The Synergy on Climate Change Research in China and in São Paulo Workshop
Cooperation in Science supported by NSFC and FAPESP

国家自然科学基金委员会
National Natural Science Foundation of China

"Impacts of climate change on coastal ecological environment, agroforestry ecosystem and human health and their responses".

Conservation biology of native species : A genetic approach in forest restoration and climate change

María Imaculada Zucchi

Scientific Researcher

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Grupo de Genética e Genômica da Conservação APTA

RESEARCH LAB

apta Agência Paulista de Tecnologia dos Agronegócios

USP ESALQ

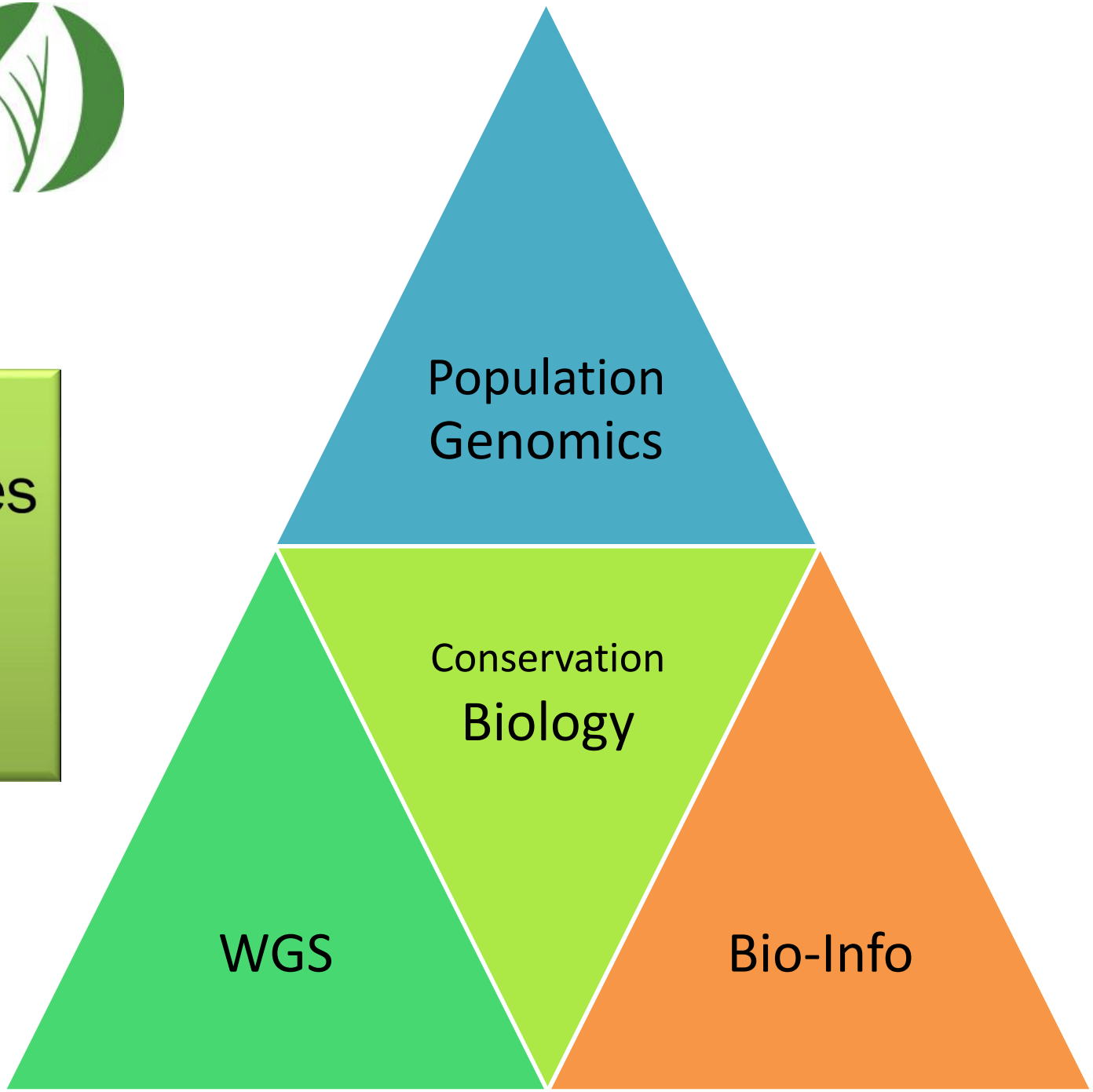
UNICAMP

Grupo de Genética e Genômica da Conservação
APTA

Research Professor

ONGOING RESEARCH :

- Native Brazilian trees
- Palm trees
- Pest insects
- Native pollinators

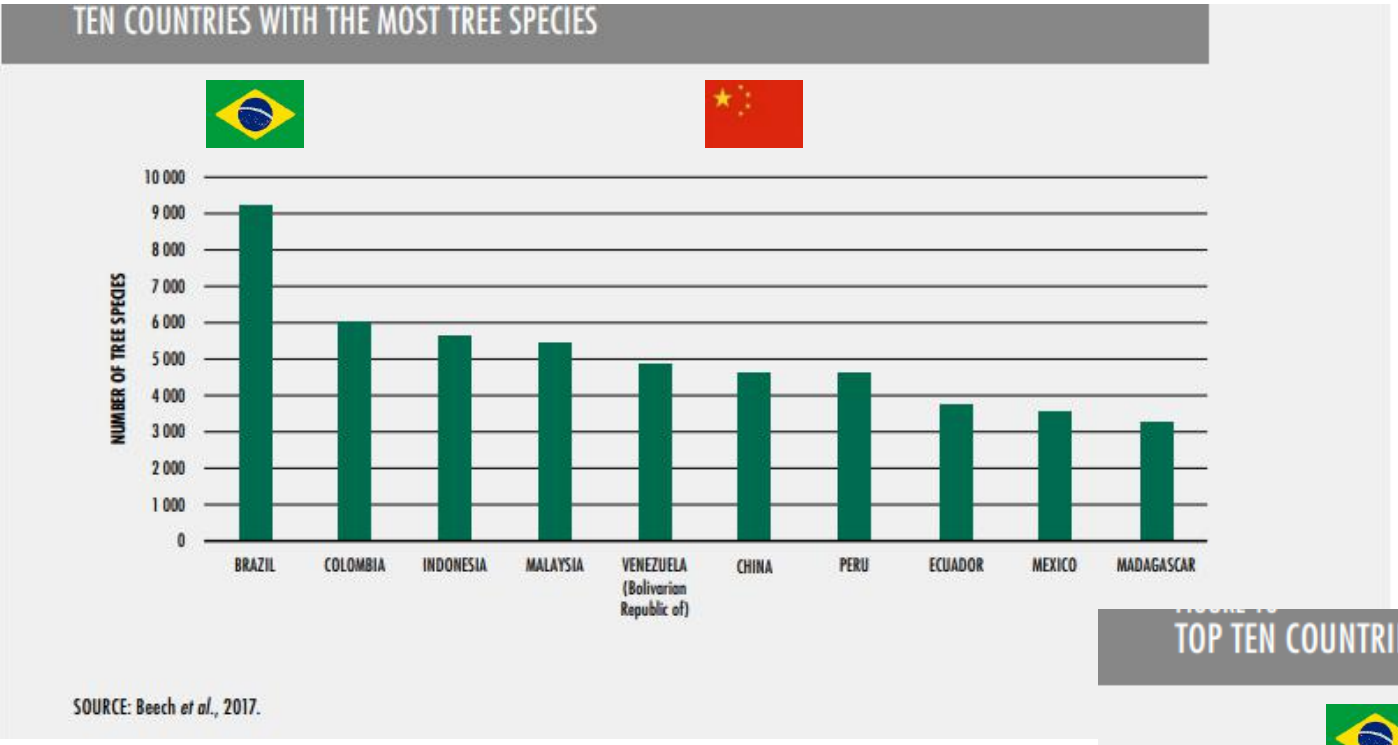


VULNERABILITY STATUS OF FOREST PLANTS, ANIMALS AND FUNGI IN THE IUCN RED LIST AS OF DECEMBER 2019

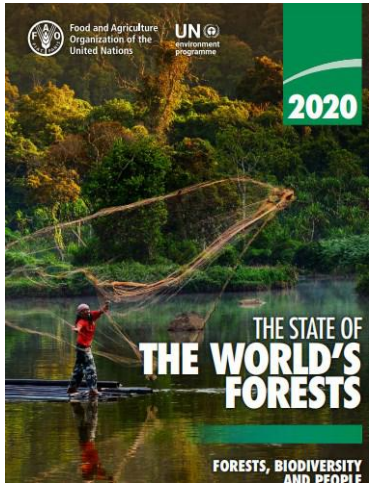
Category	% critically endangered	% endangered	% vulnerable
Plants	8.1	15.0	13.5
Animals	4.9	8.5	8.0
Fungi	4.9	8.5	8.1

SOURCE: IUCN, 2019a.

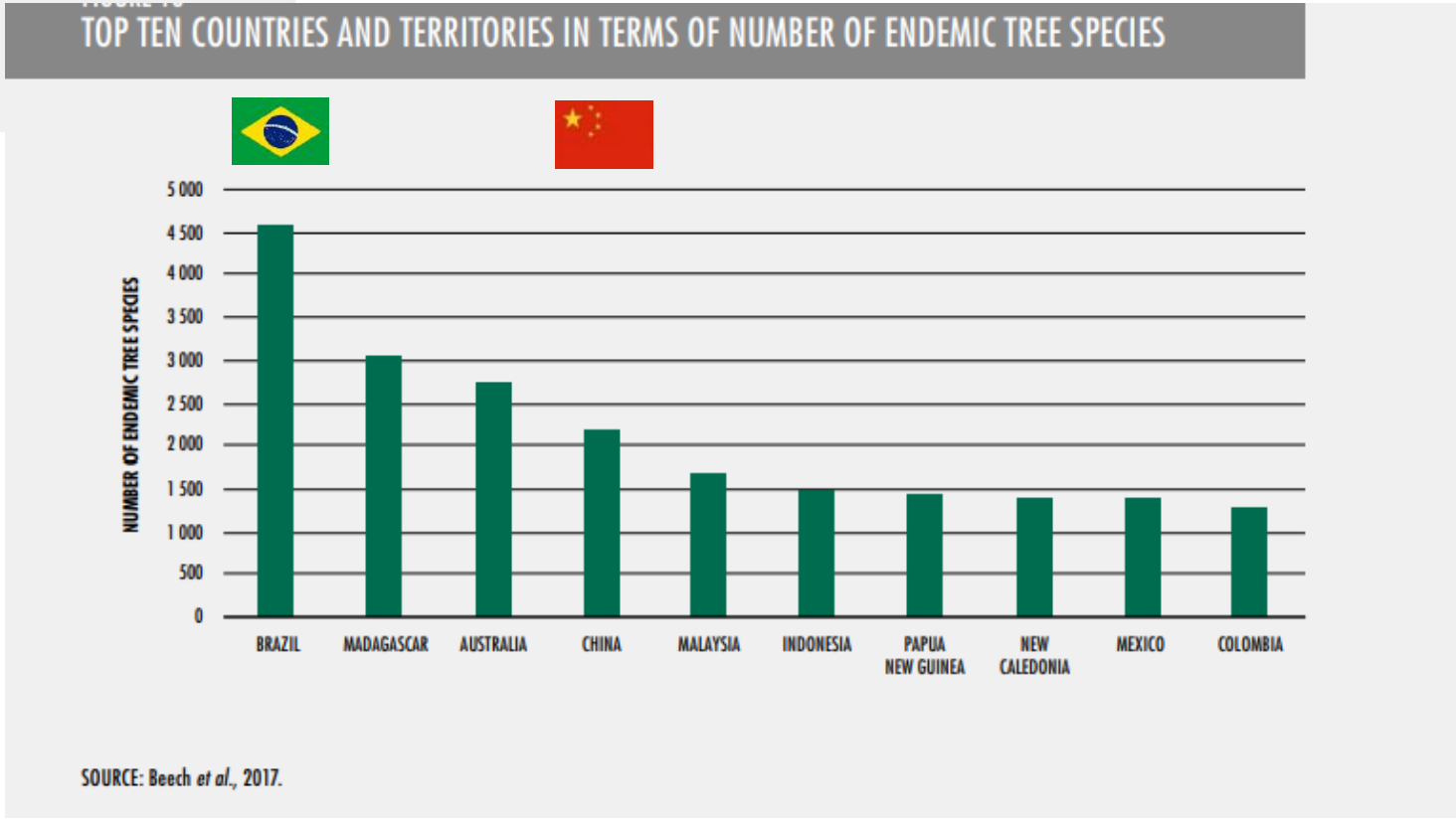
FAO and UNEP. 2020. *The State of the World's Forests 2020. Forests, biodiversity and people.* Rome.
https://doi.org/10.4060/ca8642en



