Chapter 5. Focus and perspectives

This focus section complements CropWatch analyses presented in chapters 1 through 4 by presenting additional information about topics of interest to global agriculture. Section 5.1 presents a production outlook for 2015, while the other three sections focus on disaster events (5.2), agricultural developments in North America (section 5.3), and an update on El Niño (5.4).

5.1 Production outlook for 2015

The latest global CropWatch forecasts of maize, rice, wheat, and soybeans production for 2015 are presented in tables 5.1 and 5.2, providing both a quick overview (table 5.1) and detailed production estimates for each of the 31 countries monitored by CropWatch (table 5.2).

Table 5.1. Overview of 2015 production estimates and forecasts for maize, rice, wheat, and soybean (thousand tons) for major and minor producers and exporters

	Maize		Rice		Wheat		Soybean	
	2015	Δ%	2015	Δ%	2015	Δ%	2015	Δ%
Major producers	874321	-1	660265	0	626630	1	284619	0
Minor producers	112255	3	80786	2	98212	2	25731	10
Total	**986576**	**0**	**741051**	**0**	**724842**	**1**	**310350**	**1**
Major exporters	479413	0	254646	-2	290126	2	250529	0

Note: Major exporters are those that normally account for 80% of world exports

As shown in table 5.1, the total production of maize and rice is stable with a global production of 987 million tons and 741 million tons, respectively, close to that of 2014. With a production of 725 million tons, wheat production has increased 1% over 2014. Soybean global production increases by 1% at 310 million tons. The global percentages of change are identical with those of the major producers for rice and wheat; the additional 140 minor producers for maize, 96 for rice, 98 for wheat, and 75 for soybeans do not alter the overall picture. However, the largest increases among the minor producers are those for maize (+3%) and soybean (+10%), confirming the appeal of both crops to a number of countries that may eventually become exporters of the commodities (see table 5.2).

Among the major exporters (listed in table 5.2), maize and soybeans stay at the same level as during 2014, while rice drops 2% and wheat increases by the same percentage. This may result in some strain on the markets for maize, rice and soybean.

The production estimates in table 5.2 directly reflect marked conditions of drought and water excess that have affected several countries and groups of countries, including China. In China, however, the size of the country and the large climatic diversity has helped to efficiently spread the risk. In China, maize production stagnates compared with 2014, while rice and wheat increase (+1% and +2%, respectively). Soybean continues the negative production trend (-3%), albeit at a reduced rate compared with the last ten years.

Table 5.2. 2015 production estimates and forecasts for maize, rice, wheat, and soybean (thousand tons) in selected countries, compared to 2014 CropWatch estimates

	Maize		Rice		Wheat		Soybean	
	2015	**Δ%**	**2015**	**Δ%**	**2015**	**Δ%**	**2015**	**Δ%**
Argentina	25332	1	1805	4	12053	15	52230	0
Australia	1052	2	1779	20	24581	-9	89	6
Bangladesh	2325	5	51785	2	1340	4	64	1
Brazil	79655	1	11975	1	6764	1	90230	1
Cambodia	932	-10	8824	-7			103	-6
Canada	12123	2			31141	-6	5415	0
China	**192822**	**0**	**202323**	**1**	**121613**	**2**	**12691**	**-3**
Egypt	5837	-2	6424	-1	9858	4	22	-5
Ethiopia	6425	-5	195	7	4243	-3	87	20
France	14768	-2	76	-7	39077	-2	105	-2
Germany	4513	-3			27175	-2	3	5
India	21067	4	151495	-3	91396	-4	12273	6
Indonesia	18415	0	69797	1			690	-11
Iran	2613	4	2534	0	14179	6		
Kazakhstan	603	4	365	2	15913	15	252	12
Mexico	24327	2	121	-33	3693	1	323	11
Myanmar	1723	0	27965	-2	188	1	177	-7
Nigeria	10164	-4	4562	-2	103	-14	760	9
Pakistan	5010	6	9961	5	25336	4		
Philippines	7524	0	19430	0				
Poland	3681	4			10465	-1		
Romania	10287	-8	42	-9	6852	-8	161	5
Russia	11959	2	1017	5	54296	2	2035	35
South Africa	11324	-24			1704	-2	894	33
Thailand	4979	-2	38401	-2			192	-6
Turkey	5766	-2	986	6	24471	18	229	16
United Kingdom					14590	0		
Ukraine	26889	-10	160	1	22739	-2	3711	-4
United States	359658	0	9908	-1	56578	3	108069	0
Uzbekistan	423	9	401	12	6573	5		
Vietnam	5135	1	44881	2				
Sub total	**877331**	**-1**	**667212**	**0**	**626921**	**1**	**290805**	**1**
Other countries	109245	3	73839	2	97921	2	19545	8
Global	**986576**	**0**	**741051**	**0**	**724842**	**1**	**310350**	**1**

Note: The production values in this table were estimated based on satellite indices over the respective cultivation areas, except for the minor producers for which the values were extrapolated to 2015 based on FAO statistics. For maize, satellite-based estimates cover all countries with productions starting at 1,723 thousand tons for maize (Myanmar and above); 2,534 thousand tons for rice (Iran and above); 1,340 ton for wheat (Bangladesh and above), and 3,617 thousand tons for soybean (Ukraine and above).

Maize. The largest national decreases for maize occurred in South Africa (-24%) as the direct result of drought over much of the area, followed by Ukraine (-10%) due to the combination of weather and the political situation. In Cambodia, also with a production decrease (-10%), satellite indices clearly show unfavorable conditions south of Tonle Sap, but it is not clear what exactly created the situation. Romania displays a drop of 8% due to summer drought, especially in the south. The 5% drop conjectured for Ethiopia may be modified if favorable conditions prevail for the Meher season crop, which is still growing. Significant production increases of 5% occur in Pakistan and Bangladesh, where figures may be revised down once the full extent of excess water can be assessed with greater accuracy. Among the major

exporters, Thailand and France both suffered drought which resulted in a 2% decrease in maize production.

