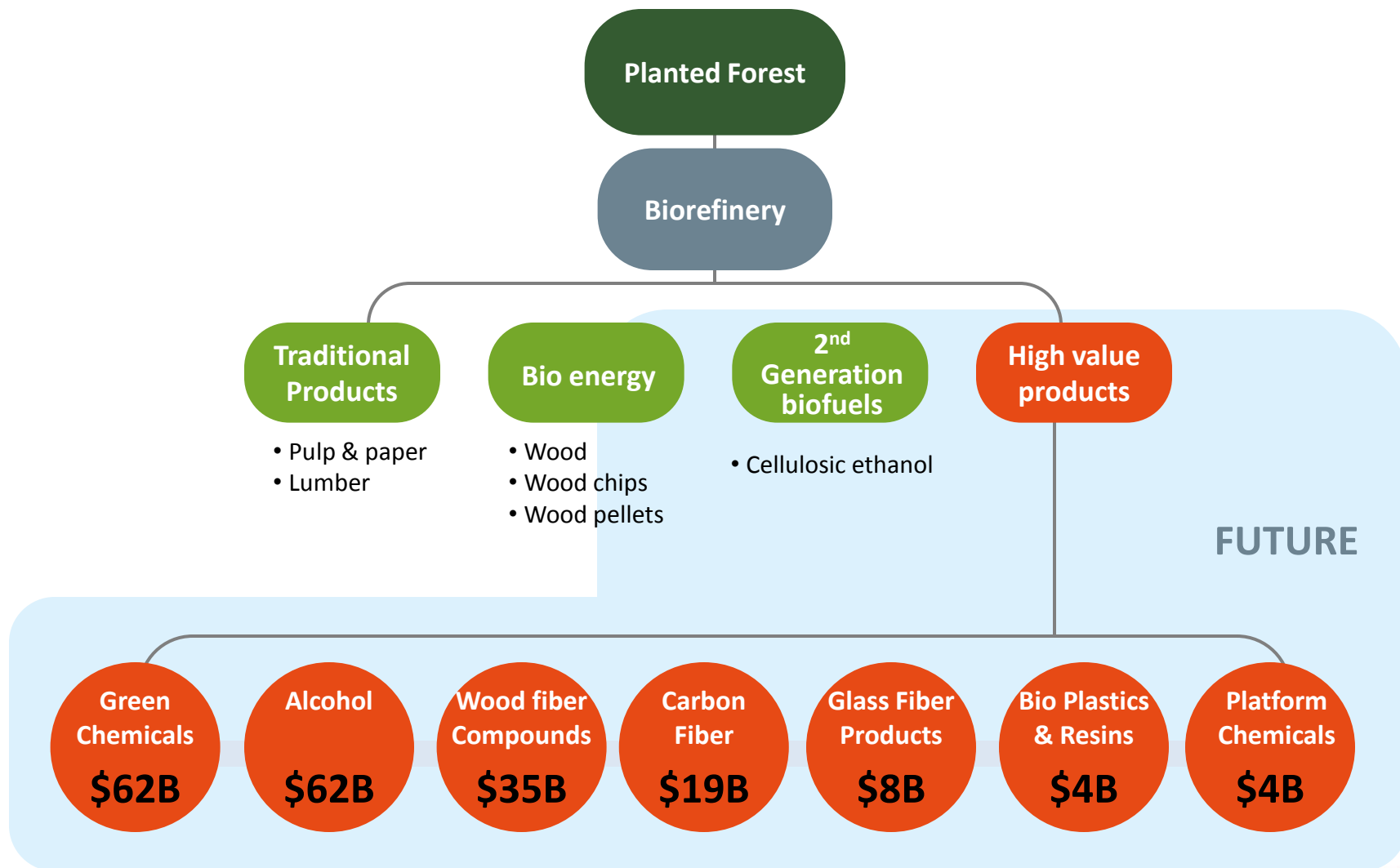


Responsible development and deployment of advances in research – the example of GM trees.

