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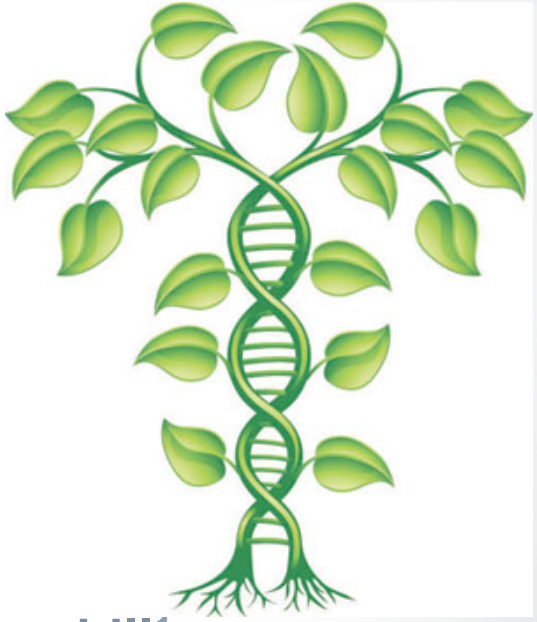
Anticipating Responsible Innovation: Genetically Modified Trees and Conceptualizations of Technological, Regulatory, and Cultural Futures



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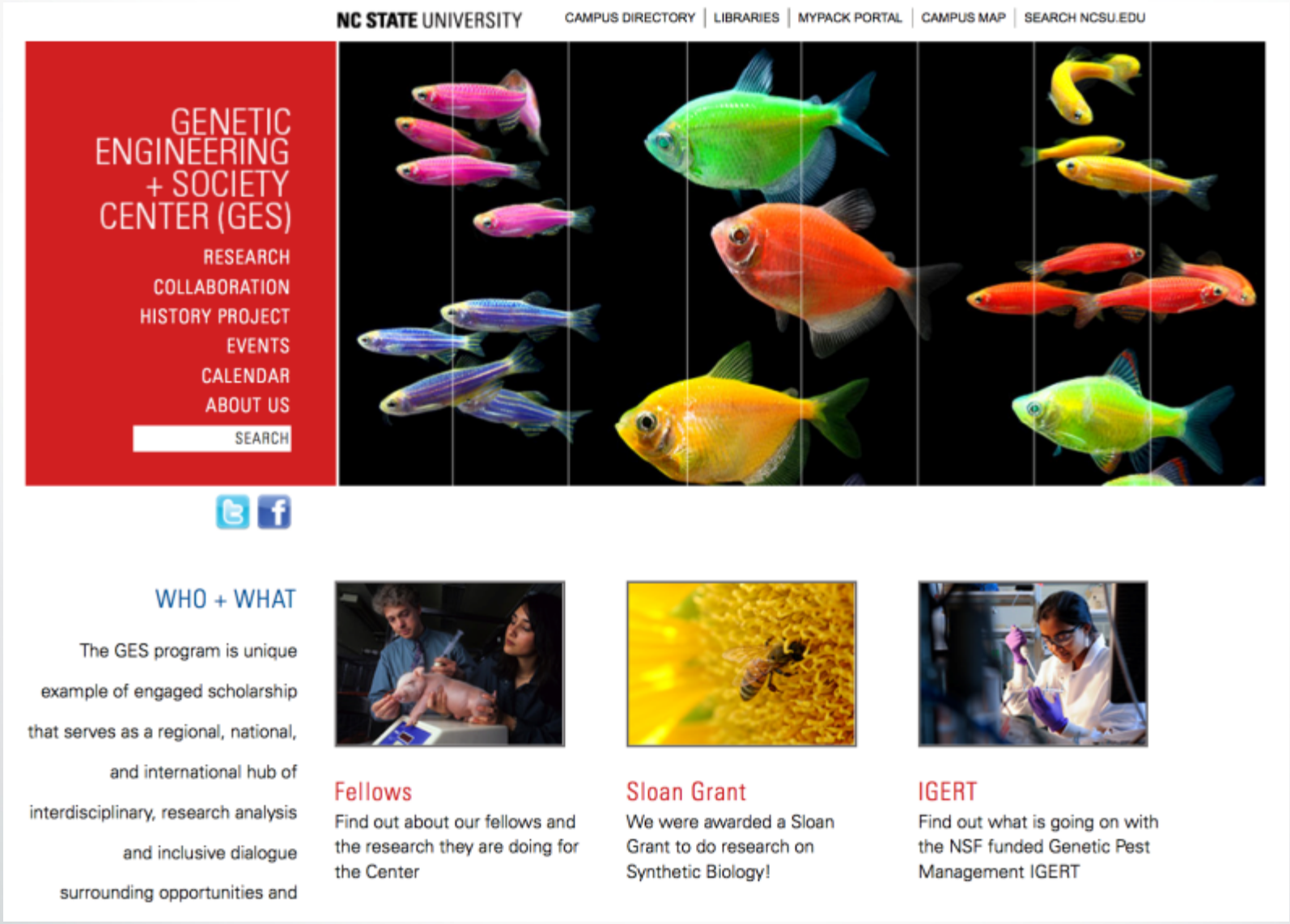
Governance of Emerging Technologies Conference: Law, Policy, and Ethics | Scottsdale, AZ | May 27, 2015



