



EXECUTIVE SUMMARY

**Smoke Screen:
The Hidden Story Behind
Biofuel Production**

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Smoke Screen: The Hidden Story Behind Biofuel Production

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Introduction

The current increase of monoculture sugar cane production for fuel purposes has led to an intense debate about its social and environmental impact, as well as issues about its future prospects. The report *Smoke Screen: The Hidden Story Behind Biofuel Production* seeks to analyze the ethanol production chain and to shed light on two aspects of the debate. The first of the two aspects is the impact of the territorial expansion of sugar cane production at the expense of food production. The debate around the threat to food security and sovereignty has gained particular relevance since what was referred to as the global food crisis in 2007, with the international price surge of basic agricultural commodities. The issue arose not only because of the increase in the use of sugar cane as automotive fuel, but primarily because of the use of corn in the United States for the same purposes. The issues around climate change are the second aspect of the debate. Contrary to the claims of governments and corporations that biofuels reduce carbon dioxide gas emissions, many institutions in the scientific community and the community at-large point out that various forms of emissions resulting from the process of ethanol production, such as burning the sugar cane fields, as well as the use of pesticides, also make significant contributions to global warming. In addition, sugar cane cultivation shifts agricultural activities to other regions such as the Amazon and the *Cerrado*, threatening important ecological areas that until now have been preserved.

The Sugar Cane Market

Sugar cane is the source of about 70% of all sugar produced worldwide. Brazil is its world's largest producer. In the last few years, Brazil has produced about one-third of the total worldwide harvest. Ten percent of the farmland in Brazil is used to grow sugar cane. Recently, production has increased rapidly. The estimate for the 2010/11 crop, according to CONAB (*National Supply Company*) is more than 8 million hectares of cultivation, an increase of 9.2%. Production is forecast at 664 million tons, representing a 10% increase over the previous year. Of this total, about 90% will be produced in the south-central region (South, Southeast and Midwest), and the remaining 10% in the North and Northeast. It is estimated that the total area of sugar cane planted in the country will increase from 60 million hectares in 2010 to 69.7 million in 2020, an increase of 9.6 million hectares, an area larger than the southern Brazilian state of Santa Catarina.

Sugar

The world's largest producers of sugar, Brazil, India, China, Thailand, Mexico, and the United States, account for about 60% of global production.

World Sugar Production – thousands of tons

Country/Harvest*	2006/2007	2007/2008	2008/2009
Brazil	31,450	31,600	31,850
China	11,497	14,636	12,337
India	30,780	28,630	15,960
Mexico	5,633	5,852	5,260
Thailand	6,720	7,820	7,200
United States	3,119	3,113	3,010
Others	38,851	39,271	38,146
Total	128,050	130,922	113,763

* The USDA measures crop years from October to September, which is why the figures for Brazil here are slightly different than the figures supplied by CONAB, which refer to Brazilian production.

Source: USDA (www.fas.usda.gov/psdonline), accessed 21/9/10.

Brazil: Production of sugar – thousands of tons

Region/Harvest	2007/08	2008/09	2009/10
South-central	26,201	27,074	28,747
North-Northeast	4,826	4,546	4,328
Brazil	31,027	31,620	33,075

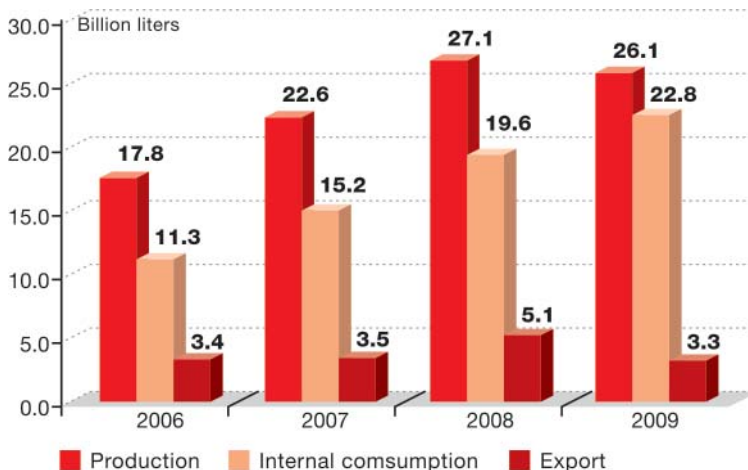
Source: Conab

The total world sugar trade is approximately about 50 million tons, which is about one-third of global production. The international market for sugar is heavily regulated and protected in several countries through subsidies and import barriers. Defeated at the World Trade Organization (WTO) because of its high subsidies, the EU announced in 2005 plans to reduce the prices paid to sugar producers by approximately 40% over a period of two years, and to reduce production by more than one-third by 2012. The Brazilian sugar industry estimates that with the end of the European subsidy, Brazil will gain 50% of the newly-opened market.

