

THE BORDERS OF SUGAR CANE PRODUCTION IN BRAZIL

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ABSTRACT

The sugar cane production is one of the oldest economic activities in Brazil. Currently, its production is concentrated in the country's Southern region, with a highlight to São Paulo State which holds more than half of this production, as compared to all other states of the country. This one shelters the biggest number of sugar cane and alcohol plants in operation and projected. However, in the latest twenty years, the crop has been surpassing the borders and advancing into other areas or regions, which are occupied before by other economic activities. This fact can be evidenced by the growth of the number of plants, processing capacity and sugar and alcohol production increase in almost all Brazilian regions. Thus, the present study intended to present an analysis on the production sector of sugar cane in Brazil, based on a collection of information about the sector dynamics.

Key Words: *sugar cane, sugar, alcohol*

Introduction

Sugar cane has always represented a crop of major importance for the economy of the Brazilian Northern region. This crop had part of its structure redirected to the ethanol production as from the 1930's, but only in the 1970's this use had intensified. Currently, the State of São Paulo represents the major productive center and holds the biggest area that is occupied by this crop. Due to the increase of demand for renewable fuel, there was the need to expand the ethanol supply, and, as a consequence, the areas occupied by the sugar cane crops. This fact will lead this crop to advance in areas that were prior occupied by other economic activities or crops, and as a main example, one can mention the States of the Brazilian Midwest, such as Mato Grosso do Sul and Goiás.

The present study intends to show the sugar cane production evolution in Brazil. This theme is justified once the demand for ethanol tends to grow only considering that due to environmental reasons, one intends to replace the consumption of petrol by products for less pollutant and better environmentally friendly fuels.

Literature Review

Ethanol Production Background

The first attempts to introduce the use of fuel alcohol in Brazil occurred during the Provisional Government of Getulio Vargas, in the 1930's. As per Decree Nr. 19.917, of 20/02/1931, the obligatory mixture of alcohol in the proportion of 5% of imported gasoline was set. However, the government experienced a strong resilience coming from the producers to convert the sugar production into alcohol. Despite the incentives given to the private initiative for the construction of plants, the government itself built the first units, one in Rio de Janeiro, in 1938 and another one in Pernambuco in 1940. The control of the productive market in the 1930's, possessed by the Sugar and Alcohol Institute (IAA), made alcohol production raise until World War II, and decreasing as from that period. The recovery happened with the return of Vargas into power in the early 1950's and more intensively, in the military government, in the 1970's, by means of the Alcohol National Program - PROALCOOL (GUIMARÃES, 2012). This latter was created by President Ernesto Geisel, in 1975, as per Decree Nr. 76.593, of November 14, 1975, as an alternative to the import of gasoline, due to the petrol global crisis, mainly the shock which had occurred in 1973. The program envisaged the support to the technological development of the sugar alcohol industry for the production and use of ethanol. Firstly, the anhydrous ethanol production, mixed to the gasoline was prioritized and, later, the production of hydrated ethanol, used in the pure form in engines adapted to internal combustion (ANP, 2010 referred to by NASCIMENTO, 2011). The program may be divided into five phases, according to Biodieselbr (2013):

1. *Initial (1975 to 1979)*: the anhydrous ethanol production was prioritized and, so production increased from 600 million of l/year (1975/76) to 3.4 billion of l/year (1979/80). In 1978, the first vehicles exclusively run with this new fuel were produced.
2. *Statement (1980 to 1986)*: the second petrol shock occurred in 1979/80 led the Brazilian government to adopt measures to strengthen the PROALCOOL, and so production reached 3.4 billion liters in 1986/87.
3. *Stagnation (1986 to 1995)*: the prices of oil barrels had dropped dramatically as from late 1986, and jointly with the scarcity of public resources to subsidize the programs to foster the alternative energetic products, the program was drowned into a stagnation phase. The supply crisis in the late 1980 affected the PROALCOOL credibility and in the following years it brought about a significant decrease of the ethanol demand, and, consequently, the sale of vehicles.
4. *Redefinition (1995 to 2000)*: in this period some policies were created and restated, which resulted in the Inter Ministry Council for Sugar and Alcohol – CIMA, which was in charge of guiding the policies to the sugar alcohol sector. The percentage of the anhydrous ethanol into gasoline increased from 22% to 24%.
5. *Current*: thirty years after the roll out of PROALCOOL, Brazil has been expanding the sugar cane plantations mainly for the 'cerrado' (savannah-like) areas. This new moment is pushed by the creation of flex fuel engines in 2003, that is, it can be run

