



### **Objectives of the project**

The overall objective of the action is to strengthen the capacity of the Faculty of Agriculture, University of Mauritius in research and training to promote sustainable agriculture for improved food security in response to climate change. The specific objectives are : 1) to use molecular methods for pest and disease characterisation; 2) to develop a package of climate-smart agriculture technologies for agriculture; 3) to develop the competences for innovative transformation of raw materials from the agricultural sectors into high-value products; 4) to increase the marketed supply of quality and wholesome milk from smallholder dairy farmers for the local market and as input for the local agroindustry; and 5) to empower the human capital in Rodrigues through agricultural education for improved resilience to climate change.

### Background

Climate smart agriculture is among the priority adaptation actions of the country's Nationally Determined Contributions. Mauritius - as a small island state - ranks among the 10 most vulnerable countries to climate change. High precipitation and temperature rise represent considerable challenges to the agricultural sector. Consequently, there is an urgent need to build climate resilience in that sector as a means to increase food security, and research has a pivotal role to play in that demarche.



A model Dairy Farm

### The action supports the vision 'to promote

the University of Mauritius as a research-engaged and entrepreneurial University'. Investment in research and training for innovative sustainable agribusinesses is key to achieving improved food security. The Faculty of Agriculture identified five areas of intervention (see the objective) for this action which are expected to support innovative research to promote sustainable agriculture amidst changing climate. The identified areas are aligned with government policy spelt out in the 'Strategic Plan 2016-2020 for the Food crop, Livestock and Forestry Sectors' of the Ministry of Agro-Industry and Food Security to promote sustainable agriculture, improve food security and contribute to poverty alleviation.

The University of Mauritius is already implementing a project under the *Global Climate Change Alliance Plus programme* working on onions and garlic production. The involvement and impact that it has on the beneficiaries is noteworthy. The University therefore already has an experience in the domain and the DeSIRA project allows for additionality.

### The theory of change to achieve the objectives

The project is expected to result in better equipped research facilities at the Faculty of Agriculture of the University of Mauritius, and innovative technologies for climate smart agriculture. The project supports five areas of intervention:

 Biotechnology for Pest and Disease Detection and Characterisation: previous analysis and also the COVID-19 pandemic have highlighted the importance of becoming more self-sufficient in foods and reduce reliance on imports. In this regard the objective of using molecular methods for pest and disease characterisation becomes pertinent as it has a direct incidence on local food production capacities through improved resilience against pests and diseases.





- 2) Advancement of Climate Smart Agricultural Technologies: the project explores how to improve the efficiency in food cultivation. This is particularly important for an island state like Mauritius where space is limited. Exploration of vertical farming potentials and aquaponics systems for instance are useful. In addition, in view of irregular precipitation patterns caused by climate change, it is essential to explore more efficient techniques including irrigation and new crops such as leguminous crops. For this purpose, an existing organic plot has been refurbished for research work. Development and adoption of small agriculture techniques require technical assistance to farmers for instance to design aquaponics units.
- 3) Enhancing Food Safety, Security and Food Innovation: the project is upgrading the Food Technology laboratory of the Faculty of Agriculture for improving the teaching and research environment, training of current and potential food operators in food safety and food innovation, educating consumers/stakeholders on food waste reduction and developing innovative food products for validation by the forthcoming agro-processing incubator of the AgriTECH Park and commercialisation by food enterprises.
- 4) Development of a sustainable and inclusive value-chain for smallholder dairy farmers: as food security is improved, this is expected to reduce dependency on imports. Increase production of wholesome milk from smallholder dairy farmers for the local market and as input for the local agroindustry is a key focus of the project. Support to the dairy sector consists essentially of technical assistance on the improvement of feeds for increased milk yield, morphological and phenotypic analysis of local cattle breeds and analysis of pathogens from local milk and evaluation of drugs against cultured pathogens.
- 5) Curriculum development and implementation of a Top up Undergraduate degree programme in Agricultural Science and Technology for Rodrigues: the project also targets the empowerment of human capital in Rodrigues through agricultural education for improved resilience to climate change. This is also be key to the sustainability of the actions.

