# Análisis de la producción azucarera en el occidente de México: Caso: valle El Grullo-Autlán, Costa Sur de Jalisco

## *Analysis of sugar production in western Mexico: Case: Cranbrook-Autlán Valley, South Coast of Jalisco*

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## Resumen

Una de las grandes actividades del valle de El Grullo-Autlán es la agrícola, en ella se destacan los cultivos básicos como lo son las hortalizas, frutales y de algunos granos como lo es el maíz, sorgo entre otros (Quintero, 2003). Pero en las últimas décadas es la *caña de azúcar* la que ha tomado gran auge, ya que a raíz de su privatización en los años 80s, la producción ha ido en constante aumento, aunado a la cada vez más demanda mundial de uno de sus principales derivados como lo es el azúcar, no sin descartar los biocombustibles, que se avecinan como una fuerte competencia para este dulce recurso. Esta necesidad mundial ha traído como consecuencia un vaivén económico en cuanto a la oferta y demanda se refiere, por lo que el buscar estrategias de producción que den respuesta a dicha demanda, será el reto tanto de este valle como de su contraparte nacional. Este trabajo da a conocer un análisis del escenario actual de la producción de la caña de azúcar, en los contextos internacionales, nacionales y regionales, por lo que las fuentes originales respecto a este cultivo fueron la parte central de este trabajo, aunado a artículos e información de notas periodísticas que también así lo señalaron.

Palabras clave: agroindustria, azúcar, producción, oferta, demanda

## Abstract

One of the great Valley activities Cranbrook-Autlán is agricultural, it highlights the basic crops such as vegetables, fruit and some grains such as the maize, sorghum and others (Quintero, 2003). But in recent decades is sugarcane which has exploded, as a result of its privatization in the 80s, production has been steadily increasing, coupled with the growing global demand for one of its main derivatives such as the sugar, without discarding biofuels ahead as strong competition for this sweet resource. This global need has resulted in an economic sway in the supply and demand side, so the search for production strategies that respond to this demand, the challenge will be aware of this valley and its national counterpart. This study presents an analysis of the current scenario of production of sugarcane in international, national and regional contexts, so that the original sources on this culture were the central part of this work, together with articles and information from newspaper articles also so noted.

Key Words: agribusiness, sugar, production, offer, demand.

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## Introduction

Agricultural activities in the valley of Autlán-El Grullo are paramount in the development of this region where basic cultivate and play an important role in its economy (Quintero, 2003). Of these stands the cultivation of sugar cane which in recent decades has had a big spike due mainly to the high global demand for sugar.

Moreover, domestic demand has always been below the production expectations of our country, which is why it takes more potential land to the crop to be used to cover these national demands (Source: ZAFRANET, 2010; CNN Expansion, 2010). This information reinforces the problem of reaching the optimal production over demand will be a major challenge, since at least locally environmental issues play an important role in the future mainly due to the loss of seasonal rain This situation is not alien to the national and international context.

But this is not a national problem alone, as global demand relative to the amount of sugar produced has a very marked gap of 3% per year (approximately between 9,000 and 11,000 tonnes per year). This global need has resulted in an economic sway in terms of supply and demand is concerned, so the search for production strategies that respond to this demand, the challenge will be aware of this valley and its national counterpart.

This paper provides an analysis of the current stage of the production of sugar cane, international, national and regional contexts, so the original source on this culture were the central part of this work, together with articles and Information newspaper reports also said so.

**The international context**

The high demand has had sugar in recent decades has led to different economic, social and political accionares in this resource-producing countries. Mexico has been no exception and has played an important role in its insertion into the world economy as one of the main sugar producers (FAO, 2004). In this respect and as to the speech at the presentation of the National Programme Agribusiness Cane Sugar (PRONAC) -2007 to 2012, held in Morelos in 2007, mention some numbers into, noting that global consumption of Sugar and was about 145 million tonnes, with production at that time of 147 million tons, which threw annual inventories (surplus) of about 2 million tons, with Brazil being the largest producer of sugar (19.1%); with the US as the fourth (5.2%) and Mexico the sixth (3.8%) (SAGARPA, 2007).

Current data (UNC, 2010) report for our country in the global context of sugar, Mexico ranks 7th in terms of production it centrifugally, 7th in consumption and 5th in production, as between 4 and 5th place of production of sugarcane per hectare, which makes our country one of the leading producers in the world, where Brazil tops the list again. UNC figures show a decline in production compared to what occurred in 2007, as SAGARPA (2007) mentioned that by this time we we located in 6th place, now falling to 7, according to data from UNC. This decline could perhaps reflect the international fluctuations in

supply and demand, but also with reservations, and supports the needs of Mexican producers as to sale prices, but mainly to climatic influence.

