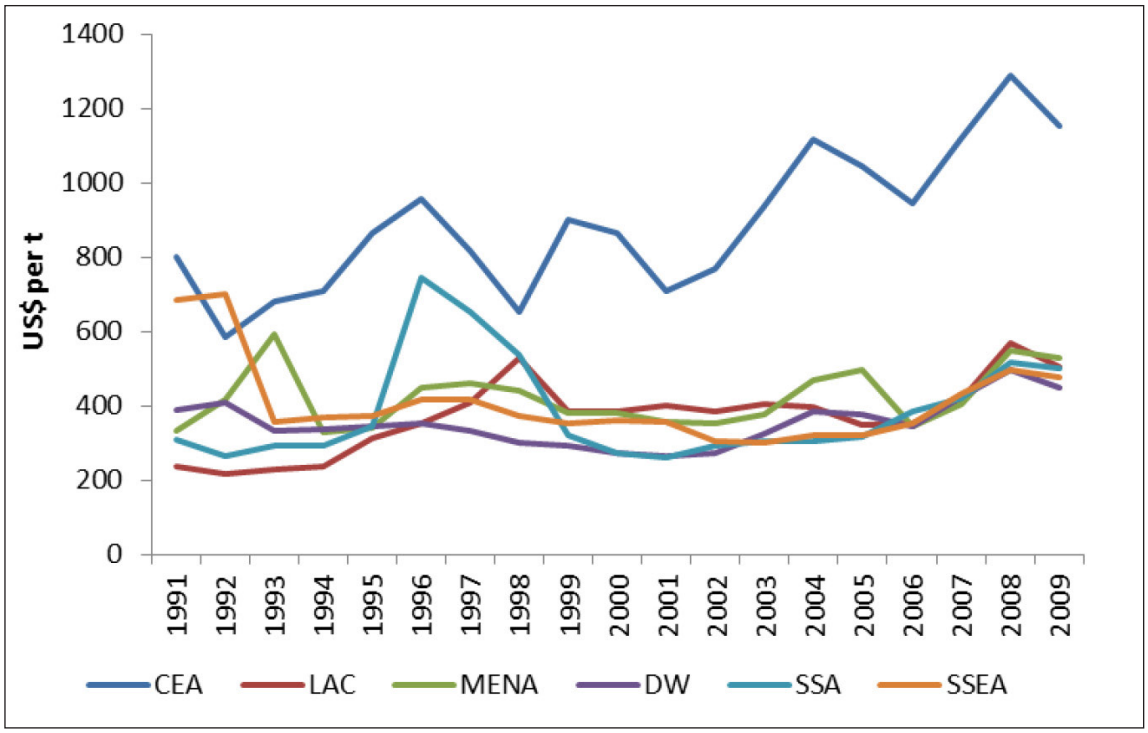
Except for Middle-East and parts of Africa, all soybean growing regions in the world show an upward trend in area, production and yield. Area expansion is found to be particularly rapid in Asia and Africa, though the area share of Africa is quite less. Latin America is observed to have the most dramatic yet stable ascent in production between 1995 and 2010 from 40 million tons to 110 million tons (Table 8).

Producer prices

Soybean producer prices have increased except for Sub-Saharan Africa, where it has decreased to US$158 per ton in 2009 compared to US$ 343 per ton in 1995 (Figure 20). Compared to all other pulses, the inter-regional differences in soybean producer prices reduced to a great extent, ranging between US$450 per ton and US$530 per ton after 2000. However, an exception to this is the Central and East Asia, where the average producer price rose at the rate of 2.9% per annum to reach US$1151 per ton in 2009, which is the highest in the world (Figure 20). This has been mainly due to the high price levels in the Republic of Korea, where the prices rose from US$1402 per ton to US$2562 per ton in 2009. The lowest price rise has been in South and South East Asia at about 0.7% per annum between 1995 and 2009 even when the production went up by 65% during the same period (Figure 20 and Table 8). Latin America and Caribbean and the developed world, the largest producers of soybean, witnessed a farm-gate price rise by 62% and 29% respectively between 1995 and 2009 (Figure 20).

Trade

In the last two decades, we found that soybean production has improved tremendously in most regions of the world compared to the other pulses. Similarly, the trade in soybean is much higher compared to all other grain legumes. Latin America and Caribbean and the developed regions are the highest producers and exporters of the crop. In the developed parts of the world, though some countries, such as the USA, Canada, Netherlands, Ukraine, and Belgium, are leading exporters, most European countries are large importers of soybean from the aforesaid countries. During 2008–10, the total production in developed regions was around 97 million tons, export was around 39 million



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

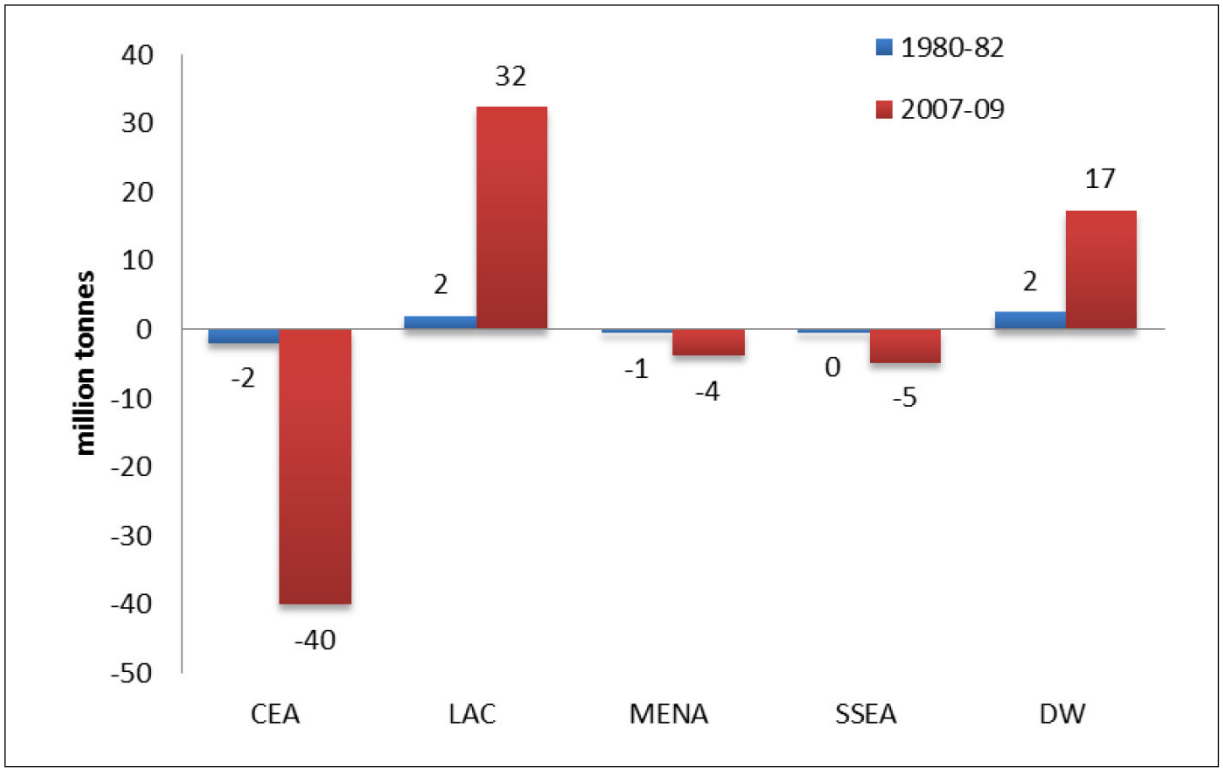
Figure 20. Trends in soybean producer prices across regions.

tons and import was 22 million tons (Table A.17). Latin America and Caribbean countries have expanded their exports from 3760 million tons in 1980-82 million tons in 1994–96 to 39 million tons in 2007–09 (Figure 21), which constitutes 34.5% of the total production (Table A.17). China is the largest importer of soybean in the world, between 1980 and 2009, its import has grown at the rate of 13% per annum reaching 44 million tons in 2009.

Consumption

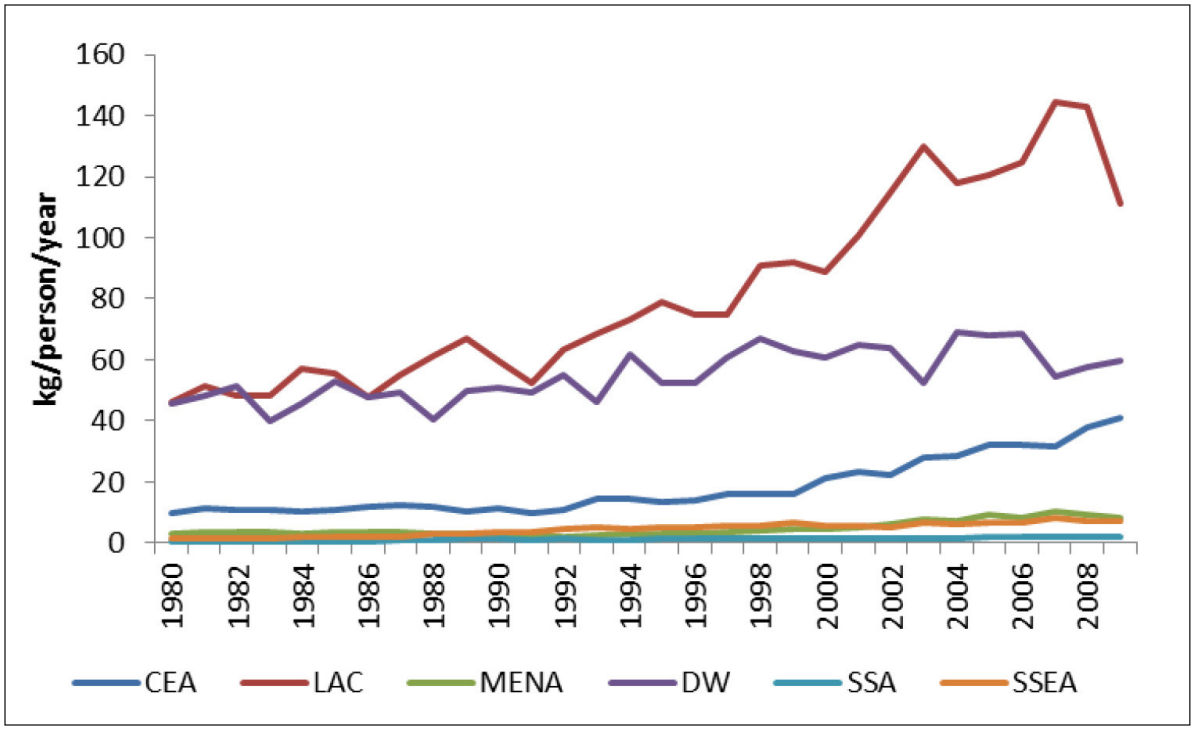
Distinct upward consumption trends are observed in all regions of the world in the case of soybean (Figure 22). In Latin America and Caribbean, developed regions, the production has grown much faster than the developed world (Figure A.8 and A.12), whereas the Americans export the surplus soybean production to Europe and China. In South and East Asia, after 1995, the production growth has not been enough to satisfy total demand (Figure A.11). Middle-East and North Africa have experienced a steeply rising demand; however, the production remains at the lowest level even in the recent past (Figure A.9).

