Chapter 5. Focus and perspectives

This focus section complements CropWatch analyses presented in chapters 1 through 4 by presenting a global outlook for 2014 production, as well as other topics of relevance to global agriculture. After a summary of the provisional CropWatch estimates for 2014 production (section 5.1), section 5.2 highlights extreme atmospheric factors—disaster events—that have interfered with crop production in recent months. Next, sections 5.3 and 5.4 focus on El Niño and maize, respectively.

5.1 Production outlook for 2014

CropWatch preliminary production estimates for 2014 are presented in table 5.1, including crops already harvested and those to be harvested between the time of reporting and the end of the year. The methodology is explained in Annex C. Important methodological points are also listed in the note to table 5.1. For several larger countries—Argentina, Australia, Brazil, Canada, and the United States, more detailed information is provided in Annex B.

Overall, CropWatch forecasts a 2.7% drop in maize production and a 4.4% increase for soybeans, while a small increase is foreseen for both rice and wheat. For all crops, a large difference is noted between the 31 countries more closely monitored by CropWatch and the "other countries" for which a linear trend based on 2001-2013 data is used to estimate production. "Others" outperform the major producers for maize (+8.6% vs. -4.0%) and rice (+6.4% vs. -0.1%), while they underperform for wheat (-2.9% vs. 0.8%) and soybean (-26.5% vs. +6.8%).

Maize. The drop in maize production is brought about by a decrease in virtually all countries except Mexico, Nigeria, Russia, Ukraine (+6.1%), and two countries in south-east Asia (Cambodia, +9.3%; Philippines, +1.4%). For the countries that have already harvested maize, and those where the crop is currently growing, it is generally easy to associate the drop with environmental conditions. The largest drops are those projected to occur in Canada, the United States, India, and several European countries.

Rice. Because the crop is irrigated (rainfed lowland rice is considered here as a form of irrigation), fluctuations are usually smaller than those that affect other crops. Significant increases (in the range of 2-3%) are projected only in Egypt, Iran, Russia, and the Philippines, with a larger increase (+14.6%) in the United States. Decreases worth mentioning included those for India, Indonesia, and Vietnam, while production stagnated in Thailand.

Wheat. Among the major exporters of wheat, Argentina, Brazil, France, and the United Kingdom all enjoyed sizeable increases of production (3.0 to 27.3%), contrary to the United States where CropWatch projects the production to drop (-2.3%). Decreases are also expected for Turkey (-6.0%) and most central Asian countries.

Soybean. Large increases in soybean production are listed for Brazil, Canada, the United States, Ukraine, and Thailand (all larger than 4%), resulting in an overall increase of soybean production by 4.4% compared to last year. The numbers could be an indication that the production share of currently minor exporters (when compared to Brazil, Argentina and the United States) keeps increasing.

Total cereal (maize, wheat and rice) output of China is forecast to be close to 513 million tons, a value almost identical with the 2013 output (see also section 4.1). Winter wheat (+1.3%) enjoyed reasonably favorable conditions while summer crops suffered drought resulting in a stagnation in production for rice (-0.5%) combined with a 1.1% drop for maize. The production of soybean, altogether a minor crop by Chinese standards, continues the downward trend that started about ten years ago, with a decrease of 1.3% that matches this trend.

Table 5.1. Estimated rates of change of production compared with 2013 for maize, rice, wheat, and soybean (thousand tons) and derived 2014 production in selected countries