Today the world production estimated based on the second revision of the forecast of world sugar for the period between October 2009 to September 2010 it was 157,160 million tons, showing a growing gap between world consumption and production world and mention the Sugar Industry in India (http://www.indiansugar.com). Still, global demand for sugar is expected to reach the 166.585 million tons. Therefore, the growth of world production is too low to cover anticipated increases in sugar consumption, and global statistical deficit is expected to reach 9.425 million tonnes from 7.247 million tonnes projected in November. The following table (No. 1) shows the current fluctuation of the sugar, according to the previous source:

**Fluctuación mundial actual del azúcar de caña**

| | 2009/10 | 2008/09 | Fluctuación | |
|---|---|---|---|---|
| | (Millones de toneladas, valor bruto) | | Millones de toneladas | % |
| Producción | 157,160 | 152,482 | 4,678 | 3,07 |
| Consumo | 166,585 | 164,153 | 2,432 | 1,48 |
| Superávit / Déficit | -9,425 | -11,671 | | |
| La demanda de importaciones | 54,281 | 50,068 | 4,213 | 8,41 |
| Exportación disponibilidad | 52,156 | 50,070 | 2,086 | 4,17 |
| Existencias al final | 53,068 | 60,368 | -7,300 | -12,09 |
| Acciones / Consumo de relación en % | 31,86 | 36,78 | | |

Tabla 1. Fluctuación mundial actual del azúcar de caña.

Fuente: *ISO trimestrales perspectivas del mercado, febrero 2010. Tomado de* Indian Sugar Mills Association. Asociación Premier de la Industria Azucarera en la India (ISMA por sus siglas en inglés) En: http://www.indiansugar.com

Note in the above table as current production prospects have always been below the needs of the world market, that is, between 9,000 and 11,000 tons per year, representing increase production by just over 3% per year According to such claims. In this regard and to see the current situation regarding the production of sugar, the next point, which addresses the main producers of this resource is presented.

World sugar production

How sugar production is at the level of countries in the world ?, or Where does Mexico currently among the main producers? About Gutierrez and Reyes (2003) reported that Mexico was at the beginning of this millennium in the first 10 sugar producers in the world, placing itself in 8th place, well below the maximum production power of sugar as they are Brazil and China, which together exceeded the more than 40,000 tons per year (just over a third of world production approximately).

But though our production of sugar has gone in this new millennium slight increase compared with the 90 years, where lower production were dealing with 6th place (FAO, 2004), it is also true that this has not been enough to satisfy national needs, together with other countries stand out in production and jump seats on the world stage. The current outlook possession to Mexico again as one of the leading sugar producers, ranking currently in 7th place (Table 2), which assumes that our country has been maintained over the past 20 years as one of the fastest production This sweetener, instead of fluctuating between the 6th and 8th.

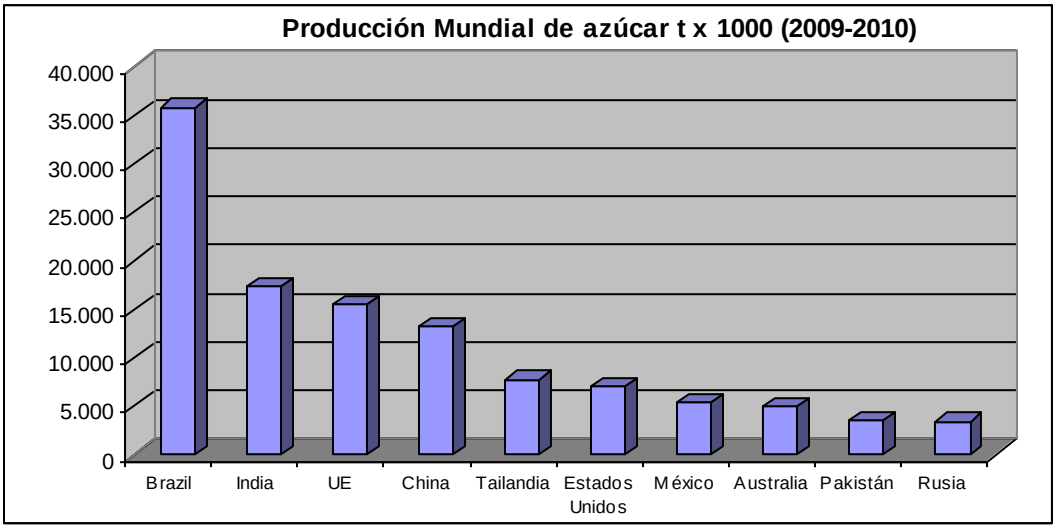
| Lugar | País | t x 1000 | cultivo |
|---|---|---|---|
| 1 | Brasil | 35.750 | Caña |
| 2 | India | 17.300 | Caña |
| 3 | UE | 15.485 | Remolacha y caña |
| 4 | China | 13.161 | Remolacha y caña |
| 5 | Tailandia | 7.700 | Caña |
| 6 | Estados Unidos | 6.998 | Remolacha y caña |
| **7** | **México** | **5.400** | **Caña** |
| 8 | Australia | 4.900 | Caña |
| 9 | Pakistán | 3.520 | Caña |
| 10 | Rusia | 3.350 | Caña |
| | Otros | 39.963 | |
| | Total | 153.527 | |

Table 2. World production of sugar t x 1000 (2009-2010).

Fuente: USDA (2010). (Elaboración propia)

The above table shows how Brazil is still maintained as one of the largest producers of sugar in the world and as some countries have been displaced by others in this category, cases like that of Russia, which at the beginning of the millennium did not appear among the top ten, for Mexico to be under Australia, currently in production exceeded. Another interesting point is the rise of Thai sugar production, which at the beginning of the millennium it was surpassed by the United States, currently reaching over this American nation.

