# FLORAMAC

22 · 26 SEPTEMBER 2025

TERCEIRA · AZORES

# PROGRAM & ABSTRACTS

azorean biodiversity group

ce3c centre for ecology, evolution and environmental changes

UAc UNIVERSIDADE DOS AÇORES

FCAA FACULDADE DE CIÊNCIAS AGRÁRIAS E DO AMBIENTE UNIVERSIDADE DOS AÇORES

ACDA Associação para a Ciência e Desenvolvimento dos Açores

Angra do Heroísmo CÂMARA MUNICIPAL

GOVERNO DOS AÇORES | VICE-PRESIDÊNCIA DO GOVERNO

**Title**
International Symposium FloraMac 2025: Program & Abstracts

**Editors:**
Elisabete Martins, Associação para a Ciência e Desenvolvimento dos Açores (ACDA), Portugal
Rui Bento Elias, Azorean Biodiversity Group (GBA-CE3C); University of the Azores, Portugal
Rosalina Gabriel, Azorean Biodiversity Group (GBA-CE3C); University of the Azores, Portugal

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# Welcome to the International Symposium FloraMac 2025

**The Organising Committee wish you a pleasant and inspiring participation!**

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# Presentation

FloraMac is an international symposium dedicated to the study of terrestrial and marine flora and vegetation in the Macaronesian region, encompassing the Azores, Madeira, Selvagens, Canary Islands, and Cabo Verde. This event brings together researchers from a wide range of disciplines, such as taxonomy, vegetation ecology, biogeography, phylogeography, paleoecology, and biodiversity conservation, among others.

Although the FloraMac Symposium, as it is known today, began in 2010 in Ponta Delgada (São Miguel Island, Azores), its origins can be traced back to 1973 with the *1º Congreso Internacional Pro-Flora Macaronésica*, held in Las Palmas de Gran Canaria (Canary Islands).

Since its first edition, FloraMac has been hosted across the Macaronesian archipelagos every 2 to 3 years, reflecting a strong tradition of regional collaboration. The editions held so far include:

- 2010: Ponta Delgada, São Miguel, Azores, organized by the University of the Azores.
- 2012: Funchal, Madeira, organized by the University of Madeira.
- 2015: Las Palmas de Gran Canaria, Canary Islands, organized by the "Jardín Botánico Canario Viera y Clavijo".
- 2018: Funchal, Madeira, organized by the University of Madeira.
- 2022: San Sebastián de La Gomera, Canary Islands, organized by the University of La Laguna and IPNA CSIC.

The 2025 edition continues this legacy, fostering scientific exchange and promoting the understanding and conservation of Macaronesian flora. This meeting will take place in the world heritage city of Angra do Heroísmo (Terceira Island, Azores). between the 22nd and the 26th of September 2025. Here we reaffirm the symposium's central mission: to advance scientific knowledge and collaboration around the unique terrestrial and marine flora and vegetation of Macaronesia. So far, each edition has not only strengthened academic ties across borders, but also highlighted the growing relevance of Macaronesian ecosystems in the face of global environmental change.

This year, under the theme "Islands in Flux: Biodiversity, Extinction, and Resilience in Macaronesia", we invite participants to explore the dynamic interplay between historical legacies, contemporary pressures, and future trajectories. From cryptic extinctions to cutting-edge phylogeographic models, and from paleobotanical insights to oceanic shifts in phytoplankton communities, FloraMac 2025 will be a platform for examining both the vulnerability and resilience of Macaronesian ecosystems.

This Abstract book includes the program and all the abstracts of the contributions presented by invited researchers, oral communications, and posters of the conference.

We are sincerely delighted to welcome you to FloraMac 2025, a space for scientific exchange, renewed collaboration, and shared commitment to understanding and safeguarding the biodiversity of Macaronesia in a time of change.

Thank you for being part of this tradition!

The organization committee

# Committees

## Organizing Committee

**Rosalina Gabriel** (Azorean Biodiversity Group (GBA-CE3C); University of the Azores, Portugal)

**Rui Bento Elias** (Azorean Biodiversity Group (GBA-CE3C); University of the Azores, Portugal)

**José María Fernández-Palacios** (Island Ecology and Biogeography Research Group; La Laguna University, Spain)

**Paulo A. V. Borges** (Azorean Biodiversity Group (GBA-CE3C); University of the Azores, Portugal)

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**Elisabete Martins** (Associação para a Ciência e Desenvolvimento dos Açores (ACDA), Portugal)

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**Isildo Gomes** (Instituto Nacional de Investigação e Desenvolvimento Agrário (INIDA), Cabo Verde)

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**Luís Silva** (Departamento de Biología, Universidade dos Açores)

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**Maria Romeiras** (Instituto Superior de Agronomia (ISA), Universidade de Lisboa)

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**Rui Bento Elias** (Azorean Biodiversity Group (GBA-CE3C); University of the Azores)

**Susana Fontinha** (Secretaria Regional de Agricultura, Pescas e Ambiente, Governo Regional da Madeira)

# Organization and Support

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# Venue

FloraMac's headquarters will be the Centro Interpretativo de Angra do Heroísmo which is located in the city of Angra do Heroísmo, Terceira Island, Azores, Portugal (link-google maps).

**Address**

Centro Interpretativo de Angra do Heroísmo
Rua do Marquês
9700-143 Angra do Heroísmo
Terceira Island, Autonomous Region of the Azores, Portugal


# Paperless conference

We are committed to acting sustainability and environmentally responsible in as many ways as possible. To achieve this, we implemented several actions to reduce its environmental impact on his events.

**Paperless practices**

- We will not print the Program and abstract book. These can be found online in the website of the event;
- We will not print certificate to be given in the event. These will be sent by email to each participant.
- We will not use plastic badge holders, eliminating a significant source of waste.

# Programme Overview

| Monday<br>September 22 | Tuesday<br>September23 | Wednesday<br>September24 | Thursday<br>September 25 | Friday<br>September 26 |
|---|---|---|---|---|
| **REGISTRATION**<br>8:30-9:30 | | | | |
| **WELCOME SESSION**<br>9:30-10:00 | KEYNOTE LECTURE II<br>**Carlos A. Góis-Marques**<br>*Looking into the past: Why study Macaronesian plant fossils?*<br>9:00-10:00 | **FIELD EXCURSION & OFFICIAL GROUP FOTO**<br>*Gruta do Natal, Volcanic Pit; Biscoito da Ferraria and Pico Alto Natural Reserve; Pioneer Vegetation of the 1761 Volcanic Eruption*<br>9:30-17:00 | KEYNOTE LECTURE III<br>**Jairo Patiño**<br>*The Macaronesian flora in peril: Understanding biodiversity loss under global change*<br>9:00-10:00 | KEYNOTE LECTURE V<br>**Isabel Sanmartin**<br>*The Macaronesian Rand Flora revisited: Deep Learning modeling approaches in Phylogeography and Species Delimitation*<br>9:00-10:00 |
| OPENING LECTURE<br>**José María Fernández-Palacios**<br>*The ghost of cryptic extinction in estimating anthropogenic biodiversity losses in Islands. The case of the Macaronesia vascular flora*<br>10:00-11:00 | **RESEARCH TALKS 3**<br>10:00-11:00 | | **RESEARCH TALKS 5**<br>10:00-11:00 | **RESEARCH TALKS 8**<br>10:00-11:00 |
| **COFFEE BREAK**<br>11:00-11:30 | **COFFEE BREAK**<br>11:00-11:30 | | **COFFEE BREAK**<br>11:00-11:30 | **COFFEE BREAK**<br>11:00-11:30 |
| **RESEARCH TALKS 1**<br>11:30-13:10 | **RESEARCH TALKS 4**<br>11:30-13:10 | | **RESEARCH TALKS 6**<br>11:30-13:10 | **RESEARCH TALKS 9**<br>11:30-12:30 |
| **Lunch break**<br>13:10-14:30 | **Lunch break**<br>13:10-14:30 | | **Lunch break**<br>13:10-14:30 | **CLOSING SESSION**<br>*New developments on Macaronesian Flora*<br>**AWARD PRESENTATION**<br>12:30-13:20<br>**Lunch break**<br>13:20-14:30 |
| KEYNOTE LECTURE I<br>**Severin D. H. Irl**<br>*Perspectives on the functional island biogeography of the flora of the Canary Islands*<br>14:30-15:30 | **RESEARCH POSTERS**<br>14:30-16:00 | | KEYNOTE LECTURE IV<br>**Joana Barcelos e Ramos**<br>*Phytoplankton in rapidly changing ocean*<br>14:30-15:30 | **MEETINGS OF Scientific Societies & Projects - 1**<br>14:30-15:30 |
| **COFFEE BREAK**<br>15:30-16:00 | | | **COFFEE BREAK**<br>15:30-16:00 | **COFFEE BREAK**<br>15:30-16:00 |
| **RESEARCH TALKS 2**<br>16:00-17:40 | **COFFEE BREAK**<br>16:00-16:30 | | **RESEARCH TALKS 7**<br>16:00-17:30 | **MEETINGS OF Scientific Societies & Projects - 2**<br>16:00-17:30 |
| | **Darwin core & data papers Course**<br>16:30-18:30 | | | |
| | | | **CONFERENCE DINNER**<br>20:00-22:00 | |

# Daily program

# Monday, 22 September 2025

## REGISTRATION

**8:30-9:30 | Monday, 22 September 2025**

## WELCOME SESSION

**9:30-10:00 | Monday, 22 September 2025**

### Welcoming addresses

**Rui Bento Elias**

Azorean Biodiversity Group (GBA-CE3C); University of the Azores

**Paulo A. V. Borges**

Representing the Rector of the University of the Azores, Professora Doutora Susana Mira Leal

**António Ventura**

Secretário Regional da Agricultura e Alimentação

## OPENING LECTURE

10:00-11:00 | Monday, 22 September 2025
**Introduced by Rui B. Elias**

### The ghost of cryptic extinction in estimating anthropogenic biodiversity losses on islands. The case of the Macaronesian vascular plants

**José María Fernández-Palacios**

Departamento de Botánica, Ecología y Fisiología Vegetal, Universidad de La Laguna

## COFFEE-BREAK

**11:00-11:30 | Monday, 22 September 2025**

# RESEARCH TALKS 1

11:30-13:10 | Monday, 22 September 2025
**Chair: Rui B. Elias**

## Biodiversity monitoring

O22 BIODIVERSITY MONITORING OF ISLAND ECOSYSTEMS (BIOMONI)
**Nathaly Guerrero-Ramírez**; Claudine Ah-Peng; Paulo Borges; Giorgia Camperio; Lea de Nascimento; Rui Elias; Franz Essl; Rosalina Gabriel; Bernd Lenzner; Fabio Mologni; Leila Morgado; Rüdiger Otto; Jairo Patiño; Samantha Suter; Wolf Wildpret Martin; Patrick Weigelt; Clara Zemp; **Holger Kreft**

O05 MEETING INTERNATIONAL BIODIVERSITY TARGETS ON ISLANDS: CURRENT STATUS AND CHALLENGES
**Fabio Mologni**; Franz Essl & Bernd Lenzner

O21 THE IMPACT OF CLIMATE CHANGE ON CABO VERDE'S ENDEMIC FLORA
**Jailson Mendes**; Paulo A.V. Borges; Luis Silva & Maria M. Romeiras

O18 SEEING THE FOREST THROUGH THE ARTHROPODS: CONTINUOUS ARTHROPOD SURVEILLANCE AS INDICATORS FOR AZOREAN FOREST QUALITY
**Paulo A. V. Borges** & Sébastien Lhoumeau

# LUNCH BREAK

**13:10-14:30 | Monday, 22 September 2025**

# KEYNOTE LECTURE I

14:30-15:30 | Monday, 22 September 2025
**Introduced by José María Fernández-Palacios**

## Perspectives on the functional island biogeography of the flora of the Canary Islands

**Severin D. H. Irl**

Institute of Physical Geography at the Goethe-University Frankfurt, Germany

# COFFEE-BREAK

**15:30-16:00 | Monday, 22 September 2025**

# RESEARCH TALKS 2

16:00-17:40 | Monday, 22 September 2025
**Chair: Paulo A.V. Borges**

## Functional Biodiversity

O28 FUNCTIONAL DIVERSITY OF OCEANIC ISLAND FLORAS
**Nathaly Guerrero-Ramírez**; Thalita Ferreira-Arruda; Patrick Weigelt; Martha Paola Barajas Barbosa; Sebastien Albert; Dominique Strasberg; Claudia Baider; F. B. Vincent Florens; Isis Petrocelli & Holger Kreft

O29 FINE ROOT BIOMASS AND FUNCTIONAL TRAITS OF WOODY PLANTS IN NATURAL AND DISTURBED ECOSYSTEMS IN TENERIFE, CANARY ISLANDS
**Natalia Sierra Cornejo**; Felipe Rodríguez; Elena Rocafull; Lucía N. Ramos; Isabel Suárez; Rüdiger Otto; Lea de Nascimento & José María Fernández-Palacios

O02 INDIVIDUAL-BASED VISITATION NETWORKS AND PLANT TRAITS OF THE PRIDE OF MADEIRA (ECHIUM CANDICANS)
**Ricardo Costa**; Ana Ceia Hasse; Rui Rebelo & Mário Boieiro

O08 INVASIVES VS NATIVES: FUNCTIONAL DIVERSITY OF THE FLORA OF LANZAROTE (CANARY ISLANDS)
**Wolf H. Wildpret Martin**; Julie Besnard, Severin D.H. Irl, Holger Kreft & Paola Barajas-Barbosa

O32 ALLELOPATHIC TRAITS OF INVASIVE AZOREAN FLORA: *HEDYCHIUM GARDNERIANUM* SHEPH. EX KER GAWL. AND GUNNERA TINCTORIA (MOLINA) MIRBEL
Wilson Tavares; Maria Carmo Barreto; **Gonçalo P. Rosa**; Ana M. L. Seca; Francisco J. Rodríguez-Mejías; Rosa M. Varela & Francisco A. Macías

# Tuesday, 23 September 2025

## KEYNOTE LECTURE II

09:00-10:00 | Tuesday, 23 September 2025
**Introduced by Carlos García-Verdugo**

### Looking into the past: Why study Macaronesian plant fossils?

**Carlos A. Góis-Marques**

Madeira Botanical Group; University of Madeira; Portugal

## RESEARCH TALKS 3

10:00-11:00 | Tuesday, 23 September 2025
**Chair: Carlos García-Verdugo**

### Biodiversity

O06 PATTERNS OF COLONIZATION AND BREEDING SYSTEM IN *CHRYSOJASMINUM ODORATISSIMUM* (OLEACEAE), THE ONLY MACARONESIAN HETEROSTYLOUS SPECIES
**Carlos García-Verdugo;** Miguel Menezes de Sequeira; Célia Bairos; Francisco J. Ocaña, Sara Martín-Hernanz, Juli Caujapé-Castells, Xavier Estellés & María Olangua-Corral8

O13 THE PHYTOVIRAL DIVERSITY IN AZOREAN NATIVE PLANTS
**Sara Luna**; Maria Susana Lopes; Eduardo Dias; Dinis Pereira; Artur da Câmara Machado & Duarte Mendonça

O33 COMMUNICATING MADEIRA'S BRYOFLORA: KNOW TO PROTECT
**Susana Fontinha** & Carlos Lobo

## COFFEE-BREAK

**11:00-11:30 | Tuesday, 23 September 2025**

# RESEARCH TALKS 4

11:30-13:10 | Tuesday, 23 September 2025
**Chair: Susana Fontinha**

## Biodiversity and Conservation

O14 ESTABLISHING LONG-TERM MONITORING BASELINES FOR VASCULAR PLANTS ACROSS AN ELEVATIONAL GRADIENT IN SÃO MIGUEL ISLAND (AZORES)
**Rui Andrade**; Rosalina Gabriel & Rui Elias

O03 EPIPHYTES AND ELEVATION: A BRYOPHYTE STUDY ON TERCEIRA ISLAND
**Xenia Davide**; Rui Andrade; Rosalina Maria de Almeida Gabriel; Lea Pichon & Amanda Taylor

O19 URBAN BRYOPHYTES IN ANGRA DO HEROISMO (AZORES, PORTUGAL): A FIRST LOOK AT A MACARONESIAN CITY
**Lucie Fatková**; Marta Rogošic; Cecília Sérgio & Rosalina Gabriel

O17 COMPARATIVE PATTERNS OF SEX EXPRESSION, SEX RATIOS AND CLIMATE EFFECTS IN ISLAND AND CONTINENTAL BRYOPHYTE POPULATIONS
**Anabela Martins**; Jairo Patiño & Manuela Sim-Sim

# LUNCH BREAK

**13:10-14:30 | Tuesday, 23 September 2025**

# RESEARCH POSTERS

14:30-16:00 | Tuesday, 23 September 2025
**Chairs: Rosalina Gabriel & Rui B. Elias**

## Biodiversity

P04 PLIOCENE LAVA TREE MOULDS FROM LA LAGUNA, TENERIFE ISLAND, SPAIN
**C. A. Góis-Marques**; M. C. Velasco-Flores; M.C. Martín-Luis & C. Castillo-Ruiz

P12 SPORE MORPHOLOGY OF THE MACARONESIAN ENDEMIC MOSS ALOPHOSIA AZORICA (REN. ET CARD.) CARD. (POLYTRICHOPSIDA, POLYTRICHACEAE)
**Leila Nunes Morgado**; Rosalina Gabriel; Cecília Sérgio & Vânia Gonçalves-Esteves

P07 A MULTITAXA APPROACH TO BIODIVERSITY INVENTORY IN MATELA PROTECTED AREA (TERCEIRA, AZORES, PORTUGAL)
**Mariana A. Sousa**; Lucas Lamelas-López; Rui B. Elias; Rosalina Gabriel & Paulo A. V. Borges

P15 IMPROVING THE BIODIVERSITY KNOWLEDGE IN THE AZORES: NEW RECORDS OF BRYOPHYTES AND LICHENS FOR SÃO JORGE ISLAND
**Gabriela M. Silveira** & Rosalina Gabriel

P02 CHARACTERISING FOREST STRUCTURE IN NATIVE AND EXOTIX WOODLANDS ON TERCEIRA (AZORES)
Sébastien Lhoumeau; Rui B. Elias; Dominik Seidel; Rosalina Gabriel & **Paulo A. V. Borges**

## Eco Services

P14 MODELLING CURRENT FOREST CARBON STORAGE ON THE CANARY ISLANDS
Rüdiger Otto; Elena Rocafull; Natalia Sierra Cornejo; Felipe Rodríguez; Ricardo Ruíz-Peinado; Juan José García Alvarado; **José María Fernández-Palacios** & Lea de Nascimento

## Models

P11 IMPROVING SPECIES DISTRIBUTION MODELS IN CLOUD-DEPENDENT ECOSYSTEMS: THE ROLE OF FOG LAYER IN THE CANARIAN LAUREL FOREST
**Víctor Bello-Rodríguez**; Juan José García-Alvarado & Juana María González-Mancebo

## Conservation

P01 EX SITU PROPAGATION OF EUPHRASIA AZORICA FROM CORVO ISLAND
**Cátia F. Freitas**; Joana B. André & Lídia M.C. Silva

P09 GERMINATION AND VIABILITY TESTING OF ENDEMIC PLANT SEEDS FROM THE MADEIRA ARCHIPELAGO: CONTRIBUTION TO THE EX SITU CONSERVATION OF INDIGENOUS FLORA
**Carla Gonçalves** & Olga Baeta

P08 STRATEGIES AND ADAPTATIONS TO CLIMATE CHANGE IN TROPICAL DRY ISLANDS: A CASE-STUDY WITH CABO VERDE GRASSES
Vanézia Rocha; **Maria M. Romeiras**; Maria J. Vasconcelos & Maria Cristina Duarte

O30 CLIMATE-GROWTH RELATIONSHIPS IN THE INTRODUCED DOMINANT WOODY TREE NELTUMA JULIFORA IN SANTIAGO ISLAND (CABO VERDE)
Daniel António Tavares Varela Semedo; Diogo Cláudio Pavão; Lurdes Borges Silva; Guilherme Gomes Roxo1; Roberto Resendes; **Maria Manuel Cordeiro Salgueiro Romeiras**; Mónica Maria Tavares Moura & Luís Filipe Dias Silva

## Evolution

P05 SEASONAL EFFECTS ON SEX EXPRESSION IN DIOECIOUS BRYOPHYTES: INSIGHTS FROM AN OCEANIC ISLAND REGION
**Anabela Martins**; Susana Fontinha; Jairo Patiño & Manuela Sim-Sim

P10 EXPLORING THE ORIGINS AND UNDERLYING MECHANISMS OF COMPOSITAE RADIATIONS IN THE CANARY ISLANDS: THE DECODADAPT PROJECT
**Òscar Castillo**; Miguel A. Padrón-Mederos; Agustín Naranjo-Cigala; Nereida M. Rancel Rodríguez; Cristina González-Montelongo; Águeda González-Rodríguez; J. Alfredo Reyes-Betancort; Paloma Martínez-Boix; Abraham Padilla; Raúl Orihuela-Rivero; Javier Tuero-Septién; Marcos Salas-Pascual; Yauci Espinosa-González; Rafaela González-Montelongo & Jairo Patiño

P13 GENETIC ANALYSIS OF THE ITS REGION IN TELINE STENOPETALA FROM THE CANARY ISLANDS
**Verónica Pérez Méndez;** Miguel A. Padrón-Mederos & J. Alfredo Reyes-Betancort

# COFFEE-BREAK

**16:00-16:30 | Tuesday, 23 September 2025**

# DARWIN CORE & DATA PAPERS COURSE

16:30-18:30 | Tuesday, 23 September 2025

**Paulo A. V. Borges**

Azorean Biodiversity Group (GBA-CE3C); University of the Azores, Portugal

**Biodiversity data publishing** is essential for scientific research, education, conservation and informed policy-making, providing academic credit for data creation and curation. Publishing biodiversity data allows us to address two very important biodiversity shortfalls:

> WALLACEAN SHORTFALL – The Wallacean shortfall is named after Alfred Russel Wallace, and refers to lack of knowledge about the geographical distribution of species.
>
> PRESTONIAN SHORTFALL – The Prestonian shortfall, named after the ecologist Frank W. Preston, can be defined as lack of knowledge about the abundance of species and their population dynamics in space and time.

Publishing data papers using **Darwin Core** (DwC) is important because it ensures that biodiversity data are standardised, discoverable, reusable, and interoperable. Darwin Core, is a standardized framework for sharing biodiversity information and facilitates the effective use of biodiversity data.

