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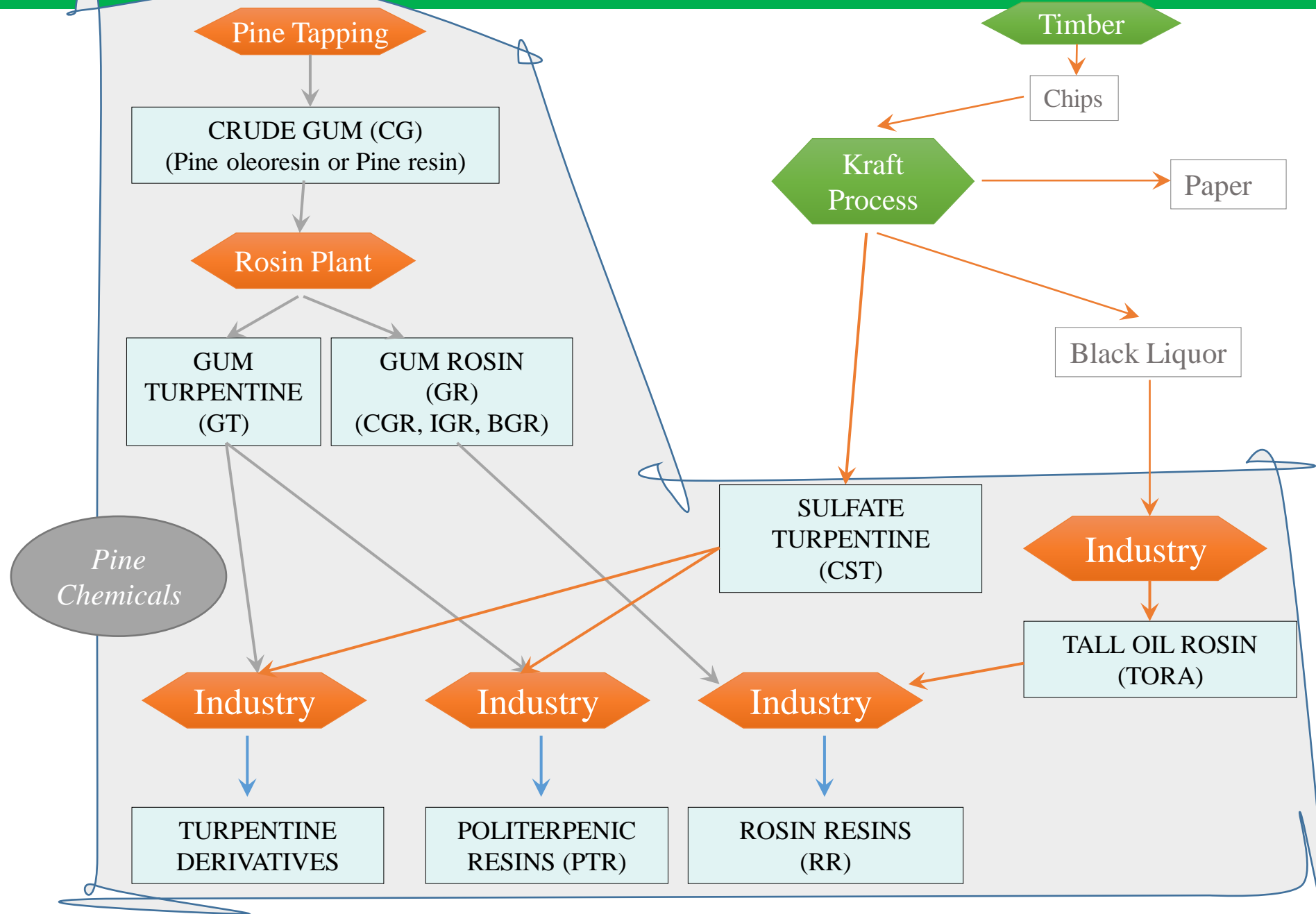
Pine Tapping Today