GlobalTreeSearch database
60 082 tree species



FAO and UNEP. 2020. *The State of the World's Forests 2020. Forests, biodiversity and people.* Rome. https://doi.org/10.4060/ca8642en



Conservation biology of Atlantic Rain Forest native species : A genetic approach on forest restoration

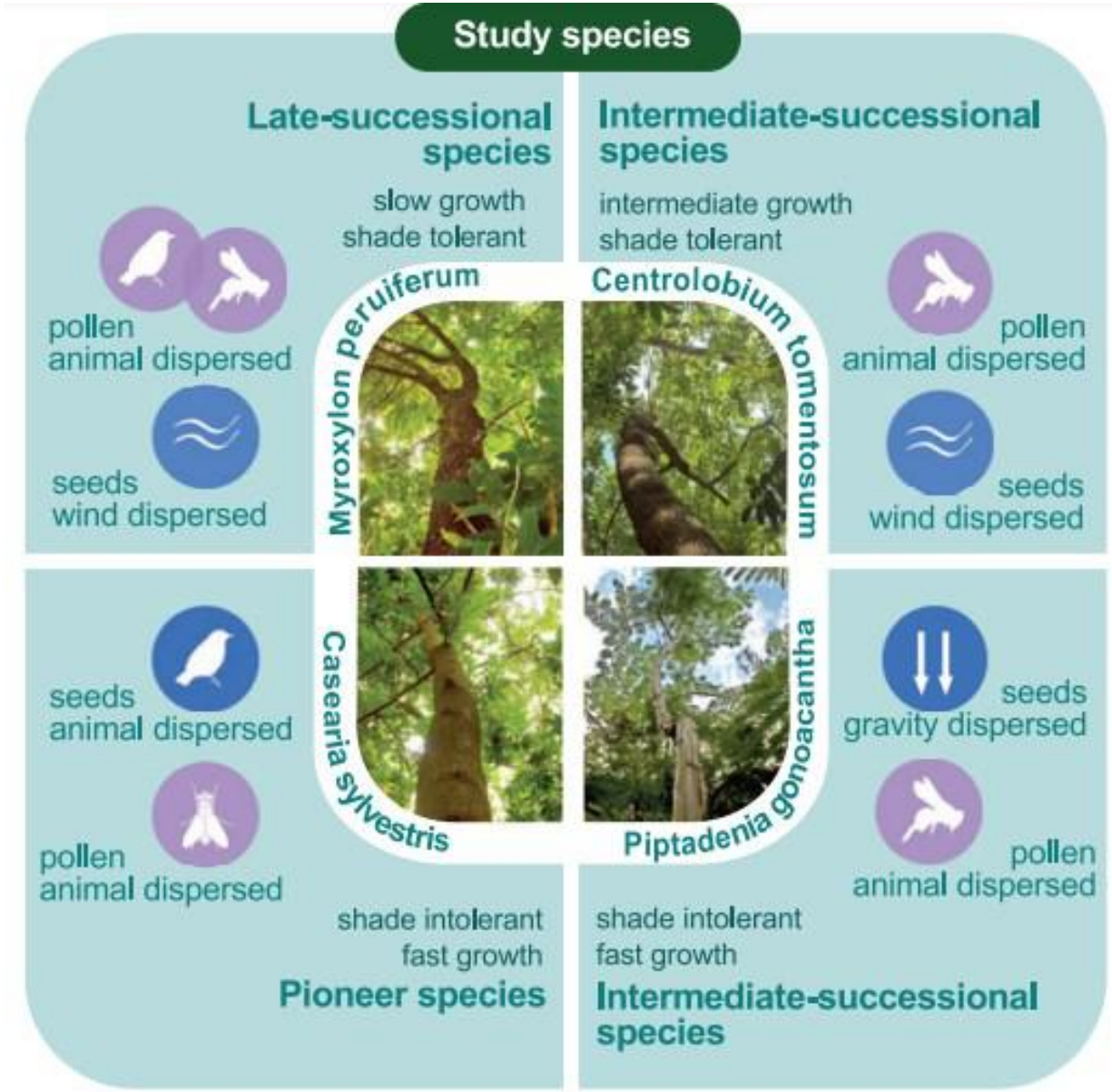
Restoration Ecology
THE JOURNAL OF THE SOCIETY FOR ECOLOGICAL RESTORATION

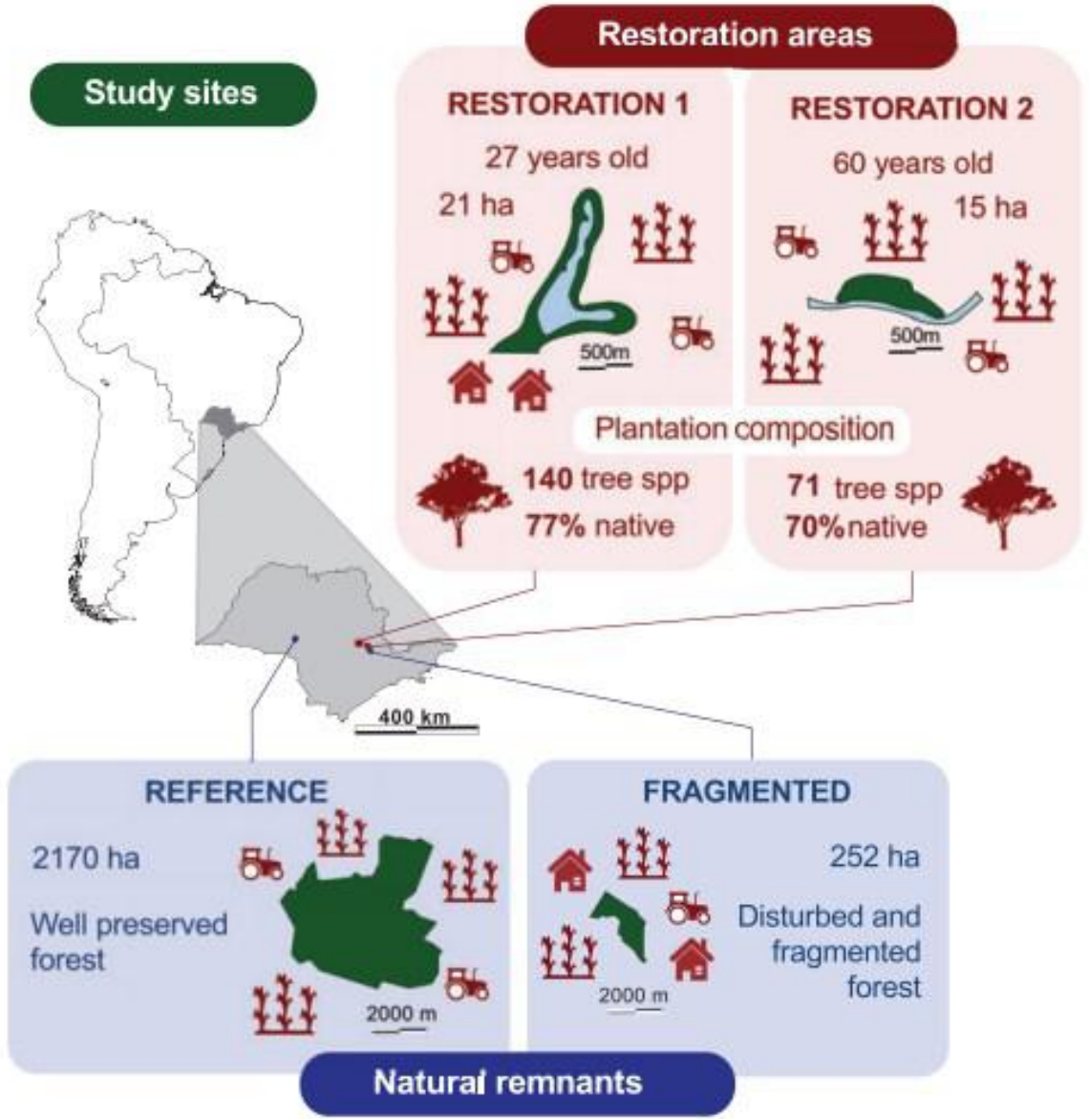
RESEARCH ARTICLE

Genetic diversity of reintroduced tree populations in restoration plantations of the Brazilian Atlantic Forest

Maria I. Zucchi[1], Patricia S. Sujii[2,†], Gustavo M. Mori[1,††], João P. G. Viana[2], Carolina Grando[2], Ellida de Aguiar Silvestre[2], Kaiser D. Schwarcz[2], Camila M. Macrini[1], Miklos M. Bajay[3], Fabiano L. Araújo[4], Marcos V. B. M. Siqueira[1], Alessandro Alves-Pereira[3], Anete P. de Souza[5], José B. Pinheiro[3], Ricardo R. Rodrigues[6], Pedro H. S. Brancalion[7,8]

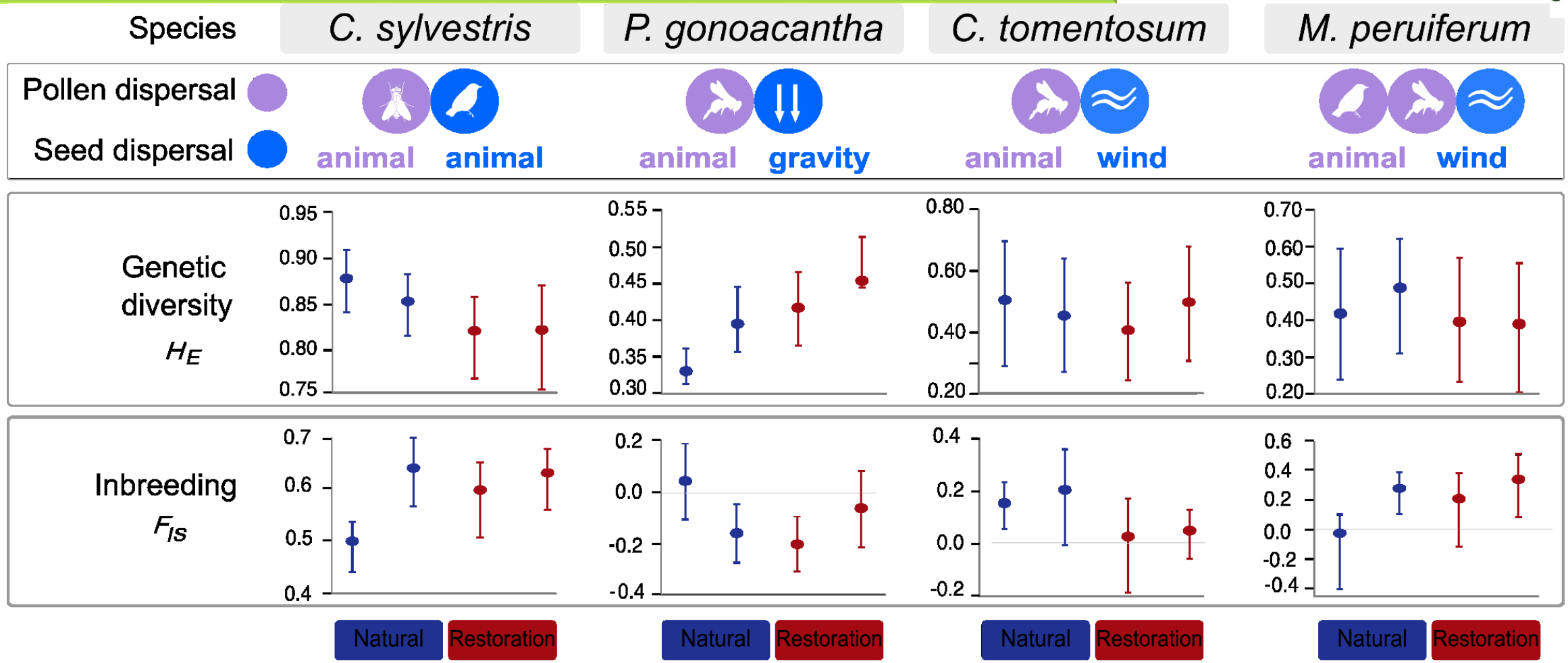
Restoration Ecology Vol. 26, No. 4, pp. 694–701 July 2018





Restoration Ecology Vol. 26, No. 4, pp. 694–701 July 2018

Population genetics parameters



Implications for Practice

- Populations established in restoration sites through tree plantations may have as much genetic diversity (GD) as natural populations from reference ecosystems.
- Restoration areas implemented with high GD may serve as sources of genetic variability to forest fragments in human-modified landscapes.

