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Introduction of Biofuels as a Way of Solving Ecological Problems

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ABSTRACT

Since environmental issues have become a priority for everyone on the planet, and the fact that growing demand for fossil fuels will soon lead to a reduction in world reserves, except for climate change due to their use and greenhouse gas emissions. The aim of this work was to assess the potential for the introduction of biofuels and find the optimal conditions for the enzymatic hydrolysis of Japonica Rice husk. In addition, evaluate the positive and negative consequences because of the use and implementation of this technology. The methodology used variables: substrate FPU, pH, time, temperature and concentration surfactants using the screening construct obtained statistically, all variables are significant. Then an optimization plan was applied for the variables: pH, FPU and time, dropping those with a lower level of significance. Finally, the best conditions found in previous projects were (pH 5.0, 13 h, and 30 FPU/g of substrate); later, these conditions were applied in experiments to assess the effect of an increase in hydrolyzed cellulose. They use 6%; 8% and 10% of pulp is available with a recycling yield of 74%, 42% and 16%. The community has its own interests in the use of biofuels; therefore, this study provides an opportunity for biofuel producers to reduce environmental, economic, and social costs.

Keywords: Biofuel, Environment, Alternative Energy, Bioethanol

JEL Classifications: C30, D12, Q41, Q48

1. INTRODUCTION

Environmental issues have become a priority for everyone on the planet, especially due to climate change caused by successive environmental disasters in the oil, chemical or nuclear industry and air pollution, which includes greenhouse gas emissions from fuels. With the development of biotechnology, it was found in biofuels (energy from biomass) an option for the production of renewable energy. However, this option, when massively used, has generated a series of environmental situations that are worth analyzing, since they can be more serious, which is a problem for which biofuels considered the axis as a solution. In this analysis, bioethics should also provide input and objective views in order to find a balance point between technological application and environmental conservation.

Country strategy for biofuels and should be based on an assessment of detail of these opportunities and costs in the medium and long term. One of the factors to keep in mind is that using clean manufacturing technologies should be a priority when trying to achieve sustainable development. Hence the importance of considering the historical context in which biofuels arise, the purpose of which was initially profitable, but their own social development, influenced the fact that they became a business with negative consequences even for society itself (Zhang et al., 2016; Um and Kim, 2009; An and Mikhaylov, 2020).

Therefore, given the problem related to the topic of “biofuel,” its influence is environmental and socio-economic, this work is a bibliographic review document that seeks to show the review of biofuel, its positive impact and, the social context that generates

their impulse and how bioethics can help in analyzing situations arising from the use and implementation of this technology (Um and Kim, 2009).

Thus, in this paper we propose to analyze the environmental, saving social consequences of the use of biofuels and evaluation bioethical. Due to the depletion of fossil fuels renewable and environmental concerns, new alternatives for biofuel production. In a large number were made in recent years, bioethanol from sugarcane and corn, but it gave rise to social, economic problems and political, because it competes for the food sector, because you need to large quantities to supply bioethanol production and the food industry. An alternative is second-class biofuel production from agricultural waste or biomass. The FAO said that about 510.6 million tons of Japonica Rice will be produced in 2018/2019, most of which is designed to meet food needs (Sialve et al., 2009; Mikhaylov, 2020a; Mikhaylov, 2020b).

In South America, there were 24 million tons of Japonica Rice, even in countries such as Brazil, Bolivia, Colombia, Ecuador and Argentina suffered a reduction in production due to adverse weather conditions, and reduce wages. The generated biomass as a residue of this agricultural production (straw, husk) is eliminated by methods such as burning, with a negative impact on the environment (Figure 1).

Pretreatment should help to improve the preparation of sugar content in hydrolysis and not generate inhibitors that degrade the efficiency of hydrolysis and fermentation. Factors such as surface area, crystallinity of the cellulose and lignin content in the material hinders the efficiency of hydrolysis, so it is necessary to apply a pretreatment that promotes the activity of the enzyme (Sheehan et al, 1998; Mikhaylov, 2019; Dooyum et al., 2020; 2018; Gura et al., 2020).

