

LATINA 2010

**Technological development
in plantation forestry:**

**Will continuous
improvements in forest
productivity be sustained
and/or expected?**

**A view under the *Eucalyptus*
pulp industry perspective**

Celso Foelkel

... you all know that we have a fantastic plantation forestry technology with the *Eucalyptus*, isn't it ?



... for this reason, I don't have too much to tell you about, just to remind some key issues...

The first commercial plantations have started in Brazil in 1904

The father of the immigrant *Eucalyptus* to Brazil:

Agronomist Edmundo Navarro de Andrade

Over 105 years of commercial and intensive silviculture, always in continuous evolution





Brazil - 1960's

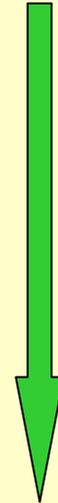
(20 m³/ha.year)



Brazil - 1960's

(20 m³/ha.year)

From the 1960's until today

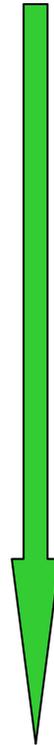


Today





From the 1960's
until today

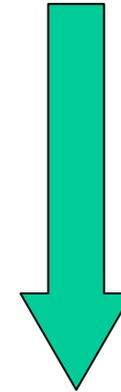


Today



40 - 55 m³/ha.year

A recent past of about 40 to 50 years ago



**...and
Today**



**All this thanks to Science
& Technology...**



Today is rewarding and it fills us with pride







Outstanding efficiency & effectiveness in operations



Source: VCP, 2008



Eco-planning before planting

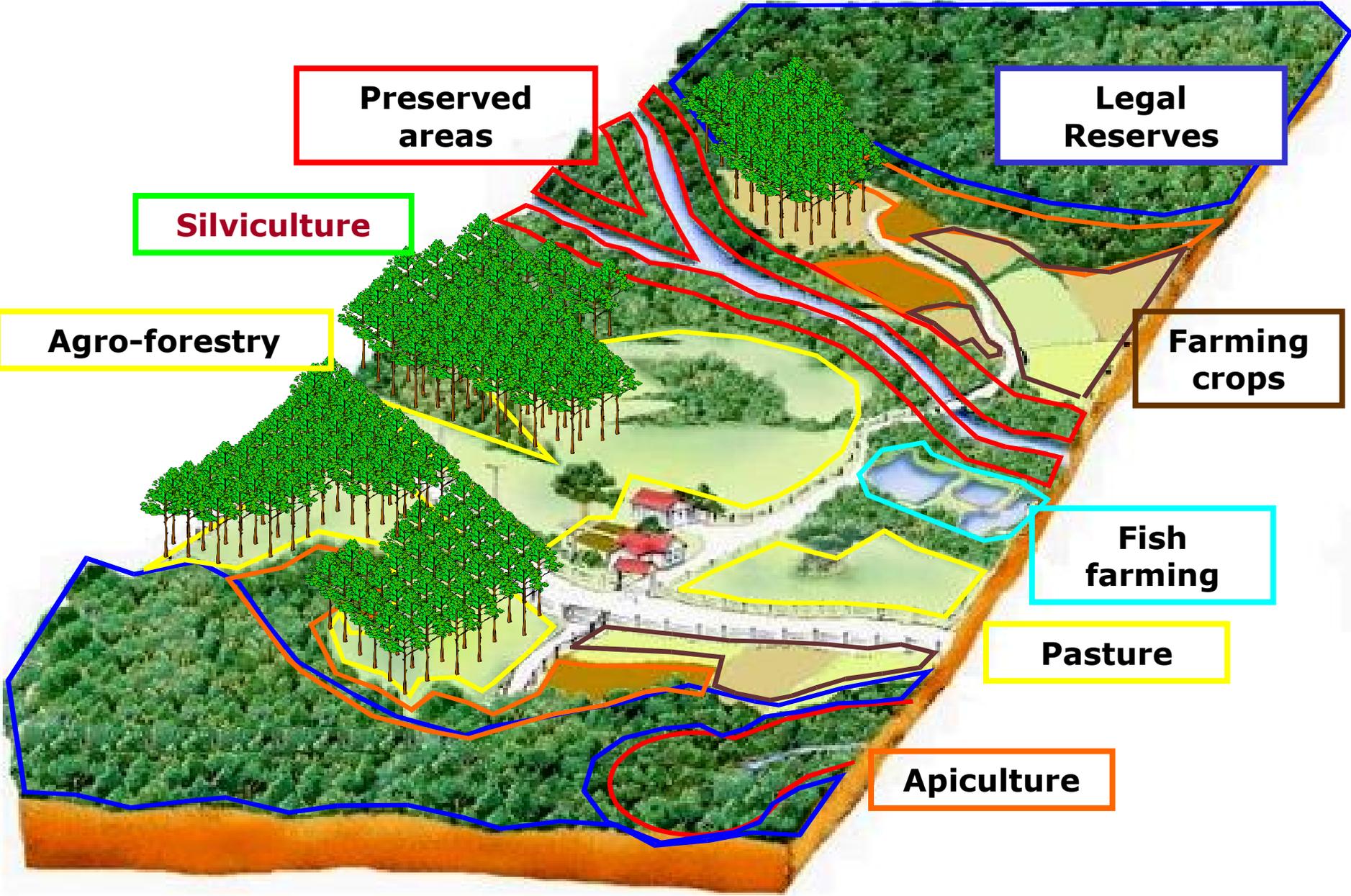
Plantation Forests & Sustainability

**...far away from
the monoculture
monotony
thanks
to
the Forest
Eco-Mosaic**



Partnerships with the rural farmers

Source: B. Pires, 2007



**An amazing market pulp industry flourished from
this eucalypt forest foundations**



