



# Inside the microflora of Robinson Crusoe Island for restoration of its native plants



Working in Partnership with CABI



September 2018

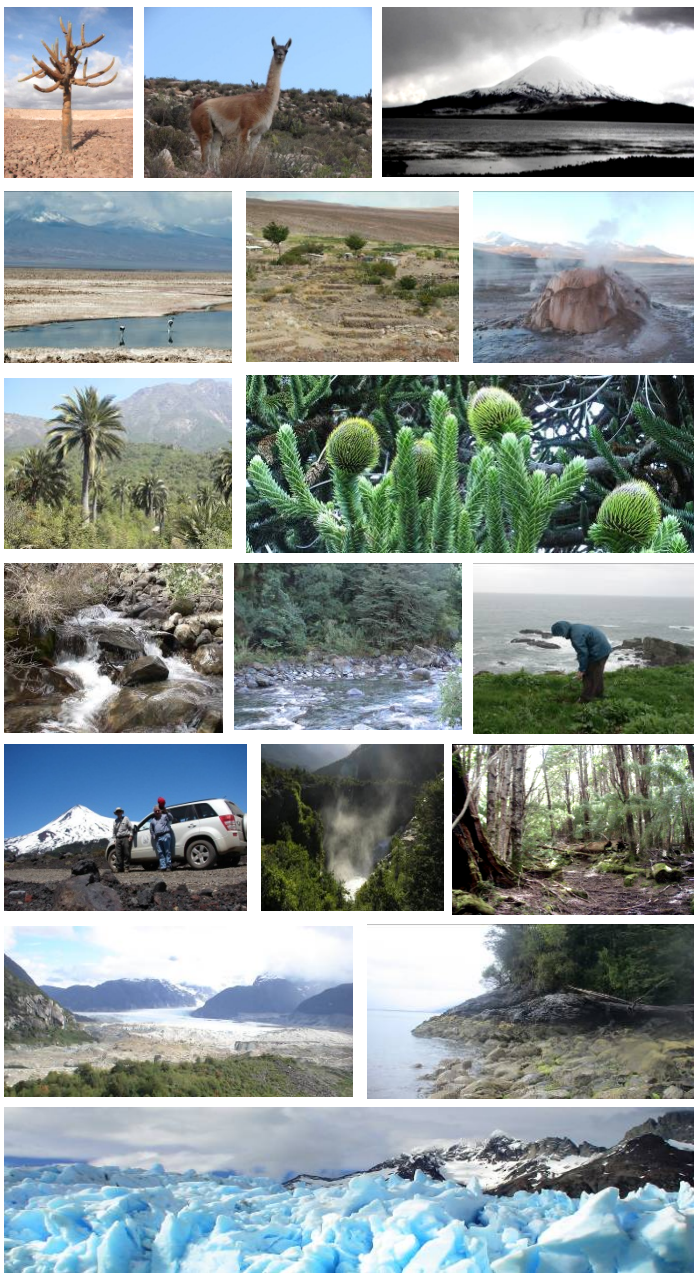
Andrés France

KNOWLEDGE FOR LIFE



# Overview

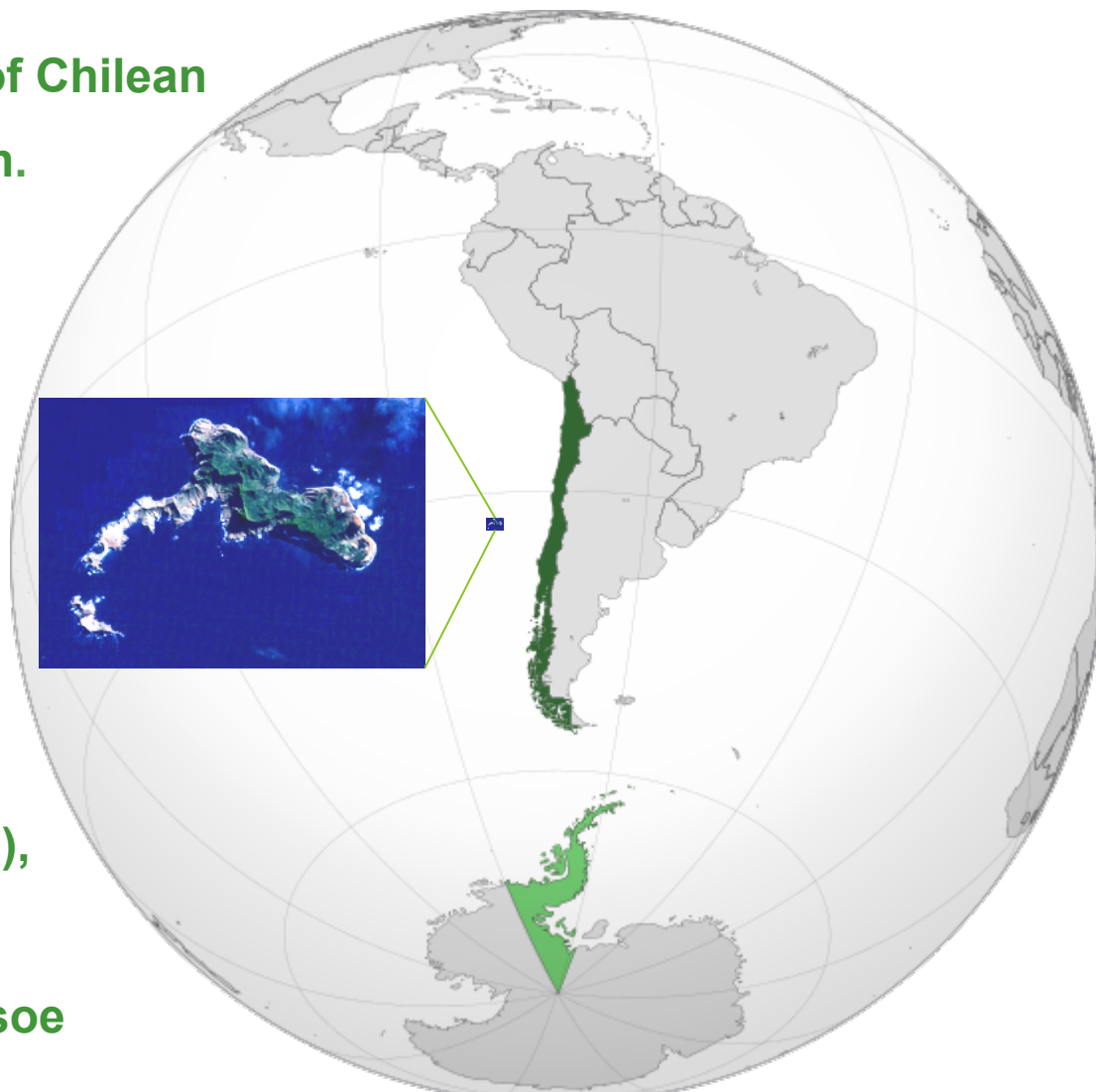
- Robinson Crusoe island
  - Location and topography
- Endemic Flora and fauna
  - Invasive species
- Darwin Initiative project
  - “Restoring the native flora and associated microflora of Robinson Crusoe Island”
  - Objectives
  - Methodology
  - Results
  - Summary





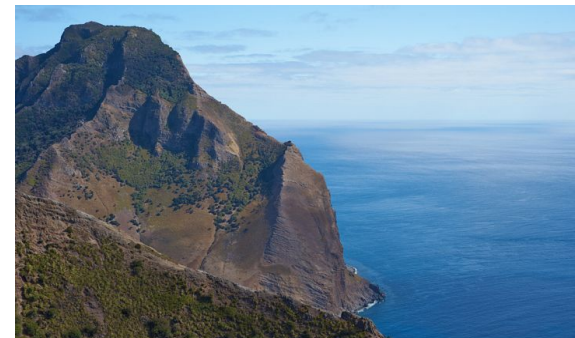
# Robinson Crusoe island

- Situated 670 km (416 mi) west of Chilean coast, in the South Pacific Ocean.
- It has a mountainous and undulating terrain, formed by ancient lava flows. The highest point on the island is 915 m (3,002 ft) above sea level at El Yunque.
- Home to the marooned sailor Alexander Selkirk (1704 to 1709), who inspired novelist Daniel Defoe's fictional Robinson Crusoe novel (1719).