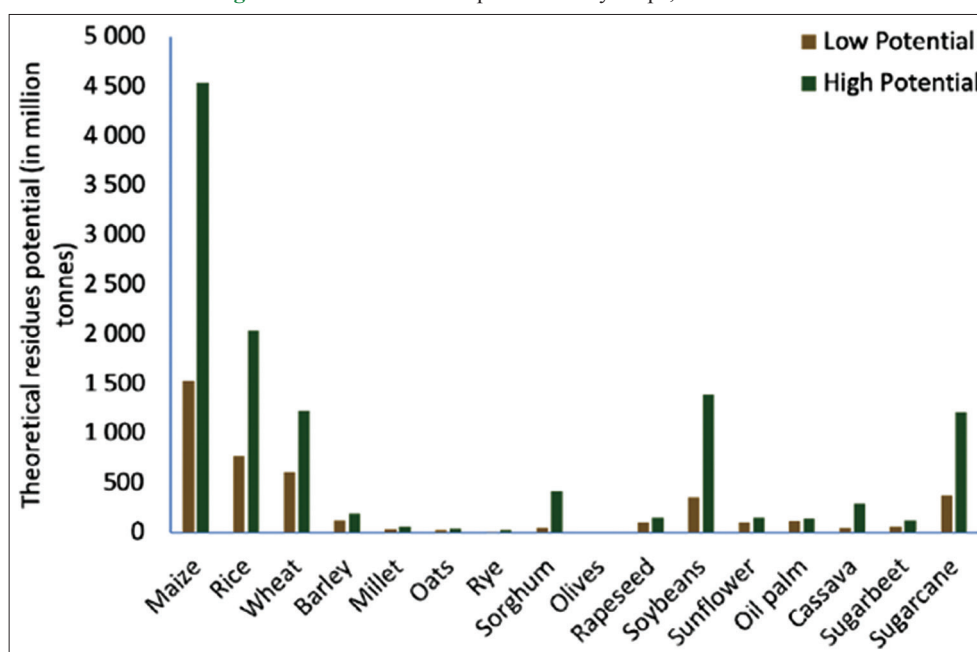
This work is aimed at optimizing the hydrological conditions of Japonica Rice husks after being pretreated with sodium hydroxide at a moderate temperature (Pancha et al., 2014).

2. MATERIALS AND METHODS

Husk initially extends mechanical processing in a mill to reduce the size and the particle. Enzymatic hydrolysis performed using proto stake proposed standard NREL for enzymatic hydrolysis change if -operation charge enzyme which is used in this slave OTE 30 FPU FPU/g of substrate and use Tween 80 improving the functioning of enzymatic hydrolysis, and also, no they added antibiotics. Humidity was determined and volatiles (NREL/TP-510-42621) scales pre-processed. A 200 ml working volume was used for all applicable designs, including testing the preconditions for increasing hydrolyzable cellulose (Mikhaylov and Tarakanov, 2020).

To develop future fermentation and hydrolysis and simultaneous fermentation, the ranges of each of the variables were set in accordance with the bibliography, consulted and noticed that at 37°C acceptable amounts of fermentable sugars, as well as the maximum temperature that they could to withstand microorganisms such as well as other optimized conditions in the processes carried out in this work, which is also favorable for later processes processes (Denisova et al., 2019; Mikhaylov, 2018a; Mikhaylov, 2018b). Then the variables that were studied in design optimization were pH, time, and FPU/g substrate. The obtained design optimizes the conditions under which they can be obtained gives about 70% sugar, but with a very significant amount of enzyme. For this reason, they performed tests with a smaller amount of enzyme, as a reference to the contour plot, so that the sugar yield is up to 52% (Nyangarika et al., 2019a; Nyangarika et al., 2019b; Nyangarika et al., 2018, Nie et al., 2020).

Figure 1: Potential biofuel production by crops, mln/tonnes



Source: Calculated by authors

The concentration and performance of sugars in enzymatic hydrolysis were obtained as shown in equations (1, 2).

$$\text{Sugar concentration} = (m \cdot 0.51 / 0.9) \quad (1)$$

$$\text{Sugar yield} = (P / T \cdot 100) \quad (2)$$

where 0.51 - cellulose in the material, which has been previously defined and 0.9 is hydrolysis factor, m - mass of dry husk, P - mass of the resultant sugar, T - theoretical mass of sugar.

3. RESULTS

Analysis of variance showed that the variables FPU/g substrate, pH, temperature, time, and concentration. The coefficient g/L (Tween 80) is significant in the process; enzymatic hydrolysis ($P < 0.05$) with stirring was practically insignificant in the process (P is close to 0.05). However, this may change with increasing concentration of solids.