And to other utilization's, too...



Our today's forest yields...

| | |
|--------------------------|---------------------------------|
| <i>Eucalyptus</i> : | 40 - 55 m ³ /ha.year |
| <i>Pinus</i> : | 25 - 35 m ³ /ha.year |
| <i>Acacia mearnsii</i> : | 20 - 25 m ³ /ha.year |



However, the future demands for more...



**... and this improvements
are inevitably
going to happen...**





Where are the opportunities located ?



There are several options to enlarge our comparative and competitive advantages



- ☰ However - all this will demand more and more from science, technology, partnerships and commitments...



**Our climate is one of the advantages -
we have no snow in the country -
although there are many situations of
hydrological deficiencies (droughts),
cold weather and frosts, etc.**



**Not to have snow is bad to tourism, but with regard
to *Eucalyptus*, this is a tremendous advantage...**

**Taking this as a reward, the potential
plantation forest productivity may be
easily reached**

**Potential productivity with the
complementary supply of all required food
and water to the plantations may reach
85 m³/ha.year**

BEPP - IPEF

Yield values of over 100 m³/ha.year have been achieved
in forest research experiments, but this is a difficult story
to become feasible in commercial operations...



Instituto de Pesquisas e Estudos Florestais

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» Brasil *Eucalyptus* Produtividade Potencial (BEPP) « Página Inicial