[Dhttps://commons.wikimedia.org/w/index.php?curid=30703702](https://commons.wikimedia.org/w/index.php?curid=30703702)

- It is a stunningly beautiful place of dramatic cliffs and soaring mountains
- The island is considered of maximum scientific importance because of the endemic plant families, genera, and species of flora and fauna.
- 63% of the native plant species are endemic, as well as more than 230 species of insects.
- Center of origin of 132 plant species.
- National Park since 1935.
- UNESCO World Biosphere Reserves since 1977.
- Most of its flora is critically endangered.





- About 60% of the Robinson Crusoe island is cover by 3 invasive species:
  - Mora (*Rubus ulmifolius*)
  - Murta (*Ugni molinae*)
  - Maqui (*Aristotelia chilensis*)
- These species are threatening the whole island flora.









## Restoring the native flora and associated microflora of Robinson Crusoe Island (RCI).



### Objectives:

- To increase *in-situ* conservation of biodiversity on RCI via the re-establishment of threatened native species.
- To increase *ex-situ* conservation of biodiversity on RCI by conserving native plant species in a new seed bank facility.
- To enhance capacity within the local RCI community to conserve biodiversity via scientific and technical training
- To study the microbial biodiversity associated to native species.



## SAMPLING 1



September 2015

**N° samples:** 115

**Substrates:** Soils and plants

**Places:** Plazoleta del Yunque, Carbonera de Torres, Piedra Agujerada, Centinela, El Rabanal, Vaquería, Cerro Centinela, Mirador de Selkirk y Parque.



