



The growth of the South American kraft pulp industry based on the utilization of plantation forests

Celso Foelkel

Summary:

Since the early 70's, the growth of South America, mainly Brazil and Chile, as producers of kraft pulp to supply domestic and international markets, is being very fast and consistent. More recently, other countries in the continent have acquired the technology and capability to develop fast-growing trees in plantations forests. Uruguay and Argentina are showing high potential to become important market pulp producers in the world scene. Bleached kraft pulp is very

competitive thanks to the low wood cost, the quality of this wood, and the right technology, both at the industrial and in the forest sites. The main reasons for this success are being the eucalyptus and pines, whose forests, woods, pulping, bleaching and product quality are admired and requested by the most strict markets, everywhere. Bleached Eucalyptus kraft market pulps coming from Brazil are well-known not only because quality and supply reliability, but because the admirable competitiveness in a so taught business segment. From Chile, the success stays more in the side of Pinus radiata pulp, although Eucalyptus also shows an important growth in the country. This paper intends to show the driving forces for these achievements, from forestry to market pulp manufacturing. This life experience will enable the readers to understand this successful business and to eventually take part on it. Since this story of success is based on plantation forests, the final part of this paper intends to show the fundamental issues that are being considered to have a productive and environmentally friendly forestry business.

Full text:

Since the 70's, the growth of the market pulp production in Brazil and Chile is being remarkable. A newcomer is joining this select group: Uruguay. These stories of success are based on the competitive production costs the countries are achieving to run the pulp mills. Certainly, there are several drivers to keep this competitive position, but the most important is surely the wood cost. The wood oriented to the production of pulp and paper in Brazil, Chile, Argentina and Uruguay come totally from plantation forests. Species of Eucalyptus and Pinus are just the right ingredients to bring Brazil and Chile at the bottom of the production cost tables, in worldwide comparisons. This means they are leaders on low cost manufacturing of these goods.

Brazil, Chile, Argentina, and Uruguay have developed excellent technologies to grow plantation forests. Those people who plant forests, surely they do believe in the future. Also, the same people who build competitive pulp and paper mills, they do deserve to play in the best markets.

The truth in this type of business is to be competitive in key issues such as: production costs, quality, logistics, and environmental awareness. These factors are able to make the difference between winners and losers in the business. Along the past 3 decades, Brazil and Chile were able to develop a successful virgin pulp exporting model. Uruguay, in recent years, was motivated to implement rather similar

model, planting trees to seed market pulp mills (they are finally coming to the country).

The virgin pulp model is oriented to the production of market pulps, with the lowest possible production cost in order to guarantee the maximum EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization). Another objective is to have maximum market share in the Eucalyptus (Brazil) and Radiata Pine (Chile) pulp businesses. Since the logistics to pulp distribution is simpler and less expensive than the one for paper, the reliability of supply to distant markets is easily obtained.

The result of this competition game is to be ahead of the other players, not only because wood cost, but in the overall competitiveness indexes, including distribution networks and environmental cares and mill performances.

Pulp production in Brazil is growing at a 7.7% rate in the past 35 years. The exports of pulp and paper are growing at 9% rate in the past decade. Chile, with a similar model, is being able to grow forest products exports from 35 million dollars in 1970 to 3 billion in 2004. From this total, 40% is market pulp. For this reason the country like to define itself as "a forest country". Chile has the lowest BSKP operating costs in the world: about 200 US\$/tonne. Brazil has the same position for BHKP: about 155 US\$/tonne. (BSKP = Bleached Softwood Kraft Pulp; BHKP = Bleached Hardwood Kraft Pulp). Uruguay, in the past 10 years was able to grow wood availability for trading from 0.6 million cubic meters to 8.5 million. This jump enabled the country to become an important exporter of wood for fiber processing. However, the objective is not only to export wood, but to grow more into industrialized products. The available 700,000 hectares of plantation forests are ready to the construction of new pulp mills in the country. They are in the way to come soon.

The pulp business future is bright to these countries: tremendous investments are being announced. In the next 5 to 7 years, new mills are coming and modernization of the existing will be implemented to raise production capacity. An estimation of additional 6.7 million tonnes per year of Eucalyptus market pulp will come to the market till 2010/2012. Other pulps are also to come: BCTMP of acacia (280,000 tonnes/y); pine pulp (685,000 tonnes/y); and Eucalyptus dissolving pulp (250,000 tonnes/y).