Ethanol

Sales of domestic ethanol in 2009 totaled about 22.8 billion liters, of which exports were 3.3 billion liters.

Production, internal consumption, and exportation of ethanol in Brazil



Source: Secex, ANP, MAPA, in BNDES (2010)

Roles in the chain of production

Companies

In the past, the sugar-based alcohol industry has generally been held by Brazilian-owned companies. During the last decade however, the process of mergers, acquisitions, and the internationalization of the sector has increased rapidly. The entire industry is currently in the hands of approximately 150 businesses. In 2010, according to Dextron Management Consulting, four of the five largest sugar-based alcohol producers in Brazil, Cosan, Louis Dreyfus, Bunge, and Guarani, have at least 50% foreign control. Businesses from various countries are working in Brazil, according to Dextron, including China (Noble), Spain (Abengoa), United States (ADM, Bunge), France (Louis Dreyfus, Tereos), Netherlands (Shell), England (British Petroleum, Clean Energy Brazil) and Japan (Mitsubishi, Sojitz).

Producers

Brazilian sugar mills, on average, get 80% of their sugar cane from their own properties, from leased land, or from local companies that have an agreement with the mills. Approximately 60,000 independent producers supply the remaining 20%. Brazil has approximately 370 sugar and ethanol mills, 62% of which are concentrated in the state of São Paulo. In addition to producing most of the sugar cane that they process, the mills try to convert neighboring lands into sugar-cane growing fields, for logistic reasons. In the 2007-2008 harvest, the average distance from the fields to the mills wasn't more than 23.2 kilometers, and in the southern-central agro-industrial region, 86% were in the range of 40 kilometers.

The local impact of sugar cane

The expansion of monoculture sugar cane represents a socio-economic and environmental threat. Some issues include the removal of small farmers from their land, unemployment, food insecurity, health problems among the workers who harvest the cane, and the depletion of the soil, among others. Municipal producers in the states with currently the most expansion, Rubiataba in Goiás, Mirassol d'Oeste and Lambari d'Oeste, in Mato Grosso; and the region around Ribeirão Preto, in São Paulo, exemplify the issues.



Sugar cane harvest grow towards food production

The competition with food production

The municipality of Rubiataba is located in the São Patricio valley in the central region of the state of Goiás, in a 756 square kilometer area. The family farmers in the municipality, in most cases, have their basic subsistence secured through the dairy production of their cattle. In addition, for their subsistence, they plant rice, beans, and *manioc* (cassava or yucca). They generally have small farms or gardens from which they harvest bananas, mangos and other fruit; they also raise chicken and pork. To complement the food their animals eat, they plant feed and sugar cane. The table below shows the recent decrease in the production of rice, beans, corn, and sugar cane in Rubiataba due to growth of the monoculture sugar cane industry.

Production of sugar cane, rice, beans, and corn in Rubiataba

	1980		2000		2008	
	Production (tons)	Area (ha)	Production (tons)	Area (ha)	Production (tons)	Area (ha)
Sugar cane	117	7	157,500	2,100	560,000	7,000
Rice	5,337	3,936	3,600	2,000	306	180
Beans	1,110	3,432	200	290	-	-
Corn	14,586	4,202	9,600	3,000	3,960	800
Total 3 grains	21,033	11,570	13,400	5,290	4,266	980

Source: Pesquisa Agrícola Municipal (Municipal Agricultural Research), IBGE.

In Mirassol d'Oeste and Lambari d'Oeste, municipalities in the southeast of Mato Grosso, sugar cane occupies areas that were once established family farms, which turned to sugar cane farming, together with the arrival of immigrants from the Northeast region of Brazil. The table below shows the expansion of sugar cane in the municipalities where the sugar mills established themselves.

Production of sugar cane, rice, beans, and corn in Lambari d'Oeste

	1990*		2000		2008	
	Prod. (tons)	Área (ha)	Prod. (tons)	Área (ha)	Prod. (tons)	Área (ha)
Sugar cane	-	-	343,200	4,800	942,799	11,350
Rice	-	-	720	400	300	100
Beans	-	-	24	80	32	45
Corn	-	-	1,320	600	1,224	360
Total 3 grains	-	-	2,064	1,080	1,556	505

* The municipality of Lambari d'Oeste was established 1991.

