

Federal University of the State of Rio de Janeiro - UNIRIO
CCBS Integrated Laboratory of Plant Biology and
Center for Innovation in Mass Spectrometry of the Laboratory
of Protein Biochemistry (IMasS-LBP)
Institute of Biosciences – Department of Botany Av Pasteur
458, 5th floor, room 512
Urca, Rio de Janeiro, RJ, Brazil CEP:22290-240 Phone +55 21
2530.2551
Mobile: +55 21 99198.5671



LABORATÓRIO INTEGRADO DE BIOLOGIA VEGETAL

MAKING IT HAPPEN

Principal Investigator: Andrea Furtado Macedo,
Associate Professor, Department of
Botany/Unirio. andrea.macedo@unirio.br



LIBV

IS A RESEARCH, TEACHING AND EXTENSION LABORATORY of the Institute of Biosciences at the Federal University of the State of Rio de Janeiro (Unirio).

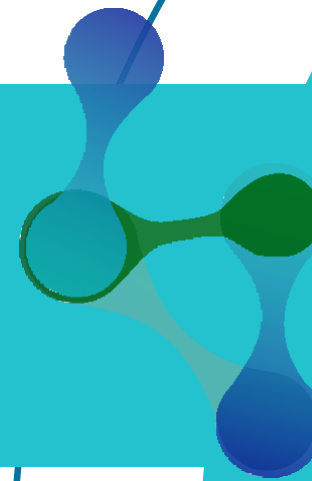
MAIN AREAS:

Plant Biotechnology Projects, which are focused mainly on molecular bioprospecting and medicinal and aromatic plant products intended for the food industry, using 'Omic' platforms such as proteomics and metabolomics.

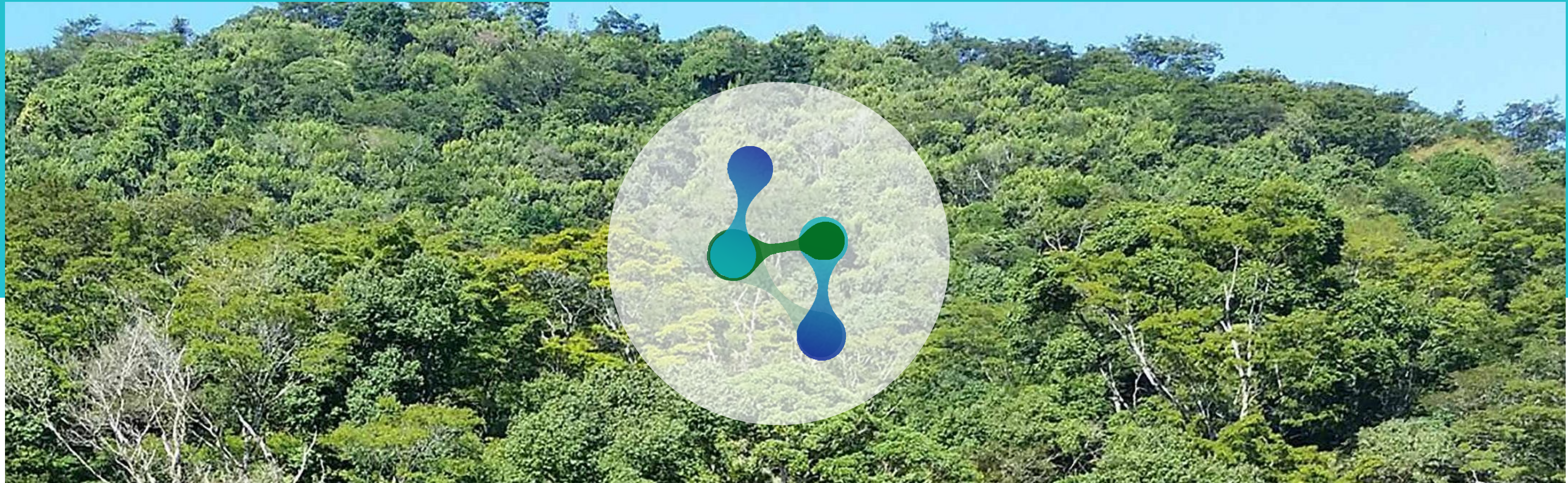
OTHER ACTIONS:

Plant identification, seedling production and conservation, domestication of wild species and hybrid production, using tools such as *in vitro* tissue culture and *ex vitro* culture.