Brazil is the world leader of Eucalyptus market pulps. From a total of 9.645 million tonnes in 2004 (PPPC, 2005) the country has manufactured 5.475 million (57%). The just started Veracel mill in Brazil is adding 900,000 additional tonnes/year. Brazil soon is to reach the 60% world market share on this product. This means that, in any case, when a pulp buyer is willing to seat to discuss eucalyptus market pulp

price, he has to talk to some Brazilian. Other countries producing Eucalyptus pulps are in order of tonnage's: Spain, Portugal, Chile and Thailand, but all far behind Brazilian production. China is also a newcomer in this game. The PPC - Pulp and Paper Products Council reported 170,000 tonnes of market pulp manufactured in China in the year 2004. China is a great importer of eucalyptus market pulp for making valuable papers to the markets.

Although plantation forests are recognized as the most significant factor to provide this competitive pole position, plantation are not so abundant in these South America countries. Considering all plantations in the four ABC&U countries (Argentina, Brazil, Chile and Uruguay) the area goes to 11,880 hectares (4,040 softwood and 7,840 hardwoods). This is roughly 6.4% of the total world plantation area (forecasted 187 million according to the FAO – Food and Agriculture Organization of the United Nations).

In Brazil, plantation forests represent 0.6% of the total country's geographical area. There is now a new boom of forest incentives to the interested parties to plant forests. They are supported by the local forest industry and by the country and state governments. In 2004, the new reforestation area reached 500,000 hectares in a single year, a record to the country. These new plantations, a great percentage by rural farmers, are very necessary to provide the required wood to support the ambitious investment plans in the pulp and paper section. BRACELPA (the Brazilian Association of Pulp and Paper Manufacturers) is firm to announce an investment plan of 14 billion dollars to be spent from 2003 till 2012.

Since Eucalyptus plantations are responsible for most of the achievements of the South American pulp and paper industry, I'm concentrating now to explain the reasons for this success in the plantation forest growth and in the low wood cost.

The average growth for the Eucalyptus forests owned by the leading forest companies in Brazil is over 40 cubic meters per hectare per year. Eucalyptus wood is a good raw material not only to pulp and paper, but also for saw-timber, furniture, panels, hardboards, laminated products, etc. There are many clonal forests planted with superior genomes. Thanks to a high quality silviculture they are growing at rates close to 60 m³/ha.year. These forest stands can yield from 10 to 16 air dry metric tonnes of pulp per hectare per year. In Uruguay and Argentina, the forest yields are not as high as in Brazil. However, due to the similarity in weather and soil conditions, they are plenty of chances to reach these performance figures. Chile has another geography and another weather. Other Eucalyptus species are planted there (Eucalyptus globulus and E.nitens). In Brazil, the dominant species is in reality a hybrid (Eucalyptus urograndis - hybrid of E.urophylla and

E.grandis), but other important species are: E.saligna, E.grandis, E.dunnii, E.viminalis, etc.

The wood cost in these countries is one of the most competitive in the world: from 15 to 30 US\$/m³ of wood, depending on the country, the distance from the mill, the species, etc.

Planting trees is a very efficient way to obtain more uniform and less expensive wood to the industry. When the rural owners are also involved in planting trees in their farms, more wood will become available to the many different end-uses, including pulp and paper. On the other hand, to grow productive forests is not a task so simple as it may look like. There are hundreds of cases of failures in the business. The reasons for the failures are in general associated with lack of knowledge on the technology for planting and managing the forests, or lack of superior genomes.

The association of good quality practices in planting and managing the plantations plus the good quality on the genetic material being planted enable the producer to reach the dreamed growth rates. The final product will be more valuable and the forest planter will be rewarded with the deserved profits and with the environmental conservation of his forest area. Planting forests is not only an economic activity. It includes social and environmental issues. This is the reason for so many debates about sustainable forestry. In Brazil and in Chile the forest certification schemes are playing important role for improving forestry and to bring sustainability to the activity. This means that forest certification is helping the very productive plantations to become environmentally friendly. Good to the environment and good to Mankind.

Plantations have great social and environmental impacts, some positive and another negative, to be evaluated and controlled. Plantations demand a lot of labor, what is more than welcome in developing countries. Social responsibility is vital in the plantation of forests.