	Maize		Rice (paddy)		Wheat		Soybean	
	2014	Δ%	2014	Δ%	2014	Δ%	2014	Δ%
Argentina (A)	24312	-1.8			13371	27.3	50430	0.5
Australia					29269	1.1		
Bangladesh	2251	0.5	51346	-0.3	1291	2.9		
Brazil	78298	-2.8	11777	0.2	7010	22.6	89036	9.0
Cambodia	996	9.3	9026	-0.2				
Canada (A)	11656	-17.9			34733	-7.5	5422	4.3
China (B)	191952	-1	201167	0	119735	1	13079	-1
Egypt	6149	-5.4	6986	3.5	9432	-0.3		
Ethiopia	6741	1.0	183	-0.8	4483	11.0		
France	15053	0.0	82	-0.6	39772	3.0		
Germany	4396	0.2			25545	2.1		
India	20682	-11.2	156812	-1.5	95661	2.3	11613	-2.8
Indonesia	18364	-0.8	70068	-1.7			775	-0.7
Iran	2507	-1.3	2616	3.0	13594	-2.9		
Kazakhstan	574	0.8	345	0.2	13843	-0.7		
Mexico	23049	1.7	180	0.4	3659	9.0		
Myanmar	1685	-0.9	28140	0.5				
Nigeria	10743	3.3	4756	1.2				
Pakistan	4810	0.2	9780	-0.2	23843	-1.6		
Philippines	7480	1.4	18956	2.8				
Poland	3860	-4.5			9564	1.0		
Romania	10962	-3.4			7435	1.9		
Russia	11751	1.0	970	3.7	53289	2.3	1508	-7.8
South Africa	12056	-2.5			1866	6.0	673	-14.3
Thailand	4992	-1.4	38710	-0.2			220	15.6
Turkey	5977	1.3	906	0.7	19702	-6.0		
United Kingdom					12648	6.1		
Ukraine	32837	6.1			23089	1.3	3854	38.9
United States (A)	326581	-7.7	9990	14.6	56728	-2.3	99213	10.9
Uzbekistan					6389	-6.6		
Vietnam	5079	-2.2	43195	-2.0				
Sub total	**871300**	**-4.0**	**676153**	**-0.1**	**621750**	**0.8**	**278987**	**6.8**
Others	112878	8.6	78629	6.4	94678	-2.9	14770	-26.5
World	**984178**	**-2.7**	**754782**	**0.5**	**716429**	**0.3**	**293757**	**4.4**

Note: Rates of change of production were computed as the product of the rates of change of yield and area: Refer to Annex C for additional details about the method; this method was applied for most countries, except those marked (A) and (B). (A) indicates that the areas are pure remote-sensing estimates (neither FAOSTAT nor national data were used for calibration); (B) indicates that no FAOSTAT or national data were used for area and yield estimates. Wheat productions for Argentina, Australia, and Brazil refer to the crop planted in 2014 and to be harvested in late 2014 to early 2015. Cells are left empty for crops not grown in a country or when the crops are a minor production; in that case, the country was included in the "Others" category, as for instance maize and rice in Australia, wheat in Myanmar and Nigeria, and soybean in France, Mexico, Kazakhstan, and Nigeria.

5.2 Disaster events

This note on disasters is prepared at a time of much insecurity in the word, with war and civil unrest across a number of countries centered on the middle-east and in an area from the eastern Gulf of Guinea to western Asia. According to the June 2014 Global Trends report of The UN Refuge Agency (UNHCR), refugees and internally displaced persons now outnumber those at the end of the Second World War. In addition, the ongoing outbreak of Ebola hemorrhagic fever is creating many problems and fears in West Africa—essentially the region covered as the Gulf of Guinea MPZ in this report. The situation entails serious food security issues, which compound problems from disasters.

Fortunately, however, few major geophysical disasters took place during the latest reporting period for this bulletin. Nonetheless, a large number of micro-disasters—in particular floods and landslides—occurred in many countries. Some of these floods, such as those in April in Dar es Salaam (Tanzania), occurred in cities. Although those floods in urban areas do not usually lead to reports about losses in the agricultural sector, they do destroy vegetable gardens (which play a major qualitative role in nutrition) and infrastructure. As a result, the long-term effect of these smaller events may be felt well after the disaster proper has ended.

The sections below briefly report on some of the major weather-related disaster events, including cyclones, rains, and floods, that have made a significant impact on agriculture over the reporting period.