- SSR
- GBS (SNPs)
- ddRAD

Restoration Ecology Vol. 26, No. 4, pp. 694–701 July 2018

- Restoration areas are important to connect the natural remnants

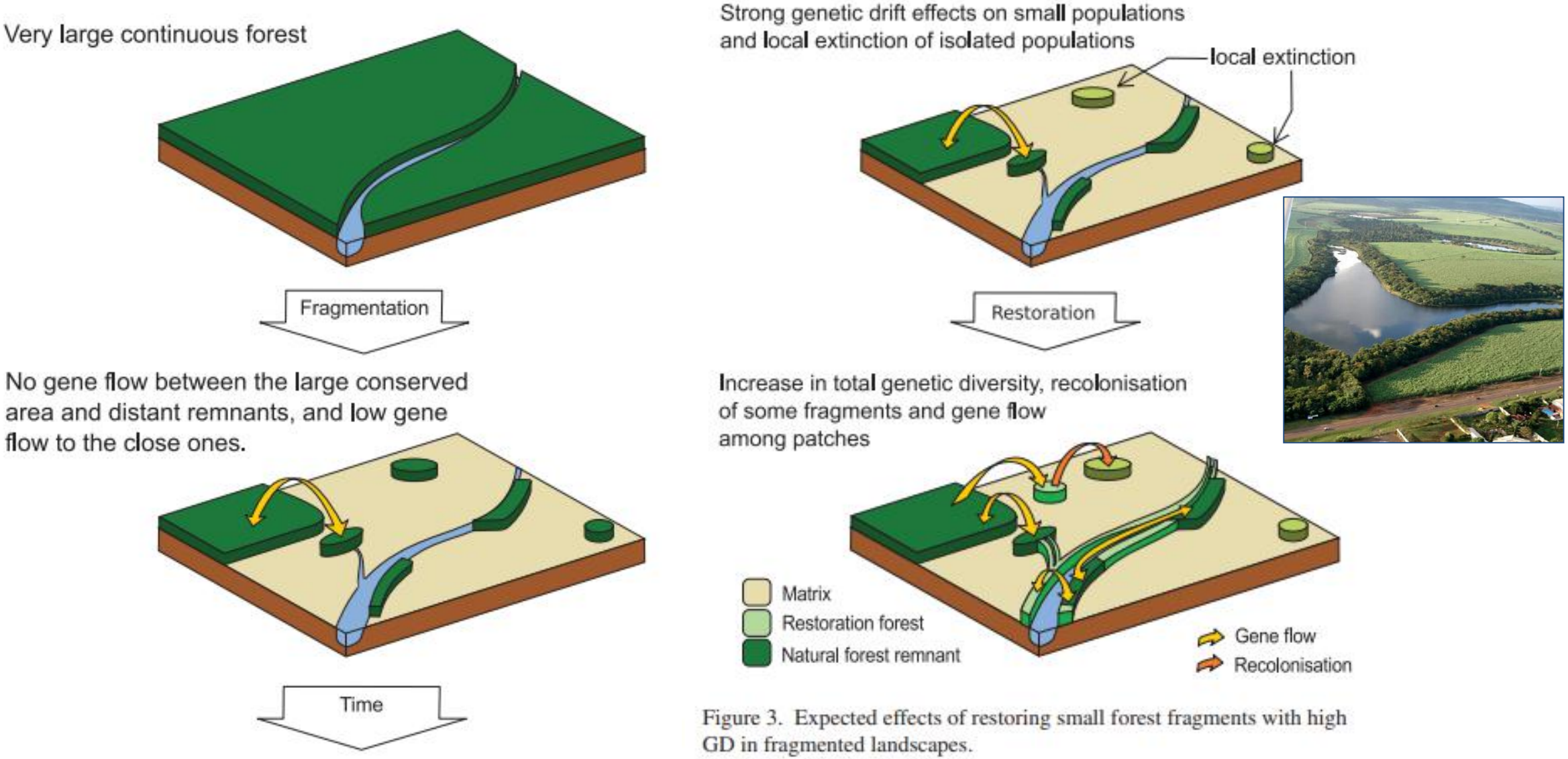


Figure 3. Expected effects of restoring small forest fragments with high GD in fragmented landscapes.

Restoration Ecology Vol. 26, No. 4, pp. 694–701 July 2018

UNICAMP

Ellida Silvestre

FAPESP

American Genetic Association

Journal of Heredity, 2018, 1–8
doi:10.1093/jhered/esx096
Original Article

Original Article

Mating System and Effective Population Size of the Overexploited Neotropical Tree (*Myroxylon peruiferum* L.f.) and Their Impact on Seedling Production

Ellida de Aguiar Silvestre, Kaiser Dias Schwarcz, Carolina Grando, Jaqueline Bueno de Campos, Patricia Sanae Sujii, Evandro Vagner Tambarussi, Camila Menezes Trindade Macrini, José Baldin Pinheiro, Pedro Henrique Santin Brancalion, and Maria Imaculada Zucchi

UNICAMP

Kaiser Dias Scwarcz

FAPESP

Forest Ecology and Management 410 (2018) 95–103

Contents lists available at ScienceDirect

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco

Shelter from the storm: Restored populations of the neotropical tree *Myroxylon peruiferum* are as genetically diverse as those from conserved remnants

Kaiser Dias Schwarcz[a,b,*], Ellida de Aguiar Silvestre[b], Jaqueline Bueno de Campos[b], Patricia Sanae Sujii[b], Carolina Grando[b], Camila Menezes Trindade Macrini[a], Anete Pereira de Souza[c], José Baldin Pinheiro[d], Pedro Henrique Santin Brancalion[e], Ricardo Ribeiro Rodrigues[e], Maria Imaculada Zucchi[a,b,*]

PLOS ONE

João Paulo Vianna

UNICAMP

FAPESP

RESEARCH ARTICLE

Genomic diversity is similar between Atlantic Forest restorations and natural remnants for the native tree *Casearia sylvestris* Sw.

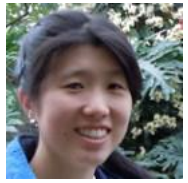
João Paulo Gomes Viana[1], Marcos Vinícius Bohrer Monteiro Siqueira[2], Fabiano Lucas Araujo[3], Carolina Grando[1], Patricia Sanae Sujii[1], Ellida de Aguiar Silvestre[1], Mariana Novello[1], José Baldin Pinheiro[4], Marcelo Mattos Cavallari[5], Pedro H. S. Brancalion[6], Ricardo Ribeiro Rodrigues[7], Anete Pereira de Souza[8], Julian Catchen[9], Maria I. Zucchi[10]*

ELSEVIER

Ecological Modelling
Volume 403, 1 July 2019, Pages 35-43

A genetic approach for simulating persistence of reintroduced tree species populations in restored forests

Patricia S. Sujii [a, 1], M
James [e]



UNICAMP

Patricia S. Sujii

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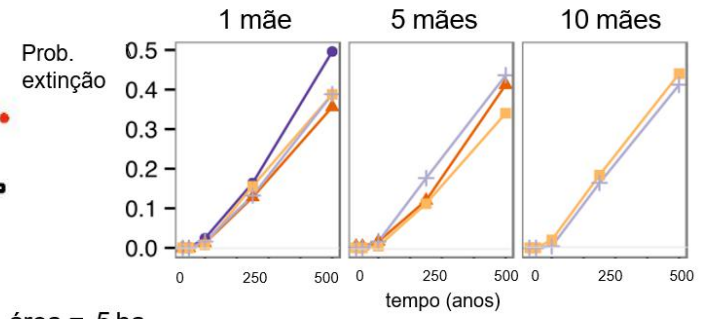
Simulações com araribá



área = 5 ha

Energy-Food vs. Sustainable Forest Management

- Native Palms

ONGOING RESEARCH :

Palm trees

Euterpe sp. Mart.

Mariana Novello

UNICAMP

ELSEVIER

Forest Ecology and Management

Volume 407, 1 January 2018, Pages 200-209

Genetic conservation of a threatened Neotropical palm through community-management of fruits in agroforests and second-growth forests

Mariana Novello [a], João Paulo Gomes Viana [a], Alessandro Alves-Pereira [a], Ellida de Aguiar Silvestre [a], Hendrie Ferreira Nunes [b], José Baldin Pinheiro [c], Pedro H.S. Brancalion [c], Maria Imaculada Zucchi [d]

