Biomass Waste: Problems or solutions?

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Embrapa Agroenergy - Waste biomass - domestic, agricultural or industrial - can cause serious problems to the environment and public health, if disposed of improperly. However, due to its low cost and ready availability, the waste may be recovered, reducing production costs and environmental pollution. To this end, new technologies must be developed with the aim of transforming waste into new products, so that waste materials are not problems but become solutions.

The amount of biomass waste produced is astronomical. In the case of cane sugar, for example, it is estimated that about 175 million tons of dry straw and bagasse were produced in 2010, data from the National Supply Company. It is difficult to estimate the amount of agricultural residues produced in the country, but it is believed that the number is of the order of one billion tons per year. Therefore, it is easy to understand that waste materials are low cost and available in places where are produced.

In the sugar and ethanol industry, the emblematic example is the bagasse cane sugar, which instead of causing problems, is burned in boilers, generating steam and electricity to supply power for the operation of the plants. The surplus electricity is sold to third parties, adding value to production. The amount of electricity generated from this waste can be further enhanced by the implementation of more efficient generators, and also taking advantage of straw and cane tips for boilers.

The use of residual biomass is a viable option for the replacement of petroleum products in Brazil, not only for power generation, but also for the production of materials such as plastics and rubber (polymer). Reducing the use of petrochemicals is important today for two main reasons: the first is related to the large variation in oil prices, the threat of scarcity and uneven distribution in the earth, facts that have caused conflicts and wars. The second reason is linked to climate change, caused by the emission of greenhouse gases. Today, Brazil is a leader in the production of biofuels. The leadership is due to the high productivity of ethanol from sugarcane and the growing production of biodiesel, a renewable fuel derived from vegetable oils or fats animals. With the increase of production and the increase in proportion of the waste, that may serve as inputs for the manufacture of materials which may replace those of petrochemical origin. Plenty of waste can be seen as a strategic advantage for the country in future, and also to be a reference in the production of biomaterials. However, for this advantage to be exploited to avoid major problems, it is necessary to correct handling of waste, scientific and technological development, and creation and adaptation of public policies.

Among the waste materials generated in the production chain of Bioenergy, include vegetable fibers that have wide application in polymer-enhanced, forming materials composite. The fibers of the stem and leaves, called hard fibers are the most commonly used as reinforcement. Compared to the synthetic fibers, natural fibers have the following advantages: it is from abundant sources and rapid renewal, have low cost, low density, specific properties, are less abrasive, non-toxic and biodegradable. As disadvantages can be: processing at low temperature (200 ° C) and lack of uniformity of properties, depending on the origin and seasonal.

Vegetable fibers are composed mainly of cellulose, hemicellulose and lignin. These components can be separated, purified and used in various applications. Cellulose is the most abundant organic material on Earth. It is currently used in many materials: paper, cellophane and tissue (mostly comprises cotton cellulose). The cellulose can also be used as reinforcement for a range of polymers, including biodegradable. The hemicellulose, although abundant, has found a little application in materials, requiring more effort
in research and development to add value to this compound. Lignin, in turn, has applications in a mixture of polymers, acting as a bactericidal agent and antidegradante function, which it already has in nature.

A simple example of application of lignocellulosic materials is to produce panels of MDF (medium density fiberboard), widely used by the furniture industry. Types of MDF panels are produced without additives, synthetic using various lignocellulosic residues, because lignin at high temperature under pressure acts as an adhesive, and the flocking fibers. A more complex example is the use of nanotechnology to obtain nanostructures structures, dimensions of the order of nanometers (a nanometer is one millionth of a millimeter). With the use of nanotechnology, the cellulose can be transformed into nanofibers, through a process known as acid hydrolysis. These nanofibers are extremely resistant to traction and find application in the preparation of nanocomposites: high performance materials and proprieties unique.

The waste may find numerous applications, consisting of an important part of supply chains. In this sense, Embrapa Agroenergy is focused in solutions "biomass the energy"? Platforms in ethanol, biodiesel, waste and energy forests. The platform integrates waste of other platforms in order to enable the use of residual biomass, adding value and achieving co-products, respecting the environment. These efforts focus on the Thematic Laboratory Utilization of co-products and wastes, which contributes to the use of waste from the production of biofuels and other supply chains for energy generation, production of high value-added materials, chemicals, animal feed and biofertilizers. In conclusion, plant debris is abundant in Brazil and its use as a new material brings the ability to leverage the Green Chemistry. The development of technologies for the treatment and use of waste, in order to reduce production costs and environmental pollution is a major challenge of today. However, with this challenge there are numerous opportunities for socioeconomic development for the country and expansion of global sustainability.

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