Cyclones

From April to July, the most significant cyclones occurred in Asia, with the largest impacts caused by cyclone Rammasun (also known as Glenda) in the Philippines, Vietnam, and China. Other cyclones included those in Japan and the Bahamas.

Cyclone Rammasun impacted the Philippines, Vietnam, and China between July 9 to 20. The most agricultural damage from the cyclone was reported for the Philippines, where the cyclone damaged areas in central Luzon, Calabarzon, Bicol, and East Visayas; total losses for agriculture are estimated at US$ 212 million. Rice and maize were affected, but according to FAO the total impact of the event on production will be limited. In China, Rammasun hit the country's southernmost island Hainan, where it made landfall on July 18 and subsequently was rated one of the strongest cyclones of the last 41 years, destroying an estimated 41,000 hectares of various crops. In Vietnam, several provinces including Haiphong, Thái Bình, and Nam Định were hit. Similar to the Philippines, no major impact on production is currently feared for the country, although 4,200 hectares of cropland are reported lost. Minor impacts were felt in Thailand, where some fields (about 500 hectares) were flooded.

A second Asian cyclone, Neoguri, took place in Japan in July but did little damage outside the country. From July 2 to 13, the cyclone mostly hit Okinawa prefecture, with total damage to the agricultural sector amounting to US$22 million, predominantly in the fisheries sector.

In the Americas in early July, hurricane Arthur affected the Bahamas and the east coast of the United States from the first to the seventh of the month, but no major impact is reported on agriculture. Similarly, several storms occurred in the North Indian Ocean, but without casualties or significant damage to agriculture in the region.

Excessive rain, floods, and landslides

Over the reporting period, Afghanistan and Europe both experienced very intense floods. In other regions, several more isolated flooding events took place.

Floods in Afghanistan started in April and culminated with the Baghlan floods in May and June. In late April, thousands of hectares were lost in the provinces of Jawzjan, Faryab, Sar-e-Pul, Baghlan and Balkh. Baghlan province (Gazargah-e-Noor district), but also Bamyan and Badakhshan provinces were the worst hit areas, with more than 2500 lives lost—although estimates vary—due to flash floods and associated mudslides. Much of the damage was due to the persistent high rain.

In south-eastern Europe, a sequence of high rainfall events that started around mid-May (May 15-17) led to the worst floods in 120 years—known as the 2014 Balkan flood—in Serbia, Bosnia and Herzegovina and, to a lesser extent, in Croatia, Romania, and Slovakia. Neighboring countries from Macedonia and Austria to Poland also experienced flooding events. The excessive precipitation was brought about by a rare event: a Mediterranean cyclone named Tamara. Agriculture was hit hard, with 10,000 hectares impacted in Serbia alone. Total damage, still being estimated, goes into the billions of dollars and it is estimated that recovery will take five years for the worst-hit areas.

About a month after the Balkan flood, between June 17 and 20, the eastern half of Bulgaria and parts of Romania and Turkey had very intense rainfall. Over 3,000 individual landslides were reported, as well as damage to health and sanitation infrastructure.

In addition to these large-scale flooding events, the following more isolated happenings also contributed to suffering, but at a rather local scale:

- *Asia.* In Asia, heavy rain and landslides occurred in the south-west of China's Guizhou province on June 4; in Jiangxi, Fujian, Guangxi, and again Guizhou on June 22; and in Yunnan on July 10. In India (in Assam) and Sri Lanka, heavy rainfall took place at the beginning of June. Tajikistan had floods in April and May, but few crops are reported lost. During late May and in June, floods occurred in southern Siberia in Russia (Republics of Khakassia and Altai) and the north Caucasus.
- *Africa.* In Africa, heavy rain was recorded in the coastal areas of Tanzania (Dar es Salaam) in April; in Sudan, the Kordofan region experienced floods in late June and in July.
- *South America.* Paraguay and adjacent areas in neighboring countries suffered floods in May.

