



**F**ood and  
**A**gricultural  
**R**esearch  
and  
**E**xtension  
**I**nstitute

**Annual Report 2022/2023**

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## Abbreviations

|         |                                                                    |
|---------|--------------------------------------------------------------------|
| ACCEA   | Early Childhood Care and Education Authority                       |
| ACGC    | Audit and Corporate Governance Committee                           |
| ADG     | Average Daily Gain                                                 |
| ADMA    | Agricultural Development Marketing Association                     |
| AEC     | Agricultural Entrepreneur Clubs                                    |
| AFRA    | African Regional Cooperative Agreement                             |
| AMB     | Agricultural Marketing Board                                       |
| AMF     | Arbuscular Mycorrhizal Fungi                                       |
| APMIS   | Agricultural Production and Management Information System          |
| AREU    | Agricultural Research and Extension Unit                           |
| AVRDC   | AVRDC-The World Vegetable Center                                   |
| AWC     | Agricultural Women Clubs                                           |
| AYC     | Agricultural Youth Clubs                                           |
| BAP     | 6-benzyladenine                                                    |
| BDU     | Business Development Unit                                          |
| BFU     | Bio-Farming Unit                                                   |
| BLU     | Building and Land Use                                              |
| BCMV    | Bean Common Mosaic Virus.                                          |
| BCYV    | Bean Yellow Mosaic Virus                                           |
| BPTV    | Banana Bunchy Top Virus                                            |
| BMRS    | Belle Mare Research Station                                        |
| BSD     | Biometry and Statistics Division                                   |
| BSF     | Black Soldier Fly                                                  |
| CAADP   | Comprehensive Africa Agriculture Development Programme             |
| CAD     | Computer Aided Design                                              |
| CATAS   | Chinese Academy of Tropical Agricultural Sciences                  |
| CEB     | Central Electricity Board                                          |
| CEO     | Chief Executive Officer                                            |
| CFS     | Committee on World Food Security                                   |
| CIAT    | Centro Internacional de Agricultura Tropical                       |
| CIRAD   | Centre de Coopération Internationale en Recherche Agronomique pour |
| CLRS    | Curepipe Livestock Research Station                                |
| CNESTEN | National Center for Energy Sciences and Nuclear Techniques Pg65    |
| CP      | Crude Protein                                                      |
| CRA     | Corruption Risk Assessment                                         |
| CRS     | Crop Research Station                                              |
| CSA     | Climate Smart Agriculture                                          |
| CSG     | Contribution Sociale Généralisée                                   |
| DAP     | Days after planting                                                |
| DBM     | Diamondback Moth                                                   |
| DBM     | Development Bank of Mauritius                                      |
| DC      | Demonstration Centre                                               |
| DeSIRA  | Development Smart Innovation through Research in Agriculture       |

|        |                                                                      |
|--------|----------------------------------------------------------------------|
| DNA    | Deoxyribonucleic Acid                                                |
| DM     | Dry Matter                                                           |
| DPC    | Defined pension contribution                                         |
| DUS    | Distinctness, uniformity and stability                               |
| DVS    | Division of Veterinary Services                                      |
| ECCEA  | Early Childhood Care and Education Authority                         |
| EU     | European Union                                                       |
| ERP    | Enterprise Resource System                                           |
| ETA    | Exudative Tube Application                                           |
| FARC   | Food and Agricultural Research Council                               |
| FAREI  | Food and Agricultural Research and Extension Institute               |
| FC     | Finance Committee                                                    |
| FSF    | Food Security Fund                                                   |
| FTS    | Farmer's Training School                                             |
| FYM    | Farmyard Manure                                                      |
| GCCA   | Global Climate Change Alliance                                       |
| GNCPC  | Ghana Cleaner National Production Centre                             |
| HBG    | Home Biogas                                                          |
| HRDC   | Human Resources Development Council                                  |
| HWT    | Hot Water Treatment                                                  |
| IAEA   | International Atomic Energy Agency                                   |
| IAS    | International Accounting Standards                                   |
| ICAC   | Independent Commission Against Corruption                            |
| ICT    | Information and Communication Technology                             |
| IFAC   | International Federation of Accountants Committee                    |
| IFRS   | International Financial Reporting Standards                          |
| IPM    | Integrated Pest Management                                           |
| IPSAS  | International Public Sector Accounting Standards                     |
| IPSASB | International Public Sector Accounting Standards Board               |
| KPIs   | Key Performance Indicators                                           |
| KSNM   | KSNM Drip fertigation system                                         |
| LAMP   | Loop-mediated isothermal amplification                               |
| LFPS   | Livestock Feed Promotion Scheme                                      |
| LPDE   | Low Density Polyethylene                                             |
| MAIFS  | Ministry of Agro Industry and Food Security                          |
| MF     | Model Farm                                                           |
| MITD   | Mauritius Institute of Training and Development                      |
| MoU    | Memorandum of Understanding                                          |
| MPSAIR | Ministry of Public Service, Administrative and Institutional Reforms |
| MQA    | Mauritius Qualification Authority                                    |
| MS     | Murashige and Skoog                                                  |
| MRIC   | Mauritius Research and Innovation Council                            |
| MSB    | Mauritius Standard Bureau                                            |
| MSPA   | Mauritius sugar Planters Association                                 |
| NAA    | Naphthaleneacetic acid                                               |
| NAP    | National Agricultural Programme                                      |
| NCC    | National Cooperative college                                         |
| NGO    | Non Governmental Organisation                                        |
| NPF    | National Pension Fund                                                |

|        |                                                                                   |
|--------|-----------------------------------------------------------------------------------|
| NPK    | Nitrogen Phosphorus Potassium                                                     |
| NTA    | National Transport Authority                                                      |
| NTRS   | National Training and re-Skilling Scheme                                          |
| PLRV   | Potato Leaf Roll Virus                                                            |
| PSE    | Public Sector Entities                                                            |
| PVX    | Potato Virus X                                                                    |
| PVY    | Potato Virus Y                                                                    |
| OSHA   | Occupational Safety and Health Act                                                |
| RAC    | Rooted Apical Cuttings                                                            |
| RDT    | Research, Development and Training                                                |
| RE     | Renewable Energy                                                                  |
| REKIR  | Research and Extension Key Information Repository                                 |
| RS/SRS | Research Scientist/ Senior Research Scientist                                     |
| RVAA   | Regional Vulnerability Assessment and Analysis                                    |
| SADC   | Southern African Development Community                                            |
| SAGP   | Switch Africa Green Project                                                       |
| SANOI  | Sécurité Alimentaire et Nutritionnelle Océan Indien                               |
| SC     | Staff Committee                                                                   |
| SFWF   | Small Farmers Welfare Fund                                                        |
| SICOM  | State Insurance Company of Mauritius Limited                                      |
| SMC    | Strategic and Monitoring Committee                                                |
| SMS    | Short Message Service                                                             |
| SPNF   | Subhash Palekar Natural Farming                                                   |
| STOSAR | Support Towards the Operationalisation of the SADC - Regional Agricultural Policy |
| UNDP   | United Nations Development Programme                                              |
| UNEP   | United Nation                                                                     |
| USDA   | United States Department of Agriculture                                           |
| VAA    | Vulnerability Assessment and Analysis                                             |
| VAM    | Vesicular Arbuscular Mycorrhizal                                                  |
| XCC    | Xanthomonas campestris pv campestris                                              |

## Chairperson's Statement

I have the pleasure to present the Annual Report for the period July 2022 to June 2023 of the Food and Agricultural Research and Extension Institute.

The year 2022-2023 was marked with the organization of several events to showcase achievements in its work programme. Demonstration and sensitisation activities were carried out on modern and sustainable agricultural practices, post-harvest techniques. Outcome of research on introduction and propagation of new and promising crops; development of new crop varieties; implementation of water and energy saving irrigation and fertigation systems were disseminated.



Management also endeavoured to develop capacity of FAREI technical staff through training and participation in workshop and conferences to enable them to further their knowledge and improve their deliverables.

Our partnership with other institutions has been strengthened and new linkages has been fostered through the signing of a memorandum of understanding with the Chinese Academy of Tropical Agricultural Sciences (CATAS).

On behalf of the Board, I acknowledge that we are responsible for corporate governance. I am specifically responsible for the leadership of the Board, ensuring its effectiveness on all aspects of its role, including good governance in dealing with our stakeholders.

I thank the members of the board, the management and staff of FAREI for the effort that they put to enable FAREI to meet its objectives and deliverables.

A handwritten signature in blue ink, appearing to read 'Hemraj Woodun', written over a light blue horizontal line.

Hemraj Woodun

Chairperson

## Chief Executive Officer's Statement

During the year the FAREI research, development and training (RDT) programmes focused on the introduction, evaluation and development of new crop varieties, novel and climate-smart technologies, integrated pest and disease management, sustainable soil and water management, feeding strategies for livestock, rearing of small livestock, livestock waste management, post-harvest technologies and agro-processing. A total of 179 research projects/activities were implemented for both crops and livestock out of which 25 were completed. Training activities targeted the adoption of sustainable practices for safe food production and the environment, and information to farmers and stakeholders so they can access support services for increased production.



Promising varieties of potato, onion, peanut, cassava and garlic were identified. New crops comprising vanilla, cardamom, quinoa, broad bean, pigeon pea, snow pea and macadamia were tested and new varieties of avocado, banana, litchi, longan were evaluated in view of identifying promising varieties for release.

Eight new clones of cocoa were introduced through funding by MRIC to determine optimal postharvest management and processing practices for quality cocoa beans and fine-flavoured derived products.

To extend the range of fruit species and varieties available for commercial production, new types of berries (including cape gooseberry, raspberry, young berry and blueberry), papaya, pomegranate, grafted avocado, cold-stored runners of strawberry, and dwarf coconut varieties were introduced and evaluated. A new technique, *rooted apical cuttings*, was used to produce mini-tubers of the new potato variety Vigora.

To facilitate access to planting materials, sweet potato cuttings, bean seeds (FBS1, FBS2 and Ferrina) and potato seeds Vigora were distributed to planters and stakeholders. Tissue cultured plantlets of banana, breadfruit, colocasia variety PNG13 and anthurium were sold to growers. A new variety of pomegranate originating from India was propagated by tissue culture and released to planters. Budwood of recommended avocado varieties and accessions were provided to growers trained in avocado grafting.

Low-cost post-harvest methods were developed to induce ripening and to extend shelf-life of banana butternut, sweet potato and minimally-processed horticultural produce. Protocols were designed for a range of value-added products including dried whole green chilli, green chilli powder, frozen pre-baked butternut cubes, jackfruit burgers, mixed oyster mushroom and breadfruit/potato burgers, green banana hashbrown, pumpkin jam as well as herbal and fruity teas.

Under climate smart agriculture, water and energy-saving irrigation and fertigation systems as well as rain water harvesting structures were introduced and implemented on-station and on-farm. I-Metos automatic weather stations fully equipped with solarimeter, soil moisture probe and disease forecasting facility were installed on different sites. Soil moisture monitoring fertigation packages were developed for Eggplant and Cabbage grown under protected conditions.

With regard to pest management, an Integrated Pest Management package was developed for diamondback moth and disseminated to the farming community. A new pheromone was found

to be effective against *Tuta absoluta* while maize plants and blue sticky traps were found effective in preventing migration of onion thrips (*Thrips tabaci*) from old plots to new ones.

Thirteen species of ladybird beetles, out of 229 recovered, were identified and *Exochomus* sp. was found to be the most common one. The eco-service plants castor bean, *Clerodendrum* sp., wild yellow chrysanthemum flowers and pigeon pea were found effective in attracting natural enemies like hover flies, tachinid flies, ladybirds, mirid bugs, damsel bugs and parasitoid wasps.

Recommendations for disease control were provided following 631 diagnostic tests carried out within the disease surveillance programme. Chilli lines AVPP 0514 and an improved AVRDC chilli line APC4 were tested and showed good tolerance to anthracnose disease.

Regarding livestock sector, new technologies and feeding practices such as use of total mixed ration and feed blocks are being tested to improve efficiency of feed utilization. A biogas plant is being set up at Curepipe Livestock Research Station under the Switch Africa Green project. A model agroforestry plot is also being set up at Petit Merlo to demonstrate sylvopastoral system.

Within the capacity building programme for farmers, 101 MQA-approved trainings have been conducted, and were attended by 1,485 trainees. These comprised 69, 28 and 4 training courses attended by 946, 447 and 92 trainees on crop, livestock and agro-processing respectively. A total of 111 participants, from State House, Early Childhood Care and Education Authority (ECCEA) and BPS College attended training on organic crop production. Twenty participants were trained on Subhash Palekar Natural Farming at the National Civil College. Training in Agroecology was conducted at Academy of Velover for 18 participants. Five training courses were carried out in Rodrigues, on sheltered farming, crop production and livestock production. Collaboration was also provided to Regional Training Centre for the running of the MQA approved course on "Starting your Journey in Agriculture".

A total of 16,333 advisory visits was effected, and 283 extension events were organised and were attended by 2,844 farmers/entrepreneurs. Group meetings (112), field demonstrations (42) and conducted tours (60) were organized, and were attended by 1188, 195 and 515 planters respectively. Besides, some 46,067 field visits for food-crop surveys and 490 additional field surveys were conducted in connection with State Land occupancy, pests and diseases, market prices and impact of adverse climatic conditions.

Other services offered to planters comprised soil and plant sampling, analysis and recommendation; issue of seed vouchers; assistance to access loan from DBM; and hot-water treatment of seeds to minimize use of agrochemicals in disease management.

Within the implementation of the National Strategic Plan for Organic Farming 2017-2027, six trainings including distribution of kits were run for 229 beneficiaries in the region of Rose Belle, Baie du Tombeau, Grand Sable, Surinam and L'Escalier.

Regarding the implementation of Government schemes, 333 applications were processed and 265 applications approved for a sum of MUR 63,361,370. During the same year, a total of MUR 26,371,879 was disbursed to 224 beneficiaries.

None of the above achievements would have been possible without the support of the FAREI Board and the hard work of our employees whose dedication has been instrumental in propelling FAREI forward.



M. Micheline Seenevassen Pillay  
Acting Chief Executive Officer

## Section 1: Vision, Mission and Objectives

### VISION

*To help steer and promote the sustainable development of the National Agri-food System through the efficient and effective application of Research, Development and Training (RDT).*

### MISSION

*To support and implement priority RDT programmes for food security and to enhance competitiveness, sustainability and stakeholder equity across the value chain.*

### OBJECTIVES

1. Introduce, develop and promote such technologies in the food and non-sugar agricultural sector within a sustainable framework;
2. Co-ordinate, promote, and harmonise research activities in the non-sugar agricultural, food production and forestry sectors;
3. Promote and encourage agricultural and agri-business development through the setting up of agricultural youth clubs, and agricultural women and agricultural entrepreneur clubs; and
4. Promote dissemination and practical application of the results.

### STRATEGY

The Institute's approach is to implement strategic and adaptive research in a participatory framework with stakeholders in response to national requirements to improve farm productivity and income. Integrating ICT potential, the FAREI also seeks to ensure that there is a rapid transfer of innovative practices developed into relevant production systems for the benefit of growers, consumers and the environment.

## SERVICES PROVIDED

- Evaluation of agricultural inputs
- Training of farmers in production practices
- Advisory service and publications
- Pest and disease diagnostics
- SMS disease alert
- Processing and seed treatment facility (Hot water treatment)
- Interface between the farming community and service providers
- Information dissemination
- Facilitating access to incentive schemes and inputs
- Training in agro-processing for product development
- Agricultural Production and Management Information System (APMIS)

## LINKAGE

The FAREI works closely with both public and private sector organisations as well as international research and development institutions to develop on its mission. Linkages and participatory collaboration with stakeholders and farmer associations in the elaboration of our research and development agenda are also of high priority. In this respect the FAREI collaborated with the Mauritius Chamber of Agriculture in the development of climate smart practices, the Faculty of Agriculture, University of Mauritius in the hemp project, the regional training centre in the training programme on “Starting your Journey in Agriculture” and the HRDC, the MOFED and MOESD&SWM in the implementation of GCCA+ projects and other projects related to climate change.

In its endeavour to develop and strengthen linkages with international organisations, activities under the IAEA/AFRA projects were pursued. Collaboration with CIRAD was reinforced through implementation of activities under EU-DeSIRA project, Food Sec Semence, SANOI and DP-Biocontrol. The FAREI also collaborated with UNDP for implementation of the Bazar Moris e-platform, the SAGP for implementation of biogas project at CLRS and the seaweed project. Collaboration between Mauritius and China was strengthened with the signing of an MoU between FAREI and CATAS.

## Section 2: Organisational Structure

The FAREI came into operation on 14 February 2014 by virtue of section 24 of the FAREI Act 2013, further to the repeal of the Food and Agricultural Research Council Act 1985. It operates under the aegis of the Ministry of Agro Industry and Food Security (MAIFS).

The FAREI arose out of the merger of the Food and Agricultural Research Council (FARC) and the Agricultural Research and Extension Unit (AREU). It has been established with a view to improve the cost-effectiveness and quality of services, and optimise human resources in both organisations.

The FAREI is administered by a Board. It is managed by a Chief Executive Officer who is also the Accounting Officer, responsible for the control and management of the day-to-day business. Its management team comprises three Assistant Directors.

The FAREI's research and development programme is conducted by the following departments:

- **Crop Research Department**

Agronomy, Vegetable and Ornamentals Research, Fruit Research, Resource Management, Plant Pathology and Entomology Divisions

- **Livestock Department**

Animal Production and Animal Health Divisions

- **Extension and Training Department**

Crop Extension, Livestock Extension, and Information and Training Divisions

### Crop Research

- **Crop Production**

Research aims at the establishment of sustainable production systems and the development of improved cropping technologies. The research programme focuses on the development of novel varieties through breeding and biotechnology, optimal resource utilisation and value-addition through agro-processing.

- **Plant Protection (Plant Pathology and Entomology)**

The objective of the programme is to develop and implement integrated pest and disease management strategies in crop production so as to minimise the use of pesticides, to conserve biodiversity, and safeguard the environmental health whilst ensuring the provision of safe food.

### Livestock Research

Research thrusts aim to respond to farmers' needs in raising the production and productivity of livestock enterprises by developing improved management practices and techniques, feeding packages using locally available feed resources, the introduction of improved breeds and genetic improvement, the conservation and utilisation of animal genetic resources.

### Extension and Training

The Extension and Training Department aims at increasing farmers' knowledge and skills to improve farm productivity and income. This is effected by timely cost-effective transfer of innovative production practices through a customer focus and a participatory approach. The Department has a comprehensive network of sub offices, model farms, demonstration centres and a Farmer Training School to meet its

objectives. With the growing challenges in agriculture, the thrust is towards professionalization of farm operations, and promoting value-addition and agri-business development.

## Support Services

- **Biometry and Statistics Division**

The Division is responsible for providing statistical support and advice to the technical cadres of the Institute through their research and extension activities. Research Divisions were assisted in developing research protocols, design and layout of experiments and field trials. Research staff were supported in data analysis and interpretation of results while Extension staff were empowered to carry out surveys and field assessments.

- **Engineering Division**

The main activity of the division is to provide technical support to the institution in the implementation of research and development projects through design and preparation of scope of works for infrastructural projects and specifications for procurement of equipment. Engineering support is also provided for empowerment of potential and existing local agricultural operators in various areas namely hydroponics, sheltered farming, rainwater harvesting systems, *inter alia*.

- **Business Development and Economics Unit**

In line with its objectives, the unit geared resources mainly to assure a backup service to prospective entrepreneurs interested in the agri-business sector. In that context, key activities include provision of information to visitors calling at FAREI Head Quarters, advisory service and business facilitation as well as technical assistance for preparation of appropriate business plan.

The core activities of the BDU, amongst others, is to:

- a) Coordinate and process numerous applications under different Schemes
- b) Monitor the implementation of projects under the different Schemes
- c) Promote and encourage Agri-business in line with Government policies

- **The Administration Section**

The administration section assists management to achieve FAREI'S goals. Support was provided for the research and development activities so as to ensure effective management of overall activities and ensure good Corporate Governance.

- **Procurement Section**

The Procurement Section and its staff are key in ensuring that the FAREI can meet its goals and objectives through effective and efficient procurement and supply functions. The section strives to add value to the organization by obtaining quality goods and services at competitive prices as well as ensuring value for money.

All approved requests for goods, works, consultancies and services are processed according to the Rules and Regulations of the Public Procurement Act 2006, the Financial Management Manual and the Code of Ethics of the ICAC.

During the period July 2022 to June 2023, the section carried out almost all bidding exercises through the e-procurement system. The procurement of goods, services and works and as increased significantly as compared to previous years. Some 87 bids were launched (manually and e-procurement) out of which 27 were approved. Expenditure for procurement for the same period amounted to MUR 115 M.

- **Health and Safety**

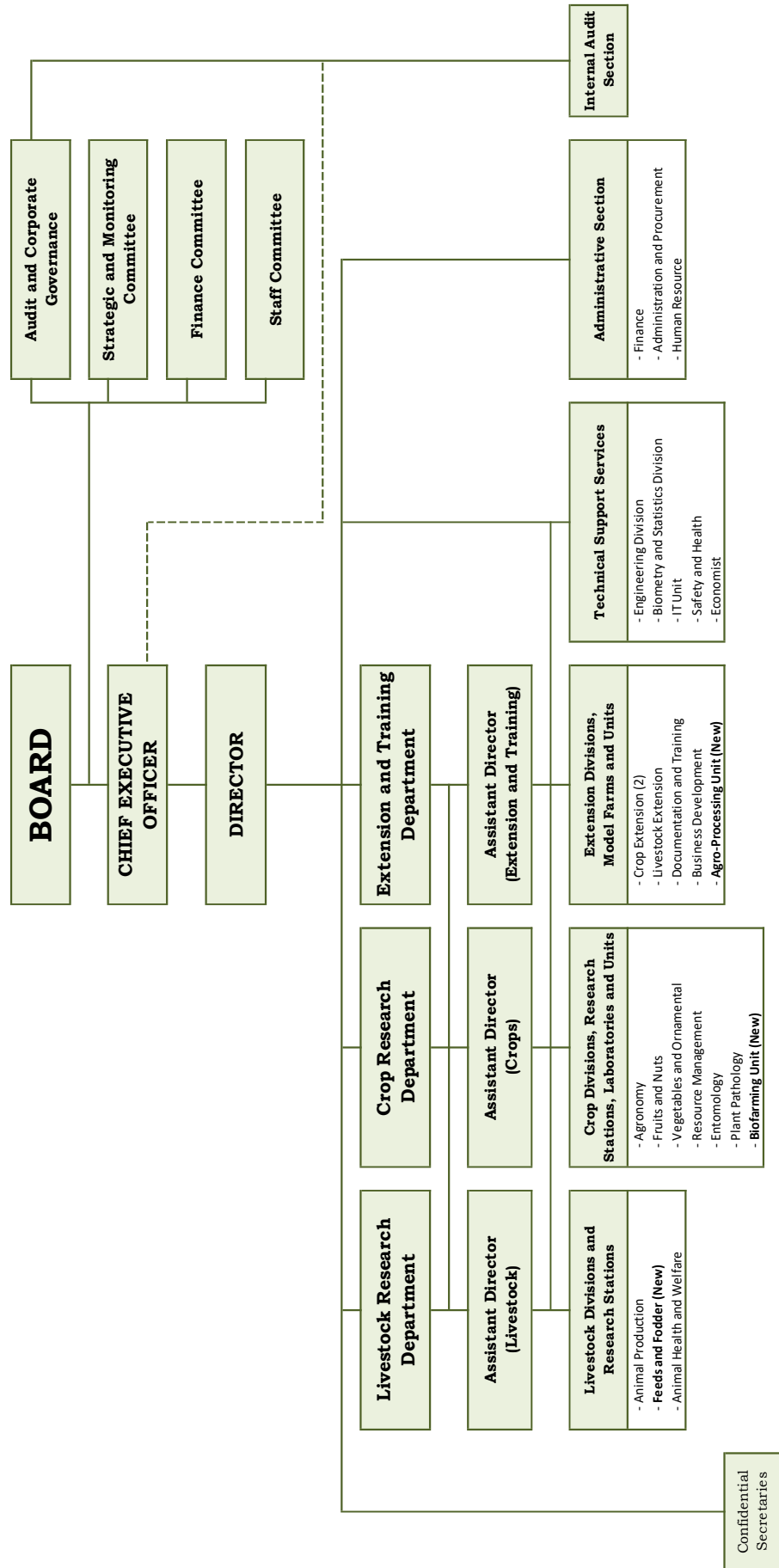
FAREI recognises the importance of a safety and health culture. It upholds its commitment to provide a safe working environment to its employees through involvement of all parties, namely management, employees and trade unions. It adopts a participatory approach to continuously improve working conditions. The aim is to minimise risks and health hazards through regular risks assessments and minimal exposure to hazardous environments. The FAREI advocates for proper flow of communication for enforcement of safety and health procedures and for employees to protect themselves as well.

#### **IT Unit**

The IT Unit at the FAREI is crucial in supporting and enhancing the organisation's technological infrastructure and operations. The IT Unit is responsible for managing and maintaining the organisation's technology infrastructure, including computer systems, networks, servers, and databases. They ensure that the infrastructure is secure, reliable, and up-to-date to support the institute's research and extension activities. The IT Unit at FAREI plays a pivotal role in leveraging technology to enhance agricultural research, extension services, data management, and overall operational efficiency. Their efforts contribute to the sustainable development of the agricultural sector by harnessing the power of information and communication technology.

# Food and Agricultural Research and Extension Institute

## Organigram



Note: The Confidential Secretaries provide services to the Directorate Team  
The Internal Auditor will fall under the administrative control of the Chief Executive Officer.

## Section 3: Corporate Governance Report

The Food and Agricultural Research and Extension Institute (FAREI) was established as a body corporate under the FAREI Act 2013. It operates under the aegis of the Ministry of Agro-Industry and Food Security. The FAREI became operational on 14 February 2014 and its main objectives and functions are spelt out at sections 4 and 5 of the FAREI Act 2013.

### Objects of the Institute

The objects of the Institute as spelt out at section 4 of the FAREI Act are:

1. To introduce, develop and promote such novel technologies in the food and non-sugar agricultural sector as may be approved by the Minister;
2. To coordinate, promote and harmonise research activities in non-sugar agriculture, food production and forestry;
3. To promote and encourage agricultural and agri-business development through the setting up of agricultural youth clubs and agricultural entrepreneur clubs; and
4. To promote dissemination and practical application of the results of any research undertaken under this Act.