In this course we will address:

**1. Why Publish Biodiversity Data?**

- The role of biodiversity data in science, conservation, and policy
- Benefits of open data: visibility, reuse, collaboration, and impact
- Ethical considerations and the value of shared biodiversity knowledge

**2. Challenges in Biodiversity Data Sharing**

- Fragmentation, lack of standardisation, data loss over time
- The need for common formats and vocabularies

**3. The Importance of Historical and Long-Term Data**

- Understanding trends and changes in biodiversity
- Reconstructing species distributions and detecting change
- Importance for long-term monitoring programmes

**4. Species Occurrence and Abundance Data**

- What types of biodiversity data matter: presence, abundance, absence, traits, interactions

- The importance of documenting rare and common species
- Links to Prestonian shortfall and sampling biases

**5. Introduction to Darwin Core (DwC)**

- What it is: structure, history, and purpose
- Core terms: occurrence, event, taxon, location, record-level metadata
- Extensions: measurementOrFact, resourceRelationship, etc.
- Darwin Core Archive (DwC-A) format

**6. Benefits of Using Darwin Core**

- Standardisation and consistency
- Interoperability between platforms (e.g. GBIF, OBIS, iDigBio)
- FAIR principles: Findable, Accessible, Interoperable, Reusable

**7. Practical Session: Preparing a Dataset Using Darwin Core**

- Hands-on with a sample dataset: cleaning, structuring, applying DwC terms
- Tools: spreadsheet templates, data validators, IPT overview (brief)
- Common pitfalls and best practices

**8. Wrapping Up and Resources**

- Where to find help: standards, tools, communities
- Overview of repositories and journals (e.g. GBIF, Biodiversity Data Journal)
- Next steps: publishing your data, getting credit

# Wednesday, 24 September 2025

## FIELD EXCURSION

**9:00 - Meeting point at Central Rodoviária de Angra do Heroísmo (Bailão)**
9:30-16:30 | Wednesday, 24 September 2025

### GRUTA DO NATAL – BISCOITO DA FERRARIA AND PICO ALTO NATURAL RESERVE – PIONEER VEGETATION OF THE 1761 VOLCANIC ERUPTION

**09:30 |** Departure from Angra do Heroísmo

**10:00 |** Visit to "Gruta do Natal".

**11:00 |** Hike to the Biscoito da Ferraria and Pico Alto Natural Reserve, passing through abandoned pastures and secondary vegetation, native peat-bogs and fens, and native *Juniperus-Ilex* montane forests; opportunity to see many Azorean endemic species, including some rare ones; opportunity to see also the impressive walls of the Pico Alto volcano's collapse caldera.

**15:00 |** Hike to the site of the 1761 eruption and pioneer vegetation.

**16:30 |** Return to Angra do Heroísmo

**Gruta do Natal** is a fascinating 697-meter-long lava tunnel that offers a unique underground experience exploring the archipelago's volcanic geology. The cave is part of the Natura 2000 Network due to its geomorphological importance and biodiversity, and its interior displays various lava formations, such as stalactites and natural balconies.

**Biscoito da Ferraria and Pico alto Natural Reserve** is one of the three Natural Reserves of Terceira Island Natural Park. It's located in the collapse caldera of the Pico Alto volcano. This collapsed caldera is filled with a significant number of geological recent trachytic domes and very thick lava flows (coulées). Due to their young age and rough surface, these domes and lava flows were never suitable for cattle breeding or agriculture, which allowed the preservation of large areas with native forests.
Besides the dominant *Juniperus-Ilex* forests, we can find forested peat-bogs, peat-bogs, fens and secondary scrublands; and also, many native endemic species like *Juniperus brevifolia*, *Ilex azorica*, *Laurus azorica* or *Vaccinum cylindraceum*, including rare species like *Lactuca watsoniana*, *Leontodon filii* or *Euphorbia stygiana*.

The **1761 eruption**, that started east of Santa Bárbara volcano, was a typical Strombolian eruption, with the emission of pyroclasts/scoria and basaltic lava flows of the 'aa' type, which flowed northward. Despite the invasion of *Pittosporum undulatum*, in many parts this lava flow is still covered by a typical Azorean **pioneer vegetation**.

# Thursday, 25 September 2025

## KEYNOTE LECTURE III

09:00-10:00 | Thursday, 25 September 2025
**Introduced by Maria Romeiras**

### The Macaronesian flora in peril: Understanding biodiversity loss under global change

**Jairo Patiño**

Island Ecology and Evolution Research Group (GEEI); Instituto de Productos Naturales y Agrobiología (IPNA-CSIC); Spain

## RESEARCH TALKS 5

10:00-11:00 | Thursday, 25 September 2025
**Chair: Maria Romeiras**

### Conservation

O01 REINFORCEMENT OF PROTECTED PLANT SPECIES UNDER THE LIFE IP AZORES NATURA: A CONTRIBUTION TO CONSERVATION AND ECOLOGICAL RESTORATION IN THE AZORES
**Diana C. Pereira** & **João F. Fernandes**

O04 RED LISTING THE GREEN ISLANDS: IUCN ASSESSMENT OF THE AZOREAN FLORA
**Guilherme Roxo;** Luís Silva; Rui Bento Elias; Diana Pereira; Mark Carine; Ann McCartney; Rúben Rego; Martin Souto; Richard M. Bateman & Mónica Moura

O07 IMPROVING THE CONSERVATION OUTCOMES OF THE ENDANGERED AZORINA VIDALII (H. C. WATSON) FEER (CAMPANULACEAE), USING AN INTEGRATED HOLISTIC APPROACH
**Rubén M. C. Rego**; Luís Silva; Maria Olangua-Corral; Ana Delaunay Caperta; Guilherme Roxo; Roberto Resendes & Mónica Moura

## COFFEE-BREAK

11:00-11:30 | Thursday, 25 September 2025

# RESEARCH TALKS 6

11:30-13:10 | Thursday, 25 September 2025
**Chair: José María Fernández-Palacios**

## Conservation

O27 FOUNDATIONS FOR AN ISLAND BIODIVERSITY OBSERVATION NETWORK (ISLAND BON): A SYNTHESIS OF MONITORING PRACTICES
**Giorgia Camperio**; Wolf Wildpret; Clara Zemp; Paulo A.V. Borges; Donat Agosti; Léandre Catogni; Lea de Nascimento; Brent C. Emerson; Rosalina Gabriel; Bernd Lenzner; Fabio Mologni; Jairo Patiño; Rüdiger Otto; Patrick Ruck; Felipe Simoes; Samantha Suter; Holger Kreft & Nathaly Guerrero-Ramírez

O10 LANDSLIDE RESTORATION USING NATURE-BASED SOLUTIONS IN THE PICO DA VARA/RIBEIRA DO GUILHERME SPECIAL PROTECTION AREA (SÃO MIGUEL, AZORES)
**Yasmin Redolosis**; Tarso Costa; Lourdes Peñil; Azucena De La Cruz; Rui Botelho

O09 RESTORATION OF A LAUREL FOREST ALONG AN ALTITUDINAL GRADIENT (300 TO 900 M) IN SÃO MIGUEL, AZORES: ASSESSMENT AND ACTIVE MANAGEMENT PROPOSAL
**Tarso Costa;** Lourdes Peñil; Filipe Figueiredo & Rui Botelho

O11 PEAT BOG RESTORATION IN THE AZORES: ASSESSING PAST ACTIONS AND DEVELOPING A NEW OPERATIONAL PLAN FOR A NATURA 2000 SITE IN SÃO MIGUEL ISLAND
**Rui Botelho**; Tarso Costa; Lourdes Peñil; Diana Fernandes & Pedro Teiga

O26 THE CONSERVATION OF ENDEMIC SPECIES AND NATURAL SPACES IN GRAN CANARIA: KEY ENVIRONMENTAL DRIVERS OF PLANT DIVERSIFICATION, AND RESILIENCE OF HABITATS IN THE FACE OF GLOBAL CHANGES
**Juli Caujapé-Castells**; Isabel Saro; Ruth Jaén-Molina; Antonio Díaz-Pérez; Daniel Reyes; Rafael Nebot; Inmaculada Guillermes-Vázquez; Miguel Ángel González-Pérez; Alejandro Curbelo; Carlos Caraballo; María Olangua-Corral; Águedo Marrero; Carlos García-Verdugo; Isabel Sanmartín; Javier Fuertes; Irene Guerra Déniz & Juan Francisco Rodríguez

# LUNCH BREAK

**13:10-14:30 | Thursday, 25 September 2025**

# KEYNOTE LECTURE IV

14:30-15:30 | Thursday, 25 September 2025
**Introduced by Rosalina Gabriel**

## Phytoplankton and the Changing Ocean: Small Organisms, Big Impact

**Joana Barcelos e Ramos**

University of the Azores, IITAA, Group of Climate, Meteorology and Global Change, Portugal

# COFFEE-BREAK

**15:30-16:00 | Thursday, 25 September 2025**

# RESEARCH TALKS 7

16:00-17:30 | Thursday, 25 September 2025
**Chair: Rosalina Gabriel**

## Biodiversity and Conservation

O20 EFFECTS OF OCEAN LIMING ON PLANKTONIC MICROBIAL COMMUNITIES
**Inês de Castro**; Susana C. Ribeiro; António Louvado; Mário Cachão; Newton Gomes; Eduardo Brito de Azevedo & Joana Barcelos e Ramos

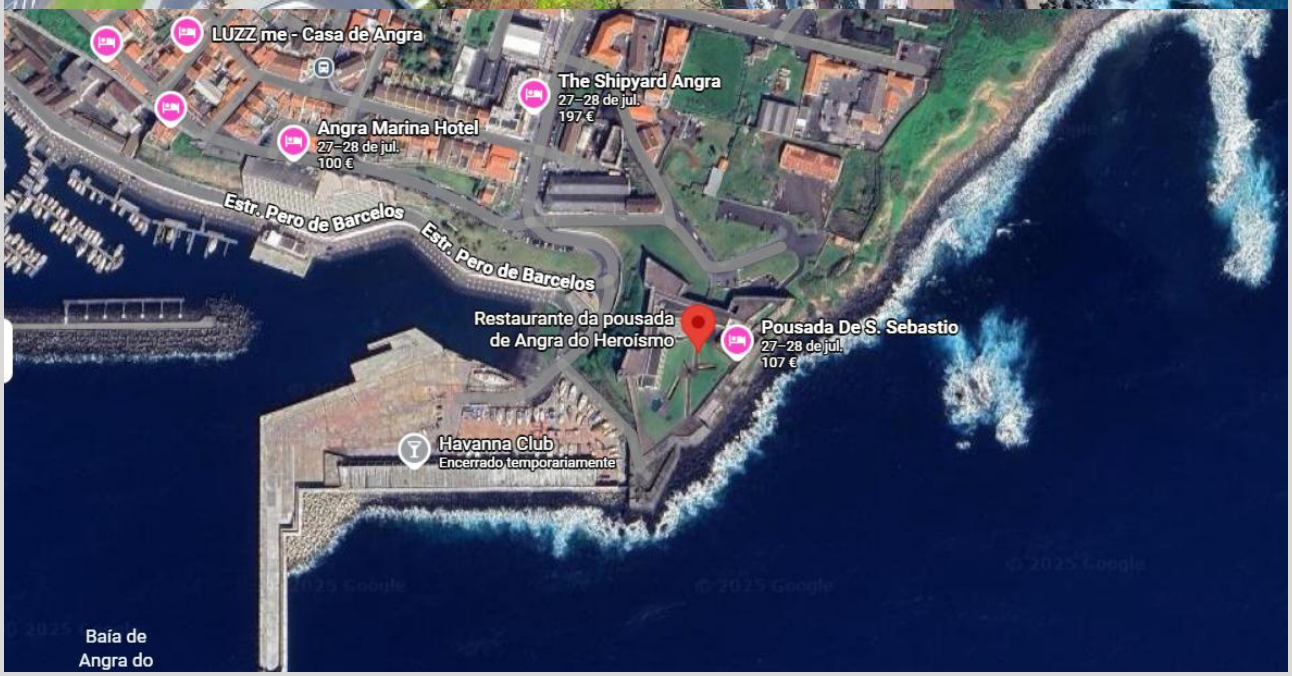
O34 CHOOSE YOUR MENU – DIFFERENT DIETS FOR THE SHORE CRAB PACHYGRAPSUS MARMORATUS IN CAPTIVITY
**Nuno Vaz Álvaro**

O12 PHYCOLOGY IN MACARONESIA: A PRISMA-BASED REVIEW OF RESEARCH TRENDS, KNOWLEDGE GAPS, AND EMERGING THREATS
**David Milla-Figueras**; Ander Larrea; Pedro Afonso & Ester Serrão

O16 DIVERSITY OF FLORA AND VEGETATION OF THE SALINAS DUNES (FOGO ISLAND, CABO VERDE)
Isildo Gomes; Carlos Neto; Maria Cristina Duarte; **Maria M. Romeiras**; S. Gomes; R. Pires; J. Correia & José Carlos Costa

# CONFERENCE DINNER

20:00-22:00 | Thursday, 25 September 2025
**Venue:** Restaurant at *Pousada Forte Angra do Heroísmo* (*sala dos canhões*)
**Address:** Pousada de Angra do Heroísmo, Rua do Castelinho s/n 9700-045 Angra do Heroísmo, Portugal



# Friday, 26 September 2025

## KEYNOTE LECTURE V

09:00-10:00 | Friday, 26 September 2025
**Introduced by Juli Caujapé Castells**

### The Macaronesian Rand Flora revisited: Deep Learning modeling approaches in Phylogeography and Species Delimitation

**Isabel Sanmartin**

Real Jardin Botanico, Consejo Superior de Investigaciones Científicas (CSIC), Spain

## RESEARCH TALKS 8

10:00-11:00 | Friday, 26 September 2025
**Chair: Juli Caujapé-Castells**

### Evolution

O15 GENETIC AND ENVIRONMENTAL CORRELATION IN HIGH-MOUNTAIN SPECIES IN LA PALMA AND TENERIFE
**Sonia Sarmiento Cabello**; Priscila Rodríguez-Rodríguez, Pedro A. Sosa

O31 EVOLUTION, DIVERSITY AND CONSERVATION OF THE CABO VERDE FLORA: DIFFERENT APPROACHES AND CURRENT KNOWLEDGE
**Maria M. Romeiras**; Isildo Gomes; Juli Caujapé-Castells & Maria Cristina Duarte

## COFFEE-BREAK

**11:00-11:30 | Friday, 26 September 2025**

# RESEARCH TALKS 9

11:30-12:30 | Friday, 26 September 2025
**Chair: Rui B. Elias**

## Evolution and Conservation

O24 ON THE ALIEN VS. NATIVE ENIGMA – DISENTANGLING THE CRYPTOGENIC ORIGIN OF ASTERACEAE SPECIES IN THE CANARY ISLANDS
**Louis S. Jay-García**; Yurena Arjona; Juli Caujapé-Castells; Juan A. Calleja; Sebastien Mirolo; Javier Morente-López; Fouad Msanda; Cherif Harrouni; Agustín Naranjo Cigala; Raúl Orihuela-Rivero; Miguel A. Padrón-Mederos; J. Alfredo Reyes-Betancort; Marcos Salas-Pascual; Guillermo Sicilia-Pasos; Daniel Wegmann; Xenia Wietlisbach & Jairo Patiño

O23 UNRAVELING THE EVOLUTIONARY HISTORY OF THE WOODY SONCHUS ALLIANCE (COMPOSITAE, CICHORIEAE) IN THE CANARY ISLANDS THROUGH PHYLOGENOMICS
**Oscar Castillo**; Yurena Arjona; Louis S. Jay-García; J. Alfredo Reyes-Betancort; Javier Morente-López; Marcos Salas-Pascual; Agustín Naranjo-Cigala; Guillermo Sicilia-Pasos; Miguel A. Padrón-Mederos; Raúl Orihuela-Rivero; Rafaela González-Montelongo & Jairo Patiño

O25 BIOMONI-GENES: ADVANCING DNA-BASED BIODIVERSITY MONITORING ON OCEANIC ISLANDS
**Paloma Martínez-Boix**; Brent C. Emerson; Abraham Padilla; Javier Tuero-Septién; Agustín Naranjo-Cigala; Nereida M. Rancel-Rodríguez; Ana Losada-Lima; Lúcia Bernardos-Concepción; Carmen Balibrea-Escobar; Raúl Orihuela-Rivero; Óscar Castillo-Agudo & Jairo Patiño

# CLOSING SESSION

## *New Developments on Macaronesian Flora*

## AWARD PRESENTATION

**12:30-13:20 | Friday, 26 September 2025**

## Speeches

**José G. do Álamo de Meneses**

Presidente da Câmara Municipal de Angra do Heroísmo

**Alfredo Borba**

Presidente da Faculdade de Ciências Agrárias e Ambientais da Universidade dos Açores

**Rosalina Gabriel**

Azorean Biodiversity Group (GBA-CE3C); University of the Azores

## LUNCH BREAK

**13:20-14:30 | Friday, 26 September 2025**

## MEETINGS OF SCIENTIFIC SOCIETIES & PROJECTS 1

14:30-15:30 | Friday, 26 September 2025

## COFFEE-BREAK

15:30-16:00 | Friday, 26 September 2025

## MEETINGS OF SCIENTIFIC SOCIETIES & PROJECTS 2

16:00-17:30 | Friday, 26 September 2025

# Abstracts

# OPENING LECTURE

## KO

## THE GHOST OF CRYPTIC EXTINCTION IN ESTIMATING ANTHROPOGENIC BIODIVERSITY LOSSES IN ISLANDS. THE CASE OF THE MACARONESIA VASCULAR FLORA

**José María Fernández-Palacios[1]*; Rüdiger Otto[1] & Robert Whittaker[2, 3]**
1 Department of Botany, Ecology and Plant Physiology, University of La Laguna, La Laguna, Tenerife, Spain
jmferpal@ull.edu.es; rudiotto@ull.edu.es
2 School of Geography and the Environment, University of Oxford, South Parks Road, Oxford, OX1 3QY, UK
robert.whittaker@ouce.ox.ac.uk
3 Center for Macroecology, Evolution and Climate, GLOBE Institute, University of Copenhagen, Universitetsparken 15, Building 3, 2nd FL, Copenhagen DK-2100, Denmark
* Corresponding author

### Abstract

With cryptic or dark extinction, the loss of unknown species that did not leave fossils behind is meant. Whereas species provided with calcarean shells (such as molluscs) or bones (such as vertebrates) usually leave traceable fossils behind, other taxa, such as arthropods, bryophytes, fungi, lichens or vascular plants, leave them only exceptionally. Thus, whereas the first group, depending on the taphonomic conditions of the deposition site, can be traced in deep time, the single evidence of the loss of the taxa belonging to the second group is their disappearance from the species lists after having been catalogued in the taxonomic period, i.e. when the firsts list of species were produced for islands' floras and faunas, what in Macaronesia happened at the transition of the 18th and 19th centuries. However, as the human colonization of Macaronesia preceded clearly this time threshold, with the Canaries being colonized by the Imazighen at the start of the CE, and the other archipelagos by the Portuguese in the XV century, the pristine nature of these archipelagos has been subject for 1500 years in the Canarian case, or for several centuries in the case of Azores, Madeira and Cabo Verde, to the impact of human activities and of the species by them introduced. It is very reasonable to consider that a flora that evolved in the absence of large herbivores was heavily impacted by the arrival of goats, sheep or pigs, and later by cows, rabbits or rodents, among others, not to mention human activities such as burning, gathering, logging or terracing.

Nevertheless, the different ways existing to calculate the cryptic extinction assume two unrealistic conditions: i) the extinction rate in the taxonomic period is similar to the pre-taxonomic period one; and ii) the cataloguing of the endemic vascular flora is already completed. For us, both assumptions are unrealistic, because i) only the more resistant vascular species were able to withstand several centuries of human and herbivory impact until they were finally catalogued by taxonomists, and ii) because catalogues are far from being completed (i.e. in the last years up to 30 new-for-science Macaronesian vascular species have been described, either through the discovery of new populations or after a taxonomical rearrangement based in genetic reasons of already know populations). Here, we propose a new way to calculate the cryptic extinction that is not more assuming that pre and post-taxonomic period extinction rates are similar, but instead that the relations of extinctions rates of species with shells or bones to vascular plants are similar in the pre- and the taxonomic periods. These new calculations multiply by one order of magnitude the assumed extinctions, something that we consider to be much more realistic.

# KEYNOTE LECTURES

## K1

## PERSPECTIVES ON THE FUNCTIONAL ISLAND BIOGEOGRAPHY OF THE FLORA OF THE CANARY ISLANDS

**Severin D. H. Irl**
Biogeography and Biodiversity Lab, Institute of Physical Geography, Goethe-University Frankfurt, Frankfurt am Main, Germany; irl@geo.uni-frankfurt.de

### Abstract

Island biogeography has traditionally focused on species diversity and endemism in describing drivers of diversity on islands, which has fundamentally contributed to our understanding of diversity processes on islands and other insular systems. However, species have been usually (implicitly or explicitly) treated as functionally equivalent in island biogeography, although island biota are widely known to have evolved a remarkable array of unique functional traits and life forms, likely even leading to gigantism/dwarfism. Using the flora of the Canary Islands – an enigmatic archipelago with about equal shares of endemic, non-endemic native and non-native plant species – as a model system, this talk will address how functional diversity is distributed in space and time to shed a new perspective on diversity processes on islands. Specifically, I will address i) how the functional trait space of the various biogeographic and evolutionary groups differs, ii) how climate drives the distribution of individual functional traits and plant life forms, iii) how different aspects of functional diversity change during succession and iv) how climate change will impact the distribution of species and their respective traits in the native flora. I will embed the results from the flora of the Canary Islands into larger frameworks provided by island biogeography, functional ecology and island biology to better contextualize the results. My research findings highlight that using functional ecology as well as island biogeography as a tool, expands our understanding of the fundamental processes governing diversity on islands, and likely also beyond - a tool that has been previously underrepresented in island biology.

# K2

## LOOKING INTO THE PAST: WHY STUDY MACARONESIAN PLANT FOSSILS? LOOKING INTO THE PAST: WHY STUDY MACARONESIAN PLANT FOSSILS?

