

REPORTAGEM DE CAPA

By Caroline Martin  
Special for *O Papel*

# Suzano Papel e Celulose begins producing hardwood fluff pulp





## Eucafluff is the company's first adjacent business start-up, which also includes the production of lignin and tissue, as well as the development of genetically modified eucalyptus

Suzano Papel e Celulose started producing fluff pulp on November 18. The R\$30 million investment marked the company's entry in this segment, with an initial production capacity of 100 thousand tons/year. Baptized as *Eucafluff*, the pulp stands out as an innovation in the global market, since it is produced from hardwood, rather than softwood pulp.

By using hardwood to produce fluff pulp, the company offers positive advantages to end consumers, as pointed out by Alexandre Corrêa, executive manager of New Business responsible for the *Eucafluff* project. "This type of pulp is used in products earmarked for incontinence and absorption, including diapers (infant and adult), female sanitary napkins, medical applications, pet care (rugs and diapers for animals)," he said about the market that currently breaks down as follows: 40% infant diapers, 25% adult diapers, 25% personal products and 10% other applications. "As such, the indispensable characteristics of this material can be summarized for its absorption capacity of water or any other liquid, in its distribution throughout the product and retention, avoiding that such liquids return to the surface. This is the main aspect of our fiber, which allows producing dryer diapers, for example," he said about *Eucafluff*, informing that the pulp developed from hardwood presents a 30% gain in terms of liquid retention. In partnership with new customers, Suzano intends to develop dryer products or products that can be used for a longer time.

The material also presents advantages in the product production process, starting with machine operation ease. "Since this is a shorter fiber, it consumes less energy in its defiberization process. When it enters our customer's mill, fluff pulp is transformed into a product similar to cotton. It is with this cotton-like aspect that it is applied in diapers and other products. This grinding process consumes a lot less energy, roughly 50%, when compared to the process using softwood," said Corrêa. "In countries like Brazil, where energy consumption is very high, this advantage represents another very interesting financial and ecologic differential for customers," he said.

Environmentally speaking, it is important to point out that the product already possesses Forest Stewardship Council® (FSC® - C010014) certification. According to Corrêa, different from other markets, less than one-third of the fluff pulp market is FSC certified. "In addition to offering this certification to our customers, we help build a more sustainable market," he said.

The production of fluff is concentrated at Suzano's São Paulo unit. The executive manager of New Business revealed that a combination of factors



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led to this decision, such as having a printing and writing machine with technologies favorable for conversion. "The machine has a flexible size, ideal for the investment." Logistics is also another factor. "Today, more than 50% of Brazil's diaper and sanitary napkin market is in the state of São Paulo and surrounding region. So we have a significant logistics gain for being close to our main clients," he said. Lastly, the historical factor added to the analysis and consolidated the decision: "Since this mill was the first to produce paper for Suzano and a series of other processes in the company's history, it made total sense that it be the first plant, not only in Brazil, but worldwide, to produce hardwood fluff pulp," said Corrêa, proud of the team that executed the innovation project.

The machine did not stop producing printing and writing paper. It was adapted to be flex, with the capacity to produce both coated printing paper and fluff pulp. Within the fluff segment, it is capable of producing products with different weights, an important characteristic for entering the market. "Offering different product weights certainly provides us a competitive advantage during this start-up moment," said Corrêa. Today, Suzano already has 15 certified customers that have been buying the product since December and we are currently negotiating with three others. "It's a list that's growing quickly, since market acceptance has been positive."

He informs that a lot of time and resources were invested to arrive at the final product. "The project started being developed back in 2007 and represents the work of our R&D area in partnership with the

market. During this period, we developed a few fluff product families, conducted countless tests with these products and made the necessary production adjustments to arrive at the product we have today. Without a doubt, this dedication is the main factor of success for bringing this innovation into the market."

With regards to the start-up moment, he says that the project's development and activities executed prior to the start-up of production went so well that the company was able to begin producing ahead of schedule. "Our plan was to begin producing fluff pulp in December, but we were able to begin producing in the second half of November, starting two weeks ahead of time, and contributing to the sales process and entry in the market." In spite of already operating at maximum speed, the machine is expected to undergo a few adjustments to optimize the process. The expectation is that within the next four months it will be 100% adjusted.