Elicitation of compounds – studies of abiotic stress and the influence of light quality on plant structure and physiology.



LINES OF RESEARCH



BIODIVERSITY SPECIES CHARACTERIZATION – to characterize plant biodiversity with economic potential in structural, chemical and genetic terms; also verifying its market potential through biological, toxicological and pharmacological tests.

SUSTAINABLE USE (CONSERVATION), RECOVERY AND ENHANCEMENT OF THE COMPONENTS OF BIOLOGICAL DIVERSITY - research of biotechnological and/or sustainable strategies for conservation (*in situ* and *ex situ*, such as tissue culture) and use of plant species, optimizing the productivity of genetic resources.

'OMIC' SCIENCES (application, development and bioinformatics) – to identify which proteins and secondary metabolites are involved in development, productivity, metabolic profile and response to abiotic factors, such as variation in the spectral quality of light and temperature. The used models are mainly medicinal plants, food and biodiesel producers.

BRAZILIAN VANILLA



MORE THAN
CRUCIAL



THE PROJECT THAT VALUES BRAZILIAN VANILLA

LIBV USES PLANT BIOTECHNOLOGY TOOLS ALONGSIDE A COMBINED PROTEOMICS AND METABOLOMICS APPROACH TO ASSESS THE POTENTIAL PRODUCTION OF VANILLIN AND OTHER AROMA/FLAVOUR COMPOUNDS OF THE VANILLA SPECIES - SOME ENDEMIC TO BRAZIL.

INNOVATION ASPECTS

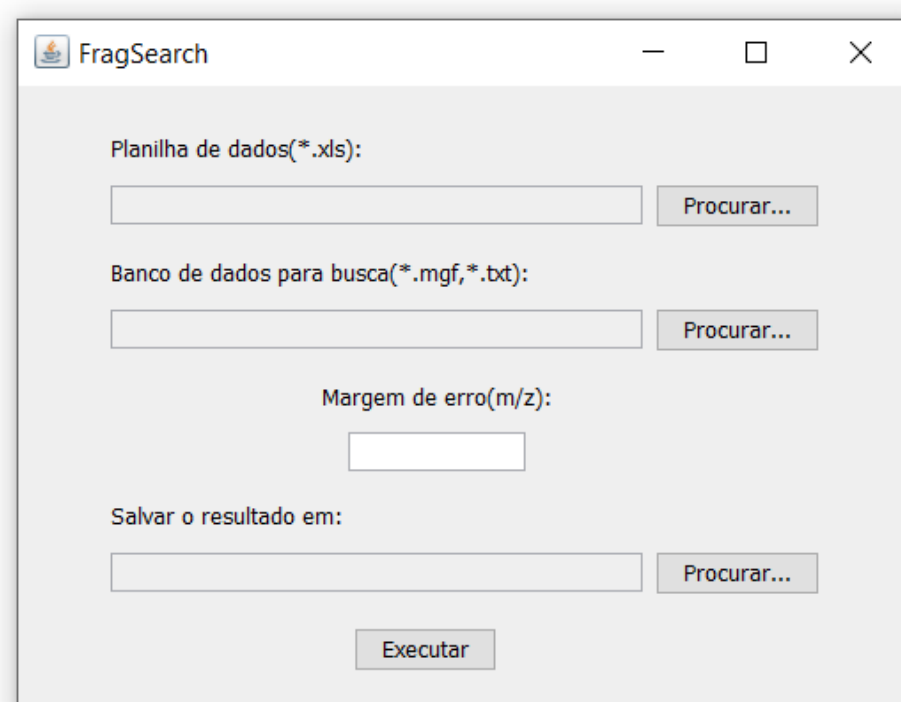
FOR THE FIRST TIME, BRAZILIAN VANILLA SPECIES WILL BE:

- monitored in terms of their development and growth;
- domesticated for hybrid and seedling production;
- assessed for their potential for production of the characteristic vanilla flavour;
- evaluated for their antimutagenic, antitumor, antimicrobial and antioxidant potential, as well as efficiency and safety

For this purpose, LIBV has been using biotechnology tools and chromatography instruments coupled with the next-generation mass spectrometry methodologies and *in vitro* activity tests (the Ames test, the Micronucleus assay, etc.). In the future, it will be possible to supply vanilla seedlings adapted to Brazilian growing conditions, and produce safe extracts for usage as a competitive product in the flavour market.