Soybean shows significant growth in consumption invariably across the globe. The developed countries consumed 55 kg/person/year between 1980 and 2009, and the growth rate was 1.3% per annum (Table A.2 in Appendix), representing the combined demand for livestock feed and for the generation of bio-diesel. The generation of bio-diesel with soybean oil is only a recent phenomenon in the USA. The average level of consumption in Latin America and Caribbean countries was still



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 21. Trade in soybean across regions.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure22. Trends in per capita availability of soybean across regions.

higher at 82.2 kg/person/year with a growth rate of 4.1% per annum (Table A.2 in Appendix). Soybean protein is processed into soy meal and is then fed to the livestock. About 98% of the total soy protein in the world is used to feed the livestock (Goldsmith, 2008). The derived demand for soybean causes the hike in demand. In the developing countries, population and income have increased, causing the shift to livestock products in China, Brazil and India. Poultry and pork are increasingly being consumed by increasing number of people in China, where a significant growth in consumption of soybean is observed (Table A.2 in Appendix).

Groundnut

Area, production and yield

Groundnut, also known as peanut, is an important crop from the perspective of food and nutrition security of poor smallholder farmers in developing countries, where it is grown widely. Groundnut is grown extensively in the developing countries of Asia, Africa and Latin America. About 62% of the production comes from South, East and Central Asia (Table 9). In Sub-Saharan Africa, the groundnut production has grown at the rate of 3.6% per annum between 1994–96 and 2008–10, and hence, it contributes about 24% to the total groundnut production (Table 9). Groundnut has a variety of uses ranging from oil production to providing feed for animals. Groundnut yield is about 1508 kg/ha on an average in 2008–10 in developing countries. It had grown at an annual rate of 1.8% (1994–96 to 2008–10). The area under groundnut cultivation has expanded by 9.2% between 1994–96 and 2008–10 in the developing world. High-yielding varieties of the crop released by ICRISAT have

helped increase the yield in Asia and Africa considerably, which has improved the farmers' livelihood as it is a cash crop (Janila et al., 2013; Ndjeunga et al., 2008).

Table 9. Groundnut area, yield and production

	CEA	LAC	MENA	SSA	SSEA	DW	World
Area harvested (million ha)							
1994–96	3.7	0.4	1.1	6.7	9.4	0.6	22.1
2008–10	4.4	0.5	1.1	9.9	7.4	0.5	24.0
% change (1994–2010)	17	13	5	48	−21	−15	9
Growth rate (%/year for 1994–2010)	0.9	−0.2	−2.0	2.6	−1.5	−1.3	0.4
Production (million tons)							
1994–96	10.1	0.7	1.0	5.3	10.4	1.8	29.4
2008–10	14.9	1.2	1.2	9.0	8.9	2.0	37.4
% change (1994–2010)	48	76	15	70	−15	12	27
Growth rate (%/year for 1994–2010)	2.6	3.8	−0.3	3.6	−0.5	0.7	1.7
Yield (kg/ha)							
1994–96	2,677	1,526	972	788	1,111	2,714	1,331
2008–10	3,388	2,402	1,068	910	1,198	3,598	1,558
% change (1994–2010)	27	57	10	15	8	33	17
Growth rate (%/year for 1994–2010)	1.7	3.9	1.7	1.0	1.0	2.0	1.3

Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

China tops in groundnut production with around 15 million tons production in 2008–10, being ahead of India, Nigeria and USA (Table A.10). However, in the case of Nigeria and India, the large production can be attributed to the large areas under groundnut cultivation. Groundnut yield in Central and East Asia has grown from 2.6 tons/ha in 1994–95 to 3.3 tons/ha in 2008–10 (Table 9). A similar rise was observed in the case of developed regions that also had yield levels of 3.5 tons/ha in 2008–10 (Table 9).

Senegal and Sudan are the other important groundnut producers, having an area share of about 12% together (Table A.10). Their yield levels are below 1 ton/ha, with a yield variability of more than 20% in each case (Table A.10). Myanmar and Indonesia, hold about 6% area share, have yield levels of 1.5 tons/ha and 1.2 tons/ha respectively with relatively less variability compared to Sudan and Senegal (Table A.10).

The area under groundnut in Sub-Saharan Africa has grown at the rate of 2.6% per annum between 1994–95 and 2008–10 and currently stands at 9.9 million ha (Table 9). In contrast, it has decreased in South and South-East Asia by 1.9 million ha in the last 15 years (Table 9). Within the same period, there has been a 17% rise in area under groundnut and 27% jump in yield in Central and East Asia (Table 9).

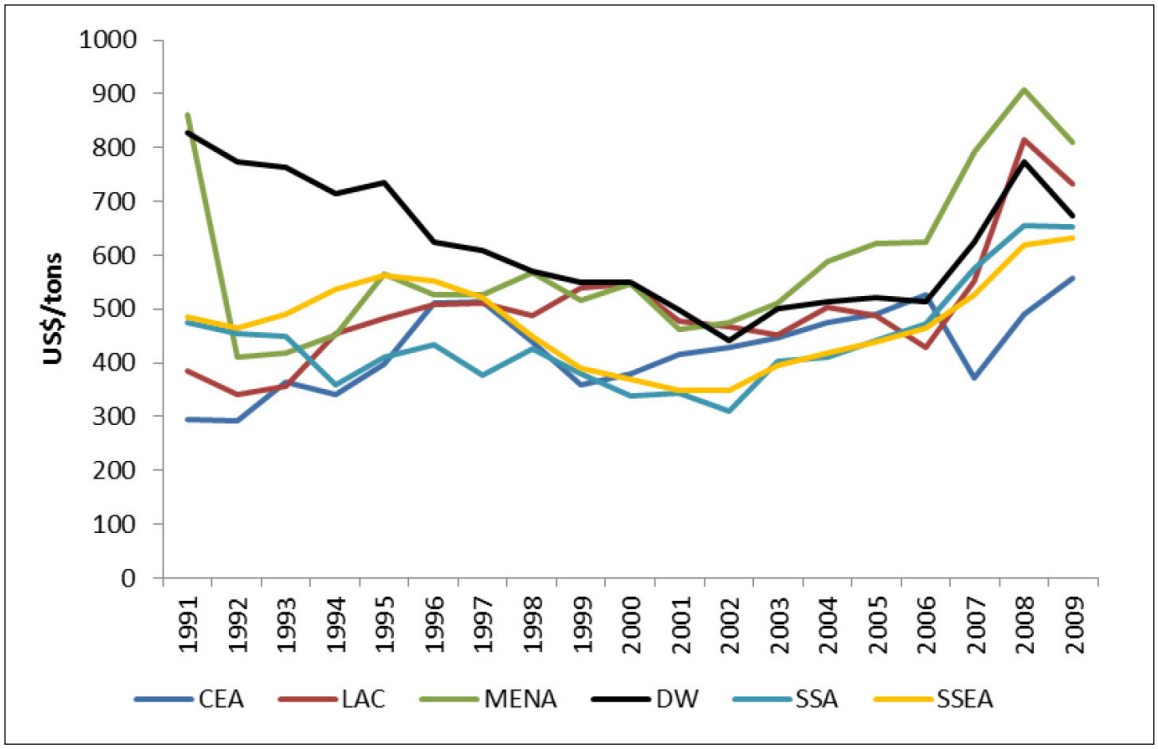
The groundnut yield levels have generally moved up across all regions in the world. In South and South-East Asia, the yield has fluctuated in the last 15 years, whereas the rise in Sub-Saharan Africa has been quite stable. Around 8% rise is found in the case of South and South-East Asia (from 1.11 to 1.1 tons/ha between 1994–95 and 2008–10), whereas a 15% rise in yield is observed in Sub-Saharan Africa from 0.78 to 0.91 tons/ha (Table 9). The trends in area under groundnut vary among the study regions. It has moved downwards in Latin America, South and South-East Asia and in the developed countries amongst which, Sub-Saharan Africa, alone showed a significant upward trend (Table 9).