Rice. Among the countries where rice constitutes a major staple, it is worth mentioning the estimated production decreases in Cambodia (-7%) and India (-3%), while the other significant drops affect countries where the crop is of lesser importance. Estimates for Indonesia, the Philippines, and Vietnam are in the range of 0 to +2%. Major rises are listed for several countries. Pakistan (+5%) is one of those where the crop plays an important part both for local consumption and as an export commodity.

Wheat. Wheat presents a very asymmetrical situation with a large number of countries having increased their production and only a few having suffered a drop. Argentina and Turkey come first, with increases of 15% and 18%, respectively, brought about by favorable weather but also increased areas, as assessed by the CropWatch cropped arable land fraction indicator. In Turkey, the fraction of cropped arable land was 6 percentage points over average. Significant wheat production increases are also seen in Egypt (+4%) and Kazakhstan (+15).

Soybean. CropWatch puts the U.S. soybean production at the same level as the previous season's production. Production is up 6% in India and as much as 35% in Russia, while a marked drop was noted for Ukraine (-4%).

5.2 Disaster events

A report issued in July 2015 by Munich Re indicated that economic losses due to natural disasters in the first half of the year (totaling US$46 billion) were down 58% compared with the recent ten-year average for economic losses over the same time period, which was US$107 billion. Insured losses were estimated to be close to US$15 billion, down 47% from an average of US$28 billion. However, even if the economic damage is down, 2015 is expected to experience a record impact in terms of numbers of people affected by disasters.

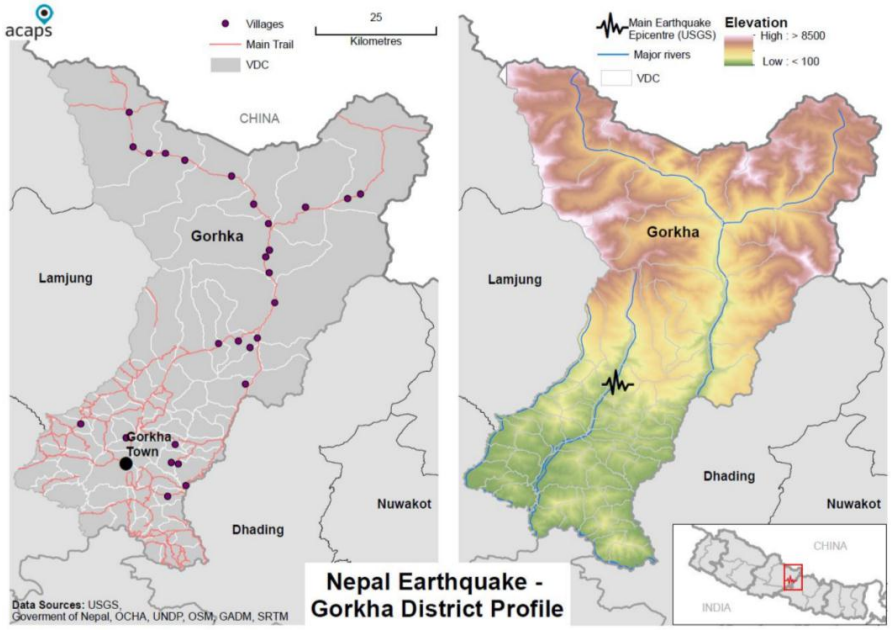
As discussed in previous CropWatch Bulletins, only a fraction of risk is insured in the developing countries. A typical example is the Dolakha earthquake of Nepal on 25 April (see also figure 5.1), in which only US$140 million in damages was insured while the total loss has been estimated to have reached US$4.5 billion—making the insured proportion about 3% of the total damages. When insured losses (payouts to beneficiaries) are split geographically, for the first half of 2015 most of them occurred in the United States (73%) due to its adverse winter and spring conditions, followed by the Asia-Pacific area (14%) and then the rest of the world, including the Middle-east and Africa.

The current reporting period is dominated by three groups of adverse conditions that have affected agriculture both directly and indirectly, even if quantitative estimates are still mostly missing. They include (i) drought in the western-central United States and adjacent areas, (ii) a heat wave affecting India and Pakistan, and (ii) floods in Asia, particularly affecting India, Myanmar and China. The following sections describe these and other global events.

Earthquakes and volcanic eruptions

The Nepal earthquake "started" on April 25 when an earthquake with a magnitude of 7.9 occurred in the Gorkha district in Nepal. Following the initial event, aftershocks—some severe, such as the one on May 12—were recorded well into August in different parts of the country, also affecting Bihar and Uttar Pradesh in India and Tibet in China. The death toll from the Gorkha earthquake has crossed 8,600.

Figure 5.1. Location and topography of Gorkha district, Nepal



Source: http://acaps.org/img/documents/d-acaps_district_profile_gorkha_nepal_earthquake_1_may_2015.pdf.

The earthquake coincided with the beginning of the maize planting season, with rice due to be planted about a month later in the six most affected districts; the disruption of society and the destruction of the infrastructure (drainage and irrigation canals, roads, loss of tools) has affected production in the affected areas. FAO estimates that crops currently in the field suffered less (losses of 20% for maize and less for other crops) than stored grain, especially rice, millet, and maize (losses exceeding 80%) and potatoes (60% loss) and wheat (40%). Crop recovered from the rubble are mostly unsuitable for human consumption and inadequate for seeds. About 16% of cattle and 36% of poultry was lost and part of the surviving population is in urgent need of veterinary assistance.