### Functions of the Institute

As per section 5 of the FAREI Act 2013, the Institute shall have such functions as are necessary to further its objects most effectively and may, in particular:

1. Conduct research in non-sugar agriculture, food production and forestry, and maximize the benefits of such research;
2. Conduct extension and advisory activities in non-sugar crops, livestock, food production and agribusiness;
3. Set research priorities in line with the needs of the food and non-sugar agricultural sector;
4. Coordinate, monitor and evaluate research programmes and projects of different institutions engaged in non-sugar agriculture, forestry and food production without any prejudice to existing legislation concerning those institutions;
5. Set up and manage research stations, model farms, greenhouses, hydroponic centres and other infrastructure for the purpose of promoting food and non-sugar agricultural technologies;
6. Carry out, subject to the approval of the Minister, such other research and related activities in non-sugar agriculture, food production and forestry; and
7. Advise the Minister generally on national policies and other matters related to research in non-sugar agriculture, food production and forestry.

## Powers of the Institute

As per section 6 of the FAREI Act 2013, the Institute shall have such powers as are necessary to attain its objects and discharge its functions most effectively and may in particular:

1. With the approval of the Minister to whom responsibility for the subject of finance is assigned, raise such loan as may be required to finance the setting up of greenhouses, hydroponic centres and other infrastructure;
2. Rent out greenhouses, hydroponic centres and other infrastructure on such terms and conditions as it may determine;
3. Levy fees in respect of services in connection with greenhouses, hydroponic centres and other infrastructure and of transfer of any other food and non-sugar agricultural technologies;
4. Set up research advisory committees;
5. Enter into any contract in accordance with the Public Procurement Act;
6. Sell or exchange any property;
7. Receive grants and donations and raise funds; and
8. To do such acts and things as may be necessary for the purposes of this Act.

The FAREI views good corporate governance practice as an essential part of sustaining the organisation's growth and continues to treat this responsibility with seriousness and commitment.

As a parastatal body, in line with the Financial Reporting Act 2004, the FAREI acknowledges its responsibility for applying and implementing the principles contained in the National Code of Corporate Governance for Mauritius (2016) (the '2016 Code') and is accordingly conducting its affairs in line with the principles of the 2016 Code.

This Corporate Governance Report highlights how the FAREI has implemented the recommendations of the Code.

## CORPORATE OBJECTIVES STATEMENT

### VISION

To help steer and promote the sustainable development of the National Agri-food System through the efficient and effective application of Research, Development and Training (RDT).

### MISSION

To support and implement priority RDT programmes for food security and to enhance competitiveness, sustainability and stakeholder equity across the value chain.

### OBJECTIVES

- a. Introduce, develop and promote such technologies in the food and non-sugar agricultural sector within a sustainable framework;
- b. Co-ordinate, promote, and harmonise research activities in the non-sugar agricultural, food production and forestry sectors;
- c. Promote and encourage agricultural and agri-business development through the setting up of agricultural youth clubs and agricultural women and agricultural entrepreneur clubs; and
- d. Promote dissemination and practical application of the results.

## STRATEGY

The Institute's approach is to implement strategic and adaptive research in a participatory framework with stakeholders in response to national requirements to improve farm productivity and income. Integrating ICT potential, the FAREI also seeks to ensure that there is a rapid transfer of innovative practices developed into relevant production systems for the benefit of growers, consumers and the environment.

## OUR CORE VALUES AND PRINCIPLES

- Respect, Honesty and Loyalty
- Pride and Ownership
- Courteous and Excellent Service
- Integrity and Transparency
- Team Culture
- Accountability

### Principle One – Governance Structure

#### Corporate Profile

Strong corporate governance is about having clear and systematic decision-making processes, thus providing clarity about responsibilities, avoiding conflicts of interest and ensuring satisfactory internal control, risk management and transparency as well as contributing to the safeguarding of trust among stakeholders. Our governance practices aim to ensure that both the decisions of the Board and their implementation by management are geared towards preserving the long-term interest of our stakeholders and ensuring the Institute's sustainability.

The Board plays a central role in the guidance and management of the organization and the pursuit of sustainability success. It is committed to ensuring that a strong governance framework operates throughout the FAREI, recognizing it as a vital component to support management in the delivery of the organization's strategic objectives. The Board determines the FAREI's overall strategy and overlooks the implementation of the strategy and performance of the latter.

This section outlines, inter-alia, the corporate governance structures in place at the FAREI and describes the organization of the Board's business.

The roles, responsibilities and duties of the Chairperson and Board members are set out at sections 7, 8 and 9 of the FAREI Act 2013.

The direction, control and accountability of the activities of the FAREI are vested in the Board, which is a unitary one. The fulfilling of these responsibilities is facilitated by a well-developed governance structure comprising various Sub-Committees of the Board. The management is accountable and subject to the control of the Board and operates within the policy framework laid down by the latter.

The FAREI's business is conducted in accordance with the FAREI Act 2013, other relevant statutory provisions and the principles of good corporate governance. All functions are exercised honestly, in good faith with due care and diligence and in the interest of the FAREI and its stakeholders.

The FAREI Board is committed to fulfilling its mandate in a manner which is consistent with good governance practices, and in particular with regard to accountability, transparency, responsibility and ethics.

A Charter for the FAREI Board and its Sub-Committees is being finalised, and will define:

- The terms of reference of the FAREI Board and its Sub-Committees;

- The composition and role of the Board of Directors;
- The general duties of the Board Directors; and

The Charter will also include a Code of Conduct for the Board Directors.

### Functions of the Board

- The Board gives strategic directions to the Institute;
- The Board formulates plans and policies in the non-sugar agricultural sector; and
- The Board takes strategic decisions on research priorities and extension activities in the non-sugar agricultural sector.

The Board assumes its fiduciary responsibilities whilst complying with all legal and regulatory requirements. In this respect, the Board adheres to the following key governance documents:

- Role, powers and functions of the Board as per the FAREI Act 2013;
- Terms of reference of the Board's Sub-Committees; and
- Code of Ethics for Employees.

Copies of the FAREI Act 2013 and the National Code of Corporate Governance for Mauritius 2016 have been handed over to the Chairperson and Board members to draw their attention on their respective roles, responsibilities and duties.

### Key Governance Positions

The Board considers key governance positions to be critical to the delivery of its strategy and to achieve a high standard of good governance.

The Board ensures that proper standards of Corporate Governance are applied and maintained throughout the FAREI. The following key governance positions are critical in enabling the Board to fulfil its mission, vision and objectives:

### Chairperson of the FAREI Board

- The Chairperson is non-executive and is appointed by the Minister of Agro-Industry and Food Security in accordance with section 7(1)(a) of the FAREI Act 2013.
- The Chairperson is responsible for the conduct of the business and activities of the Board and its sub-committees; and
- The Chairperson ensures the active participation of all board members in the discussions and deliberations of the Board.

### Chief Executive Officer

As per section 10 of the FAREI Act 2013, the Chief Executive Officer, who is the Head of the FAREI, is inter-alia responsible for the execution of the policy of the Board and for the control and management of the day-to-day business of the Institute.

The Chief Executive Officer shall, in the exercise of his functions, act in accordance with such directives as he may receive from the Board. The Chief Executive Officer also advises on:

- i. the formulation and implementation of the research and extension activities in line with government's vision; and
- ii. the formulation, implementation and enforcement of appropriate legislation in line with government's policies.

The Chief Executive Officer is the main point of contact between the Board and the management of FAREI.

### Chairpersons of Sub-Committees of the Board

The Chairpersons of the Sub-Committees work in close collaboration with and provide support and advice to the Chairperson of the Board and the Board itself.

- Mrs S Soborun is the Chairperson of the Finance and Staff Committees;
- Mr M Rughoo is the Chairperson of the Strategic and Monitoring Committee; and
- Mr S Naidu is the Chairperson of the Audit and Corporate Governance Committee.

### Board Secretary

The main responsibilities of the Board Secretary are:

- To ensure compliance with relevant statutory and regulatory requirements;
- To develop and circulate the agenda and relevant documents for Board meetings in a timely manner;
- To facilitate the induction of Board members and to provide guidance to them in terms of their roles and responsibilities;
- To assist the Chairperson in governance processes; and
- To organize Board meetings and to ensure that the records and minutes of Board meetings reflect the proper exercise of those duties.

### Management Team

Management is accountable and subject to the control of the Board and operates within the policy framework laid down by the latter.

The Management team comprises the Chief Executive Officer, the Assistant Directors and Heads of Sections of FAREI. The Management team assists the Chief Executive Officer in implementing the policy decisions of the Board.

### Our Employees

Our mission is made possible by the talent and passion of our workforce of more than 500 dedicated employees who bring their unique skills, talent, insights and passion to the work that they perform daily. The health, safety, professional development, work-life balance and equitable, respectful treatment of our employees is one of our highest priorities. We commit ourselves to ensuring that they have opportunities for development and advancement.

### Professional Services

|               |                                                                                                |
|---------------|------------------------------------------------------------------------------------------------|
| Auditors:     | The audit of the financial statements of the FAREI is carried out by the National Audit Office |
| Bank:         | The State Bank of Mauritius Ltd                                                                |
| Legal Advisor | The State Law Office                                                                           |

### Principle Two – The Structure of the Board and its Sub-Committees

In accordance with the FAREI Act 2013, the Board is constituted of a Chairperson and other members from diverse backgrounds with a view to ensuring a right balance of skills, experience and diversity. The Independent members, coming from diverse backgrounds, provide a blend of knowledge, skills, experience and commitment to make sound judgments on various key issues relevant to the business of the FAREI.

The composition of the Board of FAREI for the period 01 July 2022 to 30 June 2023 was as follows:

| Remarks                   |                                                                               |
|---------------------------|-------------------------------------------------------------------------------|
| <b>Chairperson</b>        |                                                                               |
| Mr H Woodun               | Appointed by Minister                                                         |
| <b>Members</b>            |                                                                               |
| Mrs S Soborun             | Representative of Ministry of Agro-Industry and Food Security                 |
| Mrs J Sauzier             | Representative of Mauritius Chamber of Agriculture                            |
| Mr R Kissoonah            | Representative of Mauritius Agricultural and Marketing Cooperative Federation |
| Assoc Prof D Puchooa      | Representative of University of Mauritius                                     |
| Mr S Naidu                | Appointed by Minister                                                         |
| Mr M Rughoo               | Appointed by Minister                                                         |
| Mr K Seechurn             | Appointed by Minister                                                         |
| Mr L Mungry               | Appointed by Minister                                                         |
| Mrs M Seeneevassen Pillay | Acting Chief Executive Officer as from 04 September 2021                      |
| Mr A Goolaub              | Acting Chief Executive Officer from 26 September to 19 December 2022          |
| Mrs S Auguste             | Administrative Manager - Board Secretary                                      |

## Profile of Board Members

The profiles of the Board Members are given hereunder. The interest of Board Members is declared at note 3 of the notes to the accounts.

### Chairperson

#### Mr Hemraj Woodun

Mr H Woodun is a Sole Trader and Company Director and has wide experience in the agricultural sector.

### Board Members

#### Mrs Soondaree Devi Soborun

Mrs Soondaree Devi Soborun holds a Master's degree in Public Sector Management in addition to a Bachelor's Degree in Economics and a Post Graduate Certificate in Quality Management and Performance Excellence. She has wide experience in the public sector in various fields such as shipping, broadcasting and general administration.

In the last 20 years, she has served at the Prime Minister's Office, the Ministry of Civil Service and Administration Reforms, Ministry of Environment and Sustainable Development and the Ministry of Public Infrastructure and Transport.

Mrs Soborun is presently Deputy Permanent Secretary at the Ministry of Agro-Industry and Food Security.

#### Mrs Jacqueline Sauzier

Mrs Jacqueline Sauzier has wide experience in the agricultural sector and is presently General Secretary of the Mauritius Chamber of Agriculture.

#### Mr Mukesh Rughoo

Mr Mukesh Rughoo holds a Master degree in Genetics and Plant Breeding from the University of Aberystwyth, Wales and a Bachelor degree in Agriculture from the University of Mauritius. Mr Rughoo has more than 35 years' experience in research and development of crops of strategic importance such as sugar cane, potato, tomato, maize, pulses, onion, garlic, wheat, rice and other crops.

#### Mr Rajdeo Kissoonah

Mr Rajdeo Kissoonah is presently the Secretary/Manager of the Mauritius Agricultural and Marketing Cooperative Federation Ltd. He is also the Vice President of the Mauritius Cooperative Alliance Ltd, Board Director of Belle Mare Water Users Multi-Purpose Cooperative Society Ltd and Board member of the Advisory Board of the Ministry of Business, Enterprise and Cooperatives.

#### Mr Kalyandutt Seechurn

Mr Kalyandutt Seechurn holds a School Certificate and has a wide experience in the agricultural sector.

#### Mr Sandrasagarren Naidu

Mr Sandrasagarren Naidu is a Freelance Consultant and a Trainer (MQA approved). His areas of expertise include the management of agricultural research and extension; statistics and agricultural surveys; capacity building of Non-State Actors/civil society organisations; and poverty alleviation programmes.

Mr Naidu holds a BSc. (Hons) Agriculture, University of Mauritius (1973), an MSc. Biometry, University of Reading, UK (1976) and a Diploma in Agricultural Surveys and Censuses, USDA (1981).

#### Mr Lavish Mungry

Mr Lavish Mungry holds a School Certificate and has a wide experience in the agricultural sector. He is the Secretary of the Agricultural Development Marketing Association (ADMA) in Glen Park, Vacoas. He is a member of the National Potato Committee, National Onion and Garlic Committee.

#### Assoc Prof Daneshwar Puchooa

Associate Professor Daneshwar Puchooa is the Dean at the Faculty of Agriculture, University of Mauritius. He joined the University of Mauritius in 1990 as a lecturer in Biotechnology and initiated the setting-up of the Tissue Culture Lab. and the Molecular Biology Lab. at the Faculty of Agriculture. He holds an undergraduate degree from the University of North London in Biology and Chemistry and post-graduate degrees in Applied Molecular Biology and Biotechnology from the University of London, Plant Biotechnology and Teaching & Learning in Higher Education from the University of Mauritius and in Biosafety from the University of Ghent, Belgium. Assoc. Prof. D Puchooa is highly engaged in research and is at present supervising five MPhil/PhD students. He is also the author of several chapters in books and has published over 50 peer-reviewed research papers in International Journals.

In line with the requirements of the National Code of Corporate Governance for Mauritius 2016, the Board Secretary and the Secretary of the Sub-Committees of the FAREI Board are qualified Chartered Secretaries.

## Sub- Committees

Four Board Sub-committees have been set up to assist the Board in the discharge of its duties and responsibilities. Each sub-committee operates under defined terms of reference and recommends specific matters to the Board. The Sub-committees of the FAREI Board for the period 01 July 2022 to 30 June 2023 were as follows:

1. Finance Committee;
2. Staff Committee;
3. Strategic and Monitoring Committee; and
4. Audit and Corporate Governance Committee.

### Finance Committee (FC)

#### Composition of the FC and its functions

|                |                    |
|----------------|--------------------|
| Mrs S Soborun  | <b>Chairperson</b> |
| Mr M Rughoo    | Member             |
| Mr L Mungry    | Member             |
| Mr R Kissoonah | Member             |

#### In Attendance

|                          |                                                                        |
|--------------------------|------------------------------------------------------------------------|
| Mrs M Seenevassen Pillay | Acting Chief Executive Officer                                         |
| Mr A Goolaub             | Acting Chief Executive Officer (from 26 September to 19 December 2022) |
| Mrs B Radha              | Manager Finance                                                        |
| Mrs S Auguste            | Administrative Manager                                                 |
| Mrs V Hardwar            | Stores Superintendent                                                  |
| Ms A Dunputh             | Administrative Manager <i>Secretary</i>                                |

The Finance Committee reviews and recommends to the Board matters pertaining to the financial situation of the FAREI, financial statements and reports, budget estimates, tender committee and bid evaluation reports and award of contracts.

Eight meetings of the Finance Committee were held during the period 01 July 2022 to 30 June 2023.

### Staff Committee (SC)

#### Composition of the SC and its functions:

|                      |                                         |
|----------------------|-----------------------------------------|
| Mrs S Soborun        | <b>Chairperson</b>                      |
| Assoc Prof D Puchooa | Member                                  |
| Mr R Kissoonah       | Member                                  |
| Mr K Seechurn        | Member                                  |
| Ms A Dunputh         | Administrative Manager <i>Secretary</i> |

#### In Attendance

|                          |                                                       |
|--------------------------|-------------------------------------------------------|
| Mrs M Seenevassen Pillay | Acting CEO                                            |
| Mr A Goolaub             | Acting CEO from 26 September 2022 to 19 December 2022 |
| Mrs B Veerapen           | Acting Human Resource Manager                         |
| Mr A Seebocus            | Human Resource Manager as from 03 February 2023       |

The Staff Committee examines and recommends to the Board matters relating to, inter-alia:

- Human Resource Strategies;
- Interviews, Selection and Appointment;
- Training and Development; and
- Industrial relations.

There were ten meetings of the Staff Committee during the period 01 July 2022 to 30 June 2023.

### Strategic and Monitoring Committee (SMC)

The composition of the SMC was as follows:

|                      |                    |
|----------------------|--------------------|
| Mr M Rughoo          | <b>Chairperson</b> |
| Assoc Prof D Puchooa | Member             |
| Mrs J Sauzier        | Member             |
| Mr S Naidu           | Member             |
| Ms A Dunpath         | Secretary          |

In Attendance:

|                          |                                                               |
|--------------------------|---------------------------------------------------------------|
| Mrs M Seenevassen Pillay | Acting Chief Executive Officer                                |
| Mr A Goolaub             | Assistant Director (Extension and Training)                   |
| Ms R Nowbuth             | Acting Assistant Director (Crop) – 01 July to 31 October 2022 |
| Dr (Mrs) L Unmole        | Assistant Director (Crop) as from 01 November 2022            |

### Terms of Reference of the SMC

The SMC shall inter-alia, focus on:

- Aligning with the strategic policy;
- Reviewing the performance and considering proposals regarding effectiveness and sustainability through Departmental review for crop, livestock and extension and training to farmers;
- Looking at the macro level issues and the FAREI's future in the medium term;
- Introducing, developing and promoting novel technologies in the food and non-sugar agricultural sector within a sustainable framework. To keep pace with the change, officers be given the opportunity to have access to new technologies (computer networking, etc.);
- Reflecting on FAREI's weaknesses, allocation of more resources in terms of recruitment and equipment, quality of reporting etc;
- Ensuring synergy among stakeholders;
- Preparing succession planning; and
- Addressing budgetary constraints to be able to unfold the strategic plan of action towards the farming community and avoiding departure from procedures.

There were eleven meetings of the Strategic and Monitoring Committee (SMC) during the period 01 July 2022 to 30 June 2023.

### Audit and Corporate Governance Committee (ACGC)

#### Composition of the ACGC

|                      |                        |                  |
|----------------------|------------------------|------------------|
| Mr S Naidu           | <b>Chairperson</b>     |                  |
| Mrs J Sauzier        | Member                 |                  |
| Mr K Seechurn        | Member                 |                  |
| Assoc Prof D Puchooa | Member                 |                  |
| Ms A Dunpath         | Administrative Manager | <i>Secretary</i> |

#### In Attendance

|                |                         |
|----------------|-------------------------|
| Ms P Sevathian | Internal Auditor, FAREI |
|----------------|-------------------------|

#### The Terms of Reference of the ACGC are to focus on inter-alia:

- The functioning and monitoring of the Internal Audit system to improve efficiency;
- Compliance with rules and regulations;
- Reviewing significant accounting and reporting issues to understand their impact on the financial statements;
- Encouraging consultation between internal and external auditors; and
- Assessing the adequacy and effectiveness of the organisation's governance, risk management, control frameworks, legislative and regulatory compliance.

Four meetings of the Audit and Corporate Governance Committee were held from 01 July 2022 to 30 June 2023.

### Anti-Corruption Committee

An Anti-Corruption Committee chaired by Mrs Indoomatee Ramma, has been set up at FAREI and comprised the following members: Mr R.Shimadry, Mr V.K. Bissessur, Mrs C.Teeluck, Mr S.Sunasse, Ms P. Sevathian, Mr N.Pratab, and Mrs S.Auguste as Secretary.

The Anti-Corruption Policy of FAREI has been approved by the Board and is published on FAREI's website.

A Corruption Risk Identification exercise was carried out by a sub-committee at FAREI in collaboration with the ICAC. Proposals for two Corruption Risk Assessments (CRAs) namely:

- i. Overtime allocation to Stockmen, Gardener/Nursery Attendants and Irrigation /Pump Operators and;
- ii. Sale of animals by FAREI.

have been submitted to the Ministry of Public Service, Administrative and Institutional Reforms (MPSAIR), through the Parent Ministry, and have already been implemented at FAREI. FAREI has been informed that it had successfully completed the Key Performance Indicator on good governance as at January 2023. FAREI is also in the process of conducting Corruption Risk Assessments in other risk areas.

During the period under review, three meetings of the Anti-Corruption Committee of FAREI were held.

### Principle Three – Appointment of Members

Section 7 of the FAREI Act 2013 provides for the Institute to be administered by a Board consisting of:

- A Chairperson to be appointed by the Minister;
- A representative of the Ministry;
- A representative of the Mauritius Chamber of Agriculture;

- A representative of the Mauritius Agricultural Marketing Cooperative Federation;
- A representative of the University of Mauritius; and
- 4 persons with wide experience in food and non-sugar agricultural sector, to be appointed by the Minister.

## Principle Four – Remuneration, Duties and Performance of Members

Board members are aware of their legal duties which they are called upon to perform in accordance with ethical standards. Conflicts of interest are disclosed and managed. Management submits to the Board and its Sub-Committees well documented and concise reports and papers in a timely manner to allow Board members to perform their duties with due care, diligence and in a professional manner.

### Attendance records, remuneration and benefits of members

#### Remuneration Philosophy

During the period under review, the Chairperson and Board members were paid fees in accordance with the recommendations of the PRB reports 2016 and 2021 and Circular Note No 54 of 2022 from the Ministry of Public Service, Administrative and Institutional Reforms.

The remuneration of the Chairperson for the period 01 July 2022 to 30 June 2023 amounted to MUR 672,350.

Board members, namely Mrs S Soborun, Dr D Puchooa, Mr S Naidu, Mrs J Sauzier, Mr K Seechurn, Mr M Rughoo, Mr R Kissoonah and Mr L Mungry were paid fees and travelling for a total amount of MUR 722,869 for the period 01 July 2022 to 30 June 2023.

Total number of Board meetings held from 01 July 2022 to 30 June 2023 was fourteen.

| Name                   | Board meetings attended |
|------------------------|-------------------------|
| Mr H Woodun            | 14/14                   |
| Mrs S D Soborun        | 14/14                   |
| Mrs Jacqueline Sauzier | 11/14                   |
| Mr R Kissoonah         | 11/14                   |
| Dr D Puchooa           | 11/14                   |
| Mr S Naidu             | 12/14                   |
| Mr M Rughoo            | 12/14                   |
| Mr K Seechurn          | 7/14                    |
| Mr L Mungry            | 13/14                   |

| Name                              | Fees (MUR)           |                     |                  |                  |                  |                   |                     |
|-----------------------------------|----------------------|---------------------|------------------|------------------|------------------|-------------------|---------------------|
|                                   | FAREI Board+Adj fees | Telephone Allowance | FC               | SC SMC           | ACGC             | Travelling +Adjmt | Total               |
| <b>Chairperson</b><br>Mr H Woodun | 649,380.00           | 12,000.00           |                  |                  |                  | 10,970.00         | <b>672,350.00</b>   |
| <b>Members</b>                    |                      |                     |                  |                  |                  |                   |                     |
| Mrs S D Soborun                   | 95,173.50            |                     | 8,976.00         | 16,528.00        |                  | 9,905.00          | <b>106,502.50</b>   |
| Mr S Naidu                        | 91,239.75            |                     |                  | 13,146.00        | 8,976.00         | 12,130.00         | <b>103,369.75</b>   |
| Mr M Rughoo                       | 92,099.00            |                     | 8,011.50         | 17,208.00        |                  | 12,880.00         | <b>103,199.25</b>   |
| Mrs J Sauzier                     | 57,150.75            |                     |                  | 5,911.50         | 5,055.75         | 8,200.00          | <b>65,350.75</b>    |
| Mr K Seechurn                     | 64,845.00            |                     |                  | 11,823.00        | 2,955.75         | 8,900.00          | <b>73,745.00</b>    |
| Mrs A Pompon*                     | 13,844.25            |                     |                  | 5,134.50         |                  | 2,020.00          | <b>15,864.25</b>    |
| Dr D Puchooa                      | 93,245.75            |                     |                  | 13,067.25        | 10,578.75        | 7,155.75          | <b>105,920.75</b>   |
| Mr L Mungry                       | 63,576.75            |                     | 8,011.50         |                  |                  | 9,010.00          | <b>72,586.75</b>    |
| Mr R Kissoonah                    | 59,344.50            |                     | 8,011.50         | 6,767.25         |                  | 9,325.00          | <b>68,669.50</b>    |
| Mrs K Jugroo**                    | 6,765.50             |                     | 1,176.00         | 1,176.00         |                  | 895.00            | <b>7,660.50</b>     |
| <b>Total</b>                      | <b>1,286,309.00</b>  | <b>12,000</b>       | <b>34,186.50</b> | <b>49,361.50</b> | <b>51,978.75</b> | <b>24,143.25</b>  | <b>1,395,219.00</b> |

\* Alternate Member – representing the Mauritius Chamber of Agriculture on the Strategic and Monitoring Committee

\*\* Alternate Member representing the Ministry of Agro Industry and Food Security on FAREI Board

#### Attendance of Board members at Sub-Committees

| Name                              | Sub- Committees |      |       |      |
|-----------------------------------|-----------------|------|-------|------|
|                                   | FC              | SC   | SMC   | ACGC |
| <b>Chairperson</b><br>Mr H Woodun | Nil             | Nil  | Nil   | Nil  |
| <b>Members</b>                    |                 |      |       |      |
| Mrs S D Soborun                   | 7/8             | 9/10 | Nil   | Nil  |
| Mr S Naidu                        | Nil             | Nil  | 11/11 | 4/4  |
| Mr M Rughoo                       | 6/8             | Nil  | 11/11 | Nil  |
| Mrs J Sauzier                     | Nil             | Nil  | 4/11  | 3/4  |
| Mr K Seechurn                     | Nil             | 9/10 | Nil   | 2/4  |
| Mrs A Pompon *                    | Nil             | Nil  | 6/11  | Nil  |
| Dr D Puchooa                      | Nil             | 7/10 | 8/11  | 4/4  |
| Mr L Mungry                       | 8/8             | Nil  | Nil   | Nil  |
| Mr R Kissoonah                    | 8/8             | 6/10 | Nil   | Nil  |
| Mrs K Jugroo**                    | 1/8             | 1/10 | Nil   | Nil  |

Note: Finance Committee: FC; Staff Committee: SC; Strategic and Monitoring Committee: SMC; Audit and Corporate Governance Committee: ACGC

\*Alternate Member – representing the Mauritius Chamber of Agriculture on the Strategic and Monitoring Committee.