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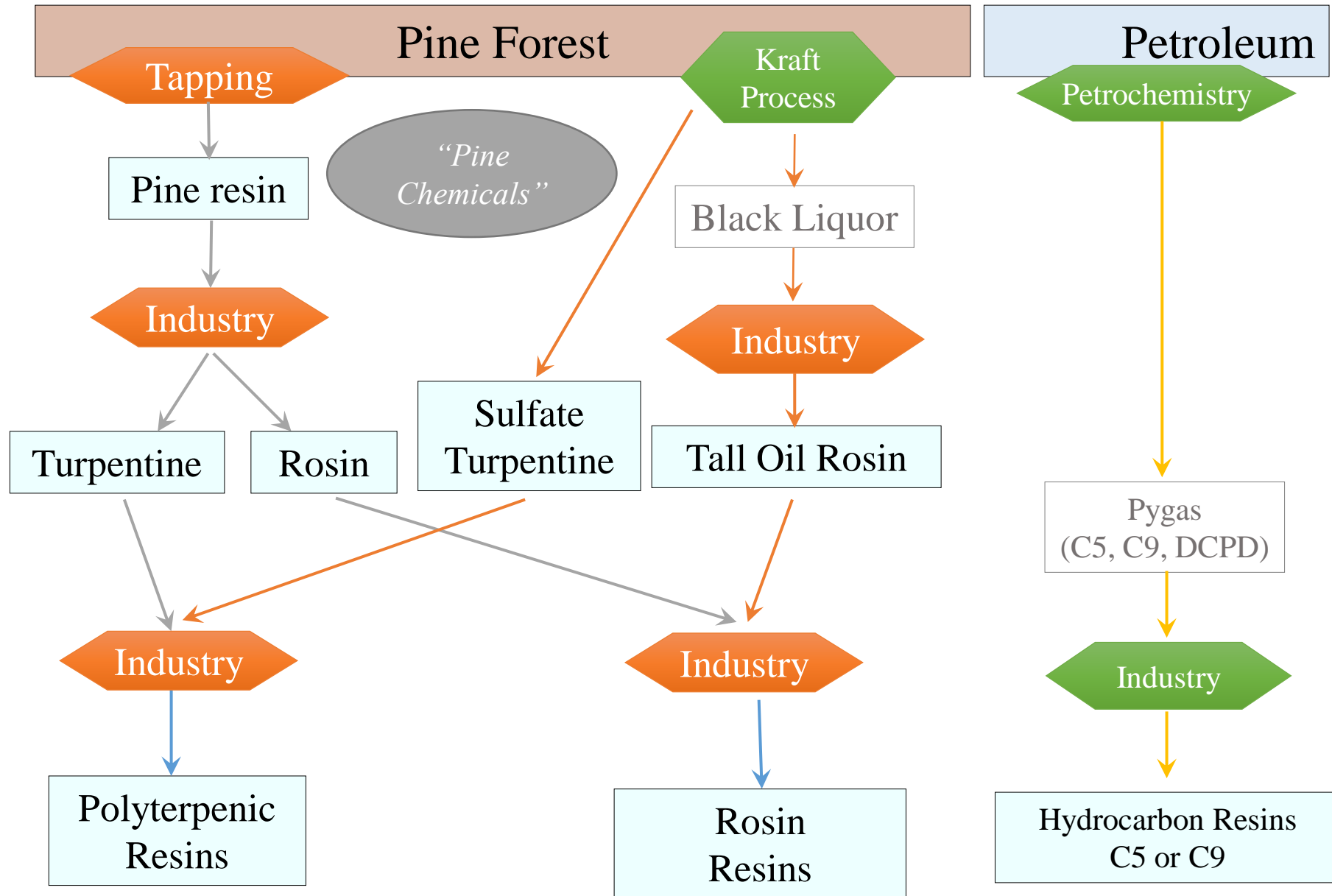
A close-up photograph of a pine tree trunk. A diagonal tapping wound is visible, with a small collection cup attached to it. The resin is dripping down the trunk, creating a thick, yellowish, crystalline substance. The background is a blurred green forest.