- **Great economic value**: heart of palm

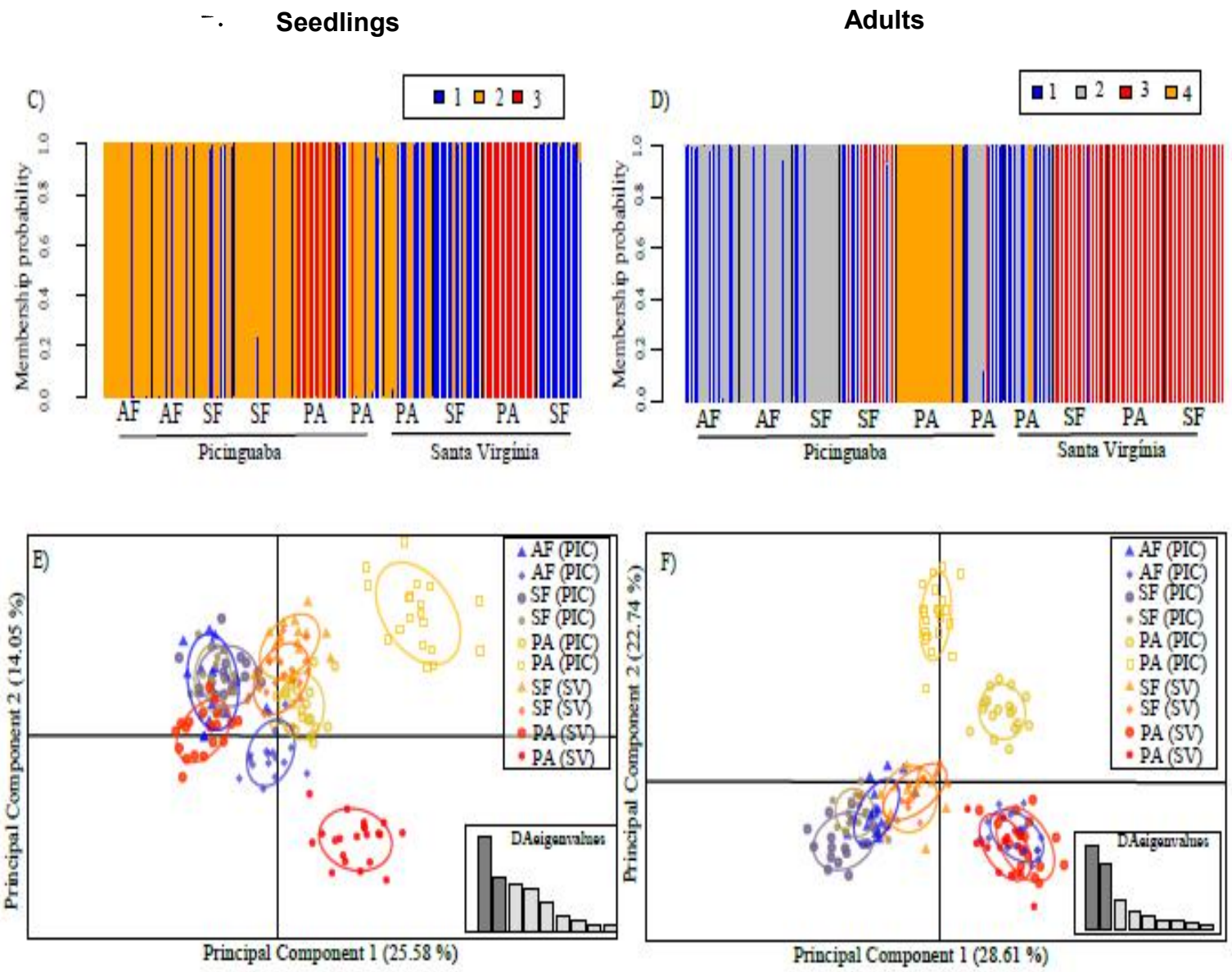
Ana Flavia Francisconi

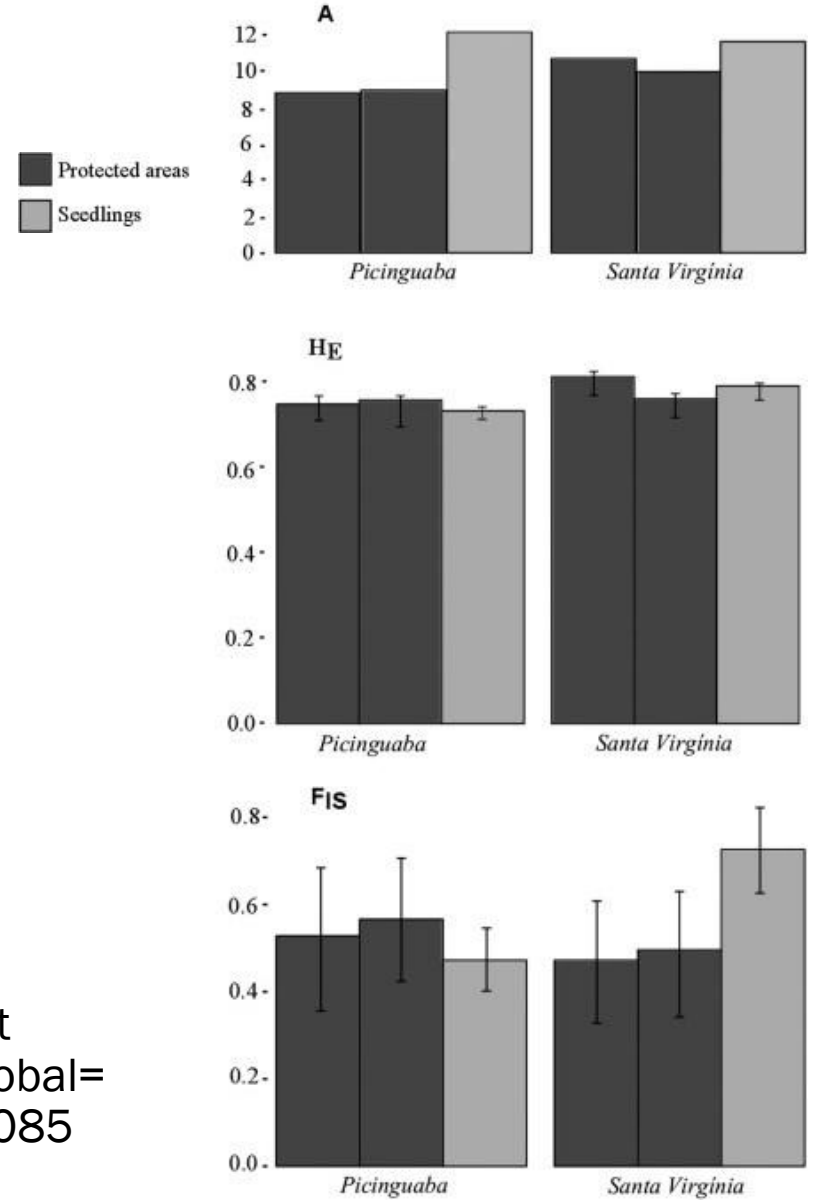
UNICAMP

- SSR
- SNPs

- **Widely distributed in Atlantic Rainforest**, its fruits are an important food source for many animals

Interactions between populations growing in managed forests and native forests in protected areas help maintain high variability and gene flow.





Fst Global= 0,085

PLOS ONE

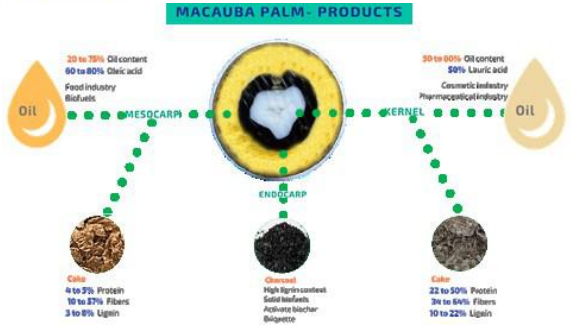
RESEARCH ARTICLE

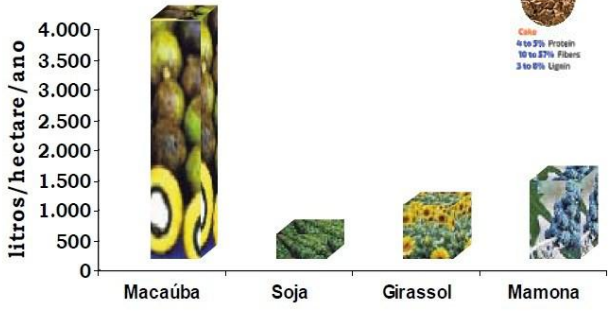
Genome-wide SNP analysis to assess the genetic population structure and diversity of Acrocomia species

Brenda Gabriela Díaz[1], Maria Imaculada Zucchi[1,2], Alessandro Alves-Pereira[1], Caléo Panhoca de Almeida[2], Aline Costa Lima Moraes[1], Suelen Alves Vianna[2], Joaquim Azevedo-Filho[2], Carlos Augusto Colombo[2]*

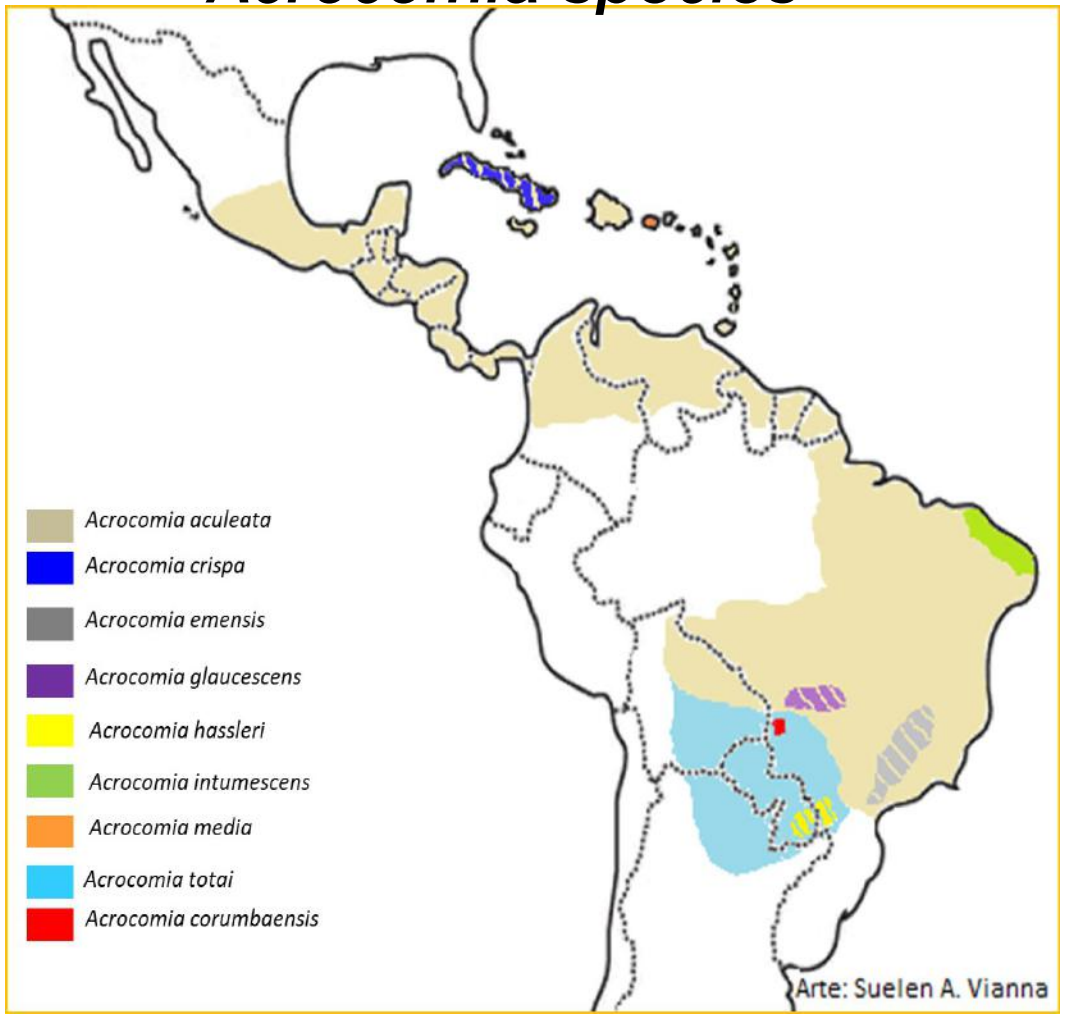
1 Biology Institute, University of Campinas UNICAMP, Campinas-SP, Brazil, 2 Centro de Pesquisa de Recursos Genéticos Vegetais, Instituto Agronômico-IAC, Campinas-SP, Brazil

