

Amazônia, Biotecnologia, Indústria 4.0

# **Scents from Amazon**

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**GREENRIO, Rio 24th May 2018**

Bioativos na Bioecono 17.05.2018

# Brazilian Biodiversity

Brazil a mega diverse country:

- ✓ 50.000 species of high plants
- ✓ 5.000 vertebrates
- ✓ 10 million species of insects
- ✓ X microorganisms.



Thanks to Mr. Siaulys

# AMAZON useful plants



14,000 species of high plants: fibers, colouring  
matters, fatty oils, resins, essential oils... Source: Mors, 2000



# The *economy* of the Amazon:

- Primarily focused on producing **commodities** such as meat, soy, energy and ore from mining operations.
- **The main export from the forest is timber = 14 million m<sup>3</sup> (2010)**
- Non-timber forest products: a **negligible share** (0.1% of total exports)

# Biodiversity

Flora

Fauna

Microorganisms

Man

Biotechnology

Bioproducts

Society

Farmaceutics

Cosmetics

Nutraceutics

Agrochemicals

S & T Inovation

# DYE STUFFS & COSMETICS

Ipê, Tatajuba	Amarelo, Fustic
Urucum, Raiz de São João	Amarelo-Laranja
Castanha do Pará	Marron
<b>Pariri, Maçaranduba, Vinagreira</b>	Vermelho tijolo
Pau-Campeche	Azul
Açaí	Vermelho / Azul
Axuá, Cumatê, Jenipapo	Negro



# Pariri em Cosméticos

(*Arrabidae chica* Verlot, Bignoniaceae)



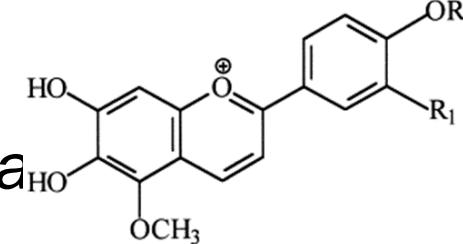
**Pigmento:** vermelho tijolo

**Usos:** pintura corporal indígenas

**Etnomedicina:**

- ✓ Feridas e úlceras.
- ✓ Infecções com *Candida*

3-Desoxiantocianina



1: R = CH<sub>3</sub>, R<sub>1</sub> = H

2: R, R<sub>1</sub> = H

3: R = H, R<sub>1</sub> = OH

4: R = CH<sub>3</sub>, R<sub>1</sub> = OH

**Produtos:** batons, pigmento capilar, sabonete íntimo

**Tese de Doutorado,** Adriana Schiozer, IQ-UNICAMP, Agosto 2017



Borari Feast in Altér-do-Chão, 2017

# Urucum, *Bixa orellana*



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# AMAZON BEAUTY CONCEPCTS: Feast in the Rio Tapajós, 2017





Folklore in the Rio Arapiuns, Amazon



# Amazon Beauty concepts



# Smell Baths

# Banhos de Cheiro



## Origem do Banho de cheiro

Há quem vê no tão paraense Banho de cheiro, tradicionalmente celebrado no dia do São João uma origem e herança puramente portuguesa. Em Portugal tinha o costume de banho-de-rio, obrigatório no dia do santo precursor. Praxe que no século quatorze já era comum na Europa ocidental. Petrarca presenciou na cidade de Colônia uma estranha solenidade. Véspera de São João, o povo reunido à borda do Reno ia imergir o corpo na água, murmurando orações e fazendo pedidos ao santo. O ato ainda se pratica no Pará. Como na cidade de Belém é difícil para a maioria da população fazer ablucções no rio, toma-se o banho-de-cheiro, nada mais nada menos do que uma forma simbólica de abluição. E abluição perfumada. Significa que quase nenhum sincetismo ocorreu nas práticas e rituais das credícies joaninas. O índio não influiu no caráter mítico e cultural das festividades de São João. Mas a matéria prima, a essência do banho-de-cheiro por sua vez foi buscado na maloca do indígena: aromas de selva amazônica.