***PINE TAPPING IS A DIVERSE ACTIVITY,
BASED IN OUTDATED TECHNIQUES,
WITH EXTRACTIVE CHARACTERISTICS
WHEN ANALIZED GLOBALY.***

PINE FOREST (natural or planted)



TACKIFIER RESINS



GUM ROSIN, TALL OIL ROSIN AND WOOD ROSIN

TERPENE RESINS
80 Kton/year

WOOD ROSIN
20 Kton/year



TALL OIL ROSIN
400 Kton/year

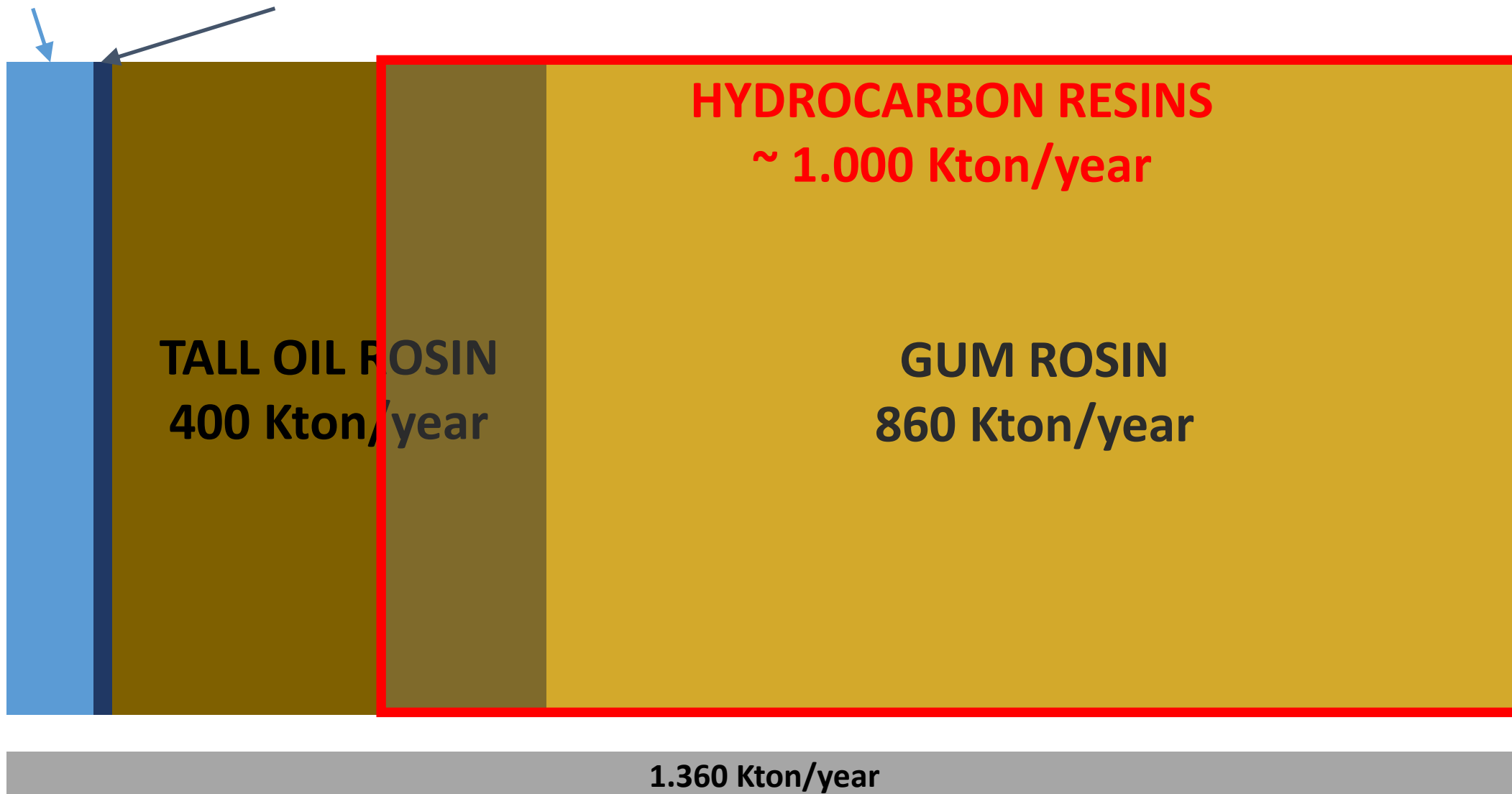
GUM ROSIN
860 Kton/year

1.360 Kton/year

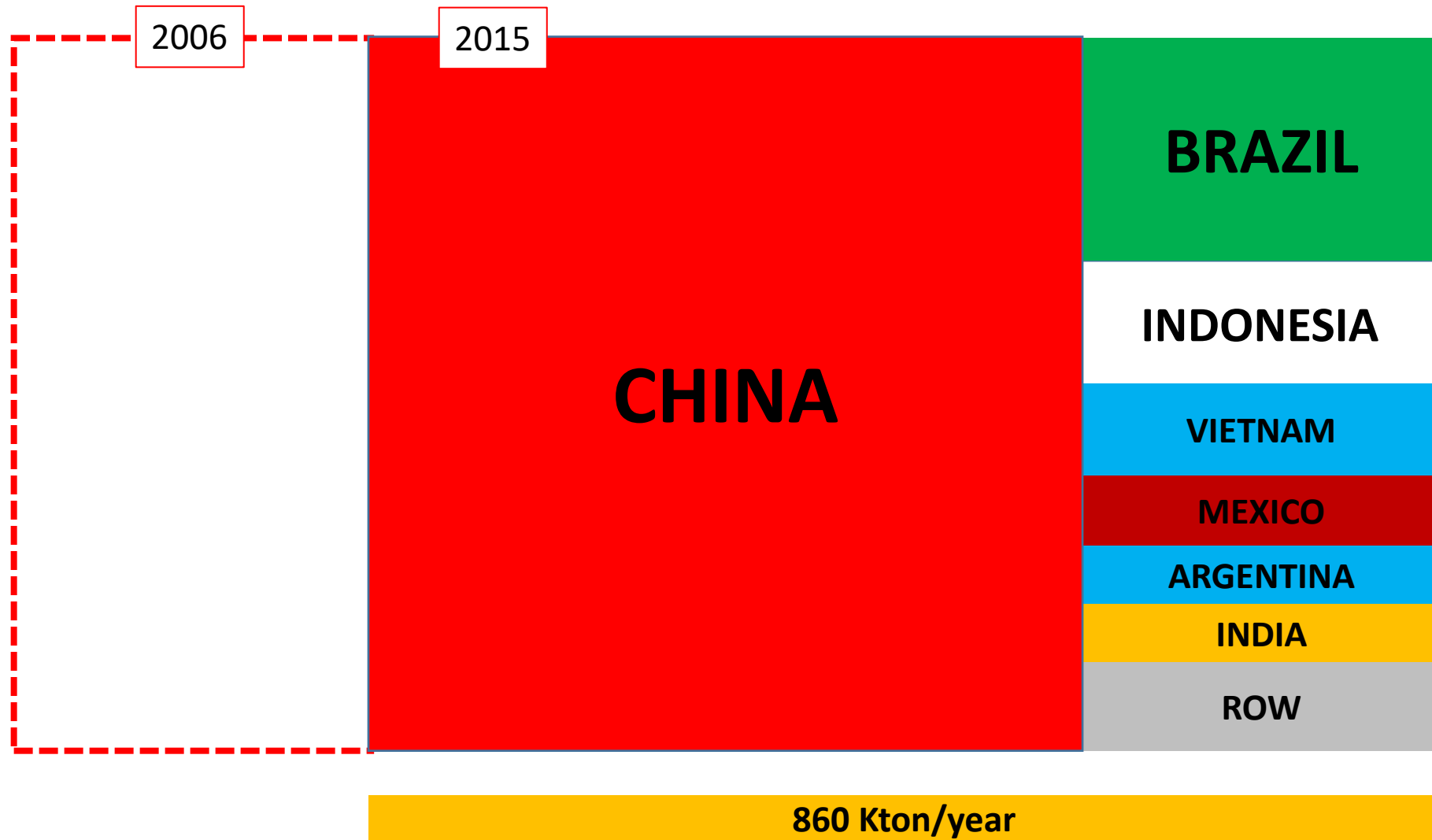
GUM ROSIN, TALL OIL ROSIN AND WOOD ROSIN

TERPENE RESINS
80 Kton/year

WOOD ROSIN
20 Kton/year



GUM ROSIN



ENVIRONMENT

LABOR FORCE

***PINE
TAPPING
TECHNIQUES***

ENVIRONMENT – FOREST RESOURCES



ENVIRONMENT – FOREST => NATURAL vs. PLANTED



- LOW PLANTING DENSITY
- NATURAL GENETIC SELECTION
- SLOW GROWING



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

ENVIRONMENT – GENETICS => NO SELECTION vs. SELECTION



ENVIRONMENT – PINE SPECIES => DIVERSITY

In thousand of metric tons / year.

