

## Physicochemical Characterization of Sugarcane Straw: A Literature Review

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### Abstract

This paper is based in an extensive literature search where were raised, studied and analyzed information of the physicochemical characterization available in the literature, especially in indexed journals. The data of ash content and elemental analysis were more deeply studied comparing parameters to find the source of the variation between the results. It can be said that it is still necessary to reproduce this study for further analysis and that the information gathered is needed to ensure the straw sugar cane as a possible biomass for the production of biofuels second generation or as thermal fuel.

*Key words:* Sugar cane straw, literature review, physicochemical characterization

### Introduction

Due to its large agricultural production Brazil has a considerable amount of agricultural and agro-industrial waste that can be of great economic and social interest. One of the most important waste is the straw generated in post-harvest agricultural phase of sugarcane. With the introduction of stringent environmental legislation in 2015 that bans any burning of this material in São Paulo state, this material is becoming more available.

The straw can be used as feedstock in bio refineries installed in their own mills and distilleries in the production of higher value-added materials such as resins and polymer films, recyclable plastics, dispersants, flocculants, and other more traditional uses, such as in paper production and the generation of electricity and renewable heat.

The data on the physicochemical characteristics of straw sugarcane is of extreme importance to facilitate use of feasibility analysis of the technologies available for the use of this residue.

### Results and Discussion

This work focused on creating a database containing results of sugarcane straw physicochemical characterization of from papers and articles to which it had access. The database also includes the origin, the sample preparation method and the normative methods used by each author. All the analysis studied and the number of publications for each are represented in Chart 1.

For more in-depth and comparative analysis of the results, where chosen the ash content and the elemental analysis. The ash content from the literature had results that varied from 4.32% to 13.00%. The origin of the sample and the sample preparation used by each author is one possible explanation for the variation of the result. Through the comparative study of the normative methods used by each author and the results was

observed that the use of different methods were not one of the variation causing factors.

**Chart 1.** Analysis studied in this work and number of publications that presented results for each

Analysis	Number of publications studied
Ash	9
Humidity	3
Extractives	5
Volatiles	5
Fixed Carbon	5
Calorific Value	6
Lignin	7

The elemental analysis results for each element (carbon, oxygen, hydrogen, sulfur and nitrogen) are relatively similar. The biggest difference between the amounts reported in the literature is oxygen due to different calculations performed for each author. In order to compare the results all the different calculus were made for all the references gathered. It was possible to observe that the biggest variation of %O obtained when the ash content was in the math due to the errors and the differences implied in the ash analysis.

### Conclusions

In this paper we analyzed more deeply the results of sugarcane straw characterization from different reference. However it is still necessary to reproduce this study for further analysis and findings during the survey data to ensure straw sugar cane as a possible biomass for the production of second generation biofuels or as thermal fuel.

### Acknowledgement

Thank you to PRPG and CNPq for the financial support for this work.

<sup>1</sup>JACOME, D.L.F. Dissertação (Mestrado em Engenharia Mecânica) – Universidade Estadual de Campinas, Campinas, 2014