



# Eucalypt Tree Improvement and Clonal Deployment in Guangxi China

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# China



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# Project Area



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# Behai Guangxi



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# Eucalypts in China

- First introduction in 1890
- In 1896 began large effort in Yunnan Province including many species and provenances
- 1950's to 1970's – large importations, little coordination, very few large success stories
- Great Leap, Cultural Revolution, opening of China's economy, death of Mao in 1976, increased global contact, impact of outside advisors, higher living standards and increased need for forest products
- Current success due mostly to efforts commencing in 1980s



# Eucalypts in China

- 4 million ha total
- 2 million ha Guangxi Province
- 1.35 million ha Guangdong Province
- Clones of interspecific hybrids –
- *Eucalyptus urophylla* x *grandis*, *Eucalyptus urophylla* x *tereticornis*
- Few seedling stands
- Nurseries begin almost 100% with tissue culture



# Eucalypts in China



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# Eucalypt Wood Utilization

- Growth rates of 5-10 cubic m/ha/year – low by world standards
  - Many are stuck in 1980s technology
- Rotary veneer and plywood with logs 8-15cm in diameter
  - Small taper clones beats high MAI clones
- MDF
- Paper, tissue
- China is largest producer of eucalypt oil from juvenile foliage of heavily pruned trees





# Eucalypt Breeding

- China Eucalypt Breeding Alliance
- China Eucalypt Research Centre
- China-Australia Afforestation Project at Dongmen Forest Farm
- ACIAR/Chinese Academy of Forestry
- Guangxi Forest Research Institute
  
- SEGX – clones from Brazil, Laos, Viet Nam



# SEGX

- End of 2015 - 72,000 ha of eucalypt plantations
- Current eucalypt MAI is 22
- Future eucalypt MAI >33

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# Annual Rainfall



Annual Rainfall 年降水分布图(1971-2000)  
(Unit单位: mm)



## Legend

- City 市
- County 县
- Town 镇
- MAI(30-40 m<sup>3</sup>/ha-Y)
- MAI(20-30 m<sup>3</sup>/ha-Y)
- MAI(10-20 m<sup>3</sup>/ha-Y)

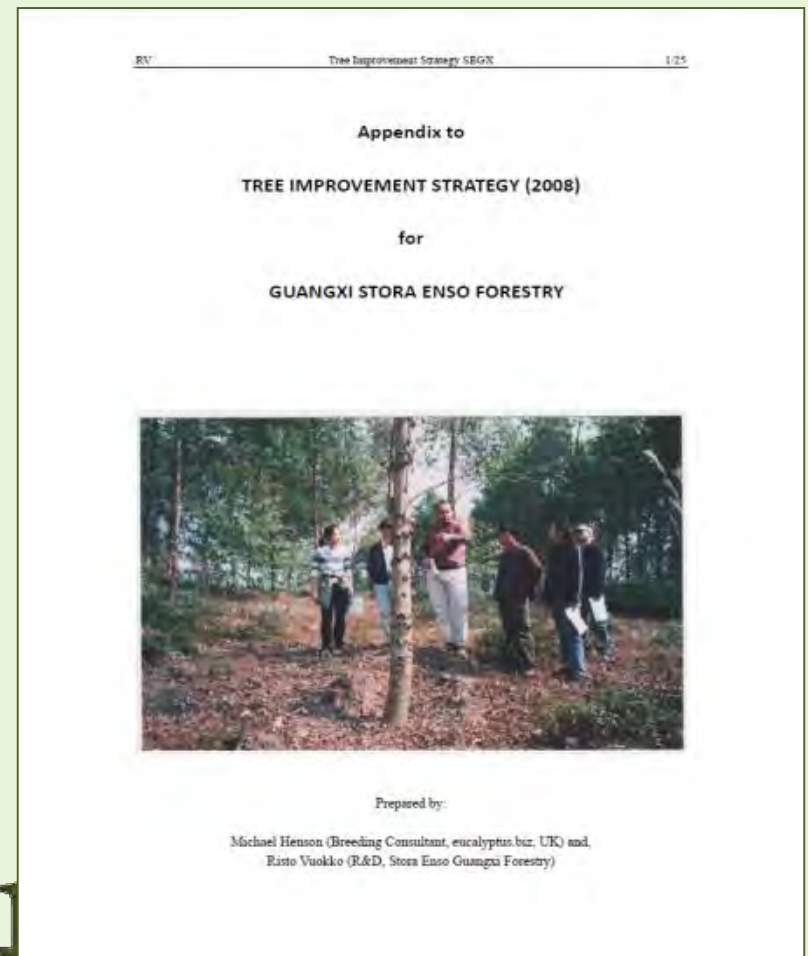
## Rainfall 降水量

- 1,000 - 1,100
- 1,100 - 1,200
- 1,200 - 1,300
- 1,300 - 1,400
- 1,400 - 1,500
- 1,500 - 1,600
- 1,600 - 1,700
- 1,700 - 1,800
- 1,800 - 1,900
- 1,900 - 2,000
- 2,000 - 2,100
- 2,100 - 2,200
- 2,200 - 2,300
- 2,300 - 2,400
- 2,400 - 2,500
- 2,500 - 2,600
- 2,600 - 2,700
- 2,700 - 2,800

