Lignocellulosic wastes such as Rice straw, Wheat straw, Corn straw and Bagasse contain same sugar molecules for bioethanol production as such can be used to generate renewable energy using appropriate physical, chemical and biological techniques.

Bagasse: 51.3

Wheat straw: 204

Corn straw: 58.6

Rice straw: 205

What is ligonocellolisic waste?

Lignocellulose refers to plant dry matter (biomass), so called lignocellulosic biomass. ... Waste biomass is produced as a low value byproduct of various industrial sectors such as agriculture (corn stover, sugarcane bagasse, straw etc.) and forestry (saw mill and paper mill discards).

Is algae a ligonocellolisic?

Conventional biomass is generally divided into two groups: lignocellulosic biomass and algal biomass. Lignocellulosic biomass contains three main components, namely cellulose, hemi-cellulose and lignin, while the algal biomass is mainly composed of carbohydrates, proteins and lipids.

Why algae are considered more valuable biofuel?

Why are algae considered more valuable for biofuel than plants (such as corn)? Many types of algae can divert the sugars they make by photosynthesis into lipids that can be used to make biodiesel. ... In biofuel-producing algae, the energy of sunlight is converted to lipids. These store a large amount of energy per gram.

Lignocellulosic biomass.

Lignocellulose refers to plant dry matter (biomass), so called lignocellulosic biomass. It is the most abundantly available raw material on the Earth for the production of biofuels, mainly bio-ethanol. It is composed of carbohydrate polymers (cellulose, hemicellulose), and an aromatic polymer (lignin). These carbohydrate polymers contain different sugar monomers (six and five carbon sugars) and they are tightly bound to lignin. Lignocellulosic biomass can be broadly classified into virgin biomass, waste biomass and energy crops. Virgin biomass includes all naturally occurring terrestrial plants such as trees, bushes and grass. Waste biomass is produced as a low value byproduct of various industrial sectors such as agriculture (corn stover, sugarcane bagasse, straw etc.) and forestry (saw mill and paper mill discards). Energy crops are crops with high yield of lignocellulosic biomass produced to serve as a raw material for production of second generation biofuel;

examples include switchgrass (*Panicum virgatum*) and Elephant grass.

Dedicated energy crops.

Many crops are of interest for their ability to provide high yields of biomass and can be harvested multiple times each year. These include popular trees and *Miscanthus giganteus*. The premier energy crop is sugarcane, which is a source of the readily fermentable sucrose and the lignocellulosic by-product bagasse.

Applicatication

Pulp and paper industry lignocellulosic biomass is the feedstock for the pulp and paper industry. This energy-intensive industry focuses on the separation of the lignin and cellulosic fractions of the biomass.

Biofuels

Lignocellulosic biomass, in the form of wood fuel, has a long history as a source of energy. Since the middle of the 20th century, the interest of biomass as a precursor to *liquid* fuels has increased. To be specific, the fermentation of lignocellulosic biomass to ethanol is an attractive route to fuels that supplements the fossil fuels. Biomass can be a carbon neutral source of energy in the long run. However depending on the source of biomass, it will not be carbon neutral in the short term. For instance if the biomass is derived from trees, the time period to regrow the tree (on the order of decades) will see a net increase in carbon dioxide in the earth's atmosphere upon the combustion of lignocellulosic ethanol. However, if woody material from annual crop residue is used, the fuel could be considered carbon-neutral. Aside from ethanol, many other lignocellulose-derived fuels are of

potential interest,
including butanol, dimethylfuran,
and gamma-Valerolactone.

One barrier to the production of ethanol from biomass is that the sugars necessary for fermentation are trapped inside the lignocellulose. Lignocellulose has evolved to resist degradation and to confer hydrolytic stability and structural robustness to the cell walls of the plants. This robustness or "recalcitrance" is attributable to the crosslinking between the polysaccharides (cellulose and hemicellulose) and the lignin via ester and ether linkages. Ester linkages arise between oxidized sugars, the uronic acids, and the phenols and phenylpropanols functionalities of the lignin. To extract the fermentable sugars, one must first disconnect the celluloses from the lignin, and then use acid or enzymatic methods to hydrolyze the newly freed celluloses to break them down into simple monosaccharides. Another challenge to biomass fermentation is the high percentage of pentoses in the hemicellulose, such as xylose, or wood sugar. Unlike hexoses such as glucose, pentoses are difficult to ferment. The problems presented by the lignin and hemicellulose fractions are the foci of much contemporary research.

A large sector of research into the exploitation of lignocellulosic biomass as a feedstock for bio-ethanol focuses particularly on the fungus *Trichoderma reesei*, known for its cellulolytic abilities. Multiple avenues are being explored including the design of an optimised cocktail of cellulases and hemicellulases isolated from *T. reesei*, as well as genetic-engineering-based strain improvement to allow the fungus to simply be placed in the presence of lignocellulosic biomass and break down the matter into D-glucose monomers. Strain improvement methods have led to strains capable of producing significantly more cellulases than the original QM6a isolate; certain industrial strains are known to produce up to 100g of cellulase per litre of fungus thus allowing for maximal extraction of sugars from lignocellulosic biomass. These sugars can then be fermented, leading to bio-ethanol.

Biocomposites.

Lignocellulosic biomasses are gaining attention also in the production of biocomposites materials such as particle panels, wood-plastic composites, and cement/geopolymer wood composites. Even though the production of biocomposites material rely mostly on wood resources, in less forest-covered countries or in countries where wood resources are already being overused, it is possible to utilize alternative sources of biomass such as invasive plants, agricultural and sawmills residues for the creation of new "green" composites. Biocomposites produced with lignocellulosic biomasses as alternative to conventional materials, are attracting the attention because are renewable and cheaper but also because they fit perfectly into the policy of the "cascade utilization" of the resources.

How ethanol is produced from biogas?

The common method for converting biomass into ethanol is called fermentation. During fermentation,

microorganisms (e.g., bacteria and yeast) metabolize plant sugars and produce ethanol.

What are the major steps involve in bioethanol production?

Bioethanol production includes three processes (1) pretreatment to separate hemicellulose and lignin from cellulose (2) hydrolysis of cellulose to obtain fermentable sugars and (3) fermentation to convert sugars into ethanol, followed by distillation to separate and purify the ethanol.

******All are from Wikipedia.**