http://research.ncsu.edu/ges

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GM Tree Typology

Fruit/Nut

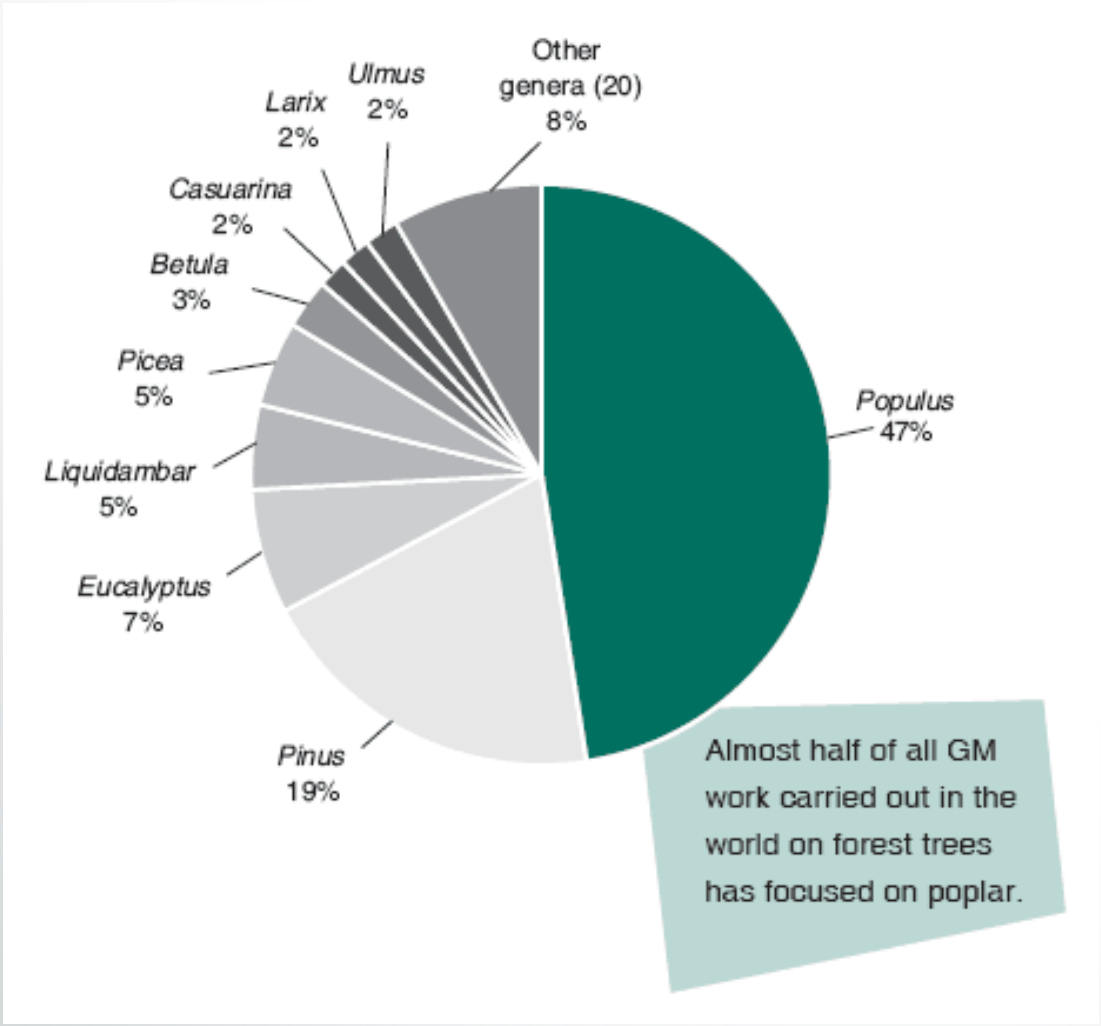
Biomass/Fiber

Restoration/Conservation

Fruit/Nut

Global News

Biomass/Fiber



FAO

Biomass/Fiber

FuturaGene
Yielding the Future™

SUZANO
PULP AND PAPER

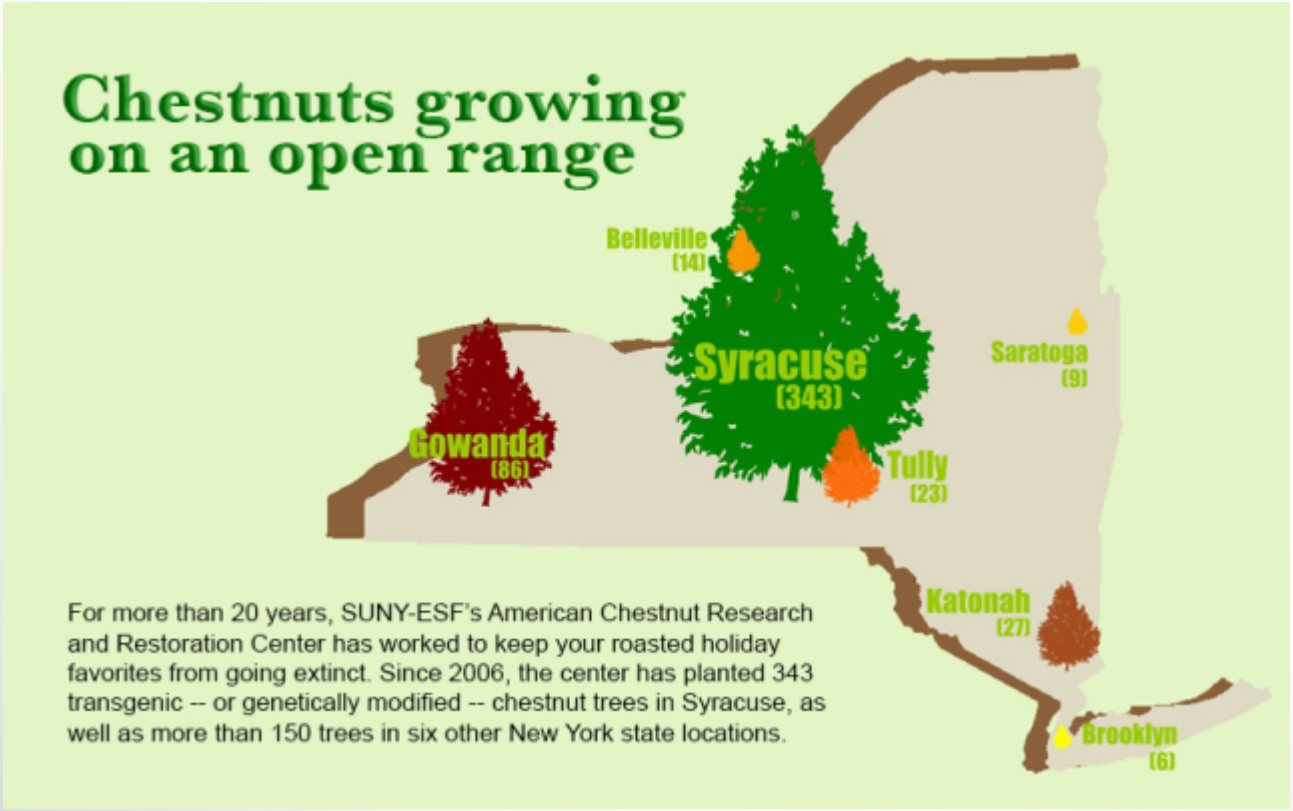
FuturaGene's eucalyptus is approved for commercial use in Brazil

São Paulo, April 9, 2015 – The Brazilian National Technical Commission on Biosafety (CTNBio) today approved the commercial use of the yield enhanced eucalyptus developed by FuturaGene, a wholly owned subsidiary of Suzano Pulp and Paper. Field experiments conducted since 2006 at various locations in Brazil have demonstrated an approximate 20% increase in yield compared to its equivalent conventional variety.