with gasoline, alcohol or a mixture of both. The difference of this new phase is that the government no longer controls the new momentum, but the private initiative, which were building new plants and expanding others, and were certain that ethanol will more and more have importance for the energy matrix in Brazil and at global level.

As per 2nd Art., of Decree 76.593, PROALCOOL, it set that

“The alcohol production originated from the sugar cane, manioc or any other raw material will be stimulated by means of the expansion of the supply of raw materials, with special emphasis in the agricultural productivity growth, modernization and extension of the existing distilleries and the installation of new producing units, attached to the plants or autonomous ones, and of storage units.” (BRAZIL, 1975).

Later on, the ethanol production was developed and specialized for the use of sugar cane as the sole raw material, once the country had already tradition in its plantation.

Zoning of the sugar cane production

The Brazilian Northeastern Region represented the productive center of sugar cane until the first decades of the XIX century. As from that period, the productive crisis and the decrease of exports of sugar made the sector turn to the domestic market and increase the competition with other regions such as the Southeast, with a highlight to the State of São Paulo. In this competition, the Northeast lost its hegemony and the new borders were benefited, as the transport of products from the Northeast to the interior of the country, made by means of cabotage, had been jeopardized (GUIMARÃES, 2012).

The biggest number of sugar and alcohol plants into operation are found in the regions that comprise the State of São Paulo, which is the biggest producer of sugar cane in Brazil, and North of Paraná State, Goiás, Mato Grosso do Sul and Triângulo Mineiro which represented the expansion areas, sheltering the new plants.

According to CONAB (2012) in relation to the area occupied by the sugar cane, the States of São Paulo and Minas Gerais, together, place the Southeast as the Brazilian region with the biggest area occupied by sugar cane, with 60.34% of the total. Followed by the Mid West with 17.64%, represented by the States of Goiás, Mato Grosso do Sul and Mato Grosso; the Northeast with 11.24% with the highlights for the States of Alagoas, Pernambuco, Paraíba and Rio Grande do Norte; and the South with 7.17, with highlights to the State of Paraná.

The Southeast holds the biggest area occupied by sugar cane, totaling approximately 5.1 million hectares or 63%. Followed by the Southeast with 1.5 million hectares or 18%, the Northeast with 960 thousand hectares or 12% and the South with 611 thousand hectares or 7%. Concerning the States that produce sugar cane, the highlight goes to São Paulo with 4.4 million hectares or 54%, followed by Goiás with 725 thousand and Minas Gerais with 722 thousand hectares, corresponding to 8.83% and 8.79%, respectively.

Sugar cane has been presenting notable expansion rates, mainly in one of the most dynamic agricultural centers of the country represented by the Midwest. As per Porto-Gonçalves &

Alentejo (2010) the crop has been advancing not only in the crop areas of the basic food basket products, but mainly in the areas intended for pastures, as well as in relation to the main agricultural commodities.

The growth expectations of participation of other Brazilian regions in the sugar cane productive market, in addition to the traditional ones such as São Paulo, are real and may be perceived in short term scenarios for regions with big productive potential.

Research Methodology

The bibliographical and document research was performed by means of information contained in dissertations and theses, scientific articles and publications of portals such as the Brazilian Enterprise for Agricultural Research (EMBRAPA), the National Supply Company (CONAB), Biodieselbr and São Paulo State Industry Association (UNICA).

Research Results

Expansion Perspectives

Prospective studies indicate that the world's ethanol consumption may increase in a generalized way (FAPRI, 2010 mentioned by OLIVEIRA FILHO, 2010). According to this same source, countries such as Canada, European Union, India, Japan, South Korea, USA and other countries may significantly increase their imports. Additionally 3.8 million sugar cane hectares shall be necessary as compared to the current production to fulfill the world's demand. Only in Brazil 34.1 million hectares are used for pastures, ready for the sugar cane plantation. By taking the sum of the agriculture areas, livestock and pastures into consideration, the country could offer among mid and high capacity land, about 60.75 million hectares for the sugar cane plantation, which is equivalent to sixteen times the need for the fulfillment of the world demand in 2019 (EMBRAPA, 2009 referred to by OLIVEIRA FILHO, 2010).