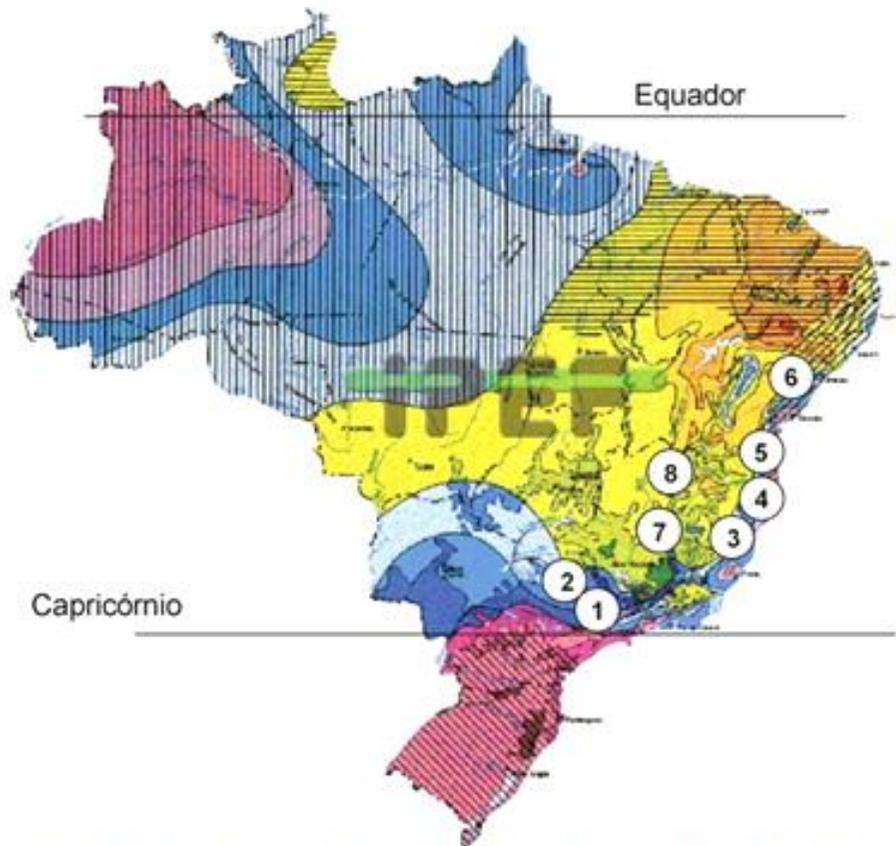
Membros do BEPP Mais informações sobre o BEPP

O projeto Brasil *Eucalyptus* Produtividade Potencial (BEPP) estuda 8 sítios experimentais por todo o Brasil, nas localidades de Fibria de Aracruz-ES, Eunápolis, Teixeira de Freitas-BA, Mogi Guaçu-SP, Luis Antônio-SP, Guanhães-MG, Bocaiúva-MG e Inhambupe-BA, respectivamente nas empresas Aracruz, Veracel, Suzano, IPBr, Cenibra, V&M e Bahia Pulp (Figura 21).



Em cada sítio, um ensaio experimental manipulando água, nutrientes ou dominância, com um ou mais clones vem sendo conduzido, medindo-se a produtividade florestal (crescimento da biomassa aérea e das folhas) e o seu balanço de carbono (produtividade primária bruta estimada através da medida dos fluxos de C para o sistema radicular e respiração).

A finalidade do projeto BEPP é a de conhecer as relações ecofisiológicas existentes entre a produção madeireira e o uso, e eficiência do uso dos recursos naturais: água, luz e nutrientes, a chamada ecologia de produção. Procura-se assim entender e quantificar os processos que controlam a produtividade do *Eucalyptus* e suas interações com o meio ambiente, abordando as questões de sustentabilidade dos sistemas de produção (manejo), o uso dos recursos naturais (água, nutrientes) e suas variações regionais, concomitantemente à produção florestal (madeira).



Mapa climático do Brasil com os 8 sítios do BEPP: 1. Mogi Guaçu/SP (IPBR), 2. Luis Antônio/SP (Fibra), 3. Aracruz/ES (Fibra), 4. Teixeira de Freitas/BA (SBS), 5. Eunápolis/BA (Verazel), 6. Alagoinhas/BA (Copener), 7. Guanhães/MG (Cenibra), 8. Bocaiúva/MG (V&M).