TECHNOLOGICAL INNOVATION



IN 2018, **LIBV CREATED AND DEVELOPED THE *FRAGSEARCH* SOFTWARE** TO ASSIST DATA PROCESSING FOR MOLECULAR IDENTIFICATION AND ANNOTATION.



BIOOMITECA MATA ATLÂNTICA, THE FIRST OPEN ACCESS ONLINE PLATFORM OF INTEGRATED METABOLOMIC AND BIOGEOGRAPHIC DATA AND GENERAL KNOWLEDGE OF THE ATLANTIC FOREST'S SPECIES, IMPROVING THE DISSEMINATION AND POPULARIZATION OF SCIENCE.



TECHNOLOGIES RESULTS + LIBV EXPERTISE

*Flavour and Patent
in its final stages.*

COORDINATOR: Prof. Dr. Andrea Furtado Macedo.

MEMBERS: Prof. Dr. Maria Gabriela Bello Koblitz, Joana Paula S. Oliveira (PPGBIO Master's student), Juliana Franco (PPGAN Master's student), Renatha Tavares de Oliveira (undergraduate student-IBIO), Ellen Moura Lopes (Master of Science-PPGBIO), Roberta Gomes Linhares (Bachelor of Science-IBIO). COLLABORATORS: Dr. Rafael Garret (LADETEC-UFRJ), Dr. Israel Felzenszwalb and Dr. Carlos F. Araújo-Lima (UERJ), Dr. LC Cameron (IMasS-UNIRIO), Dr. Rosane Castro (UFRRJ).



Resources and **INFRASTRUCTURE**

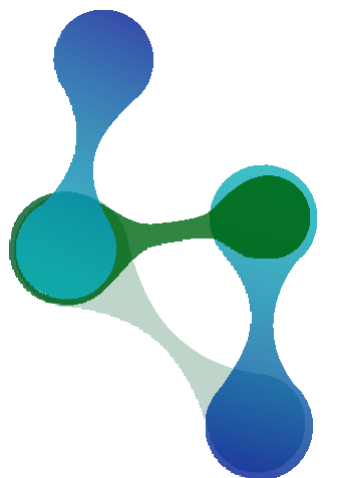
INSTITUTION: UNIRIO - physical structure to carry out research, teaching and associated activities: library, laboratories, herbariums, museums, accommodation, amphitheatres, classrooms, cafeterias, transport for monthly field trips, etc.

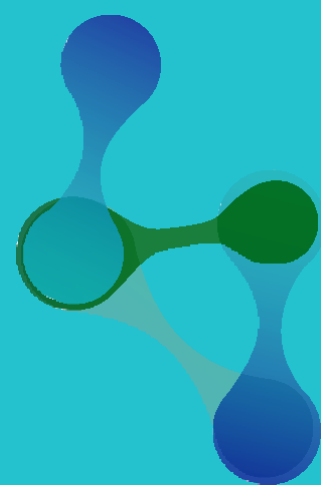
INSTITUTION: LIMAI IBIO/UNIRIO - the LIMAI Lab is a microscopy and imaging platform that includes an Olympus BX41 microscope, an Olympus stereoscope microscope and a microcomputer with ImagePro-plus software.

LIBV - is equipped to carry out tissue culture projects, electrophoresis and separation of molecules by chromatography and the preparation of extracts. It has a culture room with shelves and lighting, cooling system and photoperiod control; a washing room; a culture media preparation room and a separate room for biotechnology and molecular biology assays.