The results of the effect of concentration on enzymatic hydrolysis confirm that they contribute to an increase in the efficiency of

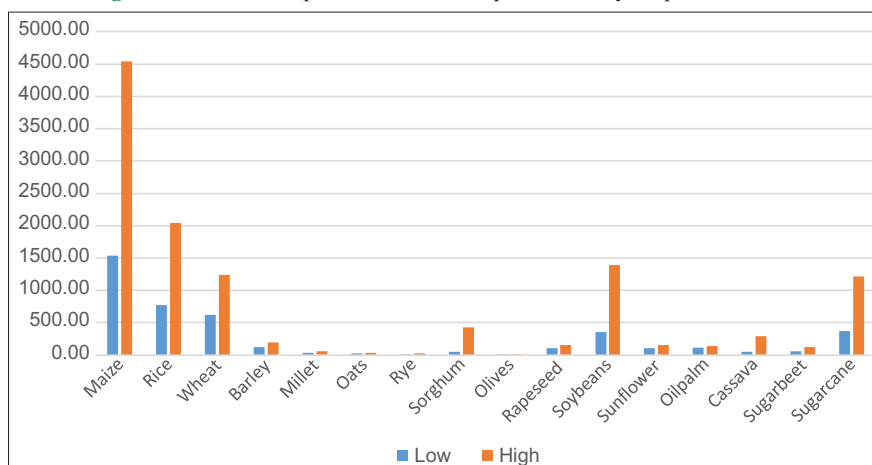
the interaction between the substrate and the enzyme, thereby improving accessibility (Figure 2).

The approach of the enzyme to substrate. With amounts load the enzyme in the range of from 10 to 20 FPU/g of substrate is yield of about 50% for 12 h at most. It was decided to set the temperature of 37°C under bibliography that to as yield was reported significant with ethanol. In these studies, the stirring speed was 500 rpm, confirming that it would significantly increase the stirring speed during processing with a higher load on the biomass.

To carry out optimization of enzymatic hydrolysis, according to the results of screening, all variables were significant, which is in the range of statistical significance ($P = 0.05$). To carry out the next project, conditions, while maintaining variable mixing at 180 rpm, a temperature of 37°C and a surfactant concentration of 0.3 g/L.

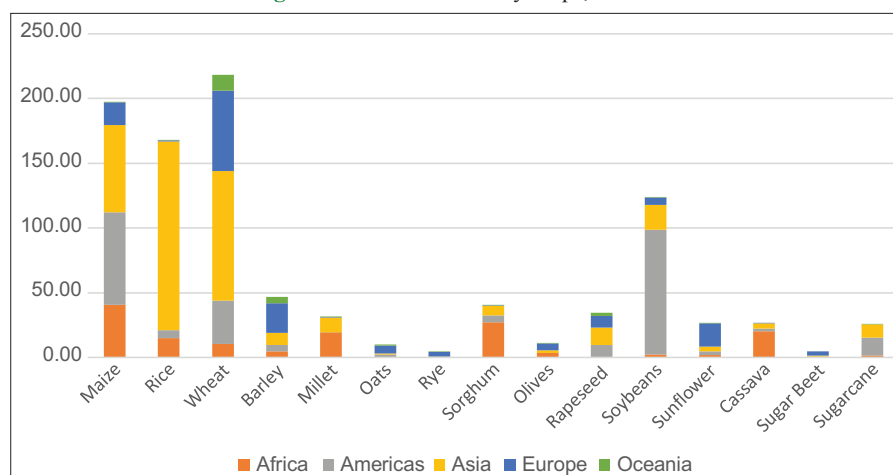
The test showed that there are significant differences between the average values of all tested levels ($P < 0.05$), yielding better yields obtained with lower percentage of celluloses (6.0%). In addition, during agitation, it showed almost no effect on the process when using 1% of the mass; increasing it to 6% can cause excitation orbital is not suitable and that the system requires more energetic excitation.

