

THE 2008 HURRICANE SEASON AND ITS IMPACT ON CUBAN AGRICULTURE AND TRADE

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In 2008 Cuba experienced its most destructive hurricane season in recorded history. Three major hurricanes and a tropical storm impacted the island in less than a month early in the season, and another hurricane raked across the island later in the season. This paper summarizes information published in an earlier report on the damages to Cuba's agricultural sector caused by these storms.¹ It goes on to examine the impact of the storms on Cuba's overall agricultural output in 2008, and assess their influence on Cuba's imports of food and agricultural products for the year.

THE STORMS

During the 2008 hurricane season, the island nation of Cuba was struck by one tropical storm and three major hurricanes, and eastern portions of the country were impacted by a second tropical storm (Figure 1). Four of these storms struck in a period of only three weeks, between August 16 and September 9, 2008.

Hurricanes typically move through the Caribbean with a fairly strong northern vector, so when they strike Cuba, they generally move across Cuba's narrow width and thus their impacts tend to be isolated to a fairly narrow swath. 2008 was unique in that two of the storms did not have this characteristic northern vector to their movement, instead moving from east to

west along the length of the island. The first storm of the season followed this pattern.

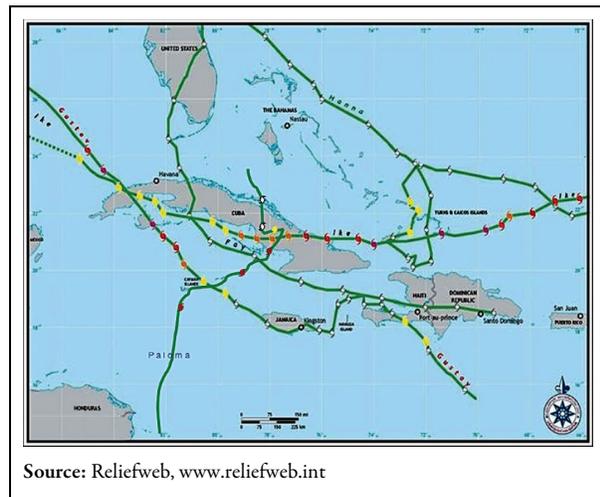
Tropical Storm Fay

On August 16 and 17, Tropical Storm Fay approached Cuba from the east, traveling in a westerly direction just offshore along the southern shoreline of Cuba. On August 18, the storm turned to the north and moved ashore near the Bay of Pigs with winds of 66 mph. It moved slowly across the island, dumping up to 18 inches of rain in some areas. The storm moved offshore near Cárdenas on August 18. Heaviest rains and winds were concentrated on the eastern side of the storm, sparing the City of Havana from the worst weather conditions.

Damage to agriculture from Tropical Storm Fay was primarily concentrated in a narrow swath along and to the east of the storm's path across western Cuba. Much of the damage was caused by flooding from heavy rains associated with the storm. There was, however, notable damage from wind to one of Cuba's main citrus producing areas in Jagüey Grande (the largest contiguous citrus planting in the world), where it was reported that significant volumes of ripe citrus fruit were knocked off of trees, and the groves experienced some broken tree branches and even some tree uprootings.

1. It is difficult to assess the full impact of storms that strike Cuba for a number of reasons. After major storms, Cuba's electrical and communications systems are typically disrupted so reports that reach the press or other government agencies for dissemination are limited. Furthermore, the Cuban government and the Cuban people are more interested in recovery than in tallying losses. For these reasons, reports of specific damages and losses are spotty at best. A report published in October of 2008, Messina, Royce and Spreen (2008), attempted to document the damages to the extent possible.

Figure 1. Hurricanes and Tropical Storms Impacting Cuba in 2008



Hurricane Gustav

On August 30, Hurricane Gustav struck the Isle of Youth as a Category 4 hurricane, with sustained wind speeds of 145 mph. After moving across the Isle of Youth, the hurricane struck the Cuban mainland south of Los Palacios, in Pinar del Río Province, traveling in a northwesterly direction and moving offshore near La Esperanza. Recorded wind gusts from this storm reportedly reached 212 mph, the highest winds ever recorded in Cuba.

