

PAPER

from cane fiber and leaves

Companies use
sugarcane waste to
produce printer
paper and packaging

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Printer paper
produced in Colombia
using pulp from
sugarcane waste fiber

Two companies are transforming waste from sugarcane into pulp and paper. In February 2017, FibraResist opened a factory to produce pulp from sugarcane leaves in Lençóis Paulista, a sugar-growing region in the interior of São Paulo. The company prioritizes applications in the packaging industry, although the technology also allows tissues to be produced for napkins, toilet paper, and paper towels. Since 2009, GCE, a company headquartered in the city of São Paulo, produced EcoQuality printing paper in partnership with the Colombian company Propal using the fibers that remain after pressing sugarcane as a raw material.

FibraResist is the result of an innovative production process. In 2009, the industrial chemist José Sivaldo de Souza presented the board of the Cem group, which works in construction, rubber, and agriculture, with a proposal to produce pulp using sugarcane waste. He knew that Cem, where he works, was looking to diversify its activities.

The group decided to invest R\$6 million in developing the project. The studies had the support of researchers from the Federal University of Viçosa (UFV), who selected cane leaf fiber as a raw material, analyzed the pulp produced, and studied a cold production process that does not use boilers to cook the fiber. The company has filed a patent request with the Brazilian National Institute of Industrial Property (INPI) to protect its entire production process. Among the products developed by the company is a biodispersant that separates cellulose from lignin, a molecule that acts as a natural glue and makes plant cells rigid. In the traditional production system, this separation occurs during cooking; however, the cold process does not require energy to feed the boilers and eliminates industrial gas emissions.

A good use for agricultural waste

FibraResist developed a production system using sugarcane leaves to produce cellulose pulp



The process developed by the company also involves a closed circuit of water, which is treated and reused, and its end waste is used as fertilizer. “It is a process designed to be environmentally sustainable,” says Mário Welber, FibraResist’s director of institutional relations. The plant required investments of R\$25 million, R\$10.5 million of which was funded by Desenvolve SP, a funding agency in São Paulo. Its production capacity is 70,000 tons (t) per year. At the moment, it is in a commissioning phase during which the equipment and industrial process are tested from start to finish and produce on a small scale. Current production is 6 t of pulp per day, which is heading to the company’s first customer, Sanovo Greenpack Embalagens, a producer of egg cartons and trays for fruit. “The paper is also being tested by two other potential customers,” says Welber.

The cane leaves FibraResist uses are collected from within a 100-kilometer radius of Lençóis Paulista by an outsourced company that delivers them in 450-kilogram (kg) bales. According to Welber, only 80% of cane leaves and waste can be removed from the farms; the remaining 20% are left in the field to nourish the plantation, keep the soil moist, control weeds, and prevent soil erosion. “The leaves are needed in the cane fields, but too much encourages the spread of pests and fuels spontaneous fires,” he says.

Cane leaf waste is abundant in Brazil. The National Supply Company (CONAB) estimated that 657.18 million t of sugar-

cane were harvested in the 2016/2017 season, occupying an area of 9.05 million hectares. According to Henrique Coutinho Junqueira Franco, coordinator of the Sugarcane Renewable Electricity (SUCRE) program at the Brazilian Bioethanol Science and Technology Laboratory (CTBE), each ton of sugarcane generates approximately 120 kilograms of leaves (dry mass) and another 125 kilograms of dry fiber, known as bagasse.

For Franco, regulatory policies that encourage better use of industry waste

Transformation of organic matter into pulp fits into sustainable production models

are needed. “Most of the bagasse is already used in electricity cogeneration and production of second-generation ethanol. But the leaves are still not widely used,” he adds.

Pulp production is one alternative for the excess leaves. According to Fernando José Borges Gomes, a professor in the Department of Forest Products at the Federal Rural University of Rio de Janeiro (UFRRJ), fibers from cane leaves and bagasse are very similar to eucalyptus fibers. “It is possible to obtain high-quality pulp with similar physical and mechanical properties to that obtained from eucalyptus,” he explains. The use of alternative fibers to produce pulp from sources other than wood is not new. Bamboo, babassu palms, sisal, and agricultural waste have been used for decades, especially in countries where little land is available to grow trees.

TECHNOLOGICAL PARTNERSHIP

Sugarcane bagasse has been used to produce paper for more than 60 years. Chinese, Indian, Argentinean, and Colombian companies use it as a raw material. Entrepreneurs Luiz Machado and Guilherme de Prá, two paper executives from São Paulo who founded GCE, saw bagasse as an opportunity to stand out in the Brazilian market for copy and printing paper;



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- 1 FibraResist purchases leaves collected from sugarcane fields from a supplier company
- 2 This waste is stored in bales next to the factory in Lençóis Paulista
- 3 Using a cold process, the cellulose is separated from the leaves using a biodispersant
- 4 The pulp is produced and sold to paper producers

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a business involving 600,000 t per year that is dominated by two companies, Suzano and International Paper (IP). “We offer a product that does not take up plantation areas and leverages what is left over from the sugar and ethanol industry. This waste is transformed into a sophisticated material,” says Machado.

GCE’s strategy to enter the paper market involved establishing a partnership with Propal, a Colombian company in the Carvajal group that was already using sugarcane bagasse in its production process but not at the quality level desired by the Brazilians. Machado and Prá brought 40 years of experience in the paper market and improved the product. They were able to achieve the standards for smoothness, thickness, opacity, and desired moisture content, resulting in the Reprograf (sold by Propal) and EcoQuality (sold by GCE) product lines. Under the agreement, the Brazilians retain 30% of the 180,000 t manufactured each year by Propal in the Colombian cities of Yumbo and Caloto. GCE sells its EcoQuality paper in Brazil, the United States, and Mexico. The decision to keep production in the neighboring country is based on two factors. The first factor is the availability of raw materials, as Colombia also cultivates sugarcane. The second factor is the cost of energy. In the

Sugarcane fibers are very similar to those of eucalyptus, the main source of paper production

Colombian factory, the boilers are gas-powered and cost 35% less than those in Brazil; energy represents 20% of the costs of paper production.

According to Machado, EcoQuality paper is sold on the Brazilian market at the same price as its largest competitors. Companies that associate their brands with sustainability campaigns are now the main client niche for printing and copy paper produced using sugarcane bagasse. Most of GCE’s revenue comes from supply contracts signed with companies that associate their brands with sustainability, such as Pfizer, Vale, Abril, and BASF. In Brazil, more than 90% of the cellulose pulp used to produce paper is derived from planted eucalyptus and pine forests. In 2016, the country produced 18.7 million t of pulp, ranking fourth in terms of worldwide production, and 5.4 million t of paper, according to data from the Brazilian Tree Industry (IBÁ).

Chemical engineer Alfredo Mokfien-ski, consultant to the Brazilian Pulp and Paper Technical Association (ABTCP), says that Brazilian pulp from eucalyptus and pine is very competitive. They enjoy large-scale production, as the factories are designed for production exceeding 1 million tons/year. “On this scale, it is hard for businesses that use alternative raw materials, with production of 70,000 or even 180,000 t per year, to be able to compete,” explains Mokfien-ski.

Fernando Gomes of UFRRJ says that, from an economic point of view, producing pulp from eucalyptus and pine is more advantageous, but transforming sugarcane waste into pulp is not insignificant, as the material has little to no value (in the case of the leaves) and fits within sustainable production models. “It is a good destination and contributes to greater sustainability in the sugar and ethanol sector,” says Gomes. ■