

Sugar Agroindustry and Its Socio-economic Impact in the Towns of Potosi and Buenos Aires, Nicaragua

Mtro. Rodrigo de Jesús Murillo Canda & Dr. Edgar Palazio

Regional and Local History, National Autonomous University of Nicaragua, Managua, Nicaragua.

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Abstract

The research was conducted in the period from July to October 2017, in the historical region of Rivas, Nicaragua in the towns of Potosi and Buenos Aires, which is located in the southeastern region of the country, between Lake Nicaragua and the Pacific Ocean, which says it geographically as isthmus. The study consisted of an socio-economic analysis of the panelero sub-sector of the towns through in-depth interviews, guides of observation producer owners of mills and workers, who provided information about the productive activities, family, social and economic data such as: ownership of the mill, land tenure, level of study, members per family monthly income, yield of sugar cane, costs of production, production of sweet brown sugar, hand of work and marketing, analysis was performed with that information. In addition, the opinion of the inhabitants of the villages, using in-depth interviews, was obtained for the benefit they get from the production of sweet in their localities tied; where is the activity of the grinding. According to the results of the analysis, bundle of sweet production is maintained by the tradition of producers, using tools and craft materials, obtaining natural products; In addition, it generates employment opportunities for the inhabitants of the towns. The factors that affect this agro-industrial activity are: natural phenomena like drought, pests, machine components, the lack of organization of producers and the exploitation that is made to workers in the sugarcane sector.

Keywords: Sweet Tied, Agro-industry, Grinding Performance

Introduction

The sugar agroindustry, its link with sugar mills and the sugar mill in the historic region of Rivas, Nicaragua; and specifically with the life of cane cutters, it is proposed to collect and analyze their experience, and expose the economic infrastructure of the sugar mill and the factors that drove its almost total decline; and prove that the changes in the modes of production suppose the extinction of their activity.

The objective of the research is to evaluate the socioeconomic impact of the sugar agroindustry in the localities of Potosí and Buenos Aires, in the historical region of Rivas in the period 1950-1970. Located in the Pacific region of Nicaragua, which covers approximately 15% of the national territory, concentrating 62% of the total population of the country.

It includes a large part of the current territory of the department of Rivas that is located in the southwest sector of the country.

Bornemann (2006) states:

"The current department of Rivas, was for thousands of years, for its quality of isthmus, obligatory route of the aborigines and settlers of America" (p.14).

The department of Rivas has an extension of 2,155 km² and includes the isthmus itself, which measures 18 km in its narrowest part, reason of interest for foreign powers for the construction of the interoceanic canal, besides being the lowest part in relation to the level of the sea. (Incer, 2000: 191).

Between 1950 to 1970, the production of candy on top was fundamental in the work of the Nicaraguan peasant. However, changes in the productive structure of the country have led to the progressive disappearance of artisanal sugar mills (displaced by other, more modern production methods).

In Potosí, the Dolores mill operated from the beginning of the 20th century, and in the 1980s it was nationalized and had the name of Benjamín Zeledón, privatized in the 1990s, now called the southern sugar company (CASUR).

The novel method of regionalization is being used. The regional history should point to the study of the particularities of our society. Another method used is Oral History.

The techniques are used: bibliographic incorporation, content, elaboration of interview questionnaires, processing, elaboration of tables, elaboration of maps, sketches and plans.

The informants were selected according to the following criteria: Older than sixty years, with thirty or more years of uninterrupted experience in the work of the sugar mill and cane cutting and inhabitants of the region.

The final questionnaire contains 44 questions arranged in two large sections

1. Geographic and environmental aspects
2. Socioeconomic aspects

Arellano (2010) indicates that:

"Sugarcane reached the soil of Nicaragua, in the year 1526, with the Government of Don Pedrarias Dávila. The results of the sowing harvest were used and made essentially for domestic use "(p.12A).

Boucher (1995) states that:

Agribusiness, it could be said, was born with the introduction of sugarcane in America, during the Spanish colonial era, first as an activity of self-consumption and later with the growth of cities, as a commercial product. In this way, the activity has remained in many countries as a traditional rural agro-industry, involving a large number of small and medium cane producers, who transform this agricultural product individually or associatively into a food. (p 321)

The first Mills mounted had mills with mallets of wood, which moved by animal power in the case of the towns of Potosi and Buenos Aires. Towards the end of the 19th century, coffee and sugar exports marked a period of economic prosperity, which led to the import of metal windmills and waterwheels to power them. Many of these mills, which have 100 or more years, are still in operation.