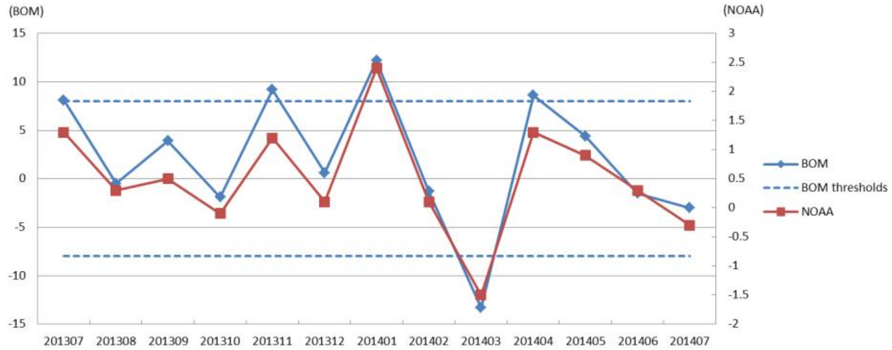
Fires

Fires are reported mostly from South America and the United States. In South America, the "Great Fire of Valparaiso" started on April 12 in the City of Valparaiso in Chile. In the United States, the Washington State wildfires started on July 8, while most fires in California took place during May and up to late June.

5.3 El Niño

El Niño is gaining increased attention this year. The two sets of values for the Southern Oscillation Index (SOI), from both the Australian Bureau of Meteorology (BOM) and the U.S. National Oceanic and Atmospheric Administration (NOAA) (figure 5.1), illustrate that the El Niño pattern kept neutral from July 2013 (within the range from -8 to 8). Following a large drop in March and subsequent increase in April, the index has steadily declined since then.

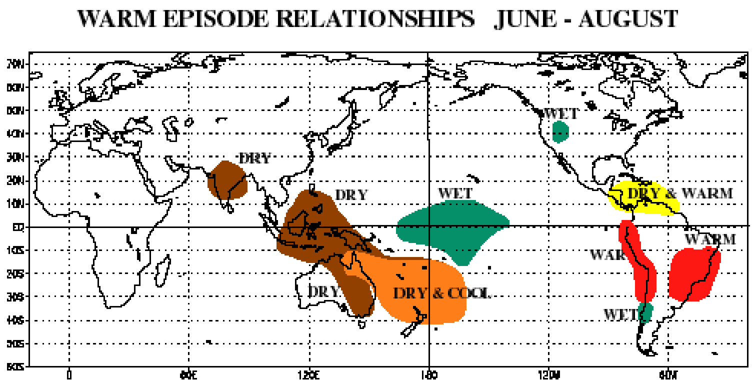
Figure 5.1. Comparison between monthly BOM and NOAA SOI datasets from July 2013 to July 2014



Note: The dashed blue lines are the El Niño thresholds in the BOM method; sustained negative values of SOI below −8 may indicate an El Niño event, while sustained positive values above +8 are typical of a La Niña event. Values within the range (-8 to +8) indicate neutral conditions. The data and methodology description of the two datasets can be found at http://www.bom.gov.au/climate/glossary/soi.shtml and http://www.cpc.ncep.noaa.gov/data/indices/.

Although the risk of a full-fledged El Niño has eased, the possibility of an El Niño event in 2014 or the Spring of next year cannot yet be ruled out. By comparing the typical climate anomalies associated with El Niño events (figure 5.2) with CropWatch global maps of rainfall and temperature departures (figures 3.1 and 3.2 in Chapter 3), it is evident that both “dry” and “warm” climate anomalies associated with El Niño for June to August have been identified by CropWatch. The El Niño characterized dry conditions in northern South and Central America and south and east parts of Australia are consistent with the large negative rainfall departure in these regions in figure 3.1. The El Niño featured “warm” events in northern South and Central America, central–northern Andes, the east of Brazil, and southern Australia also correspond well with the above average temperature anomalies in these areas shown in figure 3.2.