Today, there are enormous efforts in developing knowledge to keep at high levels the productivity of the plantations and to protect the environment. It is well recognized the importance of having a good genome in the seedlings to be planted, but this is not all. There are many examples of poor quality forests planted with superior seedlings. The combination of improved genetic material, obtained by tree breeding, and good silvicultural practices is the model being adopted today. The scientific research is to understand the relation among trees within the forest, and also their interface with the environment. By environment we are talking about all resources the tree demands, such as nutrients, water, sunshine, etc. How to optimize even further the wood production? How to better utilize the carbon absorbed by the

trees, teaching them to make more cell walls, instead of burning the carbohydrates by respiration? How to promote more growth of trunks, instead of roots, branches, flowers, bark, etc? How to develop more efficient trees, utilizing less water, less nutrients, less sunshine, to make more wood, with less natural resources? How to develop less aggressive trees to the environment, allowing the planted forest to have minimum environmental impact?

Several techniques are being implemented in the way of reaching these targets. I'm finalizing this article showing how trees of Eucalyptus are being improved and planted in South America to provide the high quality and the low cost required to keep the today's competitive position. The result of this combination is just perfect: sustainable forestry with minimum environmental impact and sustainable business. It means success in the business with environmental preservation. How far are we from this goal? Not very far, but the perfection will not be achieved. The business, the environment and the science are very dynamic. We are always having changes, demanding more knowledge, more advanced technologies and new procedures.

Some of the techniques that are being responsible for the quality, productivity and sustainability of the plantation forests are:

- Agro-ecological planning of the new area to be planted, blending the different activities (agriculture, plantation forestry, and areas of natural preservation);
- Planning plantations in mosaics, respecting the landscape, and avoiding to concentrate single species, same forest age, or single genome in large areas;
- Planning very correctly the operations of silviculture and harvesting to avoid disturbances between them, since one may interfere in the other,
- Implementation of very good quality program in the forestry area;
- Implementation of cleaner production philosophy in the forest operations, to reduce residue generation, malfunctions, unnecessary use of natural resources, etc;
- Complete banning of the utilization of fire as an operational tool in the forest;
- Conservation of soil quality and reduction of erosion, by keeping the forest residues (bark, branches, leaves, etc) in the soil surface, after harvesting;
- Minimum preparation and disturbance in the soil for planting the seedlings;
- High quality seedlings, the origin of the forest must be outstanding;
- Maximum survival of the planted seedlings, to guarantee a forest with no failures;

- Fertilization with organic and chemical fertilizers, carefully calculated based on soil and plant analyses;
- Retention of more water in the soil, utilizing the roads and the soil preparation to avoid the rain water running away from the forest site;
- Intense combat to the weeds, to avoid the competition and reduction of the initial growth of the forests;
- Intense care on preventing and combating pests and diseases;
- Adequate balance between resources, plant population and tree spacing;
- Implementation of longer rotations to better utilize the nutrient cycling the eucalyptus forests have as tremendous advantage;
- Better design and architecture of trees, for better utilization of the spacing and the sunlight;
- Maximization of aerial growth of trees;
- Maximization of wood production, reducing the competing use of carbohydrates in the tree used to the manufacture of bark, branches, etc;
- Intense utilization of mechanization in all operations, from planting seedlings to harvesting the trees and transporting the logs;
- Improvements in the genetic quality of the genomes, both planted as seeds or cloned forests;
- Improvements in the wood quality, engineering the quality of the future forest products from the early stage of design;
- Development of agroforestry models to allow the plantation of forests by rural farmers, whose first aim is agriculture;
- Better knowledge of the interfaces of the plantation forests with the biodiversity and the ecology in the watersheds;
- Better dialogue with the surrounding communities;
- Better distribution of the forests in the landscape;
- High level studies in tree genomics, an important tool for tree breeding and early selection of improved individuals.

What can we predict for the future? More efficient trees, lower lignin contents, higher pulp yields, lower wood costs, more resistance to pests and diseases, faster growth, higher performances, multi-purpose trees, etc, etc.? New technological breakthroughs are to come. However, it is clear that forest productivity and wood costs are not the only two targets in this business. Plantation forests, environment, people, agriculture, natural areas of preservation, biodiversity, and all their inter-relationship have to be always evaluated and optimized. Keeping all this in mind, the success of the pulp and paper in South America based on Eucalyptus and Pinus plantations will continue to grow thanks to this fertile knowledge.

