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Title: Producción de bioetanol de segunda generación a partir de olote de maíz

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Introduction

Lignocellulosic biomass

1st generation

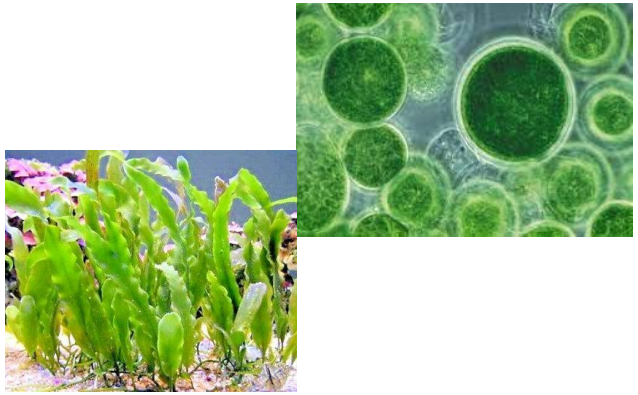
- Sugars
- Starchers

2nd generation

- Agricultural
- Forestry
- Waste

3rd generation

- Microalgae
- Macroalgae



Introduction

Ethanol production

Lignocellulosic biomass

Treatment

- Hydrolysis
- Enzimatic fermentation
- Yeast fermentation

Products

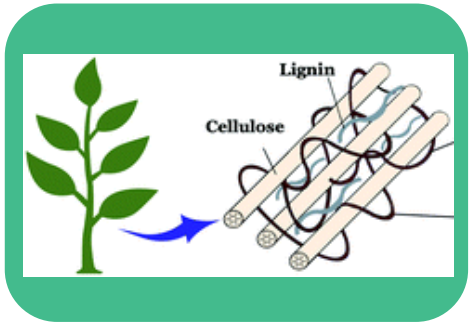
- Gas
- Ethanol
- By products

Introduction

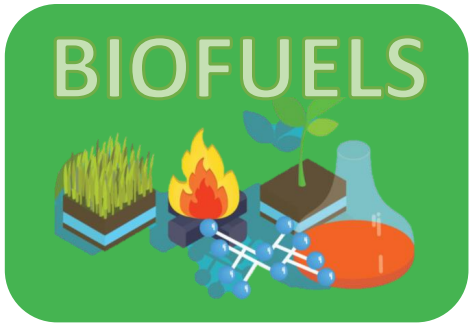
Ethanol from corn waste

Waste of corn production

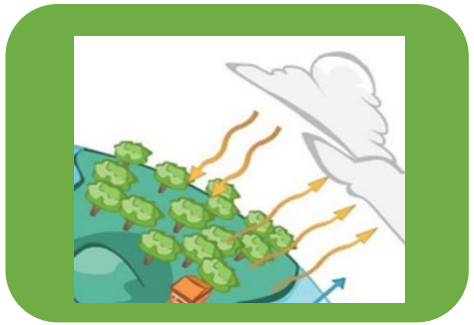
Corn cob



High concentration of cellulose and hemicellulose



Ethanol second generation



Less GHG emissions

Methodology

corn cob flour

Raw material

- Corn cob was milled, sieved and dried (60 ° C)

Biomass components

- Components (cellulose, hemicellulose and lignin) were determined by standard protocols

Fermentation

- Inoculated with S. cerevisiae. Incubation at 25 ° C, 120 rpm, 48 h. Reducing sugars concentration was quantified, control method.

Distillation

- The ethanol produced was quantified by HPLC.

Results

Figure 1. Corn cob flour

Tthe corn cobs a fine off-white flour was obtained, with a pleasant aroma, easily suspended in water.

The composition of corn cob flour is observed below:

Component	Bagasse content in g/g
Cellulose	382 ± 12
Hemicellulose	378 ± 18
Hollocellulose	761 ± 53
Lignin	223 ± 17
Extractables	129 ± 07

Results

Final yield after enzymatic hydrolysis is higher when alkaline solutions are used (Table). It's recognized that diluted acid solutions hydrolyze mainly hemicellulose and partially cellulose

In the fermentation of corn cob hydrolysates, bioethanol yields of up to 3.5 g / L were found, which is equivalent to a YP / S value of 0.46, which represents around 90% of the theoretical yield (Figure 2).