# Aromas & Miths



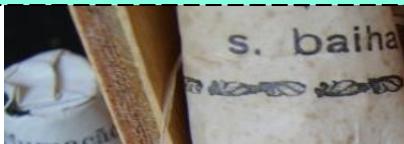
# Amazônia

*Chama dinheiro*



Amansa corno

**Chora nos meus pés**



Bem me quer

**Sabonete CHAMA  
LIMPA, PURIFICA E PROTEGE**

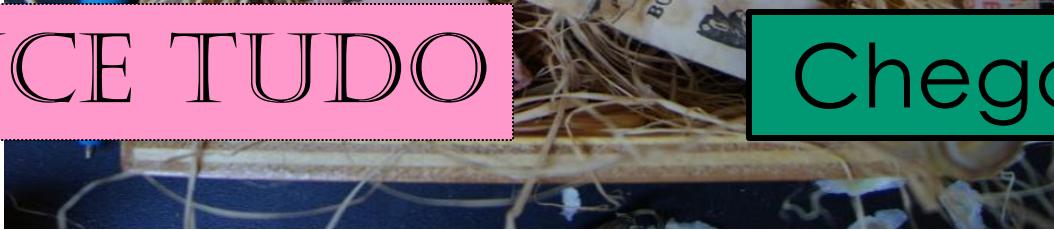


**Afasta Espírito**

**VENCE TUDO**



**Chega-te a mim**



# SOAPS 100 million/yr

Natura in BELÉM



# NATURA + THE BODY SHOP

## Global Brazilian Cosmetics Industry



# EKOS

#NaturezaGeraBeleza

Quando a natureza gera  
beleza, ela gera Ekos.



# Brazilian Cosmetic Market\*

Year	Billing of the cosmetics industry, US\$
2002	3,3 billion
<b>2017</b>	<b>~US\$ 13 billion</b>

- ✓ Average growth (deflated): 11.4%
- ✓ 2,650 Cosmetic Companies ... Only 51 in the Amazon

# Global Cosmetics Market 2014 to 2020

- ✓ 2014: USD market 460 billion
- ✓ 2020: estimated to reach **USD 675 billion**
- ✓ Growing at a rate of 6.4%/yr...



# Exuberância DE FRUTAS

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# **AMAZON FRUITS**

**at least 200 edible fruits...**



# Bacuri

*Platonia insignis*

Aroma: floral, é muito delicada, levemente ácida e aromática.

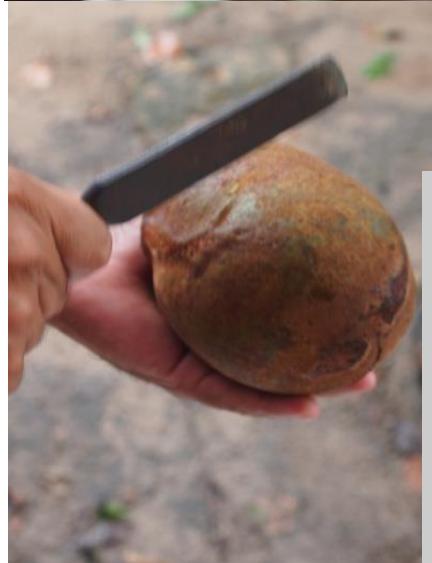
Uso: A casca do fruto recém colhido é resinosa. Da polpa preparam-se refrescos, compotas e mousses, bombons e sorvetes.  
Cosmética: Semente tem gordura vegetal

# Cocoa (*Theobroma cacao*)

Amazon cocoa seeds  
production:

120,000 tons





# Cupuaçu

*Theobroma grandiflorum*

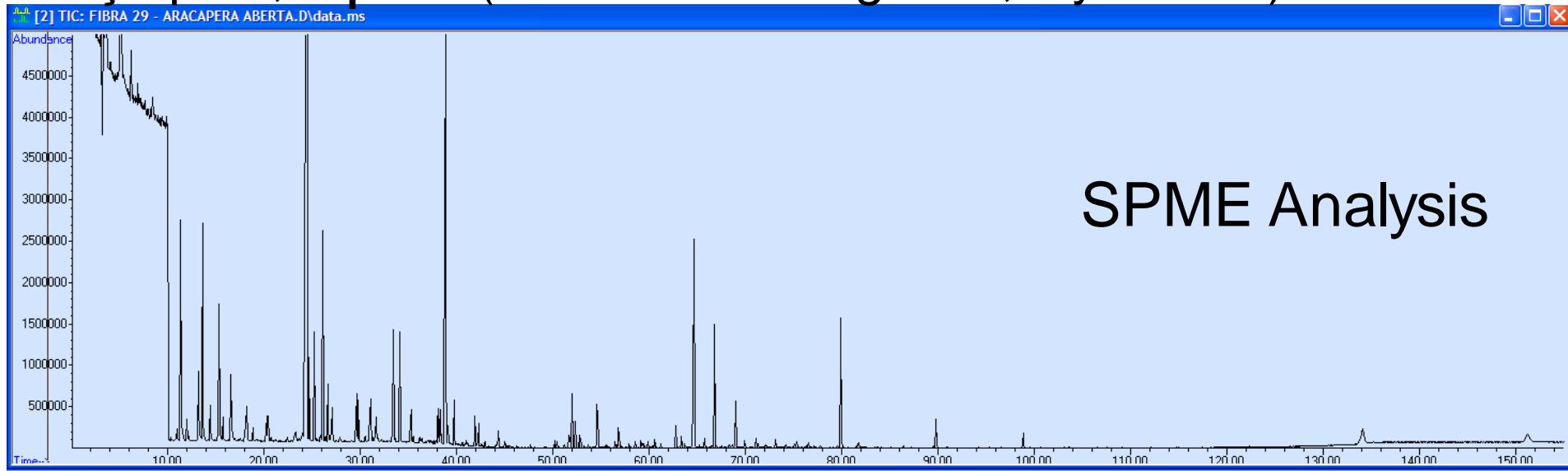
**Aroma:** Altamente aromático e deliciosamente  
**Perfume Ácido; frutal intenso**  
(que não se perde no processo).