While minor in comparison with the Nepal earthquake, the earthquake that shook the Sabah region of Malaysia on June 7 also deserves mentioning as it was the strongest earthquake in Malaysia in about 40 years and claimed about 20 lives.

The monitoring period was also characterized by a number of volcanic eruptions. These typically forced people to leave their villages and crops and often significantly increased life and crop threatening mudslides. One such eruption involved Calbuco, which erupted in southern Chile on the 17th of May, affecting an area where livestock, forestry and fisheries dominate agriculture. Elsewhere, the Piton de la Fournaise on Reunion Island became active on June 3. At the end of June, more than 6,000 residents living near Mount Sinabung (Sumatra) had to evacuate, sometimes at larges distances from the eruption itself. Also in Indonesia, Mount Raung erupted on June 29 in eastern Java, an event then followed by the eruption of Mt. Colima in western Mexico on July 11.

Drought and heat waves

Drought is often associated with other extreme conditions such as fires and heat waves, which all occurred during the reporting period in various locations worldwide.

Due to prolonged drought and reduced snowfall this year, water availability constraints continued to be severe in the western and south-western United States. Several states restricted water use in urban areas, for example in about half of Washington State (starting in March) and California (in April). In California, farmers were usually not held to the mandated 25% reduction as they were already affected by the reduced release of water from reservoirs and from creeks, which started three years ago. As a result of

the drought, the USDA in the end of April declared parts of several states as natural disaster areas, including Nevada (Lincoln, Nye, and White Pine counties), Mohave County in Arizona, and Box, Elder, and Tooele counties in Utah, where farmers could apply for assistance to the crops and livestock sectors. On May 14th, Wheeler County in Oregon was added to the list of disaster areas, as were Coryell County in Texas, Duchesne and Uintah counties in Utah, and Elmore County in Idaho. By June 13th, more than half of Oregon was affected.

In May, large fires developed in western Canada, starting with Alberta, which is the major spring wheat producing area in the country. The fires caused significant losses to the natural vegetation and about 7,000 people had to be evacuated. By the beginning of July, wild fires were also reported from British Columbia. In mid-July, Parkland County—at the very center of Alberta—was declared an agricultural disaster area, with rainfall often 25% below expectations.

In Asia, Korea DPR (North and South Hwanghae provinces) was affected by extremely dry conditions. By mid-June, the drought was said to be the worst in a hundred years. In the country as a whole, about one third of the rice areas is estimated to have suffered drought.

Heat waves are reported from Europe and Asia. The highest daytime temperature in the world (50.5°C) was recorded at Sweihan, Abu Dhabi on the third of June. In India, a new temperature record occurred at Angul (Odisha), where 47 degrees were recorded on May 25th.

Both India and Pakistan suffered a deadly heat wave at the end of May and in June, mostly in Andhra Pradesh, the neighboring state of Telanga, and the eastern states of West Bengal and Orissa. The heat wave was also characterized by the abrupt end of pre-monsoon showers and several thousands of excess deaths are deemed to have been caused by the heat. In Pakistan, the heat affected mostly the south (Sindh province) starting around the 20th of June and aggravated by electricity shortages, Ramadan, and the urban setting. Temperatures reached up to 49°C.

Early July, other heat waves were reported from Italy and from Germany. In Germany, a temperature of 40.3°C was recorded in Kitzingen, northern Bavaria, on July 5, which was the highest temperature recorded in the country since 1881, the beginning of the instrumental record. Wildfires occurred in Spain and Portugal.

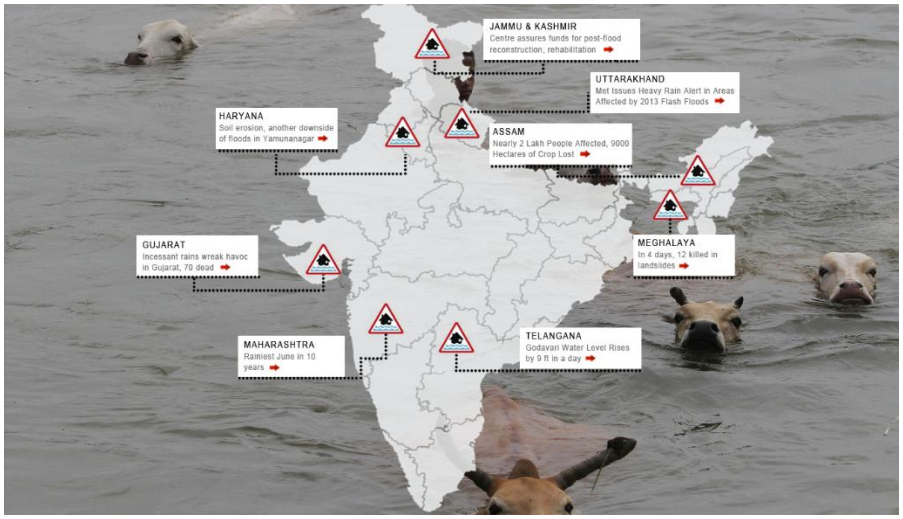
Heavy rain, floods, storms

Excess rainfall and related and secondary disasters have occurred with high frequency throughout the reporting period across the globe. Among all countries, India, China, and Myanmar seem to have suffered the most from these events in several repeated episodes. The text below does not include the five cyclones that have affected India, Bangladesh, Myanmar, and China, which are described in a separate section below.