\*\* Alternate Member – representing the MAIFS on the Finance and Staff Committees.

#### Legal Duties

All members of the Board including an alternate member are informed of their fiduciary duties at the time of their appointment.

#### Code of Ethics

The Code of Ethics for FAREI employees' rests on a number of core values which require that FAREI employees behave with integrity, selflessness, impartiality, objectivity, accountability, honesty and justice.

The three guiding principles of the code are that FAREI employees shall:

1. Fulfil their lawful obligations to FAREI with professionalism, integrity and loyalty;
2. Perform their official duties honestly, faithfully and efficiently while respecting the rights of the public and their colleagues; and
3. Not to bring the FAREI into disrepute through their private activities.

Board members are also apprised of the requirements of their Code of Ethics.

#### Conflict of Interest

All conflicts of interest are recorded during Board meetings on an "if and when required" basis. Directors accordingly recuse from participating in matters where they may find themselves to be in a situation of conflict of interest.

#### Related Party Transactions

The particulars in respect of Related Party Transactions have been disclosed in Note 3 of the Financial Statements.

Board Directors keep information relating to the FAREI, gathered in their capacity as Directors, strictly confidential and private and do not divulge them to anyone without the authority of the Board.

As per the requirement of the National Code of Corporate Governance for Mauritius 2016, the FAREI, as a Statutory Body, should evaluate its Board Directors on a regular basis. The matter will be discussed at the level of the Parent Ministry on the way forward.

### Principle Five – Risk Governance and Internal Control

- The Board considers risk management as an integral component of good business practice with a view to support management's decision making, improve the reliability of business performance and to assist in the preparation of financial statements in accordance with International Public Sector Accounting Standards (IPSAS).
- The Internal Audit section is responsible for providing assurance to the Board regarding the implementation, operation and effectiveness of internal controls and risk management. Internal Audit reports are considered at meetings of the Audit and Corporate Governance Committee. The systems in place are geared towards the implementation, maintenance and monitoring of the internal controls and the processes by which the Board is given assurance that the internal audit systems in place are effective.
- An Internal Audit Charter and an Audit Committee Charter are being finalized for approval by the Board.
- The Audit and Corporate Governance Committee monitors and evaluates the duties and responsibilities of management and of the Internal and External Audit to ensure that all major issues reported have been satisfactorily resolved. The Audit and Corporate Governance Committee reports important matters to the Board.

### Risk Assessment /Risk Management

Risk assessment is also an essential part of the Corruption Prevention Plan. The outcome of the risk assessment forms the basis for the development of the appropriate corruption prevention measures. In this context, a Corruption Risk Assessment (CRA) Plan has been prepared by FAREI in collaboration with the ICAC.

### Principle Six – Reporting with Integrity

The core values of the FAREI include service excellence to the farming community, customer care, teamwork, empowering its human resources for first class service delivery to the stakeholders of the Agri-Business sector. A fair, balanced and understandable assessment of the FAREI's financial, environmental, social and governance positions, performance and outlook have been presented in this Report.

The Annual Report of FAREI is published regularly and copies are forwarded to the Parent Ministry to be tabled at the National Assembly. The Annual Report is published in full on the FAREI's website for the information of its main stakeholders.

### Human Capital - Valuing our people

The strength of any organization lies in its human resources. The ultimate goal of the FAREI is to be acknowledged as an "employer of choice", focusing on the welfare and development of each and every one of its employees. The FAREI is aware of the fact that productivity depends on the intrinsic motivation and job satisfaction of each employee. The FAREI is therefore striving to create an atmosphere of trust at the workplace. However, in return, it is expected that all employees should aim higher and show their

professionalism in providing quality service, whilst abiding by the prescribed Code of Ethics at work.

### Intellectual Capital

The FAREI makes use of intellectual assets to ensure the best possible performance and operational efficiency. The organization continuously invests in technology solutions and IT tools for a more efficient management of documents, to facilitate knowledge sharing, to improve service delivery to the farming community and also to safeguard customer and corporate data.

In this context, the FAREI has successfully implemented a repository system namely the REKIR, whose objective is to digitalize the core activities of FAREI to ensure quality research and extension services for the sustainable development of agriculture and food production.

The system intends to keep all records, allow streamlining of complete cycles to administer research and extension tasks like registering research protocols, monitoring research experiments and results of experiment conducted on FAREI's stations and on-farm. It also intends to provide the necessary facilities to the Extension and Training department to register farmers, register visits to farmers, advice provided and to maintain publications generated by the different divisions of FAREI throughout their activities.

### Political and Charitable Donations

During the period under review, no political or charitable donations were made.

### Safety and Health Policy Statement

#### Safety and Health

FAREI is committed to protecting the environment and the health and safety of its employees, customers and the public by conducting business in a safe and environmentally sustainable manner. Safety is central to what we do and how we do it. Our vision is an injury-free workplace where all incidents are preventable. FAREI establishes safety and health management systems to identify hazards and manage associated risks. Regardless of position or place within our organization, each person has the responsibility for his/her own safety as well as of those around them. Everyone has the responsibility to stop and report any potentially unsafe activity, exposure or condition.

#### Medical Surveillance

The Medical Surveillance Program is carried out regularly for staff who are exposed to conditions which are hazardous to health. The purpose of the medical screening is for an early detection of any case of occupational disease and aims at ensuring that all concerned employees are fit for duty.

Pre-Employment medical examination is carried out to determine the aptitude or non-aptitude of new candidates for employment. All newly recruited staff have to undergo a comprehensive medical examination prior to their substantive appointment.

#### Fire Drill Exercises and Contract Maintenance for Fire Extinguishers

Fire drill exercises are carried out on a regular basis at all FAREI sites. The maintenance of fire extinguishers on all FAREI sites was ongoing by a private service provider.

### Confidentiality, Secrecy, Transparency and Integrity

The affairs of the FAREI are conducted in a transparent manner, with the timely preparation of Financial Statements and Annual Reports. In addition, there are certain rules that employees have to adopt in relation to the disclosure of information regarding the FAREI.

For the sake of transparency within the organization, clear sets of internal procedures have been devised to eliminate the risks of fraud, errors and corruption. Well established and comprehensive procedures have been formulated by the Anti-Corruption Committee of FAREI in its Anti-Corruption Policy which is displayed on its website.

### Gender Policy Statement

The FAREI re-iterates its commitment to having an increasing number of women working for the organization. Female employees are encouraged to participate in the decision-making processes and are empowered to take on higher responsibilities.

The staffing position gender-wise was as follows for the period under review:

| Grades                                                      | Male | Female | Total |
|-------------------------------------------------------------|------|--------|-------|
| Directorate, Scientific, Technical and Administrative Staff | 115  | 125    | 240   |
| Workmen's Group                                             | 246  | 21     | 267   |
| Sub-total                                                   | 361  | 146    | 507   |

### Financial Capital

The FAREI derives its revenue from:

- Government grants;
- Special government funding for specific projects; and
- External funding for specific projects.

These funds are used to meet FAREI's objectives and functions and on a broader scale to contribute to the development of the Agri-Business sector.

### Environmental and Social Responsibilities

FAREI is committed to creating maximum positive impact whilst minimizing its environmental footprint. Prudent and timely investments are made to ensure the sustainability of its operations and to constantly seek for more sustainable ways of working to protect, enhance and reduce its impact on the natural environment. To this end, the following measures are being implemented:

- Inclusion of a minimum efficiency clause in bid documents for the procurement of electrical and mechanical equipment aimed primarily at reducing electrical consumption and at the same time reducing operational costs and increasing the equipment useful operational lifetime;
- Photovoltaic panels have been installed on the roof of the FAREI's Head Office at Réduit and at Belle Mare Research Station. Other sites will be equipped with PV panels with the objective of cutting down electricity charges and also to produce electricity from green sources.

### Conflict of Interest

Where an employee, in the course of the discharge of his/her duties, suspects or should reasonably suspect that he/she may find himself, herself in a situation of conflict of interest, he/she shall disclose his/her suspicion to his/her immediate supervisor, who shall note the declaration in writing and issue such directive as he/she considers proper. Such disclosures are also made by members of panels set up to evaluate bids and by members of the Departmental Bid Committee. The disclosure system is also applicable to members of the Board and/or management forming part of a Selection Panel during a recruitment exercise.

## Principle Seven – Audit

### Internal Audit

The role of the Internal Audit is to provide independent and objective assurance on internal control and risks to Management and the Board of Directors through the Audit and Corporate Governance Committee. By following a systematic and disciplined approach, the Internal Audit section helps to accomplish the organization's objectives by evaluating and recommending improvements to operations, internal controls, risk management systems and the governance processes.

The Internal Auditor reports directly to the Audit and Corporate Governance Committee and is under the administrative control of the CEO. This arrangement allows the Internal Auditor to remain independent and to report all items of significance to the Audit and Corporate Governance Committee. The Internal Auditor has unrestricted access to review all activities and transactions undertaken by the FAREI and to appraise and report thereon. There are no restrictions placed over the right of access of the Internal Auditor to records, management or employees of the FAREI.

At the beginning of each financial year, the Internal Auditor has to submit to the Audit and Corporate Governance Committee an Audit Plan for the period concerned for approval by the Board. The Internal Audit Work Program for the period under review was approved by the Board on 1<sup>st</sup> March 2023.

### External Audit

The External Auditor of the FAREI is the National Audit Office. The Audit and Corporate Governance Committee reviews the management letter and report of the Director of Audit on the financial statements of the Institute for corrective action by management where appropriate.

An Internal Audit Charter which describes the internal audit's purpose, scope, authority, responsibility and position within the FAREI is being finalised. Action is being initiated to fill the newly created post of Internal Control Officer/Senior Internal Control Officer to reinforce that section.

## Principle Eight – Relations with Stakeholders

The FAREI is mandated to carry out farmer oriented applied research for development and to support the farming community for non-sugar crop and livestock production through its Extension Service. With a pool of professionals, it is also responsible for implementing Government policies, dissemination of new technologies and revenue generation for farmers as priority. The organization also ensures that farmers are empowered to maintain food production round the year to have a constant supply on the local market and to reduce imports as far as possible.

### FAREI's Key Stakeholders

Open lines of communication are maintained to ensure transparency and optimal disclosure of information. Apart from official press communiqués and postings on FAREI's website, regular meetings are held with FAREI's Key Stakeholders to keep them informed of the various activities carried out by the FAREI. The Chairperson and Board members are also invited to attend these meetings.

### Parent Ministry

The FAREI being an operating arm of the MAIFS, assists the latter in its mission to improve food security and safety, ensure sustainable development, continued economic growth and social development. During the period under review, FAREI collaborated with the Parent Ministry in the implementation and monitoring of government programme and budgetary measures. The FAREI has extended its assistance to the Parent Ministry in the implementation of several schemes enunciated in the Government budget for 2022/2023. Reports on the management of the above-mentioned schemes are submitted at every meeting of the FAREI Board for a proper follow up. Regular contact and dialogue are maintained with the Parent Ministry to keep the latter informed of material events affecting the FAREI.

### Employees

Management believes that employee's safety education, training and professional development are important investments in human capital which help promote an agile and engaged workforce to support the continuity of our business with a view to actively serve as a trusted resource to our stakeholders.

### Customers

The FAREI places its customers at the centre of its activities by providing high quality and innovative service delivery. FAREI operates in different locations through its Model Farms, Demonstration Centres, Research Stations and Extension sub offices to provide research, advisory and extension services to the farming community.

### Financial Partners

Communication with Financial Institutions and the financial community in general is actively pursued and usually takes place through meetings and presentations. The Annual Report of the FAREI, which incorporates its financial statements, is posted on its website.

### Other Stakeholders

Communication was kept with other stakeholders of the FAREI namely banks, suppliers of goods, works and services, consultants, legal advisors, representatives of employees' unions among others through meetings, letters, e-mails and videoconferences.

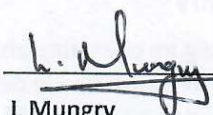
### Statement of Directors' Responsibilities

- The Statutory Bodies (Accounts and Audit) Act requires the Directors to prepare Financial Statements for each financial year which fairly present the state of affairs of the FAREI and the result of its operations and cash flows for that period.
- The Financial Reporting Act lays down that these Financial Statements should be prepared in accordance with International Public Sector Accounting Standards (IPSAS).
- Not later than four months after the end of every financial year, the FAREI shall submit the Annual Report to the Auditor, the National Audit Office. In preparing these Financial Statements, the Directors are required to ensure that adequate accounting records and an effective system of internal control and risk management have been maintained; suitable accounting policies have been selected and applied consistently; reasonable and prudent judgements and estimates have been made; and applicable accounting standards have been followed.
- The Directors confirm that they have complied with these requirements in preparing the Financial Statements.
- The Directors also report that the National Code of Corporate Governance for Mauritius (2016), as applicable to State-Owned Enterprises, has been adhered to.
- The External Auditors are responsible for reporting on whether the Financial Statements are fairly presented.

"Approved by the Board of Directors and signed on its behalf"



Hemraj WOODUN  
Chairperson



L Mungry  
Board Member

## Section 4: Technical Highlights

### Crop Research and Development

#### Introduction

From July 2022 to June 2023 activities of the Crop Research Department focused on the development of new crop varieties through breeding, the introduction and evaluation of new improved germplasm, crop productivity and quality improvement, new crop production techniques, crop protection and the development of sustainable and climate-smart packages for crop production.

#### Field and vegetable crops

##### Potato

The performance of variety Vigora, Santana and the promising variety *Everest* (Fig. 1) was evaluated on farm at Balaclava, Rivière Baptiste, Plaine Sophie, Cote d'Or and Médine in the first cropping season. The commercial variety Spunta was used as control. At Balaclava, although significantly higher yield was recorded in Everest (34.4 t/ha) and Vigora (28.8 t/ha) compared to Spunta (26.5 t/ha) and Santana (23.0 t/ha), at Cote D'Or, yield of Everest (40.5 t/ha) was at par with that of Spunta (32.2 t/ha) and Vigora (30.2 t/ha). In contrast, at Médine, significantly lower yield was recorded in Everest (28.7 t/ha)



Fig. 1 : Potato Variety Everest

compared to Spunta (47.2 t/ha), Santana (43.1 t/ha) and Vigora (35.8 t/ha). Low yield in Everest was attributed to its high susceptibility to late blight and untimely control of the disease. At Plaine Sophie and Rivière Baptiste yield did not differ significantly among the varieties and varied from 25.3 t/ha to 31.9 t/ha and from 28.1 t/ha to 29.2 t/ha respectively. With regards to unmarketable yield, significantly lower unmarketable yield was recorded in Everest (4.5 t/ha to 11.7 t/ha) followed by Vigora (5.3 t/ha to 15.5 t/ha) at all sites except at Médine where unmarketable yield did not differ significantly among varieties. Results indicate that Everest is a high yielder with low percentage of unmarketable tubers, however its high susceptibility to late blight makes this variety unsuitable for cultivation in super-humid regions such as Plaine Sophie.

In the second cropping season, the performance of Santana, Panamera, Red Lasoda and Tyson were evaluated on farm at Senneville and Plaine Sophie. The commercial variety Delaware was used as control. At Senneville, marketable tuber yield was significantly higher in Delaware (31.6 t/ha) compared to Panamera (20.7 t/ha), Tyson (15.4 t/ha) and Red Lasoda (16.7 t/ha). The lower yield in Tyson and Panamera was mainly attributed to a high incidence of soft rot in the tubers. At Plaine Sophie, significantly ( $P \leq 0.05$ ) higher yield was obtained with Tyson (25.0 t/ha) followed by Red Lasoda (19.7 t/ha) compared to Panamera (13.5 t/ha) and Delaware (12.1 t/ha). Low yield in Delaware was mainly attributed to a high percentage of unmarketable tubers (33.8 %) compared to Tyson (12.3 %). Variety Tyson will be further evaluated to confirm yield, tuber characteristics and its susceptibility to soft rot disease.

The yield and tuber characteristics of processing potato varieties Alverstone Russet and Quintera was

evaluated on farm at Balaclava and Médine. Variety Santana was used as control. Significantly higher marketable tuber yield was recorded in Santana (35.3 t/ha) compared to Alverstone Russet (31.0 t/ha) and Quintera (22.6 t/ha). Furthermore, significantly higher tuber weight (127.2 g) was recorded in Santana compared to the other two varieties. Mean tuber dry matter content in the three varieties ranged from 21.6 % to 23.2 % indicating their suitability for processing into either French fries or crisps. The evaluation of the performance of these varieties in terms of yield, tuber characteristics and suitability for processing will be pursued in 2023.

The performance and susceptibility to late blight disease of six late blight resistant potato clones (142/161/4, 142/161/5, 161/142/16, 29/5/10, 29/5/14 and 29/5/16) were evaluated in the super humid region prone to the late blight disease at Plaine Sophie and Mare Longue during the first potato season. The commercial varieties Spunta and Vigora and the promising varieties Everest and Santana were used as control. Fungicide spraying schedule for late blight control was as per recommendation for commercial cultivation. At Plaine Sophie, mean marketable tuber yield did not differ significantly among the varieties and varied between 25.4 t/ha and 32.3 t/ha. In contrast, at Mare Longue, significantly higher marketable yield was recorded in Everest (38.9 t/ha) followed by Vigora (31.3 t/ha), Santana (27.7 t/ha) and Spunta (27.7 t/ha) compared to the late blight resistant potato clones that varied between 19.3 t/ha to 22.1 t/ha. The first appearance of late blight symptoms was recorded at 45 days after planting on the susceptible varieties Spunta and Everest at both sites. At Mare Longue, the disease was effectively controlled with regular spraying of local systemic fungicides at four days intervals. However, at Plaine Sophie due to high disease pressure, leaf defoliation occurred at faster rate with highest disease severity (85 %) recorded in Spunta and Everest followed by clone 142/161/6 (50 %) at 80 days after plantation. In contrast, lowest disease severity (10 %) was recorded in Vigora, Santana, clones 142/161/5 and 161/142/16 followed by 29/5/10 and 29/5/161 with disease severity of 25 %.

The effect of haulm killing on seed potato yield and incidence of virus PVY on seed potato tubers (30 g to 175 g) of the local Spunta was studied on station at Belle Vue and Mon Desert Alma. At Belle Vue, haulm killing was carried out at 68 days after planting (DAP) while at Mon Desert Alma it was carried out at 60, 65, 70 and 75 DAP. At both sites, the chemical herbicide Paraquat was applied at the rate of 828 g/ha for crop desiccation. Haulm killing at 90 DAP was used as control treatment. At Belle Vue, significantly higher seed potato yield (20.7 t/ha) was obtained when haulm killing was made earlier (68 DAP) compared to common haulm killing practices (16.4 t/ha) at 90 DAP. At Mon Desert Alma, seed potato yield (14.1 t/ha) did not differ among plots with haulm killing made at 60, 65, 75 and 90 DAP. Lowest seed potato yield (9.6 t/ha) was recorded at 70 DAP. In contrast, total yield was significantly lower ( $P \leq 0.05$ ) at the earlier haulm killing dates with 13.5 t/ha at 60 DAP compared to 24.8 t/ha at 90 DAP. Results indicate that early haulm killing (65 to 70 DAP) leads to good yield of seed potato and has the additional benefit of lowering the cost of seed production. Post-harvest assessment for internal and external tubers defects and serological assays to assess the virus PVY incidence in tubers are on-going.

Breeding and selection of local potato clones for ware production, processing and resistance to biotic and abiotic stresses was pursued. Six promising local potato genotypes (142/161/4, 142/161/5, 161/142/16, 29/5/10, 29/5/16 and Belle Isle) with high yield and tolerance to late blight disease were planted in June at Réduit for seed-to-seed multiplication. A total of 560 kg of seed potato free from virus and external defects were selected and stored at 4°C at the Agricultural Marketing Board (AMB) for future trials in 2023.

To promote the cultivation of the newly developed and released potato variety Vigora, seed production was pursued and upscaled. A total of 1.93 tonnes of disease-free basic seeds of sizes 28 mm to 35 mm

(1.2 t) and 35 mm to 55 mm (0.73 t) was produced and stored at 4°C at the AMB for production of first year certified seeds in the crop season 2023. In addition, 1.75 tonnes of 2<sup>nd</sup> year certified Vigora seeds (30 mm to 50 mm) were produced.

## Onion

The performance of six promising varieties (SON 1806, 243, SON 1807, Askari, Irati and Rosada) and two control varieties (Local Red and Veronique) for sets production was evaluated on station at Réduit. Significantly higher yield was recorded in variety SON 1806 (32.5 t/ha) and SON 1807 (30.0 t/ha) followed by Irati (25.2 t/ha), 243 (24.3 t/ha) and Askari (21.7 t/ha). In contrast, significantly lower yield was recorded in Local Red (6.1 t/ha) followed by Veronique (14.1 t/ha) and Rosada (16.3 t/ha).

The performance of six new hybrid onion varieties (red varieties: Amid, ON 2386, Yakuti, ON 3154 and ON 2823 and the yellow variety: Ngwazi) and two promising red varieties namely (SON 1806, SON 1807) were compared to three control varieties (Rosada, Askari and Francia) on station at Richelieu and Réduit. At Richelieu, significantly higher marketable yield was recorded in variety Yakuti (59.4 t/ha) followed by Askari (57.8 t/ha), ON 3154 (54.8 t/ha), ON 2823 (53.8 t/ha) and Amid (52.7 t/ha) compared to those recorded in Francia (29.4 t/ha), Rosada (35.2 t/ha), SON 1806 (39.0 t/ha), Ngwazi (43.1 t/ha), SON 1807 (45.1) and ON 2386 (47.7 t/ha). At Réduit, significantly higher marketable yield ( $P \leq 0.05$ ) was recorded in ON 2386 (59.8 t/ha) and Askari (57.2 t/ha) followed by SON 1806 (54.0 t/ha), SON 1807 (53.8 t/ha), Amid (51.6 t/ha). In contrast, significantly lower marketable yield was recorded in Francia (24.5 t/ha) followed by Rosada (36.6 t/ha), Yakuti (42.5 t/ha), ON 2823 (44.6 t/ha), ON 3154 (46.6 t/ha) and Ngwazi (47.9 t/ha). Variety SON 1807 was found promising for the third year and will be recommended for commercial plantation. Varieties SON 1806, Amid, ON 2386 and Ngwazi will be further evaluated in 2023.

The performance of the hybrid red variety SON 1807 was evaluated at La Marie, La Chaumière, L'Espérance Trébuchet, Camp Fouquereaux and St Antoine. Variety Francia was used as control. Although higher marketable yield was recorded in variety SON 1807 at both La Chaumière (34.9 t/ha) and L'Espérance Trébuchet (36.5 t/ha), it did not differ significantly ( $P > 0.05$ ) with that of Francia with marketable yield of 32.8 t/ha and 30.1 t/ha respectively. Significantly higher marketable yield in SON 1807 was recorded at Camp Fouquereaux (44.5 t/ha) and La Marie (33.6 t/ha) compared to that in Francia with marketable yield of 30.1 t/ha and 25.9 t/ha respectively.

The performance of two promising red open pollinated varieties (AVON 1067 and Roxa) was evaluated on station at Richelieu and Réduit. Variety Francia was used as control. At Richelieu, significantly higher marketable yield was recorded in variety AVON 1067 (42.4 t/ha) followed by Roxa (36.7 t/ha) compared to Francia (29.4 t/ha). Lower bolting was recorded in AVON 1067 (4.9 %) and Roxa (15.0 %) compared to Francia (22.6 %). Similarly, at Réduit, significantly higher marketable yield was recorded in variety AVON 1067 (40.0 t/ha) followed by Roxa (31.8 t/ha) compared to Francia (24.5 t/ha). Lower bolting was recorded in AVON 1067 (19.6 %) compared to control variety Francia (36.6 %) and Roxa (29.1 %). Varieties AVON 1067 and Roxa were found promising and will be further evaluated in 2023.

The performance of the promising red open pollinated variety Roxa was evaluated on-farm at La Marie, Haute Rive, La Chaumière, Camp Fouquereaux and St Antoine. Variety Francia was used as control. There was no significant difference ( $P > 0.05$ ) in marketable yield between variety Roxa ranging between 26.4 t/ha to 34.9 t/ha and Francia ranging between 25.9 t/ha to 32.8 t/ha at all sites. In contrast, significantly lower bolting ranging between 5.1 % and 16.3 % was observed in Roxa compared to Francia (7.9 % to 18.0 %) at all sites. Variety Roxa was found promising and was well appreciated by growers. It will be further evaluated for data validation.

The effect of three sowing dates (21 April 2022, 05 May 2022 and 19 May 2022) of two promising open pollinated varieties (Roxa and AVON 1067) on marketable yield and bolting was studied on station at Richelieu and Réduit. Variety Francia was used as control. In the first sowing date, significantly higher yield was recorded in AVON 1067 (33.1 t/ha) followed by Roxa (31.6 t/ha) ( $P \leq 0.05$ ) compared to Francia (25.1 t/ha). Bolting was significantly lower in AVON 1067 (13.4 %) followed Roxa (21.7 %) compared to Francia (29.6 %). Similarly, for the second date of sowing, significantly higher marketable yield was recorded in AVON 1067 (40.6 t/ha) followed by Roxa (35.9 t/ha) compared to Francia (29.4 t/ha.) Bolting of AVON 1067 (13.4 %) and Roxa (17.2 %) was significantly ( $P \leq 0.05$ ) lower compared to that of Francia (23.0 %). For the third date of sowing, significantly higher marketable yield was recorded in Roxa (24.0 t/ha) followed by AVON 1067 (21.5 t/ha) compared to Francia (17.2 t/ha.) Bolting of AVON 1067 (2.0 %) and Roxa (6.9 %) was lower compared to Francia (15.0 %). Results indicate that timing of sowing has an effect of marketable yield and bolting. The second sowing date led to highest marketable yields of the three varieties when compared to the other sowing dates. Moreover, lower bolting was also recorded when compared with the first sowing date. The trial will be repeated for validation of results.

