

THE EVOLUTION OF CUBA'S MINERAL FERTILIZER USAGE: A SIXTY YEAR RETROSPECTIVE

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With over 15 million acres of arable land (*Anuario Estadístico de Cuba*), a tropical/sub-tropical climate, some of the best soils of any tropical country in the world (Sánchez), and a long, historical agricultural tradition, Cuba has very significant agricultural production potential. This is why it was so stunning when, in 2007, a Cuban government official reported that Cuba was importing over 84% of its basic food supply (“Necesita economía cubana”). Although the actual percentage has been debated by economists and analysts both within Cuba and from outside of the island, even the lowest estimates are around 60%—still a large proportion for a country with Cuba's agricultural potential.

This situation is a function of many factors, not the least of which is almost two centuries of heavy emphasis on sugar production for export. The strong focus on sugar was a rational economic decision because, for most of this period, Cuba received high prices for its sugar exports either on world markets or through preferential trading arrangements. And sugar exports have historically been a pivotal part of the Cuban economy—for much of the 19th century and all but the last decade of the 20th century, they generated approximately 80% of Cuba's total export earnings.

By the late 1980s, Cuba was producing well over 8 million metric tons of sugar per year, which made it the third largest sugar producer in the world behind Brazil and India (both much larger countries). However, Brazil and India both consume most of the sugar that they produce domestically, so Cuba was the

largest sugar exporter in the world at that time, shipping more than twice the volume of the second largest exporter, Australia (FAOSTAT).

Through the 1980s, approximately 10% of Cuba's sugar production was consumed domestically, with the balance of 90% being primarily exported to the former Soviet Union and the countries of the Eastern Bloc at prices which, at times, were nearly 11 times as high as the world sugar price (Bain 2005). In fact, the Cuban economy became even more heavily reliant on these sugar exports in the late 1980s, when they provided about 85% of Cuba's total export earnings. The revenues generated by these exports were used to import the necessary food supplies, along with other inputs that were essential for the functioning of the Cuban economy, including inputs for the sugar industry itself.

SHIFTING IMPORT PATTERNS FOR FERTILIZERS AND AGRICHEMICALS

Following the Cuban Revolution in 1959, Cuban government planners consolidated the vast majority of agricultural production into large State farms (Alvarez and Messina 1992, and Forster 1989). By the mid-1960s, Cuba had shifted its reliance on the U.S. as its primary sugar export market to the Soviet Union. Most of the agricultural inputs (fertilizers and agrichemicals, as well as agricultural equipment and spare parts, fuel oil and animal feed) that Cuba required for its sugar industry and agricultural sector were now imported from the Soviet Union.

Between 1958 and 1989, Cuba's fertilizer and raw fertilizer imports increased by nearly 1,200% by vol-

ume¹¹ (i.e., almost a 13-fold increase), from 124,000 metric tons to over 1.6 million metric tons (Table 1). Similarly, in the early years following the 1959 Revolution, Cuba's imports of agrichemicals also increased significantly (a topic for a separate paper).

Table 1. Cuban Fertilizer Import Volumes, 1958, 1989 and 2016 (metric tons)

	1958	1989	2016
FERTILIZERS (SITC chapter 56)			
Ammonium nitrate	193	0	0
Urea	552	351,000	61,390
Simple super-phosphate	39,243	311,000	a
Triple super-phosphate	a	26,000	a
Ammonium sulfate	53,189	272,000	18,331
Potassium chloride	9,781	394,000	23,320
Potassium sulfate	9,713	20,000	343
RAW FERTILIZERS (SITC chapter 27)			
Anhydrous ammonia	a	73,000	a
Sulfur	10,987	154,191	219,758

Source: *Anuario Estadístico de Cuba*, various issues.

a. data not available

Given the heavy emphasis on the production of sugar to sell to the Soviet Union, the vast proportion of these inputs was destined for use in the sugar industry. In the late 1980s, Cuba produced about 23% of its compound fertilizer (NPK) requirements, but Cuban data show a precipitous decline in fertilizer production after 1989, which is consistent with declines throughout Cuba's manufacturing sector as a result of the economic crisis brought on by the loss of preferential trading relationships with the former Soviet Union (FAO and *Anuario Estadístico de Cuba*).

However, the high, preferential prices Cuba was receiving from the Soviet Union for its sugar exports had permitted the Cuban sugar industry to develop into a relatively inefficient producer, with production costs far in excess of those of most major world sugar producers. Because of Cuba's inefficient production systems, with the fall of the Berlin Wall (1989) and the dissolution of the Soviet Union (1991), Cuba lost its preferential sugar export markets and could not compete selling sugar at world market prices.

Without the high prices for its sugar exports, Cuba could no longer afford to import the many inputs upon which their sugar industry was so reliant. Together, these factors signaled the end of the reign of sugar as the dominant sector of the Cuban economy, and sugar production levels began a precipitous decline until the 2010/11 season, when Cuba's sugar production bottomed out at 1.1 million metric tons—only about 13% of production volumes from the late 1980s, and the lowest level in a nearly a century.