In Kashmir, landslides and flooding on the first days of April claiming hundreds of lives. In the same period, a severe storm affected Bangladesh and took the lives of at least 33, injuring 200 others; Bogra was the worst affected district. In the last dekad of April, heavy storms hit Bihar, killing 30 people and seriously injuring around 100. Next, on May 18, flash floods washed away about 10 people in Tamil Nadu. Again, on 7 June, nearly 33,000 people were affected by floods in Assam, according to the State Disaster Management Authority (ASDMA). The floods have affected 108 villages in six districts of Assam and also damaging 1,000 hectares of crops. In the last days of June, most of India was affected by the monsoon floods, which are deemed to be the worst in 200 years. Affected areas included Gujarat, Haryana, Meghalaya, Assam, Telanga and Maharashtra. In Assam, 367,000 ha of cropland were affected and 9,000 cattle drowned. In Jammu and Kashmir, 648,000 ha of cropland were flooded and 61,000 cattle lost. In

Meghalaya, 16,000 ha were damaged and 8,800 cattle perished. Altogether, about 400,000 houses were damaged or lost and 1,000 people died.

Figure 5.2. States in India affected by floods, June 26 2015



Source: http://www.indiaenvironmentportal.org.in/media/iep/infographics/flood%20map/floods.html

In China on April 6, a severe storm with wind speeds reaching 150 km/hour occurred in China's Sichuan Province, claiming lives, injuring people, and causing direct economic losses of about US$120 million to infrastructure and houses. On May 16, thunderstorms and resulting mudslides and lightning in Guangxi Zhuang Autonomous Region in southern China claimed the lives of at least four people, while 60,500 were affected around Guilin and Liuzhou. A week later, four times more people were the victims of the floods that hit Hunan and Fujian Provinces (eastern China), destroying 2,500 houses, damaging 21,000 ha of farmland, and causing an economic loss of US$337 million. Continuing rains until early June claimed the additional lives of 16 people and affected Fujian, Jiangxi, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Guizhou, Yunnan, and other provincial regions, as reported by Xinhua.

Less severe floods were reported from various areas, including the United States (Oklahoma and Texas at the end of May, and again Oklahoma, Missouri, and Texas during mid-June), Haiti (early April), Finland (mid-May), Kazakhstan (Karaganda Oblast in mid-April due to accelerated snowmelt brought about by high temperature), Iran (July 20), and the Philippines (July 22). In the Philippines heavy rain and floods in Luzon caused 19 people to die.

Landslides and flashfloods

At least 3,000 landslides have been reported in association with the Dolakha earthquake in Nepal, along with 14 minor earthquakes and torrential rains. Six huge landslides have blocked river flow, thus creating conditions for flashflood disasters well after the seismic activity will have returned to normal.

The reporting period also recorded several curious accidents where landslides have buried mines, for instance in Phakant in Myanmar where close to 70 people went missing on April 9 due to a landslide in a jade mining area. In northeast Tanzania, at least 19 gold miners died in a similar incident in Kahama district on April 18. Four days later, on April 22, 19 people died when a coalmine was flooded in Shanxi Province, China.

In other parts of the world, about 85 people died in two landslides in Colombia on May 19 (Liboriana River) and June 12 (Cauca Department). In Georgia, 500 sheep and 40 cows were buried by a landslide on June 3.

Cyclones and storms

Over the reporting period, five significant cyclones—Maysak, Noul, Kujira, Chan-hom, and Kromen—reached land and caused large damages. All five cyclones were in Asia, with cyclonic storm Kromen probably the most damaging.

Cyclone Maysak (also known as Chedeng) was active between March 26 and April 7 and affected the Federated States of Micronesia and the Philippines. In Micronesia, the agricultural impact was extensive, with 90% of the banana, breadfruit, and taro crops destroyed in Chuuk and Yap states. Three hundred houses were destroyed and an equal number was damaged, affecting about 30,000 people (close to 30% of the population) and leading to damages amounting to US$8.5 million. The impact was minimal in the Philippines.

The Philippines were also affected, on May 10, by typhoon Noul, which followed a trajectory that had also previously touched the Caroline Islands. The typhoon then continued to China (Taiwan) and Japan. Most agricultural damage (an estimated US$23.2 million) occurred on Okinawa.

Tropical storm Kujira, which was active between June 19 and 25, destroyed 7,400 hectares of crops in Hainan, China, on June 20 and caused US$14.4 million in economic losses. In Vietnam, the storm killed nine people as a result of flooding in northern Sơn La Province.

Figure 5.3. Maize field flooded by Chan-hom in Zhoushan village Zhejiang province, July 11

Source: http://www.chinadaily.com.cn/m/ningbo/2015-07/11/content_21290377.htm.

Typhoon Chan-hom (June 30 to July 15) visited the Caroline Islands, Guam, northern Mariana Islands, Japan, China, the Korean peninsula, and the Russian far east. On July 7, the typhoon hit the central Philippines (Visayas), resulting in agricultural losses up to US$90,000. In Japan, Okinawa was hit again, but with impacts less severe than for Noul in the previous month, mostly affecting mangoes. This time the damages in Okinawa amounted to an estimated US$4.2 million. In China, more than 1 million people were evacuated in Zhejiang as rainfall locally reached 400 mm. In Zhejiang and neighboring Jiangsu alone, losses were between US$300 and 400 million, but the total economic loss amounted to US$1.43 billion. Agriculture and transportation make up the largest share of the total national loss estimated at US$1.5 billion. In Russia, heavy rains occurred in Khabarovsk Krai as the typhoon was reaching the end of its life.