Producer prices

Asia and Africa produced 91% of the world's total groundnut production. India showed a stagnant trend in producer prices, averaging at US$350 per ton between 1991 and 2009 falling between 1991 and 1998 and increasing thereafter. However, the production level has fallen by 20% during the same period between 1991 and 2009 in India. Sub-Saharan Africa follows the same trend as South and South-East Asia after 1998. Until then, it was found to have lower prices than South Asia (Figure 23). It should be noted that with the inclusion of Kenya and Rwanda, the groundnut prices would have been higher. These countries showed unusually high prices and had small area shares and thus, were excluded from the regional producer price trend calculation. In the recent years, Middle-East and North Africa has seen a sharp rise in producer prices, exceeding that of the developed world, which had the highest prices regionally till 2003. Sudan and Egypt, which are the largest producers of groundnut in the region, have experienced sharp increases after 2005. In Central and East Asia, the prices have shown an increasing trend between 1991 and 2009 from US$292 per tons in 1992 to US$556 per tons in 2009 even though production has increased by 146% in China during the same period. The Republic of Korea had been excluded from the regional producer prices analysis because of its extremely high prices for a small area share of groundnut (Figure 23).

Trade

Although groundnut trade has increased over the years, only a small percentage of the production is found to be exported in Asia (Figure 24). Between 1994–96 and 2008–10, the production of groundnut in South and South-East Asia, the highest producer of groundnut in the world, moved from 10.4 million tons to 8.9 million tons and exports have doubled reaching 0.03 million tons in 2007–09 (Table A.18). Imports are found to have increased seven-fold during the same period reaching a level of 0.10 million tons in 2007–09 (Table A.18). In 2008–10, the production of groundnut in developed countries has increased to 2 million tons from 1.8 tons in 15 years, with a growth rate of less than 1% (Table 9). The import of groundnut by developed countries has also declined as a percentage of production from 7.5% in 1994–96 to 5.5% 2008–10 (Table A.18).



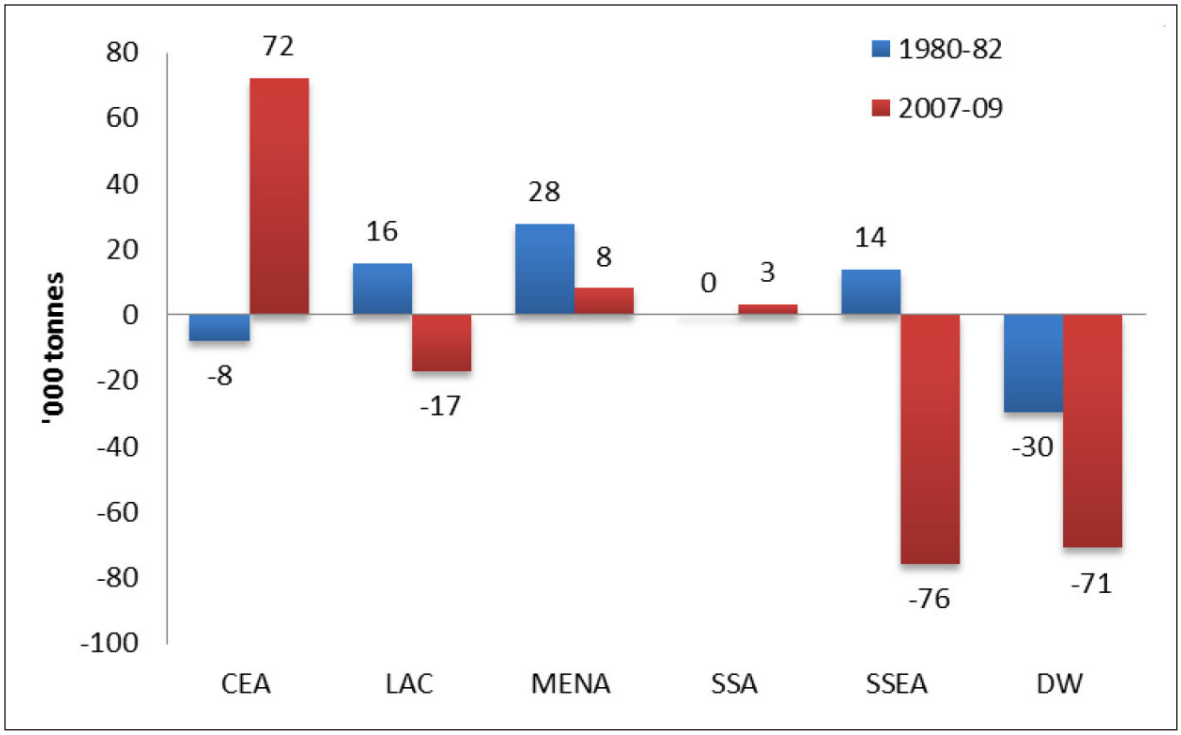
Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 23. Trends in groundnut producer prices across regions.

Consumption

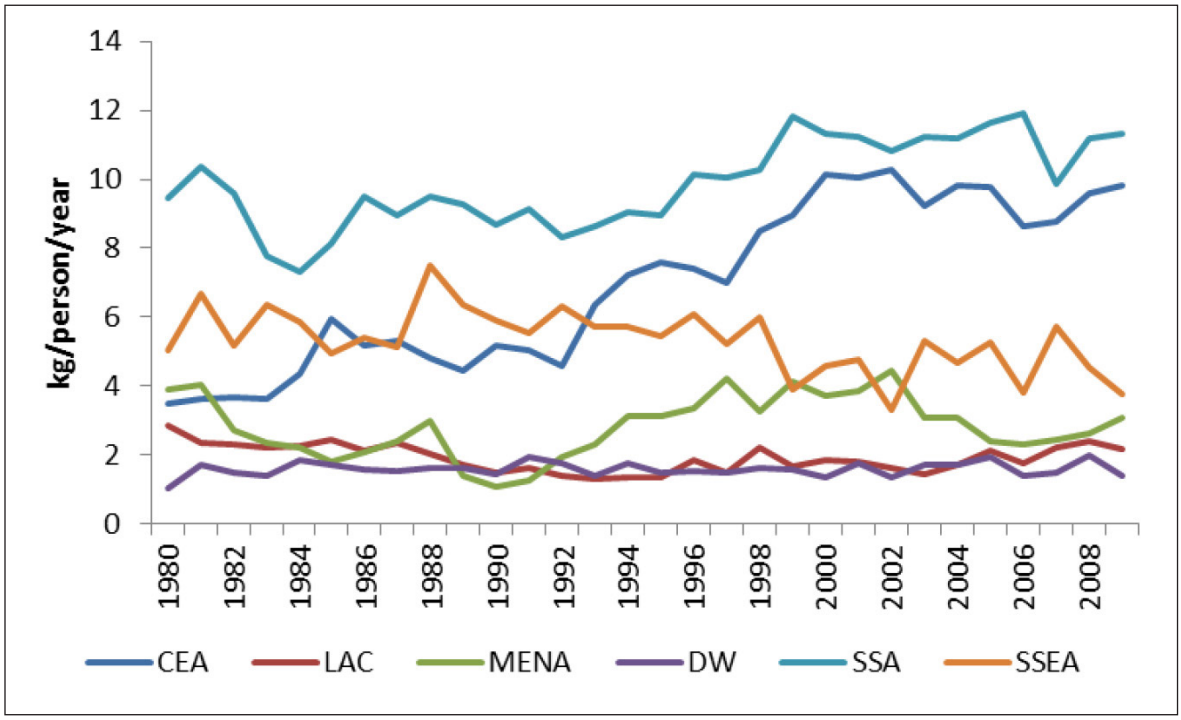
Groundnut consumption shows varying trends across various regions (Figure 25). Compared to soybean, the consumption levels of groundnut have not fared well. Central and East Asia has increased its groundnut consumption at the rate of 3.9% per annum between 1980 and 2007 and now exceeds South and South-East Asia in consumption (Figure A.13). Except in the developed countries, the gap between production and consumption is small in all other regions (Figure A.18). Between 1980 and 2007, the production deficit has increased, fluctuating between 0.1 and 0.9 million tons in the developed countries. Sub-Saharan Africa shows a significant upward trend in consumption levels, and the production has been just enough to satisfy demand (Figure A.16).

Groundnut is mainly viewed as an oilseed, and, among pulses, it has the highest consumption levels next only to soybean. Sub-Saharan Africa consumed around 9.9 kg/person/year on an average between 1980 and 2009, where an annual growth rate of 1.1% has been recorded (Table A.2 in Appendix). Central and East Asia region is the next highest consumer in terms of per capita availability, which shows a high growth rate of 3.9% per annum (Table A.2 in Appendix). In South and South-East Asia, the consumption level of 5.3 kg/person/year has declined at the rate of 1.2% per annum (Table A.2 in Appendix). In all other regions, the consumption has remained relatively stagnant.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 24. Trade in groundnut across regions.



Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle East and North Africa, SSEA-South and South-East Asia, SSA-Sub-Saharan Africa, DW-Developed World

Figure 25. Trends in per capita availability of groundnut across regions.

Summary and Conclusion

Grain legumes are important as it is a source of income and nutrition to billions of smallholder farmers and consumers around the world, especially in developing countries. The main objective of this report is to examine the global and regional trends in area under cultivation, production, yield, trade, price and consumption of eight major grain legumes—Dry bean, chickpea, cowpea, lentil, pigeonpea and faba bean, soybean and groundnut. The trend analysis reveals the growing importance of pulse crops across all economies and the lack of research efforts in the developing countries. In the developed economies, the commercial benefits from expanding pulse production are being realized more than ever in the past few decades. About 50% to 75% of the national research funds in developing countries are allocated to rice and wheat alone. Poor government support, low productivity of new cultivars and biotic and abiotic constraints due to marginalization of pulse crops are the main factors of low production of legumes in Asia and Africa. In India, the high post-harvest costs (marketing margins) are eating up the profits. Additionally, the poor yields impede the realization of high market prices relative to cereals.