## SAMPLING 2



January 2016

**N° samples :** 101

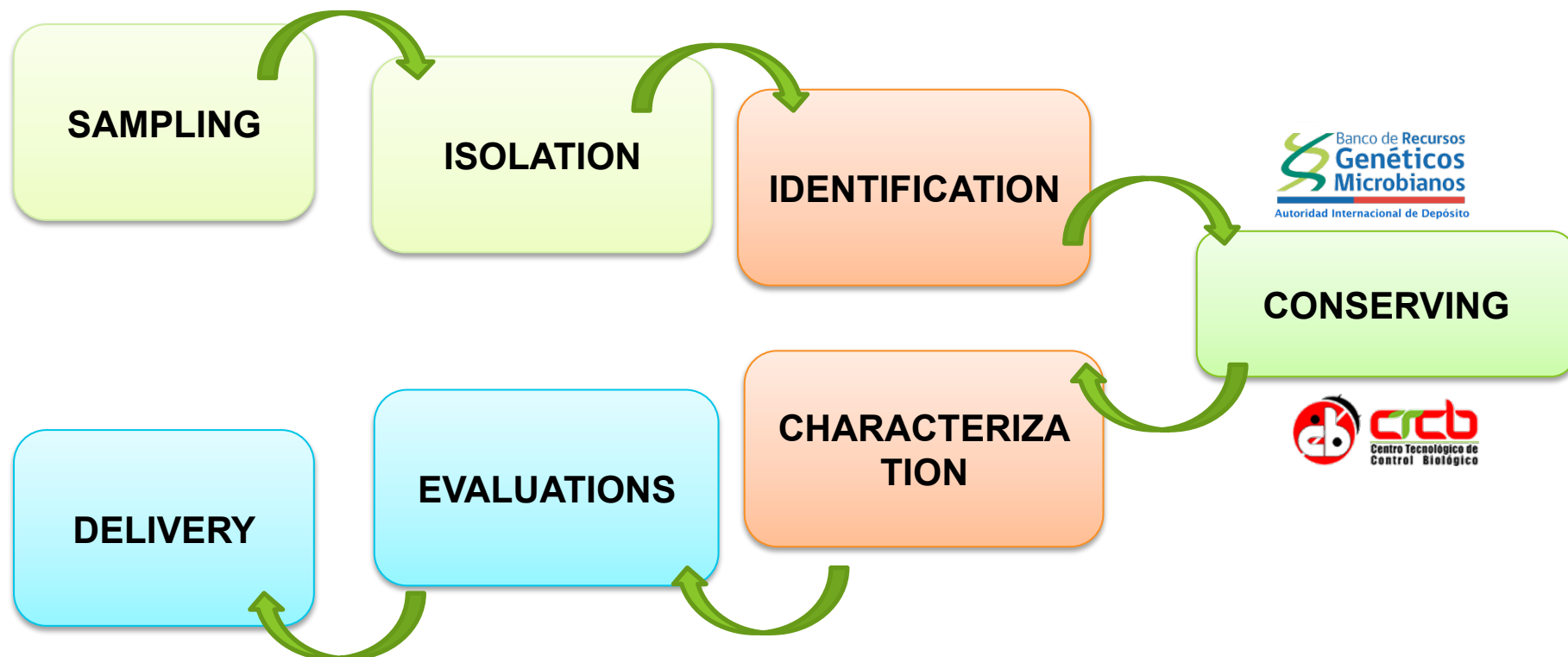
**Substrates:** Soils and plants

**Places:** Villagra, Plazoleta del Yunque, La Pascua, Rebaje el Verdugo, Puesto Francés.

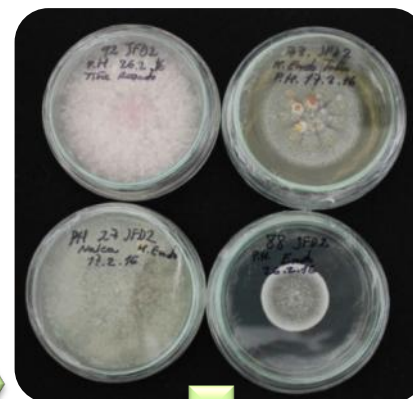
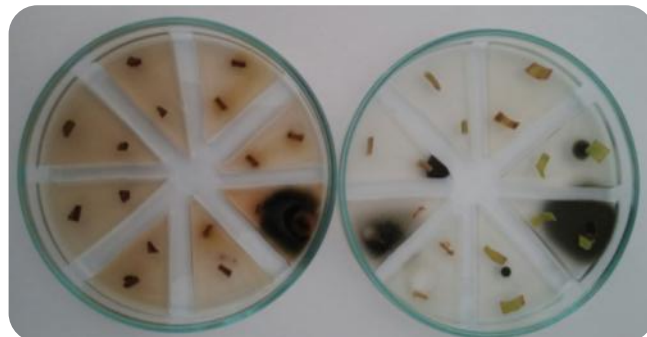




*Studies of microbial communities, identification and conservation in INIA Microbial Genetic Resources. Mass production and restoring to the endemic flora of RCI.*



## Sampling of soil and plants and microbial isolation



 Banco de Recursos  
Genéticos  
Microbianos  
Autoridad Internacional de Depósito

Results:

**124**

**Fungi with endophyte potential**

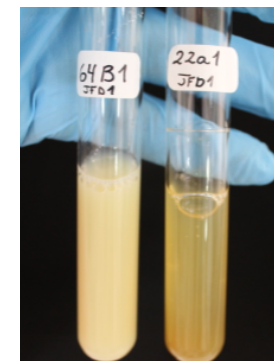
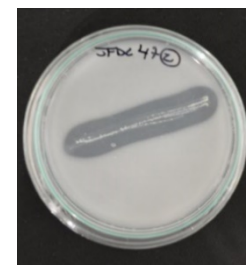
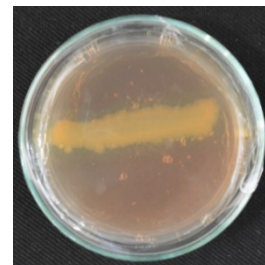
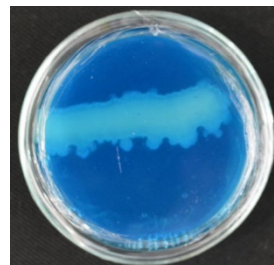