Finally, the north Indian Ocean cyclonic storm Komen had a severe impact on India, Bangladesh, and Myanmar between July 26 and August 2, causing 170 deaths due to widespread flooding brought about by exceptional rain. For instance, the Chittagong hills in southeast Bangladesh recorded more than one meter of rainfall over the event. In total, about 130,400 people were affected, and many were killed by the floods and landslides. In India, about half a million suffered from the direct and indirect impacts of Komen. About 300,000 houses were destroyed or damaged. In Myanmar, 12 out of the 14 states suffered badly through displacement (200,000 people) and other impacts (an additional 150,000 affected). The World Food Program indicated that beans and pulses (some of Myanmar's biggest agricultural exports) as well as other crops could be delayed by two months.

5.3 Crop production and trends in North America

Overview

Canada, Mexico, and the United States are among the major producers and—to varying degrees—exporters of maize, wheat, and soybeans. Table 5.3 illustrates some background information about population levels, land use, and production in the three countries, comparing it to China.

With the exception of Canada, 45-55% of the land area in the countries is used for agriculture, which thus dominates the landscapes in Mexico and the United States. The North American countries are in the upper quartile of the most urbanized countries, while China ranks just below median.

Mexico and China share several features due to their climate and level of development, such as the relatively large contribution of agriculture to GDP (3.5% and 9.2%, respectively, which compares with a level close to 1.5% for both Canada and the United States) and the larger share of the population active in agriculture. China and Mexico also practice irrigation at a larger scale than the United States and in particular Canada, where irrigation reaches just 2% of the cropland.

Table 5.3. Socio-economic and agricultural variables in North America and China

	Canada	Mexico	U.S.	China	Period	Source
Population total (millions)	36	125	325	1402	[g]	[10]
Population urban (%) 2015/2030	81/83	79/83	83/86	56/69	[g], [h]	[10]
Agriculture, value added (% of GDP)	1.5 [a]	3.5	1.4 [d]	9.2	[e]	[9]
Agricultural land as % of land area	7.2	54.9	44.7	54.8	[e]	[1]
Permanent cropland (% of land area)	0.5	1.4	0.3	1.7	[e]	[8]
Agriculture value added/worker (constant 2005 US$)		4416	68457 [d]	754 [d]	[e]	[2]
% of water withdrawal used for agriculture	12	77	40	65	[h]	[12]
% of arable land equipped for irrigation	2	25	16	51	[h]	[12]
Arable land (hectares per person)	1.32	0.19	0.49	0.08	[e]	[4]
Employment in agriculture (% of total employment)	2 [e]	13	2 [a]	35	[b]	[5][11]
Fertilizer consumption (kilograms per hectare of arable land)	74.4	72	131.1	647.6	[e]	[7]
% contribution of agriculture to GDP	1.9	3.8	1.2	10.1	[b]	[3]
Million ha with GMO crops	10.8 MS	0.2 CS	70.1 MCS	4.2 C	[d]	[6]
Wheat production (million tons)	27	3	62	122 [g]	[c]	[10][13]
Wheat imports (<) and exports (>) (million tons)	>16	>1 ,<4	>32, <2	<3 [e]	[b]	[10][14]
Maize production (million tons)	13	22	274	193 [g]	[c]	[10] [13]
Maize imports (<) and exports (>) (million tons)	>1	<9	>46	<3 >2[e]	[b]	[10] [14]
Soybean production (million tons)	5	0	82	13 [g]	[c]	[10] [13]
Soybean imports (<) and exports (>) (million tons)	>3, <1	<3	>34	<71 [e]	[b]	[10] [14]

Note: M=Maize; C=Cotton; S= Soybean; [a] 2010; [b] 2011; [c] 2012; [d] 2013; [e] 2014; [f] 2006; [g] 2015; [h] various years between 2005 and 2011

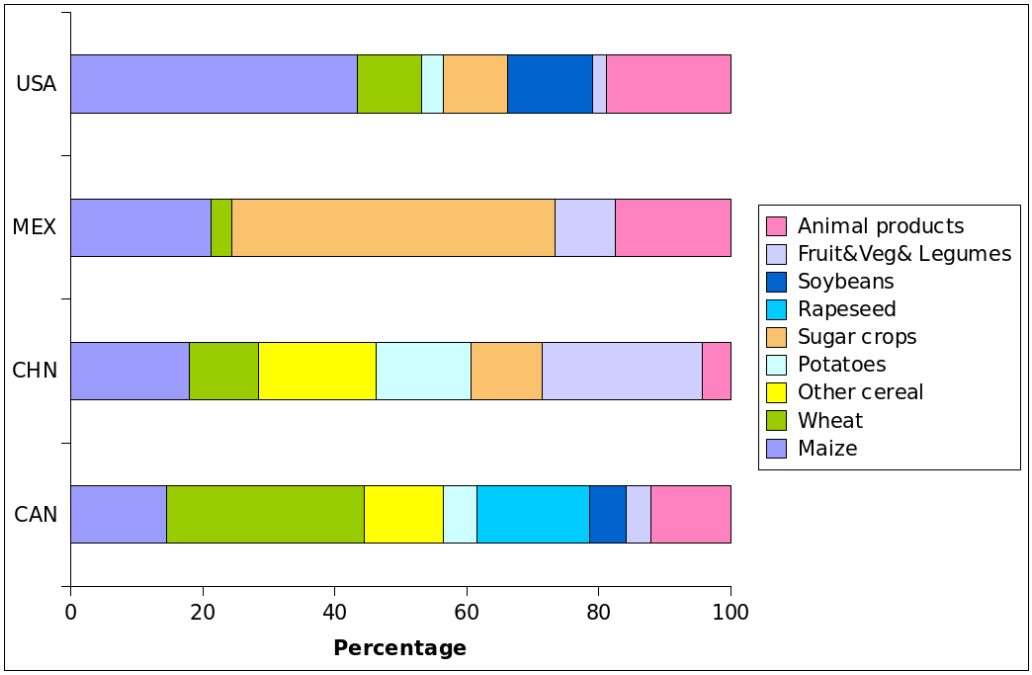
Source: [1] World Bank data, http://data.worldbank.org/indicator/AG.LND.AGRI.ZS/countries; [2] http://data.worldbank.org/indicator/EA.PRD.AGRI.KD/countries; [3] https://en.wikipedia.org/wiki/List_of_countries_by_GDP_sector_composition; [4] http://data.worldbank.org/indicator/AG.LND.ARBL.HA.PC/countries; [5] http://data.worldbank.org/indicator/SL.AGR.EMPL.ZS/countries; [6] http://www.gmo-compass.org/eng/agri_biotechnology/gmo_planting/257.global_gm_planting_2013.html; [7] http://data.worldbank.org/indicator/AG.CON.FERT.ZS/countries; [8] http://data.worldbank.org/indicator/AG.LND.CROP.ZS/countries; [9] http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS/countries; [10] http://faostat3.fao.org/faostat-gateway/go/to/home/E; [11] http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ40-eng.htm; [12] http://www.fao.org/nr/water/aquastat/main/index.stm; [13] http://www.cropwatch.com.cn/htm/en/bulletin32.shtml; [14] http://www.customs.gov.cn/publish/portal0/tab49667/info730492.htm.