LIBV'S GENERAL EQUIPMENT – computers, printers, autoclaves, pH meters, analytical and semi-analytical balances, stirring and heating plates, a high-performance liquid chromatograph (HPLC) with a UV detector and column oven (Shimadzu), one-dimensional and two-dimensional gel electrophoresis system (GE Healthcare), Milli-Q water purification system (Millipore), microwave ovens, laminar flow hoods (horizontal and vertical), drying and sterilization ovens, fume hood, rotary evaporator, freeze dryer, water pumps, refrigerator and freezer, Ultrafreezer -80°C, shakers for suspension cell culture, plant growth chambers, vortex, various micropipettes, centrifuges, ultrasonic cleaner, among others.

LIBV'S HUMAN RESOURCES: 1 Master's student (PPGBIO/Unirio); 3 Scientific Initiation students (IC/Unirio), 1 Teaching Assistant student (Unirio).





FEATURED RESEARCH

1. LOPES, E. M.; GUIMARAES-DIAS, F.; GAMA, T. S. S.; MACEDO, A. L.; VALVERDE, A. L.; MORAES, M. C.; AGUIAR-DIAS, A. C. A.; BIZZO, H. R.; FERREIRA, M. A.; TAVARES, E. S.; MACEDO, A. F. *Artemisia annua* L. and photoresponse: from artemisinin accumulation, volatile profile and anatomical modifications to gene expression. *PLANT CELL REPORTS.* , v.39, p.101 - 117, 2020.
2. LIMA, C. F. A.; OLIVEIRA, J. P. S.; COSCARELLA, I. L.; AIUB, C. A. F.; FELZENSZWALB, I.; EVARISTO, G. P. C.; MACEDO, A. F. Metabolomic analysis of *Cyrtopodium glutiniferum* extract by UHPLC-MS/MS and in vitro antiproliferative and genotoxicity assessment. *JOURNAL OF ETHNOPHARMACOLOGY.* , v.253, p.112607 - , 2020.
3. LOPES, ELLEN MOURA; LINHARES, ROBERTA GOMES; DE OLIVEIRA PIRES, LUCAS; CASTRO, ROSANE NORA; SOUZA, GUSTAVO HENRIQUE MARTINS FERREIRA; KOBLITZ, MARIA GABRIELA BELLO; CAMERON, LUIZ CLAUDIO; MACEDO, ANDREA FURTADO
Vanilla bahiana, a contribution from the Atlantic Forest biodiversity for the production of vanilla: A proteomic approach through high-definition nanoLC/MS. *FOOD RESEARCH INTERNATIONAL.* , v.120, p.148 - 156, 2019.
4. LIMA, C. F. A.; FERNANDES, A. S.; GOMES, E. M.; OLIVEIRA, L. L.; MACEDO, A. F.; ANTONIASSI, R.; WILHELM, A. E.; AIUB, C. A. F.; FELZENSZWALB, I. Antioxidant Activity and Genotoxic Assessment of Crabwood (*Andiroba*, *Carapa guianensis* Aublet) Seed Oils. *Oxidative Medicine and Cellular Longevity.* , v.2018, p.1 - 11, 2018.
5. OLIVEIRA, J. P. S.; KOBLITZ, M. G. B.; FERREIRA, M. S. L.; CAMERON, L. C.; MACEDO, A. F.
Comparative metabolomic responses to gibberellic acid and 6-benzylaminopurine in *Cunila menthoides* Benth. (Lamiaceae): a contribution to understand the metabolic pathways. *PLANT CELL REPORTS.* , v.1', p.1 - 1, 2018.

LIBV'S AWARDED TEAM

2019 Honorable mention* in Biodiversity, 18th Scientific Initiation Journey, Unirio.

2018 Honorable Mention Award, 7th BrMASS conference on mass spectrometry and the 4th BrProt meeting.

2018 Scientific Initiation Award* in Biological Sciences, Unirio.

2017 Scientific Initiation Award for the best work in Biological Sciences, Unirio.

2016 Scientific Initiation Award for the best work in Food Sciences, Unirio.

2014 Scientific Initiation Award for the best work in Biological Sciences, Unirio.

2013 Award of Outstanding Poster during the 4th Brazilian Conference on Natural Products and the XXX Meeting on Micromolecular, Evolution, Systematics and Ecology (RESEM), held in Natal – Rio Grande do Norte.

2010 Honorable Mention in Botany, XXI Symposium on Medicinal Plants in Brazil.

*presented in scientific poster format.