**Uso:** Refrescos, doces, sorvetes, bombons  
**Chocolates.**

# Araçá-pera (*Psidium acutangulum*, Myrtaceae)

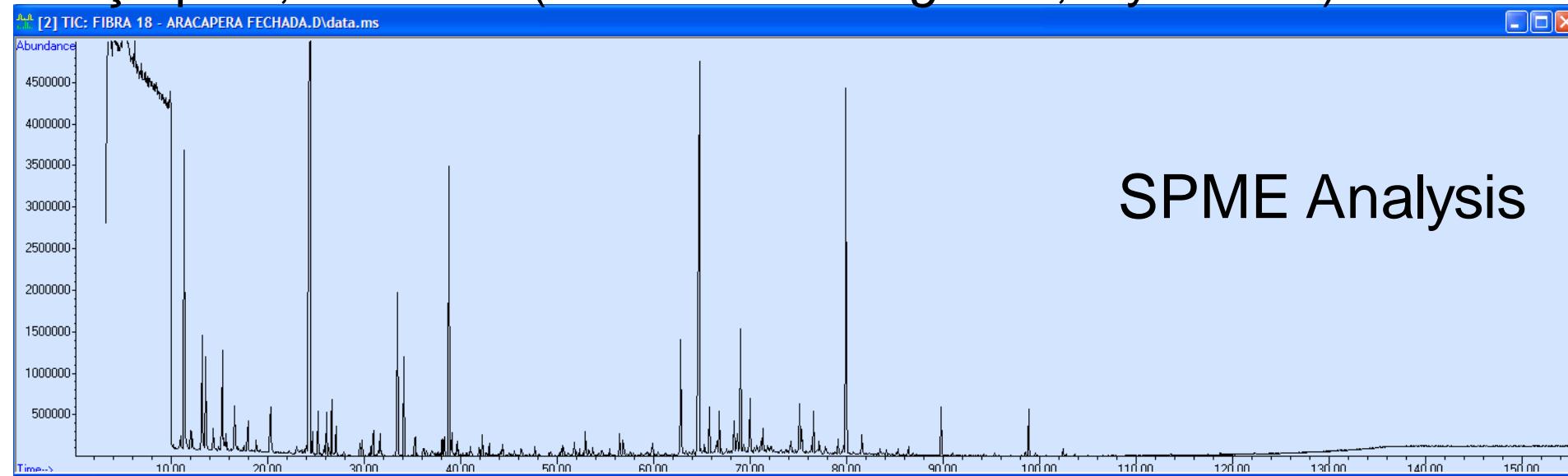


# Araça-pêra, open (*Psidium acutangulum*, Myrtaceae)



SPME Analysis

# Araça-pêra, closed (*Psidium acutangulum*, Myrtaceae)



SPME Analysis

Aroma & Fragrance  
Essential Oils  
Extracts  
Absoluts  
Concretes

Starting point: yr 2000: *CHANEL, FR*

# Amazonian Aromatic Plants with antivirus activities

Common Names	Scientific Names	Years
Rosewood	<i>Aniba rosaeodora</i>	5
Murici	<i>Byrsonima crassifolia; B. verbascifolia</i>	4
Copaiba	<i>Copaiferae multijuga; C. reticulata</i>	30
Priprioca	<i>Cyperus articulatus; Cyperus rotundus</i>	1
Tonka Beans	<i>Dipteryx odorata; Dipteryx magnifica</i>	5
Jatobá	<i>Hymenaea courbaril</i>	6
Erva Cidreira	<i>Lippia alba</i>	1
Alfavaca	<i>Ocimum basilicum</i>	1
Breu	<i>Protium heptaphyllum</i>	5