Heavy winds and rains nearly wiped out agriculture on the Isle of Youth, the majority of which was for the local market. The entire citrus crop was essentially knocked from the trees by the heavy winds or the trees were uprooted, and because of extensive damage to juice processing facilities on the island, it was not possible to recover any of the citrus fruit. (In some instances, ripe citrus fruit that is knocked from the trees can be salvaged if, within a few days, the fruit can be collected and brought to a processing facility for juicing.) The Cuban government reported that 80% of the poultry production on the Isle of Youth was damaged or destroyed.

On the Cuban mainland, the government reported the loss of 25,900 metric tons of agricultural crops on 55,700 hectares of land; 1,200 metric tons of agricultural crops were reported to have been damaged and 4,355 tons of stored food were damaged or destroyed.

Rice in the field in the impacted region was severely damaged from extensive flooding. The hurricane caused extensive damage to the rice processing facility at Los Palacios and one quarter of the rice stocks at this facility were lost when a storage silo roof was blown off.

Pinar del Río is Cuba's most important tobacco producing region, responsible for nearly 90% of Cuba's total production (*Sector Agropecuario. Principales Indicadores. Enero-Julio 2009*). The tobacco industry in this important production region suffered extensive damage with widespread reports of loss and damage to stored tobacco and infrastructure. Severe flooding caused damage to the fields, and storm winds reportedly destroyed 3,414 tobacco curing barns while another 1,590 barns were damaged. These losses will directly impact Cuba's tobacco and cigar exports, which generate important hard currency earnings for the nation.

As was the case on the Isle of Youth, the citrus industry in Pinar del Río province suffered extensive damage. Almost all of the citrus fruit was knocked off of the trees by the wind and a large proportion of the citrus trees suffered broken branches or complete destruction. Damage to juice processing facilities in the region was also reported to be significant.

Major damage to the poultry industry in the western portion of the mainland was also reported. Given that the hurricane hit just as the coffee crop was ripening and ready for harvest, damage to the crop was very high, as the ripe berries were knocked from the branches by the high winds.

Hurricane Ike

On September 8, Hurricane Ike struck the northern coast of eastern Cuba at Punta Lucrecia as a Category 3 storm (winds between 111 and 130 mph), bringing torrential rains and a particularly strong storm surge with 20 foot waves. The path of Hurricane Ike was even more remarkable than that of Tropical Storm Fay, as it moved from east to west across Cuba's entire length, bringing hurricane force winds to about two thirds of the island and tropical storm force winds and torrential rains to the entire Cuban archipelago (Figure 2).

Even though the eye of the storm passed offshore in central Cuba, this path allowed the northeastern quadrant of the storm, which contained the strongest winds and the heaviest rains, to travel squarely over the island, bringing hurricane-force winds and torrential rain to all of central Cuba. When the storm came back onshore on September 9, it followed a path similar to that of Hurricane Gustav, causing even more damage in Pinar del Río province. It should be noted that Hurricane Ike was a very large storm. Three days after moving away from Cuba, on September 12, as the hurricane was preparing to strike the U.S. coast, satellite images clearly showed the outer bands of clouds and rain from Hurricane Ike still covering the western half of Cuba.

Hurricane Ike devastated much of Cuban agriculture with both its strong winds and heavy rains, with reports of 10 to 12 inches of rain common across the island. Up to 19 inches of rain were reported in some areas, and 15 inches of rain was reported in one area in Pinar del Río province in a 24 hour period. In addition to the flooding of rivers and creeks and accumulations of water in low-lying areas caused by these rains, 87 dams and reservoirs reportedly overflowed, causing erosion at the sites and flooding downstream of these structures.

Even though sugar is typically tolerant to storm-force wind and rain, the Cuban government reported that as much as 50% of the annual sugar crop would be lost as a result of Hurricane Ike. Damage to sugar mills, factories, warehouses, and railway facilities for moving sugar also was significant, and numerous railway bridges and roads to the mills were washed out. Widespread damage to rice fields from flooding was reported across the island, this at a time when the government has been attempting to boost rice output to reduce the need to import large volumes of rice.