Due to this scenario, the Midwest presents a big potential to contribute to the world's demand. According to a study performed by Manzatto et al. (2009), which ended up in the agro ecological zoning of Sugar Cane (ZAE Sugar Cane), the region could provide additional 30 million hectares, currently occupied by agriculture & livestock. In addition to the State of São Paulo, which is the biggest producer of sugar cane in Brazil, we have the North of Paraná, the areas of the west side of Minas Gerais, including the Triângulo Mineiro, of Mato Grosso do Sul and part of Mato Grosso which are the most convenient areas for the sugar cane plantation. Highlights also go to the region known as MAPITOBA, made up by the States of Maranhão, Piauí, Tocantins and Bahia, and those regions will also be the focus of investment in the sugar cane sector.

ZAE Cana was materialized due to the strategic need to assess, indicate and calculate the measure the potential of land for the expansion of the sugar cane crop production on a dry farming regime (without full irrigation) for the production of ethanol and sugar as a base for the planning of the sustainable use of the lands, in harmony with the biodiversity (MANZATTO et al., 2009, p. 08). According to the same source, the areas indicated for the

expansion encompass the lands used for the intensive agricultural production, currently semi intensive agricultural production, special crops (perennial and annual) and pastures. The areas were classified in three classes of (high, mid and low) potential described also per type of predominant current use (Agriculture & Livestock, Agriculture and Pasture) based on the mapping made by the Public-Private Integrated Action National Project for Biodiversity (Probio-MMA), about the remaining forests.

Discussion

In table 1, one can see the growth of the sugar cane industry in all major parameters such as for example, number of plants in operation, processing and production capacity both of sugar and ethanol, regardless of the year analyzed, the values are growing and constant. A short term analysis indicated that the targets for 2017 as compared to 2006, will be 269 new plants into operation, with a total capacity of 538 million tons, and around 14 million tons of sugar cane production and about 38 million m³ of alcohol. By 2017 one expects an increase of 19% or 100 new plants in operation, of 25% of the processing capacity or 200 million tons, of 14% of sugar cane production or 5.5 million tons and 32% of ethanol production or 13.6 million m³.

Table 1: Plants and sugar cane processing capacity and sugar and alcohol production, Brazil. 2006-2017

YEAR	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Plants in Operation ^I	351	370	395	420	445	470	495	520	545	570	595	620
Processing Capacity ^{II}	450	488	538	588	638	688	738	788	838	888	938	988
Sugar Production ^{II}	30,5	30,8	31,8	33,2	34,6	36,0	37,4	38,8	40,1	41,5	42,9	44,3
Alcohol Production ^{III}	17,7	21,5	24,9	28,3	31,7	35,1	38,5	41,9	45,3	48,7	52,1	55,5

Source: EPE (2008) referred to by Cunha Filho (2009, p. 41).

NOTE: ^I(in units); ^{II}(in million tons); ^{III}(in million m³).

According to UNICA (2012), the optimism of the sugar alcohol sector is kept for the next decade (2012/2021) with the expansion of the ethanol market and the installation of 90 new production units. According to the same source, Brazil accounts for 50% of the world’s sugar exports and currently it keeps commercial relations with over 100 countries. About 75% of the product is exported under the form of raw sugar and 25% as refined sugar. The sugar cane byproducts (sugar and alcohol) rank second in the export list, only behind the soy by products. Therefore, we can see that in parallel to the expansion possibilities of the areas occupied by sugar cane, the productive sector is also developed in its different aspects.