Because of its economic importance top of sweet production is an activity of great tradition and even regarded as cultural heritage in some regions and towns. Mills generate jobs, then it is possible to carry out a quantification of the socio-economic importance of this agroindustry, which allowed to maintain producer in the field, employing labor and in some areas be an important factor for the development of the community.

The cultivation of sugar cane has been one of the agricultural activities of the country which has suffered important changes in terms of the distribution of property and ways of preparation of products derived from this raw.

They are defined as Mills according to Moon (2012) "to mills that were designed with features of rollers which are in upright positions, these mills can be triggered by animals (oxen), or by electric motors or combustion" (p. 14).

These diesel engines were replaced traditional sugar mills in the region, where used yoke of oxen in the process of grinding of the sugar cane and its derivatives. The mills are machines built with stainless steel.

The mill gradually gave way to the sugar mills producing sugar on a large scale, mainly for export, because the sweet was consumed domestically in 1960, in amounts two times greater than white sugar. The mills disappear one after another with such speed that are practically today almost extinguished. In the historical region of Rivas, it operated in 1950 more than thirty mills.

This scenario has been repeated in all the country cane-producing areas. While refineries increased each year its production capacity and modernized its machinery, the few Mills extant craft, slow and exhausting methods that have always characterized the production of sweet.

The boom in the sugar production has caused the decline in the production of sweet on top, the little importance that

currently has in national economic life shows just to see the recent agricultural censuses of the country: this category is not listed. Ultimately, sugar mills have disappeared completely drowned the estates and industrial production on a large scale.

Boucher (1995) argues that: In the case of Nicaragua, most of the sugar mills lack infrastructure (roof, bagacera, warehouses and floor), only some have roof tiles or zinc. This situation is due to the production method used: during the harvest season, they build a roof with palm leaves and zinc sheets, which disappear once the harvest is over, leaving the mill and the pots outside (p 328).

Material and Methods

The study is qualitative. It is based on the reading and interpretation of the sources based on the implementation of methods and techniques.

In the elaboration of this research project, bibliographical sources related to the subject of research were consulted, such as reports on economics, agriculture and work, promotion and public works, journals and newspapers located in the national newspaper library, government funds in the National archive and theses located in the Central Library "Salomón de la Selva" of the UNAN-Managua.

Information was also found in some internet pages where some topics found in: magazines, essays, and scientific articles are raised.

The analysis and synthesis method was used, which allowed to know deeply the reality that is studied and organized according to the order of importance. Its applicability is oriented to the decomposition of documents in all its parts to know their fundamental elements, and to elaborate a critical thought about the phenomenon under study.

Oral History, is a method that played an important role within the investigative framework, since through narrations, life stories, and experiences could be rescued the events that occurred in the time covered by the investigation, that is, the rescue of the memory, which stores all his experiences, and can help decipher that past of which he was the protagonist.

It is necessary to emphasize that the regional and local study that allowed us to rescue the collective memory, revitalizing the sense of belonging of the inhabitants for their history and daily space.

The main sources of information in the elaboration of the questionnaire were the field visits, the preliminary conversations and the personal experience of the researcher in this type of work.

The initial questionnaire consisted of a number of fifteen questions, compared to the final form. The direct contact with the field of work was gathering new contents and possibilities that were weighing said instrument. The final questionnaire contains 44 questions arranged in two large sections:

a) Geographical and environmental aspects;

b) Socio-economic aspects (raw material, production process).

The questionnaire is very specific, and covers all the activity of the agro-industry. The informants were selected according to the following criteria: male sex, age (over 60 years), with thirty or more years of experience in cutting sugarcane, working in a sugar mill, and inhabitants in the region under study.