Figure 5.2. Typical climate anomalies associated with El Niño events for June to August



Source: NCDC, http://www.ncdc.noaa.gov/paleo/ctl/images/warm.gif.

Information from other sources also indicates strong potential for El Niño. BOM declared on August 12 that the chance of an El Niño developing in 2014 is at least 50%, further suggesting that an El Niño event (though not a strong one) in 2015 was likely. In the latest El Niño-Southern Oscillation (ENSO) Diagnostic Discussion[1], the NOAA National Weather Service’s Climate Prediction Center states that “The chance of El Niño has decreased to about 65% during the Northern Hemisphere fall and early winter.” In the next few months, CropWatch will keep a close eye on the developments of El Niño and report about the regions that shown sensitivity to this event.

[1] http://www.cpc.ncep.noaa.gov/products/expert_assessment/ENSO_DD_archive.shtml

5.4 Maize trends

Global areas and uses of maize

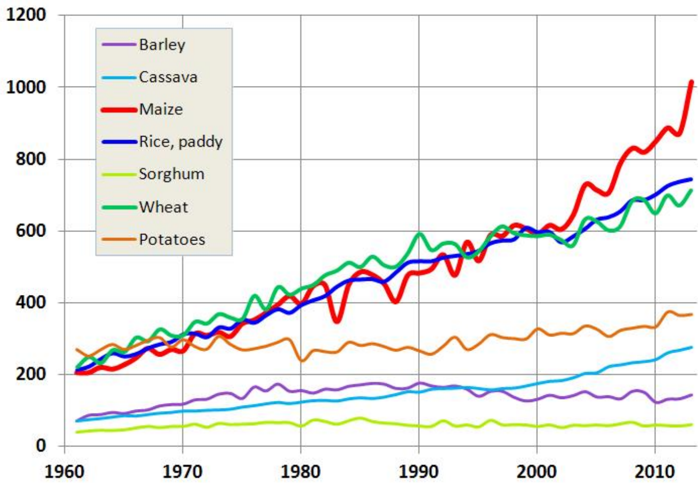
About 73% of the world's maize growing areas are located in developing countries, with most areas in low and lower-middle income nations. Maize is predominantly grown under rainfed conditions by smallholders and resource-limited farmers, thus playing an important role in the livelihoods of millions of poor people in Latin America, sub-Saharan Africa, and Asia.

In all continents except Africa, most of the maize production is used for feed stock, but the use of maize (and maize derived products, including residues) covers the spectrum from food (grain, oil starch, syrup, and feed) to non-food, including energy (ethanol and bio-diesel), green manure, and paper. In the United States for example, 38% of maize is processed into animal feeds, followed closely by ethanol and derived products (35%), while only 10% of maize production is used for food ingredients and just 1% directly for human food, mostly as cereal. Maize does, however, play a major role as a food source in places such as Mexico, where it is used for tortillas and tamales, in limited areas in Europe (used as polenta), in some Asian highlands in Nepal, Bhutan, and India, and in many African countries. In the African countries, the preferred maize type is white maize, with the crop used mostly as boiled flour (ugali or nshima).

Growing yields and production

The many uses for maize have ensured a growing demand for the crop and production has been able to keep up due mostly to growing yields and the crop's genetic plasticity. Maize production actually "took off" at the end of the 20th century and the crop now dominates rice and wheat in terms of total annual production (figure 5.3). The productions of other major crops, such as barley, sorghum, and potatoes have essentially been stagnating since the 1980s, while cassava follows a weak upward trend, mostly because of demand for animal feeds. For the period 2003-2012, the seven countries with the highest crop production growth rates are Bangladesh (0.16), Cambodia (0.14), Ukraine (0.14), Russia (0.11), Ethiopia (0.08), Myanmar (0.08), and Indonesia (0.07).[2]

Figure 5.3. Worldwide production of major cereals and tubers since 1961 (million tons)