Relative share of major agricultural product categories

The four countries differ markedly in the relative importance of their crops and animal production (figure 5.4). For the purpose of this graph, all animal products were grouped, including meat (poultry, cattle, and pork), milk, and eggs. Sugar beet (only in the United States) and sugar cane (all countries except Canada)

were grouped as sugar crops; the United States produces about equal amounts of both. Other cereals include oats and barley in Canada and rice in China. Potatoes include both white (Irish) potatoes and sweet potatoes, which constitute a major crop only in China.

Figure 5.4. Relative importance of major agricultural products in terms of quantity



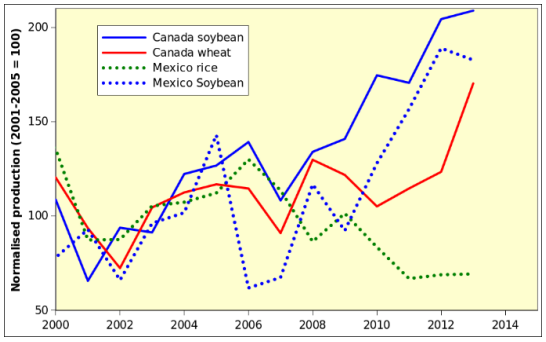
Note: The figure is based on the 10 major products for each country, with products organized in 9 categories.
Source: Based on FAOSTAT data.

The most balanced and probably least vulnerable situation as far as domestic production is concerned occurs in China, where the relative importance of different product categories is comparable. In the United States and particularly in Mexico, one crop—either maize (in the United States) or sugar cane (Mexico) dominates the scene. Other remarkable features include (i) the large and growing importance of soybean in Canada and the United States, much of which (40%) is exported to China (table 5.3); and (ii) the importance of rapeseed, oats, and barley in Canada. Rapeseed in particular is better adapted to local environmental conditions than soybeans.

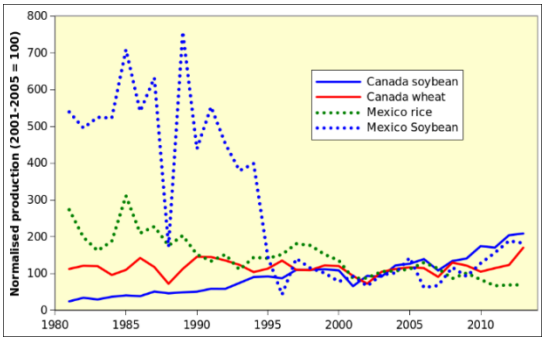
Trends

Several noteworthy trends have affected North American crop production during the first years of the 21st century, including (i) a decrease in rice production in Mexico (-21%) and the United States (-4%) and (ii) an overall systematic increase of maize, wheat, and soybean production usually exceeding 20%. Examples of the latter are maize production in the United States (21%) and Canada (29%), wheat in Mexico (26%) and Canada (27%), and—with the most spectacular increases—soybeans in Mexico (44%) and Canada (72%), to feed an apparently insatiable regional and international market. Figure 5.5b further compares the recent trend against longer trends, confirming that the drop in rice in Mexico has been ongoing for thirty years, but that the increase in soybeans is just a recovery from a 1980-95 soybean crash.

Figure 5.5. Recent (a) and long-term (b) trends in soybean, rice, and wheat production in North America



(a)



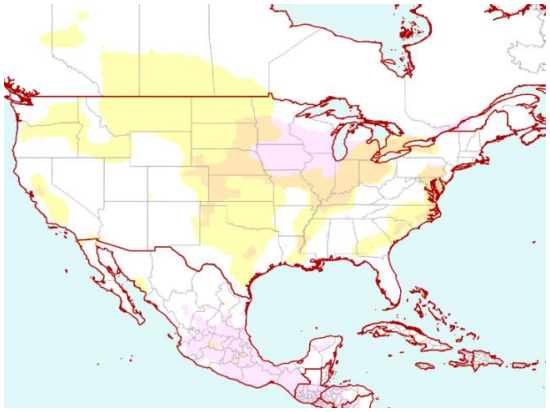
(b)

Note: Trends are normalized against 2001-2005 production averages.
Source: Based on FAOSTAT data.