**Carlos A. Góis-Marques**
Madeira Botanical Group (GBM), Faculdade de Ciências da Vida, Universidade da Madeira, Funchal, Portugal
BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Vairão, Portugal
CIBIO, InBIO Laboratório Associado, Universidade dos Açores, Ponta Delgada, Portugal
Instituto Dom Luiz (IDL), Laboratório Associado, Universidade de Lisboa, Lisboa, Portugal;
c.goismarques@gmail.com

### Abstract

Oceanic islands are deemed ideal laboratories to study plant ecology, evolution, and biogeography. Presently, botanists and vegetation ecologists interested in these insular floras use an array of integrative techniques, including fieldwork, herbarium studies, laboratory work, and statistical and modelling tools, to reveal the biological history of plant taxa and ecosystems that evolved on these islands. Despite efforts towards a holistic approach, the literature reveals that there is an important knowledge shortfall: palaeobotanical studies. Insular botanical and geological literature has inadvertently accepted the notion that oceanic islands lack well-preserved and palaeobiologically informative fossils, especially due to their volcanic origin, considered a taphonomically destructive process. However, finding Neogene and early Quaternary plant fossils on oceanic islands would provide needed empirical evidence to disentangle current theories regarding past insular plant diversity, evolution, ecology, and biogeography. In this talk, I try to demonstrate—using the Macaronesian archipelagos (Azores, Madeira, Canary Islands, and Cabo Verde) as case studies, with a special focus on Madeira Island—that the geological dynamism of oceanic islands, whether through volcanism or during quiescent periods, can create ideal conditions that facilitate the fossilization of plants and in some cases even entire terrestrial ecosystems. In fact, plant fossils in the Macaronesian islands are often exceptionally well-preserved, well-dated and abundant. Their study can provide empirical information on extinctions, extirpations, minimum ages for phylogeny calibration, evolutionary information on insular syndromes, ecological evidence of anthropic impacts, information relevant to ecosystem restoration, to name a few key areas. Still, despite recent efforts, plant fossils are still understudied due to a lack of people trained in both plant taxonomy and geology on these archipelagos.

# K3

## THE MACARONESIAN FLORA IN PERIL: UNDERSTANDING BIODIVERSITY LOSS UNDER GLOBAL CHANGE

**Jairo Patiño**
Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología, Consejo Superior de Investigaciones Científicas (IPNA-CSIC), Tenerife, Spain; jpatino@ipna.csic.es

### Abstract

Island ecosystems are globally significant biodiversity reservoirs, yet they are among the most vulnerable to the multifaceted impacts of global change. The Macaronesian region, including the Azores, Madeira, Canary Islands, and Cape Verde, provides a compelling natural laboratory to investigate how climate change, biological invasions and anthropogenic disturbance interact to reshape plant biodiversity. This presentation synthesizes current knowledge on the ecological and evolutionary processes underlying plant biodiversity loss in the Macaronesian region, while situating these findings within a broader global-change framework.

Key questions addressed include: How do island ecosystems respond to climatic shifts across macro- and micro-spatial scales? What determines species-specific vulnerability to environmental change? And how do evolutionary history and functional traits mediate extinction risk and invasion success in plants? To explore the first question, I examine evidence that rising temperatures are forcing plant species to elevational shifts, where montane ecosystems provide limited climatic refuge, often resulting in range contractions and community restructuring. For the second and third questions, I assess whether invasive plants, frequently functionally similar to native taxa and originating from comparable climate zones, are thriving at the expense of native species. Concurrently, plant extinctions have been particularly severe in recent times across coastal areas, driven by historical land-use change, the introduction of herbivorous mammals and species-specific life history traits.

Drawing on recent advances in high-resolution climate modelling, (phylo)genomics, and trait-based ecology, I highlight how generalizable global-change processes unfold in a uniquely insular setting. The Macaronesian setting underscores the urgent need for integrated, regionally tailored conservation strategies that anticipate future biodiversity dynamics. These findings offer broader insights for the conservation of island floras worldwide.

# K4

## PHYTOPLANKTON AND THE CHANGING OCEAN: SMALL ORGANISMS, BIG IMPACT

**Joana Barcelos e Ramos**
University of the Azores, IITAA, Group of Climate, Meteorology and Global Change, Portugal;
joana.b.ramos@uac.pt

### Abstract

Phytoplankton is key to marine food webs and biogeochemical cycling, with far-reaching effects on climate change. Their role in the changing ocean has been studied, but the impact of current carbon removal strategies, such as ocean alkalinity enhancement (OAE), on phytoplankton diversity, productivity, and climate feedback remains poorly understood. Here, we discuss how OAE affects the composition and diversity of natural microbial communities, focusing on phytoplankton, bacteria, and their interactions. By addressing both phytoplankton and bacteria, it is possible to analyze direct and indirect effects on the microbial community and discuss potential impact on the remineralization of organic matter and climate. Our data shows that, although necessary, strategies such as OAE need to be further tested to ensure that they do not cause more harm than benefit.

# K5

## THE MACARONESIAN RAND FLORA REVISITED: DEEP LEARNING MODELING APPROACHES IN PHYLOGEOGRAPHY AND SPECIES DELIMITATION

**Isabel Sanmartin**
Real Jardin Botanico, Consejo Superior de Investigaciones Científicas (CSIC), Spain; isanmartin@rjb.csic.es

### Abstract

The exponential growth of sequence data, driven by advances in genomics, have increased the availability of large-scale, high-quality datasets available for the scientific community. However, it has also exposed issues of scalability: the inability to analyze phylogenies from thousands of sequences using traditional statistical tools. These challenges are compounded by computational intractability and mathematical non-identifiability in models used in phylogeography and demography, which have traditionally relied on statistical inference techniques such as Maximum Likelihood and Bayesian Inference. In response, artificial intelligence tools – particularly those from machine learning (ML) – are increasingly being introduced into evolutionary biology. Unlike fields such as medicine, where ML is well established, its application in evolutionary biology is still in early stages. Supervised Machine learning is a field within artificial intelligence in which labelled data are used to train a neural network to solve complex statistical problems. Among these, deep neural networks have proven highly effective for tackling high-dimensional models, such as those that often describe micro- or macroevolutionary processes involving multiple parameters and complex dependency structures. In this conference, I will present recent work from our group applying convolutional neural networks (CNNs) to problems such as phylogeography, species delimitation, and the classification of evolutionary diversification scenarios. I will focus on their promise for inferring colonization history and island speciation in Macaronesia, including events like population contraction or expansion, allele migration, and introgression or hybridization –even from extinct “ghost" populations. Like other likelihood-free approaches such as Approximate Bayesian Computation (ABC), supervised ML does not rely on an explicit probabilistic model. However, unlike ABC, CNNs do not require reducing the data to one or a few summary statistics but can instead learn complex, high-dimensional correlations (i.e., hidden features) directly from the data. Additional advantages include the robustness to missing data and the ability to integrate different types of data; for example, combining genetic and morphological data to make predictions for non-sequenced or incomplete samples. Finally, I will discuss how deep learning enables the analysis of large phylogenies with thousands of terminals by using local information encoded in feature vectors assigned to each node in the tree. This approach captures variation in diversification trajectories embedded within the phylogeny and opens the door to learning about the speciation process itself by integrating data on traits, geography, and environmental variables at the node level.

# ORAL PRESENTATIONS

## RESEARCH TALKS 1 - Biodiversity monitoring

## O22

### BIODIVERSITY MONITORING OF ISLAND ECOSYSTEMS (BIOMONI)

**Nathaly Guerrero-Ramírez[1]*; Claudine Ah-Peng[2]; Paulo Borges[3]; Giorgia Camperio[4]; Lea de Nascimento[5]; Rui Elias[3]; Franz Essl[6]; Rosalina Gabriel[3]; Bernd Lenzner[6]; Fabio Mologni[6]; Leila Morgado[3]; Rüdiger Otto[7]; Jairo Patiño[8]; Samantha Suter[4]; Wolf Wildpret Martin[1]; Patrick Weigelt[1,9]; Clara Zemp[4]; Holger Kreft[1]***

1 Department of Biodiversity, Macroecology and Biogeography, University of Göttingen, Göttingen, Germany; nathaly.guerrero-ramirez@forst.uni-goettingen.de; hkreft@uni-goettingen.de

2 OSU-R, Université de la Réunion, CNRS, IRD, Météo France, 15 Avenue René Cassin, CS92003, 97744, Saint-Denis, La Réunion, France & UMR PVBMT, Université de la Réunion, 7 chemin de l'IRAT, 97410, Saint-Pierre, La Réunion, France

3 University of Azores, CE3C—Centre for Ecology, Evolution and Environmental Changes, Azorean Biodiversity Group, CHANGE —Global Change and Sustainability Institute, School of Agricultural and Environmental Sciences, Portugal

4 Conservation Biology Lab, Institute of Biology, University of Neuchâtel, Neuchâtel, Switzerland

5 Island Ecology and Biogeography Group, University of La Laguna, San Cristóbal de La Laguna, Santa Cruz de Tenerife, Spain

6 Division of BioInvasions, Macroecology and Global Change, University Vienna, Vienna, Austria

7 Departamento de Botánica, Ecología y Fisiología Vegetal, Universidad de La Laguna, La Laguna, Spain

8 Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología, Consejo Superior de Investigaciones Científicas (IPNA-CSIC), La Laguna, Spain

9 Department of Environmental Science, Radboud Institute for Biological and Environmental Sciences, Radboud University, Nijmegen, The Netherlands

*Corresponding author

**Abstract**

Oceanic islands contribute disproportionately to global biodiversity, hosting many endemic species with unique evolutionary and functional adaptations reflecting life in isolation. Simultaneously, islands are centres of biodiversity change, particularly vulnerable to anthropogenic disturbances such as the introduction of non-native species, habitat loss, and climate change. Therefore, with BioMonI, we aim to build a global, long-term, easily accessible monitoring network tailored explicitly to the pressing needs of biodiversity conservation and monitoring on islands. Specifically, we are elucidating spatiotemporal biodiversity trends (e.g., Borges 2025), including elusive dimensions of biodiversity; mobilizing existing monitoring data, identifying gaps, co-designing work-flows to strengthen monitoring efforts; developing a harmonized monitoring scheme; and working to make monitoring information easily accessible across archipelagos for stakeholders including researchers, citizen scientists, conservation managers, (non-) governmental organizations and public institutions.

To this end, we are using an interdisciplinary approach, developing a systematic mapping synthesis of current and past global monitoring schemes on islands (Camperio et al, 2025); leveraging long-term palaeoecological investigation of natural archives; integrating emerging genetic monitoring tools; providing biodiversity informatics and developing e-infrastructures; and scaling up the monitoring of biodiversity and ecosystem structure and functioning using remote sensing, macroecological modeling, and future scenarios. Further, we are establishing BioMonI-Plot, a long-term vegetation plot network to understand biodiversity and ecosystem change, with baseline data from three focal archipelagos (Azores, Canary Islands, and Mascarenes) but aiming to mobilize data from archipelagos worldwide. The

structure of BioMonI-Plot allows it to be easily integrated with species-level data and island-level information from the Global Inventory of Floras and Traits database (GIFT) and other vegetation-plot initiatives.

The BioMonI team includes Holger Kreft, Nathaly Guerrero, and Wolf Wildpret at the University of Göttingen (Germany), Bernd Lenzner, Franz Essl, and Fabio Mologni at the University of Vienna (Austria), Paulo Borges, Rosalina Gabriel, Leila Morgado and Rui Bentos Elias at the University of the Azores (Portugal), Lea de Nascimento, José Maria Fernández-Palacios, and Rüdiger Otto at the University of La Laguna (Spain), Clara Zemp, Samantha Suter, Vladimir Wingate, and Giorgia Camperio at the University of Neuchâtel (Switzerland), Claudine Ah-Peng and Dominique Strasberg at the University of La Réunion (France), Jairo Patiño and Brent Emerson at the Spanish National Research Council (CSIC, Spain) and Patrick Weigelt at Radboud University (Netherlands).

# O05

## MEETING INTERNATIONAL BIODIVERSITY TARGETS ON ISLANDS: CURRENT STATUS AND CHALLENGES

**Fabio Mologni*; Franz Essl & Bernd Lenzner**
Department of Botany and Biodiversity Research, Faculty of Life Sciences, University of Vienna, Austria;
fabio.mologni@gmail.com
*Corresponding author

### Abstract

Biodiversity is declining at alarming rates worldwide despite ongoing conservation efforts. In 2022, the Convention on Biological Diversity identified 23 targets and 4 goals to counter this trend, aiming to achieve them by 2030 and 2050 respectively. Islands are both biodiversity hotspots and particularly vulnerable to biodiversity loss, with half of threatened species and 75% of extinctions since colonial times). Yet, achieving these targets and goals on islands has received little attention to date. Here, we have compiled biodiversity indicators for islands globally, utilising time series data spanning from 1950 to the present. Our objectives are to (R1) explore historical rates of biodiversity change on islands globally and (R2) predict whether current trends align with the biodiversity targets (R2.a) for 2030 and goals (R2.b) for 2050 as outlined in the Kunming-Montreal Global Biodiversity Framework. We compiled a list of 300 indicators using three main sources (KM-GBF and Geobon indicators and all indicators listed by Tittensor et al., 2014) and evaluated them against six criteria (relevance, credibility, time span, time resolution, availability, global and island cover). Of these, 37 indicators met our criteria. We included an additional 3 indicators for targets lacking an indicator. We were unable to find suitable indicators for 2 targets. Then, we modelled current and future trends for each indicator, aggregated by target and goal. Despite being halfway towards the 2030 milestone, many targets still lack fully developed indicators. Furthermore, many indicators cannot be disaggregated at the island level. Preliminary results of indicators' trends and their alignment with the Convention on Biological Diversity's targets and goals will be presented as well. We urge the development of currently missing indicators, as well as the designing of indicators and long-term monitoring schemes tailored to islands.

# O21

# THE IMPACT OF CLIMATE CHANGE ON CABO VERDE'S ENDEMIC FLORA

**Jailson Mendes[1]*; Paulo A.V. Borges[1]; Luis Silva[2] & Maria M. Romeiras[3]**

1 University of Azores, CE3C—Centre for Ecology, Evolution and Environmental Changes, Azorean Biodiversity Group (IBBC), CHANGE — Global Change and Sustainability Institute, Angra do Heroísmo, Portugal, 2023106436@uac.pt, jemmendes89@gmail.com; paulo.av.borges@uac.pt

2 University of Azores, Research Centre in Biodiversity and Genetic Resources – Azores (CIBIO-Açores), InBIO Associate Laboratory, Faculdade de Ciências e Tecnologia, Vairão, Portugal, BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Vairão, Portugal, UNESCO Chair – Land Within Sea: Biodiversity and Sustainability in Atlantic Islands, Ponta Delgada, Azores, Portugal, luis.fd.silva@uac.pt

3 Linking Landscape, Environment, Agriculture, and Food (LEAF), Associated Laboratory TERRA, Instituto Superior de Agronomia (ISA), University of Lisbon, Lisbon, Portugal, Centre for Ecology, Evolution and Environmental Changes (cE3c) and CHANGE — Global Change and Sustainability Institute, Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal, mmromeiras@isa.ulisboa.pt

*Corresponding author

## Abstract

Climate change is a major threat to biodiversity worldwide. It is estimated that the global average surface temperature will increase by 2.8 °C by 2100 if emissions of greenhouse gases are not substantially reduced. In arid subtropical regions such as Cabo Verde, a decrease in precipitation is expected, further exacerbating ecosystem degradation and biodiversity loss. Historically, the Cabo Verde archipelago, with its significant levels of endemism, has experienced recurrent, severe droughts which affect plant species negatively and cause populations of these to decline in isolated habitats. Despite the presence of ca. 92 endemic vascular plant taxa, local biodiversity remains poorly understood in the context of climate change. This study aims to evaluate the impact of climate change on the distribution of endemic plant taxa: *Artemisia gorgonum, Echium hypertropicum, Echium stenosiphon* subsp*. glabrescens, Echium stenosiphon* subsp*. lindbergii, Echium stenosiphon* subsp*. stenosiphon, Echium vulcanorum* (Boraginaceae*), Euphorbia tuckeyana*, and *Periploca chevalieri*, using species distribution models (SDMs).

Occurrence data were obtained from literature, GBIF, and herbarium records, with pseudo-absence points generated to enhance model robustness. Environmental variables included 19 bioclimatic variables from Worldclim (1970–2000) and future scenarios based on SSP2-4.5 and SSP5-8.5 for 2041-2060 and 2081-2100. Modelling was conducted using the BIOMOD2 package in Studio, applying GLM, GAM, GBM and Random Forest algorithms. Land use and land cover data were integrated into the models to assess their influence on species distributions. Results indicate a marked reduction in suitable habitats for all target species, mainly due to changes in temperature and precipitation. This underscores the urgent need for focused conservation strategies to protect the unique plant diversity in Cabo Verde under future climate scenarios. This study will contribute to conservation policies by providing valuable insights into the vulnerability of island endemics to climate change.

# O18

# SEEING THE FOREST THROUGH THE ARTHROPODS: CONTINUOUS ARTHROPOD SURVEILLANCE AS INDICATORS FOR AZOREAN FOREST QUALITY

**Paulo A. V. Borges* & Sébastien Lhoumeau**
University of Azores, CE3C—Centre for Ecology, Evolution and Environmental Changes, Azorean Biodiversity Group, CHANGE —Global Change and Sustainability Institute, School of Agricultural and Environmental Sciences, Portugal; paulo.av.borges@uac.pt
*Corresponding author

## Abstract

Long-term, standardised monitoring is crucial for detecting subtle yet consequential biodiversity trends on oceanic islands. Over the last decade the Azorean SLAM project has generated one of the few uninterrupted, seasonally resolved arthropod time-series worldwide. Analyses of these data overturn the notion of an overall "insect decline" by revealing stable total richness but marked compositional re-shuffling driven by stochastic turnover of introduced species and local contractions of several endemic species. Complementary trait-based studies show that ground-restricted, large-bodied or diet-specialist endemics have disproportionately high extinction probabilities, highlighting functional attributes as early-warning signals of vulnerability.

To translate these ecological insights into actionable metrics, we developed a multimetric Index of Biotic Integrity (IBI) tailored to Azorean Forest arthropods that integrates biogeographic origin, trophic guilds and vertical distribution for epigean, understorey (IBI-SLAM) and canopy assemblages. The index discriminates pristine forest from disturbed sites, detects seasonal optima for integrity assessment, and has already been adopted by LIFE-BEETLES and LIFE-SNAILS restoration projects to benchmark Azorean forests habitat quality and guide invasive-plant removal. Its modular structure provides a transferable template for other archipelagos where community composition is dominated by a dynamic endemic–exotic mosaic.

Together, these studies establish an integrative monitoring framework that couples rigorous field protocols, functional and phylogenetic diagnostics, and predictive analytics. We advocate its expansion to other Macaronesian and tropical island systems through three priorities: (i) harmonising sampling designs to ensure comparability across strata and islands; (ii) embedding IBI assessments within national biodiversity strategies to meet post-2020 CBD targets; and (iii) fostering open data platforms that link raw occurrences, traits, genetic barcodes and remote-sensing covariates to accelerate AI-driven forecasting.

By demonstrating the feasibility and conservation value of sustained arthropod observation in the Azores, the SLAM project offers a scalable blueprint for transforming fragmented surveys into coherent, policy-relevant biodiversity monitoring for islands worldwide.

# RESEARCH TALKS 2 - Functional Biodiversity

## O28

## FUNCTIONAL DIVERSITY OF OCEANIC ISLAND FLORAS

**Nathaly Guerrero-Ramírez[1]*; Thalita Ferreira-Arruda[1]; Patrick Weigelt[1,2]; Martha Paola Barajas Barbosa[3,4]; Sebastien Albert[5,6]; Dominique Strasberg[5]; Claudia Baider[7]; F. B. Vincent Florens[8]; Isis Petrocelli[1] & Holger Kreft[1]**

1 Department of Biodiversity, Macroecology and Biogeography, University of Göttingen, Göttingen, Germany
2 Department of Environmental Science, Radboud Institute for Biological and Environmental Sciences, Radboud University, Nijmegen, The Netherlands; nathaly.guerrero-ramirez@forst.uni-goettingen.de
3 German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Leipzig, Germany
4Martin Luther University Halle-Wittenberg, Halle, Germany
5 UMR PVBMT, "Peuplements Végétaux et Bioagresseurs en Milieu Tropical", Faculté des Sciences et Technologies, Université de La Réunion, France
6Université de Lorraine, AgroParisTech, INRAE, SILVA, Nancy, France
7 The Mauritius Herbarium, RE Vaughan Building (MSIRI compound), Agricultural Services, Ministry of Agro-Industry, Food Security, Blue Economy and Fisheries. Réduit, 80835, Mauritius.
8 Pole of Research Tropical Island Biodiversity, Ecology and Conservation, Faculty of Science, University of Mauritius, Réduit, 80837, Mauritius
*Corresponding author

### Abstract

The large array of plant ecological strategies may be crucial to answer central questions in island biogeography, such as how eco-evolutionary processes underpin the assembly of island floras. For instance, integrating plant ecological strategies, which are captured through functional traits, into biogeographical models such as the General Dynamic Model (GDM) of oceanic island biogeography can provide a deeper understanding of the emergence of island biota across biogeographical timescales. Therefore, here, we assessed the diversity of plant functional strategies, i.e., functional diversity, in oceanic island floras and determined the contributions of contrasting plant growth forms, native non-endemic species, and endemic species to functional diversity. Furthermore, we determined the extent to which the functional assembly of island floras is related to macro-evolutionary processes through the lens of the GDM.

To this end, we used data from ~3000 plant species from 65 oceanic volcanic islands belonging to seven iconic oceanic archipelagos worldwide (Canary Islands, Cook Islands, Galapagos, Hawaii, Juan Fernandez, Madeira, Mascarenes, and New Zealand). We chose four traits that capture different ecologically relevant life history dimensions: i) maximum plant height as a measure of competitive ability and seed dispersal facilitation (particularly for anemochorous plants), ii) leaf length and iii) leaf width to assess leaf energy production and water balance, and iv) seed length as a measure of dispersal ability and seedling survival.

Preliminary results indicate that endemic species tend to converge on a particular growth form, such as shrubs, and exhibit novel trait combinations, thereby expanding the trait space compared to native non-endemic species. Furthermore, we demonstrate that considering the diversity of plant ecological strategies into biogeographical models yields complementary insights into our understanding of the assembly of island floras.

Our research contributes to the growing field of functional island biogeography, further enhancing our understanding of the assembly mechanisms of frequently taxonomically and functionally disharmonic oceanic island floras.

