

Ethanol Production in Brazil

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Introduction:

Over the last 40 years, a number of technological advancements have contributed to the development of the fermentation industry in Brazil, which basically revolves around the production of ethanol in Brazil. Nowadays, new technologies have been introduced which have been really helpful in the production of ethanol from sugarcane. The control of the fermentation condition plays a very important role in controlling the stress condition related to the yeast cells, and the chances of these cells being contaminated by bacteria are also decreased. Since 1970, the ethanol produced in Brazil has been used as a fuel in major parts of the world. According to the latest research, Brazilian ethanol is a substitute for 40% of gasoline, which would otherwise be used in different countries. The demand for Brazilian fuel is increasing rapidly as the government is highly interested in using it as an alternative to fossil fuels. The government is making policies that will have a great impact on the land, and as a result, crop production will be better in those specific areas.

Ethanol production in Brazil:

If we analyze all the biofuels that are currently being used in different parts of the world, ethanol has all the spotlight since it is already being produced in large quantities, and the prices are way more competitive than gasoline. In 2008, the Brazilian association got a rough estimate of the average annual production of ethanol, which was around 20 billion liters. After calculating the estimate for ethanol production, they measured the estimate for gasoline production, which was 10% higher than the estimate for ethanol production. Under these circumstances, using ethanol as a substitute for gasoline seemed a reasonable decision at that time. The production of ethanol can also be associated with the production of sugarcane, which produces a higher biomass yield. Moreover, as technology has improved the working and structure of enzymes, cellulose, which comes as a residue in ethanol production, can help increase the average production by up to 9000 liters per hectare. There are two major ways by which ethanol can be produced: chemical and microbiological methods. The chemical method for ethanol production is based on the hydration of ethylene, while the microbiological method includes the fermentation of yeast. However, yeast is not the only microorganism involved in ethanol production; there are many other microorganisms involved in ethanol production. Presently, the major method used for ethanol production is the microbiological method. This method of microbiological ethanol production is called alcoholic or ethanoic fermentation. During the process of alcoholic fermentation, sugar is converted into ethanol, energy, and other biological by-products. As far as Brazil is concerned, the main source of ethanol is sugarcane, whereas the United States uses corn for ethanol production. Plants like corn or sugarcane are considered C4 plants, which means that

they have a higher ability to convert atmospheric carbon dioxide and water into sugar and the polymers of sugar, which include starch and cellulose, by the process of photosynthesis. The ethanol produced as a result of fermentation has a reduction rate of up to 62%. The microbiological studies which have been done in Brazil have been really crucial. A lot of improvements and various developments have been made. All the past investments that were made for the research and development projects have also impacted other industries and increased their interest in ethanol production from sugarcane and vegetables as well. Nowadays, more technological advancements are being made in the industry to improve the process of alcoholic fermentation and use it for better purposes. The Brazilian industries have verified various differences among the ethanol-producing industries, which include sugarcane and its composition. Distilleries that are attached to these ethanol-producing industries help in the production of the molasses along with diluted water. There are a number of benefits that can be gained from the process of fermentation if it is carried out properly; however, the significant gains can be easily lost because of improper techniques and low-cost adaptations.

Growth of Biofuels:

Over the centuries, people have familiarized themselves with various technologies for ethanol production. However, the process that involved the commercial production of ethanol initially began in 1970. It was the time when the oil crisis began, and oil prices increased to an alarming number, which resulted in a decrease in the prices of sugar, which resulted in strengthening the ethanol-producing industries. In 1975, the Brazilian National Ethanol Program initiated the production of Ethanol in Brazil. In Brazil, the production of ethanol increased up to 0.60 billion m³. However, in 1986, there was a drastic decrease in the prices of oil, which affected the whole idea of ethanol-producing industries, and the government of Brazil was not able to maintain and support the fermentation industries at that time. The loans that were requested were immediately declined by the government, and as a result of the increased price of sugar cane, there was a greater decline in the production of Ethanol in Brazil. It was the time when ethanol was almost nowhere to be found in any gas stations, which resulted in the customers losing the vote of confidence they had in the Proalcool program. ((Matsuoka et al., 2009). Even in the past, biofuels were considered really important especially when oil and gasoline prices were rapidly increasing. This biofuel is considered renewable, has large efficiency, and bears a very low cost as compared to other products. The most appropriate example of biofuel production is ethanol production in Brazil. The use of ethanol is an ultimate source of clean energy alternative in place of gasoline, and it is probably the best substitute in order to reduce greenhouse gas emissions for transport purposes. (Martha, 2016) the Brazilian government made new and advanced policies that encouraged the production of ethanol on a global level. As far as Brazil is concerned, the production of ethanol is considered to be a breakthrough performance on an industrial level. The development of this ethanol production plan was improved in 2003. As a result of rapid progress that was made in the biofuel industry, in the year 2010, at least 86% of the vehicles were sold, and they were all flex fuel. On the other hand, there were a number of concerns that