# Amazonian Aromatic Plants are commodities...

Products	Scient. Names	US\$/kg	Volume (kg)
Rosewood	<i>Aniba rosaeodora</i>	300	2,000
Tonka beans (seeds)	<i>Dypteryx odorata</i>	10	100,000
Copaiba (resina)	<i>Copaiferae spp.</i>	10	300,000

Main broker was: Benchimol & Irmão, Manaus, AM

# ROSEWOOD (*Aniba rosaeodora*)



# Rosewood Leaf Essential Oil for Perfumery

Plantation



Trimming



Steam Distillation



Essential Oil



Formulation



Perfumes

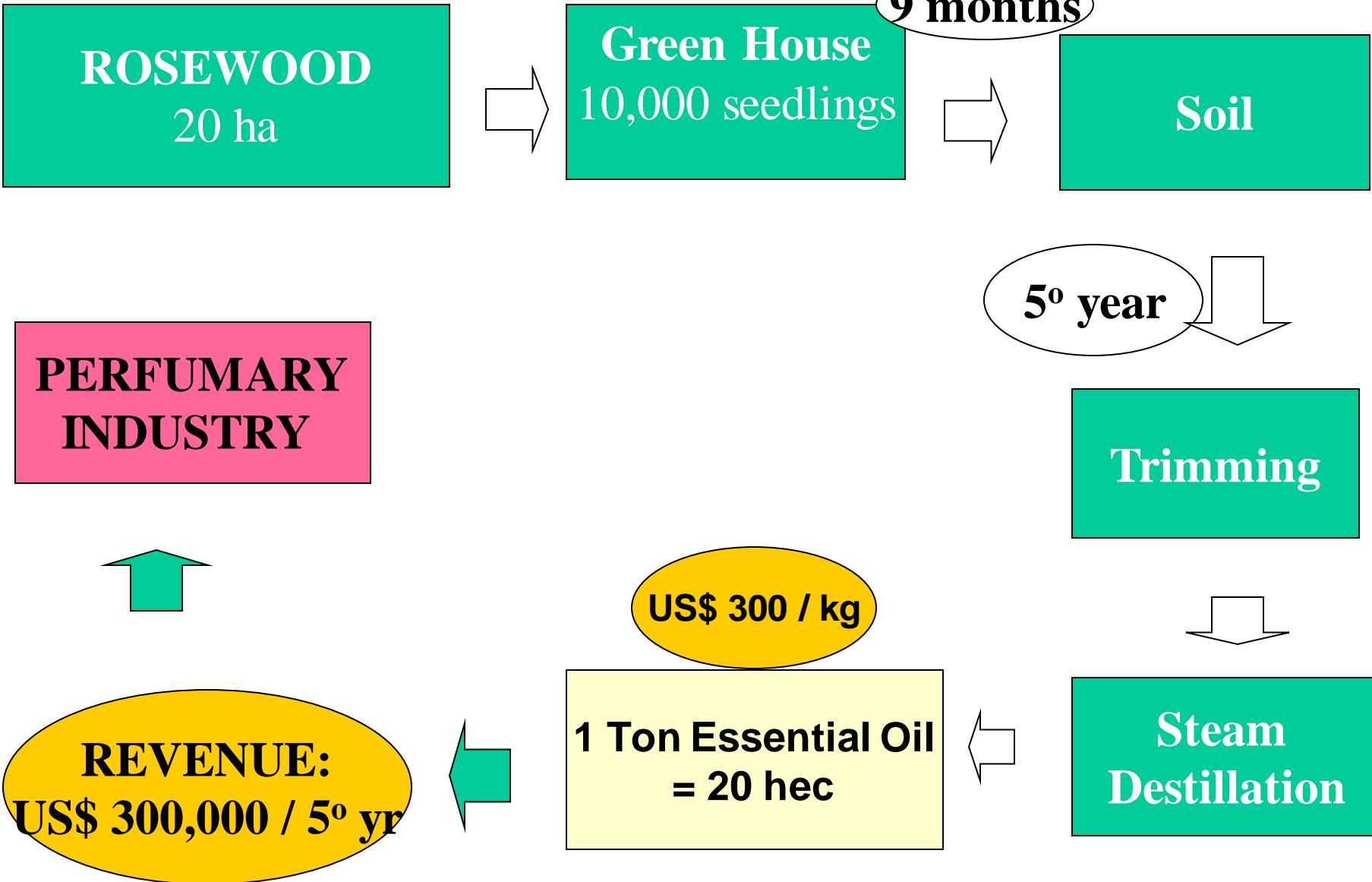


4 years old, Rosewood tree



*Eau de Parfum Bois-de-Rose Nr. 5*

# Rosewood Leaf Essential Oil Production



# *Aniba fragrans*



R & D Inovation

Rita Zaccardi, MSc Tese, 2011, UNICAMP  
Katiane Lourido, MSc Tese, 2018, UFOPA



## Eantioselective GC-Olfactometry (Es-GC-O ) analysis of Rosewood Leaf EO

*Anal. Chem.* 2006, 78, 883–890

# **Evaluation of Leaf-Derived Extracts as an Environmentally Sustainable Source of Essential Oils by Using Gas Chromatography–Mass Spectrometry and Enantioselective Gas Chromatography–Olfactometry**