Another matter of concern in pulse production is the huge yield gap between developing countries and developed countries. This is evident from the fact that production in developed countries has increased due to yield improvements whereas in developing countries it has been primarily due to area expansion. The yield growth between 1980 and 2004 in developed countries was 2% per annum and in developing countries, it was about 0.4% per annum (IFLRC-IV, 2005). Shifting pulse cultivation to limited-irrigation zones and improving input usage can have a huge impact on boosting yields. Moreover, the government should take steps policy measures reduce the trade-off between land allocated for cereals and pulses substantially. The low marketability of pulses, high risks in yield and process are the principal factors that put off farmers from cultivating pulses.

Pulses have a thin and volatile market. Developing countries still grow pulses as a subsistence crop whereas pulses, such as soybean, are grown as a commercial crop in the West. Some European countries, which import soybean from the West, have attempted producing their own protein-rich foods but were hardly faced with any success. The developing countries are yet to tap into the huge market for stock feed in industrialized countries. A persistent increase in the demand for food legumes in Asia and Africa has led to a rise in imports. The money that is lost on foreign exchange could well be invested in the domestic market for attaining self-sufficiency. The demand for pulses spurred by the population and income growth in the developing countries has resulted in some developed countries increasing their domestic production to capture these markets. Therefore, it is high time the developing countries realize the huge potential of pulses in increasing the soil fertility and nutrition and take steps in increasing the productivity and thus, the production of pulses.

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Appendix

Appendix 1. List of countries included in regional analysis as defined by FAO.

Sub-Saharan Africa	
Angola	Niger
Benin	Nigeria
Botswana	Rwanda
Burkina Faso	Saint Helena
Burundi	Sao Tome and Principe
Cameroon	Senegal
Cape Verde	Seychelles
Central African Republic	Sierra Leone
Chad	Somalia
Comoros	South Africa
Côte d'Ivoire	Swaziland
D R Congo	Togo
Djibouti	Uganda
Equatorial Guinea	United Republic of Tanzania
Eritrea	Zambia
Ethiopia	Zimbabwe
Gabon	Congo
Gambia	Ethiopia
Ghana	Malawi
Guinea	Mali
Guinea-Bissau	Mauritania
Kenya	Mauritius
Lesotho	Mayotte
Liberia	Mozambique
Madagascar	Namibia
Latin America and Caribbean	
Anguilla	Chile
Antigua and Barbuda	Dominica
Argentina	Panama
Aruba	Paraguay
Bahamas	Honduras
Barbados	Jamaica
Belize	Martinique
Bolivia	Grenada
Brazil	Mexico
British Virgin Islands	Guatemala

Cayman Islands	Netherlands Antilles
Colombia	Nicaragua
Costa Rica	Trinidad and Tobago
Cuba	Peru
Ecuador	Puerto Rica
El Salvador	Venezuela
Falkland Islands	Saint Kitts and Nevis
French Guiana	Montserrat
Dominican Republic	Saint Lucia
Haiti	Suriname
Guyana	Saint Vincent and the Grenadines
Guadeloupe	Turks and Caicos Islands
Uruguay	United States Virgin Islands
Middle East and North Africa	
Algeria	Oman
Armenia	Qatar
Azerbaijan	Sudan
Bahrain	Tunisia
Cyprus	Turkey
Egypt	Western Sahara
Georgia	Syrian Arab Republic
Iraq	Tunisia
Israel	Turkey
Jordan	Western Sahara
Kuwait	Syrian Arab Republic
Lebanon	Saudi Arabia
Libya	United Arab Emirates
Morocco	Yemen
Occupied Palestinian	
South and South East Asia	
Afghanistan	Iran
Bangladesh	Maldives
Brunei Darussalam	Lao People’s Democratic
Cambodia	Singapore
Indonesia	Thailand
Bhutan	Nepal
India	Pakistan
Viet Nam	Sri Lanka
Malaysia	Timor-Leste
Myanmar	Philippines

Central and East Asia	
Kazakhstan	Kyrgyzstan
China	Tajikistan
Democratic Republic of Korea	Turkmenistan
Mongolia	Uzbekistan
Republic of Korea	

Table A.2. Per capita availability of legumes- average, growth rate and variation between 1980 and 2009 across world regions.

	Bean, dry					
1980-2009	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)*	−2.8	−0.3	0.6	−0.1	−0.6	−0.1
Average consumption (kg/head/year)	1.2	10.7	1.2	4.5	3.0	1.8
Co-efficient of variation (%)	37	10	17	8	14	9
1980-2009	**Chickpea**					
	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)	42.2	−5.8	0.9	−0.5	−0.5	2.6
Average consumption (kg/head/year)	0.0	0.3	2.3	0.3	3.5	0.2
Co-efficient of variation (%)	109	50	20	21	14	53
1980-2009	**Cow pea, dry**					
	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)	-	−0.1	1.7	3.2	4.6	5.5
Average consumption (kg/head/year)	-	0.1	0.0	4.5	0.0	0.0
Co-efficient of variation (%)	-	12	88	28	53	74
1980-2009	**Pigeonpea**					
	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)	-	−2.8	-	1.9	−0.6	-
Average consumption (kg/head/year)	-	0.1	-	0.4	1.5	-
Co-efficient of variation (%)	-	32	-	20	12	-

1980–2009	**Lentil**					
	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)	4.4	2.9	−0.5	2.5	0.8	1.4
Average consumption (kg/head/year)	0.1	0.3	2.3	0.1	0.7	0.3
Co-efficient of variation (%)	55	26	25	36	11	54
1980–2009	**Faba bean**					
	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)	−2.3	−1.0	0.3	−0.9	6.7	−1.6
Average consumption (kg/head/year)	1.5	0.3	2.7	0.7	0.0	0.6
Co-efficient of variation (%)	33	23	10	33	77	31
1980–2009	**Soybean**					
	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)	4.9	4.1	4.3	4.8	6.5	1.3
Average consumption (kg/head/year)	18.1	82.2	4.6	1.2	4.5	55.0
Co-efficient of variation (%)	51	37	52	38	47	15
1980–2009	**Groundnut, with shell**					
	CEA	LAC	MENA	SSA	SSEA	DW
Growth rate (%/year)	3.9	−0.7	1.0	1.1	−1.2	0.3
Average consumption (kg/head/year)	6.9	1.9	2.8	9.9	5.3	1.6
Co-efficient of variation (%)	34	21	32	13	17	13

Note: CEA-Central and East Asia, LAC-Latin America and Caribbean, MENA-Middle-East and North Africa, SSEA South and South east Asia, SSA-Sub Saharan Africa, DW-Developed world;

*Growth rate reported here is the compounded annual growth rate (CAGR) which is defined as the steady rate of growth over the years i.e. of per capita availability.

Table A.3. Dry bean area,production and yield across countries.

Country-level area, production and yield of legumes

		2008–10			1980–2010		
Countries		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	India	8.3	3.4	411	0.15	30.2	30
2	Brazil	3.8	3.4	897	0.26	13.8	44
3	Myanmar	2.8	3.1	1,112	0.20	10.1	54
4	Mexico	1.4	1.1	773	0.14	5.3	59
5	United Republic of Tanzania	1.2	0.9	749	0.14	4.5	64
6	China	1.0	1.6	1,657	0.18	3.5	67
7	Uganda	0.9	0.5	491	0.20	3.3	71
8	Kenya	0.8	0.4	488	0.24	2.8	73
9	United States of America	0.7	1.3	1,930	0.08	2.4	76
10	Angola	0.6	0.2	341	0.19	2.2	78
11	Rwanda	0.3	0.3	962	0.14	1.2	79
12	Indonesia	0.3	0.3	1,098	0.24	1.0	80
13	Argentina	0.3	0.3	1,238	0.13	1.0	81
14	Malawi	0.3	0.1	594	0.13	0.9	82
15	Democratic People's Republic of Korea	0.3	0.2	919	0.05	0.9	83
16	Ethiopia	0.2	0.3	1,062	0.33	0.9	84
17	Viet Nam	0.2	0.2	924	0.20	0.9	85
18	Nicaragua	0.2	0.2	746	0.13	0.9	86
19	Guatemala	0.2	0.2	824	0.15	0.8	87
20	Democratic Republic of the Congo	0.2	0.1	541	0.04	0.8	87

Table A.4. Chickpea area, production and yield across countries.

		2008–10			1980–2010		
Countries		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	India	7.9	6.8	856	0.13	68.3	68
2	Pakistan	1.1	0.6	547	0.24	9.4	78
3	Iran (Islamic Republic of)	0.5	0.2	370	0.21	4.3	82
4	Turkey	0.5	0.5	1,164	0.11	4.0	86
5	Australia	0.4	0.5	1,246	0.25	3.5	89
6	Myanmar	0.3	0.4	1,378	0.29	2.4	92
7	Ethiopia	0.2	0.3	1,352	0.26	1.9	94
8	Malawi	0.1	0.0	458	0.25	0.9	95
9	Mexico	0.1	0.1	1,659	0.16	0.7	95
10	United Republic of Tanzania	0.1	0.0	447	0.15	0.7	96
11	Morocco	0.1	0.0	652	0.34	0.6	97
12	Syrian Arab Republic	0.1	0.0	587	0.19	0.6	97
13	Canada	0.1	0.1	1,707	0.14	0.5	98
14	United States of America	0.0	0.1	1,580	0.12	0.4	98
15	Spain	0.0	0.0	884	0.24	0.2	98
16	Algeria	0.0	0.0	763	0.36	0.2	99
17	Yemen	0.0	0.1	2,696	0.34	0.2	99
18	Kazakhstan	0.0	0.0	727	0.41	0.1	99
19	Russian Federation	0.0	0.0	2,612	0.59	0.1	99
20	Tunisia	0.0	0.0	921	0.29	0.1	99

Table A.5. Cowpea area, production and yield across countries.