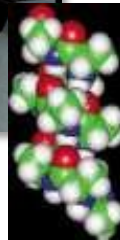
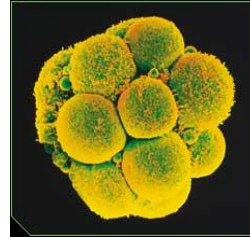
Rome – 26th September 2012

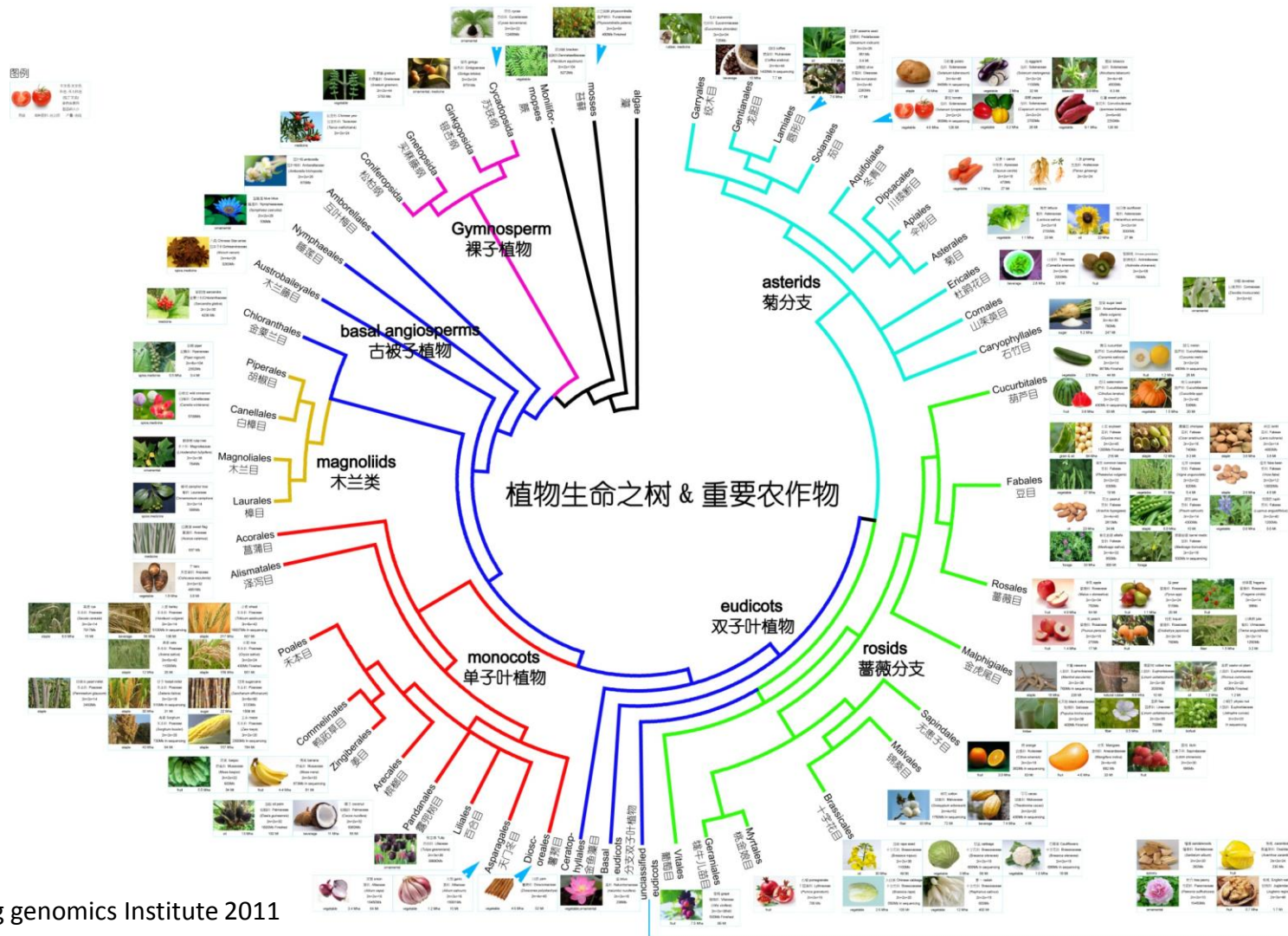
Mike May VP Public Affairs, FuturaGene



The science-society divide

The application gap





Source: Beijing genomics Institute 2011

Increasing the availability of food, feed and renewables, using the combined resources of modern biotechnology and conventional breeding to:

- Increase the yield of crops and livestock,
- Improve the nutritional value of crops and livestock,
- Reduce post-harvest losses,
- Increase integrated crop management,
- Ensure sustainable productivity increases on marginal lands,
- Improve afforestation and reforestation techniques,
- Increase efficiency of nitrogen fixation and mineral absorption.



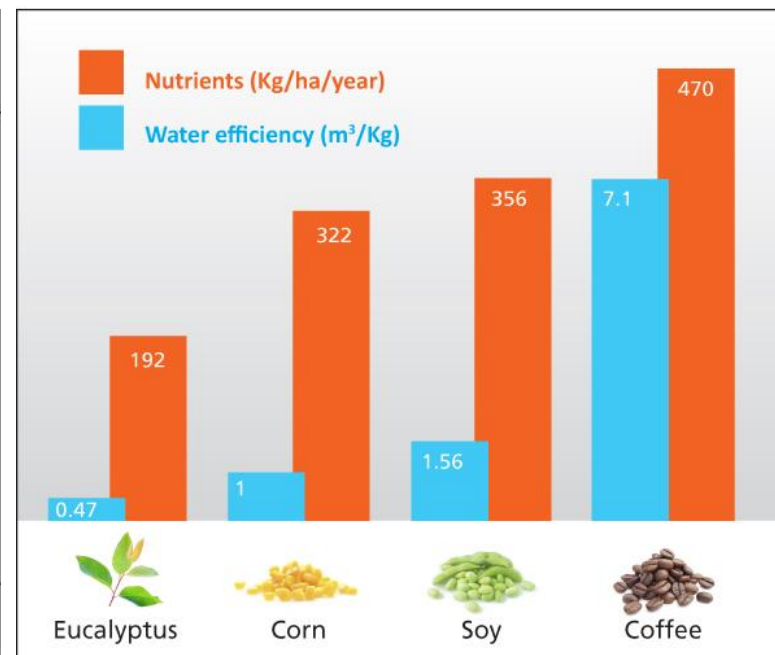
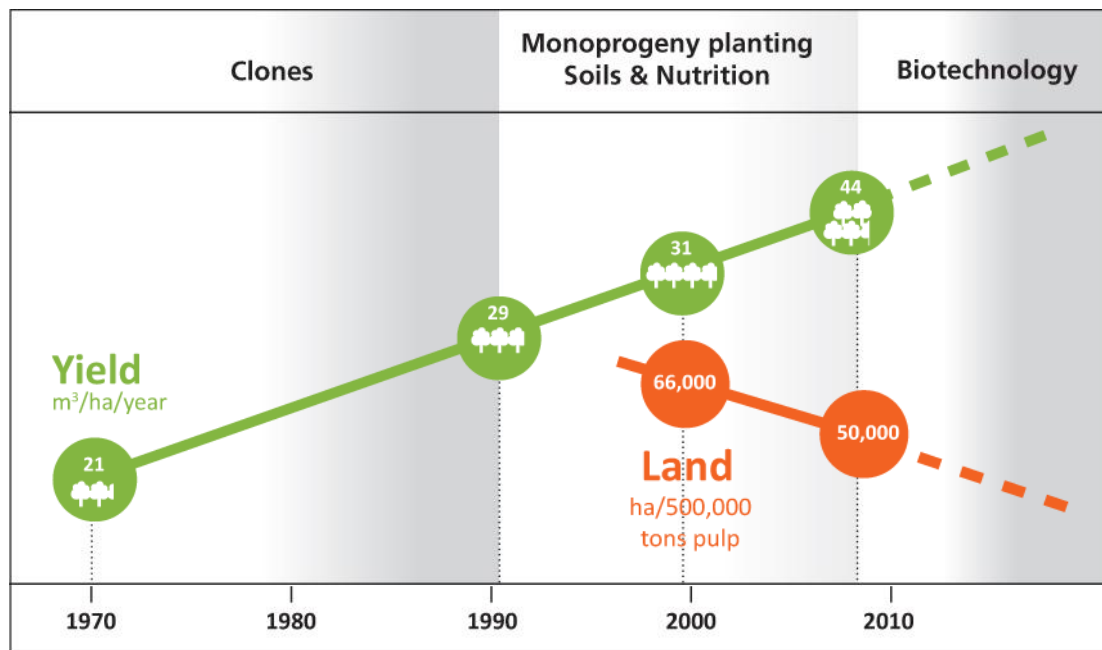
Mutually reinforcing priorities:

1. Restore 150 million hectares of deforested and degraded lands by 2020.
2. Promote science, technology, innovation and traditional knowledge in order to face forests main challenge: how to turn them productive without destroying them.
3. Zero Net Deforestation by 2020, respecting the rights and knowledge of peoples living in and from the forests and responding to their sustainable development needs.

- Comprehensive and rigorous testing - is it adequate and is it transparent?
- Gene flow
- Gene stability – is it sustainable
- Co-existence with other forms of land use
- Human health issues
- Adverse effects on non-target species (in case of toxins)
- Has there been enough debate – we simply don't know enough
- Who owns the technology?
- Can it ever reach the small scale farmers?

Planted forest innovation

Today's standards



Suzano Pulp & Paper, Bracelpa

1. Enable **knowledge Infrastructure** and promote science education;
2. **Invest** in global R&D systems and encourage financial systems that promote investment in SMEs;
3. Re-evaluate, standardise, rationalise and harmonise **regulatory regimes** in the light of scientific evidence and field experience;
4. Promote **technology transfer** and international collaboration for sharing, scale-up and replication of resources and best practice;
5. Promote the potential of technology to assist **small farmers** through capacity building, training and extension services linked through to appropriate public policy.

- Green growth implementation will be driven by novel partnerships that combine the convening power and outreach of inter- and non-governmental organisations with the innovative power of science and technology and the deployment skills of private sector business;
- Novel partnerships established would provide new thought leadership around key goals and technology platforms and how to implement them;
- Innovation, collaboration and governance will be the new pillars of sustainability.

Novel Implementation Partnerships



Mainstream models that work

Land use considerations



Eucalyptus – Sorghum



Eucalyptus – Livestock

Source: EMBRAPA

- More than 700 field trials since 1988;
- EU: 69 trials, 28 species, 32 traits;
- USA: 708 trials, 37 species, 36 traits;
- 4 commercial releases: papaya & plum (USA), and insect resistant and salt resistant poplar (China);
- High impact of public sector science
- Not only commercial targets, but environmental (eg phytoremediation), conservation (eg Dutch elm disease resistance and American Chestnut rescue)
- Proven technology for containing gene flow and gene stability
- Proven track record of biosafety and risk assessment



Transgenic line 1



Transgenic line 2



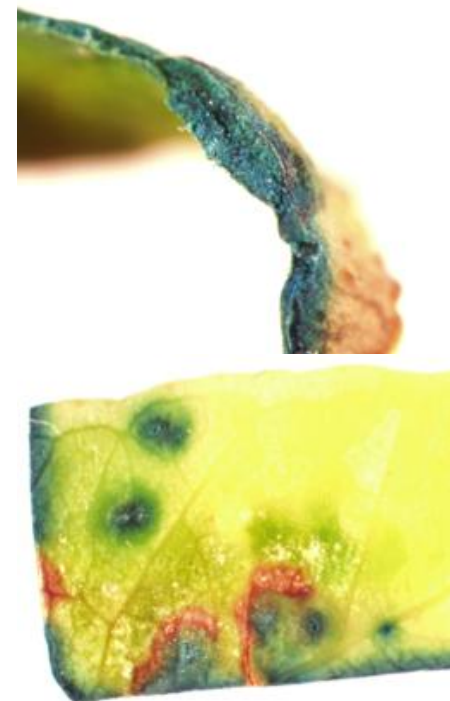
Wild Type

Pest and disease control is based on:

- Breeding.
- Field/ forest management.
- Chemicals.
- Biological control,
- GM technologies

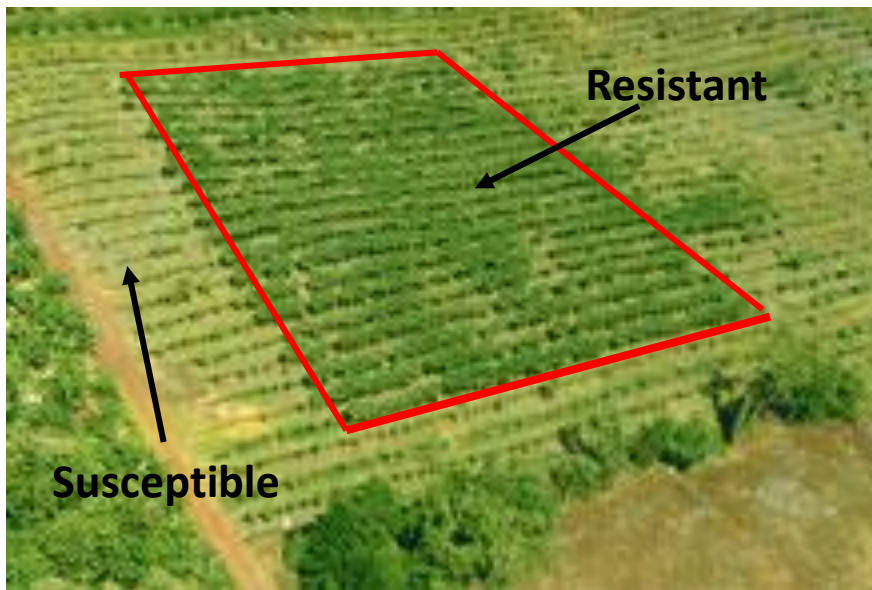
And is needed because of:

- Local problems
- Invasive species
- Climate induced changes in pest population dynamics



Commercial GM trees

- Insect-resistant poplar in China.
- Virus-resistant papaya in Hawaii.



Cultivation of Bt poplars in China

“Seeing once is better than studying a thousand times”

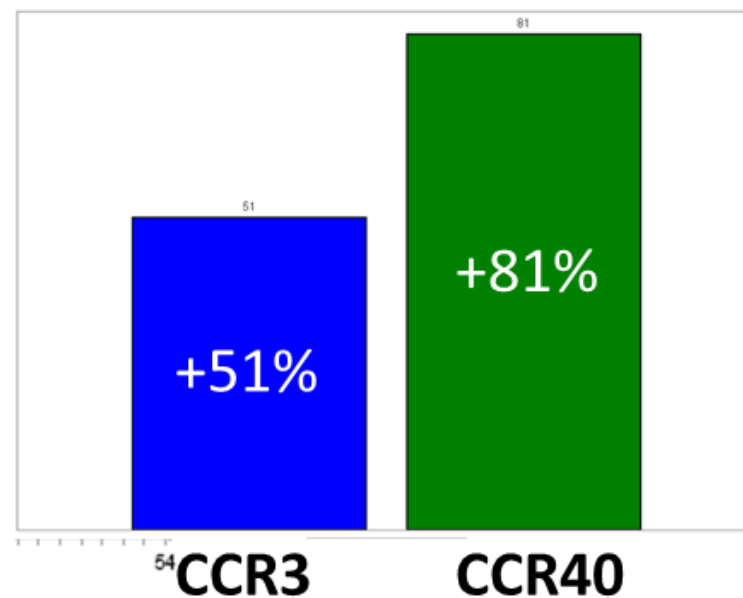


<http://www.gmo-safety.eu/science/woody-plants/316.seeing-once-studying-thousand-times.html>

May 2009



Bioethanol from GM low-lignin trees



Soil restoration, rural development

Desert species in China 2012



Source: FuturaGene & Gansu Desert Control Research Institute (GDC)



COLLABORATION

GOVERNANCE

INNOVATION

Source : EMBRAPA