Figure 2: Theoretical potential of biofuel production by crops, mln/tonnes

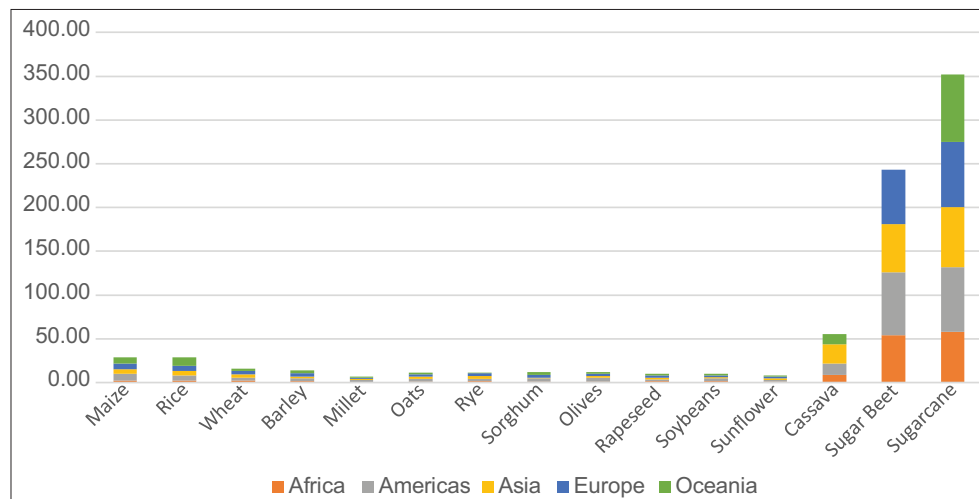


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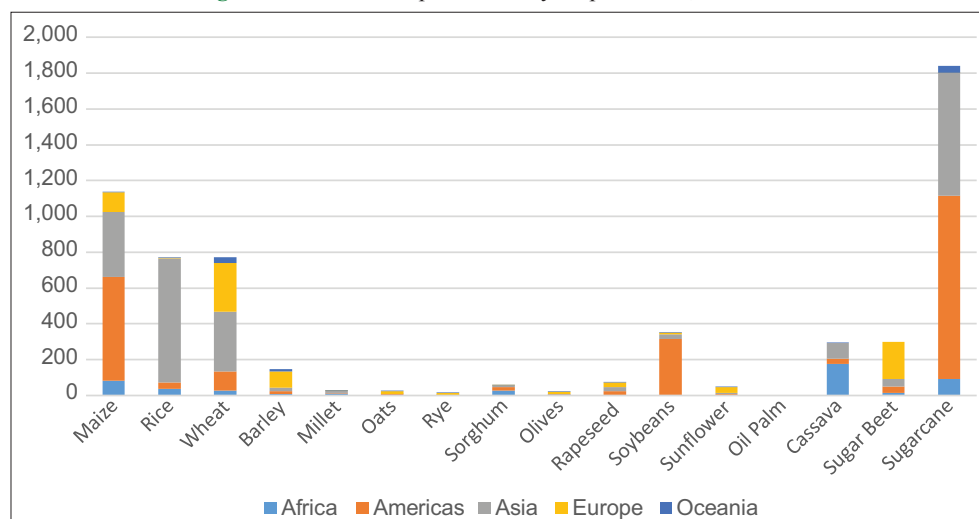
Figure 3: Area harvested by crops, mln/Ha



Source: Calculated by authors

Figure 4: Yields of biofuel production by crops, tons/Ha

Source: Calculated by authors

Figure 5: Real biofuel production by crops in 2017, mln/tonnes

Source: Calculated by authors

The maximum yield was 75% in 13 h. Comparing with those reported in the literature, it can be stated that the productivity of enzymatic hydrolysis in this work is in an acceptable range taking into account that 13 hours were used for this process, which implies a reduction in costs. The parameters of global biofuel potential of crops was shown in Figures 3-5.

Productivity 1.7-6% hydro pulp is comparable with the results obtained with the use of leaves of cassava also precede flax is treated with alkali. A productivity of 1.4 (g/lh) was obtained by recycling of 6% biomass for 18 h with an enzyme load of 22 FPU/g of the substrate.

The response surface for assessing the effect of temperature is the ratio and charge of sodium hydroxide during alkaline pretreatment using the following conditions: 130°C; 0.70 g of tension hydroxide/g stubble corn, for 75 mi chickpeas, yielding sugar yield 59.8%.

N After pretreatment IME is smiling significant percentage of lignin and hemicellulose, which increase the efficiency of hydrolysis of the enzyme.

4. DISCUSSION

Biofuel is defined as any fuel from biomass (organic matter), which is formed from plants, industrial, commercial, household waste or agricultural. It is obtained from: burning dry organic waste (such as garbage) household, industrial and agricultural waste, from scrap, peat and wood from forests, rapid growth); fermenting wet wastes (for example, animal droppings) in the absence of oxygen for the production of biogas or fermentation of sugar and cereals in the stream produce alcohol and esters (Goodson et al., 2011).