Countries		2008–10			1980–2010		
		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	Niger	5.0	1.4	267	0.41	47.6	48
2	Nigeria	3.1	2.5	836	0.24	29.7	77
3	Burkina Faso	0.7	0.4	499	0.09	6.7	84
4	Mali	0.3	0.1	385	0.44	2.5	86
5	Senegal	0.2	0.1	416	0.30	2.0	88
6	Sudan	0.2	0.1	275	0.37	1.8	90
7	United Republic of Tanzania	0.2	0.1	556	0.40	1.5	92
8	Myanmar	0.1	0.2	1,199	0.37	1.4	93
9	Kenya	0.1	0.1	412	0.27	1.4	95
10	Cameroon	0.1	0.1	1,013	0.06	1.2	96
11	Democratic Republic of the Congo	0.1	0.1	461	0.12	1.2	97
12	Malawi	0.1	0.1	720	0.10	0.9	98
13	Uganda	0.1	0.1	1,074	0.20	0.7	99
14	Haiti	0.0	0.0	694	0.19	0.4	99
15	Mauritania	0.0	0.0	474	0.21	0.2	99
16	Peru	0.0	0.0	1,387	0.09	0.2	99
17	United States of America	0.0	0.1	3,533	0.72	0.1	100
18	Sri Lanka	0.0	0.0	1,076	0.13	0.1	100
19	South Africa	0.0	0.0	656	0.33	0.1	100
20	Serbia	0.0	0.0	3,518	0.10	0.1	100

Table A.6. Pigeonpea area, production and yield across countries.

Countries		2008–10			1980–2010		
		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	India	3.5	2.6	731	0.10	74.9	75
2	Myanmar	0.6	0.7	1,229	0.28	12.7	88
3	Malawi	0.2	0.2	905	0.18	4.1	92
4	Kenya	0.2	0.1	491	0.22	3.3	95
5	Uganda	0.1	0.1	1,015	0.28	1.9	97
6	United Republic of Tanzania	0.1	0.1	738	0.07	1.5	98
7	Dominican Republic	0.0	0.0	927	0.25	0.5	99
8	Nepal	0.0	0.0	876	0.15	0.4	99
9	Democratic Republic of the Congo	0.0	0.0	582	0.07	0.2	100
10	Haiti	0.0	0.0	356	0.15	0.1	100
11	Panama	0.0	0.0	413	0.33	0.1	100
12	Burundi	0.0	0.0	965	0.11	0.0	100
13	Venezuela (Bolivarian Republic of)	0.0	0.0	769	0.22	0.0	100
14	Trinidad and Tobago	0.0	0.0	855	0.27	0.0	100
15	Bangladesh	0.0	0.0	939	0.24	0.0	100
16	Philippines	0.0	0.0	1,271	0.11	0.0	100
17	Jamaica	0.0	0.0	1,118	0.10	0.0	100
18	Grenada	0.0	0.0	832	0.26	0.0	100
19	Comoros	0.0	0.0	675	0.10	0.0	100
20	Puerto Rico	0.0	0.0	735	0.35	0.0	100

Table A.7. Lentil area, production and yield across countries.

		2008–10			1980–2010		
Countries		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	India	1.3	0.9	666	0.12	35.6	36
2	Canada	1.0	1.5	1,505	0.24	26.8	62
3	Turkey	0.2	0.3	1,338	0.24	5.7	68
4	Nepal	0.2	0.2	821	0.18	5.0	73
5	United States of America	0.2	0.3	1,372	0.18	4.8	78
6	Iran (Islamic Republic of)	0.2	0.1	433	0.23	4.5	82
7	Syrian Arab Republic	0.1	0.1	619	0.31	3.3	86
8	Australia	0.1	0.1	970	0.56	3.2	89
9	Ethiopia	0.1	0.1	1,115	0.31	2.7	92
10	Bangladesh	0.1	0.1	920	0.11	2.0	94
11	China	0.1	0.1	2,042	0.27	1.7	95
12	Morocco	0.0	0.0	546	0.47	1.0	96
13	Pakistan	0.0	0.0	467	0.15	0.8	97
14	Spain	0.0	0.0	611	0.30	0.6	98
15	Yemen	0.0	0.0	805	0.25	0.3	98
16	Russian Federation	0.0	0.0	667	0.32	0.3	98
17	France	0.0	0.0	1,350	0.18	0.2	98
18	Mexico	0.0	0.0	888	0.28	0.2	99
19	Iraq	0.0	0.0	386	0.36	0.2	99
20	Colombia	0.0	0.0	309	0.12	0.1	99

Table A.8. Trends in faba bean area, production and yield across countries.

		2008–10			1980–2010		
Countries		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	China	0.9	1.7	1,906	0.16	36.0	36
2	Ethiopia	0.5	0.6	1,214	0.14	21.0	57
3	Morocco	0.2	0.1	736	0.40	7.4	64
4	Australia	0.1	0.2	1,455	0.37	5.7	70
5	France	0.1	0.4	4,454	0.14	4.0	74
6	Egypt	0.1	0.3	3,295	0.18	3.1	77
7	Sudan	0.1	0.1	1,944	0.20	2.8	80
8	Tunisia	0.1	0.1	1,261	0.37	2.3	82
9	Peru	0.1	0.1	1,251	0.11	2.1	84
10	Italy	0.1	0.1	1,973	0.17	2.1	87
11	Brazil	0.0	0.0	477	0.25	1.7	88
12	Algeria	0.0	0.0	988	0.37	1.3	90
13	Portugal	0.0	0.0	747	0.16	1.0	91
14	United Kingdom	0.0	0.1	3,481	0.14	1.0	92
15	Spain	0.0	0.0	1,399	0.20	0.9	92
16	Guatemala	0.0	0.0	934	0.24	0.8	93
17	Mexico	0.0	0.0	1,113	0.41	0.8	94
18	Syrian Arab Republic	0.0	0.0	1,961	0.13	0.8	95
19	Paraguay	0.0	0.0	926	0.09	0.6	95
20	Germany	0.0	0.0	3,574	0.12	0.5	96

Table A.9. Soybean area, production and yield across countries.

Countries		2008–10			1980–2010		
		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	United States of America	30.7	87.6	2,851	0.14	30.9	31
2	Brazil	22.1	61.9	2,798	0.20	22.2	53
3	Argentina	17.1	43.3	2,525	0.16	17.2	70
4	India	9.5	9.9	1,045	0.19	9.6	80
5	China	8.9	15.2	1,701	0.14	9.0	89
6	Paraguay	2.6	5.9	2,285	0.24	2.6	91
7	Canada	1.4	3.7	2,756	0.12	1.4	93
8	Bolivia	1.0	1.5	1,547	0.14	1.0	94
9	Russian Federation	0.8	1.0	1,138	0.19	0.9	95
10	Ukraine	0.7	1.2	1,603	0.21	0.7	95
11	Indonesia	0.7	0.9	1,344	0.13	0.7	96
12	Uruguay	0.6	1.2	1,853	0.25	0.6	97
13	Nigeria	0.5	0.5	1,114	0.54	0.5	97
14	Democratic People's Republic of Korea	0.3	0.4	1,167	0.07	0.3	97
15	South Africa	0.2	0.5	1,898	0.23	0.2	98
16	Viet Nam	0.2	0.3	1,453	0.26	0.2	98
17	Myanmar	0.2	0.2	1,333	0.21	0.2	98
18	Serbia	0.2	0.4	2,679	0.14	0.2	98
19	Uganda	0.2	0.2	1,177	0.14	0.2	98
20	Japan	0.1	0.2	1,659	0.12	0.1	99

Table A.10. Groundnut area, production and yield across countries.

Countries		2008–10			1980–2010		
		Area (million ha)	Production (million t)	Yield (kg/ha)	CV of Yield	Area share (%)	Cumulative area share
1	India	5.5	6.1	1,105	0.18	23.0	23
2	China	4.4	14.9	3,390	0.24	18.3	41
3	Nigeria	2.5	2.8	1,119	0.22	10.6	52
4	Senegal	1.0	1.0	975	0.24	4.3	56
5	Sudan	1.0	0.8	803	0.20	4.2	60
6	Myanmar	0.8	1.3	1,533	0.22	3.4	64
7	Niger	0.7	0.3	466	0.32	2.9	67
8	Indonesia	0.6	0.8	1,240	0.13	2.6	69
9	United Republic of Tanzania	0.5	0.4	721	0.19	2.3	72
10	Chad	0.5	0.4	753	0.19	2.2	74
11	United States of America	0.5	2.0	3,795	0.15	2.2	76
12	Democratic Republic of the Congo	0.5	0.4	778	0.05	2.0	78
13	Burkina Faso	0.4	0.3	830	0.21	1.7	80
14	Mali	0.4	0.3	937	0.15	1.5	81
15	Ghana	0.3	0.5	1,428	0.23	1.4	83
16	Cameroon	0.3	0.5	1,486	0.71	1.3	84
17	Mozambique	0.3	0.1	263	0.20	1.2	85
18	Angola	0.3	0.1	375	0.19	1.2	86
19	Malawi	0.3	0.2	933	0.24	1.1	87
20	Viet Nam	0.2	0.5	2,095	0.30	1.0	88

Export and import quantities of legumes across regions

Table A.11. Dry bean export and import quantity across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
CEA	69	981	74	123
LAC	214	464	522	632
MENA	15	101	75	284
SSA	61	66	46	274
SSEA	289	1,062	176	1,001
DW	759	974	572	991

Table A.12. Chickpea export and import across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
CEA	-	4	-	1
LAC	64	126	9	28
MENA	157	122	59	271
SSA	0	26	-	5
SSEA	2	205	13	506
DW	2	498	52	196

Table A.13. Cowpea export and import across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
SSA	25	-	0	-
DW	12	1	0	4

Table A.14. Pigeonpea export and import across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
LAC	1	0	4	0
SSA	7	0	-	2
SSEA	-	1	7	-

Table A. 15. Lentil export and import across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
CEA	-	16	-	3
LAC	10	2	29	208
MENA	254	245	171	517
SSA	2	1	0	22
SSEA	6	37	32	529
DW	96	1,289	124	246

Table A 16. Faba bean export and import across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
CEA	15	36	0	3
LAC	0	2	0	5
MENA	44	26	24	373
SSA	20	0	1	5
SSEA	-	1	-	19
DW	92	516	118	124

Table A 17. Soybean export and import across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
CEA	142	427	2,115	40,461
LAC	3,760	38,901	1,879	6,587
MENA	0	1	568	3,868
SSA	1	89	3	117
SSEA	27	118	499	4,915
DW	23,412	38,791	20,937	21,573

Table A.18. Groundnut export and import across regions in 1980–82 and 2007–09 ('000 tons).