Certain changes marked the operational routine at the Suzano Unit, especially in the industrial and commercial areas. "Over the last years, Suzano has made a significant effort to change its own culture, with the objective of boosting quality and purchase experience of its clients even more. Our main objective is to supply the market with a top-quality product. As a result, the most expressive change we've had has been greater approximation between the industrial area and customers. For being an innovative product, it was fundamental that our unit understand the product and the respective application," said Corrêa.

In practice, Suzano invested in fluff pulp consumption simulators. There's a machine at our production unit, for example, that simulates the client's mill, showing the adjustments necessary in the grinding process and the respective gains in energy consumption. "We were also able to conduct a series of application tests of the material in diapers and sanitary napkins. In fact, the laboratory had to be significantly expanded to simulate the many forms of product use and application. We are working in a new market segment that has its own particularities. We need to thoroughly understand this new market in order to offer the best product and service possible," said the executive manager of New Business, informing that, in March, the company will kick off an agenda of visits for clients interested in learning about the product and its productive process.



The results of this extensive test phase demonstrate the potential of substituting softwood for hardwood at a ratio of 70% for sanitary pads and 30% for diapers. "To arrive at these figures, we produced different products with our clients with different blends in order to then analyze the quality of each one. The objective was to arrive at a level equal or superior to that already adopted by clients," said Corrêa. In the operational routine of clients, this mix does not present significant impacts. "What needs to be done is an adjustment to the grinding parameters," said the executive manager of New Business.

He says that mixtures above these values adopted as the current standard are also capable of performing well, but depend on the type of product and require other operational adjustments. "Even though our product already offers significant competitive advantages as a complement to softwood, we believe in the continuous evolution of this percentage" he said, about the company's intention to continue testing so that *Eucafluff* can obtain an even greater participation in client products. Since the market did not present any innovations in the last years, Corrêa believes that the main challenge today is to overcome the lack of habit on the part of the industrial area of clients to alter a machine's configuration. "But it's simply a matter of presenting all the benefits to clients and showing that it is completely viable and simple to make this adjustment. We have a technical team prepared for this, not only to present this possibility, but also show

these modifications to clients," he said about the value-added service that Suzano offers.

Since the Brazilian fluff pulp market is basically import oriented, Suzano saw that by offering a good service and a shorter delivery time in comparison to imported fluff would be a significant competitive advantage. Instead of traditional inventories that importing requires, the company is betting on just-in-time supply, in accordance with the production level of clients. "We invested a lot in this aspect to offer this type of service to clients, both small and those with more robust production volumes," said Corrêa. He said that the company's adaptation process to offer the new product involved several logistics tests. "We have to find the ideal vehicle for delivery, specify our cargo profile, identify the best way to package the product to avoid damages," he said about changes adopted to transport the product.

Experience in the paper segment, however, facilitated servicing a pulverized market. "We have an extensive logistics network, with operationally and systematically prepared warehouses, which lends considerable flexibility to clients. There are many ways to purchase and receive products. Clients can place very small orders and pick them up at the closest warehouse or pick up a certain volume and request delivery of the remaining portion," said Corrêa about the paper sales strategy that was also implemented in the fluff market.

Imperatriz unit is one of the production sites that will produce rolls for conversion into tissue paper



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## Commercial strategies do not exclude external market

According to data from consulting company RISI, in 2014, the size of Brazil's fluff pulp market amounted to roughly 292 thousand tons, whereby this demand is serviced only by softwood pulp imports. Additionally, global demand over the next five years shall grow approximately 3.7% a year. In Brazil, growth is expected to reach 4.3% a year during the same period.

Suzano's annual production of 100 thousand tons of fluff pulp promises to be just the first step in this promising segment. "Our strategy is to grow in the fluff market. We will not be content with the current production volume," said Corrêa. Even though the company has not yet defined the date for making its next investment in the area. It already has two routes outlined for growth. "We can either convert more machines at Suzano or invest in new fluff machines at other units. We already have an investment figure for each one of these alternatives, but given our recent entry in the market, we are awaiting to see the reaction in order to define what will be the best moment to think about this expansion."