The chart below (1), shown in more detail sugar producing countries, where Brazil with just over 23% of world production continues to top the list, followed by India with 11%, the EU (European Union) 10% and China with about 9% below Thailand and the United States and Mexico 5% to about 4%, which it as the 7th possession sugar producer today.




Grafica 1. Producción mundial actual de azúcar

Fuente: USDA (2010) (Elaboración propia).

It is eminent that one of the challenges of the next decade will be to respond to the demand for this food resource, as the numbers indicate the deficit between this need with respect to the offer, which exceeded by a little after 9 billion tonnes per year (http://www.indiansugar.com), which makes this situation a problem and challenge for the future.

While this distance has slowly been declining in recent years, this does not guarantee that it can cover the entire demand, as it can exhibit a number of other factors further open the gap of what is currently appearing , problems of declining natural resources like water, land, climate change and the replacement of sugar by sweeteners (which is already happening), coupled with the use of other derivatives of sugarcane as biofuels, can make this slight recovery that achieved year-on-year decrease can go on in the following.

Adding to this series of problems, other social and economic nature also threaten the production of sugar, as evidenced Gutierrez and Reyes (2003), who note that developed in

imposing their economic or sectoral policies commodities, countries make his subjects underdeveloped countries and losers and where their companies (transnational installed in developing countries) are the ones who decide the prices of exported goods.

## Exporters and importers of sugar

The fluctuation of these two variables is greatly influenced by the long-term agreements between governments and the need for sugar producers have safe use of installed capacity (Gutiérrez and Reyes, 2003). Moreover import levels are governed by the application of technology in the refining of raw sugar, which gives the latter an added value it more expensive. Countries like the US, Japan, Canada and others, imported raw sugar refining it and giving it an extra value. Table (3) shows the countries with the highest degree of export, taking this factor as a reference to its counterpart import:

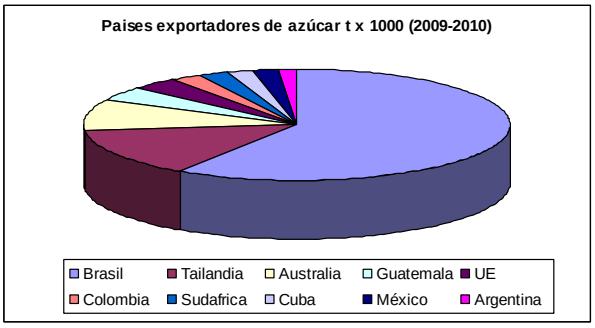
| | | Exportación | | Importación |
|---|---|---|---|---|
| | **País** | **t x 1000** | **País** | **t x 1000** |
| 1º | Brasil | 23.850 | India | 6.000 |
| 2º | Tailandia | 5.800 | Unión Europea | 3.500 |
| 3º | Australia | 3.700 | Rusia | 2.400 |
| 4º | Guatemala | 1.515 | Estados Unidos | 2.200 |
| 5º | UE | 1.475 | Indonesia | 1.500 |
| 6º | Colombia | 1.035 | Canadá | 1.450 |
| 7º | Sudáfrica | 900 | Egipto | 1.410 |
| 8º | Cuba | 800 | Japón | 1.313 |
| 9º | México | 690 | China | 900 |
| 10º | Argentina | 600 | Pakistán | 800 |

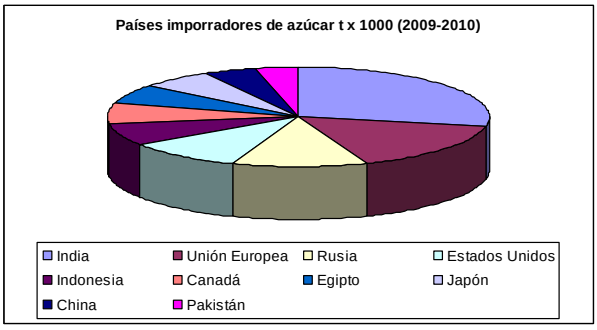
Table 3. Countries exporting and importing sugar in the world en t x 1000 (2009-2010).

Fuente: USDA (2010). (Elaboración propia)

Notice in the above table (3) and Brazil tops the list of the biggest sugar exporters in the world and as developing countries such as Thailand, Guatemala, Colombia and even Mexico, export some of your product countries with better technology to process sugar.

Otherwise the major powers in technology generate this sweetener grabbing one to meet your needs and one that have the technology of refining raw sugar, making this product a resource with greater value added, ie more expensive for countries that sold them the same. Besides export parity with respect to the importation of sugar is almost obvious, while the first is by tx 277 51 1000, the second beat around the 49 921 tx 1000. The following 2 graphs (2 and 3), we shown in more detail exporters and importers of sugar respectively:




Grafica 2 y 3. Países Exportadores e Importadores de azúcar a nivel mundial t x 1000 (2009-2010)

Fuente: USDA (2010) (Elaboración propia).

The above graphs show how Brazil is the largest exporter of sugar with just under 50% (46.51 tx 1000) of world exports, while the country that matters most is India with just over 12% worldwide (12,018 tx 1000 ). While Mexico is among the top 10 exporters of sugar with 1.3% worldwide (1,345 tx 1000).