	Export Quantity		Import Quantity	
	1980–82	2007–09	1980–82	2007–09
CEA	1	73	9	1
LAC	25	1	9	18
MENA	32	27	5	19
SSA	2	8	2	5
SSEA	16	33	2	109
DW	33	43	62	114

Consumption and production trends across regions

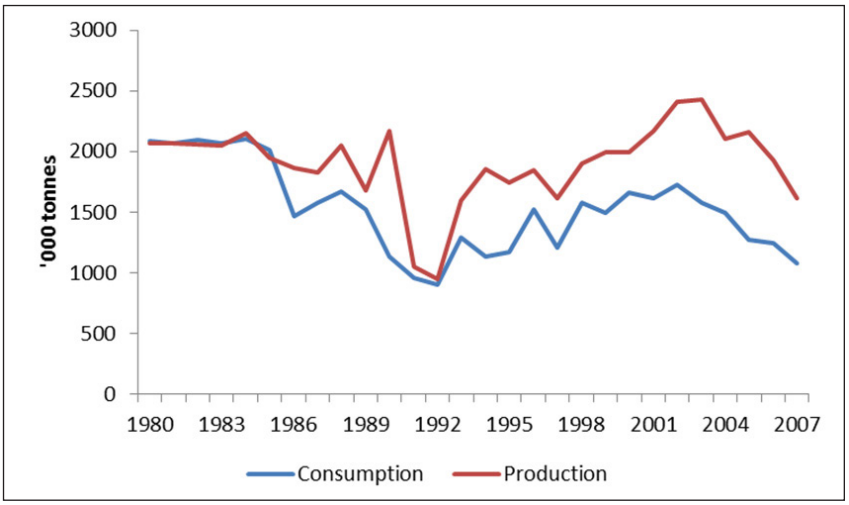

Figure A.1. Trends in dry bean consumption and production in Central and East Asia.

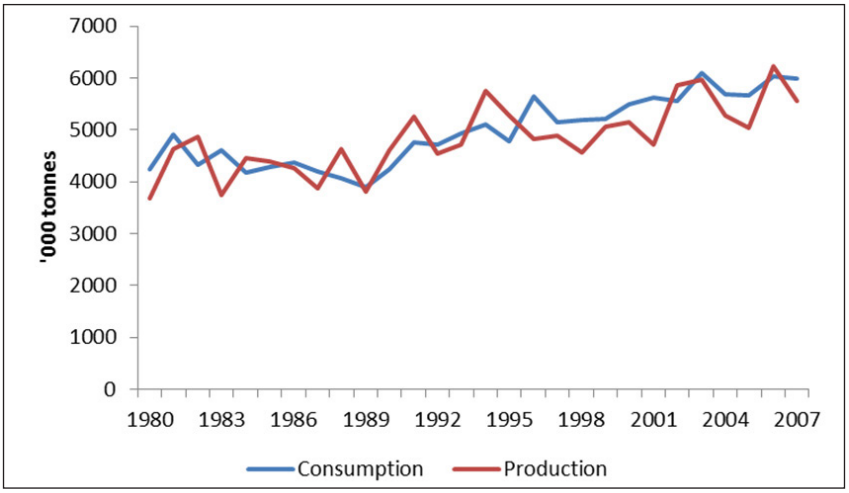

Figure A.2. Trends in dry bean consumption and production in Latin America and Caribbean.

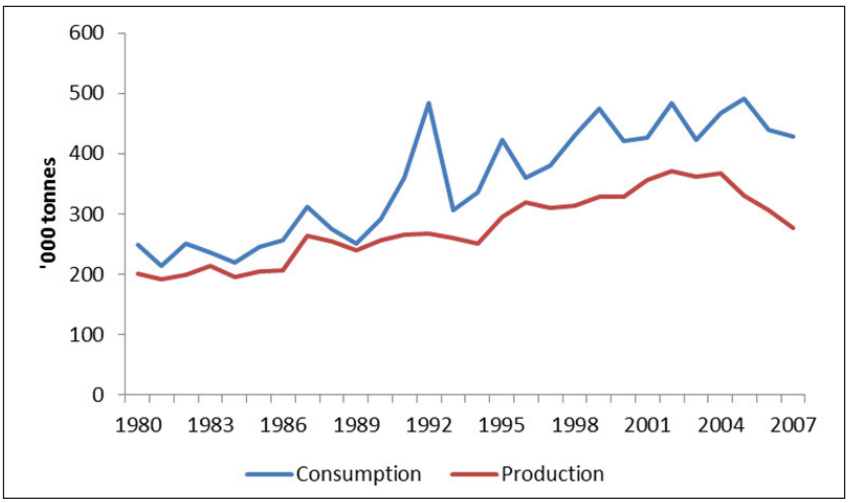

Figure A.3. Trends in dry bean consumption and production in Middle East and North Africa.

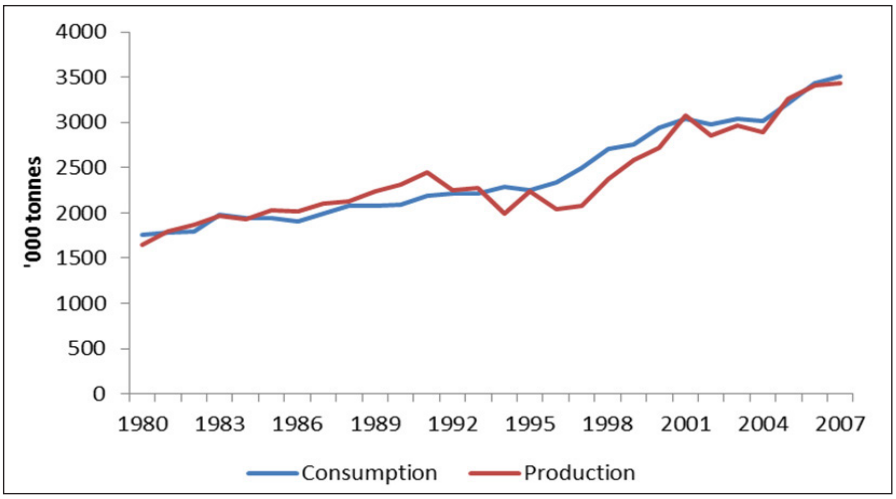

Figure A.4. Trends in dry bean consumption and production in Sub-Saharan Africa.

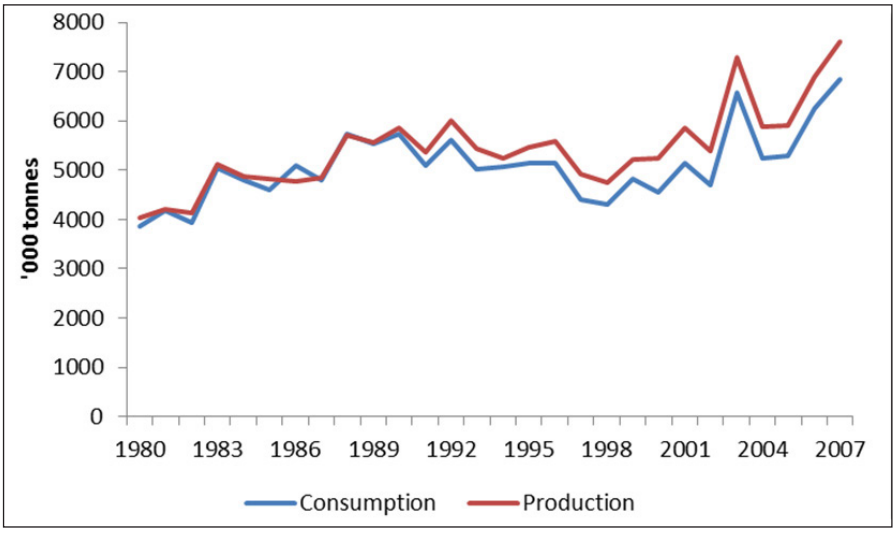

Figure A.5. Trends in dry bean consumption and production in South and South East Asia.

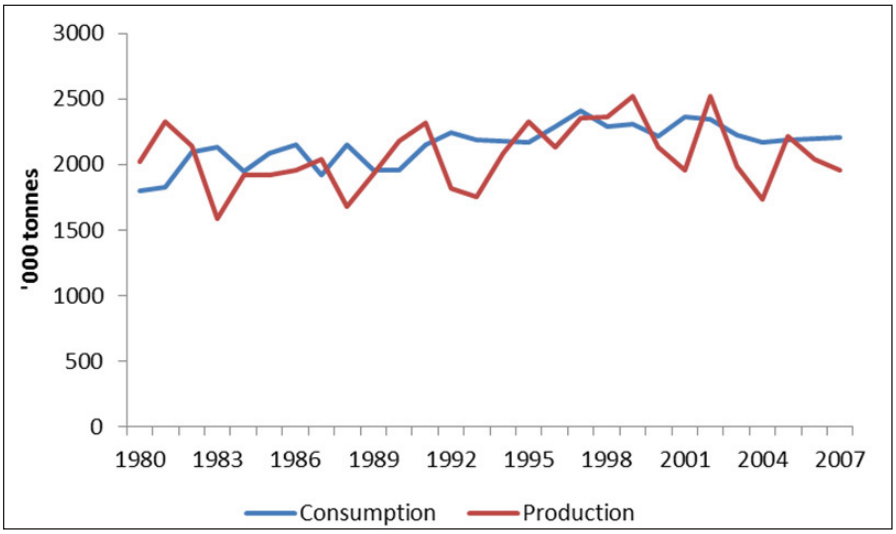

Figure A.6. Trends in dry bean consumption and production in developed regions.

