

A very special fiber

Paper is part of our life from our youngest ages for many different aspects: hygiene, information, communication, goods packaging? We tend to see it as a basic product, not as sophisticated as the high tech products we also use like computers or video cameras. It is however the product of a dedicated technology that uses the latest developments in electronics, control systems, mechanics, new materials? It also uses a renewable raw material: fibers from wood or annual plants.

The purpose of pulpmaking is to separate fibers from each other. They can then be put together again on the paper machine, in the form of a sheet whose properties and basis weight are designed for a specific end use.

Sheet properties are thus very much dependent on fibers morphology and on nature and amount of transformation they received during stock preparation, especially refining, before sheet forming.

Each tree species brings a different fiber morphology. When Eucalyptus fibers were successfully introduced on the market more than thirty years ago, papermakers recognized that this new hardwood pulp was a very special one.

What is so special with eucalyptus fibers morphology?

Fiber length is small. Actually, it is the shortest hardwood fiber one can have. Depending on the way it is measured - light microscope or optical electronic devices - and calculated, average length can be as low as 0.65 mm. Birch, aspen, beech, oaks? are longer by 15% to 40%. Softwoods fibers are well above with a minimum of 2 mm.

Fiber coarseness is low; again, it is the lowest of the common usual market pulp fibers. Coarseness is the weight of a fiber, divided by its length. Slender fibers have low coarseness for example.

Number of fibers per gram is high. This is a consequence of short fiber length and low coarseness. Common figures for Eucalyptus are in the range of 20 millions. US Southern Pines are at the other end with 1 million for example.

Eucalyptus fibers resist collapse: not only are they slender but their wall thickness is relatively high. In other words, it is not easy to bring them flat like a ribbon.

The internal architecture is also different: basic fiber wall components also called microfibrils show a low winding angle with fiber axis, compared to other hardwoods.

How do these features influence sheet properties?

How microscopic fiber features translate into macroscopic properties of sheet like strength, bulk or softness for example, is pretty well understood for most paper properties.

Homogeneous paper formation and high opacity are very important for all fine papers for graphic purposes. High number of fibers per gram and small fiber length are the most critical pulp characteristics in this respect. Using eucalyptus has allowed papermakers to achieve high quality grades.

Bulk and stiffness are critical for board or printing papers processed in copiers. Resistance to collapse and intrinsic fiber stiffness help enhancing these features and make eucalyptus the most suitable pulp for such uses.

Smoothness is a must for coated papers, especially art papers with a matt finish for which surface defects ruins print quality. Low coarseness makes the use of eucalyptus a necessity when high quality is looked for.

Softness is undisputably the most wanted characteristic of tissue papers. In this respect, no pulp can beat eucalyptus. Fiber features at work: high number of fibers per gram and low coarseness. Sheet bulk is also important. Liquid absorption is good because of these physical features and of the nature of chemical components such as hemicelluloses.

Wet web strength, porosity and paper dimensional stability are other properties where eucalyptus pulps show a distinct advantage compared to other hardwoods.

Eucalyptus trees can be seen as a big family with 600 different species. Slight differences in morphology can be measured which translate into differences in pulp and eventually paper properties. Speciality papermakers will use *Eucalyptus grandis* rather than *E. globulus* or vice versa as a consequence of very particular paper specifications, limitations of processing equipment or even pulp availability.

On top of eucalyptus intrinsic advantages, Aracruz pulp also shows a consistently high brightness and a very low dirt.. These features have made our product a first choice raw material for photo base paper, laminated products or letterheads.

Unique fiber properties make eucalyptus pulp a preferred raw material for most woodfree paper grades. When correctly processed, high quality requirements are always met and high value is added to the final product.

<http://www.basecent.com/blog/Aracruz/165>