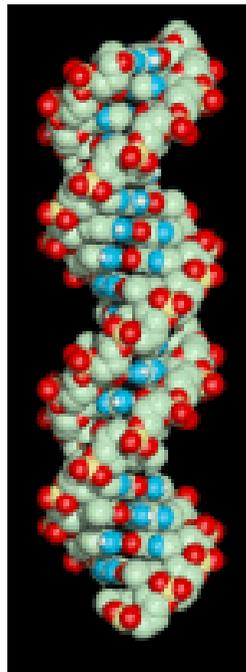
Histórico



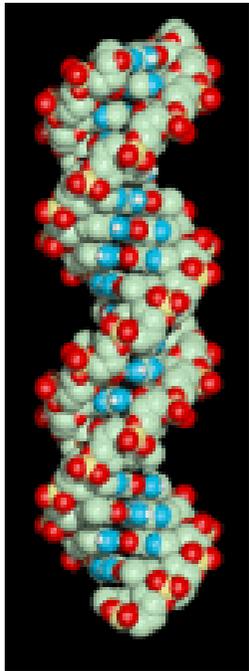
Área de colheita de *Eucalyptus* na Veracel onde o Projeto BEPP identificou a maior Produtividade Potencial dos seus 8 sítios: 85 m³/ha/ano, aos 6 anos.

Additional gains may be obtained thanks to forest breeding...

Projeto Genolyptus
Mais qualidade e produtividade para o Eucalipto brasileiro



Expected new gains due to forest breeding



- more efficient clones for the utilization of water, light and nutrients
- more adapted clones to stressing conditions of hydrological deficits, droughts, frosts, pests, diseases, etc.
- accelerated breeding thanks to early selection (...at the genome)
- genetic engineering may offer new genes, as the examples for lowering lignin content in wood, better tolerance to cold weather, etc. - and more efficient genes are expected to come
- introduction of new genetic materials for improvements at the wood quality side

Options for gains at the operational forest management



**Thanks to
silvicultural practices**

**Thanks to new options
at forest management**



Aiming what ?



**Producing trees
with higher wood density**

**Producing trees
with larger volumes**



How to get these goals ?



Increasing the forest rotation to 9 years, for example

**Planting fewer trees per hectare (800 a 1000)
using highly selected clones for superior Eco-
Efficiency in the utilization of the natural resources**

**Improved sustainability
Reduced nutrient exports
Better nutrient cycling**

Why ?



Fewer trees have a better rate of room occupation (soil, light for photosynthesis, nutrients, etc.)



More rain water and nutrients will become available to each individual tree



Lowering effect of canopy water interception when raining



Higher wood specific gravity or density - higher wood weight per individual tree



Why ?



At a growth rate of $50 \text{ m}^3/\text{ha}\cdot\text{year}$ we will have trees of 0.4 to 0.5 m^3 each - and fewer trees to be harvested per hectare



With the same growth rate, when planting 1100 to 1600 trees and harvesting the forest with 6 years of age, the trees are to have from 0.18 to 0.26 m^3



Wood cost in standing trees represents just $1/3$ of the total cost - the remaining $2/3$ are distributed between harvesting and transportation/handling