The storability of sets of seven promising hybrid onion varieties (SON 1806, 243, SON 1807, Askari, 404, Irati and Rosada) and two open pollinated varieties (Local Red and Veronique) was assessed under two storage conditions (ambient and cold) at AMB over a period of two months. After two months of storage under ambient condition, significantly lower storage loss was recorded in Veronique (7.4 %) followed by Local Red (9.4 %) and 243 (11.5 %), Irati (14.8 %), 404 (17.7 %), Rosada (19.4 %) and SON 1806 (23.1 %) compared to those in SON 1807 (72.6 %) and Askari (35.3 %). Under cold storage, significantly lower storage loss was recorded in 404 (1.3 %) followed by Local Red (1.4 %), Irati (1.6 %), Rosada (1.6 %), Veronique (1.6 %) and SON 1806 (1.8 %) compared to those in SON 1807 (3.0 %), Askari (2.1 %) and 243 (2.1 %).

The storability of sets of four promising hybrid onion varieties (SON 1806, 243, SON 1807 and 404) and one dark red variety (Africa Red) was assessed under two storage conditions (ambient and cold) at AMB over a period of four months. Varieties Rubex, Askari and Francia were used as control. After one month of storage under ambient conditions, lowest storage losses were obtained with 243, SON 1806, Africa Red, SON 1807 and 404 ranging between 6.5 % to 21.5 %, but did not differ significantly with Rubex, Askari and Francia (9.5 % to 17.9 %).

The storage loss of variety 243 (6.5 %) was significantly lower ( $P \leq 0.05$ ) than variety 404 (21.5 %). After two months, lowest storage losses were recorded in 243, Africa Red, SON 1806 and 404 ranging between 23.6 % and 53.9 % and did not differ significantly with Rubex, Askari and Francia (19.3 % to 31.1 %). After three months, all the varieties except 243 had storage losses more than 50 % and hence were not suitable for storage.

The storage losses of 243 (32.4 %) were lower compared to Rubex (66.8 %). After four months, all the varieties had storage losses more than 75 % and thus, were not suitable for storage. Under cold conditions, lowest storage losses were obtained with 404 followed by 243, SON 1806, SON 1807 and Africa Red ranging between 4.2 % and 10.1 % and did not differ significantly with Francia and Rubex (3.9 % to 6.9 %). The storage losses of Africa Red (10.1 %) were higher compared with Askari (2.1 %).



Fig. 2: Onion Variety 243

After two, three and four months, there were no significant differences in storage losses among varieties and controls ranging between 3.7 % and 12.0 %, 3.7 % and 15.3 % and 6.7 % and 19.9 % respectively. Variety 243 (Fig. 2) was recommended for commercial plantation based on current results and those of past three years. Varieties SON 1806 and SON 1807 will be further evaluated in 2023.

The storability of sets of two promising onion varieties (AVON 1056 and AVON 1031) was assessed under two storage conditions (ambient and cold) at AMB over a period of four months. Varieties Francia and Bellarose were used as control. Under ambient conditions, there was no significant difference in storage losses between promising and control varieties after one, two, three and four months of storage with 12% losses after one month and 76 % losses after four months. Under cold conditions significant differences ( $P < 0.05$ ) in storage loss were recorded as from the second month of storage. After four months, storage losses of AVON 1056 (6.6 %) were significantly lower than variety AVON 1031 (16.2 %) and did not differ significantly with those of Bellarose (10.5 %) and Francia (11.8 %). Both promising varieties AVON 1056 and AVON 1031 were still found promising in 2022 and will be further evaluated in 2023.

## Taro

An IAEA supported project was initiated with the aim of producing mutant colocasia lines showing resistance/ tolerance to the leaf blight disease through *in-vitro* mutagenesis. In 2020, two promising lines namely, AL1 and AL2 were selected for further evaluation based on their yields that were comparable to the local cultivar. The two irradiated lines showed no tolerance or resistance to taro leaf blight disease. Due to slow development of suckers under field conditions, rapid multiplication of these two lines by tissue culture was carried out from 2020 to 2021. During 2022, 100 *in-vitro* plantlets of the two irradiated lines were maintained in a slow growth medium in the laboratory. Three hundred and fifty suckers of the field planted hardened tissue culture plantlets of the two lines were provided to farmers at Fond du Sac and Camp de Masque. A good yield of corms (12.2 t/ha) in a crop cycle of 6 to 7 months were produced irrespective of lines.

The plants produced both corms and suckers. Dried leaf samples of the two irradiated lines AL1, AL2 and the local cultivar were sent at 'Centre de Coopération Internationale en Recherche Agronomique pour le Développement' (CIRAD) in Reunion Island for DNA genotyping. The three accessions were found clustered under one quadrant suggesting no genetic difference between the irradiated lines and the local cultivar.

## Pulse crops

The performance of three introduced heat tolerant CIAT bean varieties (Chitedze 1, Chitedze 2 and Chitedze 4) were evaluated on station at Richelieu in October 2021, to identify a summer variety adapted to our local conditions. Varieties Ferrina, Long Tom and Red Pearl were used as control varieties. Variety Red Pearl was the earliest maturing variety (75 to 80 DAP) while the remaining varieties were mid-maturing (85 to 95 DAP). Seed weight (dry weight of 100 seeds) of control variety Red Pearl (40.5 g) was significantly higher ( $P \leq 0.05$ ) compared to that of Chitedze 4 (34.9 g) which was at par with control varieties Ferrina (36.7 g) and Long Tom (34.3 g). In contrast, significantly lower seed weight was recorded with varieties Chitedze 1 (30.7 g) and Chitedze 2 (28.3 g). Significantly higher number of seeds per pod was recorded in variety Long Tom (4.7) followed by Chitedze 1 (4.3), Ferrina (4.3), Chitedze 4 (3.7) and Red Pearl (3.7) compared to Chitedze 2 (3.3) which was at par with the control varieties Red Pearl and Ferrina and varieties Chitedze 1 and Chitedze 4. Highest dry bean yield ( $P \leq 0.05$ ) was obtained with variety

Chitedze 1 (0.96 t/ha), but was at par with varieties Chitedze 4 (0.83 t/ha) and the control variety Red Pearl (0.8 t/ha). The yield of Chitedze 2 (0.59 t/ha) was at par with the control varieties Red Pearl (0.8 t/ha), Ferrina (0.65 t/ha) and the lowest yielder Long Tom (0.57 t/ha). Among the varieties tested, Red Pearl, Chitedze 1 and Chitedze 4 were found to adapt well in summer. The overall low yield was due to unfavourable weather conditions prevailing (heavy rainfall) during the crop cycle. A total of 6 kg nucleus bean seeds of the three heat tolerant varieties were produced for further evaluation.

A snap bean breeding programme was initiated in 2010 with the aim of developing novel varieties with desirable traits. Multiple crosses were made from 2010 to 2013 between varieties Long Tom and Vilbel and between Long Tom and Acacia. F1 seeds from each cross were sown and the pedigree method is being used for selection of progenies. In 2022, 6.4 kg of F8 seeds from crosses of Long Tom x Vilbel and 20.9 kg from crosses of Long Tom x Acacia were produced for evaluation trials.

An observational trial was set up on station at Wooton in April 2022 to study the agronomic performance of local variety of broad bean in the super-humid region under sheltered farming system. Good vegetative growth was observed with low incidence of pests and diseases except for *Rhizoctonia* sp. which caused root rot and subsequent drying of plants. Harvest started in the month of July after 105 days from sowing and ended after 3 harvest rounds with a total yield of 7.5 t/ha. Observational on-farm trials were also set at Allée Brillant Castel and at Belle Terre in March and April 2022 respectively to demonstrate the performance of local broad bean variety and to promote its cultivation. Harvest at Castel started 75 days after sowing and ended after 4 harvest rounds with a yield of 7.5 t/ha. At Belle Terre, harvests started 90 days after sowing and ended after 3 harvest rounds as the crop was highly infested with leaf miners. The crop yielded 7.0 t/ha of mature pods. Both growers found the yield to be satisfactory.

An observational trial was set up on station at Wooton in August 2022 to study the agronomic performance of Local variety of broad bean in late winter and early summer with the view to extend the growing season. Good germination above 95 % was recorded resulting in a good crop stand. Harvest which was conducted on a weekly basis started in early November after 85 days from sowing and ended after four harvest rounds. The crop yielded 8.9 t/ha of green pods of good quality with an average length of 9.2 cm and diameter of 1.4 cm with 3 to 4 seeds per pod. The yield and the good quality of the pods indicated that seeds can be sown late in winter so that harvest can be extended up to early summer periods (November/ December).

A single plot trial was set in August 2022 on station at Wooton to study the agronomic performance of green pea variety Green Beauty in late winter and early summer with the view to extend the growing season. Good germination was noted resulting in a good crop stand. Profuse flowering was observed and harvest of mature green pods which was carried out once a week, started after 74 days from sowing and ended after four harvest rounds. A yield of 7 t/ha of good quality mature 8 cm to 9 cm long green pods, 1.2 cm to 1.5 cm in diameter and with 6 to 8 seeds was obtained. Results indicate that seeds can be sown up to early September so that green peas are available in market till the end of November.

Seeds of seven progenies of the F9 green pea breeding lines (LA1, LA2, LA51, LA52, LA65, LA77 and LA138) from the cross between variety Local and Arcadia selected based on earliness to flowering, plant architecture, pod and seed characteristics were evaluated along with their parents (Arcadia and Local) on station at Réduit in a single plot for the production of F10 seeds and yield assessment. Highest yield was recorded in LA77 (11.1 t/ha) and LA8 (10.9 t/ha) and were at par with LA9 (10.3 t/ha), LA51 (9.1 t/ha) and Arcadia (9.3 t/ha). The two breeding lines LA51 and LA52 was found to be significantly ( $P \leq 0.05$ ) the tallest ones (165.7 cm and 164.2 cm) whilst LA65, LA138 and Arcadia were the shortest (< 90 cm). All the breeding

lines produced significantly bigger pods than the variety Local. Variety Arcadia produced highest average number of seeds per pod (9.7) followed by LA51 (8.7) and LA65 (8.6). The shelling out of the breeding lines ranged from 47 % to 57 %. Based on results, five breeding lines namely LA8, LA9, LA51, LA77 and LA138 were selected for screening and evaluation of the F10 generations. More than 1 kg of seeds per breeding line has been bulked and stored in cold room for further evaluation trials in 2023.

Seeds of the newly released edible podded pea variety, Sweet Snow Pea, were sown in tunnels on station at Réduit for seed production and morphological characterisation of the variety along with its parents (Local and Arcadia) and the local edible podded pea variety Chinese Pea. Based on morphological characteristics (flower colour, pod characteristics, colour of cotyledon and seed weight) variety Sweet Snow Pea was found to be closer to its male parent Arcadia and completely different from the local edible podded pea variety Chinese Pea. A total of 19 kg of seeds has been stored in cold room for on farm demonstration and promotion among farmers in 2023. Seeds of Sweet Snow Pea, were provided to four growers.

To promote the cultivation of improved bean varieties namely FBS 1, FBS 2 and Ferrina, seed production of disease-free nucleus seeds with high genetic purity was pursued. A total of 156 kg FBS1, 65 kg FBS 2 and 138 kg Ferrina were produced and stored at 11°C in a cold room. Seed germination test and virus indexing for BCMV and BYMV are on-going.

## Garlic

Allicin is mainly responsible for garlic pungency. The local garlic is commonly regarded as containing higher allicin content compared to the imported ones from China. To confirm this hypothesis, nine local garlic accessions including the promising variety (ACC1) and three imported Chinese garlic samples were analysed for allicin content using Ultraviolet-Visible Spectrophotometry at QuantiLAB Ltd. Results indicated that the local commercial garlic accessions contain significantly lower ( $P \leq 0.05$ ) levels of allicin (0.24 %) compared to the imported ones (0.39 %). Only one local accession was found to have a comparable level of allicin (0.37 %). In contrast, the promising local garlic variety ACC1 with high yield and big cloves had significantly low ( $P \leq 0.05$ ) levels of allicin (0.19 %).

Eighteen garlic accessions (ACC1 to ACC18) were sown on station at Réduit end May 2022. For accession ACC1, the outer bigger cloves (herein referred as ACC1a) were sown separately from the inner and medium-sized cloves (ACC1b). Marketable garlic yields were above the national average of 6.6 t/ha in the accessions except for ACC10, ACC13, ACC5, ACC18, ACC3 and ACC7 which varied from 5.6 /ha to 6.4 t/ha. Highest yields were obtained in ACC1a with a yield of 13.0 t/ha followed by ACC1b (10.9 t/ha) and ACC4 (8.96 t/ha). A total of 150 kg bulbs of ACC1 were selected and stored at AMB for on-station trial and promotion at on-farm level in 2023.

The performance of accession ACC1, a garlic white in colour with regular roundish bulb (~44 cm diameter), negligible inner cloves and high yield (10 t/ha to 3 t/ha) was evaluated on-farm at St Antoine, Hollyrood and La Chaumière (2 sites). In May 2022, cloves were planted on beds at spacing of 10 cm x 15 cm at St Antoine and La Chaumière. However, at Hollyrood, cloves were planted on a bed covered with a white polythene sheet at a spacing of 15 cm x 20 cm during the same period. By the end of June 2022, the garlic plots at one of the sites namely La Chaumière were affected by thrips and black aphids. At Hollyrood, the plots were affected by thrips, aphids and diseases. Yields from the different sites varied between 6.5 t/ha and 9.6 t/ha and were lower to that obtained on station at Réduit (13.0 t/ha). In contrast, bulb weight (27.9 g to 28.9 g) and bulb diameter (42.2 mm to 46.6 mm) did not differ from those obtained at Réduit. Despite the comparatively low yield, the growers showed appreciation for the accession and made a

request for planting materials to be provided for the upcoming garlic cropping cycle.

### Cardamom

A cardamom plot was set up on station at Wooton with three accessions from Wooton, Midlands and Réduit. Plants produced tillers and started flowering in February, 26 months after field transplantation. A few cardamom capsules were harvested from four plants of two accessions in June. A second round of flowering was noted followed by flower drop. Preliminary morphological characteristics of the three accessions on vegetative, flowering and fruiting stage were recorded. Further observations on fruiting stage will be carried out in the next flowering season.

### Cassava

The maintenance programme for the two recommended IITA cassava varieties Orniita and Blanchiita is on-going on station at Réduit. Seven promising local accessions are being multiplied on station at Richelieu as a source of planting materials for potential cassava growers. A new collection has been initiated on station at Réduit.

### Quinoa

The agronomic performance of four promising accessions of quinoa from USDA namely P1510548, P1634919, P1596498 and P1596293 was evaluated on station at Réduit in March and April 2022, at Wooton (March 2022) and Richelieu (July 2022). At Réduit, in both trials a good crop stand and panicle formation was noted after 30 to 33 days from sowing. However, at the flowering stage, 50 % to 60% damage by birds to panicles was observed in both trials. Variety P1596293 was found to be highly susceptible to fungal diseases (*Cladosporium* sp., *Alternaria* sp., *Stemphylium* sp. and *Fusarium* sp.) in both trials. Panicles turned black with decayed seeds. At Wooton, the trial failed due to prevailing rainy and windy conditions. At Richelieu, a good crop stand was obtained and harvest of dry panicles started after 95 days. The average seed yield of the varieties was at par and ranged from 0.37 t/ha to 0.62 t/ha. P1634919 (Fig. 3) was found to be significantly the tallest (107.3 cm) whilst the others were at par and varied from 93.1 cm to 99.6 cm.



Fig. 3: Quinoa Variety P1634919

### Vanilla

The agronomic performance of vanilla using three types of support (concrete, wooden and galvanised metal) is being assessed at Réduit. During this year, good vegetative development of the established vines has been observed irrespective of support type and the vanilla vines were trailed as and when required

by coiling them around the supports. A germplasm collection with 12 accessions of vanilla has also been set-up for morphological characterisation. Plants are at vegetative stage. Five vanilla plants have also been established on station at Wooton and trailed on concrete supports. The plants are at early vegetative stage.

### Sweet potato

The performance of four sweet potato varieties namely Little Leaf, U11, Leek and Raisin were evaluated on station at Richelieu in July 2022. In November, due to theft, 98 % of plants in plots with variety Little Leaf were uprooted. Harvest of remaining varieties was carried out in December. Colour of tubers of the four varieties were as follows: Little Leaf with red outer skin and cream flesh, Zapello with salmon orange outer skin and light orange flesh, U11 with brownish orange to pinkish orange outer skin and orange flesh with light purple stripes inside tuber, Leek with cream to pale brown outer skin and cream flesh with pink stripes and Raisin with red outer skin and white flesh colour. Yield in U11, Leek and Raisin were 19.9 t/ha, 22.0 t/ha and 25.6 t/ha respectively.

### Groundnut

Seven accessions namely Accession 1, Accession 2, Accession 3, Accession 4, Accession 5, Accession 6, Accession 7 and the variety Local Cabri were sown in May 2022 at Richelieu for multiplication and characterisation purposes. A germination rate of 80 % to 85 % was observed in all groundnut varieties except for Accessions 6, 7 and 8 with a germination rate of 50 % to 60 %. Highest ( $P \leq 0.05$ ) number of pods per plant were observed in peanut Accession 4 (34.2), which was at par with Accession 7 (30.7), Accession 6 (28.8), Accession 3 (28.4) and Accession 5 (28.0). Lowest ( $P \leq 0.05$ ) number of pods per plant was noted in Accession 1 (16.2) followed by Accession 2 (21.3) and Local Cabri (24.0). Pod yield recorded in Accession 1, 2, 3, 4, 5, 6, 7 and Local Cabri were 3.2, 2.1, 3.5, 3.3, 1.7, 3.5, 4.2 and 3.6 t/ha respectively. Significantly higher number of seeds per pod was recorded in Accession 3 (3.3) compared to Accession 5 (2.8) and Accession 2 (2.6). In contrast, significantly lower number of seeds per pod was recorded in Accession 4 (2.0), Accession 7 (2.0), Local Cabri (2.0) followed by Accession 6 (2.2).

### Gherkins

The performance of a new fertilizer regime (Locastart @ 13.44 g/m<sup>2</sup> + Physiolith @ 24.96 g/m<sup>2</sup> + 14:8:20 @ 24.96 g/m<sup>2</sup>) compared to the recommended fertilizer rate (manure @ 537.6 kg/m<sup>2</sup> + 13:13:20:2 @ 11.52 g/m<sup>2</sup> + Ammonium sulphate @ 17.28 g/m<sup>2</sup>) on yield of gherkins was evaluated on station at Richelieu under protected structure. There was no significant difference in yield between the new fertilizer regime (1.11 kg/plant) and the recommended one (0.98 kg/plant).

### Cucumber

The performance of a new fertilizer regime (Locastart @ 54.0 g/m<sup>2</sup> + Physiolith @ 66.0 g/m<sup>2</sup> + 14:8:20 @ 66.0 g/m<sup>2</sup>) compared to the recommended fertilizer rate (manure @ 2.8 kg/m<sup>2</sup> + Triple Superphosphate @ 25.0 g/m<sup>2</sup> + Ammonium sulphate @ 49.0 g/m<sup>2</sup> + Muriate of Potash @ 36.0 g/m<sup>2</sup>) on yield of three cucumber varieties namely Acylia, Bowing and Snow Cherry was evaluated on station at Wooton under protected structure. Although there was no significant difference in yield between the two fertilizer regimes irrespective of varieties, yield was higher (4 fruits/plant) in the new fertilizer regime compared to recommended one (3 fruits/plant). Evaluation will be pursued in 2023. The improvement of the local white cucumber variety through maintenance breeding was pursued. S8 seeds have been produced.

## Asparagus

Seeds of six new asparagus varieties, namely, Early California, Pacific Green, Pacific Challenger 2, Pacific Purple, Pacific Summit, and Patron, from Global Plant Genetics Ltd UK, were sown on station at Réduit in August 2021. Two months later the seedlings were transplanted on station at Réduit and Richelieu on raised beds for crown formation. Crowns of the six varieties were transplanted at a spacing of 100 cm x 60 cm in March and April 2022 at Richelieu and Réduit respectively, for full-fledged variety evaluation trials for spear production and their adaptability in the two agro-climatic conditions. The crowns will be allowed to establish for a period of up to 2 years before harvest starts.

## Tomato

The performance of eight open pollinated tomato lines introduced from World Vegetable Centre (CLN 3024A, CLN 3212C, CLN 3241 Q, CLN 3736 D, CLN 4018 B, CLN 2498 D, CLN 3241 H-27 and CLN 3938 C) was assessed on station at Réduit and Richelieu as from April 2022. The hybrid varieties, Swaraksha and THN 988 were used as control. The trial failed at Réduit due to outbreak of late blight disease. Most of the lines were found to be susceptible to the disease except for CLN 3212 C. At Richelieu, significantly higher yield was recorded in THN 988 (44.3 t/ha), CLN 4018 B (43.20 t/ha), Swaraksha (42.8 t/ha), CLN 2498 D (37.6 t/ha) and CLN 3241 H-27 (32.7 t/ha) compared to CLN 3726 D (32.1 t/ha), CLN 3938 C (32.0 t/ha), CLN 3241 Q (27.8 t/ha), CLN 3024 A (27.0 t) and CLN 3212 C (26.0 t/ha). The different tomato lines varied in their shape, total soluble solids and acidity level. Fruit weight was significantly higher in variety CLN 3938 C (185.7 g) and CLN 4018 B (165.8 g) compared to the other varieties which ranged from 96.3 g to 115.5 g. CLN 3938 C and CLN 4018 B produced largest fruits while CLN 2498 D and THN 988 produced longest fruits. The tomato line CLN 2498 D (*Fig.5*) with good yield and fruit quality was highly appreciated by growers following field demonstration and on-farm trials. It was thus released to the planting community under the name of Jupiter. A total of 400 g seeds were produced and distributed to growers. This study also identified three lines namely CLN 3241Q (*Fig. 6*), CLN 4018 B and CLN 3241 H-27 (*Fig. 7*) appreciated by growers as promising. These lines will be further evaluated in 2023.



Fig. 5: Tomato Variety CLN 2498D



Fig. 6: Tomato Variety CLN 3241Q



Fig. 7: Tomato Variety CLN 3241H-27

The evaluation of progenies from the cross between the tomato variety Metis and wild type to identify high yielding lines with tolerance to bacterial wilt and late blight was pursued. Twenty-nine progenies

selected from F3 generation were evaluated on station at Réduit for F4 generation. Based on plants and fruits characteristics, 21 progenies were selected and seeds saved for F5 generation. These progenies showed variation on growth habit, canopy size, fruit shape and yield. Most of them were of semi determinate type with large canopy. Fruit shape varied from small round, round to oblong. The number of fruits per cluster varied from 5 to 10 while yield varied between 2.6 kg to 5.5 kg per plant.

### Eggplant

The performance of five eggplant varieties namely BSS 539, KSP 1264, KSP 1421, KSP 1261 and KSP 1229 (Fig. 8) was assessed on station at Richelieu as from October 2021. Variety Cipaye Narain with fruits cylindrical in shape and light purple in colour was used as control. Fruits from variety KSP 1421, KSP 1264 and KSP 1229 were cylindrical in shape while variety KSP 1261 was round and variety BSS 539 oblong. Fruit colour varied from pink to dark purple among the varieties with variety KSP 1421 and KSP 1261 purple in colour, variety KSP 1264 pink and variety KSP 1229 and BSS 539 dark purple in colour. Average weight of fruits from variety BSS 539 (280.8 g) and KSP 1261 (260.0 g) were significantly higher than those in KSP1421 (122.5 g),



Fig 8. Eggplant Variety 1229

Cipaye Narain (100.0 g), KSP 1264 (96.0 g) and KSP 1229 (96.0 g). The varieties will be re-evaluated in 2023.

### Chilli

The performance of 10 chilli varieties (APC 4, AVPP 0514, KSP 1251, KSP 1470, KSP 1471, Sizzler, Mohini, NS 203, KSP 135 and 1472) was assessed on station at Réduit and Richelieu as from May 2022. Variety Indam 5 was used as control. At Réduit, significantly higher yield was recorded in variety KSP 1350 (12.1 t/ha), APC 4 (10.3 t/ha), Sizzler (8.9 t/ha), Indam 5 (8.5 t/ha), AVPP 0514 (7.7 t/ha) and KSP 1471 (7.7 t/ha) compared to KSP 1251 (5.7 t/ha), KSP 1472 (4.3 t/ha) and NS 203 (2.3 t/ha). At Richelieu, significantly higher yield was recorded in Sizzler (5.6 t/ha), KSP 1471 (5.0 t/ha), KSP 1251 (4.5 t/ha), KSP 1350 (4.4 t/ha) and APC 4 (4.3 t/ha). A yield of 2.2 t/ha was recorded in



KSP

Fig 9. Chilli Variety 0514

the control variety. Low yield of 2.3 t/ha and 2.7 t/ha was recorded in variety NS 203 at Réduit and Richelieu respectively. Average fruit weight at Réduit ranged from 1.8 g to 14.6 g while fruit length varied from 3.9 cm to 10.9 cm and fruit width from 0.6 cm to 1.9 cm. At Richelieu, the average fruit weight ranged from 1.5 g to 9.7 g, fruit length from 5.3 cm to 10.1 cm and fruit width from 0.8 cm to 3.1 cm. Lowest fruit weight and shortest fruit length was recorded in NS 203. The varieties KSP 1350, AVPP 0514 (Fig. 9), APC 4 and Sizzler (Fig. 9) were found to be promising in terms of yield, pungency, fruit shape and size and will thus be further evaluated in 2023. Variety NS 203 (Fig. 10) will also be further evaluated given its interesting characteristics such as upright fruit bearing, high pungency and small size. The anthracnose tolerant variety AVPP 0514 was highly appreciated by growers during on-farm trials. Thus, this variety will be released in 2023. To this end some 500 g seeds have been produced.

