ENVIRONMENT – FOREST => NATURAL vs. PLANTED

- LOW PLANTING DENSITY
- NATURALGENETIC SELECTION
- SLOW GROWING

- HIGH PLANTING DENSITY
- GENETIC SELECTION FOR PINE RESIN YIELD
- FAST GROWING

PINE TAPPING TODAY
Alex Cunningham – AR Eldorado ME. SP, BRAZIL
WHY BOTHER COLLECTION PINE GUM?
John L. Smith – Rosin Plus Consulting, USA

PRINTING INKS
375-400 KT ROSIN
## Phenotypes & Genotypes

### Oleoresin drymass (7500 trees)
- Box-Cox transformed oleoresin drymass exuded over 24 hours
  - 1002 cloned genotypes
  - 3 sites
  - 3 clonal replicates per site
  - 3 years (one site)

### Resin canals (5400 trees)
- Number of resin canals per year (averaged over triplicate samples)
  - 543 cloned genotypes
  - 3 sites
  - 3 clonal replicates per site
  - 2 years

### Wood diterpene content (3484 trees)
- Peak intensities pyrolysis molecular beam mass spectrometry
  - 959 individuals
  - 2 sites
  - 2 clonal replicates per site
  - 2 year (one site)

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**Genotypes:** 4854 SNPs in 4027 genes
The Sustainable Production in a Constant Changing Scenario

What are the main influences in our business?!

**FOREST AVAILABILITY**

**WORKFORCE COSTS**

How to survive?

**PAST**

**NOW**

**YIELD**

2.0 Kg/Tree/Yr

3.5 Kg/Tree/Yr

**BRAZILIAN PINE TAPPING**

A Sustainable Practice

Conrado A. C. Neves – Grupo Resineves, SP, BRAZIL
MODERN LOGISTICS FOR PINE RESIN
From the Forest to the Gum Rosin Plant
Mauro Favia Vieira – Fazenda Duma, SP, Brazil
CRUDE GUM SOURCING
IN TODAY’S MODERN CHINA
Mo Rongjie – Beiliu Hengli Pine Chemicals Ltd., GX, CHINA
BIOLOGY AND PHYSIOLOGY
OF PINE OLEORESIN PRODUCTION
Gary Peter - UF, FLA, USA

Stem terpene defenses against bark beetles

Constitutive
- Physical barrier: Stem
- Constitutive oleoresin flow

Induced
- Wounding and fungi induce terpene synthesis
- Chemical defense: Terpenes toxic to bark beetles & pathogenic fungi
- Wounding and fungi induce new resin canals to form in the wood

- Immediately
- 0-7 days: Jasmonate and ethylene signaling
- 2-4 weeks
Borehole Drilling With Power Tools

- Stihl BT 45 wood drill
- Atom Industries drill attachment for chainsaw powerhead
- Tanaka engine drill
- Drilling speed < 1000 rpm to avoid heating
Gum Rosin Production Process

The Starting Point:
- Early in the 40’s last century thanks to the USDA the Olustee rosin process was developed
- Central steam Stills replaced the old fire stills
- The Olustee process basics are nowadays in place in all the Plants around the world
- The last gum rosin still in the US was in Baxley (GA) shut down in 1999

Source: Based on McConnell (1963)
LISBON SYMPOSIUM FOLLOW UP

• Produce regularly this type of meeting.

• Record pine resin quality of Pine species tapped around the world.

• Study the effect of the use of stimulants in pine tapping on gum rosin.
PINE TREES DON’T WALK

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2015 PCA International Conference
September 2015 - Kyoto, JAPAN

SUSTAINABILITY

FORESTS ON THE MARCH

Trees can’t walk to a better place as climate worsens,
So scientists are relocating helpful genes instead

By Hillary Roener

ADAPT OR DIE:
Sitka spruce in British Columbia may need to
borrow genes from trees in warmer climates.
FIGURE 1 | Schematic representation of RNA extraction from vascular cambium of slash pine trees. Process of tapping and application of the respective stimulant paste was performed on day 0. On days 0, 5, 8, and 15 after tapping, a small novel bark streak was made right above the previous one. Phloem tissues were removed using a wood chisel and the cambium was exposed. RNA was extracted from vascular cambium region and immediately frozen in liquid nitrogen for subsequent analysis. Stimulant paste treatments were: NAA, POTASSIUM, CEPA, or control (bark streak only).