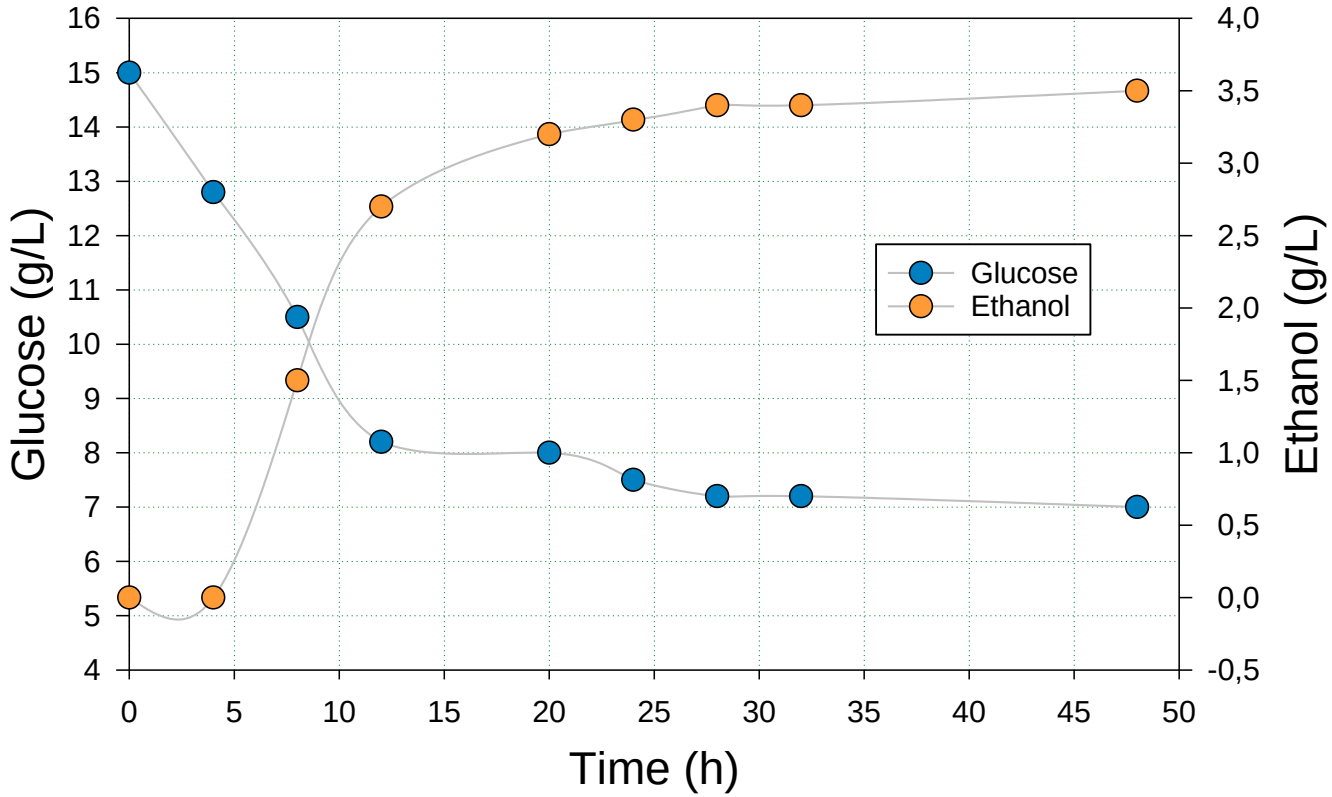


Figure 2. Sugar consumption and ethanol production

Pretreatment	Corn cob yield (mg RS/g)		Total yield	
	After pretreatment*	After enzymatic hydrolysis	Corn cob mg RS/ g	%
Diluted acid	173.65 ± 22.45	0.00	173.65	17.36
Alkaline	57.55 ± 6.93	151.24 ± 17.93	196.13	19.81
No pretreatment	0.00	55.91 ± 2.22	55.91	5.59

*Average 5 repetitions

Results

Bioethanol yields with corn cob hydrolysates fermentation was up to **3.5 g/L**, which is equivalent to a **0.46 YP/S value**, representing around **90% of the theoretical yield**.