A conventional breeding programme with variety Hot Pepper Cipaye and AVPP 05514 as parents has been

initiated with the objective of developing high yielding pungent new lines with tolerance to anthracnose. Reciprocal crosses were carried out between parent plants in an insect proof cage. However, the number of successful crosses was low. So far, 11 progenies have been obtained. Seeds from each progeny have been collected. Seed number varied from 13 to 38/fruit/progeny.

### Chinese cabbage

The performance of four open pollinated Chinese cabbage varieties (V1060 641, V1060 643, V1060 644 and V1060 646) introduced from the World Vegetable Centre was pursued on station at Réduit, during April to July 2022, using hybrid variety Pomme Type as control. Significantly higher yield was recorded in variety Pomme Type (81.5 t/ha), V1060 644 (70.3 t/ha) (*Fig. 11*) and V1060 641 (66.5 t/ha) compared to V1060 646 (62.3 t/ha) (*Fig. 10*) and V1060 643 (59.1 t/ha) (*Fig. 12*). There was no significant difference in head weight, height and compactness among Pomme type, V1060 644 and V1060 641 (*Fig. 13*). A crop cycle of 55 days was observed irrespective of varieties. The seeds of the two new high yielding open pollinated varieties will be produced for on-farm evaluation.



Fig. 10: Cabbage Variety V1060 646



Fig.11: Cabbage Variety V060 644



Fig. 12: Cabbage Variety V1060 643



Fig. 13: Cabbage Variety V1060 641

### Chinese Broccoli (Kailaan)

The performance of two open pollinated Kailaan varieties (AVLB 1201 and AVLB 1202) introduced from World Vegetable Centre was assessed on station at Réduit from May to August 2022. Hybrid varieties NKL 01 (*Fig. 14a*) and KL 01 (*Fig. 14b*) were used as control. Yields did not differ significantly among varieties with yield of 13.7 t/ha, 11.6 t/ha, 10.3 t/ha and 8.9 t/ha recorded for varieties KL01, AVLB 1201, AVLB1202 and NKL 01 respectively. Seeds of the varieties AVLB1201(*Fig. 15a*) and AVLB1202 (*Fig. 15b*) will be produced and used for evaluation on-farm.



Fig.14a: Kailaan Variety NKL01



Fig. 14b: Kailaan Variety KL01



Fig. 15a: Kailaan variety AVLB 1201



Fig. 15b: Kailaan Variety AVLB1202

## Cabbage, Cauliflower and Broccoli

Improvement of landraces of cabbage and cauliflower through the use of induced mutation was pursued. M6 seeds of 14 and 18 cabbage and cauliflower lines respectively were sown on station at Réduit in May 2022. Ten cauliflower and 12 cabbage M7 lines were selected based on head characteristics and susceptibility to black rot (*Fig. 16 and 17*). M7 seeds harvested and processed will be further evaluated for M8 seeds.



Fig 16: Breeding Lines of cauliflower



Fig 17, Breeding Lines of cabbage

The improvement of the local cauliflower variety through maintenance breeding was pursued. S7 seeds of cauliflower was collected in 2021 was sown in May 2022. Transplantation of S8 lines was carried in June 2022. Roguing of plants with symptoms of black rot and undesirable characteristics was carried out. Remaining plants have been allowed to flower and produce S8 seeds. Seeds was collected and cleaned. 50 g of S8 seeds have been collected and will be used for on farm evaluation in 2023 and production of S9 generation.

Trials were set on station at Réduit and Richelieu to determine the optimum planting distance for cauliflower hybrid varieties Tropical Eleven and White Swan. Four plant distances (0.5 m x 0.5 m; 0.5 m x 0.6 m; 0.5 m x 0.75 m and 0.6 m x 0.6 m) were tested and compared to the standard practice (0.6 m x 0.75 m). Although higher yield of 12.6 t/ha and 19.8 t/ha was recorded in the two trials at Réduit with variety Tropical Eleven and 9.4 t/ha in the trial at Richelieu CRS with variety White Swan at planting distance of 0.6 m x 0.6 m, yield did not differ significantly among the different plant spacing. Similarly, curd characteristics namely weight, circumference and compactness did not differ significantly irrespective of planting distance and varieties. From results obtained, it appears that recommended spacing for cauliflower cultivation could be reviewed to 0.6 m x 0.6 m.

Trials were set on station at Réduit to determine the optimum farmyard manure (FYM) rate for hybrid cauliflower variety Tropical Eleven during December 2021 to February 2022 and broccoli variety Everest Green during August to November 2022. Four rates namely 0 t/ha, 10 t/ha, 20 t/ha and 40 t/ha were evaluated against the recommended rate (30 t/ha). In the cauliflower trial, yield in treatment with FYM at 0 t/ha, 10 t/ha, 20 t/ha, 30 t/ha and 40 t/ha were 14.0 t/ha, 15.2 t/ha, 14.6 t/ha, 15.3 t/ha and 14.5 t/ha respectively. In the broccoli trial, yield in treatment with FYM at 0 t/ha, 10 t/ha, 20 t/ha, 30 t/ha and 40 t/ha were 13.5 t/ha, 13.9 t/ha, 14.9 t/ha, 16.7 t/ha and 15.9 t/ha respectively. No significant difference was observed in yield as well as curd characteristics such as weight, circumference and compactness for both cauliflower and broccoli irrespective of FYM rate. The trials will be repeated in 2023 to confirm results obtained.

## Carrot

The performance of two carrot varieties (Verano and Vivian) was evaluated during winter (March to July 2022) and summer (August to December 2022) on station at Réduit and during winter (May to August 2022) at Richelieu to identify varieties suitable for winter and summer production. Variety Samba was used as control. At Réduit, during winter, yield (without leaves) was significantly higher in variety Verano (62.8 t/ha) compared to Samba (53.1 t/ha) and Vivian (53.2 t/ha). Furthermore, variety Verano (*Fig. 18*) yielded significantly higher grade 1 carrots (23.5 t/ha) compared to Samba (11.9 t/ha) and Vivian (11.6 t/ha). Although no significant difference was observed among the varieties for yield with leaves and yield without leaves at Réduit during summer, variety Verano recorded higher yield with leaves (88.5 t/ha) compared to Samba (65.0 t/ha) and Vivian (55.3 t/ha) (*Fig. 19*). At Richelieu, no significant difference was observed in yield with or without leaves although variety Samba (*Fig. 20*) recorded higher yield compared to the other varieties. At Réduit, harvest was carried out at 100 days and 110 days during winter and summer respectively. Harvest was carried out earlier at Richelieu (70 days) due to the occurrence of theft. Results indicate that variety Verano is suitable for production in humid region during both winter and summer.



Fig. 18: Carrot Variety Verano



Fig. 19: Carrot Variety Vivian



Fig. 20: Carrot Variety Samba

Improvement of landraces of carrot through use of nuclear techniques for mutation breeding is on-going. Seeds of the selected parental line namely, Samba were irradiated at 623 Gy and sown in open field at Réduit in October 2022. Harvested carrots were selected and planted for the production of M2 seeds.

## Kale

Two commercial varieties of Kale, namely Nolan (*Fig. 21*) and Toscana (*Fig. 22*) were evaluated for their suitability in local conditions on station at Réduit during May to August 2022. Harvests were carried out during June to August 2022. Yield in variety Nolan and Toscana were 10.90 kg/m<sup>2</sup> and 7.25 kg/m<sup>2</sup> respectively. Both varieties will be reevaluated in 2023.



Fig. 21: Kale Variety Toscana



Fig. 22: Kale Variety Nolan

## Spinach

The agronomic performance of seven varieties of spinach (Red Tabby, KSP 80 F1, KSP 1602 F1, GLB01, AX 4-9058 F1, Golden 399 and Koy-choy) was evaluated on station at Réduit and Richelieu (*Fig. 23 & 24*). Harvest was carried out about 39 days after transplantation in one-cut. No major pests and diseases were recorded.

At Réduit, significantly higher yield was recorded in GLB01 (38.2 t/ha), KSP 81 (28.8 t/ha), KSP 1602 (28.8 t/ha), Koy-choy (27.8 t/ha), AX40058 (26.3 t/ha) and Golden 399 (25.3 t/ha) compared to Red Tabby (13.9 t/ha). Plant height

differed significantly among varieties and varied from 18.0 cm to 42.0 cm.

At Richelieu, significantly higher yield was recorded in KSP 1602 (37.4 t/ha), KSP 81 (24.3 t/ha) and AX49058 (23.3 t/ha) compared to Koy-choy (16.8 t/ha), Red Tabby (14.0 t/ha), GLB01 (11.8 t/ha) and Golden 399 (11.8 t/ha). Plant height differed significantly among varieties and varied from 25.0 cm to 40.9 cm. Leaves were smooth in texture irrespective of varieties. In contrast, leaf colour and shape varied among varieties. Leaves of GLB01, Koy-choy, AX49058 and Golden 399 were dark green and spade in shape while those of KSP 81 and KSP 1602 were green and round in shape. Variety Red Tabby produced oval shaped leaves that were green with red veins and stem. Varieties KSP 81 and KSP 1602 were found to be susceptible to bolting compared to the other varieties. The varieties evaluated were found promising in terms of yield and growth characteristics and will be re-evaluated in 2023.



Fig. 23: Spinach Variety



Fig. 24: Spinach Variety

## Artichoke

A collection of local Artichoke (*Fig. 25*) germplasm was initiated in October 2021 on station at Réduit. Offshoots from plants have been used to set another plot of artichoke on station at Wooton. At Réduit, plants produced fruits one year after transplantation. An average of four fruits was produced per plant. Fruits were 0.16 kg in weight, 12.88 cm in height and 8.20 cm in diameter. Observation on agronomic performance will be pursued in 2023 to establish feasibility of this crop for commercial exploitation.



Fig. 25: Artichoke Fruits

## Squash

Crosses were made between Squash variety Golden custard (female parent) and variety SQ 4401 (male parent). F1 seeds of fourteen lines were sown and transplanted in October 2022 on station at Wooton under protected structure. Each line had 10 plants. Pollination of the flowers was done manually. Most plants from all the lines showed virus symptoms and were eliminated. Seeds recovered from disease free plants have been saved for next generation evaluation.

## Mushroom

### Button mushroom (*Agaricus bisporus*)

A preliminary study on the possibility of cultivating button mushroom (Fig. 26) using composted bagasse and poultry manure as media was undertaken. The long method of composting involving regular turnings of the composted bagasse and poultry manure over a period of one month was undertaken during the winter season. During the composting process, temperature reached up to 60°C to 70°C. After a month of composting when absence of ammonia was noted, the compost was filled in 10 kg sample bags. Such bags were inoculated using button mushroom spawn introduced from Milkyway Agrisystem, India, in May 2022 and transferred in growing room maintained at 18°C. After colonization, coconut coir and soil mix casing layer were applied on top of the media. After colonization of the casing, the bags were vented and initiated for fructification. The first pinhead formation was noted in June 2022. The time taken from pin head formation to harvest was seven days. Bacterial blotch was noted on the surface of few buttons. Total yield in terms of cumulative number of button mushrooms harvested and corresponding weight was 129 and 2.83 kg respectively.



Fig. 26: Button Mushroom

Three types of materials namely coconut coir and soil, potting mixture (Floradur) and peat moss were evaluated for use as casing. Fruiting bags (10 kg) were inoculated with button mushroom spawn and were cased individually with the above casing materials after three weeks. Cased bags were incubated at 18°C. Yield in cased bags did not differ significantly among the different casing materials used. The average number of fruits per bag recorded in bags with Coconut coir, Floradur and Peat moss as casing material were 1.8, 1.9 and 1.7 respectively with an average weight of 65.3 g, 59.2 g and 60.4 g respectively. The characteristics of the fruiting bodies from the different cased bags were comparable with cap diameter ranging from 6.6 cm to 7.5 cm, cap thickness of 2.4 cm to 2.6 cm and stalk length between 5.0 cm to 5.6 cm. Study will be pursued to fine-tune cultural practices. Furthermore, the feasibility of producing button mushroom will also be studied.

### King Oyster Mushroom

*Pleurotus eryngii*, also known as King Oyster mushroom was evaluated on station at Wooton. As noted in previous years' trials, the pinhead and fruit development were irregular. However, the fruits were of good quality. The average yield per bag ranged between 85.5 g to 89.1 g. The cap size ranged from 7.34 cm to 7.48 cm in diameter and from 4.35 cm to 4.78 cm in thickness. A stalk length of 6.38 cm was recorded. The evaluation of *P. eryngii* will be pursued in bags with side and upright openings.



Fig. 27: King Oyster Mushroom

King Oyster mushroom (Fig 27) was evaluated on farm at Mare D'Albert, Pinewood and St Pierre for its promotion among farmers. The time taken from initiation of fruiting to first harvest at Pinewood, St Pierre and Mare D'Albert were 11, 13 and 15 days respectively. All three growers reported erratic fruiting with yield varying from 29 g to 75 g. According to growers, King oyster mushroom have good potential due to its big size, fleshiness and 'excellent' taste. However, the issue of low yield and erratic fruiting need to be addressed.

## Swiss chard

The agronomic performance of five Swiss chard varieties namely, Fordhook Giant, Greenwave, Lucullus, Charlie and Argentata was evaluated on station at Réduit and Richelieu. No significant difference in yield and average number of leaves per plant was recorded among the varieties at both sites. At Réduit, yield in Lucullus (Fig. 28), Fordhook Giant, Charlie, Greenwave and Argentata were 62.3 t/ha, 58.8 t/ha, 57.8 t/ha, 50.2 t/ha and 42.3 t/ha respectively. The number of leaves per plant among varieties varied from 10 to 14. At Richelieu, yield in Lucullus, Fordhook Giant, Charlie, Greenwave and Argentata were 69.4 t/ha, 57.5 t/ha, 28.1 t/ha, 40.0 t/ha and 37.8 t/ha respectively. The number of leaves per plant among varieties varied from 11 to 16. At Réduit, leaves of Lucullus (58.3 cm), Greenwave (58.2 cm), Fordhook Giant (56.2 cm) and Charlie (56.1 cm) were significantly longer than that of Argentata (46.4 cm).



Fig.28: Lucullus

At Richelieu, leaves of Lucullus (59.7 cm), Fordhook Giant (54.6 cm) and Greenwave (51.7 cm) were significantly longer than those of Charlie (39.7 cm) and Argentata (37.7 cm). At Réduit, width of leaves varied from 20.0 cm to 22.0 cm while at Richelieu it varied between 14.6 cm and 24.0 cm. Varieties Lucullus, Argentata and Fordhook Giant have white stalks, Greenwave has green stalk while Charlie has red stalk. All five varieties were found promising in terms of yield and growth characteristics and were appreciated by consumers. They will be thus recommended to growers in 2023.

## Industrial Hemp

The performance of two hemp varieties, Futura 83 and Fibror 79, introduced from Hemp It, France was evaluated on station at Réduit within a fenced plot under camera surveillance. Seeds were sown in October 2022 at a spacing of 10 cm within rows and 30 cm between rows. Seeds germinated four days after sowing with a germination rate of 79.4 % and 20.0 % for Fibror 79 and Futura 83 respectively. Despite the relatively low germination rate, the vegetative development of both varieties was excellent (Fig 29).



Fig. 29: Hemp Trial at Réduit



Fig: 30 Hemp at flowering

During the early stages of crop development, only leaf miner attack was observed. No disease was observed. By the end of November 2022, the plants reached 50 % flowering stage (Fig 30). The plants reached a height exceeding 3 m at the end of crop cycle with an average fresh weight of 0.45 kg and 0.42 kg per plant for Futura 83 and Fibror 79 respectively.

The tensile strength of fibres derived from the two varieties by using two extraction methods namely, dew and cold water retting was evaluated at the Faculty of Engineering, University of Mauritius (Fig 31). Cold water retted fibres were cleaner and better separated than dew retted ones. The tensile strength of the fibres was in the range of 0.5 to 4.5 GPa which is superior to E-glass fibres used for the manufacture of glass reinforced composites. Thus, hemp is a potential material to be considered as a replacement for glass fibre. It can also potentially be used in the manufacture of paper, composites for engineering applications as well as a blend with cotton for textile manufacture.



Futura 83

Fibror 79

Fig.31: Fibre extracted from hemp  
Source: Faculty of Engineering, University of Mauritius

## Crop production under protected structures

### Cauliflower

Five cauliflower varieties namely White Swan, Tropical Eleven, NS 555, KAS 002 and KAS 004 were evaluated on station at Wooton in soil under protected structure during May to August 2022. Significantly higher yield was recorded in Variety White Swan (14.04 t/ha) compared to NS 555 (11.19 t/ha), Tropical Eleven (4.32 t/ha), KAS 02 (3.55 t/ha) and KAS 04 (3.43 t/ha). However, there was no significant difference in yield between low yielding varieties namely Tropical Eleven, KAS 02 and KAS 04. Results indicate that Tropical Eleven, KAS 02 and KAS 04 are not suitable for sheltered cultivation. This trial will be repeated in 2023.

Two trials were conducted on station at Wooton to evaluate the performance of five varieties of cauliflower namely Tropical Eleven (control), White swan, NS 555 F1, KAS 002 and KAS 004 under hydroponics in February 2022 and May 2022. Days to harvest varied from 38 to 58 days after transplantation. In the first trial, no significant difference at  $P \leq 0.05$  was found in yield, average curd weight and curd circumference among the varieties evaluated. The average yield per m<sup>2</sup> in variety NS 555F1, White Swan, KAS 002, Tropical Eleven and KAS 004 were 0.9, 0.8, 0.7, 0.7 and 0.6 kg respectively. The average curd weight varied from 0.23 kg to 0.36 kg while curd circumference varied from 34.7 cm to 41.2 cm. In contrast, significantly high curd compactness was recorded in variety NS 555 F1 (26.5 g/cm) and White Swan (24.0 g/cm) compared to KAS 002 (18.1 g/cm), Tropical Eleven (16.1 g/cm) and KAS 004 (14.9 g/cm). In the second trial, broccoli variety Everest Green was evaluated along with the five cauliflower varieties. Days to harvest varied from 46 to 53 days after transplantation for the cauliflower varieties. However, broccoli was harvested 72 days after transplantation. Among the cauliflower varieties, significantly higher yield per m<sup>2</sup> was recorded in variety White Swan (0.7 kg), NS 555 F1 (0.5 kg) and Tropical Eleven (0.5 kg) compared to KAS 004 (0.3 kg) and KAS 002 (0.3 kg). Similarly, significantly higher curd weight was recorded in variety White Swan (0.3 kg), NS 555 F1 (0.2 kg) and Tropical Eleven (0.2 kg) compared to KAS 004 (0.1 kg) and KAS 002 (0.1 kg). Curd circumference was significantly higher in variety

White Swan (40.0 cm) and NS 555 F1 (33.2 cm) compared to Tropical Eleven (30.1 cm), KAS 004 (25.2 cm) and KAS 002 (25.0 cm). In contrast, no significant difference in curd compactness was recorded among the varieties and it varied from 13.7 g/cm to 16.7 g/cm. Cauliflower varieties White Swan, NS 555 F1 and Tropical Eleven were found suitable for production in hydroponics both in summer and winter. The average yield, curd weight, circumference and compactness in broccoli, were 0.9 kg/m<sup>2</sup>, 0.4 kg, 45.2 cm and 17.5 g/cm respectively. The variety was found promising for cultivation under hydroponics system.

### Gherkins

Four varieties of gherkins namely Chandini, Keerthi, Kybria and Puccini were evaluated on-farm at Long Mountain, Quatre Bornes, Petit Raffray and Médine for its promotion among farmers. All the trials were successfully carried out and the harvested gherkins were marketed either fresh or as processed products by farmers.

### Squash and zucchini

The performance of four varieties of scallop squash (Damani, Star 8081, Milano and SQ4401), one variety of gem squash (Pinnacle) and two varieties of zucchini (Star 8023 and Himanshu) were evaluated under hydroponics system station at Wooton. The average yield per plant in scallop squash varieties Star 8081 (Fig. 32), SQ 4401, Milano and Damani were 0.50 kg, 0.22 kg, 0.20 kg and 0.19 kg respectively.

The average fruit circumference among these varieties varied from 24.33 cm to 30.43 cm. Yield per plant and the average fruit circumference did not differ significantly among these varieties. In contrast, significantly longer fruit diameter was recorded in Star 8081 (20.63 cm) followed by Milano (13.40 cm) compared to SQ 4401 (8.50 cm) and Damani (13.10 cm).

Although yield per plant did not differ significantly between the two zucchini varieties, a higher yield was recorded in Star 8023 (0.77 kg) compared to Himanshu (0.54 kg). The average fruit circumference in Himanshu and Star 8023 (Fig. 33) were 32.90 cm and 29.2 cm respectively. Fruit diameter was comparatively longer in Himanshu (31.0 cm) compared to Star 8023 (25.7 cm).

For the gem squash, variety Pinnacle, the yield, average fruit circumference and fruit diameter were 0.24 kg/plant, 17.90 cm and 31.90 cm respectively. Poor yield was observed irrespective of crops and varieties due to poor pollination (manual) resulting in low fruit set. Gem squash variety Pinnacle (Fig. 34) was found promising for hydroponic cultivation.



Fig. 32: Squash Variety Star 8081



Fig. 33: Zucchini Variety Star 8023



Fig. 34: Gem Squash var Pinnacle

### Sweet pepper

Eight varieties of sweet pepper namely Sandra, 739 F1 (Fig. 36), Ferrari, Milena, Sunny, Chocolat (Fig. 35) and the control varieties Redjet, Bachata (Fig. 36), were evaluated under hydroponics system on station at Wooton and Réduit as from May 2022. At Wooton, significantly higher yield per plant was recorded in

variety Sandra (2.73 kg) followed by Redjet (2.33 kg), Sunny (2.31 kg), Bachata (2.29 kg) and Ferrari (2.28 kg) compared to Milena (1.97 kg). In contrast, no significant difference was observed in average fruit weight, average fruit diameter and average fruit length among the varieties. The average fruit in variety Sandra, Redjet, Sunny, Bachata, Ferrari, 739 F1, Chocolat and Milena were 232.8 kg, 271.4 kg, 244.2 kg, 250.4 kg, 260.5 kg, 279.1 kg, 255.9 kg, 249.6 kg respectively. Average fruit diameter and length ranged from 8.38 cm to 9.16 cm and from 8.41 cm to 9.26 cm respectively.

At Réduit, yield per plant did not differ significantly among the varieties. Yield per plant in variety Ferrari, Sunny, Milena, 739 F1, Bachata, Redjet, Chocolat and Sandra were 3.9 kg, 3.8 kg, 3.7 kg, 3.2 kg, 3.1 kg, 3.1 kg, 2.9 kg and 2.6 kg respectively. In contrast significantly higher average weight per fruit was recorded in variety Redjet (322.8 g), 739 F1 (300.0 g), Sunny (262.59 g), Bachata (261.23 g), Sandra (252.3 g) compared to Ferrari (219.1 g), Chocolat (216.7 g) and Milena (205.4 g). Average fruit diameter and length ranged from 7.85 cm to 9.52 cm and from 8.68 cm to 9.60 cm respectively. All fruits were blocky in shape.

Varieties Ferrari, 739 F1 and Redjet turned red at maturity while Sunny, Bachata and Sandra F1 turned yellow, Milena orange and Chocolat brown. Varieties Sandra, Ferrari, Sunny and Milena were identified as promising and will be re-evaluated.



Fig. 35: Sweet Pepper Variety  
Chocolat



Fig. 36: Sweet Pepper Variety  
739 F1



Fig. 36: Sweet Pepper Variety  
Bachata

## Tomato

The performance of three varieties namely Trinity (Improved THN 988), Cobra and THN 988 (control) were tested in hydroponics system on station at Réduit (August 2021 to March 2022) and Wooton (October to December 2022) under a new fertiliser formulation with a 50 % reduced nitrate content compared to recommended fertiliser formulation for the stage two growth and development. Recommended fertiliser formulation was used as control. Trials at both sites were affected by cyclones Batsirai and Emnati. At Réduit, harvest was completed prematurely due to heavy infestation of *Tuta absoluta*. At Wooton, the average yield per plant in recommended fertiliser treatment in variety Trinity, THN 988 and Cobra were 5.2 kg, 4.5 kg and 3.4 kg respectively. The average yield per plant in new fertilizer treatment for variety Trinity, THN 988 and Cobra were 4.5 kg, 4.0 kg and 3.1 kg respectively. Although higher yields were recorded in the recommended fertilizer treatment, irrespective of varieties, they did not differ significantly from those in the new fertilizer treatment. Similarly, no significant difference in number of fruits/plant (56-66), average fruit weight (109 g to 138 g), average fruit length (5.6 cm to 6.7 cm) and average fruit diameter (5.3 cm to 5.9 cm) was recorded between the two fertilizer treatments, irrespective of varieties. At Réduit, although higher yield per plant was recorded in variety Trinity in the new fertiliser treatment (4.1 kg) compared to the recommended one (2.3 kg), yield did not differ significantly. For variety THN 988, significantly higher yield per plant was recorded in new fertiliser treatment (3.0 kg) compared to recommended one (1.7 kg) ( $P \leq 0.05$ ). In contrast, for variety Cobra, significantly higher yield per plant was recorded in recommended fertiliser treatment (1.9 kg) compared to new fertilizer treatment (1.4 kg). Irrespective of fertilizer formulation, average weight of fruits was significantly higher in variety THN 988 (108.7 g) and Trinity (89.6 g) compared to Cobra (74.8 g). Average length of fruits was significantly

higher in variety THN 988 (6.1 cm) compared to Trinity (5.6 cm) and Cobra (4.7 cm). However, the average diameter of fruits did not differ significantly and varied from 5.1 to 5.5 cm.