The banana and plantain crops suffered severe damage with as much as 80% of the crop being lost in some regions of Cuba, and tree losses estimated to be in excess of 350,000 in the eastern provinces alone. Also in the eastern provinces, 10,000 hectares of vegetable and root crops were reportedly destroyed.

Cuba's coffee crop also suffered extensive damage across the island with 50% losses common in central

Cuba and nearly 100% losses in some eastern provinces. Because a large proportion of Cuba's coffee is exported on the premium market, crop losses will decrease Cuba's hard currency revenues from export.

Cuba's citrus crops begin to ripen in August, and it is expected that most of the ripe citrus fruit throughout the island was knocked off the trees, and many of the trees were damaged or destroyed by the heavy winds. Cuba's acting Minister of Agriculture reported that Hurricane Ike destroyed over 135,000 tons of fruit. Beyond the loss of fruit in the current season, tree damage detrimentally impacts future production as well. There is also the problem in Cuba of citrus greening (the bacterial disease Huanglongbing, or HLB, which is fatal to trees and for which there is no known cure); because of this disease, the long-term prospect for the Cuban citrus industry is uncertain, but hurricane winds undoubtedly result in the spread of this disease more broadly in Cuba.

Figure 2. Tropical Storm and Hurricane Wind History of Hurricane Ike, 2008



Although no specific reports are available, Cuba's citrus juice processing facilities in Jagüey Grande in western Matanzas province almost certainly sustained major damage from Hurricane Ike. The Cuban government reported that its large fruit processing facility in Ciego de Avila in central Cuba was severely damaged by the storm. These developments will detri-

mentally impact domestic fresh citrus fruit and citrus juice supplies as well as Cuba's fresh citrus and citrus juice concentrate export markets which will further reduce hard currency export earnings.

Heavy winds were reported to have caused extensive damage to poultry houses throughout the island. Over one-half million head of poultry were lost to the storm. Poultry feed supplies were seriously disrupted by the storms which will complicate the recovery of the industry. Losses of birds for meat and eggs will detrimentally impact the supply of these important sources of protein for the Cuban population.

Hurricane Paloma

Finally, on November 8 Hurricane Paloma came ashore in eastern Cuba, in Camagüey Province, as a category 3 hurricane with sustained wind speeds of 120 mph. The storm brought heavy rains but it dissipated quickly so damage was largely limited to flooding, although these floods were particularly problematic since they occurred in an area that was still attempting to recover from severe flooding from storms less than two months earlier.

PRODUCTION EFFECTS

Given Cuba's reported agricultural losses from the series of hurricanes and tropical storms in 2008, agricultural production for the year would be expected to be considerably lower than 2007 volumes. However, while all major crop categories reported decreases in production volumes for 2008, the expected high levels of loss are not reflected in Cuba's official agricultural production data (Table 1), particularly with respect to staple crops like viandas (roots and tubers), horticultural crops and rice.

There are a number of possible explanations for this, the most obvious of which are:

1. Cuba's reported agricultural losses due to the storms were overestimated and/or efforts to salvage damaged crops were particularly successful;
2. Cuba's 2008 agricultural production figures are inaccurate and too high;
3. Cuba's agricultural production levels for 2008 may have been tracking at significantly higher levels than 2007, in which case a comparison be-

tween 2007 and 2008 agricultural production figures would not be a relevant comparison; and

4. The 2008 harvest for some crops may have been largely completed when the storms struck, in which case the losses may not be fully realized until the 2009 season.

Table 1. Cuba's Agricultural Production, 2007 and 2008 (1,000 MT)

Crop	2007	2008	% change
Viandas	2,369	2,150	-9.2%
Horticultural crops	2,603	2,439	-6.3%
Rice	439	436	-0.7%
Corn	369	327	-11.4%
Tobacco	26	22	-15.4%
Citrus	469	392	-16.4%
Tropical Fruit	784	739	-5.7%

Source: *Anuario Estadístico de Cuba*, 2008 and 2009 issues.