Production of sugar cane, rice, beans, and corn in Mirassol d'Oeste

	1990		2000		2008	
	Prod. (tons)	Área (ha)	Prod. (tons)	Área (ha)	Prod. (tons)	Área (ha)
Sugar cane	133,042	2,181	-	-	498,894	5,477
Rice	2,400	1,500	1,998	1,110	3,000	1,000
Beans	1,320	2,200	486	1,100	360	600
Corn	5,000	2,500	5,850	1,950	9,060	3,200
Total 3 grains	8,720	6,200	8,334	4,150	12,420	4,800

Source: Pesquisa Agrícola Municipal (Municipal Agricultural Research), IBGE.

In the regions studied, and in São Paulo as well, the rise in consumer prices may be due to higher transportation costs.



The increasing value of flat land proper to mechanization is displacing smallholders and taking the job of sugar cane cutters

Rising land prices and the disruption to food production

The sugar cane ethanol production fever is the primary reason behind the increase in land values, particularly in 2007, in various regions of the country. The regions that had the highest increases were precisely those that experienced the greatest expansion of sugar cane farming: the Southwest (17%), the Central-West (12.2%), and the South (11.64%). According to the publication, *Agriannual* (2009), of the FNP Institute, the land with the highest potential for price increases is located at the new agricultural frontiers, and has agro-energy and reforestation capacity. The publication also discusses the increase in foreign investor interest, meaning real estate speculation, concentrated specifically in the agricultural frontier regions of the North and Northeast. The regions around the mills in operation or in construction have had a significant increase in value. In the 30 kilometer radius around the mills, the value of land is already up to four times greater than it was before the arrival of the plants. The value of land in Brazil, particularly in sugar-cane growing regions, is already causing the displacement of both large agricultural and cattle farms and the smaller family farms. All of the major dairy farms in the state of São Paulo, for example, which in the past produced about 10,000 liters of milk per day, have now become sugar cane farms. The transformation was very good for the sugar-cane based alcohol industry, because as the sugar-cane was planted on prairie and flat lands, it became logistically that much more viable. According to Maurício Lima Verde, president of the Rural Union of Bauru and vice-president of the Agricultural Federation of the State of Sao Paulo, farmers who have chosen to lease their fields to mills or plant sugar cane themselves have earned up to three times what they other would have earned.

Loss of land and market concentration

The spread of sugar cane plantations in São Paulo has resulted in a situation where the concentration of production is increasingly in the hands of the sugar mills and large suppliers, eliminating small producers. According to a study sponsored by Pedro Ramos, a professor and researcher at the University of Campinas (UNICAMP), only 25% of cane crushed by mills is now coming from independent suppliers. The remaining 75% is produced by the mills themselves. Another issue is the pressure from sugar cane farming on

local villagers. In two villages, Margarida Alves and Rosalina Nunes, both in the Mirasol d'Oeste region of Mato Grosso, villagers told us the Cooperative tried to rent their land for this purpose:

"We had to go to INCRA to tell them we would not accept it. Because if my neighbor rents their land to plant sugar cane, without a doubt my neighbor on the other side will also, and I'll be squeezed in the middle." (José Paes Floriana, small producer in the village of Margarida Alves.)

In Rubiata, Goiás, the Cooper-Rubi company has only 900 hectares of its own land. The rest of its 16,100 hectares is leased from 181 different farmers, called "partners" by the company. Lease contracts can be signed for one, two, or three cycles. Each cycle lasts

five or six years, which includes cultivation then harvest. In the beginning of the contract, an agreement can be made to receive advanced payment of one or more years. When a small farmer agrees to rent his or her land, it is a decision that can be difficult to reverse. After the first payment is received, the small farmer, at the end of the contract, rarely has the financial resources to farm his property again.

In addition, removing the trees, gardens, sometimes even the houses from the property makes a return to the property that much more unlikely, and means lease contracts are systematically renewed.



Renters lose space for growing food and raise cattle

"The mill owners persuade people, in a certain way, because if people don't have their head in the right place, they'll lose their land. They tell them they'll earn between \$1,000 and \$1,200 reais, which is better than "killing" yourself working. People think only about the money; they forget that they won't have the chicken they used to raise, or the small garden of lettuce, tomatoes they didn't have to buy at the supermarket. They forget that they still have to pay for water, energy, and rent. They only think about the \$1200 reais per month they'll get." (Adilson Alves Pimenta, small farmer in Rubiataba, June 22, 2009).