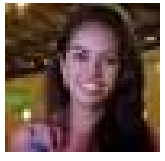
* carlos.colombo@sp.gov.br



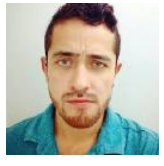


Acrocomia species





Brenda Diaz



Jonathan Marroquín

ACROENERGIA
INSTITUTO AGRONÔMICO DE CAMPINAS

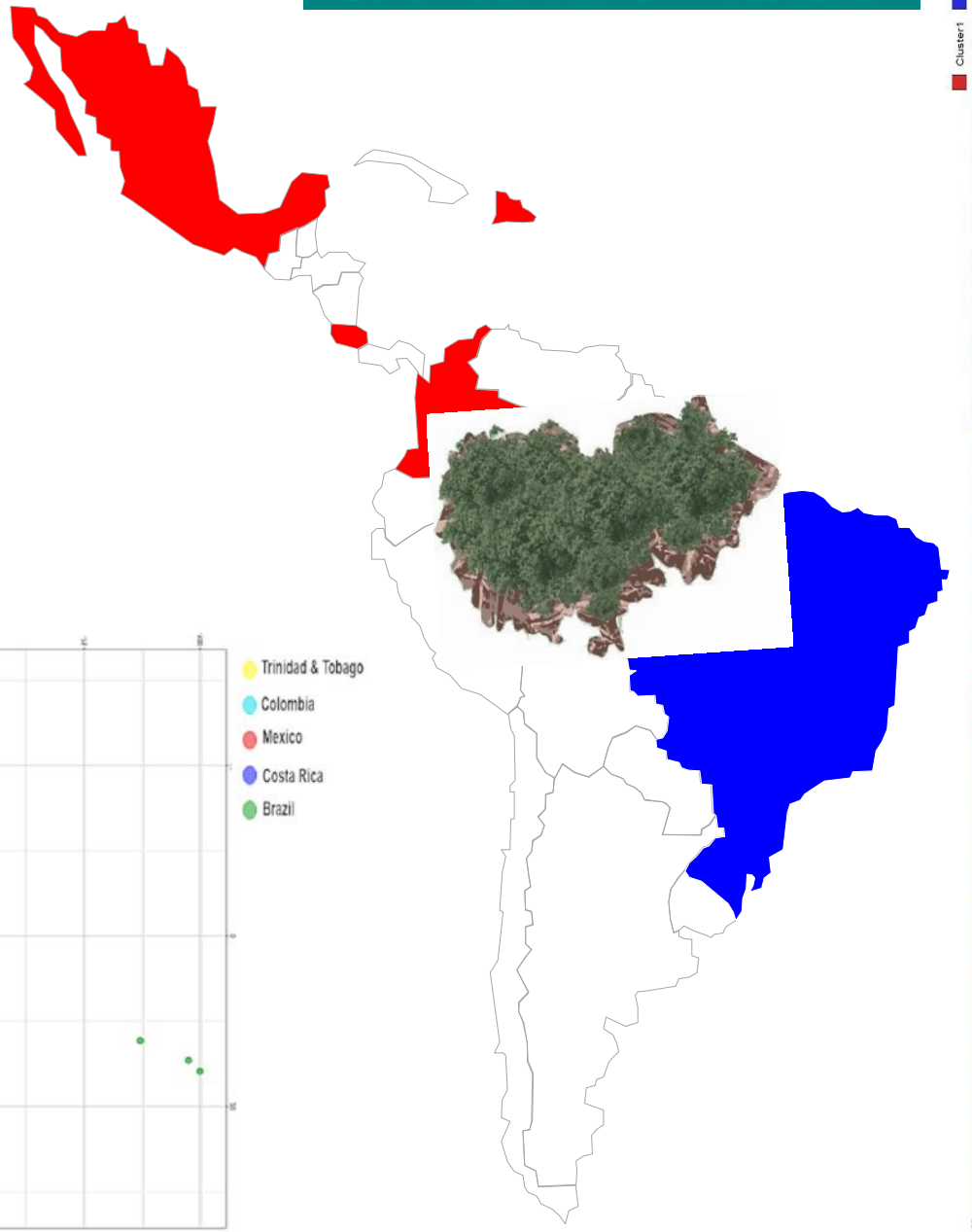
UNICAMP

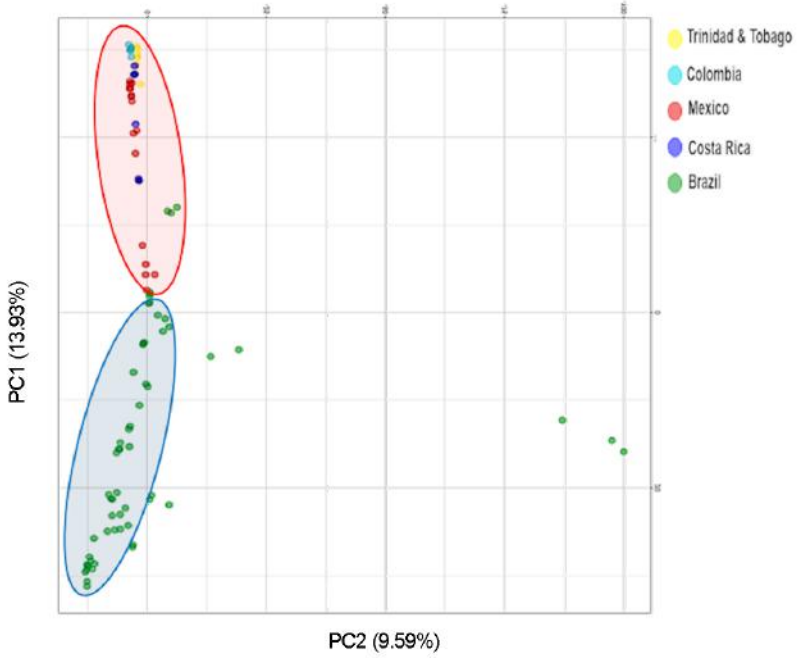
apta Regional

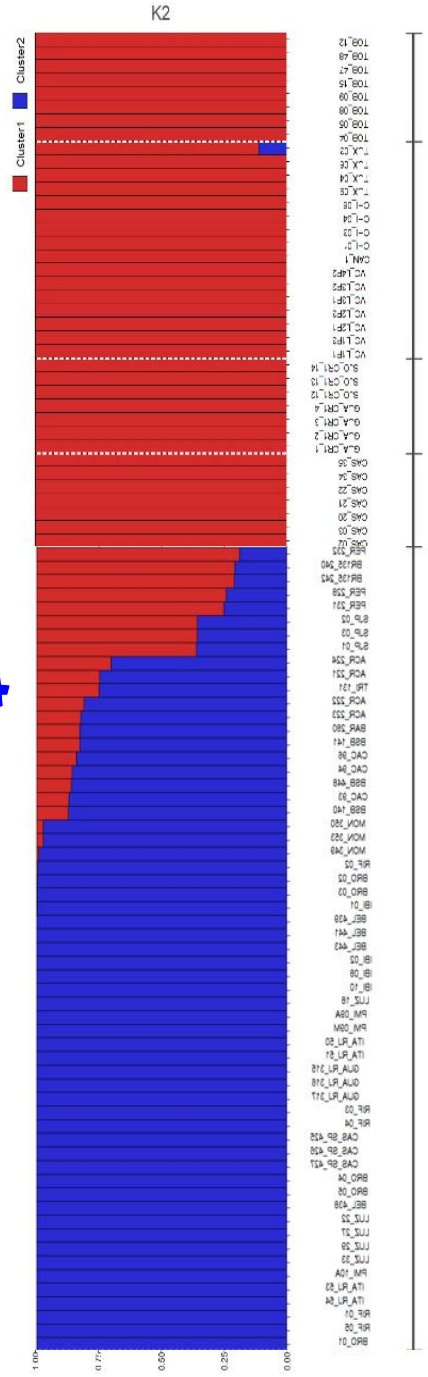
IAC
INSTITUTO AGRONÔMICO

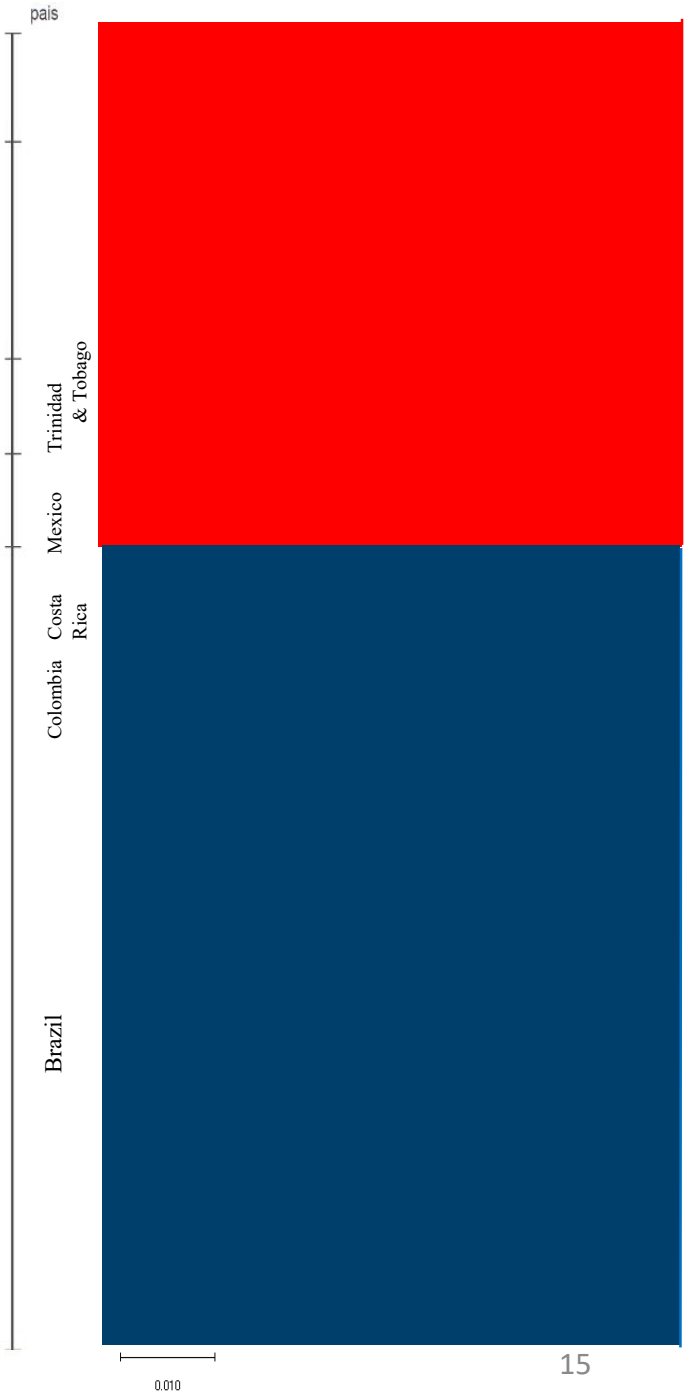
Genetic Diversity

- ddGBS (SNPs)