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In consideration of the world's present environmental situation and the threat of species extinction, investigations concerning alternative sustainable sources of natural substances represent an extremely important issue. In this respect, the present research is focused on the analytical evaluation of Brazilian rosewood (*Aniba ro-*

derativization processes, has also been extended to GC-O. Enantioselective gas chromatography–olfactometry (Es-GC–O) is a valid method for the correct determination of sensory properties and differentiation of individual enantiomers, as demonstrated by Mosandl and his group.<sup>2</sup> It is worthwhile to point out that the preponderance of one of the enantiomers, defined by

# Priprioca

*Cyperus articulatus*

## Aroma

Fragrância leve, amadeirada, picante e com notas florais. Fornece um óleo essencial, usada na indústria farmacêutica e cosmética.

## Uso

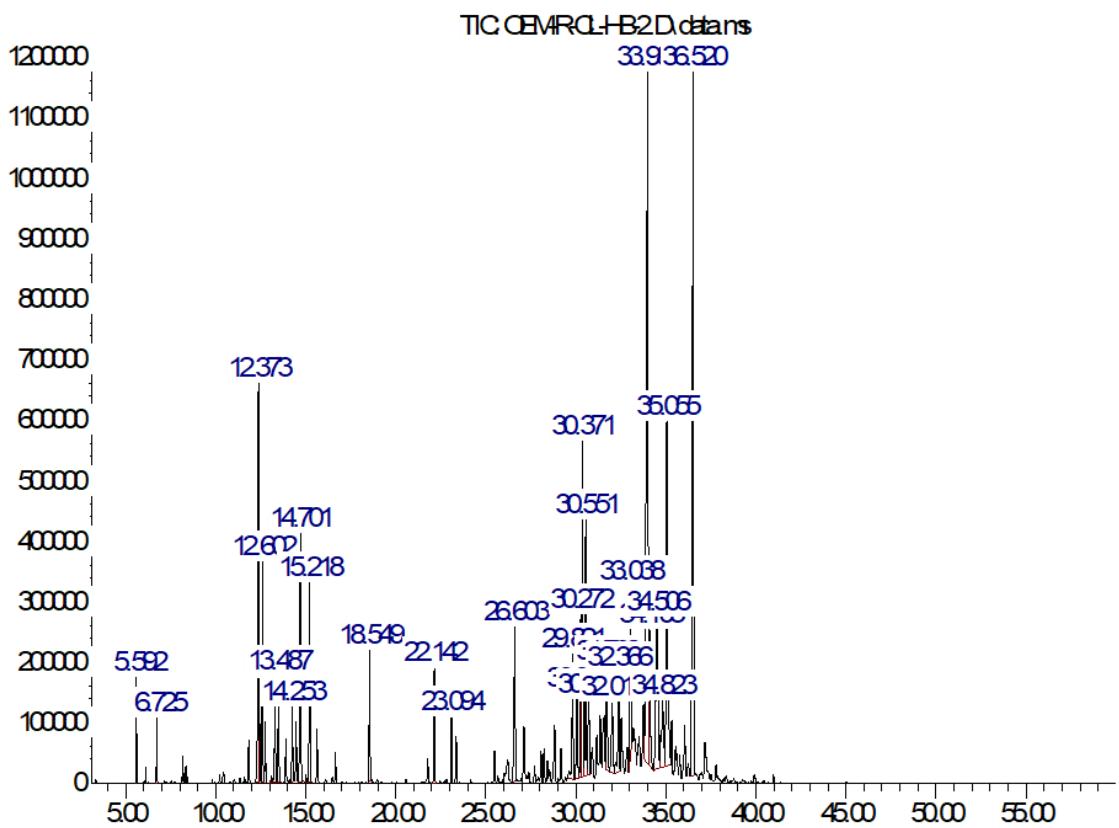
Aroma de floresta, selvagem e verde. Usa-se o extrato em álcool ou ralado.