This paper will go on to examine each of these possible explanations and will offer additional insights into the situation in Cuban agriculture following the 2008 storms. It should be noted that the joint research that the University of Florida has conducted with the University of Havana for the last 15 years has been constrained in recent years by a series of U.S. federal policies and state laws. As a result, our ability to collaborate with Cuban scientists to address these issues has been limited, so the following analysis is somewhat speculative in nature. Nevertheless, it hopefully will help to provide an improved sense of the present situation in Cuba's agricultural sector and its food supplies.

Possible Explanation #1:

Overestimated Losses and/or Salvage?

The high levels of reported agricultural losses from the storms summarized here and documented in additional detail in the report referenced earlier in this paper are consistent with what could be expected from such a series of storms striking Florida or elsewhere in the Caribbean and Central America. Therefore, overestimated losses seem to be an improbable explanation for the relatively small differences between 2007 and 2008 production volumes. And while some crops damaged by the storms were undoubtedly salvaged, most of these crops are highly perishable so it would seem unlikely that the salvage volumes were particularly significant.

Possible Explanation #2:**Over-Reported Production in 2008?**

Experience working with Cuban data over the past 15 years suggests that the Cuban government generally attempts to report its agricultural production data accurately, to the extent that its data collection procedures permit. It is acknowledged that official data sources do not seem to capture all of the volumes of production from private farmers, from self-provisioning plots on cooperatives and state farms, over-quota production sold in the Mercados Agropecuarios (MAs) and barter exchanges. Nevertheless, there is little to suggest that the Cuban government has been any less consistent in its data collection methods and reporting for agricultural production for 2008 than in previous years. In fact, if the Cuban government was attempting to manipulate its agricultural production figures for 2008, they would have had more incentive to under report than over report in an effort to improve its chances to obtain outside aid and assistance, to gain international sympathy for its situation, and to further decry the U.S. embargo and the damage they claim it inflicts on the Cuban economy.

Possible Explanation #3: 2008 Would Have Been a Better Production Year than 2007?

While the Cuban government and Raúl Castro have been emphasizing the goal of increasing agricultural production for a number of years, there is little evidence to suggest that 2008 agricultural production volumes would have been significantly higher than 2007 figures had the storms not struck. Despite the announcement by the Cuban government over the past 18 months of a number of agricultural policy changes, few if any have been implemented to any significant degree.

Possible Explanation #4: Issues Across Crop Years?

This appears to offer a more plausible reason for Cuba's 2008 reported agricultural production levels being higher than anticipated following the storms. For example, for perennial and tree crops, with respect to which the majority of the harvest takes place in the spring, the 2008 harvest was largely complete before

hurricane season began. Therefore, the impact of the summer hurricanes and tropical storms will not be fully realized until the spring harvest the next season. In September of 2009, perhaps in an effort to document this, the Cuban government published a detailed report on Cuban agricultural production for the first seven months of calendar year 2009 with comparative data for the same period for 2008 (*Sector Agropecuario. Principales Indicadores. Enero-Julio 2009*).²

The data in this recent report does reflect decreases in agricultural output for a number of crops for the first seven months of 2009, as compared to the same period in 2008 (Table 2). In some cases these decreases were quite substantial while other crops actually showed increases for 2009.

Table 2. Cuban Agricultural Production by volume, selected crops January through July of 2008 and 2009 (1,000 MT except where otherwise noted)

Crop	Jan. – July 2008	Jan. – July 2009	% change 2009 to 08
Viandas	1,024	891	-13.0%
Horticultural crops	1,093	1,141	+ 4.4%
Rice	85	98	+15.3%
Corn	110	83	-24.5%
Tobacco ^a	88*	26*	-70.1%
Citrus	428	234	-45.3%
Tropical Fruit	261	202	-22.6%

Source: Sector Agropecuario. Principales Indicadores. Enero-Julio 2009.

a. Data for tobacco in this data series was reported in millions of “cujes.” “Cujes” are wooden bars to which the newly harvested tobacco leaves are secured for hanging in curing barns. No factor was found to convert from “cujes” to metric tons so the data in this table for tobacco cannot be compared to the data in Table 1.