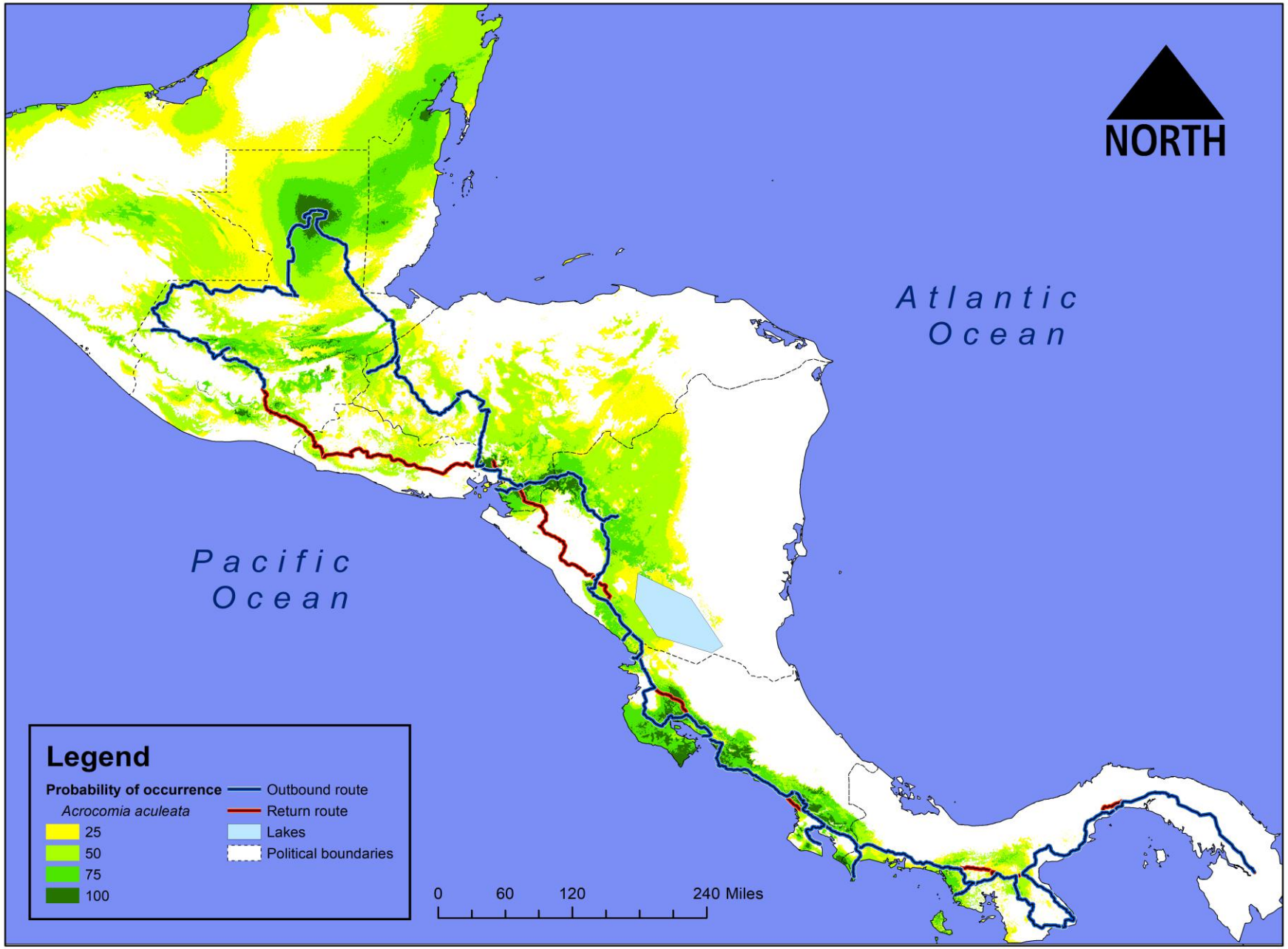






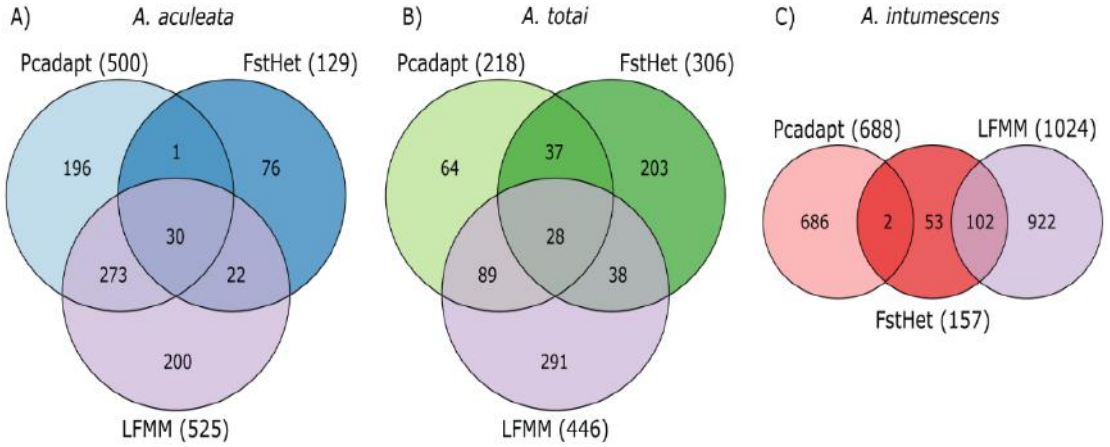


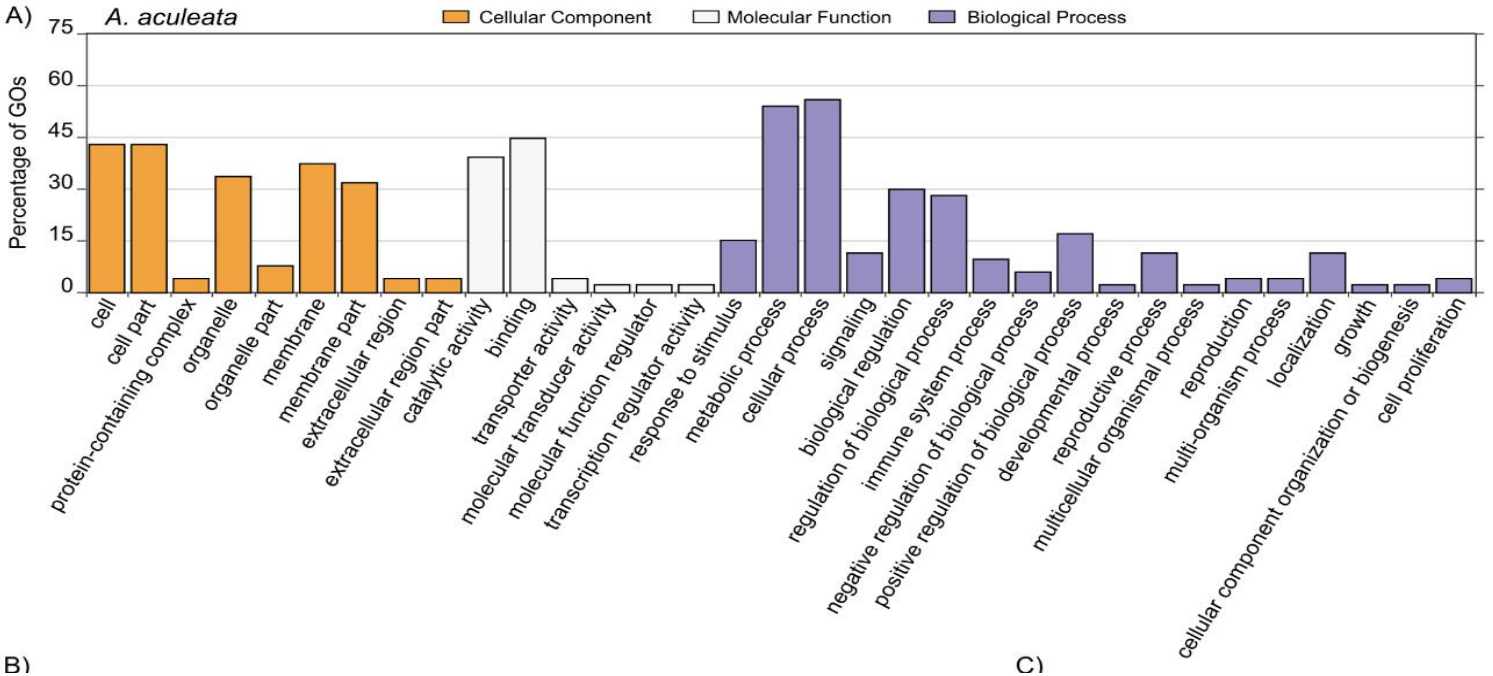
Sampling the Mesoamerican gene pool



Outliers loci & Adaptation genes

Sinergy



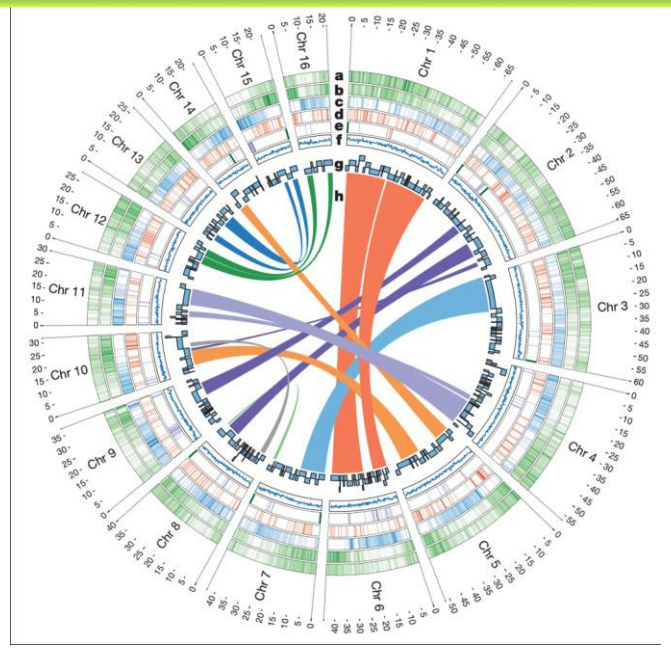


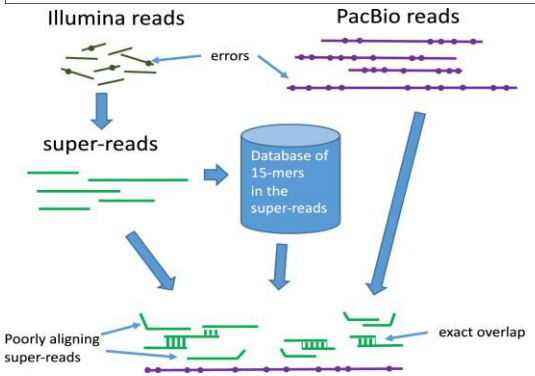
- Lipid biosynthetic process
- Carotene methabolism
- Plant defense
- Flower developement
- Germination
- Growth regulation

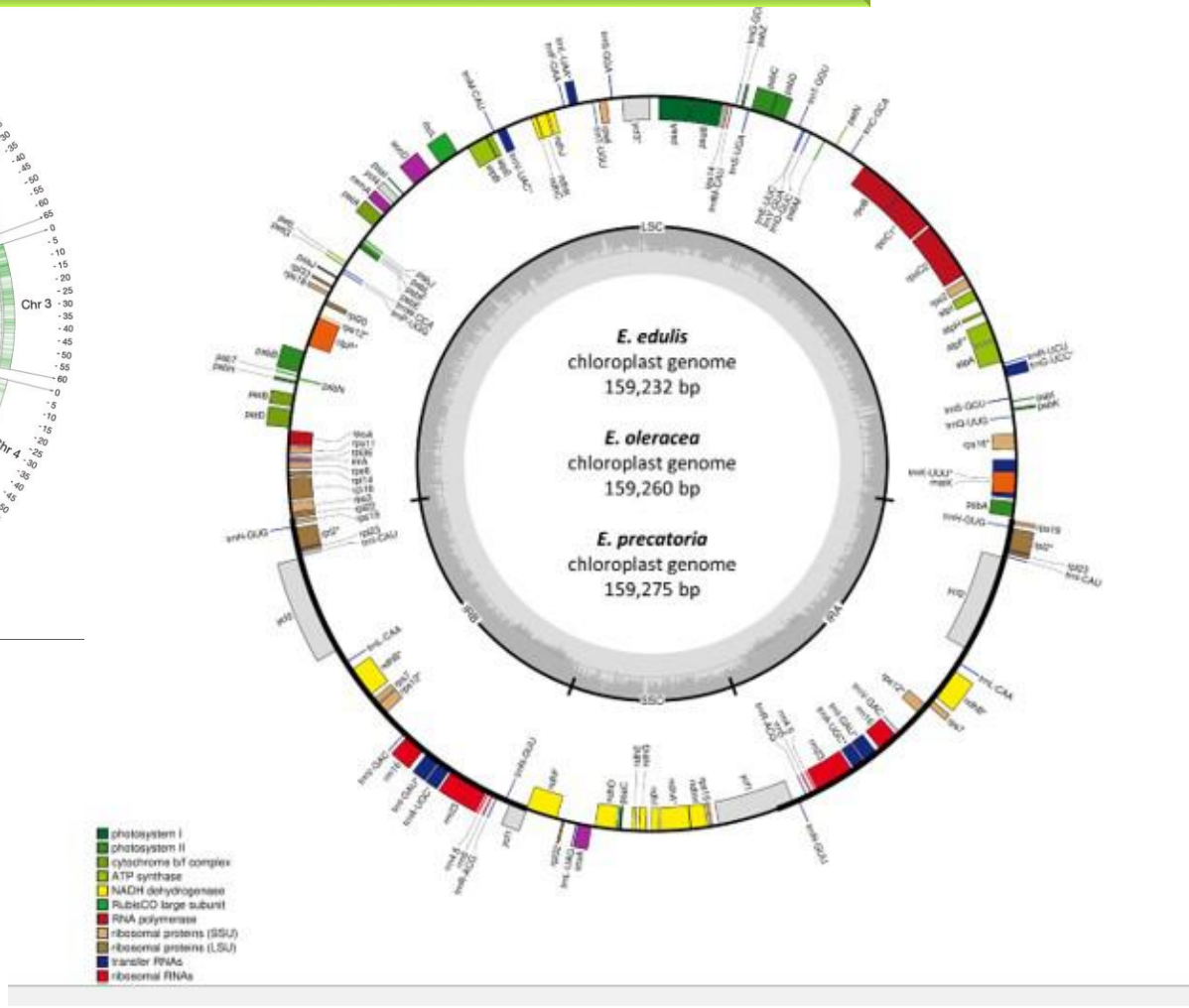
Whole Genome Sequencing- Plastome seq

Sinergy

- De novo assembly
  - Plastomes
    - Illumina
  - Whole-Genome
    - Nanopore
    - Illumina
-