### Strawberry

The performance of three varieties namely Armelle (Fig. 39), Mara des Bois and San Andreas (Fig. 37) were evaluated under hydroponics system on station at Wooton. Variety Charlotte (Fig.38) as used as control. Number of harvests varied from 11 to 18 among varieties. Fruit shape varied from conical and cordate. No significant difference ( $P \leq 0.05$ ) was observed among the varieties in terms of yield and number of fruits per plant. The average yield per plant in variety Mara des Bois, San Andreas, Charlotte and Armelle was 118.8 g, 109.1 g, 100.7 g and 79.9 g respectively. The average number of fruits per plant varied from 8.25 to 12.5. Similarly, no significant difference ( $P \leq 0.05$ ) was noted in average fruit weight, average fruit length and average fruit diameter among the varieties. The average weight per fruit in variety Mara des Bois, Charlotte, San Andreas and Armelle was 16.7 g, 15.0 g, 14.6 g respectively. Fruit length varied from 3.5 cm to 4.6 cm and fruit diameter from 3.0 cm to 3.7 cm. Poor pollination (manual) resulted in low yield. Varieties Mara Des Bois and San Andreas being everbearing varieties were found promising.



Fig. 37: Strawberry Variety San Andreas



Fig. 38: Strawberry Variety Charlotte



Fig 39: Strawberry Variety Armelle

### Planting Material development

- Micro-propagation

#### Potato

Tubers of virus-indexed potatoes of variety Spunta, Everest, clones 6, 9, 27 and 28 were initiated for *in-vitro* propagation for provision of hardened potted plants to the Plant Pathology Division for preliminary screening against bacterial wilt. Only Spunta, Everest, clones 9 and 27 were successfully propagated by nodal cuttings in basal Murashige and Skoog's (MS) medium. A total of 126 potted plants was produced.

The performance of apical rooted cuttings (Fig. 40) and tissue culture potato plants variety Vigora, grown on two substrate mixtures (Peat-Sand and Peat-Perlite) were evaluated. Significantly higher yield was recorded in apical rooted cuttings (155.26 g/plant) grown on Peat: Sand (2:1) mixture compared to tissue culture plants (117.9 g/plant) grown on Peat: Perlite (3:1) mixture. Mini-tuber production from apical rooted cuttings grown on Peat: Sand (2:1) was not significantly different from those grown on Peat:Perlite (1:1) mixture. Hence it is recommended to produce potato mini-tubers using apical rooted cuttings on Peat:Sand (2:1) mixture as it is a cheaper alternative. A total of 319 kg mini-tubers were produced.



Fig. 40: Rooted Apical Cutting

## Colocasia

Three Fiji Colocasia varieties namely, PNG 13, MAL 08 and SM 152 along with two promising lines resulting from mutation breeding programme (AL1 and AL2) were maintained in slow growth medium for short to mid-term conservation. Hardened, potted Colocasia plants PNG13 are put on sale to interested growers.

## Banana

Six accessions of banana introduced from Biodiversity International, are currently being multiplied to produce the necessary quantity of planting material for field evaluation. *In vitro* propagation of the banana cultivars Williams, Petite Naine, Goldfinger, local Gingely, Mammoul, Ollier, FHIA17, and FHIA25 are on-going for supply to growers.

## Tea

Tea plantlets are being maintained in slow growth medium. Around 200 potted plants are available in nursery.

## Pomegranate

Pomegranate plants (Fig.41) were propagated by both tissue culture from conserved germplasm and cuttings. Success rate in the initial stage from both types of propagation method was low (50 %).



Fig. 41: Potted Pomegranate  
(2 months old)

## Garlic

*In vitro* trials for multiplication and bulbification (Fig. 42, 43 and 44) of one imported garlic accession (VFG158) and eleven local garlic accessions namely Beeharry, Boodnah, Bondah, Gooniah, Haulkhory, Ramdhuny, Ramjee, Rampall, Sujeebun, Sujeebun2 and Unuth were undertaken through meristem culture. Explants of garlic accessions were inoculated on Murashige and Skoog (MS) medium supplemented with different concentrations and combinations of growth regulators namely, 6-benzyladenine (BAP), gibberellins, isopentenyl adenine (2iP) and kinetin and naphthaleneacetic acid (NAA). A total of 14 shoot multiplication media was tested. Shoot proliferation were observed on only six MS media supplemented with growth regulators as follows: 0.25 mg/L NAA + 0.5 mg/L 2iP, 1.5 mg/L BAP + 0.5 mg/L NAA, 0.3 mg/L NAA + 3 mg/L 2iP, 0.5 mg/L NAA + 2mg/L 2iP, 2 mg/L BAP + 2 mg/L NAA and 1 mg/L BAP + 0.5 mg/L. The highest number of shoot formation was observed in MS media containing 0.3 mg/L NAA + 3mg/L 2iP while lowest number of shoot formation was observed in MS media containing 2 mg/L BAP +2 mg/L NAA for most of garlic accessions tested.

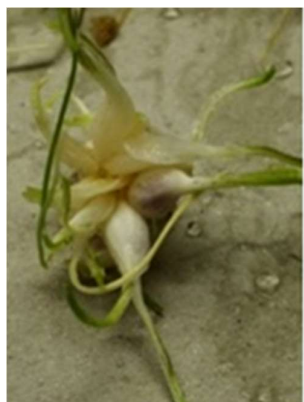


Fig.42: Bulblet Formation

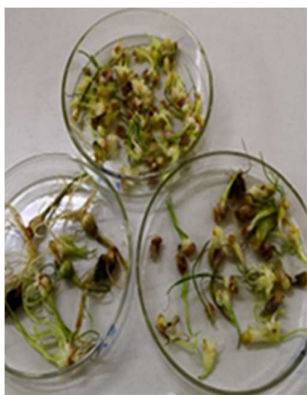


Fig. 43: Harvested Bulblets



Fig. 44: Garlic Plants

The effect of three media variations, all based on MS medium and enriched with three concentrations of sucrose supplemented with various growth regulators (12 % sucrose, 2 mg/L Kin+ 1 mg/L GA3 + 3 % sucrose and 2 mg/L BAP + 1 mg/L GA3 + 90 % sucrose) on bulblet formation from garlic cultures incubated at  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and 16 L/8D was studied. Significantly higher number of bulblets was produced in MS supplemented with 2 mg/L BAP + 1 mg/L GA3 + 90 % sucrose compared to the other media. In contrast, lowest number of bulblets was produced in MS medium supplemented with 2 mg/L Kin + 1 mg/L GA3 + 3% sucrose.

A preliminary trial was undertaken to determine the success rate of garlic bulbs production from indivisible bulblets in nursery. After six months, divisible garlic bulbs of 1.51 g to 16.38 g were produced

### Anthurium

About 450 hardened tissue culture plantlets of a new promising line (coded as Ca) are available in nursery and about 1500 *in vitro* plantlets in growth room.

*In-vitro* stock plantlets of 8 lines (A2, C2, D1, D2, PVGR, PVR, Mar 4 and Mar 5) are being maintained in slow growth medium.

### Supply of plants

A total of 4,352 plants were sold, this included 3,385 hardened banana plants, 7,736 semi-hardened banana and 2,027 ornamental plants. A total of 3,448 plants of various crop species were supplied free of charge to producers for their promotion on-farm. Ninety-four potted plants of granadilla (Fig. 45 and 46) were supplied for field evaluation.



Fig.45: Granadilla Plants  
(1.5 months old)



Fig. 46: Granadilla Plants  
(5 months old)

### Quality Declared Seed

Technical support was provided to eight Francia seed producers at Rivière des Anguilles, Médine SE, Gros Cailloux, La Ferme, Mon Rocher and Belle Mare. A total of 29.8 tonnes Francia mother bulbs were planted on a combined area of 7 ha. In 2022, climate was generally favourable for seed production and diseases were easily managed through sanitation and chemical control. Pollination was satisfactory in all seed plots leading to good seed set except at Belle Mare where poor pollination was noted. About 3.6 tonnes umbels were harvested which yielded 542 kg seed after processing. These seeds have been stored at the

Agricultural Marketing Board and will be made available for the 2023 onion production.

Technical support was provided to four bean seed producers at Senneville, Médine, La Ferme and Bassin. The production sites included the cultivation of variety Ferrina at all sites, while FBS1 and FBS2 were specifically cultivated at Médine. The combined area under production amounted to 5,418 m<sup>2</sup>. During growth stage, plants displaying symptoms of virus were rogued. In the regions of Senneville, La Ferme and Bassin, the number of plants displaying virus symptoms was below the established threshold level. However, at Médine, the number exceeded the acceptable threshold level.

Marketable seeds were successfully obtained from Senneville, La Ferme and Bassin. A total of 185 kg Ferrina seeds were produced at Senneville and Bassin and have been stored at the Agricultural Marketing Board and will be made available for the 2023 bean production.

### Seed production

The development of organic seed production for targeted vegetable crops, including onion, Pak Choy, bean, lettuce, and white radish, among local organic farmers is being promoted. The aim is to provide farmers with locally adapted planting material suitable for organic farming. Seven organic farmers were identified and supported by the Bio-farming Unit to produce organic seeds for their own use and for sale. The farmers were provided with organic seeds as starting material and received technical guidance on seed production, pest and disease control, as well as seed extraction and cleaning. With this assistance, the farmers successfully produced seeds of onion variety Francia (2.3 kg), onion variety Bellarose (200 g), lettuce variety Mignonette (1.7 kg), bean variety Ferrina (8.5 kg), Pak Choy Local (0.6 kg), and Local White Radish (3.8 kg).

In 2022, the purification of the Bellarose and Francia onion varieties and assessment of their morphological genetic purity was pursued on mother bulbs produced from seeds of 2021. The Bellarose variety exhibited a morphological genetic purity of 47.8 %, indicating that approximately 47.8 % of the observed traits aligned with the expected characteristics of the Bellarose variety. On the other hand, the Francia variety demonstrated a higher morphological genetic purity of 68.4 %, indicating a greater adherence to the anticipated traits specific to the Francia variety. A total of 116 kg Bellarose mother bulbs and 37.2 kg Francia mother bulbs were selected and kept at the Agricultural Marketing Board for subsequent seed production in the upcoming season.

The use of vacuum packaging for storage of onion seeds (variety Francia) was assessed. Initial seed moisture content and germination rate were 8 % and 96.7 % respectively. Seeds were packed in plastic or aluminium packaging with varying vacuum (70 %, 80 % and 90 %) and without vacuum. After 12 months of storage at 8°C and 55 % RH at Agricultural Marketing Board, the seeds were evaluated for germination, weight and moisture content. There were no significant changes in seed weight or moisture content during the storage period. However, there was a significant difference in germination rate, with aluminium pouches outperforming the plastic bags without vacuum by 4.2 %. Plastic bags with 70 % and 80 % vacuum, as well as aluminium packaging with 70 %, 80 % and 90 % vacuum, were recommended for onion seed storage.

### Cataloguing of developed varieties

Trials were conducted on station at Réduit in 2021 and 2022 to characterise the potato variety Vigora using morphological description for distinctness, uniformity and stability (DUS). The variety was compared with Spunta which represents the variety of common knowledge. Clearly distinguishing characteristics between Vigora and Spunta were recorded at the light sprout, vegetative, flowering, reproductive and

tuber bearing stages. Furthermore, molecular characterisation revealed genetic similarity coefficient of 0.38 between Vigora and Spunta indicating that the varieties are genetically distant. Similarly for the three elite bean varieties namely FBS 1, FBS 2 and Ferrina, trials were undertaken on station at Réduit in 2021 and 2022 to confirm their distinctness, uniformity and stability compared to varieties Long Tom, Vilbel and Red Pearl which represent the varieties of common knowledge. Clearly distinguishing characteristics between the varieties were recorded at plant, pod and seed level. Molecular characterisation revealed genetic similarity coefficient of 0.28 between FBS 1, FBS 2 and Long Tom indicating that the varieties are genetically distant. Hence, the progenies FBS 1 and FBS 2 showed high genetic divergence with their recipient parent Long Tom. On the other hand, high genetic similarity (76.0 %) was obtained between Ferrina and Long Tom indicating their close relationship.

## Ornamentals

### Anthurium

Anthurium breeding activities were pursued. A total of 10 genotypes from 2020 crosses are being evaluated. Among the genotypes, the red colour spathe is predominant (4) followed by orange (3), white (2) and peach (1). The evaluation and selection of potential germplasm is being carried out based on morphological, flowering and yield parameters.

The performance of six potted varieties (Aramon, Royal Champion, Maine, Nebraska, Utah and Montanna) and 14 standard varieties (Pistache, Tropic Night, Rosa, Presence, Xavia, Terrasol, Carisma, Marysia, Moments, Zafira, Midori, Arena, Maravilla and Bon Ami) grown on raised beds with bagasse-based medium was evaluated on station at Réduit.

Among the potted varieties, significantly higher number of flowers per plant per annum was recorded in varieties Nebraska (17.7) and Aramon (12.4). The remaining varieties yielded between 6.3 and 8.3 flowers/ plant/ annum. Longest flower stalk was recorded in Aramon (35.7 cm) while shortest in variety Royal Champion (12.7 cm) followed by Maine (13.3 cm), Utah (14.6 cm), Nebraska (18.3 cm) and Montana (18.3 cm). Longest spathe was recorded in variety Montana (4 cm) while for remaining varieties it varied between 9 and 12.3 cm. Broadest spathe was recorded in variety Maine (10.7 cm) and smallest in variety Montana (4.3 cm) for the remaining varieties it varied between 6.3 cm and 8.3 cm. Among the standard varieties, Carisma yielded highest number of flowers/ plant/ annum (9.0) followed by Xavia (7.8) and Rosa (7.4).

The remaining varieties yielded between 4.8 and 6.7 flowers/plant/annum. Longest flower stalk was recorded in Xavia (39.5 cm) and Midori (34.2 cm) while shortest in variety Rosa (18.3 cm) followed by Zafira (19.2 cm) and Maravilla (19.9 cm). Highest spathe length was recorded in Xavia (15.7 cm) while shortest was recorded in Rosa (7.5 cm) and Zafira (7.5 cm). Presence had the largest spathe length (16.2 cm) while Rosa the smallest (5.1 cm). For the remaining varieties, it varied between 6.2 and 13.9 cm. Longest spathe length was recorded in variety Xavia (15.7 cm) while shortest recorded in Rosa (7.5 cm) and Zafira (7.5 cm).

Vase life of flowers differed significantly among varieties with Midori displaying the highest vase life (35 days) and Presence the shortest (10 days). Varieties Xavia, Maravilla, Pistache and Rosa produced attractive lustrous good size foliage with good keeping quality. Varieties Terrasol, Rosa, Xavia and Carisma are highly preferred because they produced high number of attractive flowers with excellent flower size and long vase life.

## Rose

Eight varieties of spray roses (Yellow Tune, Belarus, Maroon, Exclusive Sensation, Orange Balloon, Sweet 4 –Tune, Bella Sensation and Latvia) were introduced from Netherlands in December 2022 and were transplanted in a greenhouse on station at Wooton. So far, no mortality in plants has been observed. Evaluation of their performance is ongoing.

## Chrysanthemum

The performance of five chrysanthemum varieties namely, Discovery (green), Neelima (dark red) (*Fig. 47*), Prolific (peach), Pusakesari (white) (*Fig. 48*) and Centenary (yellow) (*Fig. 49*) were evaluated during winter under protected structure on station at Réduit. The varieties took on average between 30.3 to 36.1 days for bud initiation. Significantly higher number of flowers per plant was recorded in varieties Pusakesari (30.8) followed by Centenary (28.4) and Neelima (27.7). In contrast, lowest number of flowers per plant was recorded in Discovery (15.5) and Prolific (15.6). Pusakesari produced bigger flowers (8.7 cm in diameter) compared to Centenary (6.7 cm), Neelima (6.6 cm), Prolific (5.2 cm) and Discovery (4.3 cm). Pusakesari was comparatively taller (48.0 cm) compared to Centenary (45.5 cm), Neelima (43.7 cm), Prolific (41.5 cm) and Discovery (40.5 cm). Plant spread in PusaKesari, Centenary, Neelima, Prolific and Discovery were 20.1 cm, 17.1 cm, 16.5 cm, 15.9 cm and 15.2 cm respectively. Significantly higher number of primary branches per plant was recorded in Pusakesari (9.1) compared to the other varieties that varied between 7.8 to 8.8. Based on results, PusaKesari was found to be superior in terms of vegetative and floral characteristics followed by Centenary and Neelima.

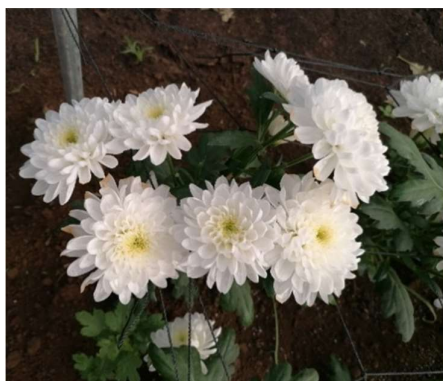


Fig. 47: Chrysanthemum variety Pusakesari



Fig. 48: Chrysanthemum variety Centenary



Fig. 49: Chrysanthemum variety Neelima

The performance of three varieties namely Pusakesari (white), Centenary (yellow) and Discovery (green) was evaluated in controlled environment on station at Wooton. The number of days taken to first flowering in Pusakesari, Centenary and Discovery was 125, 128 and 137 respectively. Pusakesari produced highest number of stems per plant (9.3) compared to Centenary (8.6) and Discovery (7.0). Pusakesari was comparatively taller (75.6 cm) compared to Centenary (71.3 cm) and Discovery (48.3 cm). Significantly higher number of flowers per plant was recorded in varieties Pusakesari (5.6) and Centenary (5.0) compared to Discovery (3.7). Pusakesari produced bigger flowers (5.0 cm in diameter) compared to Centenary (4.3 cm) and Discovery (3.0 cm). Based on results, PusaKesari was found to be superior in terms of vegetative and floral characteristics followed by Centenary.

## Orchid

The performance of orchid varieties from seven families (Dendrobium, Oncidium, Tolumnia, Grammatophyllum, Vanda, Fragrance Orchids and Phalaenopsis) is being assessed in a greenhouse on station at Réduit. The plant and flower characteristics were recorded. Plant heights varied from 4.1 cm to 54.9 cm with the tallest ones belonging to the families Grammatophyllum (54.9 cm) (*Fig 50*) followed by Dendrobium (54.5 cm) (*Fig. 51*), Fragrance orchids (52.5 cm), Vanda (47.6 cm), Phalaenopsis (46.5 cm) and Oncidium (33.8 cm). Shortest plants were recorded in Tolumnia (4.1 cm) (*Fig. 52*). Dendrobium (187 days) reached first flower bud initiation earlier followed by Tolumnia (201 days), Fragrance orchids (223 days), Phalaenopsis (230 days), Oncidium (244 days), Grammatophyllum (305 days) and Vanda (320 days). Dendrobium and Vanda flowered throughout the year while seasonal flowering was observed mainly in Oncidium, Fragrance orchids and Phalaenopsis. The average number of spikes produced per plant per year in Dendrobium, Oncidium, Tolumnia, Grammatophyllum, Vanda, Fragrance Orchids and Phalaenopsis was 8.7, 2.4, 4.7, 1.5, 3.0, 3.6 and 1.2 respectively with an average of 5.8, 3.8, 3.7, 10.2, 3.9, 5.0, 3.3 flowers/spike respectively. The increased flower yield compared to previous years may be attributed to the greater number of leaves per plant, larger leaf area and bigger number of pseudobulbs per plant. Phalaenopsis was susceptible to diseases and pests throughout the year. Dendrobium, Fragrance orchids and Vanda with good plant stature, leaf area and leaf area index performed better in terms of vegetative characters which ultimately resulted in better yield.

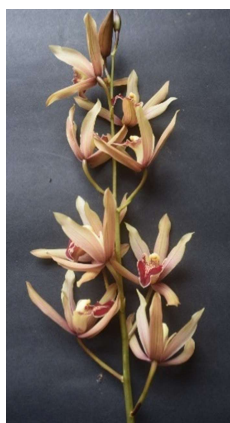


Fig: 50 Orchid variety  
Grammatophyllum



Fig:51 Orchid variety  
Dendrobium



Fig: 52 Orchid variety  
Tolumnia

## Fruits and Nuts

### Banana

An on-farm assessment was carried out at St Antoine to evaluate the performance of recently introduced banana varieties, namely Novaria, Formosana, FHIA17 and FHIA18. Among these varieties, Novaria, a type of Cavendish, was selected and propagated by Société de St Antoine. Novaria demonstrated faster recovery following cyclone damage and showed promising bunch yields despite its susceptibility to freckle and eumusae leaf spot.

The development of 15 banana varieties (Mamoul, Mysore, Pisang Awak, Petite Naine, Formosona, Novaria, Gingeli, Gold Finger, Namwa Khom, Ice cream, Silk, GCTCV 106, Williams, FHIA17 and FHIA25) has been progressing slowly since 2020 on station at Wooton, with all plants remaining in the vegetative

stage even after two years.

At Réduit, where 18 different banana varieties (FHIA17, FHIA23, FHIA25, FHIA18, Namwa Khom, Philibert, FHIA03, Silk, Novaria, Formosana, Mamoul, Balbisiana, Cameroun, Butuhan, Butuhan apex, M. balbisiana, P. klutuk wulung, M. balbisiana var luiquiensis) were established between late 2021 and early 2022, the seven fiber-rich accessions (Balbisiana, Cameroun, Butuhan, Butuhan apex, M. balbisiana, P. klutuk wulung, M. balbisiana var luiquiensis) showed good development but were still in the vegetative stage. Among the other varieties, early bunch emergence was observed in 25 % and 10 % of plants in FHIA03 and FHIA23, respectively, just 10 months after planting.

A dedicated insect proof structure has been constructed on station at Richelieu to serve as a repository for promising and new banana varieties, providing elite suckers for large-scale propagation.

## Cocoa

Cocoa budwoods of eight clones (ICS 6, ICS 46, UF 613, ICS 68, ICS 84, ICS 48, ICS 29 and ICS 35) were introduced from the International Centre for Quality Cocoa, UK and grafted on variety Criollo as rootstock. In 2021/2022, the grafted new clones were transplanted on station at Reduit (8 clones) under conventional farming system, on station at Pamplémousses (7 clones) under organic farming system and on farm at Chamarel (6 clones) under agroforestry system. The development of the grafted clones was good at all sites. Early flowering and fruit set was noted in two clones namely ICS 35 and UF 613, 1.5 to two years after planting.



Fig.53: Kohala fruits

## Avocado

Activities were focused on introduction and evaluation of varieties, characterisation and evaluation of selected local accessions with promising traits and support to growers through training in avocado grafting and supply of budwoods and grafted plants to develop the avocado sector.

Under conventional farming system on station at Reduit, yield per tree of the 22-years old introduced avocado varieties namely Rincon, Fuerte, Ettinger and Hass were 15 kg, 30 kg, 33 kg to 60 kg and 32 kg respectively.

Four years old trees established from grafted plants of varieties Fuerte and Ettinger yielded 20 kg and 36 kg fruits per tree/ year respectively.

At Pamplémousses Organic Research Station, a wide variation in fruit yield per tree from 2 kg to 60 kg was recorded due to differences in tree age and variety. Younger trees of varieties Ettinger, Fuerte and Rincon produced 3 kg fruits/tree to 16 kg fruits/tree. Among the old trees (> 20 years), yield per tree varied from 3 kg to 16 kg in the local accessions namely Petit Poucet (Fig 56), L1, L5, R1T4 and R1T3. In contrast, yield per tree in accessions Tortue (R1T2) (Fig 54), R4T2- Fuel varied from 20 kg to 30 kg. Up to 50 kg to 60 kg per tree were recorded among varieties Ettinger, Pinkerton and the local accession Fuel (R4T3).



Fig. 54: Local Accession  
Tortue



Fig.55: Local Accession  
R1



Fig. 56: Local  
Accession Petit Poucet



Fig.57: Local  
Accession R9

In view of broadening the range of germplasm of varieties for commercial production, new varieties including type A: Hass (Fig 58), Lamb Hass, Pinkerton, Maluma, Russel 034 and Gem-2017 and type B: Zutano, Edranol, Bacon, Fuerte, Ettinger and Ryan were introduced for evaluation and dissemination to farmers during 2021 to 2022.



Fig.58: Hass Fruits

## Litchi

The new litchi variety Kiamana (Fig 59) was transplanted on station at Pamplémousses and Réduit in 2018. In 2022, 7.8 kg of fruits were recorded per tree of which 2.2 kg were unmarketable due to splitting. Yield was comparable to that Tai So variety of the same age. The fruits were large in size and the average fruit weight was 23.75 g. All Kiamana fruits had chicken tongue seeds with a high pulp to seed ratio of 4.1 : 1 compared to the Tai So variety (3.2 : 1). At harvest, its pulp brix value was 18.7% and acidity was 0.7%. One of the main drawbacks noted in Kiamana was high rate of fruit splitting which could be due to erratic water supply. Further evaluation is ongoing to confirm findings prior to dissemination of the variety for commercial production.



Fig:59 Kiamana fruits

Evaluation of late bearing litchi varieties namely Bengal, Jensen, Heong Lai, B3, Huan Zhi, Faysishu, and Waichee was carried out on farm at Moka, Savannah and Bord Cascade. Fruits from the late bearing varieties reached harvest maturity between end of December 2021 to mid-January 2022, as compared to Tai So fruits which reached harvest maturity between mid-November to mid December 2022.

Fruits of all the late bearing varieties were round in shape except for Bengal which was conical in shape with a tapered tip (Fig 64). The mean fruit weight in Faysishu, Waichee, Bengal, Huan Zhi, Jensen, B3 and Heong Lai was 18.70 g, 16.90 g, 15.76 g, 15.70 g, 14.8 g, 13.47 g and 10.37 g respectively. In all the varieties, the pulp brix value was above 19° while those in Bengal, Huan Zhi and Heong Lai were 24° and above. Jensen had the highest pulp to seed ratio of 3 : 1 followed by Huan Zhi (2.9 : 1), Faysishu (2.7 : 1) and Waichee (2.6 : 1). Of the seven varieties, Heong Lai fruit was the smallest (10.37 g) with the lowest pulp to seed ratio of 2.2 : 1. Moreover, the highest number of fruits per panicle was recorded in Jensen (30) (Fig 61) and the lowest number of fruits per panicle was in B3 (5) (Fig 63). The percentage of fruits with chicken tongue seeds was highest in Huan Zhi (40 %) followed by B3 (33 %), Waichee (Fig 60) and Faysishu (20 %). Fruits of varieties Bengal, Jensen and Heong Lai had no chicken tongue fruits.