This is the first genetically modified (GM) eucalyptus event to be approved worldwide and

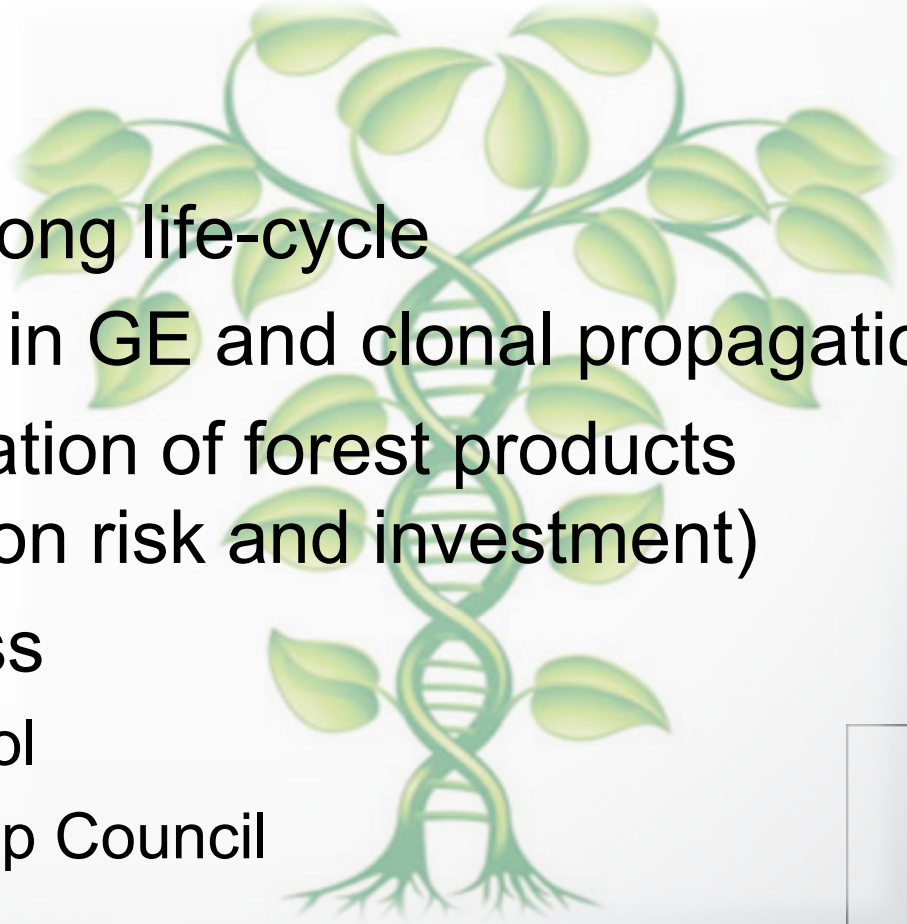
Restoration/Conservation

www.masschestnut.org



www.thenewshouse.com

What has slowed the development and deployment of GM trees?



- Size
- Slow maturation, long life-cycle
- Technical hurdles in GE and clonal propagation
- Vertical dis-integration of forest products industry (impacts on risk and investment)
- Regulatory process
  - Cartagena Protocol
  - Forest Stewardship Council

Research Questions

1. In what ways do forest biotechnologists anticipate “technological rejection,” and how does this affect their practice?