The workers who met these criteria were the ones who gave the most information. After preliminary interviews with all the informants who met the aforementioned characteristics, we selected eight, who answered the complete questionnaire. The investigation was carried out in the historical region of Rivas, in the localities of Potosí and Buenos Aires. Both the preliminary work and the collection of the material were carried out through the direct interview, personally conducted by the person responsible for the work. The following steps were followed:

- a) Preparation of the preliminary questionnaire;
- b) Visits to the field to complete the questionnaire;
- c) Selection of informants according to the criteria indicated;

d) Recording the interviews. Each informant described, almost with absolute freedom and with as much detail as possible, the entire process of the sugar agroindustry;

e) Comparison of the data obtained with the statements of the questionnaire to verify that they were complete;

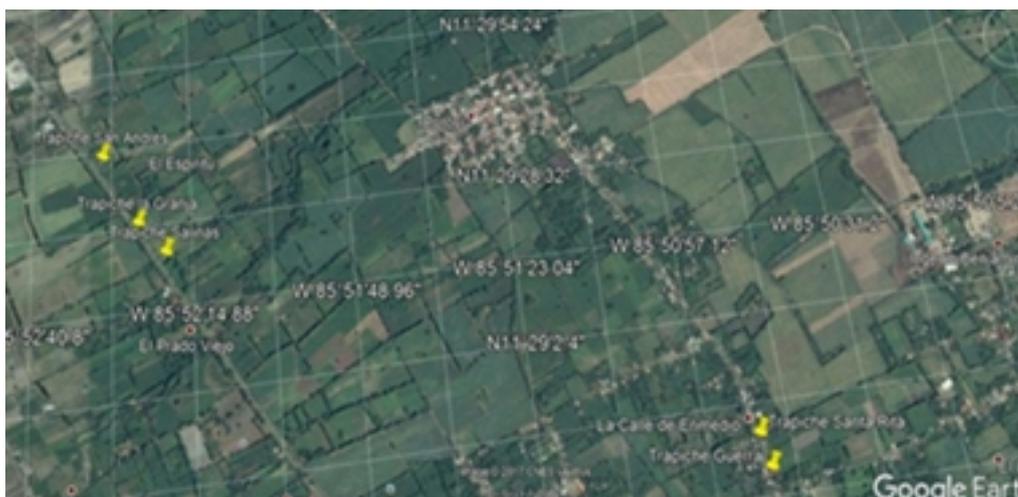
f) Return to the field to complete the data.

The interviews were conducted in public and private places such as: private homes, the mayor's office of Potosí and the disappeared trapiches, which facilitated obtaining the material.

Results and Discussion

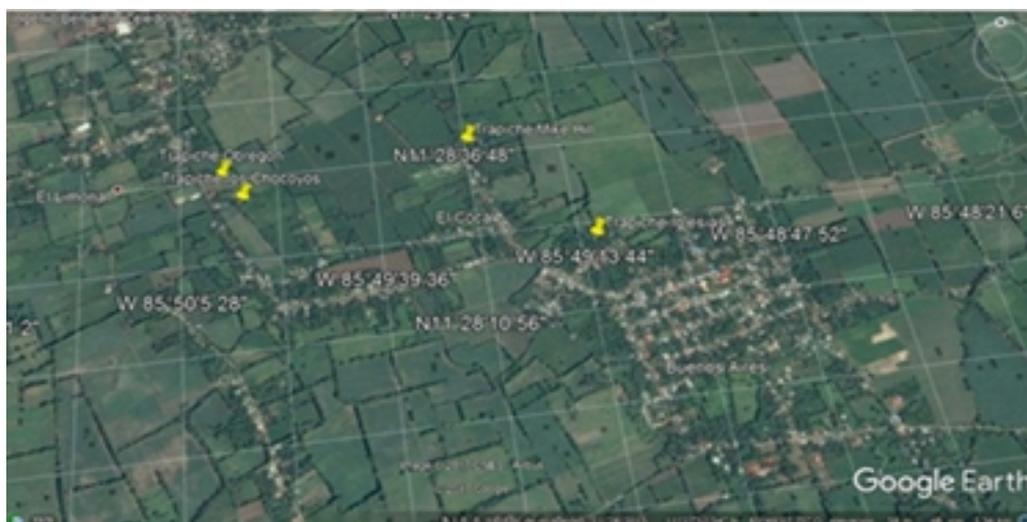
Description of the Panelero Subsector

In the historical region of Rivas and the localities of Potosí and Buenos Aires, the production of sweet tying is characterized as one of the oldest artisanal industries. And it decreased with the sugar production of the Dolores mill, for the 1950s, however, in the region there were 30 sugar mills. Although there are many difficulties for the production of mill derivatives, activity continued to be carried out with low yields.