# O29

# FINE ROOT BIOMASS AND FUNCTIONAL TRAITS OF WOODY PLANTS IN NATURAL AND DISTURBED ECOSYSTEMS IN TENERIFE, CANARY ISLANDS

**Natalia Sierra Cornejo*; Felipe Rodríguez; Elena Rocafull; Lucía N. Ramos; Isabel Suárez; Rüdiger Otto; Lea de Nascimento & José María Fernández-Palacios**

Universidad de La Laguna, Avda. Astrofísico Francisco Sánchez, s/n, 38200, La Laguna, Canay Islands, Spain;
nsierrac@ull.edu.es; frodriguezarvelo@gmail.com; erocafull@fg.ull.es; alu100646320@ull.edu.es;
isabel.suaher@gmail.com; rudiotto@ull.edu.es; leadenas@ull.edu.es; jmferpal@gmail.com

*Corresponding author

## Abstract

Fine roots are critical organs for plant functioning, responsible for the uptake of water and nutrients, symbiotic associations with mycorrhizae, and the transfer of carbon (C) and nutrients to the soil. These processes are closely linked to fine root biomass, carbon allocation belowground, and functional traits—such as specific root length (SRL), root tissue density (RTD), and mean diameter—that reflect plant strategies and adaptations to diverse abiotic and biotic conditions. These traits vary substantially across natural and disturbed ecosystems, offering valuable insights into how ecological functions shift in response to environmental change.

Despite their fundamental ecological roles, fine roots remain understudied compared to aboveground plant components, especially in oceanic island ecosystems such as the Canary Islands. Tenerife, in particular, harbours a striking diversity of ecosystems shaped by natural processes and anthropogenic disturbance, making it an ideal setting to explore how fine root biomass, morphology, chemistry, and carbon allocation respond to environmental gradients in both natural and altered systems.

To address these questions, we established 20 × 20 m plots in ten distinct ecosystems across Tenerife, comprising five forest types (four natural, one disturbed) and five shrubland types (two natural, three disturbed). From each plot, we collected soil cores down to 30 cm depth to assess fine root biomass, morphological traits (SRL, RTD, mean diameter), chemical traits (N content, C:N ratio), and patterns of carbon allocation to the fine root system.

We expect that: (1) fine root biomass will be highest in the semi-natural laurel forest and lower in the disturbed *Morella–Erica* forest and drought-prone thermophilous woodland; (2) coastal and summit shrublands will exhibit low fine root biomass but high proportional carbon allocation belowground; and (3) root trait combinations will reflect a gradient from acquisitive strategies in humid, high-productivity systems (e.g., laurel and *Morella–Erica* forests) to conservative strategies in dry, low-productivity environments (e.g., thermophilous woodland, coastal and summit shrublands).

Our findings aim to advance understanding of plant strategies and the ecological consequences of disturbance, contributing with a key piece, but often overlooked component of the ecosystems puzzle: the fine root system.

# O02

## INDIVIDUAL-BASED VISITATION NETWORKS AND PLANT TRAITS OF THE PRIDE OF MADEIRA (ECHIUM CANDICANS)

**Ricardo Costa[1,2,3]*; Ana Ceia Hasse[4,5,6]; Rui Rebelo[2] & Mário Boieiro[1,2,3,7]**

1 University of the Azores CE3C - Centre for Ecology, Evolution and Environmental Changes, Azorean Biodiversity Group & CHANGE - Global Change and Sustainability Institute, School of Agricultural and Environmental Sciences, Portugal; rcosta47447@gmail.com; mario.rc.boieiro@uac.pt

2 CE3C- Centre for Ecology, Evolution and Environmental Changes, CHANGE – Global Change and Sustainability Institute, Faculty of Sciences, University of Lisbon, Portugal; rmrebelo@ciencias.ulisboa.pt

3 LIBRe – Laboratory for Integrative Biodiversity Research, Finnish Museum of Natural History, University of Helsinki, Finland

4 CIBIO-Research Centre in Biodiversity and Genetic Resources, InBIO Associate Laboratory, School of Agronomy, University of Lisbon, Portugal; ana.ceia.hasse@cibio.up.pt

5 CIBIO-Research Centre in Biodiversity and Genetic Resources, InBIO Associate Laboratory, Vairão Campus, University of Porto, Portugal

6 BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Portugal

7 IUCN SSC Atlantic Islands Invertebrates Specialist Group; 9700-042 Angra do Heroísmo, Azores, Portugal

* Corresponding author

### Abstract

Island systems are known to be rich in unique and threatened species, some being highly charismatic. Plant-pollinator interactions are an important and often understudied factor that might greatly affect the survival of mandatory zoophilous plants. This topic is however extremely complex, as identifying the entire pollinator community of a plant species can be very challenging, and may vary greatly between individuals. In Macaronesia, the genus *Echium* is one of the best examples of plant radiations, with a total of 29 species. Studies focused on the flower-visitor communities of these plants are restricted to some species in the Canary Islands, consisting mostly of isolated records on the other archipelagos. The focus of this work was to assess the relation between traits of individual plants belonging to the Madeira endemic *Echium candicans*, and their network of flower-visitors. A total of 24 individual plants were monitored (in two study areas) near Pico do Arieiro, Madeira Island. The flower visitors on each plant were sampled on six 10 minutes sessions between 10h and 16h between the end of June and beginning of July. For each plant, we determined its largest diameter and height, the number and average size of its inflorescences, and estimated the number of flowers as well as distance from conspecifics. We then calculated multiple network metrics for each of the individual-based flower visitor-plant networks. The presence of the most abundant pollinator species, as well as the network metrics, were then related to the plant traits using regression models. There was a positive relation between the number of flowers per plant and the average size of the inflorescences with most network metrics. The relation between nested rank with the average size of the inflorescences pointed out that this trait led to an increase in the diversity of flower visitors. Plants with more flowers and larger inflorescences were also more central in the network, had a higher number of pollinators, and seemed to be more important for some of flower-visitor species. Most visitors also showed a positive relation with the two previously mentioned plant traits. Only three visitor species (the bee *Amegilla quadrifasciata*, the hoverfly *Eristalis tenax*, and the lizard *Teira dugesii*) showed a significant relation with the isolation of the individual plants, being more frequent in less isolated individuals. Furthermore, *A. quadrifasciata* had also a negative relation between with inflorescence size and the highest positive relation with the number of flowers of the plants. Our results then point to a preference for denser patches of resources by this frequent visitor of the flowers of this endemic plant.

# O08

## INVASIVES VS NATIVES: FUNCTIONAL DIVERSITY OF THE FLORA OF LANZAROTE (CANARY ISLANDS)

**Wolf H. Wildpret Martin[1]*; Julie Besnard[1], Severin D.H. Irl[2], Holger Kreft[3] & Paola Barajas-Barbosa[4]**

1 Biodiversity, Biogeography & Macroecology Group University of Göttingen, Germany, wolf.wildpret.martin@gmail.com, julie.besnard@stud.uni-goettingen.de

2 Biogeography and Biodiversity Lab, Goethe University Frankfurt am Main, Altenhöferallee 4, 60438 Frankfurt am Main, Germany, irl@geo.uni-frankfurt.de

3 1 Biodiversity, Biogeography & Macroecology Group University of Göttingen, Büsgenweg 1 37077 Göttingen, Germany, hkreft@uni-goettingen.de

4 Biodiversity Synthesis group at iDiv, Germany; paola.barajas@idiv.de

*Corresponding author

### Abstract

Lanzarote is the northernmost and easternmost of the Canary Islands. With its 15,5 Mio Years of age and is close proximity to the African continent it is characterized by a much more arid climate and flat terrain than any of the western Canary Islands. We expect this to have an effect on the plant strategies currently present on the islands both by natural processes and due to human impact when compared to the rest of the archipelago and to Tenerife in particular. We sampled 8 functional traits of the certain natives and invasives seed plants of Lanzarote during March 2025 and combined this with data gathered in other islands to perform the first representation of functional diversity of the flora of Lanzarote. In total we present data for a majority of the certain native flora and propose a modified listing of invasive species for Lanzarote. We explore the overlap of certain native and invasive functional diversity to elucidate if differing plant strategies are responsible for the invasion success of the relatively few established invasive species, as well as compare them to the functional diversity of the most invasive species globally. We will also explore a weighted trait space for Lanzarote based on the abundance of grid cells occupied by both native and invasive species in order to try and better represent functional diversity in accordance with current vegetation structure.

# O32

# ALLELOPATHIC TRAITS OF INVASIVE AZOREAN FLORA: HEDYCHIUM GARDNERIANUM SHEPH. EX KER GAWL. AND GUNNERA TINCTORIA (MOLINA) MIRBEL

**Wilson Tavares[1]*; Maria Carmo Barreto[1]; Gonçalo P. Rosa[1,2]; Ana M. L. Seca[1,2]; Francisco J. Rodríguez-Mejías[3]; Rosa M. Varela[3] & Francisco A. Macías[3]**

[1] Centre for Ecology, Evolution and Environmental Changes (cE3c), Azorean Biodiversity Group & Global Change and Sustainability Institute (CHANGE), Faculty of Sciences and Technology, University of the Azores, Ponta Delgada, Portugal; wilson.tavares@uac.pt, maria.cr.barreto@uac.pt, goncalo.p.rosa@uac.pt, ana.ml.seca@uac.pt

[2] LAQV-REQUIMTE, Universidade de Aveiro, Portugal; anaseca@ua.pt

[3] Allelopathy Group, Department of Organic Chemistry, School of Sciences, Institute of Biomolecules (INBIO), University of Cadiz, Cádiz, Spain; fjrodme@uca.es, rmvarela@uca.es, fam@uca.es

*Corresponding author

## Abstract

Biological invasions are widely recognized as primary drivers of biodiversity loss, especially in insular ecosystems, where endemic species often exhibit limited competitive abilities. The Azores archipelago has experienced significant ecological disruption due to invasive plant species, with *Hedychium gardnerianum* Sheph. *ex* Ker Gawl. (Kahili ginger) and *Gunnera tinctoria* (Molina) Mirbel (Chilean rhubarb) standing out as two of the most aggressive. These species exhibit exceptional invasive behavior, suggesting multifactorial mechanisms that include high reproductive capacity, efficient dispersal strategies, and possible allelopathic interactions. To explore this latter hypothesis, this presentation reports on the phytotoxic potential of these plants using in vitro bioassays. In this study, aqueous and ethanolic extracts of both plants—prepared from either fresh or dried aerial parts and rhizomes—were obtained by maceration or ultrasound-assisted extraction. These crude extracts, along with their hexane, ethyl acetate, and methanolic fractions, were tested in vitro for phytotoxic activity using etiolated coleoptiles of wheat (*Triticum aestivum* L.) as a model. The most active extracts were subsequently selected to assess their in vitro effects on seed germination and early growth of the weeds *Lolium rigidum* Gaudin and *Portulaca oleracea* L., as well as the crops lettuce (*Lactuca sativa* L.) and tomato (*Solanum lycopersicum* L.). Those models evidence the allelopathic impact of the secondary metabolites produced by *G. tinctoria* and *H. gardnerianum*. The results show that *H. gardnerianum* exhibits higher phytotoxic activity than *G. tinctoria*, with significantly stronger inhibitory effects on coleoptile elongation and on both germination and seedling growth of target species. While *G. tinctoria* also demonstrates phytotoxic effects, these are comparatively moderate and less consistent across the tested species. These findings strongly suggest that allelopathic interactions may play a prominent role in the invasive success of *H. gardnerianum*, whereas other mechanisms may substantially contribute to the invasiveness of *G. tinctoria*. These and other ongoing results offer insight into the chemical ecology of plant invasions and may inform more effective management strategies for preserving native biodiversity in vulnerable island ecosystems.

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# RESEARCH TALKS 3 - Biodiversity

## O06

## PATTERNS OF COLONIZATION AND BREEDING SYSTEM IN CHRY*SOJASMINUM ODORATISSIMUM* (OLEACEAE), THE ONLY MACARONESIAN HETEROSTYLOUS SPECIES

**Carlos García-Verdugo[1]*; Miguel Menezes de Sequeira[2]; Célia Bairos[3]; Francisco J. Ocaña[4], Sara Martín-Hernanz[5], Juli Caujapé-Castells[6], Xavier Estellés[7] & María Olangua-Corral[8]**

1Departamento de Botánica, Universidad de Granada, Granada, Spain, cgarciaverdugo@ugr.es
2Madeira Botanical Group (GBM), Faculty of Life Sciences, University of Madeira, Portugal, miguelmenzessequeira@gmail.com
3Madeira Botanical Group (GBM), Faculty of Life Sciences, University of Madeira, Portugal, celia.tre@staff.uma.pt
4Departamento de Ecología, Universidad de Granada, Granada, Spain, bb2occaf@ugr.es
5Departamento de Biodiversidad, Ecología y Evolución. Facultad de Biología, Universidad Complutense de Madrid, Madrid, Spain, sarmar37@ucm.es
6Jardín Botánico Canario "Viera y Clavijo"- Unidad Asociada de I+D+i al CSIC, Las Palmas de Gran Canaria, Spain, julicaujape@gmail.com
7Departamento de Botánica, Universidad de Granada, Granada, Spain, xavierestelles@correo.ugr.es
8Jardín Botánico Canario "Viera y Clavijo"- Unidad Asociada de I+D+i al CSIC, Las Palmas de Gran Canaria, Spain, molanguas@gmail.com
*Corresponding author

### Abstract

Heterostyly is a floral dimorphism which is rare on oceanic islands, probably because scarcity of pollinators and/or small population sizes on these systems promote evolution towards other breeding systems such as self-compatibility. In this presentation, we analyze the pattern of heterostyly in *Chrysojasminum odoratissimum*, a species endemic to Madeira and the Canary Islands. We perform phylogenetic and phylogeographical analyses to infer the spatio-temporal pattern of colonization of *C. odoratissimum*, and measure floral traits in six populations from three Macaronesian islands to test if putative genetic sublineages are associated with significant shifts in the pattern of heterostyly. Our results point towards strong genetic structure across the species distribution, which suggests that gene flow among islands is relatively rare. However, flower traits, including heterostyly, do not show substantial variation among the three sublineages detected. We discuss the factors that may account for the maintenance of heterostyly under the pattern of geographical isolation observed in *C. odoratissimum*.

# O13

## THE PHYTOVIRAL DIVERSITY IN AZOREAN NATIVE PLANTS

**Sara Luna*; Maria Susana Lopes; Eduardo Dias; Dinis Pereira; Artur da Câmara Machado & Duarte Mendonça**

Biotechnology Centre of Azores, School of Agricultural and Environmental Sciences, University of Azores, Portugal; sara.pb.luna@uac.pt

### Abstract

The Azores archipelago, characterized by its unique biodiversity, is home to numerous native plant species that play a crucial role in the island ecosystems. However, this rich botanical heritage faces significant threats from various factors, including habitat loss, climate change, and the increasing prevalence of plant viral diseases, which can lead to the decline or extinction of vulnerable species. For the last few years, we have been making efforts to understand the viral diversity present on Azorean native plants and to comprehend if crop viruses are being spread into the native flora. Our results revealed that *Azorina vidalii* (Campanulaceae) is infected with crop viruses such as Cucumber mosaic virus and Tomato spotted wilt virus and a few putative novel viruses; *Angelica lignescens* (Apiaceae) is infected with a putative novel chordovirus closely resembling a virus known to infect carrots; *Deschampsia foliosa* and *Rubus hochstetterorum* also showed to be infected with putative novel viruses. Viral infections in plants can lead to reduced growth, impaired reproductive success, and contribute to population decline, particularly in endemic species with restricted distributions, thereby threatening the fragile balance of the Azorean ecosystems. By emphasizing the importance of early detection and response frameworks, as well as community engagement in conservation efforts, this study advocates for a holistic strategy that safeguards native plant species while mitigating the impacts of viral diseases. Ultimately, fostering a synergistic relationship between ecological conservation and plant health will be essential for the sustainable management of the Azore's unique flora and the preservation of its ecological integrity.

# O33

## COMMUNICATING MADEIRA'S BRYOFLORA: KNOW TO PROTECT

**Susana Fontinha[1,2]* & Carlos Lobo[2]**

1 cE3c - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal; suzu65@gmail.com

2 Jardim Botânico da Madeira Eng.º Rui Vieira, Caminho do Meio, Bom Sucesso, 9064-512 Funchal, Madeira

*Corresponding author

### Abstract

Bryophytes, despite their small size, are a vital component of many ecosystems, playing a fundamental role in maintaining ecosystem function and resilience. Many of these ecosystem services are essential to sustain human well-being.

Macaronesia is recognized as a global biodiversity hotspot due to its high levels of endemism and ecological diversity. For example, in terms of bryophlora, 30% of the bryophytes endemic to Europe are restricted to European Macaronesia (Madeira, Azores and Canary Islands).

In Madeira, bryophytes occur in all terrestrial ecosystems, whether natural or human-altered, and from the coastal more arid areas up to the highest mountain peaks, reaching 1861 meters above sea level on Madeira Island.

Although Madeira archipelago covers a small area, approximately 580 bryophyte taxa have been recorded in this archipelago, which corresponds to around 27% of the total taxa cited for Europe.

The Laurel Forest is a key habitat. In addition to a high diversity of bryophyte species, it harbours all Macaronesian endemics that are reported for Madeira and 69% of the Madeiran endemics.

Raising public awareness on Madeira's bryoflora is crucial to promote its sustainable use and ensure the protection of vital species. In fact, effective conservation action requires communication, education, and public awareness.

Over the last 30 years several actions fostering public awareness on the bryoflora of Madeira have been done. These include the publication of books, tv documentaries, talks, course for teachers, workshops and thematic field trips for the general public. These efforts will be presented in this communication.

# RESEARCH TALKS 4 - Biodiversity and Conservation

## O14

## ESTABLISHING LONG-TERM MONITORING BASELINES FOR VASCULAR PLANTS ACROSS AN ELEVATIONAL GRADIENT IN SÃO MIGUEL ISLAND (AZORES)

**Rui Andrade*; Rosalina Gabriel & Rui Elias**
CE3C – Universidade dos Açores – Faculdade de Ciências Agrárias e do Ambiente and CE3C – Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group, Portugal; rui.ca.andrade@uac.pt; rosalina.ma.gabriel@uac.pt, rui.mp.elias@uac.pt
*Corresponding author

### Abstract

Global changes, such as climate change and biological invasions, are strongly linked to plant communities' distribution, a relationship particularly pronounced on islands, where spatial constraints inherently limit biodiversity. In the Azores, human settlement in the 15th century led to a severe reduction of the original native forests, which now persist only in small, fragmented patches and are increasingly threatened by invasive species. This study focuses on São Miguel Island, the largest in the archipelago, and intends to characterize the composition, abundance, and distribution patterns of vascular plant communities across a series of 100 $m^2$ permanent plots. These plots were established within native vegetation areas along an altitudinal gradient ranging from 50 to 1000 meters above sea level. A total of 67 species were recorded: 18 from Polypodiopsida, one from Selaginellopsida, two from Pinopsida, 15 from Liliopsida, and 31 from Magnoliopsida. Almost one third of these species (N=19) are exotic, including eight classified as invasive species under Azorean legislation. The highest species richness and best-preserved communities were observed at 600 m. At this altitude, communities are dominated by endemic woody species *Ilex azorica* and *Laurus azorica*, confirming the potential vegetation distribution maps. Invasive species were recorded throughout the entire altitudinal range, with notable dominance of *Pittosporum undulatum* and *Hedychium gardnerianum* at 200 m and 400 m, while *Clethra arborea*, a highly invasive species with significant ecological impact, was well established at 800 m a.s.l. These findings highlight the high conservation value of native vegetation above 600 m and raise concerns regarding the advanced stage of biological invasion and ongoing homogenization processes occurring in the island's lower elevations. Long-term monitoring of these permanent plots will be essential to detect temporal shifts in vegetation composition and to inform more effective and evidence-based conservation strategies. In 2025 the same plots in the altitudinal gradient of São Miguel Island were resampled.

# O03

# EPIPHYTES AND ELEVATION: A BRYOPHYTE STUDY ON TERCEIRA ISLAND

**Xenia Davide[1]*; Rui Andrade[2]; Rosalina Maria de Almeida Gabriel[2]; Lea Pichon[1] & Amanda Taylor[3]**

1 Wageningen University & Research, Netherlands
xenia.davide@wur.nl & xeniadav@gmail.com, amanda.taylor@wur.nl
2 Centre for Ecology, Evolution & Environmental Change, Universidade dos Açores, Portugal;
ruiandrade14@hotmail.com, rosalina.ma.gabriel@uac.pt
3 L'Institut Agro Montpellier, France; pichonlea18@gmail.com
* Corresponding author

## Abstract

Background: Bryophytes, as non-vascular plants, are highly sensitive to microclimatic changes, making them excellent bioindicators of environmental shifts. Insular ecosystems, such as the Azores, host diverse bryophyte communities but remain vulnerable to habitat fragmentation and shifting conditions. Elevation serves as a key environmental gradient influencing species distribution, while microhabitat factors, such as host tree traits, further affect bryophyte assemblages. Given the projected climatic shifts in the region, long-term studies are crucial to understand how bryophyte communities are changing over time.

Aim: This study investigates long-term trends in epiphytic bryophyte diversity on Terceira Island, assessing changes over the past decade (2012 - 2024), mainly focusing on shifts in species richness along an elevational gradient and their association with host tree characteristics.

Methodology: Epiphytic bryophyte communities were sampled along an elevational gradient (40 - 1000 m a.s.l.) at 200 m intervals. Microhabitat data - including humidity, light, inclination, plant substrate, tree perimeter, and bark rugosity - was recorded. Specimens were identified and compared to surveys conducted in 2012. Biodiversity indices (α, β, γ-diversity) and Hill numbers were computed for both years and compared. A Generalised Linear Mixed Model (GLMM) was developed to assess the influence of the environmental and microhabitat variables on species richness in 2024.

Main findings: A total of 1188 epiphytic bryophyte specimens were collected, representing 78 species. Liverworts were dominant, especially at higher elevations, with 46.2% of species restricted to 600 - 1000 m a.s.l. Species richness increased with elevation and was significantly higher in 2024 than in 2012. However, β-diversity analyses indicated overall community composition remained stable, with only subtle shifts found when analysing taxonomic groups separately. GLMM results identified elevation and plant substrate as key predictors of species richness, while other environmental variables had minor effects. These findings suggest that changes in bryophyte diversity may be driven by subtle climatic shifts, forest regeneration or decreasing disturbances.