The project is both timely and relevant as it complements the AgriTECH park project that the University is also simultaneously implementing, consisting of putting in place an incubator to test innovative ideas and promoting entrepreneurial activities. In this case, this is eliminating the gap between research and its application. The final beneficiaries remain the small farmers and the small planters who, as entrepreneurs, will benefit from both the results of the research and the possibility to put them into application in the incubators. The results of the research will be shared with the planters and farmers community for maximum outreach. Capacity building of extension officers and NGOs who are striving to improve the livelihoods of the farming community in Mauritius is expected to have multiplier effects as they pass on the results of research to their target audience as part of their knowledge dissemination activities. Moreover, publications generated from the project, presentation of findings at conferences and a dedicated website for the project are important mechanisms to capture relevant results of research which are expected to have multiplier effects.

### **Main activities**

The activities of the project consist of:

- ✓ Acquisition of equipment to (a) upgrade the research facilities in biotechnology for molecular pest and disease diagnosis, for identification of pest and pathogens; (b) create conceptual models through sensors; (c) set up small scale aquaponics systems; (d) refurbishment of existing organic plot for research work; and (e) purchase laboratory equipment required for teaching, research and developing and processing, quality control and preservation of food products.
- ✓ Training of students on molecular techniques to diagnose pests and diseases.
- ✓ Experiments and provision of expertise to producers to: (a) develop CSA technologies for selected leguminous crops under organic, sheltered and conventional farming systems; (b) develop





efficient water use technologies for small-scale farmers, by testing different irrigation regimes and methods for sustainable agricultural water management.

It is known that research is of no use if not made available to end-users. This is why a key focus of the project is on dissemination of research findings to relevant stakeholders through:

- ✓ The creation of an e-agriculture platform within the scope of this project and the use of Web2.0 tools enhances the visibility and contribute to dissemination of the action.
- $\checkmark$  Social media are an essential tool to share information generated from the action.
- ✓ Training workshops, inherent in the project design to achieve project outcomes, target stakeholders.
- ✓ Media (TV, newspaper and radio) coverage of these activities contribute to project dissemination.
- ✓ Pamphlets produced as part of some of the activities are an effective way to disseminate information to stakeholders and target audience.

### Results achieved to date (September 2023)

### Work Package 1: Enhanced capacity for molecular characterisation of pest and disease in Mauritius and Rodrigues.

- ✓ A dedicated equipped research facility at the Faculty of Agriculture (FoA) for rapid pest and disease screening based on molecular approach is fully set up. Master's and doctoral students are enrolled at the FoA and the laboratory is being used optimally.
- The project has been able to do a systematic screening of Norovirus (NoV) and Hepatitis A virus (HAV) in various widely consumed agricultural commodities such as watercress, lettuce, and tomato crops.
- ✓ A workshop was held with personnel of the Food and Agricultural Research and Extension Institute (FAREI) on DNA extraction, Polymerase Chain Reaction (PCR) and bioinformatic analysis in 2022 since limited DNA-based tests are used by FAREI for disease diagnosis. Several training sessions have been carried out in the area of molecular disease diagnosis with government officials working in the plant pathology and veterinary sector. In addition, several FAREI officers are currently undertaking their MPhil/PhD at the FoA and therefore have also received thorough training in molecular biology, paving the ground for a long-lasting symbiotic partnership between the FoA and FAREI.

## Work Package 2 - A package of climate-smart technologies for agriculture in Mauritius and Rodrigues is developed.

- Smart Farming technologies for data integration and management for agriculture are being developed on the AgriTECH Park: A conceptual model for integration of sensors data such as soil moisture, temperature, humidity and pressure has already been designed; Calibration of gateway and sensors have been completed; A mobile App for displaying the sensor data has been designed and implemented.
- ✓ A small-scale low-cost aquaponics unit was set up and tested for lettuce production at household level. Both lettuce and kale production were successfully grown using this system of production.
- ✓ Based on literature review and trials undertaken so far, write-up of the recommendation sheets for organic and CSA-based technologies are under progress. Evaluation of the efficacy of different mulches in suppressing weeds and of their effect on the growth and yield of beans is underway.
- ✓ Development of efficient water use technologies for small-scale farmers is ongoing, with different irrigation systems (drip and micro-spinkler) evaluated for soybean production.