**Financiamento:  
CAPES**

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# Chemistry of Priprioca (*Cyperus articulatus*)

Abundance



GC-MS Analysis	%
Isocorimbolone	18.6
Mustacone	14.2
Aristolone	9.85
<i>Trans</i> -pinocarveol	5.90
Cariophyllene oxide	5.34
Viridiflorene	2.83
Verbenone	2.74
1,3,8- <i>p</i> -menthatriene	2.70
$\beta$ -humulene	2.70
<i>Trans</i> -calamenene	2.40
$\alpha$ -selinene	2.08

# SENSORIAL ANALYSIS OF CYPERUS OIL (*Cyperus articulatus*)

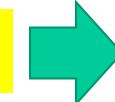
## Évaluation olfactive:

- ✓ Odeur résineuse, riche en facettes, difficile à décrire.
- ✓ On peut y trouver des notes de: vetiver, encens, épices.



Boisée, **cuivré**, aromatique, piquant

1996, Pós-Doutorado, Márcia Ortiz, IQ-UNICAMP



NATURA

PERFUME CHAMMA: Remerciements á Olivier Paget, MANE do Brasil

# Ensaios em Câncer com os resíduos da Priprioca

RESULTS: HEX extract on MARC shown antiproliferative activity, mainly towards tumor lines U251 (glioma), MCF-7 (breast), NCI-H40 (kidney) and OVCAR-3 (ovary)