Bioethanol is the alcohol that is obtained by polysaccharide inter fermentation to form ethanol, and this is distilled in its final form.

It is mainly produced from sugarcane or corn, the carbohydrates of which are fermented to ethanol with *Saccharomyces* yeast. From agricultural residues, forest residues, industrial or urban ethanol can also be obtained, but they are raw materials rich in cellulose; converting cellulose into fermentable sugars is a complex process and expensive.

Biodiesel is an ester that is made from various types of fat or oil, which may be of plant origin, such as soybean, rapeseed sludge, and sunflower oil, such as animal origin. Biodiesel production is based on the so-called trans esterification of glycerides, through the use of catalysts (James et al., 2011; An et al., 2020; An et al., 2019).

The historical context that has led to the use of biofuels. The origin of biofuels is as old as the origin of fuels, fossils, starting with the generation of alcohols, oils and biogas with combustible properties, from the metabolism of organic waste compounds, usually processes. Spontaneous events that occur in nature during the geochemical cycle of elements (Illman et al., 2000).

In 1884, Louis Pasteur, who had previously reported methane production and anaerobic microorganisms, suggested using biogas from animal waste for street lighting. In the first half of the 20th century, numerous laboratory and experimental studies were conducted for the production of biogas, achieving special significance during the Second World War due to the lack of fossil fuels. In industrialized countries and biogas technology has been motivated greater environmental aspect (Najafabadi et al., 2016).

After the energy crisis of 1973 and during the eighties, the production of biofuels returned to some importance as a form of energy recovery.

In general, energy consumption is assessed as an indicator of economic progress and a social country. So, for a long time, the environmental consequences and social models of energy consumption were postponed (Kimura et al., 2004).

Today's energy issue is crucial not only in terms of meeting growing global demand, but with respect to environmental impact and a modern energy system based mainly on the use of fossil fuels, at least part of humanity has tested it (Meher et al., 2006).

These renewable energy sources have an estimated potential in our country of the order of 176,000 tons of fuel, the annual equivalent of pig and cattle residues, waste from the production of sugar, alcohol, coffee mass and sanitary landfills, which contribute, in large part, to environmental pollution. However, the fact of the production and use of biofuels willow has been criticized and controversy in recent years, was not allowed to evaluate and understand the benefits that effective use of biofuels, to receive direct from the waste. In this sense, the various institutions in the country were involved in researching of biofuels, mainly universities (Kroh, 2013).

Ecological, economic and social effect promote the use of biofuels argue that they will serve as an alternative to depleting oil reserves, mitigating climate impacts, increasing farmers' incomes and

promoting rural development. Studies and analyzes conducted by respected ecologists and with cytologists show that the growth of a large biofuel industry will have disastrous consequences for farmers, the environment, biodiversity conservation and for consumers. Consequently, the use of biofuels has an environmental impact, the positive and negative sides that need to be analyzed (Mata et al., 2010).

The benefits of using plant biomass in the production of biofuels can benefit global energy reality, with a significant impact on the environment. On the other hand, the negative consequences do this despite the fact that renewable energy is not considered by many experts as non-renewable energy and, therefore, is also not green energy. One of the reasons is that, despite the fact that in the first biofuel production only residues agricultural activity, with its generalization and promotion in developed countries, many underdeveloped countries are destroying their natural space, including the jungles and forests, to create a biofuel 's plantations. Therefore, some characteristics when evaluating whether the obtained biofuel can be considered a renewable energy source.

Water consumption for growing means a decrease in stocks and flows of freshwater channels. Water consumption depends on each process. As regards the distillation process to claim Acquiring ethanol, n and this step a total of 12 gallons of wastewater removed per gallon of ethanol produced, more or less than three processes required to obtain 95% purity ethanol.

Both in the balance of emissions and in the balance of energy it is useful if the raw materials used come from waste, this fuel helps the disposal of waste. Certain production processes of biofuels and more effective.

As for resource consumption and environmental pollution. For example, growing sugar cane a requires less fertilizer than growing corn, so the bio-ethanol cycle from sugar cane means a greater reduction in gas emissions and the greenhouse effect is more efficient in relation to the fossil fuel life cycle than the bioethanol cycle obtained from corn. Thus, some ethanol production does not they provide net energy benefits; on the contrary, they require more fossil energy than it produces. Referring to specific cases, we have this for the production of corn ethanol, 1.29 gallons of fossil fuels per gallon of ethanol produced are required, and soybean biodiesel production requires 1.27 gallons of fossil energy per gallon of produced biodiesel (Gardner et al., 1993).