The external market is also part of future plans. "At present, the focus of our production is the internal market, but we have plans to begin exporting. We have already conducted some tests to prepare for exporting," he said.

## Suzano's other adjacent businesses are also growing

Suzano is betting on innovation and breaking paradigms to put into practice what it calls adjacent

businesses, which can be summarized as the pursuit of new applications for eucalyptus pulp and the diversification of its products. According to the company's CEO Walter Schalka, in addition to seeking greater profitability, all actions executed today position Suzano in a fundamental preparatory phase for the future scenario. "We are extremely happy with Suzano's current moment, considering its increasing operating results over the last quarters, and posting records on top of records. This evolution in the company's operational cash generation and EBITDA demonstrates that the action plans implemented are in the right direction. More than that, for the joy of our shareholders, we continue seeking alternative ways to create value. We announced two new important investment programs: one earmarked for Project 5.1 that focuses on debottlenecking capacity, modernizing production units and increasing forest base, which will also lead to a cash cost-reduction over time; and the other earmarked for our adjacent businesses. It is a moment in which the company has a very positive energy, since all actions are headed in the right direction and we are gradually capturing these results."

The recent entry in the tissue segment integrates and reinforces the strategic pillar of adjacent businesses. In the beginning of November 2015, the company announced a R\$ 425 million investment for the construction of two units for producing rolls for conversion into tissue in the cities of Mucuri (BA) and Imperatriz (MA). Each one will have a double-width machine, with a production capacity of 60 thousand tons/year. The strategy is to operate as in industrial partner of players in this segment, supplying jumbo rolls that will be converted into the end product, lending cost and logistics competitiveness.

The selection of units was made because, at present, part of tissue production occurs with the rolls and/or end products being produced in the south and southeast regions and then converted and/or transported to the North, Northeast and Midwest. Additionally, Mucuri is strategically located to service the northeast and southeast regions, while Imperatriz is closer to the North, Northeast and Midwest markets. The company also informed that the Mucuri and Imperatriz industrial units are ready to receive the project. In both cases, Suzano already possesses the space necessary to implement the production units. Each unit will have a leader and an operational team totally dedicated to tissue production. At present, the company is undergoing the organizational structuring process of its operations and the next step will be to map and recruit employees.

Implemented at the Limeira unit, the lignin plant will have an annual production capacity of 20 thousand tons



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The strategic partnerships to transport rolls are still being negotiated. In Mucuri, the transporting of rolls shall be done by highway. In Imperatriz, in addition to highway mode, considering that Suzano possesses of railway inside the unit, railway freight to the southwest – connecting the Carajá railway with the North-South – and the Northeast, to the Port of Itaqui, is being analyzed.

On January 15, the company closed the purchase of two roll production machines for conversion. The two double-width tissue VTM4 paper machines will be supplied by Voith Paper and include NipcoFlex T shoe press technology and EcoChange automatic reel change equipment. Each machine will have a capacity to produce roughly 220 tons of paper per day at a speed of 2 thousand meters per minute. The supply will be according to the Process Line Package (PLP) mode, in which Voith, in addition to the machines, is completely responsible for contracting and managing the supply of auxiliary equipment and services necessary for the machines' functioning.

Suzano is in the process of negotiating with the other suppliers. The expectation is that construction work will begin in May. Production start-up is scheduled for the third quarter of 2017 in Imperatriz and, three months later, in Mucuri. Considering that the tissue market is growing at 1% to 2% above GDP, the company's expectation at the start-up moment is of market growth, whereby this growth should be greater in two-ply and three-ply tissue paper.

The R\$ 70 million investment announced last August for the installation of the first lignin extraction industrial plant in South America, is another adjacent business being spearheaded by Suzano. Implemented at the Limeira (SP) unit, the plant will have a production capacity of 20 thousand tons of lignin per year, whereby installed production capacity, considering potential new lines in other industrial units, could reach 185 thousand tons per year. The announced investment will be 70% financed by innovation-oriented credit lines. The expectation is that the plant will begin operating in June 2017.