## Key:

U251 = Glioma

MCF7 = Brest

786-0 = Kidney

NCI-H460 = Lung

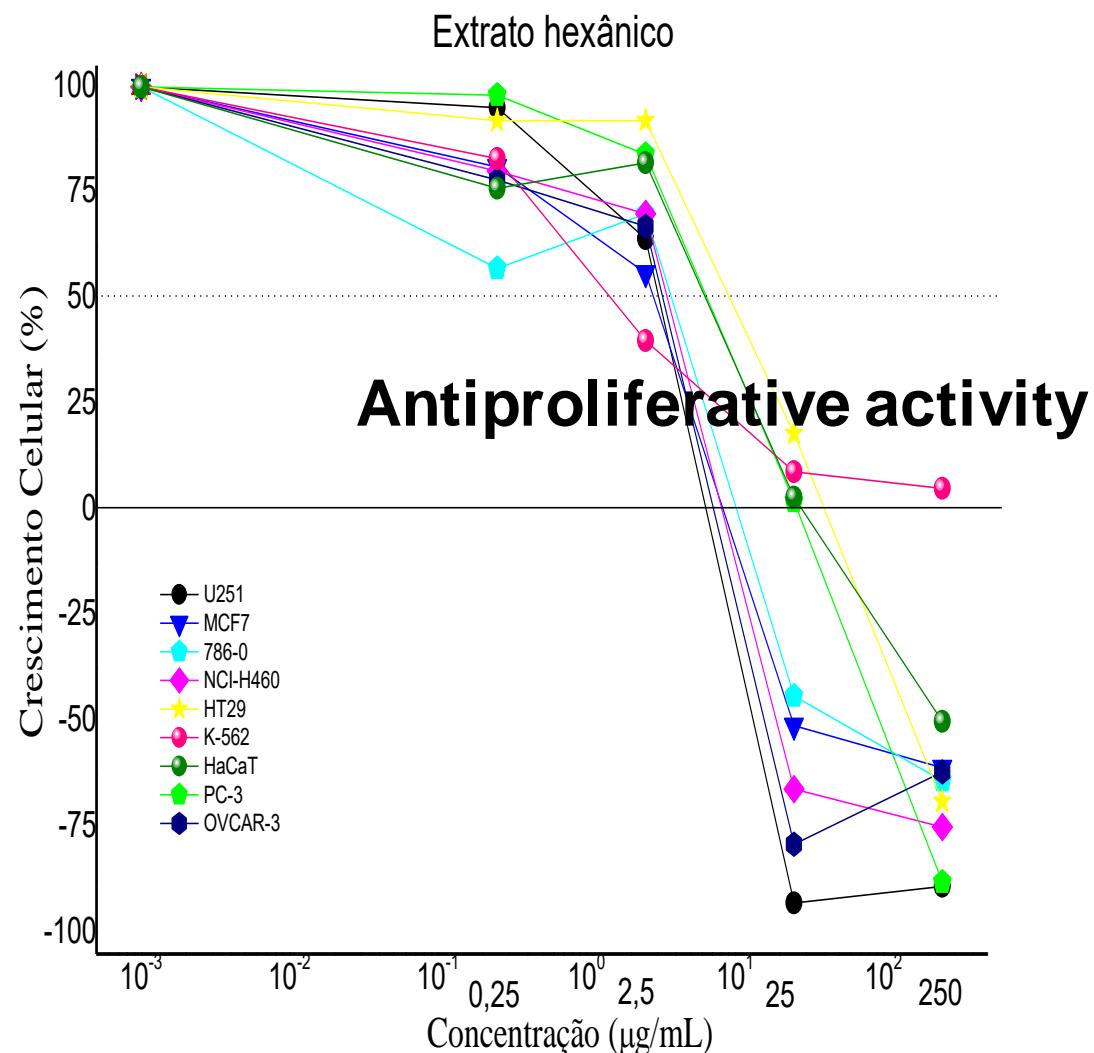
HT29 = Colon

K-562 = Leukemia

HaCaT = non-human  
cell lines

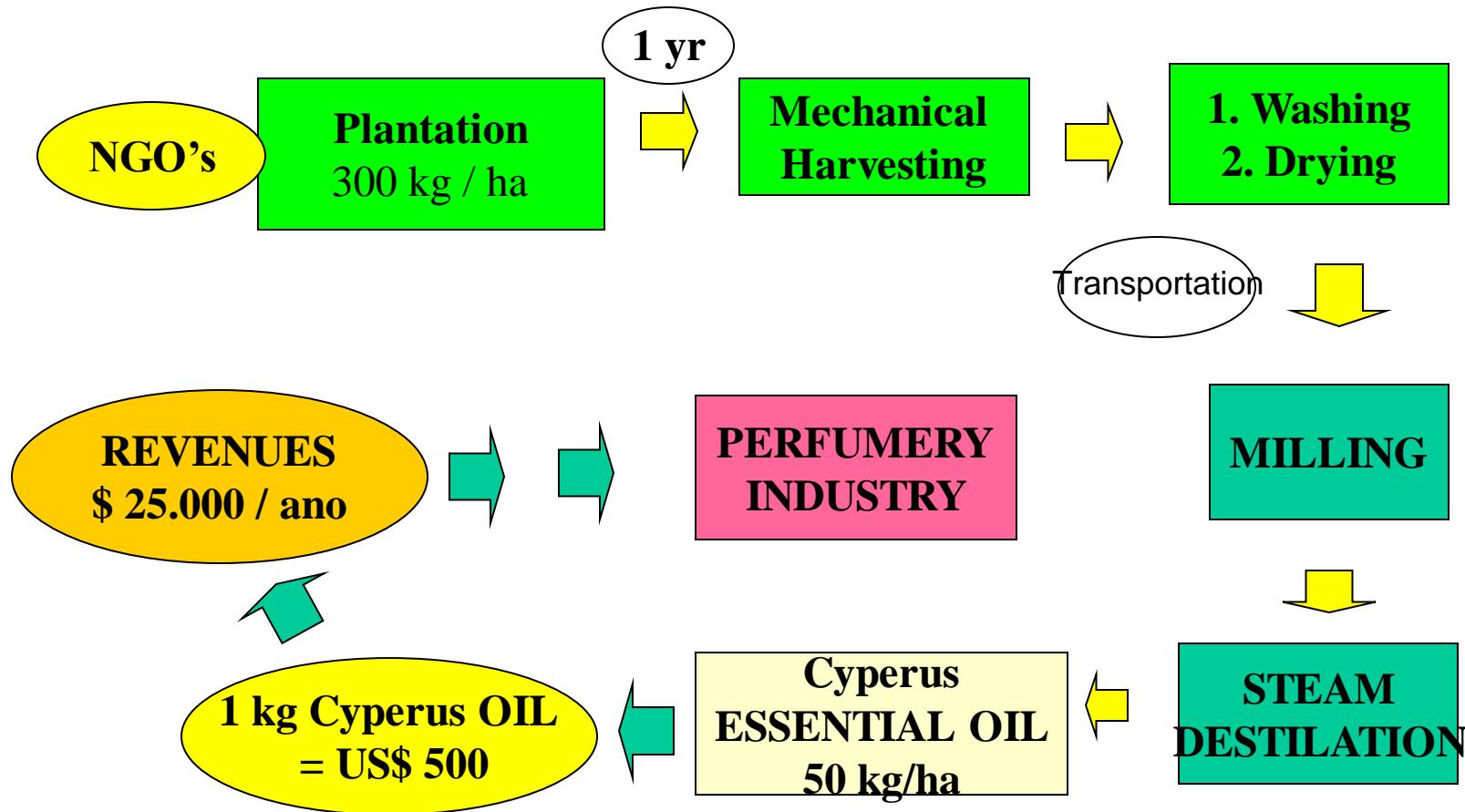
PC3 = Prostate

OVCAR = Ovary



**Graph 2: *C. articulatus* antiproliferative activity of HEX extract.** Panel of 08 human tumor cell lines and 01 non-tumor cell; after 48h treatment. The chart list % of cell growth and samples in different conc. (0,25; 2,5; 25 e 250  $\mu\text{g/mL}$ ).