In conclusion and based on Gutierrez and Reyes (2003) who point out that the sugar market is one of the most distorted in the world and given that the internal policies of each of the producing countries, where subsidies production and exports are evident, so this same author quotes LMC (2001), who mentions that a general can basically distinguish two types of markets sugar: protected market and the free market.

## The national context

In this national Production of sugarcane is comprised of fifteen States (Figure 1). Also the number of members to the two large mills sugarcane organizations (National Peasant

Confederation-CNC National Confederation of Rural Property-CNPR) comprises a total of 57 (CNIAA, 2010).

Under this scheme, production, supply and demand for sugar has been an important part in the production process both national, regional and where crises have been and are present in respect of these fluctuations and supply need of sugar.

Figura 1. Agroindustria cañera en México (fuente: Unión Nacional de Cañeros, A. C. – CNPR, en: http://www.caneros.org.mx)

Castillo and Aguirre (2004) reported that one of the crises of the domestic sugar industry has been growing presence in the market for sweeteners sugar substitutes such as corn syrup rich in fructose and where industrial sugar guilty to allude North American Free Trade Agreement (NAFTA), because from here said sweetener freely imported from the United States. This was also evident Dominguez (2005), who notes that this global supply and demand for sugar has been tarnished by different situations, one being the surplus production which derive two sides, one is on the same overproduction and other changes in consumer habit or replacement of sugar with artificial sweeteners such as corn syrup high fructose, aspartate, saccharin, among others.

These fluctuations of the world market in terms of the different needs are not alien to the local sugar industry in this valley, as the regional supply and demand are ruled according to that dynamic present since the late 80s (Castillo and Aguirre, 2004; Dominguez, 2005), with the release of the state of the sugar mills and the privatization of these, where the actor is removed as an engine for economic development agent and the market starts to be the main generator of the economy

In addition and together with the macro and micro situations sugar production and consumption are the general conditions of the country for the production of this resource. About the ideal weather conditions that Mexico has for growing sugarcane, the richness of its soils and the investments being made to increase productivity in sugar cane plantations in our country, are causing production Mexican sugar have a greater share of the world market. According to statistics from the United States Department of Agriculture (USDA) and the Organization for Food and Agriculture of the United Nations (FAO), sugar production in Mexico is located, on an annual average in recent years, about 5 million tonnes, which represents about 3.9% of the world total. Sugar production by ownership in mills, notes that 52.4% is obtained from mills in the private sector and other government-mills (ASERCA, 2004).

Aguilar et al (2009) quotes CNPR (2008) indicate that sugar cane in 2008 contributed 13.5% of the value of domestic agricultural production, accounting for 0.4% of Gross Domestic Product (GDP) and 7.3 GDP agriculture, which generated more than 450 000 direct and indirect jobs where beneficiaries were more than 2.2 million people. For the year 2008 683.008 hectares were used for growing sugar cane, generating 48`363,316 tons of raw material supplied by the 57 sugarcane mills located in 15 states (Table 4).

| **Estado Productos** | **Superficie industrializada** | **Producción de caña de azúcar (ton)** | **Producción de azúcar (ton)** |
|---|---|---|---|
| Campeche | 9,582 | 393,258 | 44,270 |
| Chiapas | 27,436 | 2,323,059 | 271,698 |
| Colima | 11,066 | 881,551 | 98,092 |
| **Jalisco** | **64,756** | **5,726,307** | **700,598** |
| Michoacán | 13,993 | 1,164,971 | 138,125 |
| Morelos | 13,914 | 1,503,078 | 191,452 |
| Nayarit | 29,433 | 1,913,446 | 230,072 |
| Oaxaca | 45,611 | 2,856,351 | 336,181 |
| Puebla | 15,411 | 1,691,658 | 211,132 |
| Quintana Roo | 22,663 | 1,171,593 | 115,041 |
| San Luis Potosí | 68,035 | 4,415,191 | 543,563 |
| Sinaloa | 24,910 | 2,140,473 | 199,404 |
| Veracruz | 278,597 | 18,651,017 | 2,076,051 |
| Tamaulipas | 28,964 | 2,169,061 | 230,312 |
| Tabasco | 28,636 | 1,362,302 | 134,655 |
| **Consolidado Nacional** | **683,007** | **48,363,316** | **5,520,646** |

Table 4. States producers and sugar

Fuente: CNPR (2008), citado por Aguilar et al (2009)

The above chart (4) shows how Jalisco is among the largest producers of sugar (12.6%) nationwide, just below Veracruz is the largest producer of the sweetener with 37.6. In more recent information generated by the National Confederation of Rural Property (CNPR) on its website (http://www.caneros.org.mx/principal.html#), it is noted that the production of sugar cane is generated by 15 states, benefiting 227 municipalities and about 12 million people across the country. Currently 54 sugar mills operating in the country, where the National Association of Sugarcane participates with 46% of national production. Also, the area sown to sugar cane is 812,000 hectares being harvested for the 2008-2009 cycle of 663,000 hectares (UNC, 2010).

In addition to this, Mexico has produced 1,956,513 tonnes of sugar so far in the 2009/10 harvest, ie 15% less than the same period in the previous cycle, so it is estimated that the production of sugar this cycle will be 5.01 million tons, while the government expects a harvest of between 4.5 and 4.9 million tons, down from 4.96 million tonnes of 2008/09 due to bad weather in the first months of the harvest ( Source: CNN-Expansion, 2010).