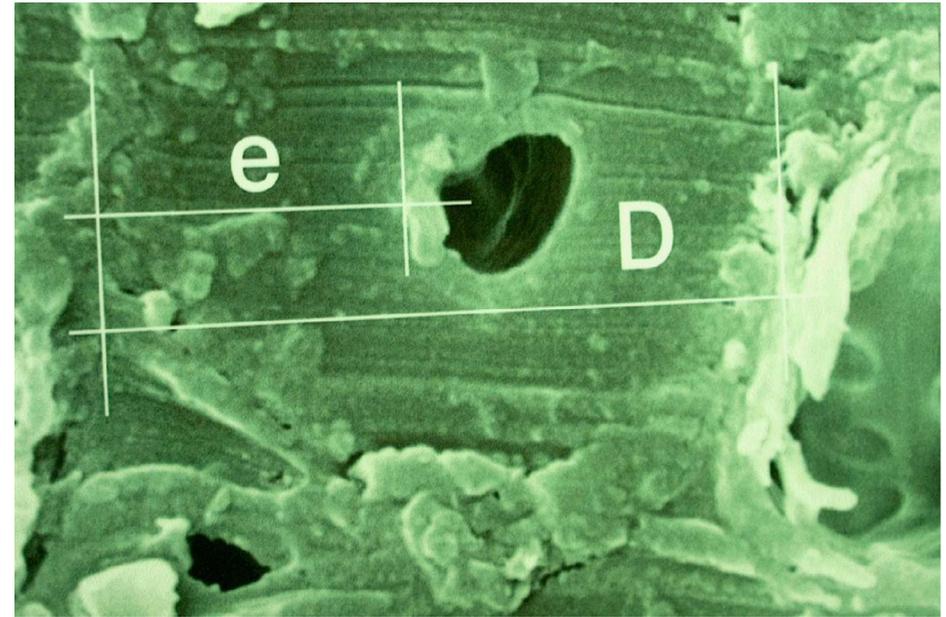
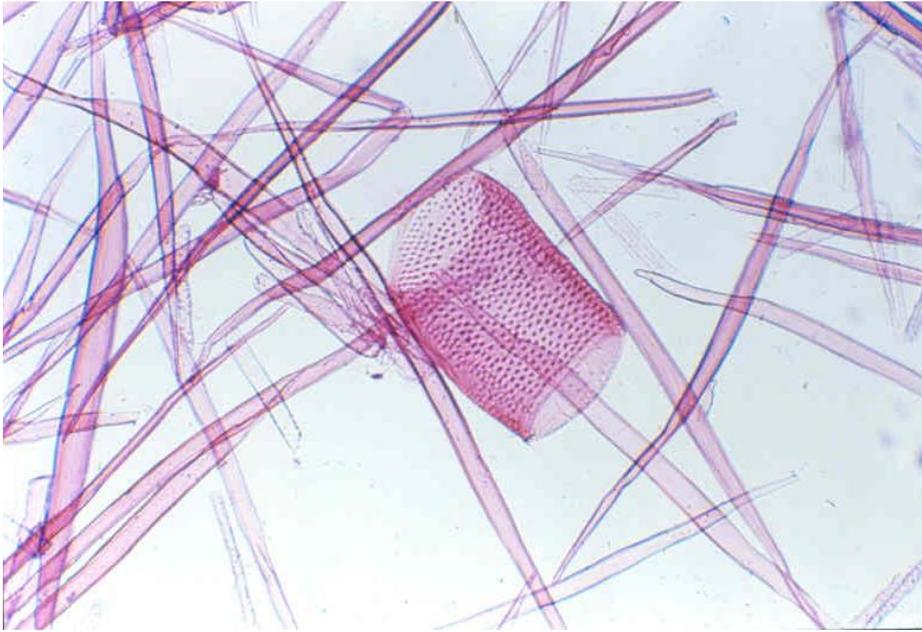
Larger and more voluminous trees are vital to the new Silviculture oriented to Results and Eco-Efficiency

For all these reasons is that forest management should be oriented to maturity (wider rotations and somewhat older trees)

Economics and sustainability are a lot better than the pedophilic management being proposed to harvest 3 to 5 year-old *Eucalyptus* trees (or even younger)



And what else may be done?