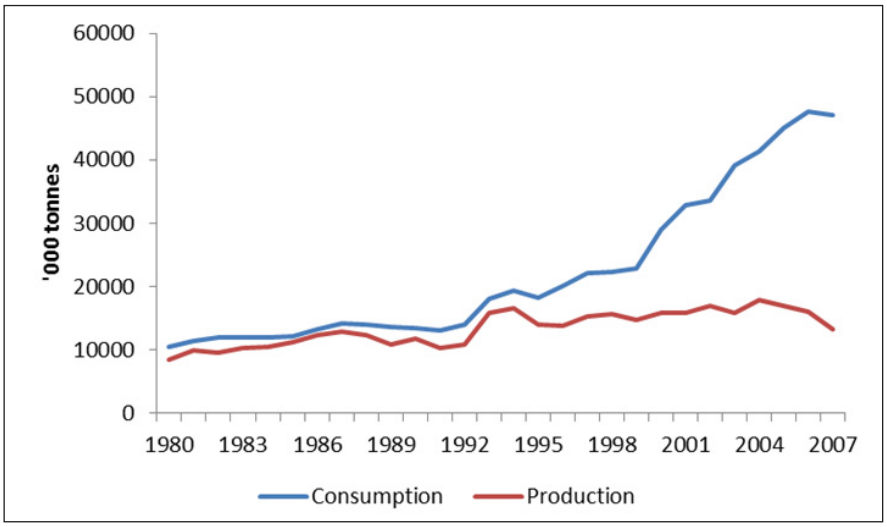

Figure A.7. Trends in soybean consumption and production in Central and East Asia.

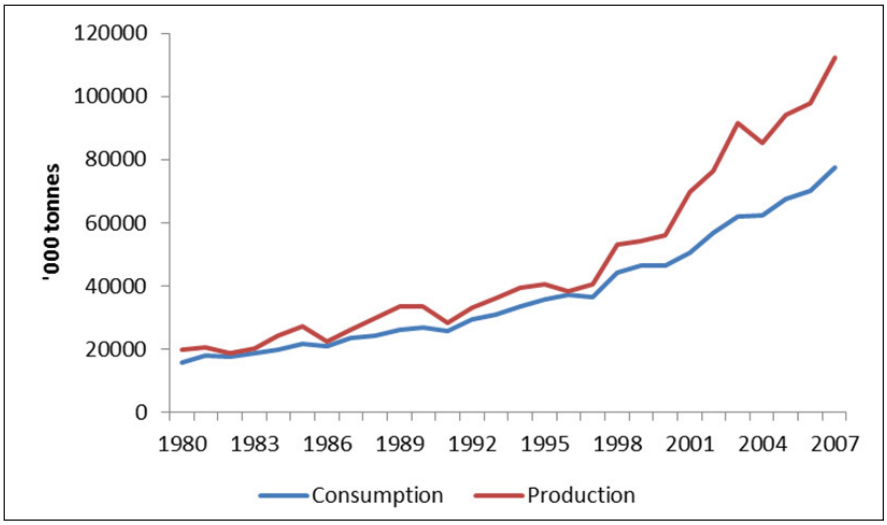

Figure A.8. Trends in soybean consumption and production in Latin America and Caribbean.

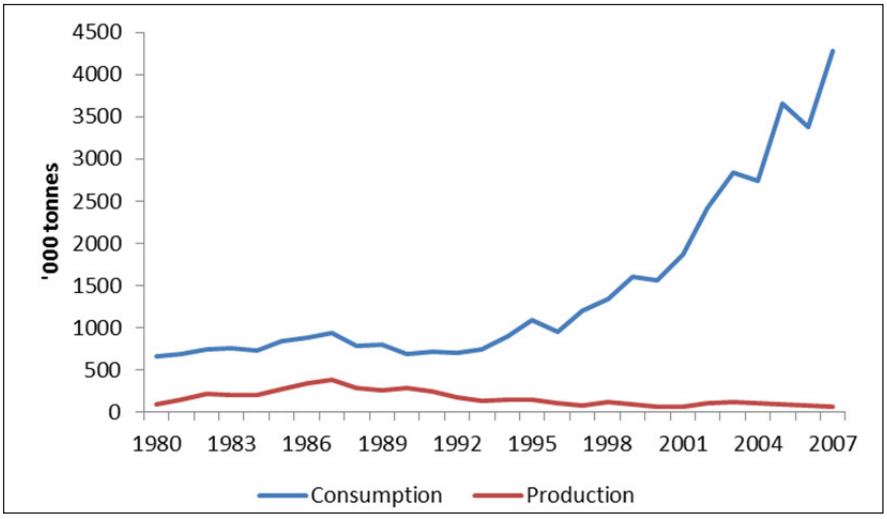

Figure A.9. Trends in soybean consumption and production in Middle East and North Africa.

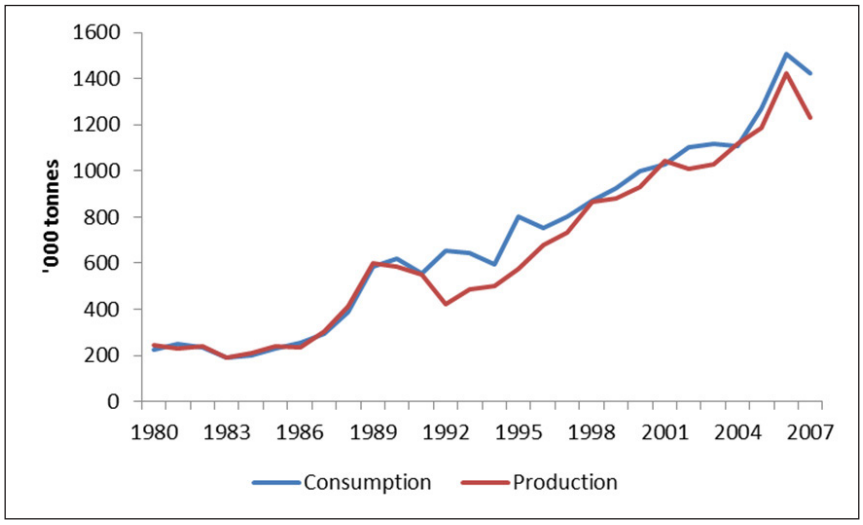

Figure A.10. Trends in soybean consumption and production in Sub-Saharan Africa.

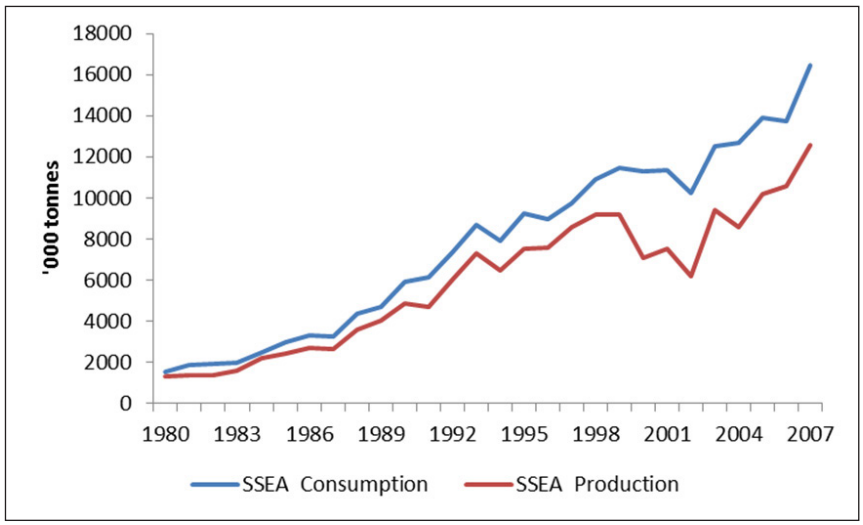

Figure A.11. Trends in soybean consumption and production in South and South East Asia .

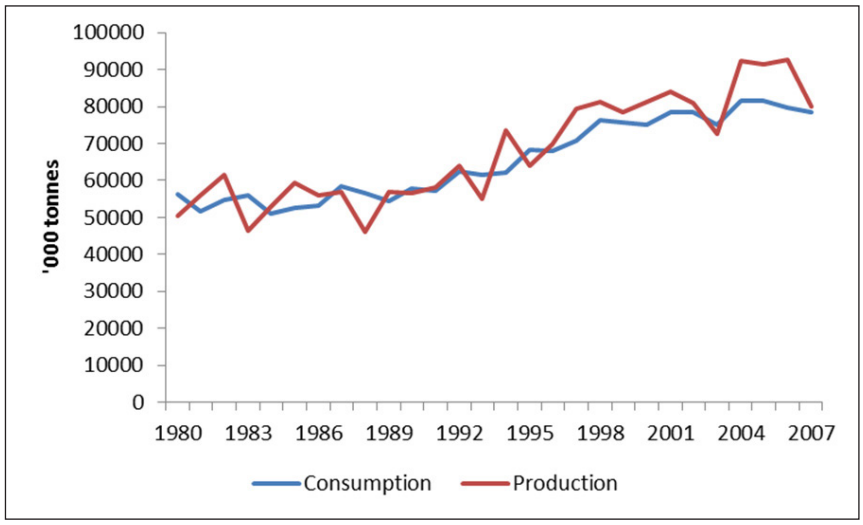

Figure A.12. Trends in soybean consumption and production in the developed world.