Dong et al., (2021) reported on corn husk fermentation, for which they hydrolyzed the material with acid and enzymes prior to fermentation, and obtained butanol yields **of 9.5 g/L, with 35.7 g/L initial concentration**.

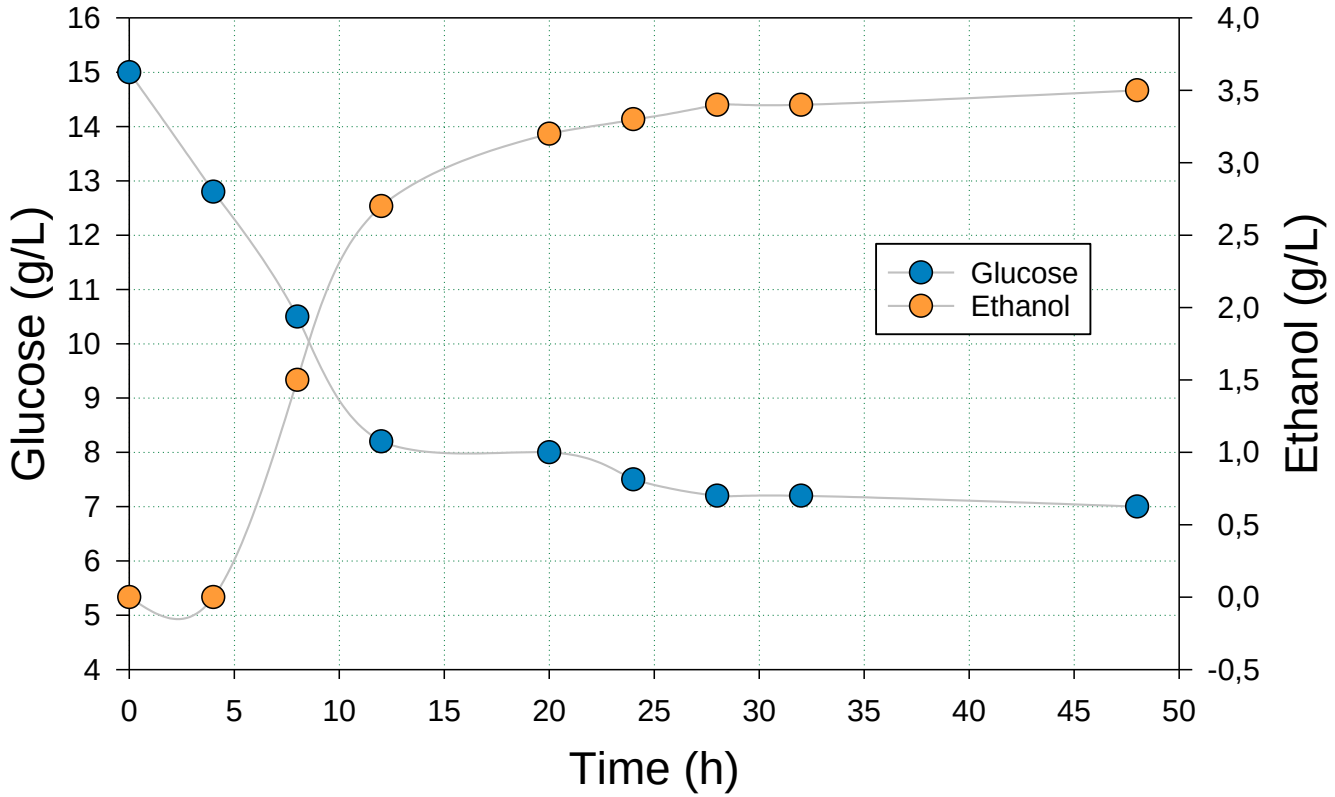


Figure 2. Sugar consumption and ethanol production

Conclusions

- The lignocellulosic biomass of corn cob reached values close to 40%, which allowed obtaining up to 19.81% of fermentable sugars, by means of alkaline pretreatment of the biomass and later through enzymatic hydrolysis of cellulose.

- These hydrolysates were shown to be appropriate for the production of bioethanol and yields close to the theoretical maximum (90%) were achieved in fermentation.

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