Fig: 60 Waichee



Fig: 61 Jensen variety



Fig: 62 Savanah variety



Fig: 63 B3 variety



Fig: 64 Bengal variety

## Longan

Four years old trees of introduced longan varieties Kohala (*Fig 65*), Biew Kiew (*Fig 66*) and Chompoo (*Fig 67*) flowered in mid- September 2022 and their fruits reached harvest maturity in February 2023. The estimated fruit yield recorded per tree was between 3.6 kg and 5.3 kg in Chompoo, 2 kg and 3.5 kg in Kohala and 1.5 kg in Biew Kiew. The fruits were round in shape with greenish brown peel colour. Kohala fruits were the largest in size among the three new varieties. Its fruits had an average weight of 8.5 g with a higher pulp to seed ratio of 1.9 : 1. The average fruit weight in Biew Kiew and Chompoo was 7.9 g and 6.6 g with a pulp to seed ratio of 1.8 : 1 and 2.5 : 1 respectively. Pulp of the three longan varieties had similar brix value of 19° at optimum maturity.



Fig: 65 Kohala fruits



Fig 66 Biew Kiew fruits



Fig: 67 Chompoo fruits

## Pomegranate

The 4-year-old plants of the new pomegranate variety Ind19 (*Fig 68*), introduced from India is being evaluated at Richelieu. The plants have reached 3.5 m in height and a canopy diameter of 3.7 m. Annual yield per tree was around 40 to 60 fruits. Main flowering period was observed from May to June and harvest from September to December.

Fruit weight (*Fig 69*) varied between 143 g to 382 g with peel colour orange red at maturity and arils deep red (*Fig 70*). The weight of the arils (edible portion) accounted up to 62 % of the fruit weight. Its seeds were soft and palatable. About 70 ml of juice was extracted from 100 g of arils. Brix value varied between 13.2° and 15.6°, while acidity varied between 0.20 % and 0.52 %. A total of 120 plants were provided free of charge to some 11 growers in the sub humid and humid zones for evaluation under farmers' conditions.



Fig: 68 pomegranate variety Ind19



Fig: 69 pomegranate fruits



Fig: 70 pomegranate arils

## Papaya

Ten new papaya accessions (Neo 253, Neo 225, Neo 246, Neo 237, Neo 203, Neo 209, Neo 202, Neo 223, Neo 232 and Neo 261) introduced from Neofresh Ltd, South Africa was evaluated on farm at Bois Pipe and l'Espérance Trébuchet.

Five accessions namely: Neo 261, Neo 253 (*Fig 71*), Neo 246 (*Fig 72*), Neo 223 (*Fig 72*) and Neo 202 were identified promising based on the number of fruits and fruit yield per tree, mean fruit weight, pulp brix value, pulp firmness, pulp colour and taste.

Fruits of Neo 261, Neo 253 (*Fig 74*) and Neo 246 were classified as large with mean fruit weight of 2.5 kg, 1.8 kg and 1.5 kg respectively with firm pulp (0.7 kg/cm<sup>2</sup> and above) and pulp brix value of 10 and above. Though Neo 202 (*Fig 73*) produced fruits with low firmness (0.2 kg/cm<sup>2</sup>), it was found to be a high yielding variety producing an average of 43 small-sized fruits of weight varying between 400 and 1,100 g with a yellowish orange pulp, brix value of 9° and a pleasant taste.



Fig: 71 Neo 253



Fig: 72 Neo 246



Fig: 72 Neo 223



Fig: 73 Neo 202



Fig: 74 Neo 253

## Macadamia

Macadamia is being promoted as an alternative cash crop for diversification in abandoned sugarcane lands. In 2021 and 2022, some 6,000 grafted plants were distributed to more than 50 growers. In 2022, a last batch of 2,234 grafted plants, 926 rooted cuttings and budwood were introduced from South Africa and some 1,200 plants were grafted locally. These plants are being hardened prior to dissemination to growers in 2023.

Evaluation of twelve varieties namely A16, A4, 816, 849, 842 814, 816, N2, 695, 791, GVE and Beaumont that were established on station at Reduit, Wooton and Richelieu between 2018 and 2021 was pursued. Varieties A4, 695, 791, N2, 849 and Beaumont were observed to flower and set fruit under local conditions. The main flowering period was from July to September. Fruit set occurring in July to September were less prone to fruit drop when exposed to strong winds occurring in December to February (due to their bigger sized nuts) compared to those set later (October/ November) which were highly susceptible to fruit drop (up to 100 %). Over 90 % of nut loss occurred between fruit set to harvest. The nuts reached harvest maturity in March/April. The annual nut yield recorded in 3-year-old trees was 0.5 kg in GVE and 0.7 kg to 1.2 kg in A4.

## Strawberry

The performance of five introduced strawberry varieties (Rubygem, Charlotte, San Andreas, Armelle and Manon des Fraises) as frigo (cold stored) plants was assessed under open field with plastic mulch, fertigation and rain shelter on station at Wooton during 2022. The percentage of marketable fruits varied between 79.9 % and 94.1 % among the five varieties. Rubygem had the highest percentage (94.1 %), followed by Charlotte (92.9 %), San Andreas (91.6 %), Armelle (83.2 %), and Manon des Fraises (79.8 %).

In terms of fruit size, large-sized ( $> 40$  g) and medium-sized ( $\geq 20$  g and  $\leq 40$  g) fruits accounted for 40.9 %, 25.3 %, and 24.4 % of the marketable fruit weight in San Andreas, Rubygem, and Armelle, respectively.

Charlotte had the highest percentage of small-sized fruits (87.4 %), followed by Manon des Fraises (82.4 %). Manon des Fraises fruits were the sweetest with an average brix value of  $10.6^{\circ}$ , followed by Rubygem ( $8.7^{\circ}$ ) and Charlotte ( $7.0^{\circ}$ ). Armelle and San Andreas had relatively lower average brix values of  $5.0^{\circ}$  and  $5.6^{\circ}$ , respectively.

Rubygem fruits were the firmest with an average firmness value of  $1.7 \text{ kg/cm}^2$ , followed by Armelle ( $1.3 \text{ kg/cm}^2$ ), Charlotte ( $1.2 \text{ kg/cm}^2$ ), and Manon des Fraises ( $1.05 \text{ kg/cm}^2$ ). San Andreas had the lowest average firmness value of  $0.5 \text{ kg/cm}^2$ . Regarding runner production, Rubygem and Manon des Fraises produced the highest number of runners ( $> 32$  runners/plant), while Armelle produced around 16 runners per plant. San Andreas and Charlotte were classified as poor runner producers, with less than 4 runners per plant.

Based on their high total and marketable yield and the percentage of medium and large-sized fruits, varieties Armelle, Rubygem, and San Andreas were found suitable for commercial production.

On the other hand, the low-yielding varieties, Manon des Fraises and Charlotte, were well-adapted to open-air, backyard gardening, and organic production due to their high tolerance to foliar diseases.

The performance of locally produced daughter runners sourced from the 2021 strawberry variety Manon de Fraises compared to imported cold stored runners was evaluated on station at Wooton in early May 2022.

The growth of imported cold-stored runners was vigorous and uniform, with no mortality. In contrast, the growth of daughter runners was slow and uneven, resulting in a 5% mortality rate one month after planting. Significantly higher mean total and marketable fruit yields was recorded in imported cold-stored runners compared to the daughter runners. The mean total fruit yield per plant for imported cold-stored runners (458.20 g) was nearly three times higher than that of daughter runners (139.63 g).

## Berries

In view of extending the range of fruit species grown locally, cuttings of five berry species (blueberry, cape gooseberry, red raspberry, youngberry, goji berry and blackberry) were introduced from Berries of Africa, South Africa in 2021 and being evaluated in open field and protected conditions since October 2021. Among the five species, cape gooseberry (*Physalis peruviana* L.) and red raspberry (*Rubus ideaus*) were found promising. Their fruit yield and quality were found to be significantly better under protected conditions as compared to open field conditions. The few goji berry (*Lycium barbarum*) introduced did not survive when transplanted in field. Cape gooseberry flowered shortly after planting (about 2 months) and remained productive throughout the year with higher yield in summer months. The flower to fruit harvest takes around one month. Its mean fruit weight was 4.2 g. Mean fruit yield was around 150 to 200 fruits /plant /month under protected conditions and 40 to 60 fruits/ plant/ month in open field conditions. The lower fruit yield under open field was attributed to damage by heavy rains, strong winds, snails, rats and birds.

Under protected conditions, red raspberry plant produced an average of 18 floricanes /plant, each plant with 60 to 100 berries while in the open field, an average of 4 floricanes, each with 20 to 30 berries was recorded under super-humid conditions on station at Wooton and up to 10 floricanes, each with 60 to 80 berries was recorded on station at Réduit. The duration from flower to harvest in raspberries in protected and open field conditions were about 18 days and 25 days respectively. In the open, over 70% of fruits were unmarketable due to damage by snails, birds and splitting after rain. Foliar damage by the insect “Mouche Bleu” (*Cibdela janthina*), strong wind and excessive rainfall were the main challenges limiting the commercial exploitation of raspberry in open conditions. Cape gooseberry and red raspberry were thus propagated and disseminated to interested growers for commercial exploitation.

Under open field conditions, growth of the blueberry (*Vaccinium* spp.) varieties Star, Biloxi, Legacy plants was very slow despite several attempts to improve soil conditions. Three new low-chill varieties namely Misty, Sharp Blue and Centurion were introduced in December 2022 for evaluation in 2023.

## Extending shelf life of fresh produce

### Post-Harvest

The shelf life of blast-frozen ripe jackfruit pulp was evaluated at -18°C for 45 to 50 mins stored in a freezer. The pulp maintained its colour, taste and sweetness (> 17° Brix), without any presence of off-flavour 46 days after storage in freezer.

The shelf life of Chayote under different packaging and storage conditions was assessed. Freshly harvested chayote kept under ambient room conditions (20 to 22°C) was found to have a maximum shelf life of 8 days while disinfected ones, wrapped either in cling film or packed in biodegradable low-density polyethylene (LDPE) bag had a shelf life of 20 and 14 days respectively under similar conditions. At 12 to 14°C, disinfected fruits, packed in biodegradable LDPE bags had a shelf life of 45 days compared to 36 days for non-disinfected fruits. Individually wrapped disinfected chayote was observed to have the longest shelf life of 55 days at 12°C to 14°C. Furthermore, packaging and low temperature storage was found to significantly reduce moisture loss and delay sprouting in chayote.

Suitable homemade preservative solution for extending shelf life of cut flowers namely chrysanthemum, roses and orchids was studied. Chrysanthemum (white) displayed the longest vase life of 33 days when kept in vase solution containing tap water + 87 ppm sodium hypochlorite + 200 pm citric acid + 4 % sucrose

compared to 17 days when kept in tap water. For roses the White and Salmon Pink type displayed the longest mean vase life of 14.7 and 14.2 days respectively when kept in preservative vase solution containing tap water + 87ppm sodium hypochlorite + 200 ppm citric acid + 6 % sucrose as compared to only 6.8 to 7 days in tap water. Cut flowers of orchid varieties namely dendrobium (purple colour) and grammatophyllum (olive green colour) had longer vase life of 27 and 35 days respectively when kept in preservative solution containing tap water + 87 ppm sodium hypochlorite + 4 % sucrose + 200 ppm citric acid while they displayed a vase life of 20 and 21 days respectively when kept in plain tap water.

The shelf life of freshly harvested eggplant fruits packed in Bio-LDPE perforated bags under two storage temperature conditions was studied. The shelf life of eggplant fruits packed in Bio-LDPE perforated bags stored at 20°C to 22°C (supermarket shelves conditions) and 12°C to 14°C were 11 days and 18 days respectively.

The fruits maintained their colour and firmness, with no sign of internal browning. At 11 days of storage, the percentage cumulative weight loss was 0.67 % in packed fruits kept at storage temperature (12°C to 14°C) as compared to 2.32 % in those kept at higher temperature (20°C to 22°C). After 18 days of storage at 12°C to 14°C, development of brown spots on the fruit's peduncle and calyx and sign of internal flesh browning due to chilling were noted.

### Agro-processing

With a view to increase fresh produce shelf life, reduce food loss and provide ready to use safe/ quality and nutritious products, some 20 new processed agro-products including pumpkin jam, jackfruit burger (plain and mix with mushroom), dry cocoa seeds, tomato pesto, dried tomatoes, dry tomato in olive oil, dry blue butterfly pea flower, moringa and turmeric capsules, seaweed capsules, vegetable leather from pumpkin and beetroot as potential healthy snack were developed. Green jackfruit pulp was identified as highly suitable for production of frozen vegan burgers. Pumpkin jam and pumpkin leather scored high acceptability and were perceived to have with a fruity melon flavour. Leather made from beetroot which is rich in anthocyanins scored good acceptability. A snack made of a mix of leather layers of pumpkin and strawberry / beetroot scored very good acceptability with a shelf life of 6 months in moisture proof packages.

The processing potential of tubers of five sweet potato varieties namely Purple (purple pulp), Leek (cream pulp), Zapello (orange pulp), Raisin (cream pulp) and U11 (orange pulp) for crisps and frozen fries production was determined. Crisps yield was around 25 % while flour yield ranged from 15 % to 20 %. Crisps from varieties Raisin, U11 and Purple had a shelf life of 3 months and were found to have very good sensory acceptability. Varieties of sweet potato with orange and purple flesh were found to be highly suitable for flour production due to high anthocyanins content and visual appearance. Flour from Leek, Raisin and Purple packed in moisture-proof high-density polyethylene (HDPE) zip lock packs had a shelf life of 15 months while flour from Zapello and U11 has a shelf life of 6 months due to loss of colour. The different sweet potato flour was used as a supplement to wheat flour up to 30% in the making of a range of products such as wrap, pancake and pastries among others.

Ripe fruits of the tomato variety Jupiter were identified as highly suitable for processing into a wide range of products including puree, chutney, dehydrated tomato preserved in olive oil, dehydrated tomato powder, pizza sauce dip, chutney and "rougaille" paste based on its fruit shape, size, pulp thickness, high brix and low acidity.

Protocol for dehydration of *Ulva lactuca*, a seaweed for the production of derived products including dried seaweed powder, flakes, capsules and paste/condiments for commercialization was developed. The dry seaweed flakes and its powder being hygroscopic in nature was found to have a shelf life of 15 months when packed in different packaging materials (Biaxially Oriented Polypropylene (BOPP), HDPE, Aluminium pouch). The dry seaweed sample was found free of heavy metals. It had a very good nutritional profile thus making it suitable as a nutritional supplement with cooked rice or pasta, or with wheat flour up to 1.5 % w/w to develop noodles or pasta.

The potential of the edible blue flower of Butterfly pea (*Clitoria ternatea*) as tea and cordial was investigated. The flower was dried at 45° for tea purpose while fresh flowers were used for cordial. Dried flowers maintained the blue colour and had a shelf life of 6 months when packed in air-tight packages and stored away from sunlight. The dried flowers when mixed with hot water yielded an attractive deep blue colour liquid, with a herbal “pea” taste. Addition of an acidifying agent like lemon or citric acid to the infusion changed the colour from blue to purple, showing its suitability for use in preparation of colourful cocktails or fruity teas.

## Climate Smart Agriculture

### Irrigation and water management

Two novel water saving irrigation technology, namely the KSNM Spray Irrigation system and the KSNM Drip Irrigation system was introduced from India. The effect of the KSNM Spray Irrigation system (Fig. 75) on yield of Chinese cabbage, pakchoi and lettuce was compared with the conventional sprinkler irrigation system on station at Wooton and Réduit. At Wooton, significantly higher yields by 44.8 %, 29.0 % and 41.8 % were recorded in Chinese cabbage, pakchoi and lettuce respectively in plots with the KSNM Spray Irrigation system compared to plots with conventional sprinkler system. Similarly, at Réduit, significantly higher yield by 40.8%, 32.5 % and 43.5 % were recorded in Chinese cabbage, pakchoi, and lettuce respectively with the KSNM Spray Irrigation system compared to plots with the conventional sprinkler system. The KSNM Spray Irrigation system was found to be the most appropriate irrigation system for leafy vegetable crops and is suitable for farmers whose fields are located in the irrigated project zones managed by the Irrigation Authority as the available water supply is already pressurized to the required level.



Fig. 75: KSNM Spray Irrigation System in Leafy Vegetables at Réduit



Fig. 76: KSNM Drip Fertigation System in Sweet Pepper and Long Chilly at Réduit

The yield and quality of sweet pepper and two varieties of chilli namely Velocity and Sandra were assessed under the KSNM drip fertigation system and the conventional pressurized drip fertigation system on station at Réduit (*Fig. 76*). Significantly higher yields by 66.7 %, 52.5 % and 38.1 % respectively were recorded in chilli variety Velocity, chilli variety Sandra and sweet pepper respectively under the KSNM Drip fertigation system compared to the conventional pressurized drip fertigation. Results indicate that the KSNM Drip fertigation system can be used to improve vegetable crop production in farmers' fields and is suitable for farmers whose fields are located in the irrigated project zones managed by the Irrigation Authority as the available water supply is already pressurized to the required level.

The yield and quality of eggplant and cabbage were assessed under drip fertigation and drip irrigation with conventional fertilizer recommendation in soil under protected conditions. For eggplant, the number of fruits per plant, fruit weight per plant and fruit size were significantly higher by 34.1 %, 37.6 % and 13.1 % respectively in drip fertigation system compared to drip irrigation with conventional fertilizer recommendation.

Off-season production of eggplant can be achieved when cultivation is carried out under protected conditions with fertigation provided the seedlings are transplanted in February and the plant is able to achieve its full vegetative stage during the late summer months. The trial has proved that eggplant can be produced and harvested during winter months. For cabbage, head weight per plant and head size were significantly higher by 35.1 % and 19.7 % respectively in drip fertigation system compared to drip irrigation with conventional fertilizer recommendation. Production of cabbage can thus be successfully achieved under protected conditions with fertigation during high rainfall seasons which adversely affect the crop in open field cultivation.

The yield of cabbage, squash, cucumber and watermelon was assessed under the ECOFLO (*Fig. 78*) solar power-driven drip fertigation system of 1,000 m<sup>2</sup> and under pressurized Venturi drip fertigation in open field on station at Réduit. Similar yield and quality were achieved under both fertigation systems. The ECOFLO solar power-driven drip fertigation system can thus be used as an alternative to conventional electricity driven pressurized Venturi drip fertigation system in farmers' fields devoid of electrical supply. Moreover, owing to the erratic rainfall pattern caused by climate change, this promising energy-efficient technological package is suitable for farmers cultivating under rainfed conditions whereby they can fertigate with the water saving drip fertigation system technology driven by the ECOFLO solar power-driven pump.

The yield of French bean was assessed under the ECOFLO solar power-driven drip irrigation system and the SF2-Futurepump solar power-driven drip irrigation system on station at Wooton. Significantly higher yield by 19.9 % was obtained in the ECOFLO solar power-driven drip irrigation system compared to the SF2-Futurepump solar power-driven drip irrigation system. The ECOFLO solar power-driven drip irrigation



Fig. 77: ETA Gravity-Fed Fertigation System in Zucchini at Wooton



Fig. 78: Squash under the ECOFLO Drip Fertigation System at Réduit

system is targeted for large surface area of up to 1,000 m<sup>2</sup>. On the other hand, the SF2-Futurepump solar power-driven drip irrigation system, due to its lower cost, is suited for organic farming and backyard gardening.

The yield and quality of zucchini were evaluated under the climate smart Exudative Tube Application (ETA) gravity-fed fertigation system (*Fig. 77*) and the gravity-fed drip fertigation system on station at Wooton. The number of fruits per plant, fruit weight per plant and fruit size was significantly higher by 28.6 %, 20 % and 7.1 % respectively in the ETA gravity-fed fertigation system compared to the gravity-fed drip fertigation system. The improvement in yield and quality was due to the more uniform moisture and fertilizer supply at the root zone level by the 100 % porous textile hose of the ETA gravity-fed fertigation system.

The nitrogen plant uptake and fertilizer use efficiency in cabbage were evaluated using enriched 15N – Urea applied twice, first at two weeks after transplantation and secondly at head formation to plots grown under three systems namely, fertigation using gravity-fed drip irrigation system (*Fig. 79*), gravity-fed exudative tube fertigation system (*Fig. 81*) and rainfed conditions (*Fig.80*). At end of the crop cycle, whole cabbage plants harvested from each treatment plots were washed, dried, and separated into outer leaves, curd, and stem/ root. The sample parts were oven dried at 70°C till constant weight. Oven-dried cabbage sample parts were grinded, and tin cups prepared and sent to National Center for Energy Sciences and Nuclear Techniques (CNESTEN), Morocco for Nitrogen-14 and Nitrogen-15 analysis.



Fig. 79: Gravity-Fed Drip Fertigation System



Fig. 80: Conventional Rainfed System



Fig.81: ETA Irrigation System

## Sustainable Production

### Composting

The Switch Africa Green funded project entitled ‘Evaluation of the effect of Treated Manure on vegetable crop production’ in collaboration with the Livestock Department has been implemented in order to assess the effect of treated manure on growth and yield of vegetable crops. Field and pot trials were set up on station at Wooton and Réduit to evaluate the effect of two types of sanitised manure namely, solarised and dehydrated, with or without recommended chemical fertilisers on yield of bean and cabbage. Burning of seedlings and germination inhibition was observed (*Fig. 82*) for the treatment with solarised poultry manure in both cabbage and bean



Fig. 82: Adverse effect of solarised manure on cabbage seedlings



Fig. 83: Cabbage trial at Field Level

respectively, presumably due to the heat generated during the decomposition processes of the poultry manure. In contrast, no such effect was observed with dehydrated manure which was applied seven weeks after the dehydration process. Significantly higher yield was obtained with treated manure, irrespective of sanitisation method, when used together with recommended fertiliser (*Fig. 83*). Thus, solarised manure cannot be recommended for use immediately after solarisation. However, it can safely be used after further decomposition/ composting. On the other hand, seven weeks dehydrated manure can be recommended for use in vegetable crop production.

### Organic products

The effect of Sealife Organics Compost at the rate of 20 t/ha in combination with or without recommended chemical fertilisers on lettuce yield was assessed on station at Réduit (*Fig. 84*) and was compared with poultry manure at the rate of 25 t/ha with or without recommended fertiliser, along with a control (soil only). The fertilization combinations were determined based on crop requirements, soil condition and recommendations from the manufacturer/ supplier. The control treatment (soil only) had a significantly lower yield (187 g) compared to the treatments using poultry manure or Sealife Organics Compost, both with or without the recommended fertilizers. In contrast, the combination of poultry manure with fertiliser resulted in the highest yield (427 g), followed by the combination of Sealife Organics Compost with fertilizer (326 g). The treatments using only poultry manure (284 g) or Sealife Organics Compost (258 g) also resulted in significantly higher lettuce yield compared to the control. Results indicate that both poultry manure and Sealife Organics Compost, particularly when used in combination with the recommended fertilisers, positively influenced lettuce yield. The compost and manure treatments outperformed the control treatment, demonstrating their potential in improving crop productivity.



Fig. 84: Lettuce trial at Réduit

The performance of a new organic substrate namely Sealife Organics Potting Mix was assessed for the production of cabbage (*Fig. 85*) and tomato (*Fig. 86*) seedlings and was compared with Peat Moss and soil (control). In cabbage, fresh weight of seedlings was significantly higher in Peat Moss (1.95 g) followed by Sealife Organics Potting Mix (1.31 g) compared to soil medium (0.28 g). Similarly in tomato, fresh weight of seedlings was significantly higher in Peat Moss (1.45 g) followed by Sealife Organics Potting Mix (1.08 g) compared to soil medium (0.36 g). The tomato and cabbage seedlings were well developed in Sealife Organics Potting Mix and Peat Moss substrates. In contrast, they were poorly developed in the soil medium. Based on results Sealife organics potting mix can be recommended.



Fig. 85: Production of Cabbage Seedlings using: Soil (1); Sealife Organics Potting Mix (2); and Peat Moss (3).



Fig. 86: Production of Tomato Seedlings using: Soil (1); Sealife Organics Potting Mix (2); and Peat Moss (3).

Two on-station trials were conducted to develop organic fertilizer packages for garlic and tomato production at Flacq and Rivière des Anguilles respectively. In the garlic trial, three different organic fertilizer treatments with certified organic fertilisers in combination with manure (30 t/ha manure + GLS Enrich at sowing+ 3 mL/L Seasol at 3 weeks after germination; 30 t/ha manure + Wonderlife G at sowing + 3 mL/L Seasol at 3 weeks after germination; 30 t/ha manure + Ever 7 at sowing+ 5 L/ha Osiryl at 3 weeks after germination) were tested alongside a control treatment which consisted of manure only. Results indicated that the control treatment without organic fertilizer had significantly lower yield (3.7 t/ha) compared to the manure treatments combined with organic fertilizers which varied between 5.9 t/ha and 6.0 t/ha. However, the combination of manure with Ever 7, and Osiryl resulted in significantly higher yields (6.0 t/ha). For the tomato trial, similar organic fertilizer treatments as in garlic trial was used but with manure applied at the rate of 15 t/ha. Results showed that the control treatment without organic fertilizer had significantly lower yield (10.4 t/ha) compared to the manure treatments combined with organic fertilizers which varied between 14.0 t/ha and 16.7 t/ha. However, there was no significant difference observed among the three different organic fertilizer packages tested. This suggests that all organic fertilizers were effective under the conditions of this trial. Both trials demonstrated the importance of using organic fertilisers in improving yield compared to the control treatment without organic fertilisers.

A trial was conducted to evaluate the effectiveness of three fertiliser packages namely GLS Enrich at a rate of 371 kg/ha, Wonderlife G at a rate of 37 kg/ha and Farm Yard Manure (FYM) at a rate of 60 t/ha for organic onion (var Bellarose) seed production. Significantly higher yield of onion umbels per hectare was recorded in Wonderlife G (1166.23 kg) treatment compared to FYM (975.64 kg) and GLS Enrich treatments (928.00 kg).