The data reported by the previous source in terms of sugar production for the period 2009-2010 is well above the reported by the National Chamber of the Sugar and Alcohol Industry (CNIAA, 2010) (Table 5), as seen a difference of 157, 837 tons, perhaps this latter source reports it to the report of February 13, 2010, while that is not known until the first month is calculated.

| Concepto | Producción Acumulada (ton) Semana anterior | Semana actual |
|---|---|---|
| Caña molida | 15`574,680 | 17`348,952 |
| Azúcar refinada | 500,679 | 553,239 |
| Azúcar estándar | 1`065,859 | 1`199,030 |
| Azúcar blanco especial | 42,717 | 46,406 |
| Mascabado | -- | -- |
| **TOTAL AZÚCAR** | **1`609,255** | **1`798,676** |
| Rendimiento Fábrica | 10.33 | 10.37 |

Table 5. Production accumulated until February 13, 2010.

Fuente: Cámara Nacional de la Industria Azucarera y Alcoholera (CNIAA, 2010) (En: http://www.camaraazucarera.org.mx)

The above chart (5) shows the indicators of domestic sugar production have increased slightly in the second week of February with respect to the first of the month. But what can also be seen in the table is the percentage of refined sugar runs a short percentage, as you might think that the level of sugar refining is not for Mexico its strongest card, which is not true of countries industrialized, producers and other sugar refiners.

Added to this latest information and Moon (2010) reports for the second half of May a rebound in domestic sugar production, since "the end of the first quarter of this year, the cumulative production of sugar corresponding to the 2009-2010 harvest was 4 million 300 thousand tons, registering to April a weekly recovery in production compared to the previous "harvest, this according to the National Committee for Sustainable Development of Sugarcane.


Gráfica 4. Ingenios cañeros en el estado de Jalisco

In addition Zafranet (2010) reported production levels for the 2008-2009 period of 4 million 962 818 tonnes, estimated for 2009-2010 of 4 million 824 000 tonnes. The latter figure exceeds by just over 500, 000 tons actual production for this reporting period by the National Committee for Sustainable Development of Sugarcane. This information reinforces the problem of reaching the optimal production over demand will be a major challenge, since at least locally environmental issues play an important role in the future mainly due to the loss of seasonal rain This situation is not alien to the national and international context. Moreover estimated imports will be below 500,000 tons, so the total demand will not cover at least the remainder of 2010, taking a deficit of 589, 043 tons. But that's what happens in our Jalisco?

***The state context***

Jalisco state currently has 6 sugar mills (Figure 4), 3 of which are located near the city of Guadalajara (Tala in the municipality of the same name, San Francisco in the municipality of Ameca and Bellavista as part of this municipality) and the other 3 on the south coast of the state of the state (José María Morelos in the municipality of Casimiro Castillo, Tamazula in the municipality of the same name and Melchor Ocampo in the municipality of autlán).

The production of these devices is subject to different dynamics in each of them, among them mention may be made the way they work, and their origins and their legal reason, where the latter is referred to his status as a private or dependent of the government. Then the dynamics of each of these devices is explained.

***Ingenio Tala***

Specific cases where the government of Mexico with the expropriation of the 80 sugar mills generated a series of problems that were faced by legal disputes and where some of the sugar mills regained their status of private investment have, as in the case of Ingenio Tala who since 2004 belongs to Grupo Mexico Sugar (GAM) according to decision of the Supreme Court of Justice issued against the expropriation of sugar mills in 2001 (http://www.gamsa.com.mx /tala.htm). Currently the GAM group is a food manufacturing company dedicated to the production and commercialization of sugar cane and its

derivatives and has four mills and three packing plants strategically located in five Mexican states.

***Ingenio San Francisco Ameca***

This sugar mill belongs to the Beta San Miguel group which produces cane with 5 mills located throughout the republic, these being: Ingenio San Francisco Ameca located in Ameca, Jalisco, located in Ingenio Cheese Cheese, Colima, Ingenio San Rafael de Pucté located in Chetumal, Quintana Roo, Ingenio San Miguel del Naranjo Naranjo located in San Luis Potosi, and Wit Constancia located in Tezonapa, Veracruz. With respect to wit San Francisco, this gets its raw material from 5,384 sugarcane, which are small landowners or owners of 11,400 hectares., It employs 411 people in the region permanently in harvest season and 333 in repair time, giving grinding for the harvest of 868.697 07/08 tons of cane between the months of December and May, receiving 300 trucks daily cane crushing capacity and was 6,600 tons of cane per day (http: //www.bsm. com.mx/sanfrancisco.htm)

***Bellavista Ingenio***

Start your potential sugarcane production in the mid-90s by creating SIMAPRO group (System Measurement and Improvement of Productivity), who in recent years by the International Labour Organization in coordination with saints mills group, supported by comprehensive projects as CIMO, is given the task of analyzing the problems affecting the Ingenio Bellavista, where after an exchange of views, select a group of 40 people, including: local union, only Joint Commission, technical supervisors, employees, and management for identifying and monitoring functions area through the application of a. . . System Measurement and Improvement of Productivity (SIMAPRO) (http://www.caibsa.com/)