Anticipating technological rejection

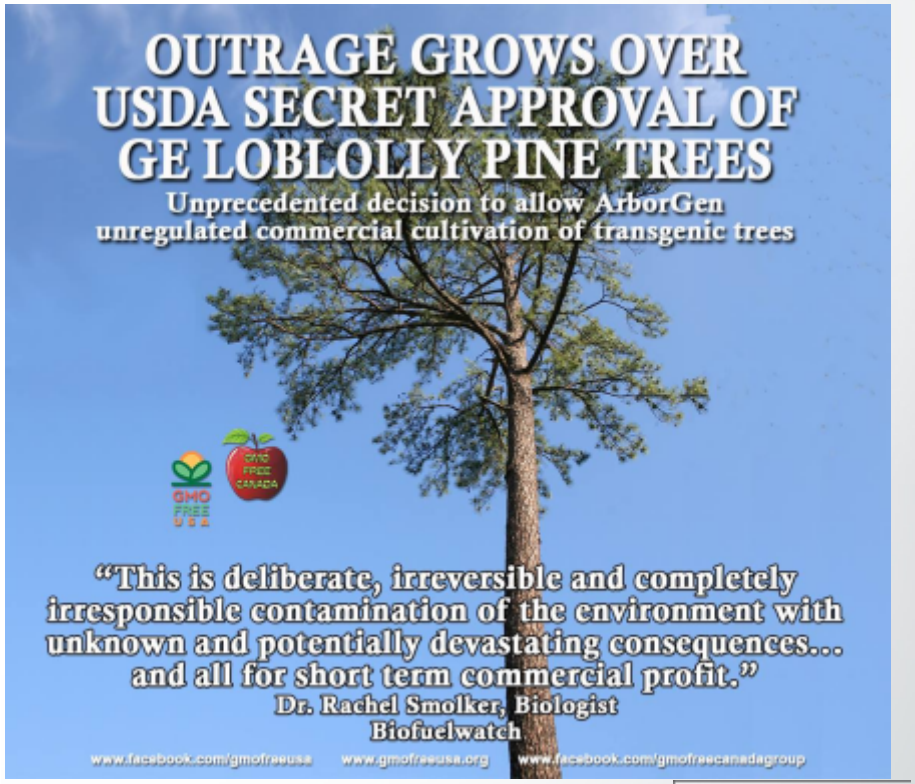
"In the past several years, out of public view, [Kress] has considered DNA donors from all over the tree of life, including **two vegetables, a virus and, briefly, a pig**. A synthetic gene, manufactured in the laboratory, also emerged as a contender. **Concerns about public perception and potential delays in regulatory scrutiny** put a damper on some promising leads. But intent on his mission, Mr. Kress shrugged off signs that national campaigns against genetically modified food were gaining traction. Only in recent months has he begun to face the full magnitude of the **gap between what science can achieve and what society might accept**…

…If we don't have consumer confidence, it doesn't matter what we come up with."

"A Race to Save the Orange by Altering Its DNA."
The New York Times (July 27, 2013)

Anticipating technological rejection

- GM loblolly pine with increased wood density
- Outside scope of USDA regulation (APHIS letter)
- Donor, recipient, nor method of transformation involve a plant pest



ARBORGEN®

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Anticipating technological rejection

- TedX talk by Powell
- Partnership with American Chestnut Foundation
- Crowdfunding as public engagement
- Tri-partite strategy
  - Conventional backcrossing, cisgenic, transgenic

National Geographic

Research Questions

1. In what ways do forest biotechnologists anticipate "technological rejection," and how does this affect their practice?
2. Will proponents of GM trees successfully disrupt anti-GMO discourse by invoking pro-environmental and anti-corporate narratives?

Disrupting anti-GMO narratives?

Gravity of the Monsanto Effect

www.wakingtimes.com

Disrupting anti-GMO narratives?

Forest biofuels and biomass

FuturaGene
Yielding the Future™

Highlights

View the new FuturaGene film about the socio-environmental benefits of the genetically modified eucalyptus
September 30, 2014

Public Hearing discusses biosafety aspects related to FuturaGene's genetically modified eucalyptus
September 04, 2014

Yielding the Future – Innovating a Sustainable Path for a Better Future

In a world challenged by growing population, diminishing resources and climate change, FuturaGene's technologies address critical challenges of plant yield enhancement and yield protection. We harness biotechnology to ensure the security and sustainability of Fiber, Fuel, and Feed. We believe that the key to sustainable agriculture lies in continuous improvement and protection of yield and processability of crops, thus maximizing output, whilst minimizing all inputs such as land, water and fertilizer.