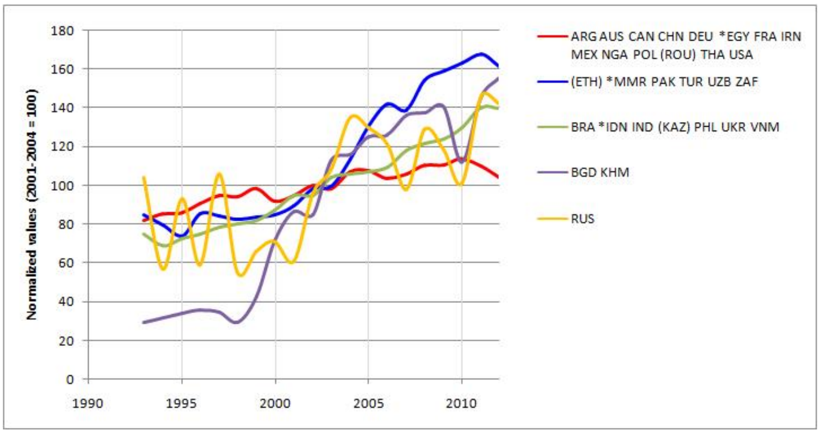


Source: Authors, based on FAOSTAT data.

[2] Growth rates are expressed as the ratio between the slope of the 2003-2012 trend line (expressed in tons/year by country) divided by the average 2003-2012 production (in tons) (FAOSTAT data).

The increase in maize production has been achieved not only through increases in yield, but also a growth in the share of maize area at the expense of other cereals. This indicates that maize has become, in many countries, the preferred cereal. Figure 5.4 illustrates national variations in maize yield for groups of countries, clustered based on the similarities in their variations over time.

Figure 5.4. National variations in maize yield since 1993 for country clusters



Note: Countries are identified by their three-letter ISO codes (see also Chapter 3). Variables are expressed as an index compared to the average value for the period 2001-2004, which was taken as 100. For each cluster, the most typical country is indicated with an asterisk, while the one that is farthest from the center of the cluster is shown between brackets. The figure was prepared using ADDATI software, available at http://circe.iuav.it/~silvio/addawin_site/addawin_en.html.

Source: Authors, based on FAOSTAT data.

As illustrated in figure 5.4, major maize producers, such as Argentina, France, and the United States, have experienced yield variations between index values of 80 to 110 for the 1993-2005 period, but yields have since remained relatively stable around an index value of 115. Meanwhile, rapid increases in maize yield took place in three groups of countries, as indicated by the green, blue, and purple trend lines. The first (in green), shows a 40% increase over the last decade, including Brazil, Indonesia, India, Kazakhstan, the Philippines, Ukraine, and Vietnam. The other two (in blue and purple) indicate as much as a 60% increase, representing trends for Ethiopia, Myanmar, Pakistan, Turkey, Uzbekistan, and South Africa (blue) and Bangladesh and Cambodia (purple), with large yield fluctuations for the last two countries. The data suggest a sustained and successful effort to increase maize production in Myanmar, Ukraine, and South Africa. Although some of the spectacular increases have been those of the minor producers, those dramatic increases may have still markedly affected national production patterns and diets within those countries.

The share of maize among other cereals is illustrated in table 5.2 for selected countries. The first six countries—Myanmar to Laos—are characterized by having more than doubled their already substantial share of maize in the national cereal production from 1994-2004 to 2004-2013. (The large yield increases for Myanmar and Ukraine were illustrated in figure 5.4). The second set of countries—Germany to China—are the world's top ten producers, from China in first to Germany in tenth place. Russia ranks as the world's fourth country in terms of production, but is listed in the top of the table for having a factor 3.2 increase in its relative share of maize production among all cereals. With the exception of France, where the share of maize in the total cereal output decreased 10% (factor 0.9) and Brazil, where it remained unchanged, all major producers have increased the relative share of maize in their cereal output over the last ten years by 10 to as much as 40 percent (India).