Ingenio José María Morelos

The Trust Ingenio Jose Maria Morelos 80342 comes from the installation of a factory used to be called transfer Zone Hospital Morelos state, constituting one of the newest facilities in the State of Jalisco, this was done at the beginning of the decade sixties, being president of Mexico Lic. Adolfo Lopez Mateos, sponsored at the time by the Ministry of Agriculture. In

1961 the work for the preparation of land and for the construction of the mill, same as concluded two years later began; the test Zafra took place from 13 April to 13 June 1963 and in her a total of 29.994 tons of cane was ground and produced 1,888 tons of sugar (Source: Trust Ingenio Jose Maria Morelos 80342. In: http: // ingeniojmamorelos.com.mx/Nosotros.html)

Ingenio Tamazula

El Ingenio Tamazula S.A. de C.V. begins in 1921-1923 when the idea of a sugar mill on the banks of the river in the town of Tamazula was conceived, this part of Mr. Rafael Montaño Ochoa then Chief Mechanic Ingenio Santa Rosa, convinced the brothers Salvador and Albino and that new Ingenio Mendoza Mendoza, called Ochoa and Company, later renaming Central Tamazula, making his first harvest in 1924 and 1,284 tons of cane were milled. In 1940 the harvest occurs first refined sugar with a total of 4,187 tons. From 1943-1944 he was boosted capital and industrial dynamism Bachelor Aaron Saenz Garza, who associated with the founding family and Ochoa Mendoza and Mr. Jones and Lancaster Prieto Verea owners Ingenio Santa Cruz and Cortijo, who quit operate, the factory managed to grow and the field and taking the name WIT Tamazula SA DE C.V. (Http://www.gsaenz.com.mx/tamazula.html)

Currently the average production of cane per hectare for this ingenuity was at the 94. 6 ton, with a standard sugar production per hectare of around 11 200 Kg. While total production and refined sugar was 138.82 ton for the 2010-2011 cycle (UNC, 2011).

**The regional context**

To be within the regional context is important to note the location of the Cranbrook-Valley Autlan, so this is between the coordinates: 19 ° 35 'to 19 ° 54 N and 104 ° 07' to 104 ° 29 'W (INEGI, 2000). Belongs to Irrigation District 094 of the South Jalisco area

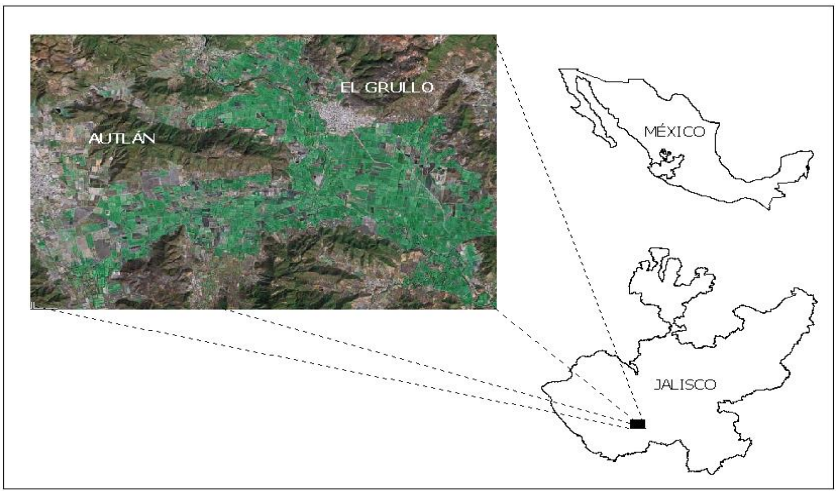



Figura 2. Ubicación del valle de El Grullo-Autlán (Costa Sur de Jalisco)

(Unit Autlan-Grullo-El Limón), with irrigated 11,912.97 ha.) (CNA, 2005). It has 16,837.3 ha. Cultivated with sugar cane (CNPR, 2009) and a favorable seasonal development of staple crops benefiting more than 100,000 people in these two municipalities (INEGI, 2000) (Figure 2).

Ingenio Melchor Ocampo

As part of Zucarmex Group founded in 1993 and considered one of the main sugar producers in Mexico, is the Ingenio Melchor Ocampo, whose corporate headquarters are located in Navolato, in the state of Sinaloa.

With regard to this Ingenio it is important to stress its value relative to other mills in the state of Jalisco, because like the Ingenio Tamazula their average production of sugarcane, and the same sugar per hectare is almost similar , this being in the order of 94 tons and 11, 000 kg. respectively. Table (6) shows more clearly the importance Ingenio presents this in relation to the rest of the state.

| **Ingenios de Jalisco (municipios donde se localizan)** | **Superficie sembrada con caña (Ha)** | **Caña de azúcar por hectárea (ton)** | **Azúcar por hectárea (Kg.)** | **Producción de azúcar estándar por hectárea (Ton)** | **Producción de azúcar refinada por hectárea (Ton)** |
|---|---|---|---|---|---|
| Tala (Tala Jalisco) | 19, 674 | 74. 78 | 8, 100 | 159.8 | - |
| San Francisco Ameca (Ameca) | 10, 960 | 76.13 | 8, 400 | 92.7 | - |
| Bellavista (Bellavista) | 4, 532 | 70.19 | 7, 700 | 35.8 | - |
| José María Morelos (Casimiro Castillo) | 6, 951 | 61.63 | 7, 200 | 50.6 | - |
| Tamazula (Tamazula) | 12, 358 | 94. 6 | 11, 200 | - | 138.82 |
| **Melchor Ocampo (Autlán de Navarro)** | **8, 469** | **94.21** | **11, 090** | **93.96** | **-** |