Furthermore, without the revenues from sugar sales to the Soviet Union, Cuba was crucially constrained in its ability to purchase the necessary inputs critical to all sectors of the economy. This sent the Cuban economy into a tailspin, introducing a period of austerity that Cuban President Fidel Castro euphemistically described as the “Special Period in Peacetime” (*Periodo Especial en Tiempos de Paz*), often simply referred to as the “Special Period.”

The Cuban government did not report imports in 2016 of several of the fertilizer product categories for which it reported imports in 1989; this may be because they no longer import some of the items, or perhaps the import volumes are so small as to be negligible. Nevertheless, for those that are reported, a steeply declining trend is apparent, with import volumes of nearly all items falling significantly, some even below even the 1958 levels.

The one exception to these sharp declines is for sulfur imports, which show an increase of nearly 43% between 1989 and 2016. However, Cuba's imported sulfur volumes for the decade from 2005 through 2014 averaged approximately 153,000 metric tons, or very close to the level of imports in 1989, so the sharp increase in sulfur import volumes began in 2015 and 2016. It also should be noted that sulfur is used in a wide range of industrial applications besides an input to the production of fertilizers.

1. The Cuban government also reports figures for the value of imports. However, the value figures are in Cuban pesos (*pesos nacionales* also referred to as *CUP\$*) and the Cuban peso is not a convertible currency. For that reason, the value figures are not included in this article.

The decline in Cuban fertilizer imports after 1989 is a function of several factors. Most importantly, as discussed previously, the Cuban sugar industry was steadily collapsing and eventually over 2.5 million acres of sugarcane land were taken out of production (*Anuario Estadístico de Cuba*). At the same time, the government did not have the internal capital to shift these lands to production of food for domestic consumption, and therefore the need for fertilizer for agriculture declined. Second, in the 1980s, Cuba had begun research to substitute natural fertilizers and biological inputs for synthetic fertilizers and agrichemicals. Following the loss of Soviet preferential trading relationships, this research took on an increasingly important role as a way to try to maintain agricultural production, making a virtue of necessity. The data are not available, however, to identify the degree to which domestically-produced natural fertilizers and biocontrols may have replaced synthetic fertilizers and agrichemicals.

U.S. FERTILIZER AND AGRICHEMICAL SALES TO CUBA

The Trade Sanctions Reform and Export Enhancement Act (TSRA) of 2000 allowed U.S. firms, for the first time in nearly 40 years, to sell food and agricultural products (and medicines) to Cuba. The legislation did contain some significant constraints to sales, most notably, the provision that all sales had to be in cash. Nevertheless U.S. firms shipped nearly \$5.6 billion worth of food and agriculturally-related products to Cuba since 2000.

According to U.S. Department of Commerce data in the USA Trade Database, U.S. firms have shipped over \$9.6 million worth of fertilizer to Cuba since

2000, broken down as shown in Table 2. The U.S. Department of Commerce database, however, does not report export quantities, only values, so it is not possible to draw meaningful comparisons with the volume data reported by Cuba.

U.S. fertilizer exports to Cuba have been sporadic. Cuba purchased negligible amounts of fertilizers from the United States in 2002 but in 2004 it purchased \$1.2 million worth of fertilizers from U.S. suppliers. U.S. fertilizer sales increased steadily for the next two years and reached nearly \$2.5 million in 2006. Sales dropped to zero in 2007 and then jumped to over \$4 million in 2008. But Cuba has not purchased any fertilizer products from the United States since that year.

Until 2008, all U.S. fertilizer sales to Cuba fell under Harmonized System export classification Schedule B code 3100000000, Fertilizers and Fertilizer Materials. In 2008, however, nearly all of the sales were for Diammonium Hydrogenorthophosphate or DAP (Schedule B code 3105300000), with a small quantity of Animal/Vegetable Fertilizers (Schedule B code 3101000000).

Although Cuba does not report the countries from which it imports fertilizers, the Global Trade Atlas Database reports mirror data which provides some indication of Cuba's suppliers of these products. Thus, the vast majority of Cuban fertilizer imports come from a range of countries in Latin America and the Caribbean. EU countries are also regular though relatively minor suppliers of fertilizer products to Cuba. Cuba has also periodically imported fertilizers from countries in Asia, Africa and the Middle East.

Table 2. Cuban Imports of Fertilizers from the United States, Values, 2000 through 2017 (U.S. \$)

	2002	2004	2005	2006	2008
Fertilizers & Fertilizer Materials (Schedule B code 3100000000)	\$4,845	\$1,202,670	\$1,846,742	\$2,468,751	0
Animal/Vegetable Fertilizers, whether or not mixed together or chemically treated, Fertilizers produced by mixing/chemical treatment of Animal/Veg Products (Schedule B code 3101000000)	0	0	0	0	\$129,600
Diammonium Hydrogenorthophosphate—DAP (Schedule B code 3105300000)	0	0	0	0	\$3,953,292
Total	\$4,845	\$1,202,670	\$1,846,742	\$2,468,751	\$4,082,892

Source: USA Trade Database, U.S. Department of Commerce.