Environmental Pollution

Sugar cane cultivation is the third largest consumer of agro-toxins (pesticides and herbicides) in Brazil, responsible for 8.2% of all total sales in 2009. Sugar cane cultivation presents the highest risk of underground water contamination due to the leaching of herbicides through the ground. One environmental problem of particular importance is the excessive and indiscriminate use of vinasse (a cane-farming residue) as fertilizer in a process called fertigation, which creates the risks of pollution for both surface water (streams and springs) and underground water (aquifers), as well as the progressive salinization of soil. Other significant environmental consequences of sugar cane cultivation, include the compaction of soil due to the traffic of heavy machinery during planting, plant maintenance, and harvesting; the silting up of local bodies of water due to erosion; the reduction of biodiversity caused by deforestation and monoculture sugar cane planting; and the depletion of soil due to pesticides, organic matter, and other chemicals causing silt issues and further pollution of rivers, lakes, and springs. Silt issues, among its other consequences, can cause problems for hydro-electric plants, as well as for water supply.

Family farmers who stay on their land are directly affected by various environmental issues created by sugar cane production such as burning and herbicides.

"Before planting sugar cane on the other side of the creek, I planted rice, and I planted and harvested beans, and corn. After they started planting sugar cane on the other side of the creek, about 200 meters from my own property, the crop duster would pass and dump pesticides on the sugar cane, and it would fall on my property. After that, I couldn't plant anymore. I planted rice, and it came out beautifully, it grew, but it didn't produce rice. I used to think it was the sun's fault, but it did rain! The plants just didn't produce. We went five years like that, and we just couldn't produce anything like we used to. So I gave up planting. Even the vegetable garden we used to plant on the side of the house wouldn't grow, which was about 1000 meters from the sugar cane." (Roberto Barbosa Mussato, small farmer in the village of Margarida Alves, August 19, 2009).

The physical conditions of sugar cane workers and unemployment

The violation of labor laws and collective bargaining agreements characterize labor relations in the sugar cane industry. Degrading work conditions, frequently comparable to slave labor, are used by the sugar cane businesses to keep planting activity mechanized and moving at a high level of capacity. But, at the same time, no alternative opportunities for the conversion of these exploited workers to family farming have been created. In Rubiataba, Goiás, the Cooper-Rubi mill is gradually mechanizing the sugar cane harvest. According to a business representative, the number of workers during the harvest will be reduced from 800 to 300. This radical reduction is occurring in all producing states, even faster in flat regions. Family farmers are worried about this apparently irreversible process, and offer land reform as an alternative:

"It's very complicated. The government needs to create other options. And one of the options is land reform. Rural workers go work for themselves, with an infrastructure and the financial means to support themselves in the fields. If everything is mechanized there is going to be chaos. Hunger will hit everyone in a frightening way." (Carlos Arriel, small farmer in Rubiataba, June 22, 2009)



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In the pursuit of higher productivity the mills pay bonus to workers that cut above 6 tons of sugar cane per day

Sugar Cane and Global Warming

Worldwide, energy production and industrial activities are the main producers of greenhouse gases, responsible for 26% and 19% of worldwide emissions respectively in 2004. In Brazil, the primary cause of emissions can be referred to as "changes in the land use and forest activities." Emissions from energy production and industrial activities account for only 16% and 2% respectively. Deforestation and forest fires in Brazil are the primary causes of greenhouse gases, making Brazil the fourth largest emitter of greenhouse gases in the world. While it isn't quantifiable in terms of emissions, the increase in sugar cane cultivation is responsible for part of the cattle farming increase in the Amazon, which results in deforestation and the further emission of gases.

The sugar cane zoning proposal

In September 2009, the Ministry of Agriculture established a project called Agro-ecological Zoning for Sugar Cane (ZAE). The purpose of the project is to make sure that ethanol exportation doesn't lead to deforestation. But the fear is that the expansion of sugar cane production, even with the designated zoned areas, will push other agricultural activities into areas that weren't designated as zoned. Also, there are no guarantees that surrounding environments will be protected from the effects of deforestation and pesticide contamination; the *Cerrado*, for example, is an area of great biodiversity that has very little protection. Finally, the project doesn't establish restrictions for existing mills, or for new mills that have already obtained environmental permits in restricted areas.