The largest production loss on a percentage basis was in tobacco with a 70% decrease for the first seven months of 2009 as compared to the same period for 2008. However, these losses should not be fully attributed to the 2008 storms, as the Cuban government and Cuban press indicate that tobacco acreage planted in 2009 is down between 30% and 40% from 2008 because of the global recession and input shortages re-

2. The author is not aware of any comprehensive, detailed, mid-year statistical report on agriculture ever being prepared and released previously by the Government of Cuba.

sulting from the economic challenges being faced by the Cuban government.

Citrus and tropical fruit production volumes for the first seven months of 2009 decreased notably (45.3% and 22.6% respectively), which would be expected from the reported tree damage. Also, a portion of the decline in citrus production could be due to the bacterial disease citrus greening (mentioned previously), which citrus industries in several parts of the world are struggling to control. Corn production decreased by 24.5% over the period, and production of viandas also decreased by 13%, which likely reflects storm damage and losses from severe flooding of fields.

Production of horticultural crops and rice actually showed increases in the year-to-date comparisons between 2008 and 2009, with production volumes expanding by 4.4% and 15.3%, respectively. This increase in rice production more than offsets losses experienced in 2008 from 2007.

TRADE EFFECTS

2008 was a record year for U.S. food and agricultural exports to Cuba, with the value of Cuban purchases from the United States increasing by more than 60% from 2007 to a total of over \$691 million (Table 3). As has been the case since 2004, the United States was once again Cuba's largest supplier of food and agricultural imports in 2008, providing approximately one third of Cuba's total food and agricultural product import requirements.

Table 3. Value of Cuba's Food and Agricultural Purchases from the United States, 2007 and 2008

	Total (\$ million)
2008	\$691.1
2007	\$431.2
% Change	60.3%

Source: U.S. Department of Agriculture, U.S. Trade Internet System.

An initial supposition might be that this dramatic increase in imports from the United States in 2008 was the Cuban government's response to crop losses and damage from the hurricanes as it attempted to replace these lost food supplies. The United States represents a particularly good source of imports of food and agricultural products for Cuba in emergency situations be-

cause of its ability to deliver goods rapidly due to its geographic proximity, and with freight rates that are reasonable even for smaller volume shipments (U.S. cash payment requirements notwithstanding). However, a careful analysis of the trade data shows that this is not the case.

The first issue to consider is that commodity prices increased substantially between 2007 and 2008, so a large proportion of the increase in the value of Cuba's food and agricultural purchases from the United States in 2008 was the result of price increases rather than volume increases. An aggregated analysis of Cuba's purchases from the United States shows that U.S. export volumes increased by about 11% between 2007 and 2008, with the balance of the increase being the result of commodity price increases.

But beyond that, an examination of Cuba's purchases of food and agricultural products from the United States pre- and post-hurricane season offers an interesting observation; Cuba's purchases from the United States actually fell on a volume basis from September to December of 2008 (after the hurricanes), with all of the growth in purchasing volumes for 2008 taking place during the first eight months of the year (Table 4).

Table 4. Volume of Cuba's Food and Agricultural Purchases from the United States, 2007 and 2008

	Total Volume (1,000 MT)	January to August (1,000 MT)	September to December (1,000 MT)
2008	1,738	1,212	527
2007	1,570	940	630
% Change	10.7%	28.9%	-16.3%

Source: U.S. Department of Agriculture, U.S. Trade Internet System.

In terms of more current assessments of trade flows, the value of U.S. food and agricultural exports to Cuba for the first eight months of 2009 are about 18% lower than for the same period in 2008 (Table 5). This is in contrast to announcements by Cuban government officials at the recent International Trade Fair in Havana that the value of Cuban food and agricultural product purchases from the United States this year will be about one-third lower than in 2008. Press reports also indicate that the Cuban government plans to decrease its overall imports by about one-third for 2009 in re-

sponse to the economic pressures from the global recession.

Table 5. Value of Cuba's Food and Agricultural Purchases from the United States, January to August 2008 and 2009

	Million \$
January to August 2009	\$380
January to August 2008	\$463
% Change	- 17.9%

Source: U.S. Department of Agriculture, U.S. Trade Internet System.