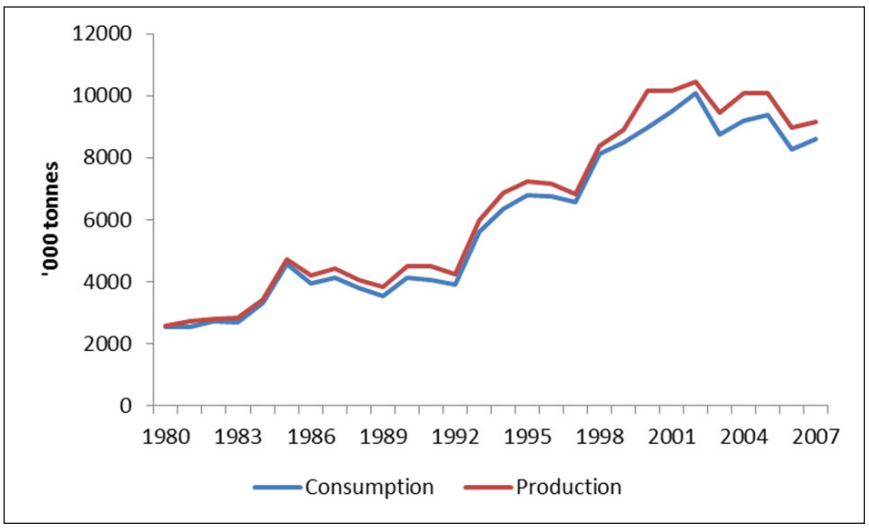

Figure A.13. Trends in groundnut consumption and production in Central and East Asia.

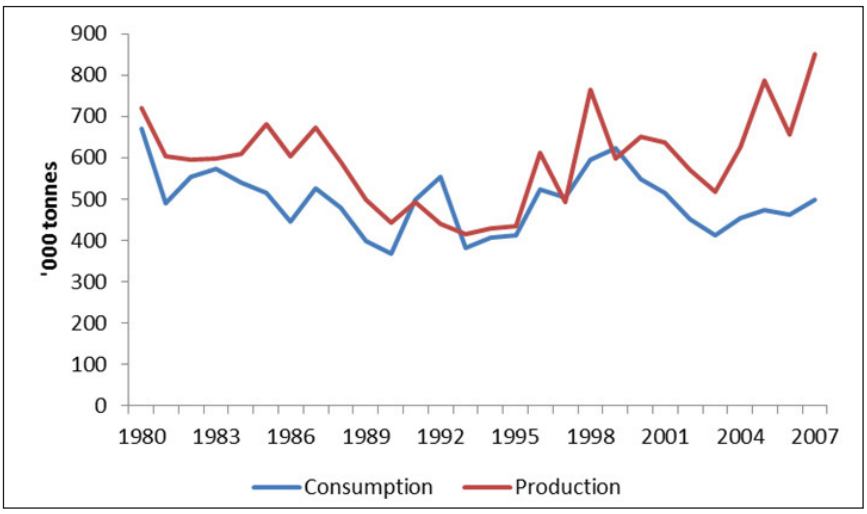

Figure A.14. Trends in groundnut consumption and production in Latin America and Caribbean.

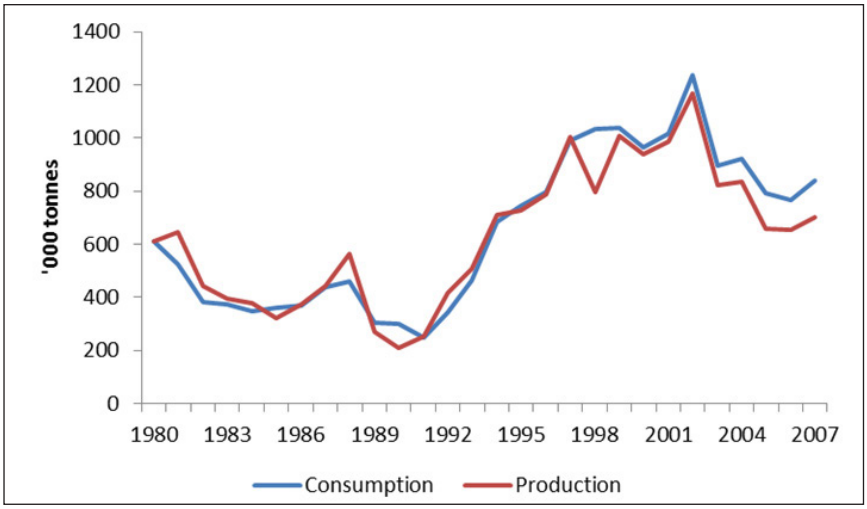

Figure A.15. Trends in groundnut consumption and production in Middle East and North Africa.

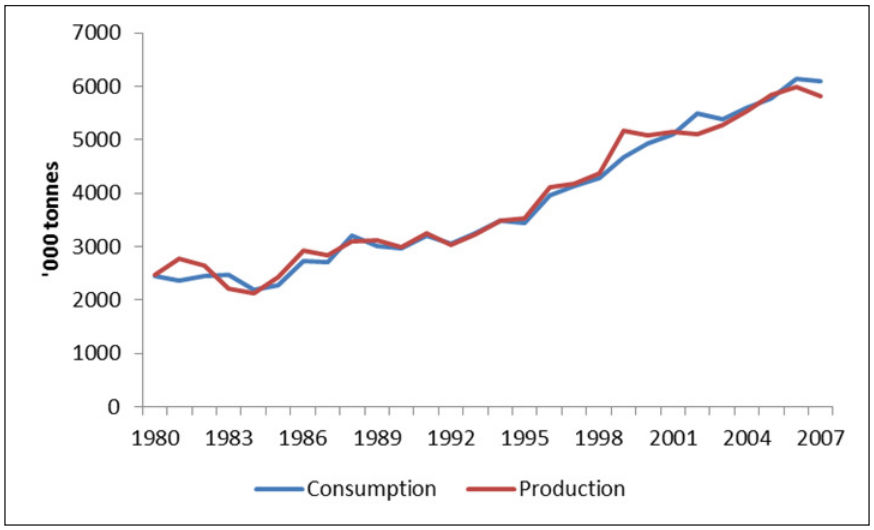

Figure A.16. Trends in groundnut consumption and production in Sub-Saharan Africa.

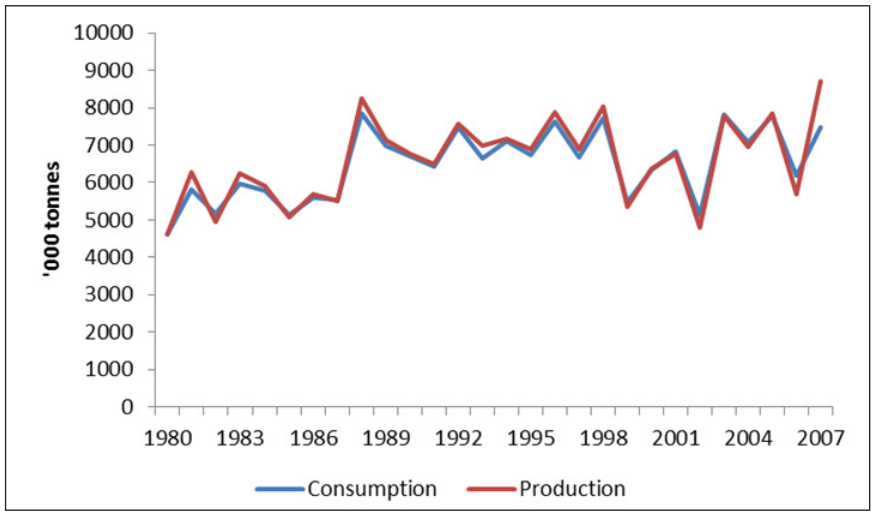

Figure A.17. Trends in groundnut consumption and production in South and South East Asia.

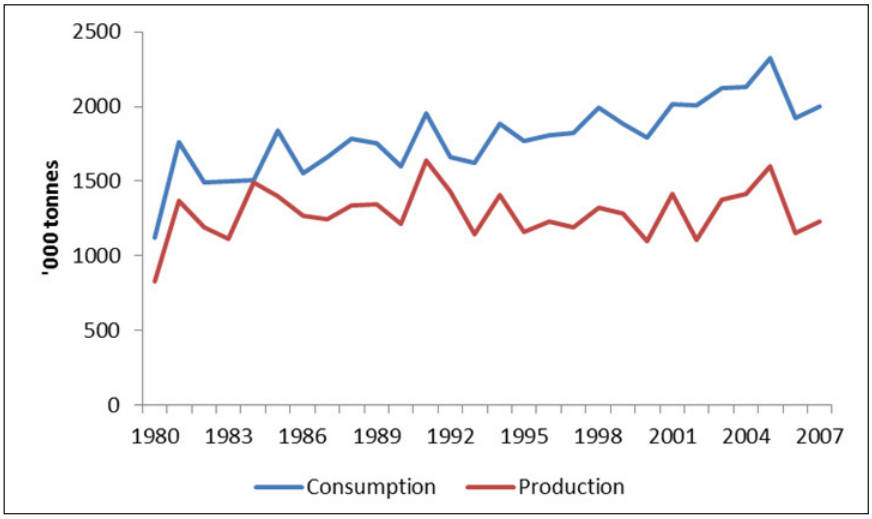

Figure A.18. Trends in groundnut consumption and production in the developed world.

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