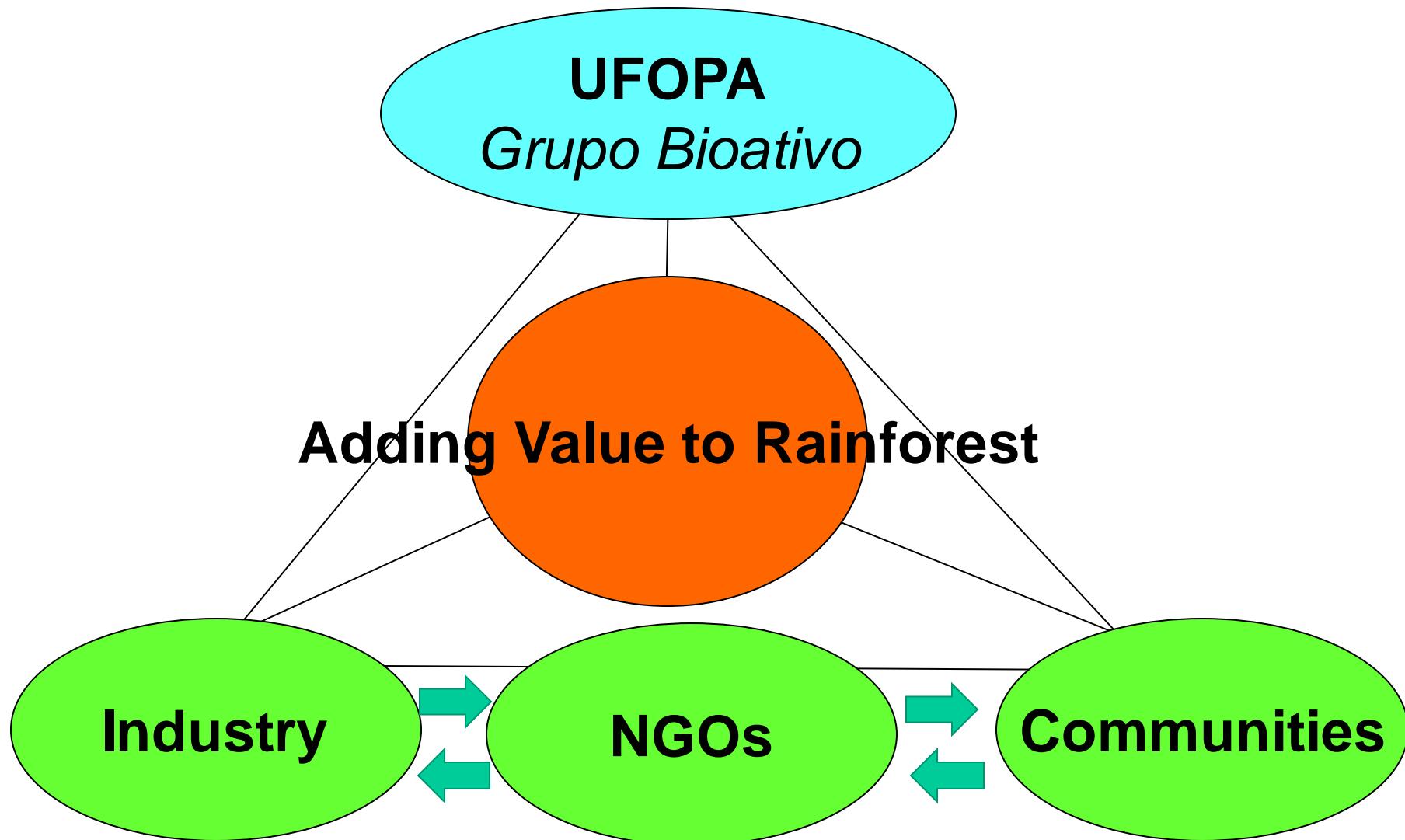
# Pilot-Industrial production of Cyperus Oil



# CONCLUSION

- Cyperus harvest may present as a new economic alternative to **poor communities** in Amazon.
- The use of Cyperus **waste residue** will add value and sustainability to the production chain.
- Isolation and identification of **bioactive substances** from Cyperus residues can help for the development of cosmeceutic products.

# Partnership: the name of the Game!



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- ✓ UNICAMP: Análises Químicas e Biológicas
- ✓ SUÉCIA: Ensaios antibióticos
- ✓ ALUNOS: A. M. Kasper; B. San Martin; I. Machado; M. Rios

Obrigado