Conclusion: Despite community composition remaining largely stable between the years, overall species richness - both regionally and along the elevational gradient - increased. This indicates a gradual shift, with liverworts showing stronger responses than mosses. The findings highlight the importance of bryophytes as bioindicators and the need for long-term systematic monitoring to evaluate the effects of climatic shifts on insular vegetation.

# O19

# URBAN BRYOPHYTES IN ANGRA DO HEROISMO (AZORES, PORTUGAL): A FIRST LOOK AT A MACARONESIAN CITY

**Lucie Fatková[1]*; Marta Rogošic[2]; Cecília Sérgio[3] & Rosalina Gabriel[4]**
1 Charles University, Faculty of Science, Institute for Environmental Studies, Prague, Czech Republic, fatkoval@natur.cuni.cz
2 Grenoble Alpes University, Faculty of Chemistry and Biology, Grenoble, France and Oikon d.o.o., Institute of Applied Ecology, Zagreb, Croatia, marta_rogosic0805@hotmail.com
3 CE3C - Centre for Ecology, Evolution and Environmental Changes / Natural History & Systematics (NHS) and CHANGE – Global Change and Sustainability Institute, Lisbon, Portugal, clgomes@ciencias.ulisboa.pt
4 University of the Azores, CE3C/GBA - Centre for Ecology, Evolution and Environmental Changes / Azorean Biodiversity Group and CHANGE – Global Change and Sustainability Institute, Angra do Heroísmo, Portugal, rosalina.ma.gabriel@uac.pt
*Corresponding author

## Abstract

Although urban areas are often homogenised and disturbed, microhabitats within cities can support biodiversity and contribute to ecosystem services, making cities more liveable. Bryophytes, in particular, are small plants that require few resources, contribute to urban biodiversity, help mitigate fine particle pollution, reduce the heat island effect, and serve as sensitive bioindicators for monitoring air quality and detecting local effects of climate change.

To our knowledge, this is the first time that the urban bryoflora was studied in Macaronesia, specifically in Angra do Heroísmo, in Terceira Island (Azores). To structure the sampling effort, the city was divided into four 1 km × 1 km quadrants. In each quadrant, eight sites of 100 m × 100 m were searched for bryophytes, and two quadrats of 2 m x 2 m, carefully surveyed for species growing on rock, soil, and trees. Whenever possible, three replicates were collected for each substrate, resulting in 300 microplots of 50 cm 2. A total of 94 bryophyte species were identified, mostly mosses (N=81), but also liverworts (N=13), and two hornworts. The richest genera were *Bryum*, *Didymodon*, *Ptychostomum*, and *Tortula*. Among the most frequently encountered species were *Tortula muralis* (in 76 microplots), *Lunularia cruciata* (64), *Didymodon umbrosus* (60), and *Scorpiurium circinatum* (49). Two new species were reported for the Azores: *Acaulon fontiquerianum* and *Didymodon fallax* (see L.T. Ellis et al., 2025). Trees were scarce and unevenly distributed in the city, resulting in a smaller number of epiphytic than rupicolous and terricolous species. This study demonstrates that urban oceanic environments are far from irrelevant to bryophyte research, as nearly a fifth of all known Azorean species were recorded in Angra do Heroísmo. Future research should focus on trees in parks and gardens, as they may provide important microhabitats for epiphytic bryophyte species. As a recommendation, tree species with persistent bark should be prioritised in urban planting to enhance habitat availability.

Ellis, L. T., Alataş, M., Ali, Sk. N., Alvarez, D. J., Aponte Rojas, A. M., Atwood, J. J., … Winter, G. (2024). New national and regional bryophyte records, 79. Journal of Bryology, 46(4), 295–318. https://doi.org/10.1080/03736687.2025.2454811

# O17

# COMPARATIVE PATTERNS OF SEX EXPRESSION, SEX RATIOS AND CLIMATE EFFECTS IN ISLAND AND CONTINENTAL BRYOPHYTE POPULATIONS

**Anabela Martins[1]*; Jairo Patiño[2,3] & Manuela Sim-Sim[1,4]**

1 CE3C - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute /MUHNAC - Museu Nacional de História Natural e da Ciência, Universidade de Lisboa, Portugal; anabelamartins323@gmail.com

2 Island Ecology and Evolution Research Group. Instituto de Productos Naturales y Agrobiología (IPNA-CSIC), Tenerife, Spain; jpatino@ipna.csic.es

3 Departamento de Botánica, Ecología y Fisiología Vegetal, Universidad de La Laguna, Spain

4 Departamento de Biologia Vegetal, Faculdade de Ciências, Universidade de Lisboa, cE3c - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Portugal; mmsim-sim@ciencias.ulisboa.pt

*Corresponding author

## Abstract

Island biotas, with their isolation and environmental diversity, have long fascinated biologists. While the comparison of island and continental plant populations offer tremendous potential for studying ecological and evolutionary patterns, comparative research on these geological settings remains less developed in plants compared to the vast body of literature on animal groups such as birds, insects, lizards, and mammals. Investigating the reproductive biology of plants is crucial for understanding their population dynamics and the evolutionary processes that shape their diversity. Bryophytes, a large and diverse group of plants, provide an excellent model for studying ecological and evolutionary patterns across island and continental regions, as their sexual expression and reproductive success are highly sensitive to environmental conditions.

In this study, we investigate sex expression, phenotypic sex ratio, and explore how climate change may differentially affect the distribution range of each sex in four unisexual bryophyte species (one moss (*Exsertotheca intermedia* (Brid.) S.Olsson, Enroth & D.Quandt) and three liverwort species (*Frullania polysticta* Lindenb., *Frullania teneriffae* (F.Weber) Nees and *Porella canariensis* (F.Weber) Underw.)), across their entire distribution range. Depending on the species, the geographic range includes the Canary Islands, Madeira, the Azores, the Iberian Peninsula, the British Isles, and the Faroe Islands. For the non-Macaronesian endemic species (*F. teneriffae*, *P. canariensis*) higher levels of sex expression and males were found in the Macaronesian archipelagos. In leafy liverworts, females appear to be correlated with lower temperatures and higher precipitation levels, while males seem to be associated with higher temperatures and relatively lower precipitation levels. Populations from Macaronesia exhibited higher levels of sex expression compared to their continental counterparts, suggesting that the distinct environmental conditions of these islands play a crucial role in shaping their reproductive patterns.

Projections suggest that all four species will lose over 95% of their climatically suitable areas in Macaronesia by 2100. However, parts of the Atlantic coastal fringe of Europe and northwestern Africa may act as climate refugia for both sexes of the Macaronesian endemics. This study highlights the vulnerability of Macaronesian bryophytes to climate change, emphasizes the importance of sex-specific strategies in conservation planning, and identifies potential refugia that may support the long-term survival, provided that Macaronesian bryophytes can track climate change across the North Atlantic.

# RESEARCH TALKS 5 - Conservation

## O01

## REINFORCEMENT OF PROTECTED PLANT SPECIES UNDER THE LIFE IP AZORES NATURA: A CONTRIBUTION TO CONSERVATION AND ECOLOGICAL RESTORATION IN THE AZORES

**Diana C. Pereira* & João F. Fernandes**
Secretaria Regional do Ambiente e Ação Climática, Portugal, Diana.C.Pereira@azores.gov.pt, joao.fm.fernandes@azores.gov.pt
* Corresponding author

### Abstract

One of the main objectives of the LIFE IP AZORES NATURA project is to ensure the conservation of threatened and protected plant species in the Azores, while simultaneously promoting the ecological restoration of priority natural habitats. Through population reinforcement actions, the project aims to halt the decline of endemic species and improve their conservation status, directly contributing to the goals of the Natura 2000 network and compliance with the Habitats Directive (Article 17).

Target species surveys have been completed on most islands of the archipelago, with new populations identified on four islands, covering ten target species. This represents a significant advance in understanding their distribution and conservation status. In parallel, seed collection for ex situ conservation has been ongoing across all islands, with the fruiting season for most species occurring between July and August. Seeds of herbaceous species are sent to the Faial Botanical Garden for propagation, while seeds of woody species are delivered to the Forestry Services for production.

To date, around 156 kg of seeds have been collected. This material has been used to reinforce declining natural populations, particularly in areas facing significant threats and pressures, promoting an integrated approach to conservation in vulnerable island ecosystems. In terms of in situ conservation, approximately 15,000 herbaceous plants and 19,000 woody protected plants have already been reintroduced or reinforced in the field.

This presentation aims to share the results obtained so far and discuss the methodologies applied, contributing to the exchange of experiences and the strengthening of native flora conservation strategies in Macaronesia.

# O04

## RED LISTING THE GREEN ISLANDS: IUCN ASSESSMENT OF THE AZOREAN FLORA

**Guilherme Roxo[1,2,3]*; Luís Silva[1,2,3]; Rui Bento Elias[4,5]; Diana Pereira[6,7]; Mark Carine[8]; Ann McCartney[9]; Rúben Rego[1,2,3]; Martin Souto[1,2,3]; Richard M. Bateman[10] & Mónica Moura[1,2,3]**

1 Faculdade de Ciências e Tecnologia, Universidade dos Açores, Rua Mãe de Deus, 9500-321 Ponta Delgada; Portugal; guilherme.g.roxo@uac.pt

2 CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Pólo dos Açores – Ponta Delgada, São Miguel, Açores, Portugal

3 BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Portugal

4 University of the Azores, Angra do Heroísmo, Portugal

5 cE3c/GBA – University of the Azores, Centre for Ecology, Evolution and Environmental Changes / Azorean Biodiversity Group, Angra do Heroismo, Portugal, cE3c/GBA – University of the Azores, Centre for Ecology, Evolution and Environmental Changes / Azorean Biodiversity Group, Angra do Heroismo, Portugal

6 Projeto LIFE IP AZORES NATURA. Secretaria Regional do Ambiente e Ação Climática, Ponta Delgada, Portugal.

7 CEEAplA - Center of Applied Economic Studies of the Atlantic. Universidade dos Açores, Ponta Delgada, Portugal.

8Life Sciences, Natural History Museum, UK

9 Genomics Institute, University of California, Santa Cruz, US

10 Jodrell Laboratory, Royal Botanic Gardens Kew, UK

*Corresponding author

### Abstract

The Azores archipelago is home to a distinctive flora, featuring approximately 84 endemic vascular plant taxa (species and subspecies). However, many of these unique plants are increasingly threatened by habitat degradation and invasive alien species. In this study, we present an updated comprehensive assessment of all endemic vascular plant species of the Azores using the IUCN Red List Categories and Criteria. Each species was categorized accordingly, and the Red List Index (RLI) was calculated to provide a synthetic measure of overall extinction risk. Our analysis shows that the current RLI for Azorean endemic vascular plants is 0.63, indicating a moderate to high level of extinction risk across the group. This score highlights an alarming reality, as 60% of the flora is classified in threatened categories as follows: Extinct (2), Critically Endangered (5), Endangered (28), and Vulnerable (7). The large proportion of Endangered species is particularly striking, while the presence of 12 Data Deficient taxa further highlights the need for continued field research and the integration of molecular data to resolve complex species boundaries and improve conservation assessments. These findings emphasize the urgency of implementing effective conservation actions, notably habitat restoration, to protect this irreplaceable component of Azorean biodiversity. The RLI also provides a valuable baseline for tracking future trends in extinction risk, guiding both regional conservation planning and policy development.

# O07

# IMPROVING THE CONSERVATION OUTCOMES OF THE ENDANGERED AZORINA VIDALII (H.C.WATSON) FEER (CAMPANULACEAE), USING AN INTEGRATED HOLISTIC APPROACH

**Rubén M. C. Rego[1,2,3]*; Luís Silva[1,2,3]; Maria Olangua-Corral[4]; Ana Delaunay Caperta[5]; Guilherme Roxo[1,2,3]; Roberto Resendes[1,2,3] & Mónica Moura[1,2,3]**

1CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Faculdade de Ciências e Tecnologias, InBIO Laboratório Associado, Universidade dos Açores, Portugal; ruben.mc.rego@uac.pt

2BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO de Vairão, Vairão, Portugal

3UNESCO Chair – Land Within Sea: Biodiversity & Sustainability in Atlantic Islands, Universida

4Banco Germoplasma & Dpto. Biología Reproductiva, Jardín Botánico Canario "Viera y Clavijo" – u.a. CSIC, Las Palmas de Gran Canaria, Spain

5LEAF—Linking Landscape, Environment, Agriculture and Food Research Center, Associate Laboratory TERRA, Instituto Superior de Agronomia, Universidade de Lisboa, Portugal

*Corresponding author

## Abstract

*Azorina vidalii* (Campanulaceae) is a coastal endemic plant, present on all the Azores islands. This species has been recently reassessed as Endangered, following IUCN guidelines. However, many aspects of this species' biology remain unknown or poorly studied. Through a holistic approach, we aim to increase the knowledge about this species, in the fields of ecology, floral morphology and reproductive biology, to better support its conservation. We found that *A. vidalii* displays a broad ecological niche, being present in many different plant communities, from sea level meadows to halophytic chamaephyte communities from coastal cliffs and lowland juniper stands in Pico Island. Nonetheless, the anthropogenic expansion towards the coastal areas narrowed its habitat to a vegetation belt, constrained by sea and human activities (e.g. farming and animal husbandry, construction) and threatened by invasive species. In terms of floral morphology, variation in some floral traits led to geographic differentiation among subarchipelagos, possibly due to dispersal, isolation or environmental factors. *Azorina vidalii* presents a mixed breeding strategy, with intermediate levels of self-incompatibility/compatibility. A shorter male phase caused by pollen removal stimulates the rapid development of the female phase, leading to an overlap of the sex phases and an apparently incomplete dichogamy, increasing the chances of autogamous breeding. Pollinating agents are fulcral for the achievement of fertilization. Altogether, these data will favour a sounder conservation planning for this endangered emblematic plant.

# RESEARCH TALKS 6 - Conservation

## O27

## FOUNDATIONS FOR AN ISLAND BIODIVERSITY OBSERVATION NETWORK (ISLAND BON): A SYNTHESIS OF MONITORING PRACTICES

**Giorgia Camperio[1]*; Wolf Wildpret[2]; Clara Zemp[1]; Paulo A.V. Borges[3]; Donat Agosti[4]; Léandre Catogni[5]; Lea de Nascimento[6]; Brent C. Emerson[7]; Rosalina Gabriel[3]; Bernd Lenzner[8]; Fabio Mologni [8]; Jairo Patiño[7]; Rüdiger Otto[6]; Patrick Ruck[5,9]; Felipe Simoes[10]; Samantha Suter[1]; Holger Kreft[2,11] & Nathaly Guerrero-Ramírez[2,11]**

1 Conservation Biology, Institute of Biology, Faculty of Sciences, University of Neuchâtel, Neuchâtel, Switzerland; giorgia.camperio@unine.ch; clara.zemp@unine.ch; samantha.suter@unine.ch

2 Biodiversity, Macroecology and Biogeography, Faculty of Forest Sciences and Forest Ecology, University of Göttingen, Göttingen, Germany; wolf-hermann.wildpret@forst.uni-goettingen.de; hkreft@uni-goettingen.de; nathaly.guerrero-ramirez@forst.uni-goettingen.de

3 University of the Azores, CE3C/GBA - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Rua Capitão João d´Ávila, Pico da Urze, 9700-042, Angra do Heroísmo, Portugal; paulo.av.borges@uac.pt; rosalina.ma.gabriel@uac.pt

4 Plazi, Bern, Switzerland; donat.agosti@hesge.ch

5 BiTeM Group, Information Sciences, HES-SO/HEG Geneva, Switzerland; leandre.catogni@hesge.ch; patrick.ruch@hesge.ch

6 Island Ecology and Biogeography Group, Instituto Universitario de Enfermedades Tropicales y Salud Pública de Canarias, Universidad de La Laguna, La Laguna, Spain; leadenas@ull.edu.es; rudiotto@ull.edu.es

7 Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología (IPNA-CSIC), La Laguna, Spain; bernd.lenzner@univie.ac.at; fabio.mologni@univie.ac.at; bemerson@ipna.csic.es

8 Division of BioInvasions, Global Change and Macroecology, Department of Botany and Biodiversity Research, University of Vienna, Vienna, Austria; jpatino@ipna.csic.es

9 SIB Text Mining Group, Swiss Institute of Bioinformatics, Geneva Switzerland

10 Plazi, Porto Alegre, Rio Grande do Sul, Brazil; flsimoes28@gmail.com

11 Centre of Biodiversity and Sustainable Land Use, University of Göttingen, Göttingen 37077, 14 Germany

*Corresponding author

### Abstract

Islands contribute disproportionately to global biodiversity, containing many endemic species found nowhere else on the planet. Simultaneously, islands are highly vulnerable to anthropogenic disturbances, making them epicenters of species extinctions and invasions. This calls for robust monitoring approaches about the status and trends of biodiversity that inform researchers, conservation and restoration initiatives, ecosystem managers, and policy-makers, among other stakeholders. The monitoring landscape of island ecosystems is highly fragmented, and an overview and work towards harmonizing tools and approaches is needed. Herein, we identified past and ongoing monitoring schemes on marine islands, where Essential Biodiversity Variables (EBVs) have been assessed, and which protocols have been used. To do that, we use a systematic map providing a broad overview of quantitative and qualitative evidence related to island monitoring.

Our methodology builds on a collaboratively developed ontology, defining key concepts related to terrestrial biodiversity, monitoring schemes, and islands. Using the CADIMA platform, to adhere to systematic evidence synthesis best practices and ensure consistency, transparency, and reproducibility this ontology underpins the screening process and the coding framework which are being conducted by different research teams. The approach is aligned with emerging global standards for evidence synthesis, including those promoted by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

Given the large volume of search results (over 14,000 unique publications records), a BERT-based pre-trained model was fine-tuned for binary text classification to assist in the title and abstract screening phase. The model supports prioritizing potentially relevant records, aiming to increase efficiency while maintaining rigorous inclusion criteria. The binary model has the potential to become a permanent resource for the broader biodiversity monitoring community beyond the scope of this project. Our approach involves transforming the selected scientific articles into machine-readable formats, which are archived in Biodiversity PMC, a platform that makes biodiversity publications openly available. This process allows biodiversity data (e.g. EBVs) to be annotated, extracted, and reused, thereby improving data accessibility and supporting long-term, open, and reproducible biodiversity research.

The presentation of the preliminary results on the thematic distribution and EBVs standardization of island biodiversity monitoring efforts will be an opportunity for discussion around the potential creation of a coordinated Island Biodiversity Observation Network (Island BON) together with island plot based monitoring (BioMonI-Plot), to strengthen global collaboration in monitoring and conserving island biodiversity.

# O10

# LANDSLIDE RESTORATION USING NATURE-BASED SOLUTIONS IN THE PICO DA VARA/RIBEIRA DO GUILHERME SPECIAL PROTECTION AREA (SÃO MIGUEL, AZORES)

**Yasmin Redolosis[1]; Tarso Costa[1,2]*; Lourdes Peñil[3,4]; Azucena De La Cruz[1]; Rui Botelho[1]**

1 Sociedade Portuguesa para o Estudo das Aves, Portugal, yasmin.redolosis@spea.pt, tarso.costa@spea.pt, azucena.martin@spea.pt, rui.botelho@spea.pt

2 cE3c—Centre for Ecology, Evolution and Environmental Changes & ABG—Azorean Biodiversity Group, Faculty of Sciences and Technology, University of the Azores, Portugal

3 Regional Directorate for Forest Resources and Spatial Planning (DRRFOT), Portugal, Lourdes.P.Penil@azores.gov.pt

4 Department of Forestry Engineering-University of Córdoba. Edda.Leonardo da Vinci, Campus Rabanales, Spain

*Corresponding author

## Abstract

Due to the orography, soil characteristics and high rainfall, landslide events are frequent in the Azores. Landslides create open areas that are generally occupied by invasive alien plant species (IAS), further contributing to the degradation of natural habitats such as the Pico da Vara/Ribeira do Guilherme Special Protection Area on São Miguel Island. In 2015, the LIFE+ Lands of Priolo project implemented Nature-based Solutions (NBS) to stabilise landslides and support habitat restoration. To evaluate the effectiveness of the intervention and to assess the ecological restoration a decade after the execution of this work, this study presents monitoring data from five restored sites and compares them to three different reference states in non-intervened slopes: dominated by exotic vegetation, dominated by native species and an intermediate state.

No landslide events have occurred on the restored and control areas in the last 10 years, and surface hydric erosion was negligible. As expected, the NBS present structurally functional vegetation cover. All species used in hydroseeding, selected among native and endemic species present in this habitat, showed germination. *Leontondon rigens*, *Festuca francoi* and *Luzula purpureosplendens* showed the highest germination rates (0.22, 0.10 and 0.01 plants per square meter, respectively), while *Calluna vulgaris*, *Erica azorica*, and *Hypericum foliosum* showed less than 0.003 plants per square meter. Spontaneous germination was higher for native species (72.5%), although the number of exotic species recorded (n = 13) was higher than for native species (n = 6). The species used in the hydroseeding accounted for 82.5% of the total germination. After 10 years, the vegetation covers of the restored slopes showed an average of 87.9% native species. The most representative native species in the restored slopes were the moss *Sphagnum* sp., the shrub *Calluna vulgaris*, the fern *Woodwardia radicans* and the herbaceous *Festuca francoi*. From these species, only seeds from *Calluna vulgaris* and *Festuca francoi* were used in hydroseeding. One the other hand, the most representative exotic species on these slopes were the herbaceous *Polygonum capitatum*, *Poa* sp. and *Erigeron* sp., and the fern *Dicksonia antarctica*.

Multivariate analysis revealed that most of the restored slopes were closely related to the control area, which was dominated by native species. The best results were obtained when the herbaceous layer had lower diversity and higher dominance of native species (particularly *Sphagnum* sp., *Woodwardia radicans* and *Festuca francoi*). Plant cover has proved to be a reliable indicator for assessing the performance of the NBS, and continued monitoring is essential to fill the gaps for the effective and successful implementation of future projects. The information generated by the NBS monitoring plan in this case study will be useful for improving the methodology in new interventions for slope restoration and NBS implementation.