Source: Google Earth, 2017

Figure 1. Trapiches of Potosí



Source: Google Earth, 2017

Figure 2. Trapiches of Buenos Aires

The conditions for the production of candy tied are rural, they demand ample physical space, there is access to the sugarcane crop that facilitates the hauling; the lands destined for this cultivation are commonly of flat topography. The whole productive process is developed by the producer, from the sowing of sugarcane, production, to the commercialization of the product.

Conditions of Management of the Cultivation of Sugar Cane for Sugar Sweet

The crop management starts from planting, with the preparation of the soil, called chapia¹.

90% of the producers of Potosí and Buenos Aires, carried out the cleaning of the cane fields, and perform planting in selected areas; applied Cypermethrin², you say to some pest control such as lobster,³ and Tiger⁴ which are products chemicals to kill pests; they don't have any other work until the time of the harvest, except in very particular but non-significant, they fertilize with organic fertilizers such as: chemical fertilizers. At a general level. By the crop management, deemed to how rustic milling products.

Description of a Grinding

The grindings in Potosí and Buenos Aires, consist of a physical space where the process of extracting the juice from

the sugarcane takes place, and its cooking to produce mainly tied with sugar.

The grinding includes: land, infrastructure, tools, equipment, labor and diesel or electric motor machinery in its beginnings animal traction; so that the productive functions can be realized.

Land: Generally all the land where the mills are located are flat, these include an area of facilities for the furnace and molding, space for the mill, area for drying the bagasse; which is then used as fuel, in the processes of transforming the juice from sugar cane to honey.

Most of these lands are located in cool places, with access to water.

Infrastructure: Depending on the economic situation of each producer, in general, the basic installation is an open galley of two waters; there are the ovens that are usually two, each with coppers or sheets where the honey is sewn, the blender pots and the molds are located.

This construction is made of wooden columns, which support the roof that is made of clay tile or zinc sheet. The kiln is made of clay brick, its shape depends on the use of a copper or sheet for the baking of cane juice, it is usually trapezoidal.



Source: Own Elaboration, 2017

Figure 3. Trapiche the Potosí Farm

Tools and Equipment

There are three types of sugar mills, those with iron driven by diesel-based engines, 220 electric motor and, in the past, wooden mills powered by oxen.

The tools that are used in the processing of candy tied in the localities of Potosí and Buenos Aires are:

- Barrel for harvesting sugarcane juice
- Buckets to move the juice to the oven,
- Copies or sheets to bake the juice,
- Small wooden shovels,

- Wooden duct or can to pass the honey to the blender
- Whisk pot and wooden shovels to beat, cool honey and knit,
- Wooden molds for the tied of sweet.
- Colander or pascón to clean the garbage of the boiling juice.

¹Cleaning of the terrain with machete

²Ciermetrina is an insecticide, pyrethroid of broad-spectrum, systemic non-, non-volatile that acts by contact and ingestion. Provides effective insect control and low toxicity for mammals.

³You say is an insecticide product containing deltamethrin, active substance which belongs to the chemical class of pyrethroids. Applied foliar, Decis Protech effectively controls infestations of numerous pests in authorized applications

⁴Is a mixture of (organophosphate insecticide) Dimethoate with Cypermethrin



Source: Antigüedades Pueblo Viejo 2016. Owner Alberto Navas

Figure 4. Molds for sweet tying

Possession of the Mills

In the production of sweet brown sugar, the sugar mill is one of the essential equipment; already that through this, is milled sugar cane to extract the juice, which will be cooked so that the sugars to concentrate, and sweet brown sugar can be. Of the total of registered Mills, 100% of producers possess own trapiche(Mills).

Area Cultivated with Sugar Cane

The Earth is essential within all productive agricultural or industrial activity. The availability of a physical space, is what allows to establish productive plots. In the historical region of Rivas, the main agro-industrial crops are: rice, beans, corn, sorghum and sugar cane. Most cultivated sugar

cane, is used for the production of sweet brown sugar. In the historical region of Rivas there is a potential area for growing sugar cane, both to produce brown sugar sweet and processed at the mill.

In memory of Ministry of economy, exposed by the Minister of industry Mr. Enrique Delgado, as shown in table 1, seeded apples and agricultural production during the year 1950-1951. Highlighting various products such as corn, rice, beans, and sugarcane, in the historical region of Rivas. 628 blocks from sugar cane getting 25,040 tons were cultivated. A part of this culture is dedicated to the production of sweet and other derivatives that were processed manually in traditional trapiches or in modern mills that rapidly intensified exploitation of the labour of peasants who continued taking one hard agricultural work.

