Sugarcane bagasse characteristics

Introduction

Sugarcane is one of the most promising agricultural sources of biomass in the world. Its approximate composition of the sugarcane in natura is the following:

- Stem and green leaves: 8%
- Sheath and dry leaves: 20%
- Clean Stalk: 72%

Bagasse is the fibrous residue left over after its crushing of the stalk for the extraction of the juice.

Sugarcane bagasse is divided into two major components: pith and rind. Pith is the inner part of sugarcane bagasse while rind is the outer part of it.

Sugar mills generate approximately 270-280 kg of bagasse (50% moisture) per metric ton of sugarcane (Rodrigues et al. 2003). Considering that about 92% of the sugarcane bagasse is burned in the industry for process heat generation, if the remaining 8% could be used for second generation ethanol production, an additional ethanol yield of 2,200 L would be produced per hectare of sugarcane. The production of ethanol from sugarcane bagasse, through hydrolysis and fermentation, could yield about 280-330 L per ton of dry bagasse considering a cellulose content of 40% in the bagasse (Leite et al. 2009).

Uses

The usual uses of sugarcane bagasse are:

1 – Fuel

Bagasse is often used as a primary fuel source for sugar mills. When burned in quantity, it produces sufficient heat energy to supply all the needs of a typical sugar mill, with energy to spare. To this end, a secondary use for this waste product is in cogeneration, the use of a fuel source to provide both heat energy, used in the mill, and electricity, which is typically sold on to the consumer electrical grid.

2 –2nd generation ethanol

Typically, bagasse is made of 45 to 55% of cellulose, 20 to 25% of hemicellulose, and 18 to 24% of lignin. This high ratio of cellulose to lignin is the reason why it is considered the best feedstock for cellulosic ethanol production, as it requires much less preprocessing that other feedstocks such as hardwoods.

3 – Apparel

In the apparel industry, bagasse is utilised for production of textile rayon fibers such as viscose, modal and lyocell. The bagasse is shredded, broken down with eco-friendly chemicals or other chemicals, and then when it is still in a liquid form, it is shot at very high pressure through tiny holes. This long strand of fibre is then solidified and spun into yarn. Rayon fibres are thus produced. Since rayon is manufactured from organically occurring polymers, it is considered as a semi-synthetic fibre. Sugarcane rayon is glossier and more silk-like than wood pulp rayon. Sugarcane rayon, in particular, has a delightful lustre, however, this could also merely be a manufacturing difference, and not a material difference.

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Characteristics

The chemical characteristics of sugarcane depend on the varieties used, its harvest methods, the technologies employed to test it, etc

Chemical composition of the sugarcane straw (sheath + dry leaves).

Constituents	**% in mass**
Cellulose	44.5 ± 0.5
Polyoses	30.4 ± 0.3
Total lignin	12.3 ± 0.2
Ash	7.5 ± 0.3
Extractives (Cycle-Hexane/Ethanol 2;1)	3.7 ± 0.1
Total	98.4 ± 0.3

Chemical composition of the sugarcane green leaves.

Constituents	**% in mass**
Cellulose	40.5 ± 0.8
Polyoses	30.8 ± 0.8
Total lignin	22.8 ± 0.2
Ash	2.1 ± 0.2
Extractives (Cycle-Hexane/Ethanol 2;1)	2.5 ± 0.1
Total	98.4 ± 0.4

Components, % d.b.*	**GABRA *et al.*(2001)**	**PELÁEZ SAMANIEGO(2007)**	**LINERO and LAMÔNICA(2005)****
C	44.2	41.58	46.2
H	5.4	5.8	6.2
N	0.6	0.45	0.5
O	38.7	n.d.	43
S	0.1	0.08	0.1
Cl	0.3	n.d.	0.1

Production

Alkol Biotech is the sole producer of sugarcane in Europe. The bagasse we provide comes from our growing regions in the city of Motril in Spain. It can be provided during the harvest period, which goes from january to june.

It can be provided in raw or crushed with up to 50% moisture or dry with up to 10% moisture. It is sent by refrigerated truck to any part of the European Union and usually arrives in 2 days.

The minimum amount per order is 5 tons. It is recommended to secure the order by january. To order, please send an email to info@alkolbiotech.co.uk