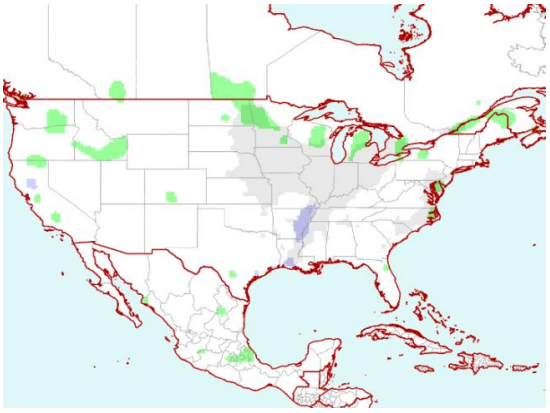
Country overviews

Figure 5.6 illustrates the distribution of crops production areas in North America. Canada is particularly interesting because the current distribution results from the interaction of severe winter conditions and generally cool temperatures (compared with the United States and Mexico), but also from the fact that the development of early varieties has allowed the expansion of soybean at higher latitudes. This was paralleled by a reduction of farmland (about 6% since the 1980s), a reduction in the number of farms, and an increase in farm size, which reached an average of 315 ha per farm in 2011.

Figure 5.6. Approximate distribution of main cereal, soybean, and potato production areas in North America



(a)



(b)

Note: Figure a (left) illustrates wheat (yellow) and maize (red) production areas; figure b shows soybean (grey), potatoes (green), and rice (blue).
Source: Maps based on JRC crop masks.

Canada

In Canada, the south of Ontario is the country's largest maize production area (62% of maize land in 2011 with an average farm size of 51 ha), although its relative share in total maize land is decreasing. South Quebec (30% of maize land and 65 ha per farm) represents the second largest area, which an increasing share in maize land. Due to the cooler climate, Manitoba has only 6% of the national maize areas (average farm size is 120 ha), but its maize area is expanding. Under normal climatic conditions, only 2% of crop water requirements are supplied by irrigation; maize irrigation is concentrated in the prairies in western Canada (South Alberta, Saskatchewan, and west Manitoba) where the water is provided by many small dams.

The prairies also account for 80% of wheat areas and constitute the major production centers for rapeseed (canola) and cattle. Soybeans are grown in Prince Edward Island, Quebec, Ontario, Manitoba,

and Alberta. The crop has been permanently expanding since the 1980s—when it was still largely confined to southern Ontario (figure 5.6(b))—and it seems to be exploding now; the largest share of production comes from Ontario, and more than half of the production is being exported. Most soybeans are still cultivated in eastern Canada (sometimes occupying more than half of the cropland), but the crop is gaining ground in the Prairies where its share of farmland still stays below 10%. The ratio of GMO to non-GM is about 60/40, with organic soybean for export making up about 1%.

About 50% of Canadian wheat is produced in Saskatchewan, followed by Alberta and Manitoba. Winter wheat (mostly grown in western Canada) represents only a very small fraction (1%) of the total wheat area.

United States

Crop distribution in the United States is mostly contiguous with the pattern noted for Canada, but relatively fewer changes have taken place. The main maize producing areas in the country belong to the Corn Belt, where a flat landscape and favorable maize climate prevail south and east of the Great Lakes area. The main maize producing states include Iowa, Illinois, Nebraska, and Minnesota, together accounting for about half the country's production. Other important states include Indiana, Ohio, southern Michigan, Kansas, and Missouri, and, to a lesser extent, South Dakota, North Dakota, Wisconsin, and Kentucky. Powerful farmers' organizations are a main feature of maize farming in the United States.

The production areas of soybean in the United States largely overlap with those of maize, maybe with a slightly more southern distribution because of climatic reasons. The major producers are Illinois, Iowa, Minnesota, Indiana, and Ohio.

Of wheat, 75% is winter wheat, which usually comes under the names of hard or soft and red or white wheat, with hard red winter wheat being the most common type (constituting about 45% of all wheat produced in the country). This wheat is mostly cultivated in Kansas, Colorado, Oklahoma, and Texas. Other winter wheat types come from Arkansas, Illinois, Indiana, North Carolina, Ohio, Oregon, southern Idaho, Tennessee, and Washington. Spring wheat (hard red spring wheat and durum) mostly come from South Dakota, Montana, Wisconsin, North and South Dakota, and Montana (figure 5.6(a)).

Most trends affecting Canadian farming also occur in the United States, including the very low share of agricultural population, the explosion of soybeans, and the general growth of yields and exports. In 2010, the United States had 1.2 million farmers and 0.8 million farm workers (compare with table 5.3). Much land that used to run as small family farms has now been leased to large companies (such as for example Archer-Daniels Midland, ADM) that have come to run much of American agriculture on leased and rented land, a trend that was very marked between 2002 and 2007, but has slowed down since then. As a result of this trend, four companies for example are operating four-fifths of the U.S. beef market.

The explosion in soybean production started during the first half of the 20th century. The United States has been the world's largest soybean producer since 1942, after representing just 3% of production in 1930. By the mid-1970s, the value of exported soybean exceeded that of maize and wheat. Globally, about 80% of soybean is genetically modified; for maize this number is 32%.

Maize plays a central role in a U.S. Department of Energy strategy to use the crop to provide 5% of the U.S. energy supply by 2020, compared to its 1% contribution today. In 2013, U.S. maize is used in about equal proportions for feed (38%) and ethanol and by-products (35%). In addition, 7% of the production goes to stocks, 10% to exports, and 10% to food (including starch and popcorn). Only 1% is used for direct human consumption, mostly as breakfast cereals. This figure is almost identical with maize consumption in Canada, which is currently about 3 kg/person per year, down from about 4 kg/person per year in 1970. The use of 35% of maize for methanol represents a steep increase over the share of 3% in the 1990s.