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Sugar cane planting disrespects the minimal limits established, invading the margins of the roads

Conclusions and recommendations

It is not unreasonable to conclude that the expansion of sugar cane cultivation has created a series of problems, including social and environmental issues:

- **Threats to food security** as a result of crop displacement from areas that were traditionally cultivated by family farmers and are now being used for sugar cane cultivation. Family farmers lose access to their subsistence food items because they lease their own land, and then other land becomes too expensive. Indirectly, consumers also suffer because land used to grow food is farther and farther away, and transportation costs limit access to fresh food.
- **Increased pressure to acquire land**, particularly the land around the sugar and ethanol mills, which displaces family farmers due to the sale or leasing of land to the mills. After they give up the land, farmers and their families tend to move to urban centers. In the cities, they generally find that the money they've received for their land isn't enough to sustain their lives, and that their farming skills don't help with their job search in an urban setting, and they have food costs that they didn't have in the past because they produced their own food.
- **Work relationships and unemployment.** Relationships on the sugar plantations are historically characterized by degrading conditions in the fields where the sugar cane is cut, and a long history of a struggle for worker's rights. Recently, with the modernization of the industry, the intention of which was to avoid burning the cane as well as to end the degrading exploitation, has resulted in a new issue: mechanization of the cutting process is increasing unemployment rates among sugar cane cutters.
- **Water and air pollution, and the social isolation of local communities.** Families that decide to stay on their land have to confront problems such as water and air pollution, which make their own production difficult and create a series of health threats. As neighbors leave and public services are reduced in the regions, the people who stay are increasingly isolated.
- **Biodiversity loss.** The spread of the ethanol production model based on monoculture sugar cane cultivation is a fundamental contributor to the loss of biodiversity, and for deforestation.
- **There are no emission-reduction guarantees.** In the case of sugar cane, emissions come from the annual burning of the sugar cane fields, which is a regular part of the cultivation process. Burning the left-over sugar cane foliage systematically destroys and degrades entire systems, both inside and outside the sugar cane plantations, not to mention the severe air pollution it creates, which has a harmful effect on not only adjacent rural areas, but on neighboring urban areas as well. The excessive use of pesticides in sugar cane production also pollutes underground water sources, and is another source of carbon dioxide in the atmosphere, which is another reason for the environment lack of sustainability of this production chain.

A simple substitution of petroleum derivatives fuels for biofuels without considering environmental issues and social needs is not the solution to the problems caused by the mass use of fossil fuel. Energy sovereignty in Brazil should be based on a model of production and consumption of sustainable energy, produced in decentralized way that creates the least impact on the environment, which includes biofuels as a possibility as long as it is compatible with food production, the social use of land, and ecological criteria that preserve the environment.

Recommendations

- Ensure that biofuel expansion doesn't compete in important strategic ways with family farm food production, keeping in mind the need to guarantee food security on local, regional, and national levels, with a focus on maintaining stocks and food price stability.
- Guarantee that through 2015 the standards for the sugar cane chain of production for biofuel is consistent with concept of clean and sustainable energy, including the following: the suspension of the practice of burning the sugar cane fields after the harvest; measures for the treatment of pollution-causing residue such as vinasse (a cane-farming residue), and other residues that don't contaminate the water table; genuine reduction of greenhouse gases with the substitution of the type of fuel used in the transportation of sugar cane and of ethanol; and the creation of alternatives to spraying pesticides on sugar cane crops.
- Revise the sugar cane agro-ecological zoning project in a way that inhibits the expansion of sugar cane farming at the expense of food production; preserve all important ecological areas; create mechanisms that measure the indirect impact of the expansion of sugar-cane farming, such as the rise in the price of land and the displacement of communities.
- Promote, as a joint effort between the public sector and private business sector, a job-training program for sugar cane workers/cutters for work in other productive activities and professions, and strengthen policies to provide incentive to family farmers, such as access to land, credit, and technical assistance.
- Improve work conditions among sugar cane cutters, including the increase of control of workers over their production, and enforce the rules.
- Regulate and limit the purchase of land for speculation by both national and foreign investors, respecting the social purpose of land established in the Brazilian Constitution.
- Monitor the social and environmental impact of biofuels, such as the effects of residues on worker's health, the threat to the quality of water resources, the competition with areas of food production, the reduction of space to cultivate basic food items, the loss of land and the impoverishment of family farmers, particularly women. The purpose of monitoring should be to develop measures that correct the harmful effects.

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