

# Studies regarding the feasibility of implementing sugar beet and sorghum biomass to produce ethanol in Quebec

Record number : OPR-387

## Overview

### RESEARCH DIRECTION

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### INFORMATION

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### ADMINISTRATIVE UNIT(S)

Faculté de génie  
Département de génie chimique et de  
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### LEVEL(S)

2e cycle  
3e cycle  
Stage postdoctoral

### LOCATION(S)

Université de Sherbrooke  
P3

## Project Description

In recent years, a mandate was set in place supporting the addition of a minimum of 5% ethanol to fuel volumes. This would amount for a total of 2 billion liters of ethanol at a national level and 450 million liters in Quebec alone. The industrial partner of the present proposal, GreenField Global, located in Varennes (QC), is the sole provider of industrial ethanol in the province, generating 180 million liters of fuel-grade ethanol each year. Despite this, a significant part of the required ethanol volumes to reach the established federal mandates has to be imported.

To support the efforts in achieving the targeted production levels, the government of Quebec recently reinstaured (for 5 years) the tax credits for the production of first (based on free sugars) and second generation (based on cellulose) ethanol. However, the only mature ethanol production technologies readily available at large scale are the ones based on the first-generation sugars. Thus, the concept of ethanol generation 1.5 was developed in order to reduce the gap between the existing and emerging approaches. This concept relies on the use of both easily recoverable free sugars as well as the cellulosic and hemicellulosic constitutive ones from carbohydrate-rich biomass such as sorghum and sugar beet. Such an approach allows for a smooth transition towards novel ethanol production technologies while simultaneously reducing the costs associated with the extraction of second generation carbohydrates. Sweet sorghum for instance is getting increased attention to produce sugars and ethanol. Besides significant amounts of easily-fermentable sugars (20% of dry weight), the sorghum biomass contains mainly cellulose, hemicellulose and pectin. Thus, about 10 m<sup>3</sup> ha<sup>-1</sup> of ethanol have been reported using the free sugars extracted from the sorghum biomass, without taking into account the untapped cellulosic and hemicellulosic carbohydrates. This comes already as an improvement in comparison with the 4.1 m<sup>3</sup> ha<sup>-1</sup> of ethanol obtained from corn. In addition, and similarly with starch-based ethanol, the resulting fermentation byproducts can be commercialized as animal feedstock. Thus, the proposal identified two main objectives: the first one consists in the development of an efficient long-term beet biomass storage approach allowing for minimal loss of carbohydrates while the second main objective focuses on the elucidation of various simplified sugar extraction approaches in order to identify their implementation potential into a simultaneous extraction strategy for the 1st, 1.5 and 2nd generation sugars.

**Discipline(s) by  
sector**

**Sciences naturelles et génie**

Génie chimique

**Funding offered**

Yes

**Partner(s)**

GreenField Global Inc.

The last update was on 12 March 2024. The University reserves the right to modify its projects without notice.