# O09

# RESTORATION OF A LAUREL FOREST ALONG AN ALTITUDINAL GRADIENT (300 TO 900 M) IN SÃO MIGUEL, AZORES: ASSESSMENT AND ACTIVE MANAGEMENT PROPOSAL

**Tarso Costa[1,2]*; Lourdes Peñil[3,4]; Filipe Figueiredo[1] & Rui Botelho[1]**

1 Sociedade Portuguesa para o Estudo das Aves, Portugal, tarso.costa@spea.pt, filipe.figueiredo@spea.pt, rui.botelho@spea.pt

2 cE3c—Centre for Ecology, Evolution and Environmental Changes & ABG—Azorean Biodiversity Group, Faculty of Sciences and Technology, University of the Azores, Portugal

3 Regional Directorate for Forest Resources and Spatial Planning (DRRFOT), Portugal, Lourdes.P.Penil@azores.gov.pt

4 Department of Forestry Engineering - University of Córdoba, Edda.Leonardo da Vinci, Campus Rabanales, Spain

*Corresponding author

## Abstract

As part of the LIFE+ Lands of Priolo project (LIFE12 NAT/PT/000527), we have implemented the action "Environmental requalification project for the creation of an altitudinal gradient of vegetation" which aimed to develop the ecological restoration of a 24-hectare area, ranging from 300 to 900 height in the Pico da Vara/Ribeira do Guilherme Special Protection Area. Before the intervention, this area consisted of laurel forest with high levels of invasive alien species (IAS) at higher altitudes and patches dominated by IAS, particularly incense tree (*Pittosporum undulatum*), in the lowlands. The present study has been conducted to evaluate the ecological restoration by means of analysing two indicators, namely vegetation and the Passeriformes communities.

A total of 8 vegetation plots (100 square meters) were monitored: 3 plots as a reference for poor ecological status (dominated by IAS); 4 plots located within the intervention area; and 3 plots selected as a reference for good ecological status. Plots were monitored between 2015 and 2024, and data collection consisted of identifying and recording each plant species in three development classes (tree, sapling and seedling). The Passeriformes community was assessed by comparing the intervention area with three control areas during both the spring and winter months: two areas dominated by IAS, while the third area was dominated by native species.

*Picconia azorica* was the species that showed the greatest reduction in abundance after the plantations. When analysing the seedling and tree classes alongside the planting data, it was clear that *E. azorica* and *Frangula azorica* showed the highest natural regenerations, i.e., propagation from planted individuals. The density of native species in 2025 varied between 0.5 and 1.0 ind./m2. The most prevalent IAS were *Rubus* sp., *Hedychyum gardneranum* and *Cyathea cooperi*, reaching densities up to 0.6 ind./m2. The most substantial growth has been observed in the native *Morella faya* and *Prunus azorica* trees, with annual increments of approximately one meter being recorded. Multivariate analyses demonstrate that the monitoring plots progressively distanced themselves from the exotic control plots between 2015 and 2024, increasingly resembling the good status control plots. The study of the Passeriformes community demonstrates that the intervention area exhibited diversity and composition more closely resembling that of the area dominated by native vegetation.

To improve the restoration results, it is recommended to take the following management actions: i) strengthen the plantation with the high-growing species (*M. faya* and *Prunus azorica*) and the main self-propagating species (*E. azorica* and *F. azorica*); ii) increase the density of *Ilex azorica* due to its ecological role for the conservation of the Azores Bullfinch, and; iii) control the main identified IAS, especially *Rubus* sp.

# O11

# PEAT BOG RESTORATION IN THE AZORES: ASSESSING PAST ACTIONS AND DEVELOPING A NEW OPERATIONAL PLAN FOR A NATURA 2000 SITE IN SÃO MIGUEL ISLAND

**Rui Botelho[1]*; Tarso Costa[1,2]; Lourdes Peñil[3,4]; Diana Fernandes[5] & Pedro Teiga[5]**
1 Sociedade Portuguesa para o Estudo das Aves, Portugal, rui.botelho@spea.pt
2 cE3c—Centre for Ecology, Evolution and Environmental Changes & ABG—Azorean Biodiversity Group, Faculty of Sciences and Technology, University of the Azores, Portugal, tarso.costa@spea.pt
3 Regional Directorate for Forest Resources and Spatial Planning (DRRFOT), Portugal, Lourdes.P.Penil@azores.gov.pt
4 Department of Forestry Engineering - University of Córdoba. Edda.Leonardo da Vinci, Spain
5 E.Rio, Leonardo Coimbra Street, 27, 4200-365, Porto, Portugal, geral@erio.pt
*Corresponding author

## Abstract

The central area of the Graminhais plateau is home to the largest patch of peat bog on São Miguel Island. It is partially included in the Pico da Vara/Ribeira do Guilherme Special Protection Area and is fully protected by the Serra da Tronqueira/Planalto dos Graminhais Special Conservation Area. Despite its ecological importance and the provision of a series of ecosystem services, the area was historically used for grazing cattle and exotic conifer plantations. Other threats to its conservation were the presence of invasive alien species (IAS), the destruction of riparian galleries, and impacts caused by visitors through trampling and the circulation of off-road vehicles.

Between 2009 and 2013, under the LIFE+ Sustainable Laurel Forest project (LIFE07/NAT/P/000630), active management measures were implemented in an area of 75 hectares of the Graminhais peat bog by promoting the development of native plant communities and recovery of hydric dynamics in this habitat. To achieve these goals, water retention has been promoted through the use of a variety of techniques, including the construction of micro-weirs using nature-based solutions and other materials. To restore the plant community, IAS were controlled, Sphagnum spp. were inoculated and native species were planted.

The first results, taken between 2010 and 2013, showed that the water retention measures implemented were effective. In this analysis, the water depth of 10 selected sites was higher compared to their controls. After ten years, the plant community changed from herbaceous to Polytrichum and Sphagnum dominated on the intervened sites. In 2023, hydrological monitoring was implemented to assess the long-term effects of the restoration by analysing rainfall, water depth in the peat bog and flow in the adjacent stream, with data collected at an hourly resolution. The results show that unrestored sites present higher variation in the water levels in comparison with restored sites, especially during heavier rainfall. Response period streamflow was more related to water levels at the unrestored site than the restored site. However, between rainfall events, stream discharge was mostly related to the water level of the restored site. These results show that stream flow is sensitive to the high-water level oscillations observed at the unrestored site. It is therefore an effective tool for assessing the recovery of sponge function.

In 2024, new conservation efforts were launched under the LIFE IP Azores Natura project (LIFE17 IPE/PT/000010) for the restoration of a basin of 38 hectares in the Graminhais Plateau. The restoring plan is based on the most innovative techniques for sponge functions recovery of freshwater ecosystems outlined during the Spongeboost project (Horizon/101112906). The Graminhais Plateau is one of the selected sites to implement and test innovative water retention measures, in which the findings will be useful for upscaling sponge solutions from local to European levels.

# O26

# THE CONSERVATION OF ENDEMIC SPECIES AND NATURAL SPACES IN GRAN CANARIA: KEY ENVIRONMENTAL DRIVERS OF PLANT DIVERSIFICATION, AND RESILIENCE OF HABITATS IN THE FACE OF GLOBAL CHANGES

**Juli Caujapé-Castells[1]*; Isabel Saro[1]; Ruth Jaén-Molina[1]; Antonio Díaz-Pérez[3]; Daniel Reyes[2]; Rafael Nebot[2]; Inmaculada Guillermes-Vázquez[1]; Miguel Ángel González-Pérez[1]; Alejandro Curbelo[2]; Carlos Caraballo[2]; María Olangua-Corral[1]; Águedo Marrero[1]; Carlos García-Verdugo[4]; Isabel Sanmartín[5]; Javier Fuertes[5]; Irene Guerra Déniz[6] & Juan Francisco Rodríguez[2]**

1 Jardín Botánico 'Viera y Clavijo'-Unidad Asociada de I+D+i al CSIC, Cabildo de Gran Canaria, Camino del Palmeral 15, 35017 Las Palmas de Gran Canaria, Spain; julicaujape@gmail.com

2 Instituto Tecnológico de Canarias, C. Cebrián s/n, 35003 Las Palmas de Gran Canaria, Spain

3 Gestión y Planeamiento Territorial y Medioambiental, S.A., C. León y Castillo 54, 35003 Las Palmas de Gran Canaria, Spain

4 Depto. de Botánica, Universidad de Granada, Facultad de Ciencias, Avenida de Fuente Nueva, s/n, 18071 Granada, Spain

5 Real Jardín Botánico, CSIC, Plaza Murillo 2, 28014 Madrid, Spain

6 Escuela de Ingeniería Informática, Universidad de Las Palmas de Gran Canaria, 35017 Las Palmas de Gran Canaria, Spain

*Corresponding author

## Abstract

Gran Canaria is a considerably old oceanic island (ca. 15.5 Mya) in the Canarian archipelago. Despite featuring a small size (about 1,560 km2), Gran Canaria contains a remarkable plant diversity, largely explained by the island's great geographical and ecological complexity in a context of recurrent cycles of genetic isolation, admixture and migration throughout its geological ontogeny, which foster an overall fast evolutionary turnover in the endemic flora, similarly as in all other islands of the Canarian archipelago. Both the complex geographical and biological settings of Gran Canaria, and the additive impacts of anthropogenic variables on biodiversity (e.g., exacerbated tourism, sustained increase of resident population, invasive species, or changes in land use), pose daunting challenges for the environmental management of the endemic flora and the Protected Natural Areas of the island. By knowing how the endemic flora in this island is influenced by biotic and abiotic variables, we can grasp a better notion of the impacts of global changes on biodiversity, while refining our understanding of plant diversification. The great natural complexity of Gran Canaria makes it an ideal first study-case to derive lessons for similar analyses planned in the remaining Canarian and Macaronesian islands. In this investigation, we use data on 95 biotic and abiotic variables (including genetic and phylogenetic diversity) in the distribution ranges of each of the ca. 260 Canarian plant endemics known to reside in the island of Gran Canaria to address three main questions. First, which are the key environmental drivers that stimulate the diversification of the endemic Angiosperm flora of Gran Canaria? Second, what areas of this island are most and least resilient to environmental change? And third, what is the extent of anthropogenic influence in the endemic species within and outside the Protected Natural Areas? All the variables used and the species distribution ranges were compiled and analysed with the information platform created by the NEXTGENDEM project (MAC2/4.6d/236), so this communication will also serve to exemplify how the analysis of multiple georeferenced biotic and abiotic data layers using this platform may contribute answers to important plant conservation queries, and provide decision makers with evidence-based indications to help preempt environmental problems and tackle pressing concerns on the conservation of endemic species and natural spaces.

# RESEARCH TALKS 7 - Biodiversity and Conservation

## O20

## EFFECTS OF OCEAN LIMING ON PLANKTONIC MICROBIAL COMMUNITIES

**Inês de Castro[1]*; Susana C. Ribeiro[2]; António Louvado[3]; Mário Cachão[4]; Newton Gomes[3]; Eduardo Brito de Azevedo[1] & Joana Barcelos e Ramos[1]**

1 Group of Climate, Meteorology and Global Change, IITAA- Institute of Agricultural and Environmental Research and Technology, University of the Azores, Portugal; inesmcastro@ua.pt

2 Group of Food Science and Health, IITAA- Institute of Agricultural and Environmental Research and Technology, University of the Azores, Portugal

3 Department of Biology and Centre for Environmental and Marine Studies (CESAM), University of Aveiro, Portugal

4 Instituto D. Luiz, University of Lisbon, Lisbon, Portugal; Department of Geology, Faculty of Sciences, University of Lisbon, Portugal

*Corresponding author

### Abstract

The continued rise in atmospheric $CO_2$ levels and the resulting global warming are making it increasingly challenging to keep global temperatures within the 1.5–2 °C limit outlined in the Paris Agreement. As a result, carbon dioxide removal strategies are gaining attention, with ocean alkalinity enhancement (OAE) emerging as a particularly promising approach. Among OAE methods, ocean liming—the addition of quicklime (CaO) or hydrated lime ($Ca(OH)_2$)—offers the dual benefit of atmospheric $CO_2$ removal and mitigation of ocean acidification. Despite its potential, the ecological safety and effectiveness of this approach remain largely untested. Here, we report the impacts of ocean liming on the abundance, community composition, and extracellular enzymatic activity (EEA) of a North Atlantic planktonic community. Our results show that OAE delayed phytoplankton development, particularly affecting diatoms. The bacterial community composition response to OAE was community-specific, although members of the order Oceanospirillales consistently responded in both communities. Additionally, OAE led to increased EEA rates, primarily within the bacterial community. While phytoplankton development appeared only marginally impacted, the observed shifts in bacterial composition and activity suggest that organic matter remineralization processes may be altered. If these patterns are consistent across different marine communities, OAE could induce short-term disruptions in microbial dynamics. Further research is essential to assess whether these effects persist over longer timescales and in diverse ecosystems.

# O34

# CHOOSE YOUR MENU – DIFFERENT DIETS FOR THE SHORE CRAB *PACHYGRAPSUS MARMORATUS* IN CAPTIVITY

**Nuno Vaz Álvaro**
UAc – IITAA, Universidade dos Açores, Portugal; nuno.ms.alvaro@uac.pt

## Abstract

*Pachygrapsus marmoratus* is a common and abundant species in Azorean shores that has potential to be an alternative food resource. The species is already harvested mostly has fish bate, but also as a regional appetizer. To prevent a possible increase in the capture of individuals, and higher pressure in the coastal habitats, a small exploratory aquaculture trial was carried out to study the possibility that these animals could be produced in captivity. With the aim of optimizing diets that would lead to a more efficient increase in weight and size, an experiment was carried out with 40 individuals, half females, half males, who were subjected to three types of food, two natural (frozen fish and macroalgae) and one artificial (cat snack) for two months). Each 10 individuals were fed with one food, and a final group of 10 were fed with the three food types, changing food every week, throughout the essay.

The results showed a more efficient response in the average development of specimens fed with fish and artificial food than those fed with macroalgae.

# O12

# PHYCOLOGY IN MACARONESIA: A PRISMA-BASED REVIEW OF RESEARCH TRENDS, KNOWLEDGE GAPS, AND EMERGING THREATS

**David Milla-Figueras[1,2,3]*; Ander Larrea[1]; Pedro Afonso[1,2] & Ester Serrão[3]**
1 OKEANOS – Centro I&D da Universidade dos Açores, Horta, Portugal; davidmfigueras@gmail.com
2 IMAR – Instituto do Mar, Departamento de Oceanografia e Pescas/Universidade dos Açores, Horta, Portugal
3 Centro de Ciências do Mar (CCMAR), Universidade do Algarve, Portugal
*Corresponding author

## Abstract

Macroalgae are essential components of marine ecosystems, contributing to biodiversity, primary productivity, and the functioning of coastal habitats. In the Macaronesian archipelagos—which includes the Azores, Madeira, the Canary Islands, and Cape Verde—seaweeds not only hold ecological and economic value but also serve as indicators of environmental change. This region is experiencing increasing pressures from multiple fronts, including climate change, invasive species, habitat degradation, and other natural and anthropogenic impacts. These stressors are driving shifts in coastal ecosystems, often resulting in the simplification of structurally complex habitats such as marine forests.

To better understand the current state of knowledge on macroalgae in Macaronesia, we conducted a systematic literature review following PRISMA guidelines. This study aims to map research output across islands, identify the most studied taxa and topics, and highlight temporal trends and geographic biases. We assess which archipelagos and disciplines (e.g., taxonomy, ecology, biotechnology, toxicology) are best represented, and where critical knowledge gaps remain.

Our findings provide an overview of how phycological research in Macaronesia has evolved, what has been done, and what remains to be addressed. By adopting a holistic perspective, this review supports the development of more integrated and adaptive management strategies that can respond to the region's growing environmental challenges.

# O16

# DIVERSITY OF FLORA AND VEGETATION OF THE SALINAS DUNES (FOGO ISLAND, CABO VERDE)

**Isildo Gomes[1]*; Carlos Neto[2]; Maria Cristina Duarte[3]; Maria M. Romeiras[3]; S. Gomes[1]; R. Pires[5]; J. Correia[6] & José Carlos Costa[4]**

1 Instituto Nacional de Investigaçao e Desenvolvimento Agrario (INIDA), Cabo Verde; gomesisildo56@gmail.com

2 Centre for Geographical Studies, Institute of Geography and Spatial Planning (IGOT), Universidade de Lisboa, Portugal

3 cE3c - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Faculdade de Ciˆencias, Universidade de Lisboa, Portugal

4 LEAF – Linking Landscape, Environment Agriculture and Food Research Center, Associate Laboratory TERRA, Instituto Superior de Agronomia, Universidade de Lisboa, Portugal

*Corresponding author

## Abstract

The dunes of Salinas are located in the northeast of the island of Fogo, above a coastal platform and approximately 500 m from the village of São Jorge, in a strip interspersed downstream of the Campanas and São Jorge streams. The Salinas dune system was established on a coastal shelf, gently sloping towards the sea, above approximately 30 m above sea level, on top of a lava mantle composed of nephelites and limburgites, of geological activity prior to the formation of the caldera, and with recent, fine pyroclastic materials. Inserted in the semi-arid zone, the dune system of Salinas, the only dune system covered with vegetation on the island of Fogo, has different types of soils, namely Lithosols, Coluvissolls and Vitric Andosols (Diniz & Matos, 1987), presenting itself with varying thicknesses, from large deposits of black sand to deposits of very low thickness.

In order to study the diversity of flora and vegetation of the Salinas dunes, 12 phytosociological inventories were carried out, according to the principles of the landscape sigmatist school of Zürich-Montpellier (Braun-Blanquet, 1965; Géhu & Rivas-Martínez, 1980; Rivas-Martínez, 2005). For each inventory, several ecological factors were noted, namely distance from the sea, exposure, season humidity, soil type, dune morphology, latitude, longitude; anthropogenic actions and flora species and their respective degrees of cover were also recorded.

The preliminary treatment of the collected botanical data points to the occurrence of 26 species of angiosperms, belonging to 24 genera and 12 families. The floristic list includes 17 native species, of which seven are endemic to Cabo Verde, and nine are introduced. From this floristic composition, 11 forage species, five medicinal species and six species with relevant role in the fixation of dunes stand out. Of note are the records of *Tamarix senegalensis* (classified as vulnerable on the National Red List), for the first time on the island of Fogo, and *Canavalia rosea*, for the first time in Cabo Verde.

The dominant taxa were *Ipomoea pes-caprae* subsp. *brasiliensis*, *Cyperus crassipes*, *Paronychia illecebroides* and *Canavalia rosea*, covering large dune surfaces, and other companion species of remarkable ecological and scientific value, such as *Daucus humilis*, endemic exclusively to the island of Fogo, *Nanorrhinum elegans*, *Asparagus squarrosus*, *Asteriscus daltonii* subsp. *vogelii*, *Lotus purpureus* and *Polycarpaea caboverdeana*.

# RESEARCH TALKS 8 - Evolution

## O15

## GENETIC AND ENVIRONMENTAL CORRELATION IN HIGH-MOUNTAIN SPECIES IN LA PALMA AND TENERIFE

**Sonia Sarmiento Cabello*; Priscila Rodríguez-Rodríguez, Pedro A. Sosa**
Instituto Universitario de Estudios Ambientales y Recursos Naturales (IUNAT), Universidad de Las Palmas de Gran Canaria, Spain; sonia.sarmiento@ulpgc.es
*Corresponding author

### Abstract

Dispersal plays a central role in shaping the ecological and evolutionary dynamics of populations and communities. However, the influence of seed dispersal mechanisms on plant genetic differentiation has been comparatively less studied than that of pollen dispersal, especially in environmentally heterogeneous oceanic island landscapes. This study examines the interplay between environmental variation, seed dispersal strategies, and genetic structure in nine plant species native to the Canary Islands of La Palma and Tenerife. These islands present pronounced environmental gradients in climate and topography, offering a natural context to investigate how dispersal mediates genetic makeup. We analyzed genetic composition and environmental factors across species exhibiting diverse seed dispersal modes, including long (anemochory, zoochory) and short (barochory, ballistic) distance seed dispersal mechanisms. Our findings reveal consistent patterns of genetic differentiation both between and within islands. Notably, species with limited dispersal capacity exhibited stronger genetic structuring in areas with high environmental contrast within islands. On the other hand, species with long-distance dispersal modes displayed weaker genetic differentiation across similar gradients. These results suggest that seed dispersal strategies can influence spatial genetic patterns, although the strength and consistency of this effect may vary across species with varying demographic characteristics. This work advances our understanding of how dispersal ecology and environmental variation jointly influence plant population genetics.

# O31

# EVOLUTION, DIVERSITY AND CONSERVATION OF THE CABO VERDE FLORA: DIFFERENT APPROACHES AND CURRENT KNOWLEDGE

**Maria M. Romeiras[1,2]*; Isildo Gomes[3]; Juli Caujapé-Castells[4] & Maria Cristina Duarte[2]**

1 LEAF – Linking Landscape, Environment Agriculture and Food Research Center, Associate Laboratory TERRA, Instituto Superior de Agronomia, Universidade de Lisboa, Tapada da Ajuda, 1349-017 Lisboa, Portugal; mmromeiras@isa.ulisboa.pt

2 CE3C – Centre for Ecology, Evolution and Environmental Changes, CHANGE – Global Change and Sustainability Institute, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal

3 Instituto Nacional de Investigação e Desenvolvimento Agrário de Cabo Verde (INIDA), São Jorge dos Órgãos, Santiago, Cabo Verde

4 Jardín Botánico Viera y Clavijo-Unidad Asociada de I+D+i al CSIC (Cabildo de Gran Canaria), Camino del Palmeral 15, Las Palmas de Gran Canaria, 35017, Spain

*Corresponding author

## Abstract

Islands are perfect hotspots to understand how species diversification processes take place. Dramatic evolutionary changes over relatively short time scales occur in plant species isolated on islands. The Macaronesian archipelagos (i.e., the Azores, Madeira, Selvagens, Canary Islands and Cabo Verde) are home to biotas with exceptionally high levels of endemism. Such is the case of vascular plants, which include some of the most important radiations in this region. In the Macaronesian region, the islands of Cabo Verde are good systems to study processes promoting lineage divergence, especially due to different islands' ages and diverse habitats occurring across small spatial scales. The archipelago of Cabo Verde harbours a high diversity of endemics that are mainly found in the northern (Santo Antão, São Vicente, and São Nicolau) and southern islands (Santiago, Fogo and Brava), where the mountainous areas offer a wide range of habitats in relatively restricted areas. This communication presents recent studies carried out by the author and collaborators, and provides an overview of the current knowledge of the plant diversity in these islands, namely the taxonomy of the native species, their conservation status and the results of molecular studies performed on Macaronesian endemic flora. The new research initiatives jointly developed by European and Cabo Verde institutions will also be presented, highlighting the most important projects, which have contributed new data to promote the conservation of plant diversity and sustainable management of natural resources in Cabo Verde.

