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AMAZON AND BIOENERGY: ETHANOL PRODUCTION

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The anthropized area (with primary vegetation changed by man) in the Brazilian Amazon already exceeds the surface of France, 543,965 km², representing more than 600 million hectares the region needs to promote their sustainable development from that area that can no longer be seen as unproductive.

Besides the hydroelectric potential of the region holds, more can be added in Amazon's power supply if present policies and programs for bioenergy production in this area. Is the case of the production of ethanol from sugar-cane, in which Brazil is a world leader with productivity of 6,800 liters per hectare, surpassing the beet in the European Union (5,400 l/ha), sugar-cane in India (5,200 l/ha), corn in the United States (3,100 l/ha), manioc in Thailand (3,100 l/ha), wheat in the European Union (2,400 l/ha).

The global interest for developing biofuels has increased since the middle of this decade, in view of rising oil prices, as well as a greater concern with the environment, refer to the development of renewable energy sources and cleaner, making it possible to move forward in overcoming the current paradigm, based on fossil fuels. In this scenario, Brazil stands out, whose program of ethanol from sugar-cane provides interesting results, since the research of sugar-cane varieties increased income through manufacturing of engines that run on any blend of gasoline and ethanol.

What might be called "Brazilian solution to the problems of fossil fuels" – the use of sugar-cane ethanol to replace gasoline – is not unique to our country and is being adopted in other countries producing sugar-cane (of which there are nearly one hundred in the world), such as Colombia, Venezuela, Mozambique and Mauritius Isles.

In Brazil, ethanol, produced from sugar-cane, it replaces gasoline that would be today half consumed and its cost is competitive, without the subsidies that make the program at its inception. This was accomplished in about 30 years from the creation of

the Proálcool program, released in country in mid-1970 to reduce dependence on imported oil. Highlight also the gain in productivity that has been more than 3% per annum over the past 40 years, a result of genetic improvement of sugar-cane.

Projections made in the Instituto de Economia Agrícola (IEA), da Secretaria de Agricultura e Abastecimento de São Paulo, in 2006, show that in 2015 the ethanol production will be 36 billion gallons, with a production, in Brazil, in the order of 902.8 million tons of sugar cane, which will occupy an area of about 12.2 million hectares.

Recent studies promoted by researchers at Escola Superior de Agricultura "Luiz de Queiroz", da Universidade de São Paulo, demonstrate the fitness of nine million hectares anthropizeds on the East side of the State of Pará and two million in the State of Maranhão to the cultivation of sugar-cane for ethanol production. Area twice as large as the current planted in the State of São Paulo in Brazil.

Although the sugar-cane present high energy balance (factor that indicates the relationship between spending on power unit to produce the same amount of energy in the form of biofuel), 1: 9.63, your production system has always been related to the broad expanses of land to cultivate genetically modified linked to large businesses. Fearful of growing this production system in the Amazon region and the region of the Pantanal, the Government pressed by environmental movements, edited the 6,961 Decree of September 17, 2009, approving the Agro-Ecological Zoning of Sugar-Cane, developed by Embrapa (Ministry of Agriculture), which excludes the Amazon and the Pantanal Region for the cultivation of this culture.

The State of São Paulo, accounts for 60% of national production of ethanol. Sugar-cane generates 38% of renewable energy and the value of its production in 2011, was 27.2 billion, which represented 44.36% of forestry and agricultural production of the State. For its importance to the development of São Paulo, the State strives to transform ethanol into a commodity. To do this, one of his arms is the scientific and technological knowledge capable of generating innovation in the productive chain constants.

In this field, the Sugar-cane Genome Project completed in 2001, mapped the genes expressed in the plant. Currently, thematic projects have managed to identify DNA bases gigapares 10.8 of sugar-cane. The completion of the identification is scheduled for 2013. The researchers want to go beyond the sugar-cane genome. Both the amount of data, such as questions about how does the plant genome. Studies of grasses (family of sugar-cane), such as sorghum and rice, have shown that, in order to

enhance the productivity of plants you must know how the activity of genes is controlled, i.e. knowing the function of DNA snippets called promoters.