In addition to the countries highlighted in the table, very spectacular increases (more than twentyfold) were observed for a few other countries. While their increases are mostly due to those countries' very low starting values for share of maize production, increases in Lithuania, neighboring Belarus, and in

Bangladesh still mark a dramatic change. In other countries, also coming from very low starting values, relatively more modest but still significant increases are reported for Laos (above factor 4) and Saudi Arabia (factor 9). In the case of Saudi Arabia, this increase is part of the overall increase of food production in the country as a result of irrigation with deep water, which will be phased out completely in 2016. Of the remaining countries with an increase in maize share, less than half (39%) have achieved this increase through an increase in maize area at the expense of other cereal production areas.

Finally, among the 100 major producers worldwide, six countries have actually undergone a decrease of the share of maize in the total cereal production. This includes Japan and Morocco as well as several central Asian countries (Turkmenistan, Afghanistan, and Uzbekistan). In all countries the drop is close to 30%, except in Uzbekistan where it reaches 75%.

Table 5.2. Relative maize production and increases in area and production for select countries

	Rank based on 2004-2013 annual production average	Factor of increase in the share of maize area and production among national cereal area and production between 1994-2003 and 2004-2013		Percentage of maize in national cereal output (2011-13)
		Area	Production	
Countries with fastest growing share of maize				
Myanmar (MMR)	19	1.4	2.1	5
Ukraine (UKR)	11	2.1	2.3	45
Sri Lanka (LKA)	43	1.3	2.6	5
Cambodia (KHM)	35	2.0	2.7	9
Russian Federation (RUS)	4	2.4	3.2	11
Laos (LAO)	56	2.9	4.4	26
Top ten of countries (incl. Russian Federation)				
Germany (DEU)	10	1.3	1.3	11
Bangladesh (BGD)	9	14.8	22.7	3
Canada (CAN)	8	1.3	1.3	23
France(FRA)	7	0.9	0.9	23
Brazil (BRA)	6	1.0	1.0	77
Indonesia (IDN)	5	0.1	1.3	21
India (IND)	3	1.3	1.4	8
United States (USA)	2	1.2	1.1	60
China (CHN)	1	1.3	1.3	38

Source: Authors, based on FAOSTAT data.

Looking forward

Looking forward, expectations are that maize will continue to be a leading crop. However, it is unlikely that the fast pace of maize production increase can be sustained more than 10 or 15 years, even if pockets of fast increases persist.

First, land is limited and productions are getting close to their potential based on available sunlight. Many recent publications have discussed the problem of yield gaps—the difference between current yields and those that could be achieved by optimally using resources. The rate of yield change is already low in some major producing countries such as China and India and in some countries with advanced agriculture. Techniques are being examined that may have the potential to maintain the growth for some more time, in places not ideally suited for the crops or by improving the management of resources, but increasing maize yields in some countries will come only at an unacceptably high economic and environmental cost.

Second, in the longer run, climate change impacts may result in a relative advantage of other (non-C4) cereals over maize, particularly in tropical countries where maize is expected to suffer more (or benefit less) than some other crops from CO_2 fertilization and improved water use efficiency. New varieties will be needed that are resistant to drought, heat, water-logging, and sub-optimal soil nitrogen, with varieties tuned to specific locations to solve anticipated problems.

Finally, it is important to note that maize yields are also more variable than those of other crops, which has an impact on food security. This variability is due, among other factors, to the crop's high water use, as well as management and genetic factors. Contrary to lower yielding crops, maize production systems often amplify environmental variability, especially the variability of water supply.

Maize will continue to dominate the cereals production scene, although the links between the agriculture and energy sectors through both the supply side (energy is an important input in crop production) and demand side (maize as source of biofuels) have the potential to stress markets. For the immediate future, FAO and OECD foresee no dramatic price fluctuations. In the longer term, competition for land with other established crops, variable but stagnating yields in many countries, as well as competition from plants with higher water use efficiency, are all likely to work against maize and modify the balance between cereals.