# RESEARCH TALKS 9 - Evolution and Conservation

## O24

## ON THE ALIEN VS. NATIVE ENIGMA – DISENTANGLING THE CRYPTOGENIC ORIGIN OF ASTERACEAE SPECIES IN THE CANARY ISLANDS

**Louis S. Jay-García[1,2]*; Yurena Arjona[1,2]; Juli Caujapé-Castells[3]; Juan A. Calleja[4]; Sebastien Mirolo[1,5]; Javier Morente-López[6]; Fouad Msanda[7]; Cherif Harrouni[8]; Agustín Naranjo Cigala[9]; Raúl Orihuela-Rivero[1,2]; Miguel A. Padrón-Mederos[10]; J. Alfredo Reyes-Betancort[10]; Marcos Salas-Pascual[9]; Guillermo Sicilia-Pasos[1,2]; Daniel Wegmann[11,12]; Xenia Wietlisbach[11,12] & Jairo Patiño[1,2]**

1 Universidad de La Laguna (ULL), San Cristóbal de La Laguna, Tenerife, Spain; louissjaygarcia@gmail.com
2 Instituto de Productos Naturales y Agrobiología (IPNA-CSIC), San Cristóbal de La Laguna, Tenerife, Spain.
3 Jardín Botánico Canario "Viera y Clavijo" - Unidad Asociada de I+D+i al CSIC, Cabildo de Gran Canaria, Spain.
4 Universidad Autónoma de Madrid, Madrid, Spain.
5 University of Liège (ULiège), Liège, Belgium.
6 Department of Plant Evolutionary Ecology, Goethe-University Frankfurt, Frankfurt am Main, Germany
7 Hassan II Institute of Agronomy and Veterinary Sciences, Agadir, Morocco.
8 Ibn Zohr University, Agadir, Morocco.
9 Universidad de Las Palmas de Gran Canaria, (ULPGC), Las Palmas de Gran Canaria, Spain.
10 Jardín de Aclimatación de la Orotava - Instituto Canario de Investigaciones Agrarias (JAO -ICIA), Puerto de la Cruz, Tenerife, Spain.
11 University of Fribourg, Fribourg, Switzerland.
12 Swiss Institute of Bioinformatics, Fribourg, Switzerland.
*Corresponding author

### Abstract

A species is classified as cryptogenic when there is no conclusive evidence to determine its origin (i.e. native or introduced). In the Canary Islands, this classification is particularly common for species native to the West of the Mediterranean basin and those that possess long-distance dispersal mechanisms. Distinguishing between natural colonization and (sub-)historic anthropogenic introductions becomes a significant challenge in these cases, leading to the use of uncertain categories of origin. Accurately identifying exotic species among cryptogenics is crucial for effective conservation management, especially in the context of oceanic island systems, where invasive species can have devastating impacts. While several methodologies have been proposed, a robust and evidence-based framework for assessing the origin of cryptogenic plant species is still lacking.

Here, we propose the use of ddRAD-seq in combination with demographic models for assessing the cryptogenic status of Canarian vascular plant species. We selected several species of uncertain origin within the three main subfamilies of the Asteraceae family, a diverse group with varying ecological strategies and a significant presence in the Canarian flora. Our study aimed to test which demographic scenario best explains the observed spatial distribution of genomic variation between the continental and insular distribution ranges. Specifically, we collected samples from all eight main islands and two adjacent continental areas: the Macaronesian enclave of Morocco and the South Iberian Peninsula. We built and sequenced ddRAD-seq libraries, to evaluate the different hypothetical scenarios and estimate the archipelago colonization time of each species.

We have found two clear and contrasting patterns among the studied species. On one hand, several ruderal species exhibited patterns consistent with single and multiple colonization events from the South Iberian Peninsula and/or Morocco occurring between the late Pleistocene and early Holocene. These species fit demographic models that support natural colonization processes. On the other hand,

we identified species displaying genetic signatures indicative of a clear introduction during historic times, or consistent with human-mediated naturalization. The benefit of our methodology is manifold: by accurately identifying human-introduced species, conservation efforts can be better targeted, potentially prioritizing management or eradication strategies for these taxa. Furthermore, our cost-effective genome-wide approach provides a valuable framework that can be applied to resolve the cryptogenic status of species in other study systems, from species to regions facing similar challenges in disentangling natural and anthropogenic influences on biodiversity.

# O23

# UNRAVELING THE EVOLUTIONARY HISTORY OF THE WOODY SONCHUS ALLIANCE (COMPOSITAE, CICHORIEAE) IN THE CANARY ISLANDS THROUGH PHYLOGENOMICS

**Oscar Castillo[1,2]; Yurena Arjona[1,2] ; Louis S. Jay-García[1,2]; J. Alfredo Reyes-Betancort[3]; Javier Morente-López[1]; Marcos Salas-Pascual[4]; Agustín Naranjo-Cigala[5]; Guillermo Sicilia-Pasos[1,2]; Miguel A. Padrón-Mederos[3]; Raúl Orihuela-Rivero[1,2]; Rafaela González-Montelongo[6] & Jairo Patiño[1,2]**

[1]Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología, Consejo Superior de Investigaciones Científicas (IPNA-CSIC), Tenerife, Spain. oscar3.ad@gmail.com
[2]Department of Botany, Ecology and Plant Physiology, University of La Laguna (ULL), Tenerife, Spain.
[3]Jardín de Aclimatación de La Orotava, Instituto Canario de Investigaciones Agrarias (ICIA), Tenerife, Spain.
[4]Instituto de Estudios Ambientales y Recursos Naturales (IUNAT), University of Las Palmas de Gran Canaria (ULPGC). Gran Canaria, Spain.
[5]Department of Geography, University of Las Palmas de Gran Canaria (ULPGC), Gran Canaria, Spain.
[6]Genomics Division, Instituto Tecnológico y de Energías Renovables (ITER). Plataforma genómica de alto rendimiento para el estudio de la biodiversidad, ITER, Unidad Asociada al CSIC por el IPNA-CSIC, ITER, Polígono Industrial de Granadilla, 38600. Santa Cruz de Tenerife, Spain.
*Corresponding author

## Abstract

The woody *Sonchus* Alliance is an iconic example of island plant radiation in Macaronesia. It comprises a morphologically and ecologically diverse clade of predominantly insular endemics within the genus *Sonchus* L. (subtribe Hyoseridinae, tribe Cichorieae, Compositae). Despite being considered as a textbook case of adaptive radiation, the evolutionary history and phylogenetic relationships within this alliance remain to some extent unresolved. Previous studies, based on limited molecular markers, have not yielded a well-supported backbone, and the delimitation of genera and infrageneric taxa remains contentious.

To address these limitations, we have employed next-generation sequencing (NGS) technologies using the Compositae1061 COS probe set, enabling phylogenomic-scale resolution across the alliance. Our comprehensive sampling includes representatives of all major lineages currently assigned to the group: *Sonchus* (subg. *Dendrosonchus* and subg. *Sonchus*), *Babcockia*, *Sventenia*, *Lactucosonchus*, and *Chrysoprenanthes*. This dataset allows us to test monophyly, clarify interspecific relationships, and reassess the taxonomic classification proposed to achieve holophyly within *Sonchus* s.l.

Our preliminary results reveal a well-resolved phylogeny that helps to explain patterns of morphological evolution and ecological diversification of the group. Furthermore, our findings contribute to understanding the historical biogeography of Sonchus in the Canary Islands. Beyond the woody alliance, our work also contributes to the broader revision of Sonchus, addressing longstanding questions regarding its origin, paraphyly, and nomenclatural challenges. Our study underscores the transformative power of phylogenomics for resolving complex evolutionary histories in insular floras and highlights the need for integrative taxonomic frameworks that incorporate molecular, morphological, ecological, and chorological evidence.

# O25

## BIOMONI-GENES: ADVANCING DNA-BASED BIODIVERSITY MONITORING ON OCEANIC ISLANDS

**Paloma Martínez-Boix[1]*; Brent C. Emerson[1]; Abraham Padilla[1]; Javier Tuero-Septién[1]; Agustín Naranjo-Cigala[2]; Nereida M. Rancel-Rodríguez[3]; Ana Losada-Lima[3]; Lúcia Bernardos-Concepción[1]; Carmen Balibrea-Escobar[1]; Raúl Orihuela-Rivero[1,3]; Óscar Castillo-Agudo[1] & Jairo Patiño[1]**

1 Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología, Consejo Superior de Investigaciones Científicas (IPNA-CSIC), Tenerife, Spain; paloma.boix@ipna.csic

2 Department of Geography, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain

3 Department of Botany, Ecology and Plant Physiology, University of La Laguna, Tenerife, Spain

*Corresponding author

### Abstract

BiomonI is part of the Biodiversa+ initiative, a collaborative effort to establish a long-term international biodiversity monitoring network for oceanic islands. The project aims to develop standardized methodologies to evaluate biodiversity and ecosystem function, with an eye toward conservation in the face of global pressures such as climate change, habitat degradation, and invasive species. As part of this initiative, the BioMonI-Genes work package, led by two laboratories from the Island Ecology and Evolution Group (GEEI) at the Spanish National Research Council (CSIC), focuses on often-overlooked dimensions of biodiversity in oceanic island flora and invertebrate fauna. Focused on Tenerife (Canary Islands), BioMonI-Genes employs DNA-based monitoring to explore patterns of phylogenetic diversity and community structure.

We combine Sanger and high-throughput sequencing (HTS) technologies to optimize molecular strategies for capturing biodiversity across habitats and spatial scales. Four permanent 50 × 50 m plots have been established in the Anaga Rural Park's laurel forest, a biodiversity hotspot within the Canaries. Sampling encompasses major plant lineages, including vascular plants, ferns, bryophytes, and green microalgae, building a representative DNA-based approach for multi-level biodiversity. Sequencing of hundreds of low-copy nuclear exons and flanking regions supports our robust genomic barcoding framework. In parallel, passive trapping and DNA barcoding of flying invertebrates allow us to explore community composition and address the "dark taxa" challenge, organisms poorly represented in traditional taxonomic and ecological studies.

By advancing integrative molecular tools and scalable monitoring protocols, BioMonI-Genes lays the groundwork for robust, long-term biodiversity assessments. This effort is not only about cataloguing life, but about equipping island ecosystems with the scientific insight needed to navigate the accelerating impacts of global change.

# POSTERS

## Biodiversity

## P04

### PLIOCENE LAVA TREE MOULDS FROM LA LAGUNA, TENERIFE ISLAND, SPAIN

**C. A. Góis-Marques[1,2,3,4]*; M. C. Velasco-Flores[5]; M.C. Martín-Luis[5] & C. Castillo-Ruiz[5]**
1 Madeira Botanical Group (GBM), Faculdade de Ciências da Vida, Universidade da Madeira, Funchal, Portugal, c.goismarques@gmail.com
2 BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Vairão, Portugal
3 CIBIO, InBIO Laboratório Associado, Universidade dos Açores, Ponta Delgada, Portugal
4 Instituto Dom Luiz (IDL), Laboratório Associado, Universidade de Lisboa, Lisboa, Portugal
5 Departamento de Biología Animal, Edafología y Geología, Facultad de Ciencias, Universidad de La Laguna, Tenerife, Spain.
*Corresponding author

**Abstract**

Lava tree moulds are plant fossils found associated with basaltic (s.l.) lava flows worldwide, and especially abundant in Holocene lava flows, becoming rarer in older rocks. In the volcanic Macaronesian Islands, these types of plant fossils are well-known but rarely mentioned in the geological or palaeobotanical literature, despite their potential to reveal the past presence of trees and forested ecosystems. Recent palaeobotanical prospection of Tenerife Island of sites mentioned in literature, led us to prospect the San Roque locality, near the city of La Laguna. There, we found lava tree moulds preserved within a Pliocene Anaga shield volcano (4.89 to 3.28 Ma) a'a lava flow outcropping in San Roque Mountain, La Laguna, Tenerife Island. The size and stem habit indicate that the fossils belonged to phanerophytes (trees and shrubs), implying the presence of possible forest ecosystem during the Pliocene of Tenerife. When compared to the palaeobotanical record of Tenerife Island, these fossils are, so far, the oldest known plant fossils from this island. Unfortunately, due to total combustion of the wood and lack of diagnostic characters, taxa identification is not possible. Despite this, the locality should be further assessed as a potential geosite or other form of conservation for the Canary Islands' paleontological heritage, providing awareness of the palaeobotanical record of Tenerife and the Canary Islands. Further prospection in Anaga shield volcano will certainly yield new palaeobotanical data for Tenerife and the Canary Islands.

# P12

# SPORE MORPHOLOGY OF THE MACARONESIAN ENDEMIC MOSS ALOPHOSIA AZORICA (REN. ET CARD.) CARD. (POLYTRICHOPSIDA, POLYTRICHACEAE)

**Leila Nunes Morgado[1]*; Rosalina Gabriel[1]; Cecília Sérgio[2] & Vania Gonçalves-Esteves[3]**

1 cE3c- Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group, CHANGE – Global Change and Sustainability Institute, School of Agricultural and Environmental Sciences, University of the Azores,, Portugal; lmorgado2024@gmail.com; Rosalina.ma.gabriel@uac.pt

2 MUHNAC - Museu Nacional de História Natural e da Ciência. Universidade de Lisboa/ cE3c- Centre for Ecology, Evolution and Environmental Changes / Natural History & Systematics (NHS) CHANGE – Global Change and Sustainability Institute, Lisbon, Portugal; csergio@fc.ul.pt

3 Universidade Federal do Rio de Janeiro, Museu Nacional, Departamento de Botânica, Laboratório de Palinologia, Quinta da Boa Vista, São Cristóvão, Rio de Janeiro, Brazil; esteves.vr@gmail.com

*Corresponding author

## Abstract

The *Alophosia azorica* (Ren. & Card.) Card., the single species of the genus *Alophosia*, is currently restricted to the Azores and Madeira, although it is hypothesized that this lineage may have had a more extensive historical distribution. Studies on the morphology and systematics of this Macaronesian endemic species have contributed to increasing our knowledge of this species of the Polytrichaceae group. Bryophyte spores are produced through meiosis in the capsules and are crucial for the dissemination and propagation of these plants. Palynological studies of spores have yielded significant insights into the delineation of taxonomic groups, life strategy and functional traits, enhancing our understanding of bryophytes. Therefore, this study aims to fill this gap by providing a detailed analysis of the spore morphology and ultrastructure of *A. azorica*, reviewing its morphological characteristics as reported in the literature, and clarifying its life strategy. The specimens used in this study came mainly from the Bryophyte section of the Herbaria of the University of the Azores and the University of Lisbon, but fresh samples were also collected in the field for this study. Observations and measurements of the stem, leaves, rhizoids, capsule, and seta were conducted for comparison with existing literature. Sporophytes from five specimens of *A. azorica* were separated to study spore morphology using Light Microscopy and Scanning Electron Microscopy. The specimens investigated in this study exhibited the typical characteristics assigned to the species by different authors. The examined spores are isomorphic, monads, heteropolar with a subcircular amb, spheroidal in polar view, convex-plane in equatorial view, psilate exospore and presence of perispore with microechinate ornamentation, and are very small in size. *Alophosia azorica* is considered a colonist *sensu strictu* due to its small abundant spores, the production of sporophytes across two seasons, and the presence of asexual propagules, indicating a moderate reproductive effort.

# P07

## A MULTITAXA APPROACH TO BIODIVERSITY INVENTORY IN MATELA PROTECTED AREA (TERCEIRA, AZORES, PORTUGAL)

**Mariana A. Sousa[1]*; Lucas Lamelas-López[2]; Rui B. Elias[2]; Rosalina Gabriel[2] & Paulo A. V. Borges[2]**

1 Master in Nature Management and Conservation, University of the Azores Rua Capitão João d´Ávila, Pico da Urze, 9700-042, Angra do Heroísmo, Azores, Portugal, marianasousa@outlook.com

2 cE3c - Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group, CHANGE – Global Change and Sustainability Institute, School of Agricultural and Environmental Sciences, University of the Azores, Rua Capitão João d´Ávila, Pico da Urze, 9700-042, Angra do Heroísmo, Azores, Portugal, lucaslamelaslopez@gmail.com, rui.mp.elias@uac.pt; rosalina.ma.gabriel@uac.pt; paulo.av.borges@uac.pt

*Corresponding author

### Abstract

The project “Matela - an island of biodiversity / Matela – uma ilha de biodiversidade” aims to restore the native vegetation within the Azorean Protected Area of the Terceira Island Nature Park known as the "Protected Area for the Management of Habitats or Species of Matela" (TER08), situated on Terceira Island, the Azores Archipelago, Portugal. This small fragment of native forest, positioned at a low-medium altitude (300-400 m a.s.l.), is facing some conservation impacts as a consequence of the spread of different invasive exotic plant species, mainly *Pittosporum undulatum*, *Rubus ulmifolius* and *Hedychium gardnerianum*. The database we present encompasses five taxonomic groups, including bryophytes, vascular plants, arthropods, birds and mammals. It is derived from intensive sampling campaigns conducted in 2022, but some data from a previous vascular plant survey in 2015 were also included. The objective of this study was to provide an updated inventory of bryophytes, vascular plants, arthropods, birds and mammals within this protected area. In this way we are providing the reference conditions necessary for the monitoring of the impacts of the current ongoing restoration efforts within the project “Matela - an island of biodiversity”. Whenever feasible, the present inventory is juxtaposed with historical data from previous surveys conducted in Matela.

# P15

## IMPROVING THE BIODIVERSITY KNOWLEDGE IN THE AZORES: NEW RECORDS OF BRYOPHYTES AND LICHENS FOR SÃO JORGE ISLAND

**Gabriela M. Silveira[1]* & Rosalina Gabriel[2]**
1 University of the Azores, Portugal; gabimelosilveira2010@hotmail.com
2 cE3c- Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group, CHANGE – Global Change and Sustainability Institute, School of Agricultural and Environmental Sciences, University of the Azores, Portugal
*Corresponding author

### Abstract

Bryophytes and lichens, though taxonomically distinct, share key ecological traits: both groups are poikilohydric, lacking means of preventing evaporation, lacking roots, stems, and leaves, and being capable of colonising bleak and impervious substrates, such as bare rock, tree bark, and leaves. Both groups play important roles in ecosystem functioning, enhancing soil formation, facilitating nutrient cycling, and supporting microfaunal communities. Their often-overlooked diversity contributes significantly to the overall floristic richness of these insular habitats. São Jorge Island (Azores archipelago) is a case in point, with fewer records of lichens and bryophytes than other comparable-sized islands. Formed by fissural volcanism linked to the expansion of the Atlantic crust and the São Jorge Fault, the island is long (54 km) but only 6.9 km wide. The island features iconic fajãs—coastal flats formed by lava flows or landslides—and a central ridge of volcanic cones, including Pico da Esperança, its highest point at 1053 m a.s.l. São Jorge has been inhabited since the XIV century and is currently home to more than 8000 people. Originally covered by laurel and juniper forests, the vegetation has changed due to urban growth, agriculture, and the introduction of non-native invasive species. Secluded areas, mainly on slopes and cliffs, still occur, harbouring interesting, although not fully studied, plant communities. In the summer of 2014, RG conducted *ad-hoc* fieldwork within the framework of the MOVECLIM project, surveying 10 areas and collecting 120 samples, mostly bryophytes but also some lichens. Specimens were deposited in the Cryptogamic Collection of the Herbarium of the University of the Azores (AZU). For each sample, geographic data (coordinates, elevation) and environmental parameters (height above ground [cm], slope [º], exposure [º], light, moisture, and roughness [ordinal scales]) were recorded.After being air-dried, the specimens were identified by GMS and RG, using microscopes and floras/keys, and data logged (e.g. taxon, reproductive structures, cover, sociability) according to Darwin Core protocols. The list of species includes: (i) eight lichen species, four of which are new records to São Jorge (*Leucodermia leucomelos*, *Lobaria scrobiculata*, *Physciella chloantha*, *Pseudocyphellaria aurata*), (ii) two hornwort species (new record: *Phaeoceros laevis*); (iii) 38 liverworts (new record: *Frullania acicularis*), and, (iv) 47 moss species (new record: *Rhynchostegiella azorica*). The three most common species, with more than 20 records each, were *Heteroscyphus denticulatus*, an Azorean endemic, *Frullania acicular*is and *Lejeunea lamacerina*. Other interesting records are *Leucobryum albidum*, *Metzgeria furcata*, *Thamnobryum maderense*, *Marchesinia mackaii*, and *Telaranea europaea*. Updating the cryptogam species list for São Jorge provides a more robust baseline for detecting environmental change and informing conservation planning.

# P02

## CHARACTERISING FOREST STRUCTURE IN NATIVE AND EXOTIX WOODLANDS ON TERCEIRA (AZORES)

**Sébastien Lhoumeau[1]*; Rui B. Elias[1]; Dominik Seidel[2]; Rosalina Gabriel[1] & Paulo A. V. Borges[1,3,4]**

1 cE3c- Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group & CHANGE – Global Change and Sustainability Institute, School of Agricultural and Environmental Sciences, University of the Azores, Azores, Portugal; seb.lhoumeau@gmail.com

2 Department for Spatial Structures and Digitization of Forest, Faculty of Forest Sciences and Forest Ecology, University of Göttingen, Göttingen, Germany

3 IUCN SSC Atlantic Islands Invertebrate Specialist Group, Angra do Heroísmo, Azores, Portugal

4 IUCN SSC Species Monitoring Specialist Group, Angra do Heroísmo, Azores, Portugal

*Corresponding author

### Abstract

This study aims to identify the structural and compositional differences between native and exotic woodlands on Terceira Island, Azores. By analysing landscape, habitat, and microhabitat traits, we found that less accessible terrains are covered by the remnants of native forests. A more homogeneous structural complexity is exhibited, derived from the numerous branching patterns of the endemic vascular plant species. In contrast, exotic forests exhibit structural heterogeneity driven by mixed non-indigenous vascular plant species as a result of human actions such as afforestation and latter invasion of exotic tree species, after abandonment of the agricultural use. The ground and canopy layers in exotic forests were more invaded by non-indigenous species, while the understory demonstrated greater resilience by being mostly composed of indigenous species. Our findings highlight the structural and ecological differences between native and exotic woodlands, reflecting the historical transformation of forest cover in the Azores. These insights emphasize the urgent need for effective conservation actions and long-term monitoring. While protected areas exist, their management and enforcement are crucial to ensure the preservation of native forests and the control of invasive species in exotic woodlands.