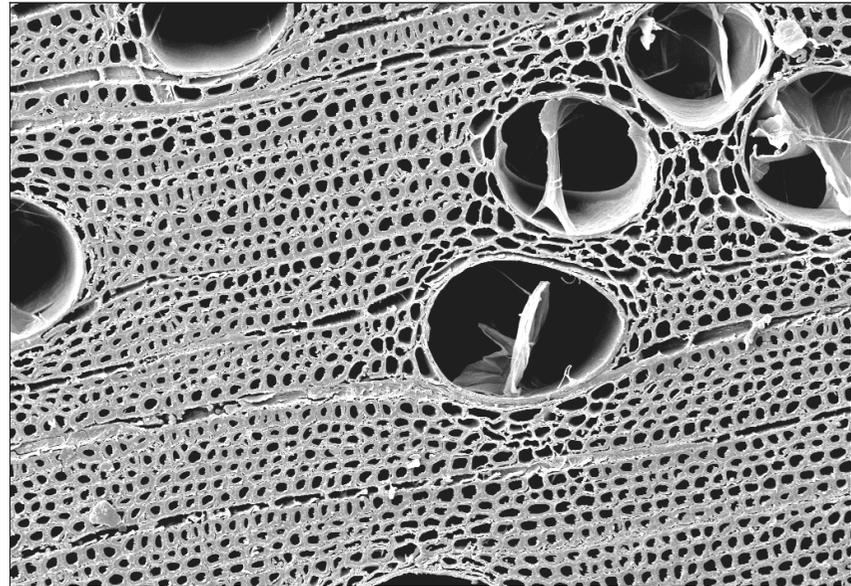


The globulization of the Brazilian fast growing *Eucalyptus*

...and what is this ?

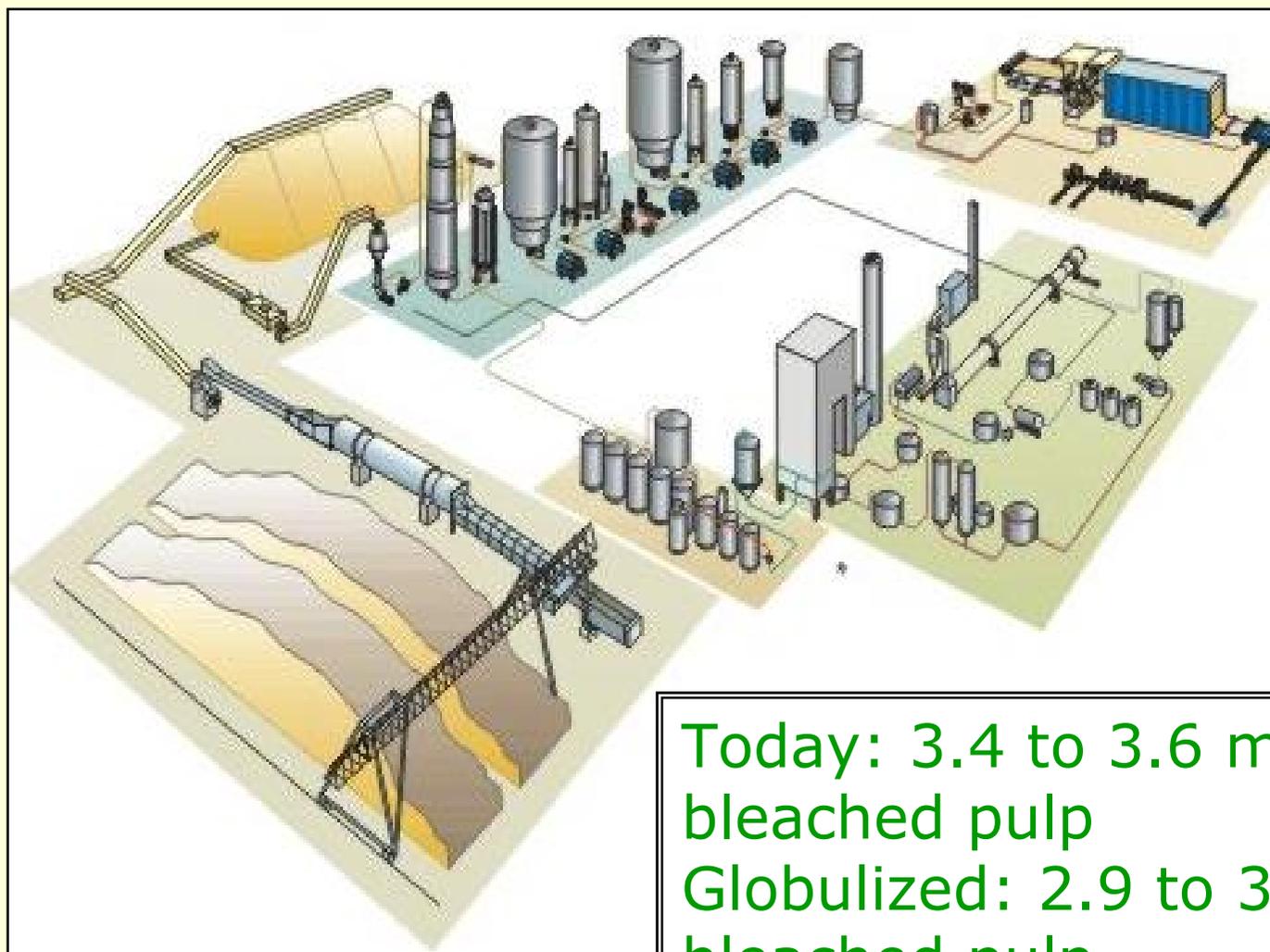
It would be the insertion of selected *E.globulus* genes in the genome of the productive Brazilian *Eucalyptus*, keeping the high forest productivity and gaining in wood quality