PLOS | ONE

RESEARCH ARTICLE

Multiple-Geographic-Scale Genetic Structure of Two Mangrove Tree Species: The Roles of Mating System, Hybridization, Limited Dispersal and Extrinsic Factors

Gustavo M. Mori[1], Maria I. Zucchi[2], Anete P. Souza[1,3]*

1 Center for Molecular Biology and Genetic Engineering, University of Campinas, CP, Campinas, São Paulo, Brazil, **2** São Paulo Agency for Agribusiness Technology, Piracicaba, São Paulo, Brazil, **3** Department of Plant Biology, Institute of Biology, University of Campinas, Campinas, São Paulo, Brazil

Population Genomics, Functional Genomics and Ecophysiology in the Evolutionary Study of Neotropical Mangrove Species in the Face of Historical and Current Climate Change

FAPESP

Processo FAPESP:13/08086-1
Pos-Doc

Mori *et al. BMC Evolutionary Biology* (2015) 15:61
DOI 10.1186/s12862-015-0343-z

BMC Evolutionary Biology

RESEARCH ARTICLE Open Access

Species distribution and introgressive hybridization of two *Avicennia* species from the Western Hemisphere unveiled by phylogeographic patterns

Gustavo M Mori[1], Maria I Zucchi[2], Iracilda Sampaio[3] and Anete P Souza[1,4*]

Genomics and functional in the evolutionary study of Neotropical *Rhizophora* species facing historical and current climate change

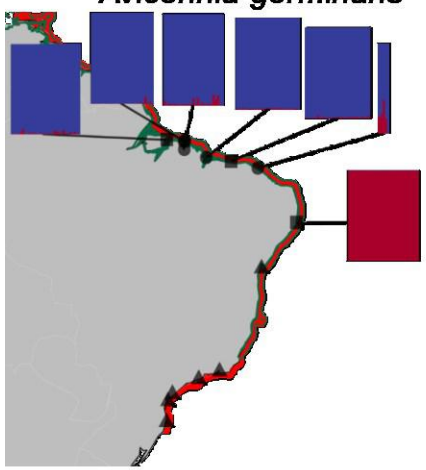
The complex evolutionary history of Western World *Rhizophora* species

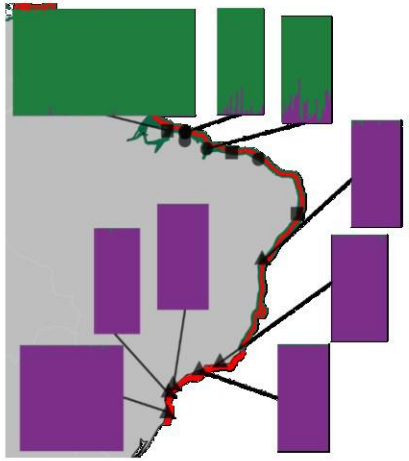
Avicennia germinans

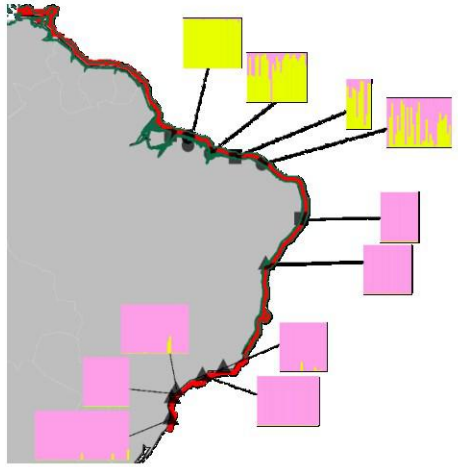
Avicennia schaueriana

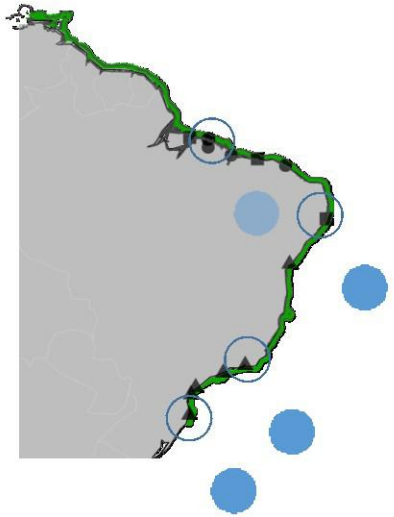
Rhizophora mangle

Hibiscus pernambucensis









Project FAPESP: 2014/22821-9
BEBE – FAPESP -JAPAN

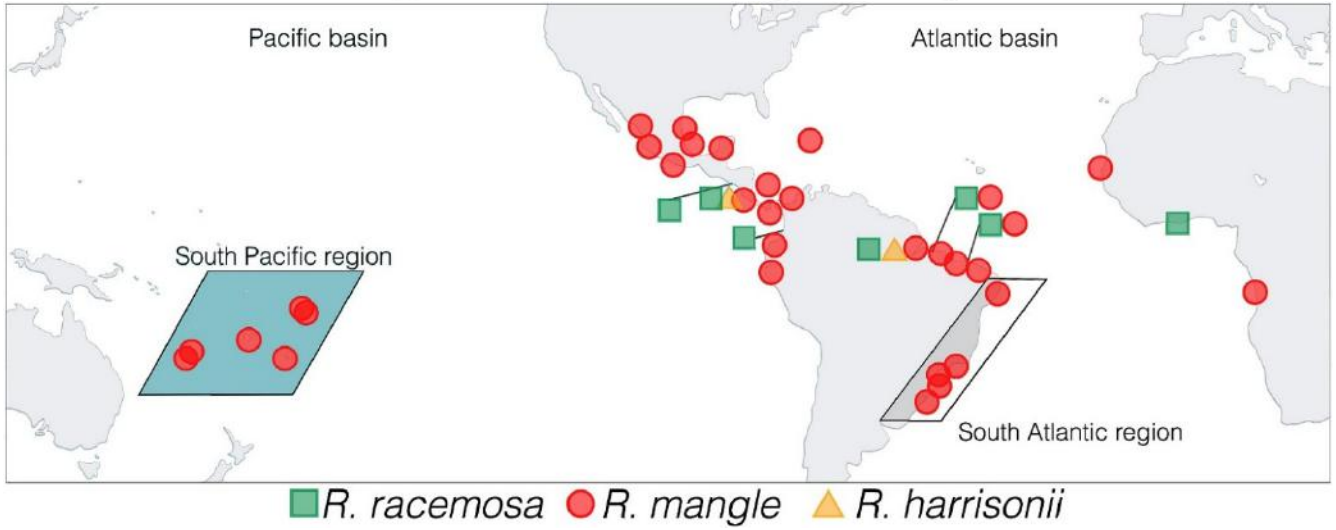
Contents lists available at ScienceDirect

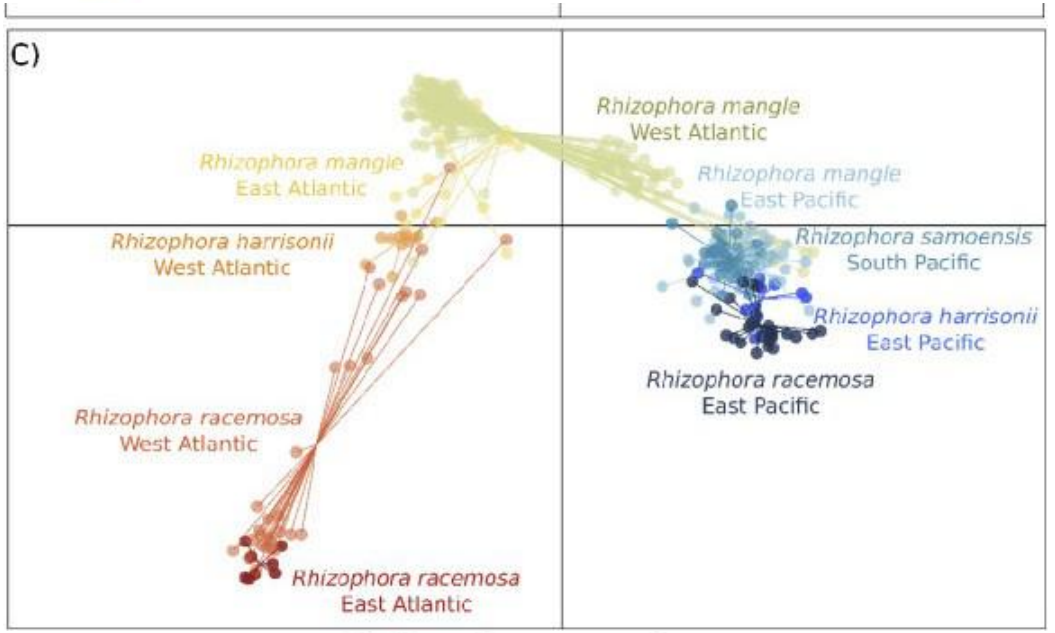
Estuarine, Coastal and Shelf Science

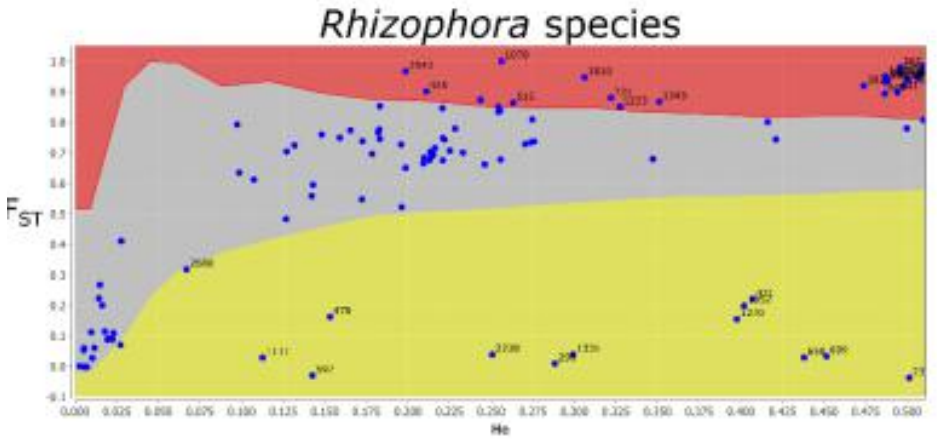
journal homepage: http://www.elsevier.com/locate/ecss

Testing species hypotheses in the mangrove genus *Rhizophora* from the Western hemisphere and South Pacific islands

Gustavo Maruyama Mori [a,*], André Guilherme Madeira [a], Mariana Vargas Cruz [b], Yoshiaki Tsuda [c], Koji Takayama [d], Yu Matsuki [e], Yoshihisa Suyama [e], Takaya Iwasaki [f], Anete Pereira de Souza [b,g], Maria Imaculada Zucchi [h], Tadashi Kajita [i,**]