Table 1. Cultivation of sugar cane

Crops	Seeded apples	Production
Rice	2,409	40,904 quintals
Corn	4,979	22,668 bushels
Beans	2,609	10,928 bushels
Forage Wheat	400	2,817 bushels
Sugar Cane	626	25,040 tons

Source: (Memoria de Economía 1950-1951, p.357)

In memory of agriculture and work presented by the Minister Don Enrique F. Sánchez in the period 1960-1961, as shown in table 2, the main crops in this town are: sesame seed, rice, beans, corn, sorghum and sugarcane in it is noted the impulse of sugar cane in the localities of Potosi and Buenos Aires mainly, increasing the apples sown to 30,820,

to obtain a production 1137.508 tons for a yield per apples of 36.91. This meant an economic boost for the large producers that sell their production to the mills that process more cane and the fall of the small producers, who continue with an obsolete artisanal process.

Table 2. Awakening sugar in the Rivas region

Cultivation	Apples	Production qq gold	Performance qq mzas
Sesame	19.911	176.996	8.89
Rice	30,500	461.575	15.13
Sugarcane (ton)	30.820	1137,508	36.91
Beans	54.060	483.709	8.95
Corn	187.224	2587.898	13.82
sorghum	71.966	846.811	11.77

Source: (Agriculture and Labor Report 1960-61, p.105)

Production and Performance of Sugarcane

The production is the amount of sugar cane which is harvested when the crop reaches physiological maturity; and performance is the production per unit area, and it is important to know the crop received management efficiency.

The total area cultivated with sugarcane, which is milled to produce brown sugar sweet and its process in the mill is 30.820 ha; for the years 1960 - 1961 this gives a total production of 1137,508 tons of sugar cane, with an average yield of 36.91 ton / has (table 2).

Labor and Employment Generation

Work is the mental and physical effort that is made available for the production of a good or service; in this case labour are farmers, that are used throughout the process of elaboration of sweet brown sugar. According to the data obtained in the grinding 1950-1951 season, 480 jobs were generated in activities such as: cutting of cane sugar, hauling, trapiche, oven, and sales management; the latter carried out by the same producer.

Season of Grinds

This activity usually begins in November, and it arrives until

April of the following year; This depends on the discretion of the producer, on the date of maturity of the cane sugar and the amount to grind; i.e., some producers milling around a day, others milled more than three months, making sweet brown sugar as the main product.

The constraints and problems of grinding in the rainy season, is that sugar cane does not have enough concentration of sugars, which are very low yields in production; Another situation.

In addition, rainy population deals for other crops such as basic grains, such as corn, beans, rice and sorghum.

Transport of Sugar Cane Grinding

Sugar cane, transported mainly by cart and truck this media type depends on the quantity of sugar cane, the accessibility to the land and the distance that the reeds are.

In the study, he was obtained that 92% of the producers used carts to transport sugar cane, 8% used truck.

Type of Trapiche

Three mills are used in the towns of Potosí and Buenos Aires.; powered wood with animal traction, diesel engine mills and electric motor 220.

Table 3. Types of sugar mill (trapiche)used in Potosí and Buenos Aires

No	Type of Trapiche	Total of producers	percentage
1	Wood oxen	1	10
2	Diesel engine	8	80
3	Electrical 220	1	10
	Total	10	100

Source: Own elaboration, 2017

The most used trapiche in the localities Potosí and Buenos Aires, is the diesel engine used by 80% of the producers, which processes more tons of sugarcane and increases the production of candy tied. 10% use trapiches powered by oxen and 10% electric.

Extraction Time of Sugarcane Juice

The time to extract the juice, to make a cooked one, varies according to the type of trapiche used; that is, if the extraction of the juice is carried out with a wooden trapiche driven by oxen, it takes an average of 3 hours. If an hour and a half diesel engine is used, depending on how the bagasse material was stored and the firewood and intelligence of the baker.

Sugarcane juice decoction

For a cooked of cane juice, 25 drums take the cooked one that left an average of eighty to a hundred tied of sweet, according to how it had the mature cane, was variable. Six cooked a day were made. The average time, for the cooking of a cooked one is two hours; this time varies depending on the type of kiln, for example: mills that use kilns with coppers, are more efficient than those that use trapezoidal sheets; since the concentration of heat is different. Also the

ovens made of brick, heat the juice faster and how was the weather and bagasse.