# Eco Services

## P14

## MODELLING CURRENT FOREST CARBON STORAGE ON THE CANARY ISLANDS

**Rüdiger Otto[1,2] *; Elena Rocafull[2]; Natalia Sierra Cornejo[1,2]; Felipe Rodríguez[2]; Ricardo Ruíz-Peinado[3]; Juan José García Alvarado[2]; José María Fernández-Palacios[1,2]& Lea de Nascimento[1,2]**

1 Island Ecology and Biogeography Group, Instituto Universitario de Enfermedades Tropicales y Salud Pública de Canarias (IUETSPC), Universidad de La Laguna (ULL), La Laguna, Spain; rudiotto@ull.edu.es

2 Universidad de La Laguna, Spain

3 Department of Forest Dynamics and Management, Institute of Forest Science (ICIFOR-INIA), CSIC, Spain

*Corresponding author

### Abstract

Forests are important carbon sinks and contribute to mitigating the effects of climate change on a global scale. However, a general lack of information about the capacity of carbon storage exists for forests on oceanic islands due to endemic-rich communities, complex topography and missing plot data bases. Knowledge about above and below ground carbon stocks (AGC and BGC) may help understanding composition, structure and functioning, monitoring future dynamics and improving management and restoration actions of these unique insular ecosystems. On the central and western Canary Islands, three mayor native forest types (laurel forest, pine forest and thermophilous woodlands) occur which, together, cover currently 21% of the islands area while plantations of exotic tree species cover up to 1.2%.

This study aims to quantify the current contribution of forests to carbon storage in the Canaries. We used the most recent structural data recorded at 1834 permanent plots of the Spanish National Forest Inventory (NFI 2017) assigned to 18 different forest types to estimate AGC and BGC at the individual and plot level applying existing allometric equations for 49 tree species. Predictive statistical models such as random forest models were developed to extrapolate carbon stocks across each island, incorporating climatic factors, topography and biotic variables such as LIDAR, updated vegetation maps and remote sensing data (NDVI, Normalized difference vegetation index).

Humid laurel forests showed exceptionally high total carbon stocks on La Gomera followed by humid pine forest on La Palma, while thermophilous woodlands generally showed the lowest values. Plantations of exotic trees revealed high variation in carbon stocks depending on density and species. On the whole archipelago, native forests and exotic plantations currently store 9.88 Mt C (AGC: 6.8, BGC: 3.08) and 0.53 Mt (AGC: 0.36, BGC: 0.168), respectively. Pine forests store 60% of the total stock while laurel forests and their degraded versions count for 34%.

Knowledge about carbon stocks is crucial to guiding management strategies that maximize carbon footprint compensation in the Canaries. Besides their importance for biodiversity and ecosystem services, the potential for carbon sequestration linked to native forests highlights the need of conserving and restoring natural and degraded forests on the Canary Islands.

# Models

## P11

## IMPROVING SPECIES DISTRIBUTION MODELS IN CLOUD-DEPENDENT ECOSYSTEMS: THE ROLE OF FOG LAYER IN THE CANARIAN LAUREL FOREST

**Víctor Bello-Rodríguez[1,2]*; Juan José García-Alvarado[1] & Juana María González-Mancebo[1]**

1 Plant Conservation and Biogeography Research Group, Departamento de Botánica, Ecología y Fisiología Vegetal, Universidad de La Laguna, La Laguna, Islas Canarias, Spain; vbelloro@ull.edu.es

2 Grupo de Estudios en Ordenación Territorial y Riesgos (GEORIESGOS), Universidad de La Laguna (ULL), San Cristóbal de La Laguna, Tenerife, Spain

*Corresponding author

### Abstract

Species distribution models (SDMs) are powerful tools for understanding the environmental requirements of species and predicting their potential habitats. However, their accuracy strongly depends on the knowledge of the current species distribution and the ecological relevance and resolution of the input variables. In humid montane ecosystems such as the laurel forests of the Canary Islands, cloud immersion can be a key ecological driver, not only for hygrophilous species but also for more generalist taxa from surrounding areas whose distributions may still be in a lesser extent influenced by cloud-related conditions.

Despite this, direct cloud or fog related variables are often missing from standard climatic datasets. In this study, we test the hypothesis that including a spatial layer representing fog or cloud immersion can improve SDM performance and their ecological interpretation. This layer was calculated from the number of days with high relative humidity recorded at meteorological stations on the island of Tenerife (Canary Islands).

We selected several laurel forest endemic species from this island with differing degrees of dependency on cloud moisture, ranging from highly hygrophilous to more generalist taxa. For each species, we built SDMs using multiple algorithms, comparing two sets of environmental predictors: one based solely on variables of temperature and precipitation, and another including the mentioned fog/cloud immersion layer.

We evaluated model performance using AUC and other spatial metrics, with special attention to the ecological realism of the predictions. Our results show consistent improvement in model performance and spatial accuracy when the fog layer is included. When the fog layer is considered, highly hygrophilous species are more restricted to that area, while generalist species are to some extent excluded from it. These findings highlight the importance of including ecologically meaningful variables in SDMs that really represents the particular conditions of some ecosystems, especially in the context of the ongoing climate change.

# Conservation

## P01

## EX SITU PROPAGATION OF EUPHRASIA AZORICA FROM CORVO ISLAND

**Cátia F. Freitas*; Joana B. André & Lídia M.C. Silva**
1 Direção Regional do Ambiente e Ação Climática, Secretaria Regional do Ambiente e Ação Climática; Rua Cônsul Dabney, Colónia Alemã, Apartado 140, 9901-014 Horta, Portugal; catia.f.freitas@azores.gov.pt
*Corresponding author

### Abstract

Euphrasia azorica, an endangered endemic plant from the islands of Corvo and Flores in the Azores, is protected under the provisions of the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora). However, the evaluations of this plant have been unfavourable-bad (U2) since the initial assessments.

Since 2019, this species has been the focal point of the LIFE IP AZORES NATURA project, with the overarching objective being the enhancement of its population knowledge, the formulation of a propagation protocol ex situ, and the establishment of a viable population in situ.

The collection of seeds was conducted in late August, after which they were stored at 15% relative humidity and 15°C until the germination trial.

The selection of suitable hosts constitutes a pivotal step within the process of collecting seeds. The selection was based on the observation of the nearby species of herbaceous plants, as well as the observation of the specimens sampled. The objective of this process was to determine where they were seemingly parasitizing other species. The hosts chosen for the trial were *Festuca francoi* and *Deschampsia foliosa*.

The seeds were cultivated at a temperature of 5°C, under a photoperiod of 8 hours of light and 16 hours of darkness. The germination trial was concluded after 122 days with a success rate of 40.83%.

Subsequently, the seedlings were transplanted into a small pot in which the hosts had already been established. The transplant trial was maintained at a temperature of 21°C, with a natural photoperiod that extended from late October 2024 to February 2025.

In a total of 49 transplant operations, only three were successful in developing into a stage at which the team could modify the conditions and transfer them to the nurseries. The three specimens were found to be parasitizing *Deschampsia foliosa*.

Following a period of three days within a greenhouse, exposed to direct sunlight, the most developed specimen began to form its first flower. After nine days of this previous stage, the plant bloomed.

# P09

# GERMINATION AND VIABILITY TESTING OF ENDEMIC PLANT SEEDS FROM THE MADEIRA ARCHIPELAGO: CONTRIBUTION TO THE EX SITU CONSERVATION OF INDIGENOUS FLORA

**Carla Gonçalves* & Olga Baeta**
IFCN, IP-RAM, Jardim Botânico da Madeira – Eng. Rui Vieira, Portugal; carla.d.goncalves@madeira.gov.pt, olga.baeta@madeira.gov.pt
*Corresponding author

## Abstract

*Ex situ* conservation of endemic species plays a vital role in preserving island biodiversity. At the Jardim Botânico da Madeira – Eng. Rui Vieira, germination and seed viability tests are being carried out on endemic plant species to assess their germination capacity and ensure long-term conservation of seed collections. The evaluation was based on germination tests conducted in a phytoclimatic chamber (18 hours light / 6 hours dark, at 20 °C), combined with dormancy-breaking treatments tailored to each species' ecological requirements in its natural habitat. *Geranium maderense* Yeo, a species with conservation status, exhibited an 84% germination rate in seeds seven months after harvest and 76% in seeds stored for 22 years, demonstrating remarkable longevity. *Melanoselinum decipiens* (Schrad. & J.C. Wendl.) Hoffm. showed a 94% germination rate, which dropped to 72% after two years and 36% after eight years of storage, indicating the need for regular seed collection at intervals not exceeding two years. *Teline maderensis* Webb & Berthel. initially showed a low germination rate (31%), which increased to 100% after chemical scarification with $H_2SO_4$. *Euphorbia anachoreta* Svent., a critically endangered species endemic to the Selvagem Islands, was collected for germination testing and propagation from in situ individuals. In *Tolpis macrorhiza* (Lowe ex Hook.) DC., a significant altitudinal effect was observed: 88% germination at higher elevations and only 25% at lower altitudes. The findings reinforce the importance of seed banks and the need to adapt *ex situ* conservation protocols to the biological specificities of each species, contributing significantly to the preservation of the native flora of the Madeira archipelago.

# P08

## STRATEGIES AND ADAPTATIONS TO CLIMATE CHANGE IN TROPICAL DRY ISLANDS: A CASE-STUDY WITH CABO VERDE GRASSES

**Vanézia Rocha[1]*; Maria M. Romeiras[2]; Maria J. Vasconcelos[3] & Maria Cristina Duarte[4]**
1 LEAF - Linking Landscapee, Environment Agriculture and Food Research Center, Instituto Superior de Agronomia, Universidade de Lisboa, Portugal, vaneziarocha@isa.ulisboa.pt
2 LEAF - Linking Landscapee, Environment Agriculture and Food Research Center, Associate Laboratory TERRA, Instituto Superior de Agronomia, Universidade de Lisboa, Portugal, mmromeiras@isa.ulisboa.pt
3 Forest Research Centre, Associate Laboratory TERRA, Instituto Superior de Agronomia, Universidade de Lisboa, Portugal, mperestrelo@isa.ulisboa.pt
4 cE3c - Centre for Ecology, Evolution and Environmental Changes & CHANGE – Global Change and Sustainability Institute, Faculdade de Ciências, Universidade de Lisboa, Portugal, mcduarte@ciencias.ulisboa.pt

### Abstract

Poaceae are fundamental to biodiversity and ecological balance in tropical regions and have a high potential for agrobiodiversity in arid ecosystems. In the context of climate change, islands exhibit critical challenges in terms of biodiversity under threat, including agricultural resilience to support local communities. One approach to addressing these challenges focuses on the diversity of C4 species. In Cabo Verde, Poaceae represents a valuable diversity of traits with drought tolerance and resilience, hence enhancing ecosystem restoration. Therefore, such diversity could supply novel solutions for enhanced ecosystem restoration, food security and sustainable agriculture in areas most susceptible to climate change. A complementary approach, recently made, to the shifts in grass diversity patterns observed over the last eight decades highlighted how climate dynamics have changed species distribution across Cabo Verde. Changes in precipitation have reshaped the composition of grass species, with their distribution patterns changing to adapt to extreme conditions such as drought. The shifts, therefore, underline the prime importance of conserving grasses not only for their ecological roles but also for potential contributions to the resilience of ecosystems in the face of increasing climatic stress. Conservation of Poaceae for crop improvement and monitoring of shifting species distribution with respect to climate change are two of the keystone issues that will lead to the effective accomplishment of biodiversity conservation and food security policies. An integrative approach of such perspectives will lead to an increase in adaptive capacity of tropical dry islands, like Cabo Verde, towards ecological stability and sustainable agriculture under continuous climate change.

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# O30

# CLIMATE-GROWTH RELATIONSHIPS IN THE INTRODUCED DOMINANT WOODY TREE NELTUMA JULIFORA IN SANTIAGO ISLAND (CABO VERDE)

**Daniel António Tavares Varela Semedo[1,2]*; Diogo Cláudio Pavão[1,3]; Lurdes Borges Silva[1,4]; Guilherme Gomes Roxo[1]; Roberto Resendes[1]; Maria Manuel Cordeiro Salgueiro Romeiras[4]; Mónica Maria Tavares Moura[1] & Luís Filipe Dias Silva[1]**

1 CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, BIOPOLIS Program in Genomics, Biodiversity and Land Planning; UNESCO Chair – Land Within Sea: Biodiversity & Sustainability in Atlantic Islands, University of the Azores, Rua da Mãe de Deus, 9500-321 Ponta Delgada, Portugal; daniel.at.semedo@uac.pt

2 Linking Landscape, Environment, Agriculture and Food (LEAF), Associated Laboratory TERRA, Instituto Superior de Agronomia (ISA), Universidade de Lisboa, Tapada da Ajuda, 1340-017 Lisboa, Portugal

3 CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, BIOPOLIS Program in Genomics, Biodiversity and Land Planning, Universidade do Porto, Vairão, Portugal

4 CBGP, INRAE, Institut Agro Montpellier, Université de Montpellier, Montpellier, France

*Corresponding author

## Abstract

*Neltuma juliflora* (synonym of *Prosopis juliflora*) is the most abundant woody species in Cabo Verde, following its widespread introduction through reforestation programmes. However, its ecology, radial growth, and response to climatic variables remain poorly understood within the archipelago. This study investigates growth ring formation and variability in *N. juliflora* on Santiago Island, assessing their synchronicity and correlation with climatic factors. Samples were collected from 165 trees across 11 sampling blocks. Ring width was analyzed using cross-dating techniques, incorporating random forest models and generalized linear models to assess growth patterns and environmental influences. Principal Component Analysis (PCA) and the Variance Inflation Factor (VIF) were applied to reduce multicollinearity and improve model reliability. Growth rings were successfully identified despite the presence of false rings. Mean radial growth ranged from 1.76 to 2.31 mm/year, while r-bar values varied between 0.120 and 0.396. The findings demonstrate that the interannual variability of *N. juliflora* radial growth is strongly influenced by climatic factors, with extreme temperatures and irregular precipitation identified as the primary limiting factors. The species' differential response across altitudinal and edaphic gradients highlights the complexity of its growth dynamics in semi-arid environments. The relationship between ring formation and climatic fluctuations indicates a growth pattern driven by water availability and temperatures conditions, confirming the species' sensitivity to prevailing environmental factors.

# Evolution

## P05

## SEASONAL EFFECTS ON SEX EXPRESSION IN DIOECIOUS BRYOPHYTES: INSIGHTS FROM AN OCEANIC ISLAND REGION

**Anabela Martins[1]*; Susana Fontinha[2,3]; Jairo Patiño[4,5] & Manuela Sim-Sim[1,6]**

1 CE3C - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute /MUHNAC - Museu Nacional de História Natural e da Ciência, Universidade de Lisboa, Rua da Escola Politécnica, 58, 1250-102 Lisboa, Portugal; anabelamartins323@gmail.com

2 cE3c - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal; suzu65@gmail.com

3 Jardim Botânico da Madeira Eng.º Rui Vieira, Caminho do Meio, Bom Sucesso, 9064-512 Funchal, Madeira

4 Island Ecology and Evolution Research Group. Instituto de Productos Naturales y Agrobiología (IPNA-CSIC), 38206, La Laguna, Tenerife, Spain; jpatino@ipna.csic.es

5 Departamento de Botánica, Ecología y Fisiología Vegetal, Universidad de La Laguna, 38200, La Laguna,Tenerife, Spain

6 Departamento de Biologia Vegetal, Faculdade de Ciências, Universidade de Lisboa, cE3c - Centre for Ecology, Evolution and Environmental Changes & CHANGE - Global Change and Sustainability Institute, Campo Grande, 1749-016 Lisboa, Portugal; mmsim-sim@ciencias.ulisboa.pt

*Corresponding author

### Abstract

Seasonal patterns in the reproductive and growth cycles of bryophytes are closely linked to their life strategy and reproductive ecology. These biological traits are influenced by environmental factors, with climatic conditions playing a crucial role in shaping species adaptation. In this study, we investigated seasonal dynamics of sex expression, sex ratio variation, and sporophyte frequency in four bryophyte species (*Exsertotheca intermedia* (Brid.) S.Olsson, Enroth & D.Quandt, *Frullania polysticta* Lindenb., *Frullania teneriffae* (F.Weber) Nees and *Porella canariensis* (F.Weber) Underw.) across two oceanic islands (Madeira and Tenerife), and mainland Portugal (Sintra mountain). Sampling was conducted during two seasons, spring and autumn (2022). Our results revealed significant seasonal variation in sex expression for *F. polysticta* and *P. canariensis*, with higher sex expression in autumn. Sex ratios remained consistently female-biased for *E. intermedia*, *F. polysticta*, and *P. canariensis* across seasons, while *F. teneriffae* exhibited a female-biased ratio in spring and a balanced ratio in autumn. Although sporophyte frequency did not vary significantly across seasons, *E. intermedia* produced more sporophytes in spring, whereas *P. canariensis* did so in autumn. While limited to a single year, our findings highlight the intricate phenological patterns of bryophytes and emphasize the need for further research into the ecological drivers shaping these dynamics, particularly in oceanic island environments.

# P10

## EXPLORING THE ORIGINS AND UNDERLYING MECHANISMS OF COMPOSITAE RADIATIONS IN THE CANARY ISLANDS: THE DECODADAPT PROJECT

**Òscar Castillo[1,2*], Miguel A. Padrón-Mederos[3], Agustín Naranjo-Cigala[4], Nereida M. Rancel Rodríguez[2], Cristina González-Montelongo[2], Águeda González-Rodríguez[2], J. Alfredo Reyes-Betancort[3], Paloma Martínez-Boix[1], Abraham Padilla[1], Raúl Orihuela-Rivero[1,2], Javier Tuero-Septién[1], Marcos Salas-Pascual[5], Yauci Espinosa-González[1], Rafaela González-Montelongo[6] & Jairo Patiño[1,2]**

[1]Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología, Consejo Superior de Investigaciones Científicas (IPNA-CSIC), Tenerife, Spain. oscar3.ad@gmail.com

[2]Department of Botany, Ecology and Plant Physiology, University of La Laguna (ULL), Tenerife, Spain.

[3]Jardín de Aclimatación de La Orotava, Instituto Canario de Investigaciones Agrarias (ICIA), Tenerife, Spain.

[4]Department of Geography, University of Las Palmas de Gran Canaria (ULPGC), Gran Canaria, Spain.

[5]Instituto de Estudios Ambientales y Recursos Naturales (IUNAT), University of Las Palmas de Gran Canaria (ULPGC). Gran Canaria, Spain.

[6]Genomics Division, Instituto Tecnológico y de Energías Renovables (ITER). Plataforma genómica de alto rendimiento para el estudio de la biodiversidad, ITER, Unidad Asociada al CSIC por el IPNA-CSIC, ITER, Polígono Industrial de Granadilla, 38600. Santa Cruz de Tenerife, Spain.

*Corresponding author

### Abstract

The Canary Islands provide a unique natural laboratory for investigating evolutionary processes in oceanic insular systems, given their ecological diversity, complex geological history, and proximity to continental source areas. Among the most prominent elements of the Canarian flora is the Compositae (=Asteraceae), the largest angiosperm family worldwide and one of the most successful in island ecosystems. Parallelly, recent studies highlight Compositae as the most species-rich family on oceanic islands, with multiple confirmed and putative insular radiations, including several Macaronesian examples.

The DecodADAPT project focuses on uncovering the genomic and ecological drivers of diversification in four Compositae genera in the Canary Islands: *Argyranthemum*, *Gonospermum, Reichardia* and *Sonchus*. Using high-throughput sequencing and ecological data, we aim to reconstruct the phylogenetic relationships, assess historical biogeographic patterns, and examine how ecological niche differentiation and hybridization have shaped current diversity. By integrating genomic tools with ecological approaches, trait data and greenhouse experiments, we will test hypotheses concerning the adaptive origins of these radiations. This integrative approach will shed light on the mechanisms driving the evolutionary success of Compositae in the Canary Islands and offer broader insights into diversification on oceanic islands.

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## GENETIC ANALYSIS OF THE ITS REGION IN TELINE STENOPETALA FROM THE CANARY ISLANDS

**Verónica Pérez*; Miguel A. Padrón-Mederos & J. Alfredo Reyes-Betancort**
Jardín de Aclimatación de La Orotava (JAO), Instituto Canario de Investigaciones Agrarias (ICIA), Tenerife, Spain;
vperez@icia.es
*Corresponding author

### Abstract

*Teline stenopetala* is a Macaronesian endemic legume composed of six recognized subspecies. The Canary Islands host five of them, *T. s.* subsp. *microphylla*, *T. s.* subsp. *pauciovulata*, *T. s.* subsp. *sericea*, *T. s.* subsp. *spachiana* and *T.s.* subsp. *stenopetala*. Whereas Cabo Verde hosts the other one – *T. s.* subsp. *santoantaoi*, in Santo Antão island. This study focuses exclusively on the Canarian taxa, which are distributed across the western and more humid islands. Each island has one or two subspecies. On La Palma two subspecies are present: *T.s. stenopetala*, which is widely distributed in the humid zones, and *T. s.* subsp. *sericea*, found in drier places. These subspecies can be easily distinguishable by the degree of leaves pubescence. In La Gomera island, two subspecies, *T. s.* subsp. *microphylla* and *T. s.* subsp. *pauciovulta*, also coexist. Although they generally occupy different ecological niches, there are zones of contact where there are plants with intermediate morphological characters. In contrast, El Hierro and Tenerife home only one subspecies each, *T. s.* subsp. *mycrophylla* in El Hierro, and *T. s.* susbp. *spachiana* in Tenerife, which is restricted to areas near Teide National Park. This subspecies has small leaves and it is the most morphologically distinct form among the Canarian taxa. Genetic studies suggest the taxa within the same island are more closely related to each other than to those from different islands, challenging the existing current morphological traits classification. To clarify this controversy, we analyzed several chloroplast and ribosomal DNA regions across all *Teline stenopetala* subspecies. However, significant resolution was observed only with the ITS region. This limited genetic differentiation may be explained by the recent speciation of this genus, considering the volcanic origin and relatively young geological age of the Canary Islands from 12 Ma for Tenerife to around 1 Ma for El Hierro. The ITS region (ITS1-5.8S-ITS2) has been widely employed in plant taxonomy and phylogenetic studies, and it has previously been used this species. In this study, we expanded the sampling by amplifying the ITS region from 183 individuals of *Teline stenopetala* collected from populations of the four islands where it is present. The resulting sequences were compared between them and grouped in.

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