The Fundação de Amparo à Pesquisa do Estado de São Paulo-FAPESP launched in July 2008 the Bioen Program. The program has five lines of research. One is on biomass, with focus on sugar-cane genetic improvement. The second is the process of manufacture of biofuels. The third is linked to ethanol for automotive applications and aviation engines. The fourth is linked to biorefinery, synthetic biology studies (combines biology and engineering to build new functions and biological systems), chemical-juice and chemical-alcohol. And the fifth deals with the social and environmental impacts of the use of biofuels. As you can see the program search the ethanol production chain.

An offshoot of Bioen was the creation, in 2010, the Center for Research in Bioenergy Paulista. It aims to stimulate interdisciplinary research and expand the contingent of researchers involved with the theme is maintained by FAPESP, the State Government of São Paulo and the São Paulo State universities three. An example of this effort is the Center of Biomass Systems and Synthetic Biology, at the University of São Paulo (USP). This Center will bring together researchers from institutes of chemistry, mathematics and statistics, biosciences, life sciences and polytechnic school.

With reference to the production of ethanol in the Amazon region, a viable alternative is the cultivation of cassava. This is a tuberous plant rich in starch (potato starch) and excellent source of ethanol. Presents a good energy balance (1: 1.76), losing to sugar-cane, because of this, be used crushed sugar-cane as energy. Has wide adaptation and dissemination throughout the Amazon region and can provide a high potential for producers connected to family agriculture.

During the Proálcol (decade 70), cassava, as a source of ethanol, has been extensively evaluated. However, obstacles linked to the mechanization of the harvest (now partially hedged); additional cost of starch processing (now have specific enzymes that transform into glucose the efficient starch, in which occurs the alcoholic fermentation) and, mainly, the exceptional characteristics of sugar cane, meant that culture. Today, the prices of a barrel of oil, the demands for cleaner fuels, and technological advances in cultivation of cassava to put back into the match.

In Brazil, searches with the cultivation of cassava are based on two lines:

a) development of cultivars with higher concentration of starch by plant, to increase energy efficiency. This survey is being conducted at the Center of Roots and Tropical Starches (Cerat) of Paulista University.

b) Embrapa Cenargen is conducting research in the direction of exploitation and use of mandiocabas, which are sugary cassava, i.e. accumulate sugar (sucrose) instead of starch. Both lines of research are showing encouraging results, but also have some challenges to be faced. Searches with mandiocaba, Embrapa Amazônia Oriental, indicate cultivars that produce up to 60 tonnes of roots per hectare.

According to the researchers of cassava of the Instituto Agronômico de Campinas-IAC de São Paulo, manioc would have the following characteristics which place it ahead with other plant starches.

1. Low capital consumption. Even with small amount of capital producers cultivate cassava with reduced need for credit or equity, or in collaboration with agri-industry material receiving.

2. Steady flow of cash. Cassava roots are marketed throughout the year, so the contribution of capital is constant by allowing the financial administration resembles a business without seasonalities, with rational administration and easy for small producers and agribusiness.

3. Business model for small producers. The techniques currently available enable small producers to obtain good income making it a profitable business model.

4. New varieties. The most important instruments for obtaining good yields in cassava do not have any cost or have reduced costs. Are good varieties, good 14 seeds (manivas) and planting in the correct season

5. Equipment designed for small producers. From the years 90, there was a good development of machinery for planting and harvesting that facilitated the work on small areas and allowed the expansion of the size of cultivated areas have increased because of the efficiency of the cultivated area.

6. Marketing contracts. The conflict between farmer and agribusiness was a negative factor in the production chain, however with the introduction of contracts and public disclosure of prices via the Internet, the segment was professionalised and numerous issues minimized in prices and timetable in fulfilling contracts.

7. Generation of employment, skills and income. Once the cassava production technologies are of local and regional development, made by small entrepreneurs and public institutions, lead to streamlining and strengthening of the local and regional

economy. Of course, the thread will develop faster, more efficiently and with more innovations that count with the support of public policies directed to the industry with this approach.

Amazon has ample opportunity to produce ethanol from sugar-cane and cassava. However, it is vital that, as the State of São Paulo, to enroll this opportunity in the constant advancement of knowledge and the establishment of efficient productive chains to ensure that such production has been established on a sustainable basis.