| PINE SPECIES | CHINA | BRAZIL | INDONESIA | OTHER COUNTRIES | TOTAL | % |
|---------------------------|------------|------------|------------|-----------------|--------------|----|
| <i>Pinus massoniana</i> | 575 | | | | 575 | 46 |
| <i>Pinus yunnanensis</i> | 250 | | | | 250 | 20 |
| <i>Pinus elliottii</i> | 50 | 65 | | 30 | 145 | 12 |
| <i>Pinus merkusii</i> | 5 | | 95 | | 100 | 8 |
| <i>Pinus caribaea</i> | 10 | 30 | | 20 | 60 | 5 |
| <i>Pinus simão kesiya</i> | 60 | | | | 60 | 5 |
| Other species | 5 | 5 | 5 | 40 | 55 | 4 |
| TOTAL | 955 | 100 | 100 | 90 | 1.245 | |

Own estimates for the production season of 2010/2011 .

ENVIRONMENT – PINE SPECIES => DIVERSITY

Elvira Rodriguez (1961)

| PAIS | PRODUCCION MUNDIAL | ESPECIES PRINCIPALES |
|---|----------------------|---|
| EE.UU | 50 % | Pinus palustris Pinus elliottii |
| FRANCIA | 15 % | Pinus pinaster Pinus halepensis |
| RUSIA | 8 % | Pinus sylvestris |
| PORTUGAL | 7 % | Pinus pinaster |
| ESPAÑA) MEJICO) GRECIA) INDIA) | 20 % 20 % | P. pinaster P. halepensis P. laricio P. oocarpa P. leiophylla P. pseudostrobus P. halepensis P. longifolia |

LABOR FORCE – CULTURAL TRAITS



PINE TAPPING TECHNIQUES – OPEN FACE



CUT INTO XYLEM OR CUT UP TO XYLEM

PINE TAPPING TECHNIQUES – OPEN FACE



WITH OR WITHOUT STIMULANT

PINE TAPPING PRODUCTION TECHNIQUES

There are four different ways to tap a pine tree for crude gum...



PINE TAPPING PRODUCTION TECHNIQUES

Crude Gum

“Arcaic” or inefficient tapping techniques applied onto *natural* pine forests

“Modern” tapping techniques applied onto *planted* pine forests to produce crude gum and wood.

