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Fast pyrolysis of sugarcane straw and eucalyptus bark in a fluidized bed reactor

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FAST PYROLYSIS OF SUGARCANE STRAW AND EUCALYPTUS BARK IN A FLUIDIZED BED REACTOR

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1. KEY NOTES

- Biomass → driving economic growth and reducing CO_2 emissions depending on the degree to which it can replace fossil fuels.[1]
- The fast pyrolysis process can convert biomass into liquids with high added energy value - bio-oil

2. INTRODUCTION

- Biomass energy contributes approximately 10% of global energy, with two thirds of this bioenergy being generated in developing countries and the remainder in developed countries. [2]
- Sugarcane straw (SCS) and eucalyptus bark (EB) (Figure 1) are two important agro-industrial residues not only in the Brazilian scenario, but also internationally.

Figure 1 – Sugar cane straw and eucalyptus bark milled.

- The fast pyrolysis process arise as a tool for converting biomass into liquid fuel with greater energy densification and a wide range of applications.[3]

3. GOALS

To evaluate the fast pyrolysis process of SCS and EB in a bubbling fluidized bed reactor at 500 °C characterizing the main product (bio-oil) and its by-products (biochar and gases)

4. METHODOLOGY

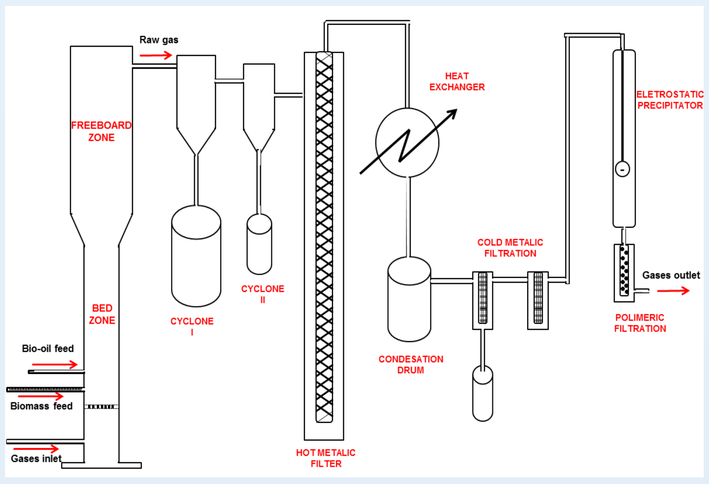

Figure 2 – Fast pyrolysis plat flowchart.

Table 1– Biomass composition

Characterization	SCS	EB
Ash - % w/w	3,0	9,0
Carbon - % w/w	46,4	43,0
Hydrogen- % w/w	6,13	5,82
Nitrogen- % w/w	0,2	0,4
Volatile Matter- % w/w	79,4	76,6
HHV - MJ/kg	18,88	17,84

5. RESULTS

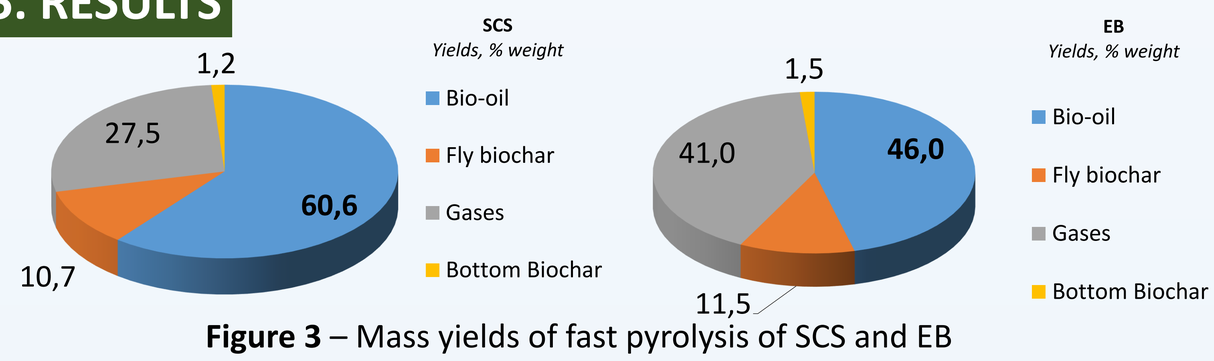

Figure 3 – Mass yields of fast pyrolysis of SCS and EB

Table 2– Bio-oil characterization

Characterization/Property		SCS bio-oil	EB bio-oil
Ultimate analysis, %w/w	C	49.3	30.6
	H	5.85	6.115
	N	0.6	0.4
	S	<0.1	<0.1
	Ash	0.16	0.15
	Cl	0.021	0.111
Water Content, % w/w		38	48
Density, kg/m³		1081.75	1107.85
HHV, MJ/Kg		18.05	9.52
LHV, MJ/kg		16.77	8.18

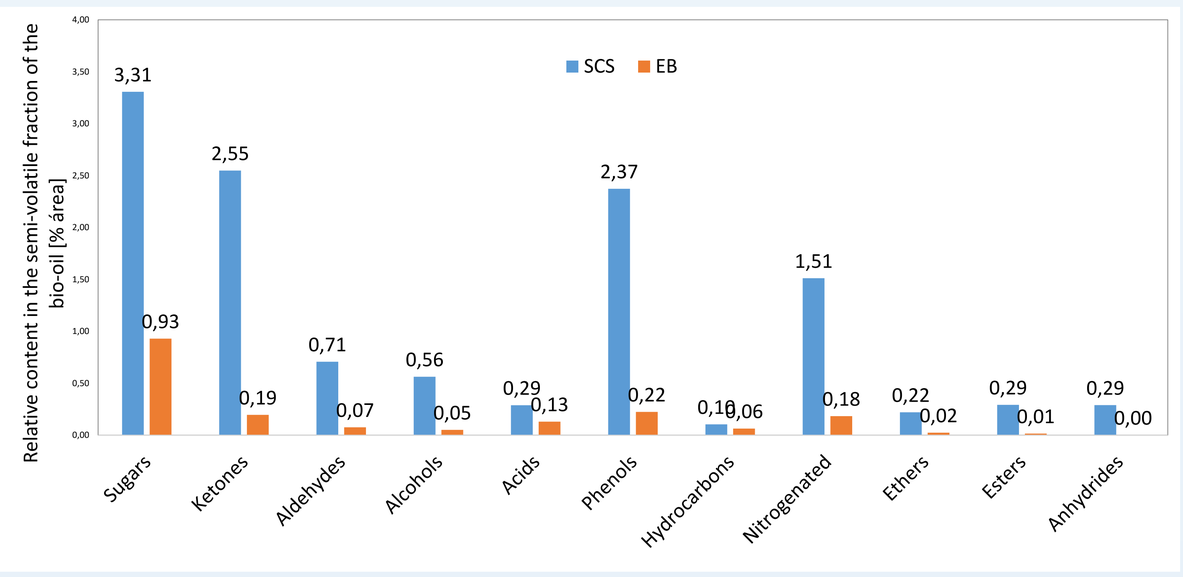

Figure 3 – Composition of bio-oil in extracted fractions

6. CONCLUSIONS

- Fast pyrolysis process is an important tool for the conversion of biomass into intermediate(s) with better logistics and energy density;
- The processing of sugarcane straw is less complex than Eucalyptus bark, generating a bio-oil with potentially better properties.

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8. ACKNOWLEDGMENTS

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