"Between 2006 and 2007, we carried out a complete transformation of the company's innovation process. During this transformation phase, we wrote down what we called the company's technological strategy. One of the branches of this technological strategy was to return to what we believe is our main competence: produce eucalyptus biomass, with excellent competitiveness. In looking back and dedicating attention to this biomass, we decided to try and

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extract other types of value from it and develop new business. We then selected a few projects associated to biomass from among our financial analyses and the biorefinery line ended up positioning itself as one of the most important projects, based on the use of lignin for different market applications," said Fábio Figliolino, Innovation executive manager, about the moment that preceded the beginning of analyses focused on extracting and utilizing eucalyptus lignin, in 2008.

Lignin is present in approximately 25% to 30% of eucalyptus wood and gives rigidity to trees. It is a subproduct of the pulp production process (obtained from the black liquor resulting from the wood cooking process), which is currently used by the industry to generate energy. But it can also be used as a substitute of oil byproducts in high-value added applications in different markets such as civil construction and the furniture industry.

After making the decision to further explore the potential of this important wood component, between 2008 and 2010, Suzano conducted lab tests, developed lignin analysis methods, investigated different extraction procedures and began studying some market applications. "From this extensive data-collection process, we decided to take a second step forward, which involved finding answers to some important market questions, since we saw that we needed to have a sufficient amount of lignin to be able to offer our partners in the market and to channel the development of this product," said Figliolino about the movement that converged from industry discussions on new options for substituting oil byproducts in

**FuturaGene's GM eucalyptus with increased productivity began being developed in laboratory in 2001**



According to Mello, the characteristic of greatest growth of this genetically modified eucalyptus is due to the expression of a vegetable protein that acts in the elongation process of cells during the plant's development

different production chains, and led to the production start-up in January 2012 of the first lignin bench plant in Latin America, on an experimental basis.

Designed by Vinicius Lobosco, RD&I consultant at Suzano, the plant has a lignin production capacity of 700 kg per day, which amount is earmarked to different partners in the market. Figliolino says that the experimental plant not only serves for developing the market, but it is also useful for developing the process to obtain lignin and optimizing it. "The plant has some important points and processes. The first stage refers to the cleaning of certain contaminants that come with black liquor following the pulp production process. In the second stage, we see to that the liquor reaches ideal conditions to undergo purification. For such, we lower its pH with CO<sub>2</sub> in tubular reactors. This process of adding CO<sub>2</sub> to black liquor in appropriate pipes was developed in the pilot plant in partnership with the supplier and was patented by us. With these reactors, we significantly reduce reaction time, providing a lot more productivity to the plant. After this stage, we have the lignin maturation phase, followed by the filtration process and finally the washing process, when we obtain a lignin content of 97% to 98%," said Lobosco about the process that leads to extracting the component from wood.

The current production of lignin does not impact the operational routine of the pulp production unit. Once the industrial plant starts up, scheduled to happen in the middle of next year, the company will prepare for a few specific differences, such as a reduction in lignin quantity in the recovery boiler, an increase in water that returns for evaporation and a certain change in the ratio of sodium

and sulfur from the process. "But all these aspects are small, considering the amount of lignin that the pulp mill operates with. The amount to be removed corresponds to an average of 2% of all lignin that circulates in the pulp production process," said the Innovation executive manager.

Suzano is quoting suppliers to give continuity to the industrial plant project. "At present, we're closing the acquisition of the four main stages of the process. By the end of this year, we will have purchased the larger and smaller scale equipment. Some of the suppliers quoted are well known to the pulp and paper industry, and others are very new, since we opted to do this project with our own technology, mainly developed in the pilot plant," said Figliolino.

The company is also preparing to have a sales team specially dedicated to the new business. Figliolino explains that it is completely different from the usual approach, therefore, in addition to the research team's work, Suzano will seek professionals to build the commercial team. "They will be allocated to each one of the market applications we've developed. It is truly a new business for the company and that includes a new type of selling and marketing," he said about the training that shall occur prior to start-up.