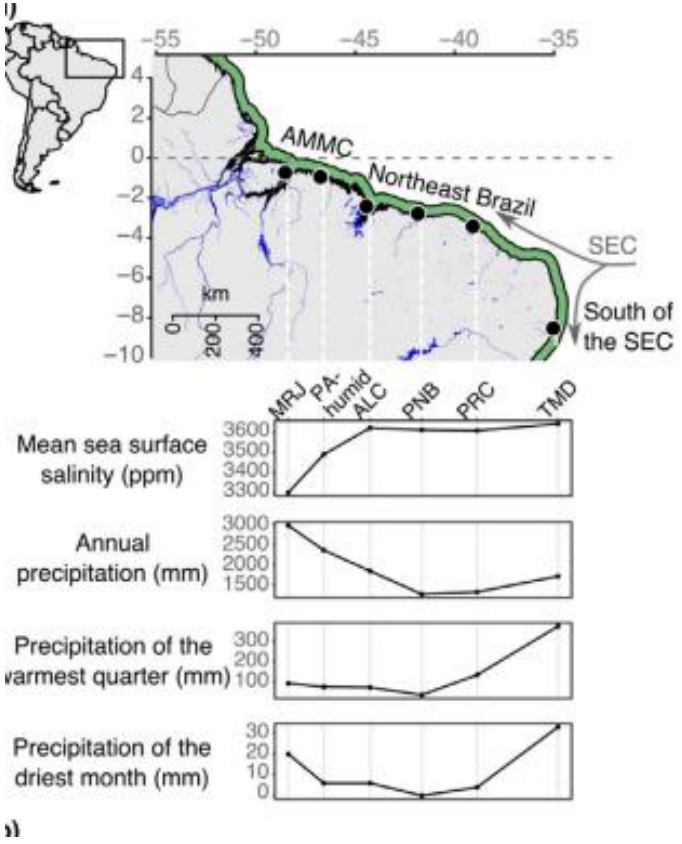
Project FAPESP: 2014/22821-9
BEBE – FAPESP -JAPAN

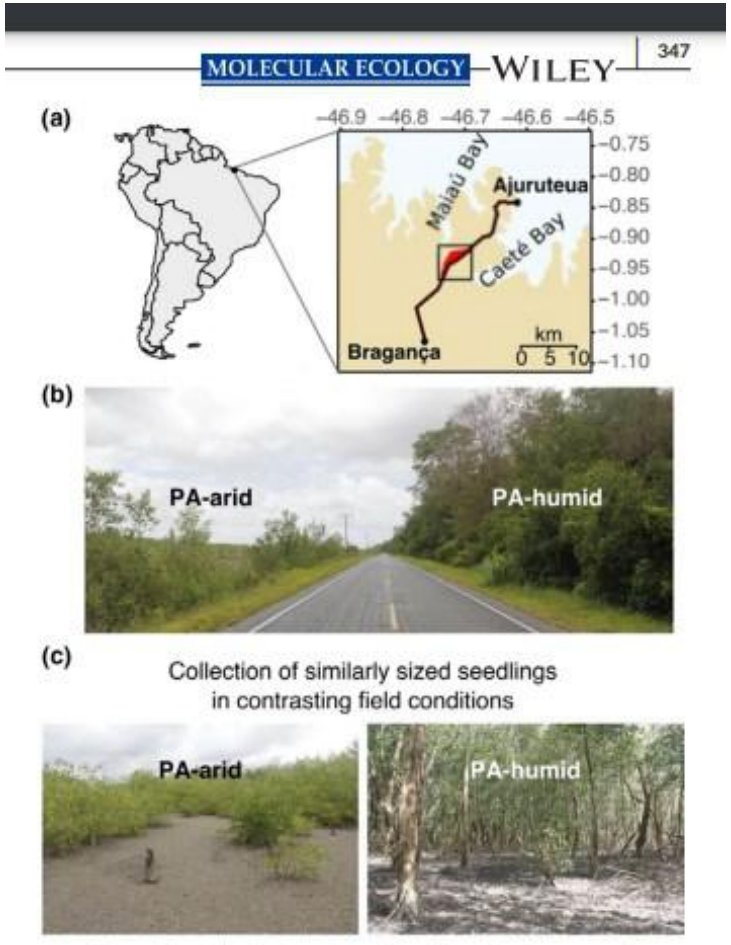
ORIGINAL ARTICLE

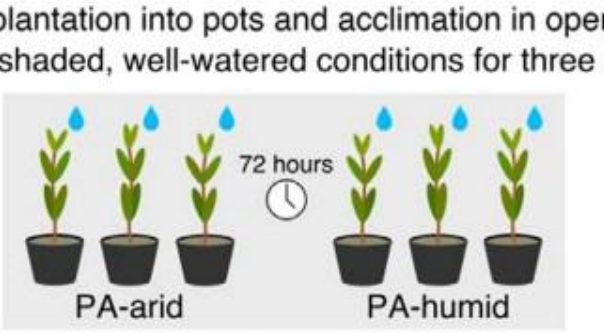
MOLECULAR ECOLOGY WILEY

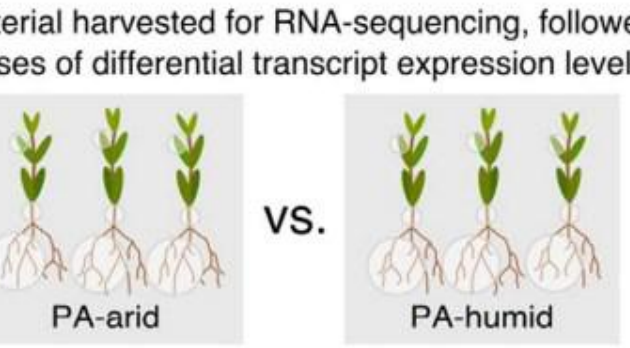
Molecular responses to freshwater limitation in the mangrove tree *Avicennia germinans* (Acanthaceae)

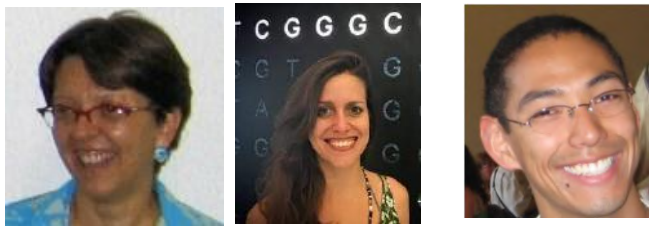
Mariana Vargas Cruz[1] | Gustavo Maruyama Mori[2] | Dong-Ha Oh[3] | Maheshi Dassanayake[3] | Maria Imaculada Zucchi[4] | Rafael Silva Oliveira[1] | Anete Pereira de Souza[1]





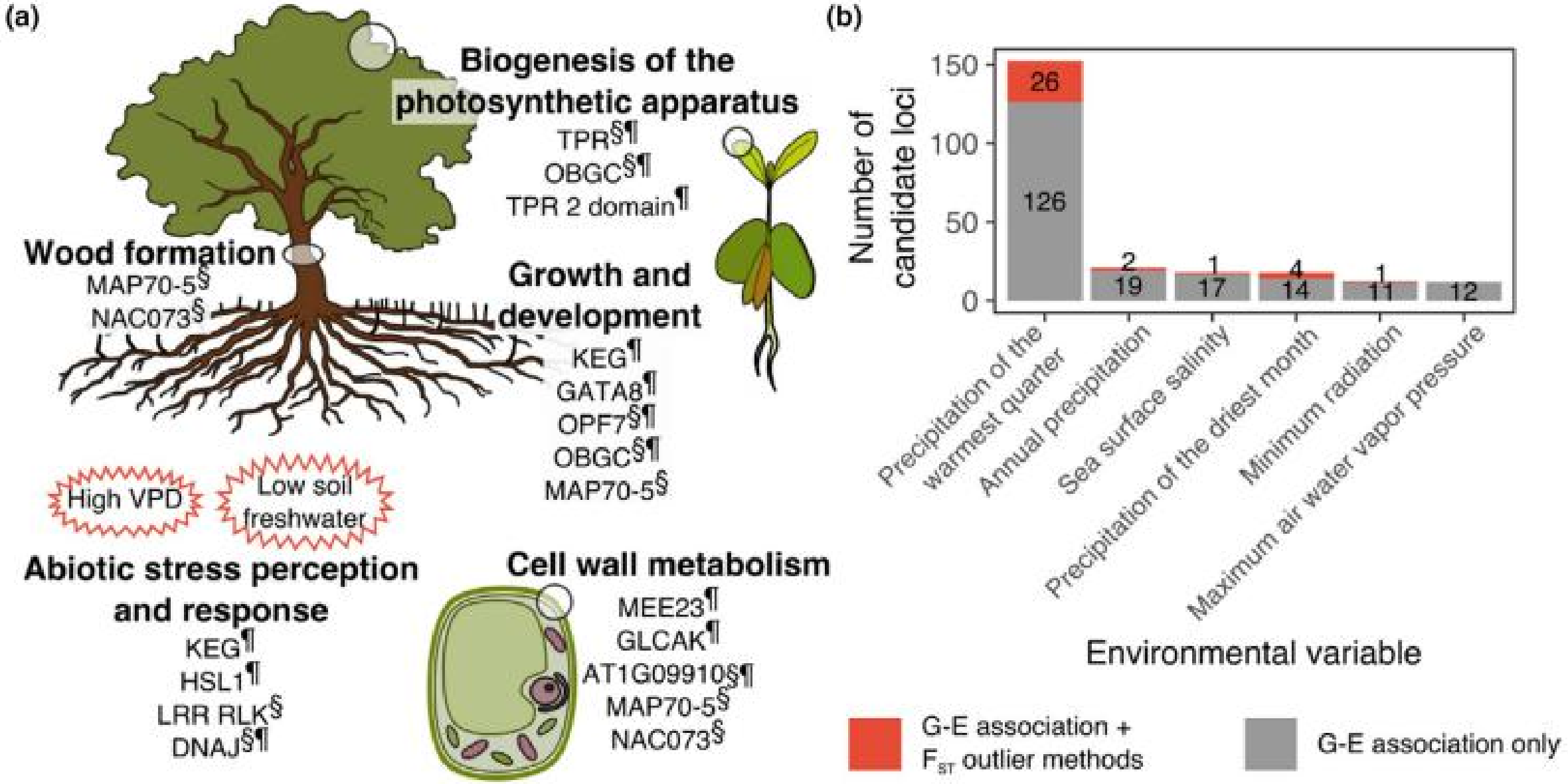






FAPESP

Processo FAPESP: 2011/52072-0, 2013/08086-1, 2013/26793-7 and 2014/22821-9.


(a)
Biogenesis of the photosynthetic apparatus
TPR§¶
OBGC§¶
TPR 2 domain¶
Wood formation
MAP70-5§
NAC073§
Growth and development
KEG¶
GATA8¶
OPF7§¶
OBGC§¶
MAP70-5§
High VPD
Low soil freshwater
Abiotic stress perception and response
KEG¶
HSL1¶
LRR RLK§
DNAJ§¶
Cell wall metabolism
MEE23¶
GLCAK¶
AT1G09910§¶
MAP70-5§
NAC073§
(b)
Number of candidate loci
150
100
50
0
26
126
2
19
1
17
4
14
1
11
12
Precipitation of the warmest quarter
Annual precipitation
Sea surface salinity
Precipitation of the driest month
Minimum radiation
Maximum air water vapor pressure
Environmental variable
G-E association + F_{ST} outlier methods
G-E association only

Research team ongoing – 2021

Grupo de Genética e Genômica da Conservação
APTA

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Flaviane Malaquias
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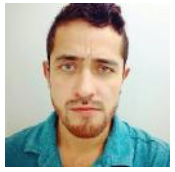
Acacio Gonçalves Neto
Pos-docc

PhD candidate

Luciano Delmondes
PhD candidate



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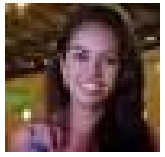

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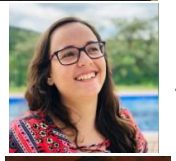

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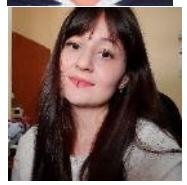

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Master candidate

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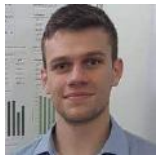

Andre Augusto Stella
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Collaborators

Researcher collabs

Thank you for your time and attention!

Maria Imaculada Zucchi

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