# Plant Growth Promoters (PGPR)



- ✓ Siderophore activities
- ✓ Phosphate solubilisation
- ✓ Ammonium production
- ✓ Auxins production



Results:

**92**

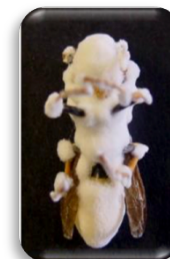
**Bacteria with  
PGPR activity**





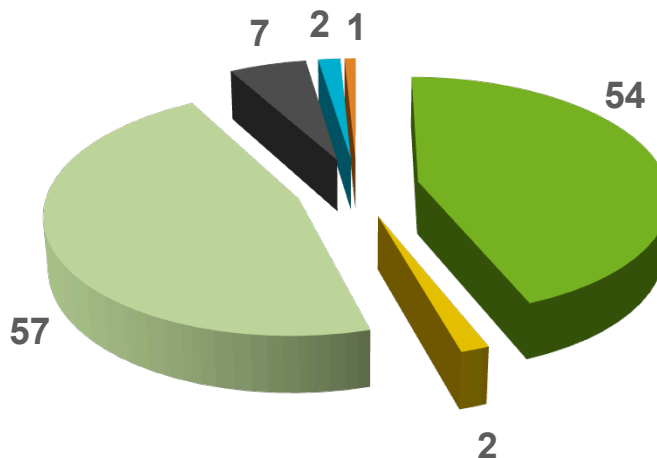
- ✓ Fungi adapted to use insects as food
- ✓ Species not reported in the continent
- ✓ Double function as EPF and endophyte
- ✓ Super Fungi: EPF, endophyte and plant growth promoter

## Entomopathogenic Fungi (EPF)



## Results

**123**  
**EPF**

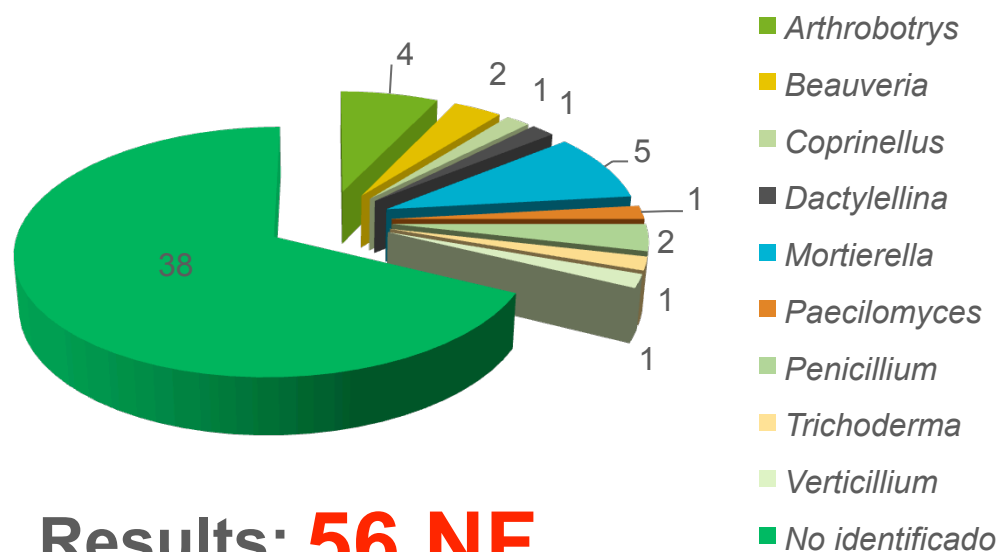
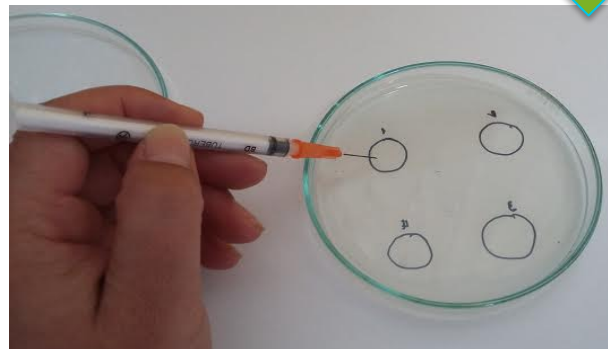