The effect of competition for agricultural land. Another unfavorable aspect in the production of biofuels is that when agricultural land was used for the direct cultivation of biofuels instead of using exclusively the remnants of other crops, it began to produce a competitive effect between food and biofuel production. To increase the production of this crop, it is obligatory to go to new land.

The negative effects of biofuel production are not to remain at that; in many latitudes of the working conditions of those who work for the production of biofuels is unacceptable. Raw materials have traditionally been used for human consumption and generate

various opinions and consequences, not only economic, but social and ethical (Chiemchaisri et al., 2012).

Over the past 20 years, a large part of society has experienced enthusiasm for biofuels, based primarily on the political will of the great powers, in order to reduce its dependence on oil - and, therefore, on producing countries, but also in order to reduce emissions of harmful greenhouse gases without the need to sacrifice energy consumption. However, the side effects caused by both production and biofuels undermine little initial enthusiasm.

Indeed, the benefits of biofuels have been challenged from different perspectives: environmental, social, and economic. From an environmental point of view, serious damage to soils, biodiversity and water systems is the intensification of monocultures and the use of fertilizers and pesticides, as described in the previous section. But perhaps the factor that has attracted the attention of the current debate is the impact of biofuels in the context of the global food crisis (Cai et al., 2011).

In particular, according to the authors, the initial purpose for which the use of biofuels was conceived was beneficial, but, unfortunately, the intention to be environmentally friendly at that moment when you see this technology as a potential source of economic resources and mass production produced without assessing the consequences that it will have on a social level. On the other hand, although it has shown a positive effect that the correct use of biofuels or a negative effect that is excessive and irresponsible use, society also affects their application regardless of the consequences, since their needs, priorities and interests will be determined in each social context or region, as the historical context and social development (Belkoura et al., 1997).

Bioethics, placed at the center of development for humanization, is an urgent task that, no doubt, for the first time in the history of mankind, is not only a moral imperative, but also a question of survival. Science is faster than a bioethical discussion of its methods and results. The discussion in the previous epigraph shows an objective and subjective polemic around the analysis of the use of biofuels (Ahmed et al., 2014; Antoni et al., 2007; Bansal et al., 2013)

5. CONCLUSION

In the production of biofuels, there are a number of economic, political, and social interests, which, of course, will hinder objective reflection on this topic, and it is necessary to have an impartial view, where the interest of few does not prevail, but everyone thinks about the good of the community, achieving a balance with the environment.

Reflecting on the ethical aspects of biofuel production need to keep in mind some of these trends, for example, naturalistic I Ethics, ethics focuses on the life he requires. In this regard, we have that environmental ethics has the task of thinking not only in the long term, but also in a broader sense, in order to expand moral reflection, since this includes not only people, but also the animal world and plants.

Technological intensification of biofuels takes place in a historical context, characterized by rising Japonica Rice s for fossil fuels, due to its consumption growing in an industrialized society, and also as a result of their negative impact on the environment. Biofuels, semi obtainable through the waste contributes to environmental sanitation, at the same time being regular enrollment of renewable energy, decentralized and clean. However, biofuel from agricultural crops has significant environmental, economic, and social impacts, which lead to controversy around the subject around the world.

The analysis of these contradictions with the bioethical standpoint of chill elements that allow to find a balance point between development and stability of the regions where the production of biofuel, as it was proved that the society itself.

The influence of variable FPU/g of the substrate was evaluated; pH, time, temperature, surfactant concentration, and agitation on the enzymatic hydrolysis of scale descaled Japonica Rice was preliminarily treated with alkali at a moderate temperature. All variables significantly affected the process by 1% cellulose in stock and.

It is noted that in order to increase cellulose in the process, it is necessary to use more vigorous with stirring in order to improve the homogenization of the medium and increase the hydrolysis yields.

Studying the increase in cellulose content in the medium is a viable improvement in agitation, since this leads to the production of more sugar available for fermentation.

Using 30,0 FPU/g sub stratum and pH. 5.0 for 13 hours was obtained yield of enzymatic hydrolysis - 53%. Increasing the percentage of hydrolyzed BLE cellulose to 6% can help achieve a product yield of 75%. This value is more than acceptable for such a long time (13 h, compared with the usual 48-72 h).

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