Conserving and valorizing biodiversity: the medicinal flora of Madagascar

Duez Pierre
Service de Chimie Thérapeutique et Pharmacognosie
Université de Mons
A major player of indirect cooperation

- The Academy of Research and Higher Education (ARES) is a public interest organization representing the higher education of the Federation Wallonia-Brussels (*Universities - Colleges - Arts Colleges*)

- The Development Cooperation Commission (CCC) is a standing committee of the Academy of Research and Higher Education

- **Definition of a common development cooperation policy for universities, colleges and arts Colleges**
- **Coordination and management of educational and research projects**
- **Financed by the Directorate General for Development Cooperation and Humanitarian Aid (Belgian State)**
Strengthen and enhance, through partnerships, the contribution of higher education to development

ARES-Biodiversity in Madagascar
Madagascar broke away from Africa more than 150 million years.

This island is home to 12,000 species of plants (of which 70-80 % are endemic ), making it one of the regions with the most diverse and original flora in the world.

Biodiversity hotspots: only 1.4 % of earth surface but concern 60 % of animal and vegetal species

The environment is fragile and threatened:

- Demographic pressure
- Deforestation
- Erosion,…

Madagascar retains only 9 % of its original hotspot surface
IMRA: partner in Madagascar
(since 1998)

Institut Malgache de Recherches Appliquée
✓ Scientific research and training of researchers
✓ Promotion and education of the rural world
✓ Improvement of health status
The IMRA is a specialist in medicinal plants

- The plants used in traditional medicine are investigated and valued
- Extracts are produced for the Madagascar community to be sold at subsidized prices.

The IMRA collects an average of 200 plants / year

- In primary forest and other habitats of the island.
- Species identified as interesting are no longer found in their natural sites.

The IMRA faces two major problems

- The time needed for the study of plants
- The disappearance of many species
Objectives of bioconservation projects

1. Contribute to the conservation and sustainable management of plants (medicinal plants in particular)

2. Contribute to the study and promotion of most important genetic resources (development of innovative approaches in therapy)
1. Develop a strategy for the conservation and sustainable management of medicinal plants

a) **Establish a basic infrastructure**
   - development of a collection of medicinal plants

b) **Develop a pilot *ex situ* conservation** for a limited number of plants following:
   - A technical limitation criterion
     - The aptitude to vegetative propagation
   - An emergency criterion
     - The level of disappearance of the plant
   - A social criterion:
     - The importance of the plant in traditional medicine

c) **Disseminate the knowledge** for the subsequent exploitation of selected genetic resources

*Syzygium cuminii* (L.) Skeels (Myrtaceae) ➔ **MADEGLUCYL®**
Le cycle de conservation et d’utilisation des ressources génétiques végétales

Harvesting

Distribution and utilization

-196°C

Cryoconservation

Propagation and conservation

Characterisation

ARES-Biodiversity in Madagascar
2. Study and promotion of important genetic resources → innovative therapeutic approaches

Modulation of Quorum Sensing: a new approach to fight bacteria
2. Study and promotion of important genetic resources ➔ innovative therapeutic approaches

Modulation of **Quorum Sensing**:
a new approach to fight bacteria

**AHL mimics**
Study of *Combretum albiflorum*

Bio-guided isolation of catechin and naringenin, flavonoid derivatives that:

- **Inhibit** the production of pyocyanin, a **virulence factor** in *P. aeruginosa*
- **Do not affect** the growth and **viability** of the bacteria

*Pseudomonas aeruginosa* PAO1 (production of pyocyanin)

Study of *Dalbergia pervillei*

Bio-guided isolation of perbergin that:
- **Inhibits** the production of *virulence factors* in *Rhodococcus fascians*
- **Does not affect the growth and viability** of the bacteria
Study of *Dalbergia trichocarpa* (1)

Bio-guided isolation of a new triterpene coumarate that:

- Prevents the formation of *Pseudomonas aeruginosa* biofilm
- Does not affect the growth and viability of the bacteria

Fluorescence microscopy (x400)
Study of *Dalbergia trichocarpa* (2)

The new triterpene coumarate:

- Helps an antibiotic to efficiently disrupt a formed biofilm of *Pseudomonas aeruginosa*

**Fluorescence microscopy (x400)**

Razamiravaka et al, PLoS One, 10(7): e0132791
Thank you for your attention