# Work Package 3 - Enhanced capacity in food safety, innovation and food waste management for improved food and nutrition security.





- ✓ The Food Technology laboratory of the Faculty of Agriculture and the Agro- Processing Unit on the AGRI-Tech Park has been upgraded with food processing and analysis equipment for improved training; A plaque to acknowledge the support of the EU was unveiled by the Ag President of the Republic of Mauritius in the presence of EU representative. The project website was also launched on the same day (<u>https://www.desirafoa.com/</u>).
- ✓ A MSc programme in Food Safety and Innovation has been mounted. A first round was offered in Academic year 2020-2021 and the second round will be offered in Academic year 2023-2024. This MSc programme fits perfectly in today's context. It focuses on engaging learners in the creative use of scientific knowledge to formulate and manufacture safe, healthy and environment-friendly food products. It also aims at building competencies to enhance employability, increase confidence in scientific and business skills, promote women's entrepreneurial empowerment and contribute to food innovation for sustainable socio-economic growth.
- To celebrate the International Day of Awareness of Food Loss and Waste, the Faculty organised a Forum on "Food Waste Management" on 29 September 2023. The aim was to provide a platform for stakeholders from academia, government, civil society, private sector, food operators, hospitality sector, educational sector and non-governmental organizations to discuss about actions related to food waste /loss reduction. It also marked the launching of a recipe book on valorization of food leftovers and imperfect fruits and vegetables, another output of Work Package 3. The e-version of this recipe book was made available on different platforms for easy access by anyone.

# Work Package 4 - Developing a sustainable and inclusive value-chain for smallholder dairy farmers in Mauritius. How far can we improve our self-sufficiency for the consumption of fresh dairy milk and dairy milk added products?

- ✓ Characterization of the nutritional value of forages available on-farm, with preliminary results submitted to the farmers.
- ✓ Data-informed on-farm feeding recommendations.
- ✓ A detailed plan for a 'Mixed Forage Pasture multi species fodder bank' is available.
- ✓ Optimised on-farm rations for dairy cows.
- ✓ 'Technical Guide on the Management and Development of Pastures' produced.
- ✓ A detailed characterisation of the morphological and phenotypic data of the dairy herd from selected farms of relevance in future breeding programmes and improvements of the herd is available.
- ✓ Developed of a value-added product namely drinking yoghurt with fresh fruit jam puree.
- ✓ Developed of a value-added product namely butter with aromatic herbs.

### Work Package 5 - Curriculum development for Rodrigues

✓ A BSc (Hons) AgricScience and Technology (Top Up) programme has been designed for agricultural officers in Rodrigues. It is approved by the Faculty of Agriculture and the Rodrigues Regional Assembly (RRA). The course was due to start in June 2023.

### Organization

The project is implemented by the University of Mauritius. A team leader is responsible for the implementation of the project activities. Academics from the Faculty are involved as per the area of competence. A project steering committee has been set up at the level of the Faculty of Agriculture to monitor implementation and progress of the project.

The project was officially launched on 04 March 2020 by the Vice-Prime Minister and Minister of Education, Tertiary Education, Science and Technology, in presence of the Vice Chancellor, Pro- Vice Chancellor, the EU Ambassador and other dignitaries. The event benefitted from considerable press coverage.





### Implementing organization

University of Mauritius as main applicant.

### **Other stakeholders**

- ✓ Food and Agricultural Research and Extension Institute (FAREI)
- ✓ Ministry of Agro-Industry & Food security,
- ✓ Young farmers' organisations,
- ✓ Small holder farmers.

### Location

Republic of Mauritius

### Funding and co-funding

EU funding	€ 500,000
University of Mauritius	€ 81,000
Total budget	€ 581,000

### Duration

48 months (January 2020- December 2023)

Website https://www.desirafoa.com/

Updated on 07/11/2023