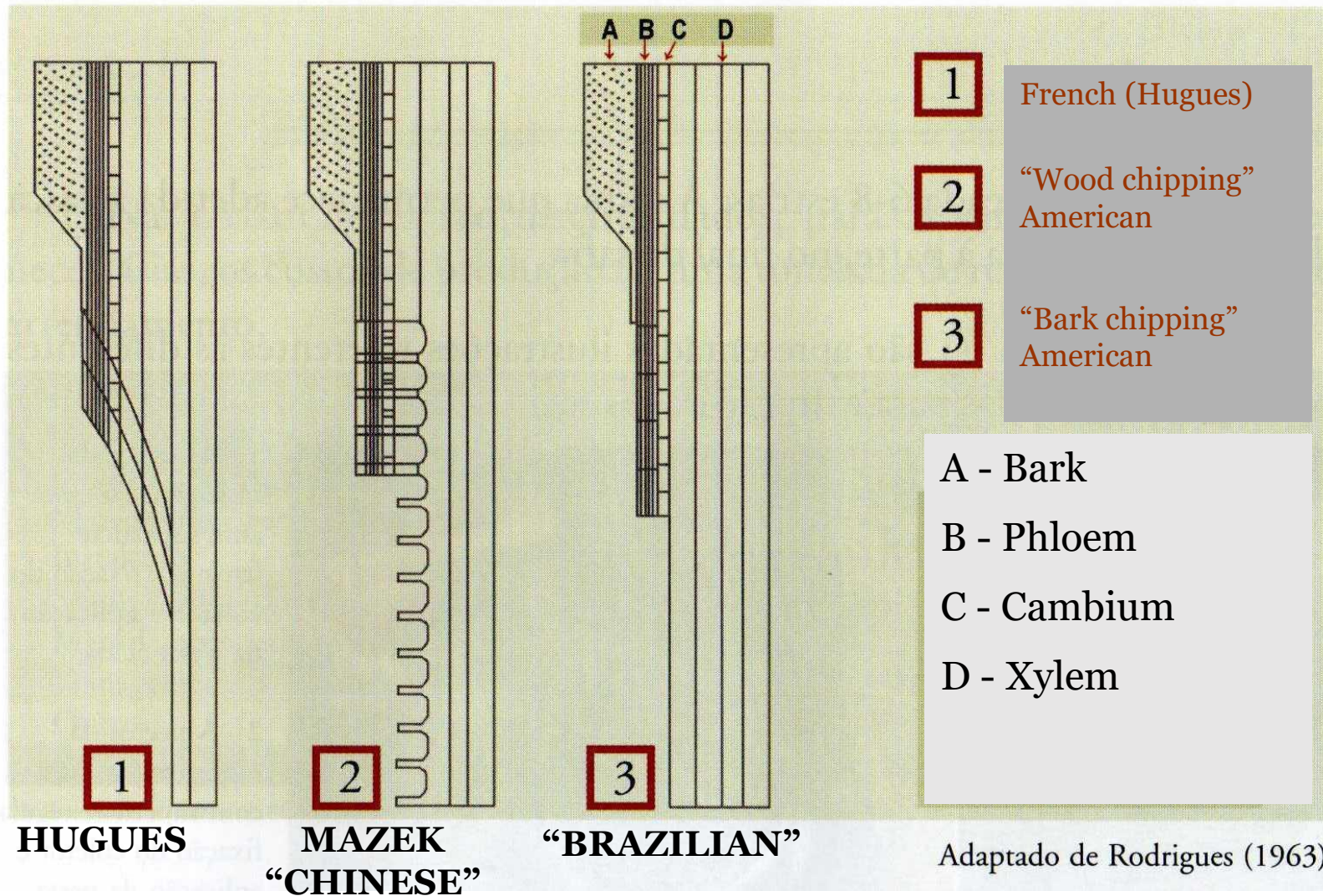
Unpredictable

Predictable



PINE TAPPING PRODUCTION TECHNIQUES

Tapping technics are grouped in three classes:



PINE TAPPING PRODUCTION TECHNIQUES

... one that is responsivel for most of the crude gum produced in the world!



“CHINESE”

- A cut is done daily to expose new wood and produce the yield of crude gum.
- One worker can treat about 1.500 pine trees per season.
- Yield of about 2 kg per tree per season (6 months)
- The worker income is directly related to what he can produce : 1.500 trees * 2 kg/ tree * crude gum price.
- A pine tree can be tapped for about 6 to 7 years.
- Generaly speaking ther is no concern about planting new pines.

PINE TAPPING PRODUCTION TECHNIQUES

...and a modern and well developed technique!



“BRAZILIAN”

- A cut is done every 15 to 21 days to expose new wood and produce the yield of crude gum.
- One worker can treat about 7.000 pine trees per season.
- Yield of about 6 kg per tree per season (10 months)
- The worker is in the payroll of a “Pine Tapping Company” = management = pay by production.
- Chemical stimulants used to enhance crude gum yield.
- A pine tree can be tapped for crude gum for more than 12 years.
- Every year new pine trees are planted for the production of crude gum.

PINE TAPPING PRODUCTION TECHNIQUES

CHINA:

- Almost daily collection.
- Stored (hidden) under the water in ponds or stored by a broker.
- Sold in small quantities (50 kg to few tons) to the rosin plant.
- Packaged in plastic bags.
- Payment at sight.
- Short distance from production area to rosin plant.

BRAZIL:

- Collected every 3 / 4 months. The bag in the pine tree acts as a “store house”.
- Send to the rosin plant in 200 kg steel drums with a plastic bag for protection or in bulk by tank truck.
- Pine resin can travel thousand of kilometers from production area to rosin plant.
- Is exported “*in natura*” to Portugal and Argentina.

PINE TAPPING TECHNIQUES - SEASON



- ALL YEAR ROUND
- EXTENDED (9 MONTHS)
- SHORT (5/6 MONTHS)

CHINA:

- Farmer = One man (family) = Independent
- Farmer needs to produce less to obtain his expected income.

BRAZIL:

- Farmer = Pine tapping company (hundred of employes) or Medium forest owner.
- Farmer seeks the best price in the market for his pine resin.
- Important part of the income is reinvested in buying land and planting pine trees for pine resin production.