Table 6. Production of sugarcane and sugar mills in the state of Jalisco (zafra 2010-2011)

**Fuente**: UNC. (2011). Comité Ejecutivo Nacional 2010-2014. Estadísticas de la industria de la caña de azúcar 2002-2011. Unión Nacional de Cañeros, A. C. – CNPR. En http://www.caneros.org.mx/principal.html# (Elaboración propia)

In the above table can be seen as more mills hectares, it is not exactly the most production. Wit the case of Tala with just over 19,000 ha., Seeded, their average production per hectare does not exceed 75 tons. (This is also reflected in the production of sugar per hectare). Wits contrary to Melchor Ocampo and Tamazula case those with fewer hectares production exceeds 90 t / ha. But it is clear that the ingenuity Tamazula presents the technology for the

production of refined sugar, which increases the level of sugar production. This situation does not arise in the other mills in the state, including Ingenio Melchor Ocampo.

As an important part of this study is relevant to analyze why fewer hectares wit Melchor Ocampo is producing more cane and hence more tons, making the probe more detail in the company was a fundamental part of this study.

Sugarcane area

Currently and until the 2010-2011 harvest for this crop acreage it was 8, 469 ha (Figure 5), with a standard sugar production per hectare of around 11.2 Kg. (UNC, 2011).

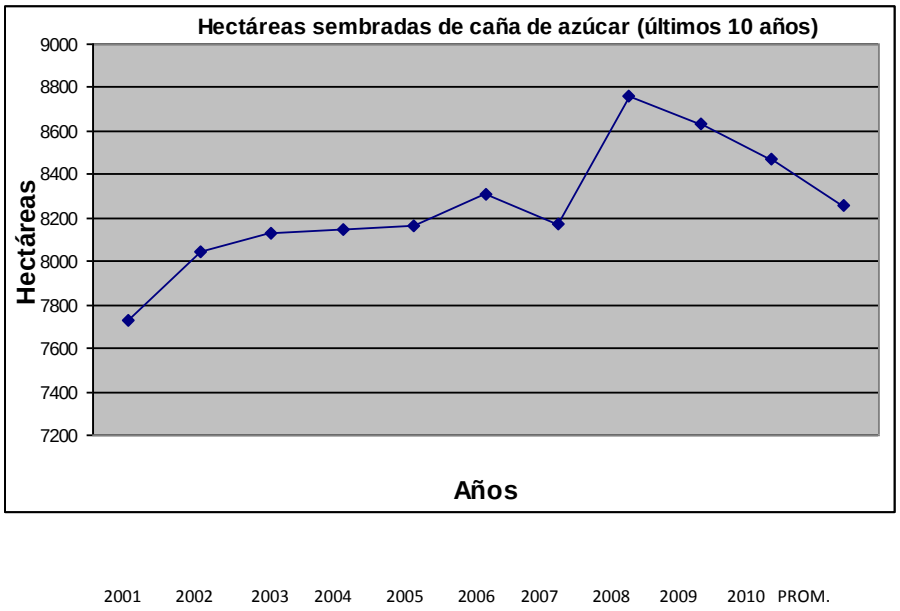



Figure 5. hectares planted with sugar cane in the Ingenio Melchor Ocampo in the last 10 years

**Fuente:** UNC (2011) (Elaboración propia)

In the chart above you can see how the number of hectares has been slight variations in the last 10 years. Stability in the number of hectares sown in the harvest period from 2002 to 2007. He appeared But the most marked change occurred in the 2007-2008 harvest, where there was an increase of just over 600 hectares of new cane sembradío sugar for that period. The average has remained above average in this decade.

Sugar cane production

The production of sugarcane in the last 10 years has also been marked variations, with the best years of production the half of this decade just ending production fluctuations of the order of 100 to 105 ton / ha cane of sugar. The following chart (6) shows such behavior.

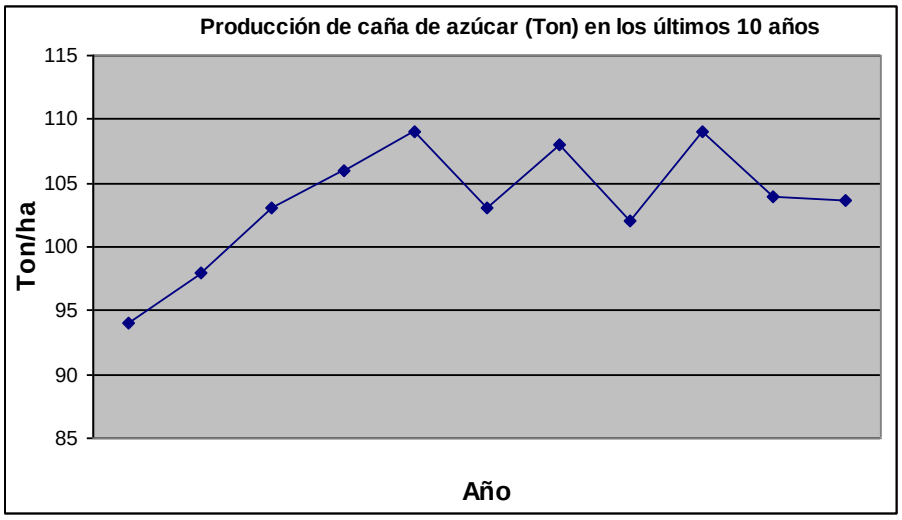



Figure 6. Area planted with sugarcane in the Ingenio Melchor Ocampo in the last 10 years

**Fuente:** UNC (2011) (Elaboración propia)

In the chart above you can see how the rise in the production of sugarcane per hectare was in the early years of this decade (2001-2005), later appearing with annual fluctuations and variations which seem to continue, and perhaps because largely to low rainstorms that have occurred in recent years (this in the words of sugarcane growers).