Mexico

The bulk (80%) of Mexican wheat production originates in four states (Sonora, Baja California, Guanajuato, and Sinaloa), while just three more (Michoacán, Chihuahua, and Jalisco) account for 90%. In these states, 92% of production is irrigated, and all states are located in west and north-west Mexico. For soybean, 80% of the crop comes from the three states of Tamaulipas, San Luis Potosí, and Campeche in eastern Mexico, bordering the Gulf of Mexico near the U.S. border and western Yucatan.

Soybean has an interesting history in Mexico (Figure 5.5(b)); cultivated area fell from just under 500,000 ha in the mid and late 1980s to 50,000 in 2006, after which it increased again to reach about 160,000 ha today. This is because soybeans, cultivated as a spring-summer crop, constituted a reservoir of silverleaf whitefly, which would then damage the vegetables that were widely cultivated as fall-winter crops to supply the North American market during winter. As vegetables constitute a major source of income, soybean, as well as cotton, were banned.

Maize is cultivated on about 60% of Mexico's cropland. The major maize producing area (Sinaloa, 15% of production and located on the southeastern Bay of California) is mostly irrigated. Virtually all other states grow the crop under rainfed conditions. In fact, in the ten states that produce 80% of the national maize output the average irrigation density is 16%. These states include, in order of decreasing output: Jalisco, Michoacán, México, Guanajuato, and Chihuahua, which borders Texas and New Mexico and has the second highest level of irrigation (50%) after Sinaloa, Guerrero, Veracruz, Chiapas and Puebla. Most states (except Chihuahua) are located in the south of Mexico (see figure 5.6(a)) and grow maize as a summer crop from June to October.

Interestingly, Mexico is the place of origin of maize, but it has become, over the years, one of the main maize importers. Maize provides about 10% of human calorie and protein intake and the country is self-sufficient for maize as far as human consumption is concerned. About half of maize imports are used for animal feeds.

NAFTA, the North American Free Trade Agreement, provides Mexico an easy access to the U.S. and Canadian markets for some products such as vegetables, fruits (mostly tomatoes and avocados[4]), fruit juices, and flowers, especially in winter.

5.4 El Niño

El Niño continued to strengthen during this monitoring season. Figure 5.7 illustrates the behavior of the Southern Oscillation Index (SOI) of the Australian Bureau of Meteorology (BOM) from July 2014 to July 2015. Sustained negative values of SOI below -7 may indicate an EI Niño event, while sustained positive values above +7 are typical of La Niña. Values within the range (-7 to +7) indicate neutral conditions.

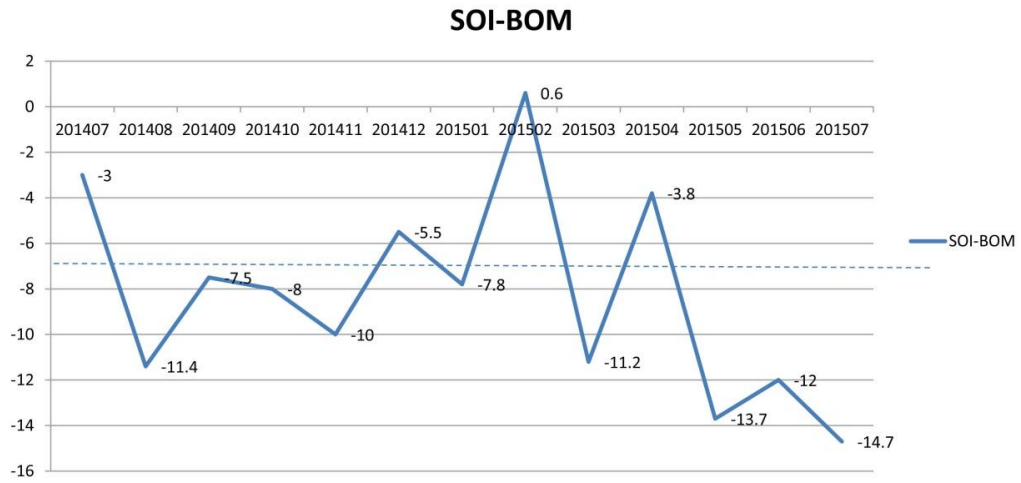
As shown in the figure, the SOI value remained negative throughout the past 12 months, except for a positive value of +0.6 in February 2015; this positive value, however, was immediately followed by a decrease in the SOI, with a large negative value of -14.7 in July. Considering the consistently strong negative values of the SOI and tropical Pacific Ocean temperatures over El Niño thresholds, the status of the ENSO Tracker at the BOM is raised to “Continue to Strengthen” as of July 2015. The BOM also reported that it may not even weaken until the end of this year.

Over the reporting period, EI Niño-induced extreme weather conditions happened worldwide. In April, rainfall in Australia decreased by 50%-80%, compared to the same period of past year. In May, 8 provinces in the Philippines and California suffered from severe drought. The heat wave in India has led

[4] After the U.S. lifted an 80-year ban on the import of Mexican avocadoes in 1997.

to 2000 deaths. In June to August, Thailand experienced its most severe drought in 10 years, while in July the middle and western parts of America suffered from heavy rainstorms. Section 5.2 includes a more comprehensive list of abnormal conditions across the world, and CropWatch will keep a close look at EI Niño conditions in the coming months.

Figure 5.7. Monthly SOI time series from July 2014 to July 2015



Source: Australian Bureau of Meteorology (http://www.bom.gov.au/climate/glossary/soi.shtml).