LABOR FORCE – HOURLY RATE

- **RANGE OF 2 – 4 U\$D/HOUR**
- **RANGE OF 5 – 8 U\$D/HOUR**
- **OVER 9 U\$D/HOUR**

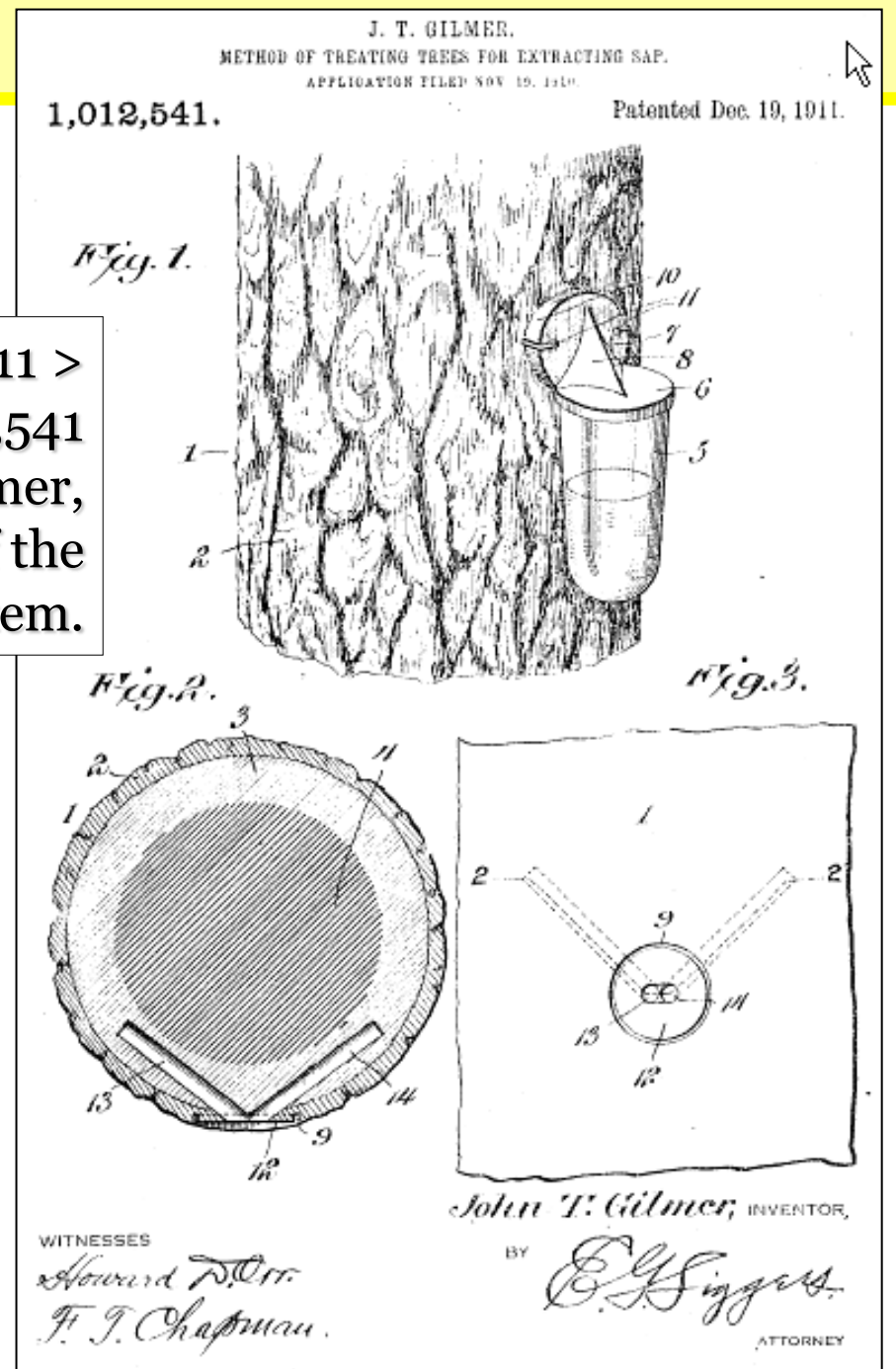


PINE TAPPING TECHNIQUES - BOREHOLE



1911 >
US Patent 1,012,541
J.T. Gilmer,
Description of the
first close system.

< 2015
Dimond G,
Georgia, USA.



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