- *Beauveria*
- *Fusarium*
- *Metarhizium*
- No identificado
- *Paecilomyces*
- *Trichoderma*





# Nematophagus Fungi (NF)



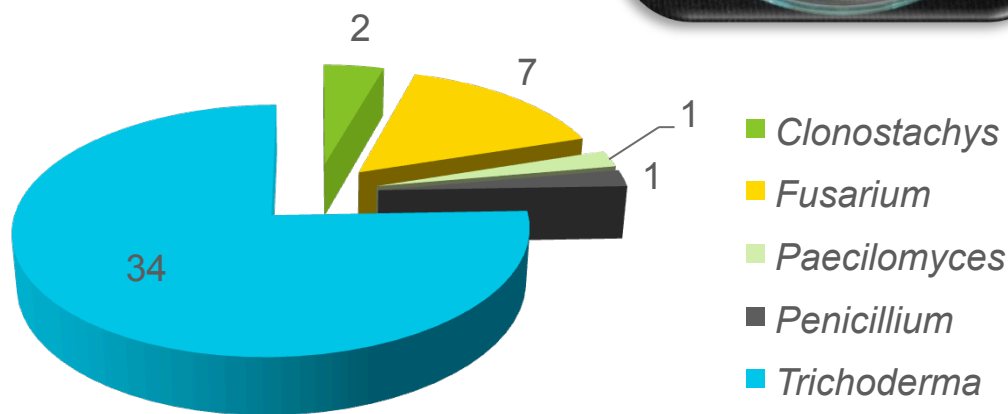
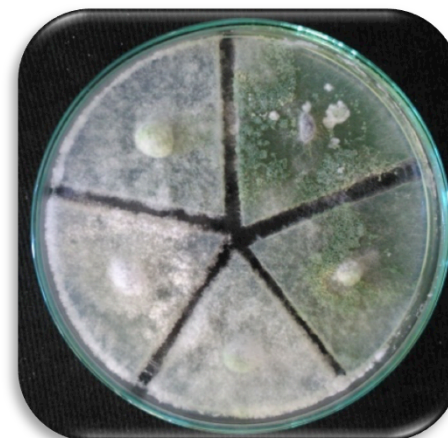
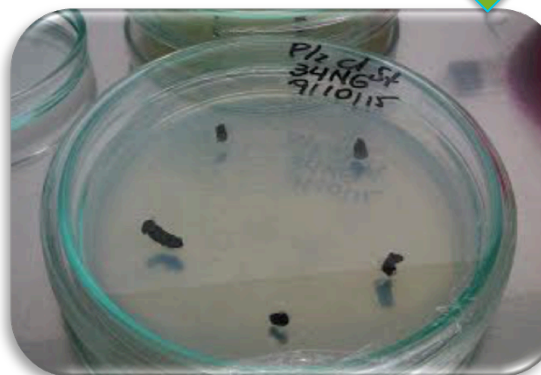
Results: **56 NF**



## Micopathogenic Fungi (MF)



- ✓ Fungi specialized in parasitizing other fungi.
- ✓ Evaluated against plant pathogens.
- ✓ Parasites of sclerotia.
- ✓ Double function as MF and growth promoter.



Results: **45 MF**



The Robinson Crusoe Island more than doubles the number of positive samples of useful microorganisms, compared to continental Chile, regardless of the region being sampled.

This is another example of the RCI biodiversity.





- The Robinson Crusoe Island represents an extraordinary source of microbial biodiversity.
- Fungi and bacteria with multiple properties that benefit the development of the plants were collected from the island.
- The emphasis has been on the rescue of flora and fauna, forgetting the most important part: the microbial community.
- It is urgent to rescue the island from invasive species, otherwise this biodiversity will be lost along with their endemic microflora.





Thanks