became evident during the 2000s that the production of these biofuels was a hazard to food production, which is exactly why food security has been a concern, especially in the areas where there is not enough food supply. The fuel versus food debate has been a prominent issue in Brazil. Moreover, all the environmental problems that had a direct association with the production of biofuel were also highlighted so that the government of Brazil does not ignore the consequences of producing ethanol. The major concern for Brazil after these issues were raised included the choice of land that would be suitable for the production of ethanol. After tons of research, it was suggested that the areas where there is a marginal growth of sugarcane would be suitable, and it would be helpful in the displaced activities of agriculture at a frontier level. According to research done in 2011, the area that is most suitable for sugarcane production has now been replaced by grazing lands for animals, but the production of staple food has not been affected. The marginal lands bear low costs, which is why they are suitable for sugarcane growth production. This is the most suitable situation for both biofuel and food security, as there were concerns about the production of sugarcane, which was later used for fermentation. There are a number of ways by which the government can help increase agricultural production. The most important way is to increase the area of cultivation. The major concern of Brazil at this point is the yield gain by increasing the area of cultivation. In the reference, future policies are reviewed, and different strategies are applied so that everyone is in a win-win situation.

Policies:

The ethanol and gasoline blend strategy has been a part of Brazil since 1993. At that time, the percentage of blending was around 20-25%; however, if you analyze the recent years, for instance, 2003-2006, the blending has been up to 20%. By that time, when the gasoline prices increased, the government increased the percentage to almost 23%. In rainy seasons, there is always a considerable decrease in the production of sugarcane, which means there is less production of ethanol and a drastic increase in the price of ethanol. In addition to the mandated blending of ethanol, there is a specific amount of tax that is collected from this procedure. This tax is distributed to three different categories, which include paying the subsidies, providing finance to all the environmental projects that are under process, and financing the production of transportation. (Agroenergy Yearbook 2010) Apart from these taxes, there is an IPL tax that is applied to all the newly purchased cars in Brazil. This tax is much lower for those cars that use ethanol instead of gasoline, as gasoline consumes more energy than ethanol.

In Brazil, the National Bank for Social and Economic Development is the major source of finance for all the research and development projects. Other than this bank, there are many other programs that are specifically designed to support agricultural programs, and they are related to harvesting programs. In 2011, the Brazilian president requested a new plan that was entirely based on the production and consumption of ethanol. According to the Ministry of Agriculture, there were a number of meetings where the president himself discussed future plans for ethanol production. At that time, it was not going exactly as they had planned since the prices of sugarcane were really low. However, the government abandoned all other projects and redirected the investments to the sugarcane and

ethanol production plans, which required more time and attention at that time.

Conclusion:

The burning of sugarcane straws can cause serious smoke, which is usually quite dense, and it is not good for the environment. The government of Brazil noticed this issue and made sure that raw sugarcane was burned in sloped areas where there was less population nearby. It will be strictly prohibited in areas that have the possibility of mechanization. Moreover, laws have been made to give licenses for ethanol distillation. The government's reaction to all the issues has been highly professional, and it was all about the production of ethanol. For a country like Brazil, the production of ethanol is a great opportunity to develop the agricultural sector without harming biodiversity. However, there is still room for improvement.

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