Conclusions and Recommendations

Brazil is a reference at the world level, in relation to the sugar and alcohol from sugar cane and it keeps a commercial relation with several countries. Among the major producing regions one highlights the Southeast with the biggest number of plants in operation and designed ones, as well as the biggest area occupied by the sugar cane with 63% of the total, and the State of São Paulo accounts for 54% of this amount. With the increase of demand of renewable fuels, the sugar cane crop must increase, mainly in areas apt for the crops, which are located in the States of Mato Grosso do Sul and Goiás. EPE (2013) made a forecast that the investment to be made in the sector until 2017, as compared to 2006, will result in 269 new plants into operation, with a total capacity of 538 million tons, of which about 14 million tons of sugar cane production and about 38 million m³ of alcohol. Therefore, for 2017 an increase of 19% or 100 new plants into operation is expected. Now, as per ÚNICA (2012) from 2012 to 2021 there will be about 90 plants. Hence, the two forecasts show a constant investment increase in this area. There are still in Brazil several areas that can be plowed, which can be occupied for the sugar cane production, without affecting food production; this fact contributes so that production will be growing. Another fact that contributes to the ethanol demand increase is the fact that this is a clean fuel and the credibility of the environmental paradigm is more and more present in the lives of each citizen of the world.

References

- BIODIESELBR. PROALCOOL – Programa Brasileiro de Álcool. s/n. Available at: <<http://www.biodieselbr.com/proalcool/pro-alcool/programa-etanol.htm>>. Access in: Aug. 09, 2013.
- BRASIL. Senado Federal. Subsecretaria de Informações. Decree Nr. 76.593, of November 14, 1975. Available at: <<http://legis.senado.gov.br/legislacao/ListaPublicacoes.action?id=123069>>. Access on: Sept. 10, 2013.
- CONAB - .COMPANHIA NACIONAL DE ABASTECIMENTO. Agriculture & Livestock indicators. Brasília: CONAB, Year XXI, nr. 11 and 12. Nov./Dec./2012. 2012.
- CUNHA FILHO, J. H. A estrutura socioeconômica da produção de etanol no Brasil: o uso de fatores primários de produção e as suas relações intersetoriais. 2009. 166f. Doctorate Thesis. PPG in Sciences, Escola Superior de Agricultura Luiz de Queiroz – USP. Piracicaba, SP, 2009.
- EPE. Empresa de Pesquisa Energética, Ministério de Minas e Energia. Brasil. Plano Decenal de Expansão de Energia. 2v. Brasília: MME/EPE, 2013.
- GUIMARÃES, C. G. O Instituto do Açúcar e do Álcool e a Indústria do Álcool-motor no primeiro Governo Vargas (1930-1945). Revista História Econômica & História de Empresas, XV. 1, p.135-168. 2012.

- MANZATTO, C. V.; ASSAD, E. D.; BACCA, J. F. M.; ZARONI, M. J.; PEREIRA, S. E. M. Zoneamento agroecológico da cana-de-açúcar. Expandir a produção, preservar a vida, garantir o futuro. Rio de Janeiro: Embrapa Solos, 2009. 55p.
- NASCIMENTO, H. R. O uso das geotecnologias para o monitoramento da agricultura de energia: Pedro Afonso (TO). 2011. 140f. Dissertação de Mestrado. PPG em Agroenergia, Universidade Federal do Tocantins – UFT. Palmas, TO, 2011.
- OLIVEIRA FILHO, L. A. B. Cooperação internacional para produção de etanol: limites e oportunidades. 2010. 103f. Dissertação de Mestrado (PPG em Agroenergia, Escola de Economia de São Paulo, Fundação Getúlio Vargas - EESP). Campinas, SP, 2010.
- PORTO-GONÇALVES, C. W. & ALENTEJO, P. Geografia Agrária da Crise de Alimentos no Brasil. Versão preliminar de Geografía Agraria de la crisis de los Alimentos en Brasil. Mundo Siglo XXI Revista do centro de Pesquisas Econômicas, Administrativas e Sociais, v. 20, p. 39-54. Cidade do México, DF, México, 2010.
- UNIÃO DA AGROINDÚSTRIA CANAVIEIRA DO ESTADO DE SÃO PAULO – UNICA. Números do setor sucroenergético brasileiro na safra 2010/2011.. Available at: <<http://www.unica.com.br/documentos/publicacoes/pag=0>>. Access on Sept. 13, 2013.