After developing as an independent company since its inception in 1993, FuturaGene was acquired, in July 2010 by Suzano Papel e Celulose S.A., a Brazilian company and the second largest producer of eucalyptus pulp in the world. As a wholly owned subsidiary of Suzano, FuturaGene will continue its worldwide biotech activities with enhanced resources driving its mission to be a world leader in plant

Disrupting anti-GMO narratives?

Forest biofuels and biomass

Image credit: Wikimedia Commons

- More wood from less land…
  - but increase in plantations?
- Less chemical inputs…
  - like herbicide-tolerant crops?
- Carbon-fixing trees to fight climate change…
  - but how will those C numbers really work out?
- Higher yields to make biofuels competitive…
  - but what about biodiversity and water?
  - and what about pollen drift?

Disrupting anti-GMO narratives?
GM American chestnut

- Restoration narrative
  - Heritage species
  - Ecological function
  - Disease as crisis
  - Trials on mining reclamation sites
- No profits or patents
- But they are *meant* to spread

Global Justice Ecology Project

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Research Questions

1. In what ways do forest biotechnologists anticipate "technological rejection," and how does this affect their practice?
2. Will proponents of GM trees successfully disrupt anti-GMO discourse by invoking pro-environmental and anti-corporate narratives?
3. What can we learn about "responsible innovation" from an NGO committed to promoting the "responsible use" of forest biotechnology?

- Responsible Use®: Forest Biotechnology Principles – responsibleuse.org
- Forest Fuels®: Unlocking the potential of fuels made from trees
- Heritage Trees®: Species Protection through biotechnology (Forest Health Initiative)

http://www.forestbiotech.org/

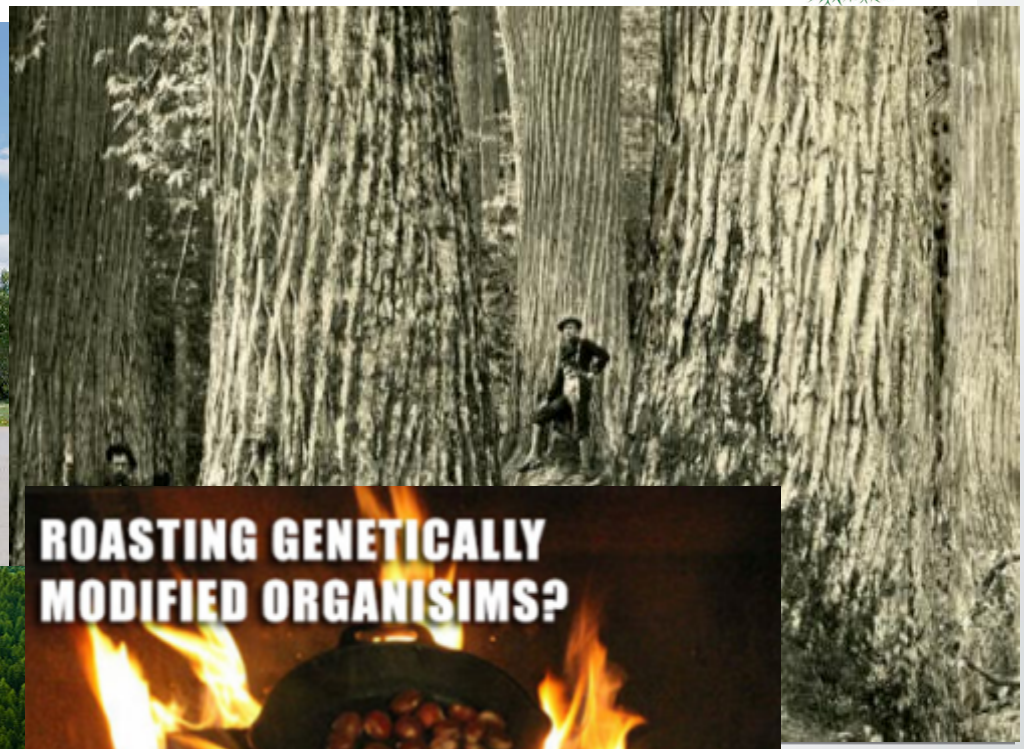
Institute of Forest Bioscience

Advocating a cisgenic strategy

"Responsive?"…or a technological gateway

Thank you!

Comments welcome: jason_delborne@ncsu.edu



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