UNCERTAINTY IN CUBAN AGRICULTURE

The theme of this year's ASCE conference is "Cuba in a World of Uncertainty." In these economic times, nations and individuals around the globe face more uncertainty on a day-to-day basis than at any time since the Great Depression some 80 years ago.

In many respects, uncertainty has been a way of life for the Cuban people for the past 20 years since the fall of the Berlin Wall and the dissolution of the former Soviet Union. But in the midst of all of this uncertainty, one of the most consistent and resounding themes of the Cuban government since the early 1990s, and particularly since Raúl Castro assumed the leadership role from his brother, has been the critical need to stimulate agricultural production to replace food and agricultural imports. Toward that end, within the last 18 months in particular, numerous new policies and procedures for agriculture have been announced including:

- Programs to distribute unused land to small holders;
- Opening of stores to sell agricultural inputs;
- Decentralization of decision making for agricultural planning;
- Increased prices paid by *Acopio* for selected commodities; and
- Increased speed of payments to farmers by the government.

These represent a good start for the oft-stated strategic objective of the Cuban government to reinvigorate its agricultural sector, so one might expect agricultural producers in Cuba to be feeling more confident about the direction of agricultural policy, leaving the main

source of uncertainty in agriculture to be hurricanes, tropical storms and other weather patterns. However, despite the aforementioned new policies, the Cuban government's commitment and/or its ability to effectively implement these policy changes remain in question. Indeed, earlier this year an economist in Cuba described Cuba's agricultural system as being "in crisis . . . The current system is an inefficient mishmash [with] no one knowing from one year to the next what to expect in terms of government policies or supplies" (Burbach).

In light of these considerations, an argument can be made that Cuba's central planning and policy making is just as uncertain as the weather. But even weather patterns cooperate sometimes, while there appears to be no break in sight with regard to the damaging effects of Cuba's misguided agricultural policies, and this may be even more damaging to the long term prospects for Cuban agriculture than hurricanes.

CONCLUDING THOUGHTS

Following the devastating hurricanes and tropical storms of 2008, the 2009 hurricane season has been kind to Cuba and indeed to all of the Caribbean Basin. The agricultural production figures for Cuba for the first seven months of 2009 show some signs of improvement, but there is little evidence to suggest that there have been enough meaningful changes in agricultural policy and practice to expect a major resurgence of agricultural output for the balance of the year and the spring of 2010, even following this year's mild hurricane season.

There are other troubling trends. Cuban government officials have stated publicly that Cuba is importing over 80% of the food supply for the Cuban people, and yet the government has announced its intention to decrease its food imports in 2009. With domestic agricultural supplies relatively stagnant, a question that looms large is where are the food supplies to feed the people going to come from?

In the late 1990s, the Cuban government acknowledged that the government food ration stores were only able to provide about two thirds of the caloric requirements of the Cuban people, with the balance being provided via the MAs and other sources outside of the ration system. There is little to suggest that this

proportion has improved appreciably, so food supplies provided outside of the ration system continue to play an important role in feeding the population. Part of the reason for the success of the MAs and other networks for food sales outside of the ration system is their quasi-market orientation. The Cuban government's recent (October 2009) indication that it will become more heavily involved in food distribution outside of the ration system may be an acknowledgment of its desire to control this important segment of Cuba's food supply and distribution system—a move which would almost certainly destroy the dynamic, market-oriented nature of these food distribution entities, which has been such a critical element of their success.

But at the same time that the Cuban government is signaling its intention to exert *more* control over the MAs, it is giving indications that it is seeking to *extri-*

cate itself from the task of ensuring basic nutrition by a series of decisions, including: eliminating subsidized meals at workplaces; removing of potatoes and peas from the ration stores; and allowing the publication of an editorial in *Granma* discussing the possible elimination of the ration book altogether. At the extreme, it could be argued that such decisions are abrogating the revolutionary government's historical obligation to provide basic nutrition for all citizens. But at the very least, they clearly add further uncertainty with regard to the future structure and function of Cuba's agricultural and food systems.

These developments certainly suggest that there are changes ahead for Cuban agriculture as well as for food supply and distribution mechanisms. A more foreboding consideration is that a food crisis in Cuba may well be looming.

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