Also according to the Innovation executive manager, the project's maturation time and the challenges surrounding this scenario have always been part of Suzano's planning. "In 2016, the project will be eight years old. We were aware of the time necessary for this development and the responsibility of being the first company in the world to produce lignin from eucalyptus for applications in the chemical market." One of the challenges pointed out by Figliolino of entering a new segment is producing lignin in an efficient and cost competitive manner for the market to which it is earmarked and knowing how to transform it into specific products. "The lignin will not arrive in the market exactly the same way it left the plant. It needs to be chemically transformed and that is a significant challenge, since we have little references about eucalyptus lignin," he said.

FuturaGene is also part of Suzano's adjacent businesses. Since the acquisition in 2010, the subsidiary has continued with its global activities in biotechnology focusing on global leadership in the genetic research and development of plants for the international markets of forestry, agriculture and biofuels. According to Schalka, the first genetically modified clone that obtained approval from the National Biosafety Technical Committee (CTNBio) for commercial purposes, which potential of increasing



productivity amounts to around 20%, is the beginning of the pulp and paper industrial revolution.

FuturaGene's increased productivity with Genetically Modified (GM) eucalyptus began being developed in laboratory in 2001. "In 2006, we planted the first experiments in the field and, subsequently, conducted countless biosafety studies to assess the impact of this eucalyptus on the environment. In January 2014, FuturaGene submitted to CTNBio a request to approve the product's commercial use. In April 2015, after analyzing biosafety, the committee approved the company's request," said Eduardo José de Mello, vice president of Operations at FuturaGene Brazil.

Given the fact that this is a pioneer product (first GM eucalyptus approved for commercial use in the world), the company faced several challenges. "We needed to have an innovative and entrepreneurial spirit in all stages, from the beginning of research to the commercial approval phase." According to Mello, the characteristic of greatest growth of this genetically modified eucalyptus is due to the expression of a vegetable protein that acts in the elongation process of cells during the plant's development. Biosafety studies conducted include: composition, degradation, ecological interactions, gene flow, studies with bees, pollen and honey, toxicity, among others. The results of all the studies demonstrated that, from an environmental and human & animal health perspective, the GM eucalyptus with increased productivity is equivalent to the conventional.

FuturaGene's eucalyptus, which produces roughly 20% more wood than the conventional clone, comprises a series of benefits, such as increased competitiveness of Brazil's forestry sector in the economic level. From an environmental perspective, "the main gain is less CO<sub>2</sub> emissions from the reduction in transportation, considering that the distance between forests and mills can be reduced," said Mello. According to him, other significant benefits include reduction in the use of inputs and availability of land for other uses. From a social perspective, the new technology will be provided without charging royalties to small rural farmers who already are partners of Suzano in the forestry development program and already benefit from the company's better eucalyptus varieties for many years.

At present, FuturaGene is expanding field tests with crosses of this variety of GM eucalyptus with the objective of developing better clones adapted to different regions where Suzano is present. "The Suzano and FuturaGene teams work in a very integrated manner aimed at maximizing the combination of FuturaGene's biotechnology knowledge with Suzano's

expertise in the forestry area," said the company's vice president of Operations in Brazil.

In talking about work fronts spearheaded by FuturaGene, Mello reveals that the company focuses its research on two key research platforms: productivity increase and better processing capacity after harvesting; and protection of plantations for defense against threats caused by pests, diseases, climate change or reduction in natural resources, as well as allowing for the use of marginal areas and recovery of degraded areas. "The company possesses several technologies in different stages of development, whereby the most advanced are earmarked for increasing forest industry productivity. The main cultures FuturaGene works with are eucalyptus and poplar," he said about the company, which has field experiments in Brazil, United States and China.

He pointed out that the technologies developed by FuturaGene have the potential to significantly contribute to satisfying the increasing global need for wood. According to WWF's Living Forests Report, demand for forestry products will triple by 2050, requiring an additional area of 250 million hectares of forest plantations. "Climate change and the increase in population mobility have caused new pests and diseases to surface and proliferate that hinder the development of eucalyptus plantations. To overcome these adverse production conditions, with variations of environmental and biological agents, it is necessary that new technological solutions be developed, since conventional tools may not be sufficient to cope with all these threats. Forestry biotechnology plays a fundamental role in this scenario, being an important part of the technological solution that seeks to maintain and, when possible, increase productivity levels in the forestry sector in a sustainable manner," he said. ■

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