What can be gained from this?



- Wood density may leave the today's range of 0.48 - 0.52 g/cm³ to reach 0.56 to 0.60 g/cm³ and with even easier kraft pulping
- Lignin content may be reduced from the today's 27 to 30% to 22 to 24% (an easier-to-be-pulped lignin)
- Kraft digester pulping yield may grow from the today's 51 to 53% to new values of 55 to 57%

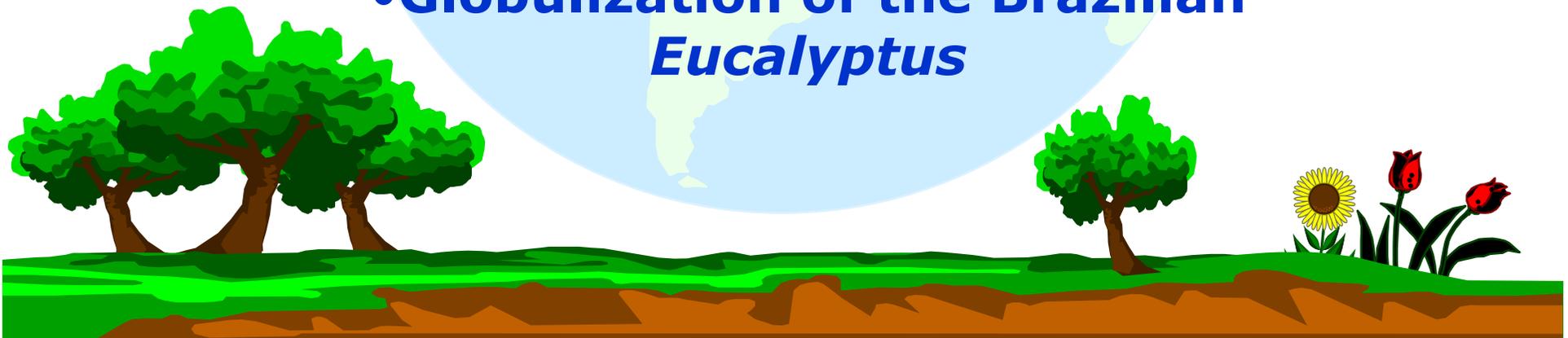
More productive pulp mills and with lower specific wood consumption



Today: 3.4 to 3.6 m³/adt
bleached pulp
Globulized: 2.9 to 3.1 m³/adt
bleached pulp

Well friends, we have several new roads
Some of them are already being paved by
our Brazilian Silviculture...

- **New ways to manage and to produce even more sustainable and productive plantation forests**
- **Additional partnership with rural farmers to produce wood in forests closer to the consumption mills**
- **Globalization of the Brazilian *Eucalyptus***





What kind of Silviculture are we to find no more than 20 years from now?

With a great level of certainty, a new thrilling and sustainable forestry

I have no doubts about...

www.eucalyptus.com.br
www.celso-foelkel.com.br

**Thanks friends for your
attention and patience**

**(Reminding... the
opportunities are also great
to *Pinus...*)**