0 20 40 80 120 160 Kilometers

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# Eucalypt Tree Improvement



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# Tree Improvement Objectives 2008-2014

- Deployment of high quality hybrid eucalypt clones for commercial plantations
- Main focus: *E. urophylla* x *E. grandis* hybrids as well as hybrids that include *E. camaldulensis*, *E. tereticornis*, *E. pellita*
- Pure species open pollinated breeding utilizing five main species and Sandkhoul land race to select trees for use in hybrid cross pollination
- Clone deployment strategy to optimize plantation growth and to create clonal mix that balances risks with productivity.
-

Selected Clone age four years.  
Age one year plantation – pruned to 1.5m.



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# Accomplishments

- **Breeding and clone production**

- More than 2200 open pollinated families from eucalypt species and provenances in field trials
- Almost 700 control pollinated families in field trials
- Almost 1000 clones included in field trials in all areas of SEGX land interest
- 20-30 clones ready for pilot scale commercial planting (2014)
- 

- **Technologies**

- Control crossing technologies developed
- Tissue culture laboratory engaged in tree improvement and commercial nursery planting stock production
- Initiated wood sampling – wood density and pulping
- Management systems of trial data and analysis



# Tree Improvement Objectives 2014 - ongoing

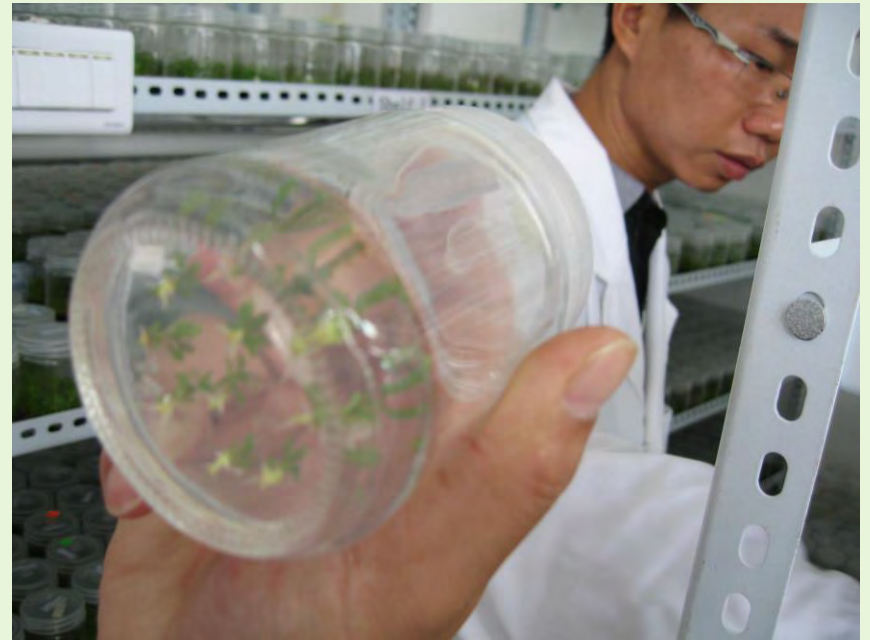
- It's the end of conventional tree improvement as we know it.
- And I feel fine.

Thanks REM !

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# Eucalypt Tissue Culture



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# 2014-ongoing Tree Improvement Strategy

- No pure species breeding
- Two way, three way and four way crosses
- Plant 2% of land to pure species from seedling seed orchards
- Utilize tissue culture success to shorten breeding cycle
- Where possible, initial clonal tests in blocks on multiple sites

# Typhoon damaged trials





# Clone with Typhoon Rammasun resistance





# Eucalypt Breeding Orchard



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# Clonal Nursery



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# Clonal Eucalypt Plantations



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# Land Invasion



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# Clonal Eucalypt Trials



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# gemview

## Data at your fingertips

Gemview is designed by breeders especially for perennial plants, and is being used for four plant species in three countries.

Access your data from anywhere, and share easily with others - as much or as little as you choose.

Gemview requires no specialised training to interrogate data in multiple ways, such as identify where specific genetic entities are planted.

Secure smooth succession by storing all your data and supporting documents, e.g. maps, photos, reports.

Manage your pedigrees and breeding values, and extract data in multiple formats for further analysis.

Gemview has built-in data analysis using customized R script



## Track your germplasm

Gemstock tracks production and storage of materials in all stages of your breeding program, including breeding archive, seed store, laboratory, greenhouse and nursery.

You can track any type of material from seed, pollen, scions and tissue culture through to nursery plants.

Gemstock means that you always have up to date genetic inventories.

You define your own production processes to suit your requirements.

Gemstock is fully integrated with Gemview, so you can check the availability of any genetic entity at any stage in your program.

Gemstock is in the late stages of prototyping, and is being implemented for select clients.





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**Or contact us today**

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“...dejar que los perros ladran, Sancho, es una señal de  
que estamos avanzando.”

Don Quixote



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