Fuel Used to Heat the Oven

In the localities of Potosí and Buenos Aires the ovens are made of clay brick and are heated mainly with bagasse, tires and wood. 100% of the producers use sugar cane bagasse, already dry to heat the oven and reduce the use of firewood.

Products that make the juice extracted from the sugar cane, is cooked to get honey, from this are produced tied sweet. Of the products made in the localities of Potosí and Buenos Aires, the main one is panela candy due to lack of technical assistance, no other type of product was produced.

Sweet Production

The elaboration of tying of sweet, represents the extraction and transformation of the juice of the sugar cane, to elaborate agro-industrial products of artisan or semi-industrial form.

The average amount of sweet produced per cooked, is an average of 100 to 120 bundles. This result depends on several factors such as: the variety of sugarcane used, the

state of maturity, the time to grind cane (dry season), and the production of other products such as shakes. A bundle

of sweet, is formed by two sweet units wrapped and tied at first in sheets of chagüite and later in plastic bag.



Source: <https://www.productosdelcampo.store/producto/atado-de-dulce/>

Figure 5. Tied packed sweet

The total production of sweet in the towns of Potosi and Buenos Aires with diesel engine is six cooked with 100 bound for cooked would be an average of 1,000 tied to the day, i.e. produced sweet month 26,000 tied. The sale prices are variable, but on average, the bundle of sweet sells for \$0.50 cents.

Place and form of marketing of sweet brown sugar Usually the products are marketed in place of grinding, within their respective localities. Transporting the product to be sold, is in truck coming mainly from northern Nicaragua and surrounding regions.

Analysis of Socio-economic Data

sweet brown sugar production, was an economic and dynamic activity. In the towns of Potosi and Buenos Aires, a combination occurs between the primary and secondary sector, namely that producers of cane sugar, raw or primary sector, are those who processed and prepared the attached sweet; It is the product or secondary sector, this benefits the nearby town in the generation of jobs, supply of products. The economic situation of the inhabitants of the towns where the mills are located, is critical; they have low monthly income.

In season grinds, people living in the surroundings, find jobs and then engaged in other agricultural activities in the towns and others emigrate to Costa Rica mainly in search of jobs.

Conclusions

The actions identified with impact on the environment are: the disposal of industrial water, emission of toxic gases, by burning tires, consumption of forest resources and sedimentation of cachaça.

The difficulties which crosses the candy industry for the cost of operation and product quality, is a permanent threat to the stability of employment of direct workers and indirectly working in small industries which uses sweet as raw material. Sweet agro-industry has a technological level low, due to the methods used for processing, are kept in its basic form handcrafted; from harvesting cane, through the extraction of the juice, the clarification to injection molding.

The products obtained from the mills, are considered as natural; There are little chemical fertilization of crops, natural additives are used in the part of the cooking and preparation of products; It is said that the management of the cultivation of sugar cane is minimum.

There was no any technical assistance or training, for the panelero sub-sector; by lot to improve productivity, industry, presentation, safety and efficiency of the productive units. Sweet brown sugar marketing is done through intermediaries, rarely to consumers, there is a distinct market, prices do not match many times the cost of production, there is abundance of product competition in the season and low demand for preferences to refined sugar.

Grinds owners and people who work in them, are mostly older adults and youth are involved in low proportion.

Most owners of grindings of the localities, considered bundle of sweet, as a cultural activity, production did so motivated by tradition and the atmosphere that it generates, as well as commercial purposes.

Sugar cane juice for cooking, it is more efficient to use boilers, because the cooking time is decreased, and also reducing the consumption of bagasse and wood; the difference of this blade is one hour on average. Yields of growing sugar cane in ton / has in the historical region, have a production 30.820 for the years 1960 - 61, recorded an average yield of 36.91 ton / has for the region.

Sweet brown sugar producers have 1,249 has surface harvested for the year 1963 terrain, with a production at 43.685 tons, to 72.7 throughput (tons per apples), are harvested for grinding and processing sweet brown sugar; demonstrating in the towns of Potosi and Buenos Aires, there is a potential area for growing sugar cane, both to produce brown sugar sweet as to process at the mill.

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