Highland production systems and sustainability in Madagascar

How can we boost agricultural production on family farms in the highlands of Madagascar, while preserving natural resources?

In Madagascar, population growth and low agricultural productivity are a threat to food security. In highland regions, declining soil fertility, pest attacks and socioeconomic constraints all limit production. The aim of the platform is to contribute through research to optimizing the interactions between farming activities and production system sustainability.

Partners

FOFIFA > Antsirabe regional research station (SRRA); Lake Alaotra agricultural research centre (CALA), Rice research department (DRR); Zootechnical and veterinary research department (DRZV).

FIFAMANOR > Research department; Animal husbandry department.

University of Antananarivo > College of agricultural science (ESSA); Radio isotopes laboratory (LRI); Science Faculty.

IRD > Functional Ecology & Bio-geochemistry of Soils & Agro-ecosystems Research Unit (Eco&Sols).

CIRAD > Internal Research Unit: AIDA; Joint Research Units: SELMET, INNOVATION, TETIS.

Associates

Madagascar > Research/development institutes; GSDM; development projects; NGOs; State services (agriculture, livestock production).

Indian Ocean > Research/development institutes; universities; commodity chains.

Africa > Research and training centres; AfricaRice Center; universities; NGOs.

France and Europe > Numerous research and higher education establishments.

International > CGIAR; major organizations.

Beneficiaries

With the support of development actors, crop and animal farmers are benefiting from new upland rice varieties, improved cropping systems based on conservation agriculture, organic fertilizer quality, pest control methods, etc.

Thanks to training through research, supervision of theses and hosting of internships, students and future management staff are able to build their skills in the fields of sustainable agricultural and livestock production.

The scientific partners are able to enhance their visibility through regular co-publications in international journals.
Expertise and technical skills

- Improving productivity and quality of upland rice. Creation of improved varieties of upland rice.
- Integrated pest management: characterization of their dynamics, modification of their impact under the combined effect of different management practices.
- Design, adaptation and dissemination of sustainable, innovative cropping systems. Methodological support for the drafting of R&D programmes in the field of agro-ecology. Recommendations and testing of direct seeding equipment.
- Assessment of the agronomic and environmental performance of cropping systems.
- Optimum use of feed resources by animals, recycling livestock farming effluent to fertilize crops, modelling of interactions.
- Integrated fertility management: characterization of soil biological and geochemical dynamics as a function of cropping systems and soil types, soil-plant mineral transfers and cycles, quantification of the fertilizer value of organic residual products.
- Characterization of farmer strategies and analyses of innovation processes within farms and producer groups.
- Characterization of the spatial structure of environments and activities by analysing satellite images and databases.

Some current projects

Recycling plant and animal biomass in crop-livestock farming systems • BIOVA, 2013–2015, European Commission/African Union, € 1M
The project is working to secure food production within family farming systems. It is structuring and heading a scientific exchange network on a regional level. It develops tools and methods for characterizing resources and validates and transfers agro-ecological techniques aimed at conserving and optimizing use of the resources available on farms. It supports the acquisition of knowledge and promotion of innovative agro-ecological techniques aimed at optimizing management of the resources produced or available within farms.

Agronomic management of resistance to rice blast • CARP, 2010–2014, ANR Systerra, € 730k
The aim is to measure the effects of conservation agriculture on the expression of upland rice resistance to blast. The project set out to identify the mechanisms involved, placing the emphasis on nitrogen uptake dynamics.

Characterization of cropping systems and their productivity using multi-source remote sensing and data mining, to ensure food security • TOSCA, 2013–2015, CNES, € 71k
To support food security early warning systems, the project will be supplying new products of a future satellite mission (SENTINEL-2). It will be exploring new remote sensing data processing and analysis methods enabling mapping of various types of cropping systems and better estimates of agricultural production in the highlands near Antsirabe, in Madagascar.

Working together for tomorrow’s agriculture