It is important to note that the residual moisture plays an important role in the early days of the sugarcane, but the lack of seasonality has led to the present production such ups and downs, as noted in the preceding paragraph. The average production per hectare of cane is held above the 100 ton / ha.

Relationship plantings (ha) with the production of sugarcane (ton)

Significantly it exposes possible or no relationship between the variables of sugarcane production and hectares planted this grass, as it could perhaps think at first that there is a relationship of dependency, that is, more hectares production increases . In this case and in

relation to Figure 7, the situation is contrasting. This graph shows that in the period 2002-2005 the area planted with sugar cane remained stable at approximately 8100 hectares, but this production did not show stability, since it gradually increased in this time of 98 ton / ha to 105.

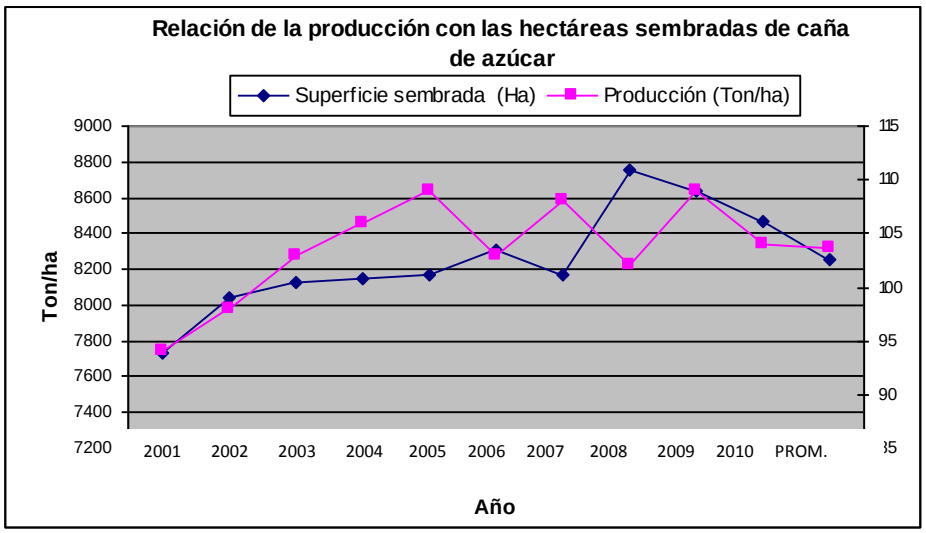



Figure 7. sown area (Ha) and its relation to production (t / ha) in the Ingenio Melchor Ocampo in the last 10 years

**Fuente:** UNC (2011) (Elaboración propia)

The same graph as exemplified in the period 2001-2002 the sown area ratio vs. Production has a great relationship, that is, increased the area under crops and increased production with it. This as well as the harvest of 2006 which reflected a close relationship between planted acreage and production that was obtained. Otherwise for the 2008 harvest, where the average area under crops production exceeded expectations, yielding an approximate average of about 105 ton / ha. What could be the explanation for these differences ?, and perhaps one of the most mentioned by farmers, moisture factor, which has been improperly submitted in this region over the past 5 years.

So as you can see throughout the document as it is not a pattern that if more hectares of sugarcane are grown, is obtained over this product, since the behavior of the plots has been contrasting throughout this valley as their production and where the humidity factor has been a fundamental part of the production per hectare.

Conclusions and Recommendations

The production of sugar cane at the international, national, state and regional level has a number of factors that directly influence their marketing to meet the demands at these levels. Some of which are environmental factors such as the loss of seasonality in rainfall and soil impoverishment.

One factor that is influencing more productive crop fluctuations sugarcane is the humidity factor as say some producers coincidentally, this was the variable most influential in these oscillations and low the cane harvest.

It is recommended that the studies of constant soil (perhaps in periods of three years) in order to see who can be influencing soil in terms of lower production of sugar cane per hectare, because like the factor humidity , soil and nutrition play an important role in the growth of this grass.

Moreover is no guarantee that if more hectares of sugarcane are grown has increased production, as this will depend largely on environmental factors such as the rain and land quality. Some state mills cases where production per hectare was much higher in those who had planted fewer hectares than in those who planted more hectares.

Perhaps the most obvious conclusion for the 4 contexts (international, national, state and regional) is that while suitable climatic conditions or an efficient method of irrigation are taken, coupled with good nutrition soil, good crops of sugarcane will per hectare. Otherwise, production will go down and leaving demand exceed supply much with the usual increases in sweetener derived from this grass.

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