OF PARTICULAR INTEREST TO FLORIDA

Several other observations are worth making for Florida suppliers of fertilizers. According to the USA Trade Database, in 2004, 90% of the fertilizer exports from the United States to Cuba were made from the Port of Gramercy, New Orleans (Louisiana Customs District) and 10% from the port of Gulfport, Mississippi (Mobile Customs District) (Table 3). In 2005 there was a major shift in the source, with 92% of U.S. fertilizer exports to Cuba being shipped out of the Port of Tampa (Tampa Customs District) and only 8% from Gulfport. Tampa once again was the port of embarkation for over 90% of U.S. fertilizer exports to Cuba in 2006 with the balance being shipped from Port Everglades, Florida (Miami Customs District). Cuba did not import any fertilizer products from the United States in 2007 but shipping patterns shifted significantly again in 2008, with 97% of U.S. fertilizer exports to Cuba shipped from the port of New Orleans and only 3% shipped from Port Everglades. Cuba has not purchased any fertilizers from U.S. suppliers since 2008.

Table 3. U.S. Fertilizer Exports to Cuba by Port, 2004 through 2008 (percentages)

Port	2004	2005	2006	2007	2008
Port Everglades, FL (Miami district)			9%		3%
Gulfport, MS (Mobile district)	10%	8%			
Gramercy, LA (New Orleans district)	90%				
New Orleans, LA Port (New Orleans district)					97%
Tampa, FL Port (Tampa district)		92%	91%		
Total Value (thousand US \$)	\$1,203	\$1,847	\$2,469	0	\$4,083

Source: USA Trade Database, U.S. Department of Commerce

CONCLUDING OBSERVATIONS

Sales of U.S. food and agricultural products, fertilizers and agrichemical inputs to Cuba face a number of challenges, the most notable of which is the cash sale requirement included in the TSRA legislation. Although U.S.-Cuban diplomatic relations have been strained under the current U.S. Administration, U.S. sales of food products to Cuba have shown slow but

steady increases every year since 2015, so the diplomatic difficulties have not closed off the Cuban market for U.S. suppliers.

Several legislative initiatives have been developed/proposed that would allow credit sales to Cuba, but none of them have gotten much traction in either the U.S. House of Representatives or the Senate to this point.

It is important to be aware that the Cuban government maintains near-monopoly control over scarce fertilizer. As a result, given that distribution takes place according to government priorities rather than market criteria, plus the inefficiencies and material limitations of Cuba's system of central planning, farmers frequently complain that even the limited supplies of fertilizer that are available are not delivered on time and therefore are not applied when they need to be to maximize productivity. Also, since the Cuban government controls the supply of all agricultural chemicals, it can provide preferential access, by crop or farm, based on export potential, import substitution or other priorities that may or may not coincide with basic food production objectives.

Outside of the centrally planned fertilizer distribution system, there are a number of foreign joint investments in agriculture in Cuba and these foreign investors undoubtedly are providing money to purchase some portion of the fertilizers that Cuba imports. In these cases, the Cuban government must ensure that these imported supplies are delivered to the joint venture farms and operations that purchased them. These foreign investors are likely purchasing from fertilizer and agrichemical suppliers in their home countries or other countries where they can obtain credit rather than sourcing from U.S. suppliers and having to pay cash.

Clearly, there are many impediments to the smooth functioning of Cuba's agricultural input markets. That said, Cuba's command and control economy has one feature that may be beneficial for U.S. suppliers—there is a single Cuban government organization responsible for all fertilizer and agrichemical purchases from the United States, Empresa Cubana Importadora de Productos Químicos (QUIMIM-PORT). This is a distinct advantage for U.S. sellers

since they have a single point of contact for potential sales in what could otherwise be an overwhelmingly complex bureaucracy.

Cuba has made significant strides in the use of biological inputs, and more ecologically benign production methods. Such efforts are sometimes even referred to as “organic” agricultural production although that term is often used somewhat loosely in Cuba. Nevertheless Cuba clearly has earned the recognition it sometimes receives as the largest experiment in the world in organic/low-input agricultural production systems (Miller).

But all of this puts Cuba in a unique and awkward position. One of the government's oft stated and high priority goals is to increase its domestic food production to reduce the amount of money spent on food imports (which have been costing the government nearly \$2 billion per year for the past few years). Yet, despite the progress Cuba has made with biological controls and low-input agricultural production systems, yields for many horticultural crops

remain at perhaps 20% to 25% of commercial U.S. yields. Judicious use of synthetic fertilizer and agricultural inputs could rapidly and significantly increase Cuba's yields and output of food for domestic consumption, thus lowering the amount of outlays to import food. However, at least until now, Cuban policy makers have been reluctant to increase their purchases of these products.

Cuba represents a geographically close market that U.S. companies can supply with high quality fertilizers and agricultural inputs with rapid delivery and in relatively small economic order quantities. As Cuba attempts to increase its production of food products for domestic consumption, it is anticipated that use and import of chemical inputs will grow gradually. However, the restrictive cash sale terms that are required under U.S. law, coupled with recent, heightened diplomatic tensions between the United States and Cuba, are likely to represent challenges for U.S. firms to capitalize on these market opportunities.

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