### Inorganic fertiliser

In 2021, the impact of a new NPK fertiliser rate (127 kg N/ha, 57 kg P<sub>2</sub>O<sub>5</sub>/ha, and 173 kg K<sub>2</sub>O/ha) determined based on soil nutrient levels and potato plant nutrient uptake on potato yield was studied on station and on farm. The new NPK fertiliser rate resulted in the highest total tuber yield and marketable tuber yield. In 2022, two additional trials (Trial A and Trial B) were conducted on station at Réduit to validate results obtained in 2021. The treatments included the new NPK rate, 100 % recommended fertiliser rate (131 kg N/ha, 180 kg P<sub>2</sub>O<sub>5</sub>/ha, and 130 kg K<sub>2</sub>O/ha), 75 % of the new NPK rate, and a no fertiliser treatment. In the Trial A, a Farmer Fertiliser rate, applied at 238 kg/ha 14:8:20 Granular mineral fertiliser, 237 kg/ha Locastart, 590 kg/ha Physiolith fertiliser and 9.5 L/ha Kaleo was also included. In trial B, significantly higher total yield was recorded in the new NPK fertilizer treatment (27.9 t/ha) compared to the other treatments which varied between 16.7 t/ha and 26.6 t/ha. In trial A, despite no significant difference in total yield among the treatments, the total yield in the new fertiliser treatment was numerically highest (33.3 t/ha) compared to the other treatment which varied between 21.2 t/ha and

29.8 t/ha. The total marketable tuber yield followed a similar pattern in both trials, with the new NPK rate outperforming the other treatments. The distribution of tuber sizes also varied among the treatments. In Trial A, the new NPK rate resulted in an optimal distribution of 62.1 % large, 23.8 % medium, and 14.1 % small tubers. Similar trends were observed with 75 % of the new NPK rate, while the 100 % recommended rate and no fertiliser treatment yielded different distributions.

Trial B showed similar patterns, with the new NPK rate consistently producing larger tubers compared to the other treatments. Based on the 2022 trials, it can be concluded that applying the new NPK fertiliser rate of 127 kg N/ha, 57 kg P<sub>2</sub>O<sub>5</sub>/ha, and 173 kg K<sub>2</sub>O/ha to potato crops resulted in the highest marketable tuber yields, ranging from 26.68 t/ha to 32.19 t/ha. In comparison, the 100 % recommended fertiliser rate yielded marketable tuber yields between 24.78 t/ha and 29.01 t/ha. The study suggests that customizing the NPK fertiliser rate based on soil nutrient availability can help optimize potato tuber yield.

### Aquaponics

An aquaponics system was established on station at Réduit in January 2023. The system consists of four distinct growing methods, namely media bed, deep water system, vertical farming and wick bed. Berri Rouge fish (*Fig. 87*) were introduced in three dedicated fish tanks (*Fig. 88*) and fed on 4 mm fish meal pellets. Following a settling period, melon seedlings were used for initial testing in March. The crop performed well without any observable signs of nutrient deficiency. Thereafter, seedlings of various crops (*Fig. 89*) such as lettuce, greens, radish, turnip, cabbage, broccoli, and tomatoes were transplanted into the different systems (*Fig. 89 a, b, c*). In an effort to disseminate knowledge and expertise, comprehensive training sessions were conducted to technical staff from FAREI, representatives from various governmental bodies and potential farmers.



Fig. 87: Side view of Fish Tank



Fig. 88: Berri rouge in fish tank



Fig. 89: Root crops in wick system



Fig. 89a: Broccoli and Tomato in Media Bed System



Fig. 89b: Lettuce and greens in Deep Water System



Fig. 89c: Greens in vertical farming system

### Agroforestry

A model Agroforestry plot has been set up on an area of about 5 arpents at Britannia to assess its performance in the Mauritian context and for demonstration to the farming community. Till date the following species have been planted under natural/organic farming system: decorative palm, white palm, banana, breadfruit, lucuma, jackfruit, guava, hog plum, citrus (mandarine), bell apple (jambosse), mulberry, hog plum, guava, papaya, avocado, mango, black plum, passion fruit, moringa, calliandra, chayote, taro and lemon grass. Moreover, crops such bottlegourd, white radish, coriander, carrot, turmeric, ginger was cultivated in the interline of tree species. From January to March 2022, cuttings of three varieties of sweet potato were planted as cover crop in the breadfruit plot while from July to September 2022, lettuce, brinjal, Zantak, Pakchoi were transplanted and white radish and bottle gourd sown. Farmyard manure was applied at the rate 2 kg/m<sup>2</sup> prior to planting on raised beds.

Due to herbicide drift from nearby plantations, the white radish, coriander and carrot plots were completely damaged. Furthermore, as a result of prevailing unfavourable climatic conditions and poor soil fertility, the blackplum, bell apple, calliandra, mandarine, hog plum and pomegranate did not perform well. To improve soil fertility, cattle manure and biofertiliser (Wonderlife G) was applied to the soil. Additionally, carbon sequestration assessment is being carried out on crop species such as breadfruit, mango, avocado, black plum, bell apple, calliandra, mandarine, hogplum, pomegranate, mulberry, guava and jackfruit. Data on parameters such as plant height, stem girth diameter and plant canopy are being recorded every semester while soil sampling and analysis are being carried out annually.

## Crop Protection

### Weed management

The efficacy of four chemical herbicides, namely sulfentrazone, fluroxypyr, metobromuron and clomazone and one relatively less toxic herbicide, pelargonic acid, was evaluated for the control of weeds in target crops.

1. In 2021, sulfentrazone 75 WDG at high rates of 1,200 g a.i. was found to be effective against *Cyperus rotundus* and did not affect peanut variety Cabri at Richelieu. To confirm the efficacy of the herbicide for the control of grasses, sedges and broadleaf weeds in peanut the trial was repeated on station at Réduit and Richelieu. Sulfentrazone was phytotoxic to peanut of an unknown variety at Richelieu and did not provide effective control of *C. rotundus* at 800 g a.i./ ha. Rates above 800 g a.i./ ha are not recommended in food crops since the residual action is effective for 12 to 16 weeks after application.
2. The efficacy of fluroxypyr 200 SC for the control of weeds in onion seedlings at one leaf stage in onion variety Francia was evaluated on station at Réduit and Richelieu. Results indicated that for fluroxypyr to be effective it needed to be applied at rates above 300 g a.i./ ha. However, such elevated rates caused leaf injury to onion seedlings and as a consequence affected seedling development. Therefore, fluroxypyr is not recommended for direct sown onions and seedlings at nursery level.
3. The efficacy of Sinopia (metobromuron (400 g/L) and clomazone (24 g/L) a selective herbicide for the control of several broad-leaved weeds and annual grasses in pre-emergence potatoes was evaluated at the rate of 2.5, 3.0 and 3.5 L/ha on station at Réduit and Richelieu for weed control in potato. Metribuzin at 2 L/ha was used as control herbicide. The residual effects of the two herbicides were studied using Chinese cabbage as test crop. No significant differences in crop emergence, *C. rotundus* density and total tuber yield among the three levels of Sinopia and the metribuzin treatment was observed at both sites. Forty-five days after sowing, weed regrowth was observed in all plots irrespective of herbicide treatments. The only weed species present was *C. rotundus* indicating that Sinopia was not effective against the weed at the rates applied. The herbicide did not affect plant emergence and was not phytotoxic to the potato plants. The effect of the herbicide Sinopia on *Solanum americanum* could not be determined since this weed species was not present at the sites where the trials were conducted. At both sites, no phytotoxicity symptoms were observed on Chinese cabbage indicating that both herbicides did not have residual effect.
4. A new product namely 'Katoun Gold', a non-selective contact herbicide containing 51.1 % pelargonic acid was found to be effective against a wide range of weeds when applied at 10 % to 20 % every two to three weeks. Katoun Gold at 15 % to 20 % is required for effective control of mature weeds. Thus, for the control of mature weeds the use of Katoun Gold is not economical on a large scale. In contrast, Katoun Gold at 10 % was found to be effective only on immature weeds (3 to 5 leaf stage). A spray hood is required to prevent phytotoxicity in crops grown in rows. The herbicide did not exhibit

residual effect on transplanted cabbage two days after application. However, an irritating smell affecting breathing of workers was detected one day after Katoun Gold application prior to cabbage transplantation.

## Disease management

### Use of bacteriophages as biocontrol agents against bacterial wilt disease

Three phages, namely Claudette (22A), Bakoly (23E) and Gervaise (1Ca) were successfully amplified and caused plaques (lysis holes) (Fig. 90) in the medium (Claudette on bacterial strain RUN 4382 and Bakoly and Gervaise on bacterial strain RUN 5453). Phage quantification was carried out through a series of phage dilutions from  $10^{-1}$  to  $10^{-8}$ .

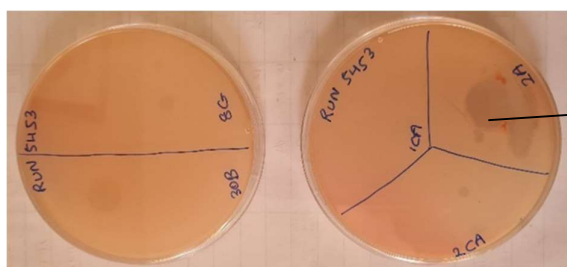


Fig. 90: Lysis plaques of phages on media containing bacteria RUN 5453

### Evaluation of varieties against major diseases

M7 generations of 14 cabbage and 15 cauliflower lines were screened for tolerance to the black rot disease caused by the bacterial pathogen *Xanthomonas campestris* pv *campestris* (XCC). Results revealed a range of susceptibility among the cauliflower and cabbage lines. Some lines were found to be susceptible, while others were classified as highly susceptible to the disease. No resistant lines were identified.

Four heat tolerant varieties of bean (AP 82, Chitedze Bean 1, 2 and 4) were evaluated for tolerance to major bean diseases on station at Réduit. A low incidence of rust disease (3.3 % to 10 %) was observed in all the varieties. Variety AP 82 showed highest incidence of bean common mosaic virus (100 %) and powdery mildew (70 %), while Chitedze Bean 1, 2 and Red Pearl (control) had a high incidence of common blight disease (100 %). Varieties Chitedze Bean 2 and 4 were highly susceptible (90%) to leaf spot disease.

Bean varieties Ferrina, FBS1, FBS2 and Long Tom were evaluated for tolerance to major bean diseases (rust, angular leaf spot, common blight, halo blight, cucumber mosaic virus, bean common mosaic virus and bean yellow mosaic virus) on station at Réduit. The incidence of leaf spots was low (1.8 % to 3.5 %) in all the varieties. Highest virus incidence was observed in varieties FBS1 (18 %) and FBS2 (18 %) compared to Ferrina (4 %). Common blight incidence was low (0% to 3.3 %) in all four varieties. Variety FBS1 (36.2 %) and Long Tom (25.7 %) were highly susceptible to rust disease. Highest virus incidence was observed in variety FBS2 (20.8 %). Angular leaf spot incidence was low in all varieties ranging from 0 to 2.7 %.

The tolerance of one AVRDC chilli line (AVPP 0514) and an improved AVRDC chilli line (APC4) to anthracnose were monitored on farm at Bel Air, Roche Terre and Martinière. Good tolerance to anthracnose was observed in both chilli lines in the three regions. The line AVPP 0514 was further monitored on farm at Martinière, Palma and Mare D’Australia. No anthracnose disease was recorded in any of the regions.

### Disease surveillance

Disease surveillance for existing and emerging diseases were carried out on banana, onion, tomato, macadamia and cocoa.

Banana freckle disease was observed with an incidence of up to 41.1 % and maximum mean disease severity of 50 % in variety Dwarf Cavendish. Banana leaf disease complex caused by fungal pathogens *Phyllosticta cavendishii*, *Cordana* sp. and *Pseudocercospora* spp. was observed with mean disease severity ranging from 36.5 % to 63.8 %. No symptoms of Banana Bunchy Top Virus (BBTV) or Fusarium wilt TR4 were observed. Presence of *Pseudocercospora fijiensis* was detected at Mare aux Goyaves and Senneville. Moreover, mixed phytoplasma infection were confirmed on symptomatic papaya leaf samples (leaf distortions and yellowing) collected from papaya varieties Neo (Fig. 91) and Jhurry.



Fig. 91: Leaf distortion and mosaics on papaya variety Neo at Réduit

The fungal pathogen *Stemphylium vesicarium* was identified as the causal agent of stemphylium leaf blight in onions (Fig. 92a, b). The disease was present throughout onion growing areas at varying incidence and severity. Culture studies of fungal isolates along with morphological and molecular characterization revealed significant variations between isolates of the fungus. The seed-borne nature of the pathogen was investigated. Imported treated onion varieties had better germination rate but were infected with a range of fungi. *Stemphylium* spp. was detected in several seed lots.



Fig. 92a: Stemphylium infected onion field and plant

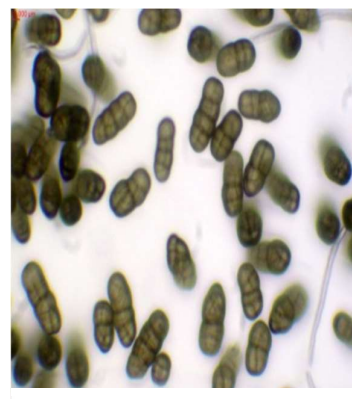


Fig. 92b: Stemphylium spore under microscope

Powdery mildew (*Oidiopsis* sp.) was observed with high incidence (100 %) and severity on tomato. Alternaria and stemphylium leaf spots with high incidences (> 50 %) and severity were also recorded. Pith necrosis (*Pseudomonas corrugate*) incidence varied between 25 % and 40 % and those of virus and phytoplasma infection varied between 25 % and 40 %.

On macadamia, *Colletotrichum* sp. had a mean incidence of up to 75 %, followed by *Phomopsis* (17.5 %) and *Pestalotiopsis* spp. (12 %). *Botryosphaeria* sp. (5 %) was identified as the causal pathogen for shoot tip die back at nursery stage.

Fungal pathogens *Colletotrichum*, *Cladosporium*, *Diplodia* and *Thielaviopsis* spp. were observed on leaves and pods of cocoa. Variety Criollo was found to be susceptible to anthracnose disease.

## Product testing

Fungicide Consentio 450 SC (Propamocarb hydrochloride 375 g/L + Fenamidone 75 g/L) at 2 mL/L of water alternated with recommended fungicides was effective against late blight disease of tomato. Its effect against early blight disease will be evaluated in 2023.

The biopesticide Milstop SP (Potassium bicarbonate) was evaluated against powdery mildew disease of lettuce. No incidence of powdery mildew was observed in the different treatments after the first two applications. Trial will be repeated in 2023 for confirmation of results.

In strawberry, application of bio-fungicide Romeo (*Saccharomyces cerevisiae*) @ 0.75 kg/ha led to a lower incidence of botrytis fruit rot disease (8.7 %) compared to that of untreated control (24 %). However, no conclusive result could be drawn from the experiment since the mean disease severity rating of untreated control was found to be less than one.

Alternating Bioproducts Biotilis (*Bacillus subtilis*) @ 10 g/L of water and Problad (BLAD which degrades fungal chitin) @ 10 mL/L at weekly interval or applying a mixture of Problad @ 10 g/L and Biotilis 10 mL/L of water at 15 days interval were equally efficient in suppressing powdery mildew in cucurbits. Treatments kept disease severity low from first symptom appearance up to harvest stages.

The disinfectant Anolyte, reported to have bactericidal, viricidal, fungicidal and algicidal properties, was tested against fungal diseases in pomegranate, guava and papaya. Anolyte water at 300 ppm followed by PF Control 83 at 1.3 mL/L water or Problad at 10 mL/L water were effective in controlling fungal plant pathogens in pomegranate. However, same was not effective in guava. Anolyte water @ 200 ppm together with PF Control 83 @ 1.3 mL/L water gave better control fungal diseases of papaya, with a mean disease reduction of 42.5 % compared to Anolyte water @ 200ppm together with Problad @10 mL/ L water (33.3 %) and Anolyte water @ 200 ppm with Milstop @ 4 g/L water (21.7 %).

A mixture of Ecosom-TV (*Trichoderma viride*) @ 4 g/L water together with Companion (*Bacillus subtilis* GB 03) @ 4 mL/L water was found effective against anthracnose disease on cocoa.

## Screening of potato against viruses

Under the National Seed Potato Programme, some 270 tonnes of seed potato were screened against Potato Virus X (PVX), Potato Virus Y (PVY) and Potato Leaf Roll Virus (PLRV). Only PVY was detected. For the active growth inspection carried out on about 54.2 ha of potato seed fields, same as potato seeds, only PVY was detected.

## Pest management

### Management of diamondback moth

An IPM package for the management of Diamond Back Moth (DBM) consisting of scouting, establishment of flowering plants (marigold and Indian mustard) along field borders as a source of feed to adult parasitoids, use of augmentorium as a tool for sanitation and multiplication of DBM's parasitoid, *Cotesia vestalis*, mass trapping using pheromone baited traps @ 152 traps/ ha and use of IPM compatible insecticides was evaluated in a cabbage plot (200 m<sup>2</sup>) on station at Wooton. The control plot (200 m<sup>2</sup>) consisted only of cabbage plants and application of insecticides on a calendar basis.

Three applications were made in the IPM plot (Fig. 93) compared to ten in the control plot. Adults and

cocoons of the parasitoid, *C. vestalis* were recorded only in the IPM plot. Furthermore, presence of mummified aphids, syrphids and bees were also observed in the IPM plot. Yield and quality of cabbage were similar in both treatment plots. Results indicated that flowering plants and trapping of DBM adults contributed in suppressing DBM in the IPM plots and that of flowering plants were effective in attracting the parasitoid of DBM, *C. vestalis*, as well as other species of beneficial insects.

Similar results were observed in previous trials set on station at Richelieu and on farm at La Laura in 2020 to 2021. Conducted tours (Fig. 94) were carried to the IPM plot to demonstrate the effectiveness of IPM to some 30 Extension staff and 50 farmers. The package was also evaluated in a farmer's cabbage field at Bigara and compared to a neighbouring cabbage field with farmer's practice. The number of insecticide application for control of DBM in IPM and field with farmer's practice were 4 and 12 respectively. Negligible damage of DBM was recorded in both IPM and Farmer's practice field. A video clip on the success story of the IPM package was made and shared among Extension Officers and farmers.



Fig. 93: IPM plot at Wooton



Fig. 94: Farmers visit to IPM plot

### Management of *Tuta absoluta*

Surveys were carried out island wide to detect the presence of *Tuta absoluta* larvae and damage symptoms on tomato, eggplant, and chilli and alternate hosts. *Tuta absoluta* was present in 28.6 % of open cultivated tomato fields and 29.2 % of the protected tomato cultivations surveyed. The average number of mines in the protected cultures ranged from 0 to 2.8 mines/ 3 upper leaves/ plant with the highest population of *T. absoluta* adults in greenhouses at Clemencia. The pest was also recorded in low numbers on wild tomato and in potato fields located in vicinity of infested greenhouses under tomato cultivation.

The efficacy of a new pheromone lure, Tu-Tom Septa, from Green Revolution for attracting *T. absoluta* male adults in Russell IPM sticky traps was studied in three tomato greenhouses. It was compared to the currently recommended lures namely Tuta Pro Caps® syringe from Life Sciences and Last Call gel from Insect Science. Significantly higher number of *T. absoluta* adults were captured in traps with Tu-Tom septa (6.17 moths/ trap/ week) compared to Tuta Pro Caps® syringe (1.84 moths/trap/week) and Last Call gel (0.89 moths/trap/week). Result indicates that Tu-Tom was the most effective pheromone in luring *T. absoluta* adults and can therefore be recommended for monitoring/mass trapping of *T. absoluta*.

The larval parasitoids *Diglyphus* sp., *Campoletis chloridae* and the predatory bug, *Nesidiocoris* sp., were recovered from exposed laboratory reared *T. absoluta* larvae on tomato plant parts. Moreover, the egg parasitoid, *Trichogramma chilonis* was recovered from *T. absoluta* eggs collected on tomato plants at Vale.

### Management of thrips

The seasonal abundance of thrips on the tomato crop and its natural enemies was studied. During the period of study, in the early stage of the crop cycle, the number of thrips recorded in the plot was quite low (< 5 per compound leaf) due to the prevailing rainy weather. During the vegetative stage of the tomato crop, thrips started colonizing the plantation and it gradually increased in numbers as the crop developed its canopy and reached a peak when the crop was at its bearing stage. The mean number of thrips/ compound leaf/ week ranged from 7 (week 3) to 37 (week 6). Natural enemies were detected at week 6 and coincided with peak occurrence of thrips and consisted of spiders, predatory mites, syrphids (Fig. 95), anthocorids and mirids. Furthermore, mymarid adults suspected to be larval parasitoids of thrips were recorded on leaves infested with thrips, however their being indeed parasitoid of the tomato thrips could not be confirmed in this study. A decrease in thrips numbers was observed as from week 7, presumably due to the presence of natural enemies that contributed in suppressing the thrips population on the tomato crop.



Fig.95: Syrphid larva predating on thrips

A trial was undertaken on station at Richelieu to study the effect of maize plants and a strip of blue sticky trap (8 m x 25 cm) as barriers in newly established onion plots and compared to a control plot (without maize plants and sticky trap) on the population level of thrips in onion plants. The new onion plots were adjacent to an existing onion plot. In the initial three weeks following trial initiation, thrips counts averaged over 50 per plant in the old onion plot, 6.3 per plant in maize-bordered onion plot, 7.7 in blue sticky trap-bordered plot and over 30 in the control plot. After two months, the average thrips counts increased to 17.5 in the maize-bordered onion plot, 16.8 in blue sticky trap-bordered plot and remained over 30 in the control plots. The number of thrips in the two treatment plots were significantly lower compared to the control plot suggesting that barriers such as maize plants and blue sticky traps are both effective in preventing migration of thrips from old plots to new onion plots.

### Evaluation of varieties/clones for susceptibility to leafminers

A pot trial was initiated to study the susceptibility of potato varieties Vigora, Spunta, Safari, Clone 5, Clone 6, Clone 9 and Clone 27 to leafminers in greenhouse. Potato leaves infested with the leafminer, *L. huidobrensis* were introduced in the greenhouse when the plants were at vegetative stage. After two months, mines were observed in all varieties with significantly higher number of mines per plant recorded on Clone 6 (6) followed by Clone 9 (4.3). In contrast, significantly lower number of mines per plant were recorded in variety Vigora (1.7) and Safari (1.7) followed by Everest (2.0), Spunta (2.7) and Clone 27 (2.7). In Clone 5 an average of 3 mines per plant was recorded.

Similarly, a potted trial was initiated to study the susceptibility of bean varieties FBS 1, FBS2, Long Tom and Ferrina to leafminers (*L. trifolii* and *L. huidobrensis*) in greenhouse. There was no significant difference in susceptibility of the four bean varieties to both species of leafminers.

### Occurrence of lady beetles on selected plants

A study on the occurrence and diversity of lady beetles was undertaken on acacia (*Leucaena leucocephala*), atemoya (*Annona atemoya*), chilli (*Capsicum annuum*), Christophine (*Sechium edule*), citrus (*Citrus limon*), duranta (*Duranta erecta*), gros feuille (*Listea monopelata*), pomegranate (*Punica granatum*), ixora (*Ixora coccinea*), litchi (*Litchi chinensis*), maize (*Zea mays*), mulberry (*Morus alba* v. *indica*), palm (*Dictyosperma album*), pumpkin (*Cucurbita pepo*), pine (*Pinus* sp.) and wild tobacco (*Solanum auriculatum*). A total of 228 lady beetles were recovered consisting of 13 species of which two were unidentified. Among the species recovered (*Cheilomenes* sp., *Chilochorus* sp., *Exochomus* sp., *Platynaspis* sp., *Rodolia* sp., *Stethorus* sp., *Scymnus* sp., *Exochomus* sp., *Nephaspis* sp., *Dysis* sp., *Clithrostetus* sp., and 2 unidentified ones), *Exochomus* sp. (113) was the most common one.

Gros feuille harboured highest number of lady beetles (91) followed palm (40) and ixora (32). On the other hand, palm (7) harboured highest diversity of ladybeetles compared to gros feuille (5) and ixora (5). Results suggest that gros feuille could be used as service crop to attract lady beetles in cultivated crops.

### Pest Surveillance

Pests were monitored on station at Réduit and Wooton on six berry species (Blueberry, youngberry, red raspberry, cape gooseberry, goji berry and blackberry). Red spider mites were recorded on all species while *C. janthina* was recorded on red raspberry and youngberry at both sites. The mealy bug, *Phenacoccus solenopsis* was recorded on cape gooseberry at Réduit. On cocoa, negligible damage by *Cratopus* sp. (2 % to 5 %) was present on leaves at Pamplémousses and Réduit. The mealy bug, *Planococcus citri* and the Oleander scale, *Aspidiotus destructor* were recorded on macadamia at Richelieu. The soft scale, *Icerya seychellarum* was recorded at Richelieu and Clavet and was naturally kept under control by the predator *Rodolia chermesina*. At Réduit, scale insects, leaf tier and *Cratopus* sp. were recorded. The green scale, *Coccus viridis* was recorded on leaves, branches and fruit panicles of coffee at Réduit, Wooton and Pamplémousses. Aphids and leafminers were detected on quinoa on station at Réduit, Wooton and Richelieu. At panicle stage, leaves were damaged by *Cratopus* spp. Predators (coccinellids, syrphids and chrysopids) of aphids were also recorded. Birds (Cateau Verts) were observed feeding on quinoa resulting into 70 % damage to panicles.

### Product testing

The efficacy of Celite 60 (Diatomaceous earth) @ 60 g/L with Codacide Oil @ 2 mL/L and Terra Neem Biostar (Karnaja Oil, Neem Oil, Mahua Oil, Chilli and Eucalyptus extract) @ 5 mL/L was tested against *Plutella xylostella* larvae on cabbage leaves in the laboratory. Tracer (Spinosad) @ 0.25 ml/L of water served as standard insecticide and water as control. The percentage (corrected) mortality in larvae after one week on leaves treated with Celite 60 and Terra Neem Biostar were 22 % and 40 % compared to those treated with Tracer (100 %). It can be concluded that both Celite 60 and Terra Neem Biostar were not effective against *P. xylostella* larvae.

The efficacy of Terra Neem Biostar at 5 mL/L, Neem Oil A<sup>+</sup> (Azadirachtin) at 3 mL/L, Vermiwash (liquid extract produced from vermicompost) at 1 mL/L and Seaweeds with Neem Oil at 0.6 mL/L were tested against the soft scale, *I. seychellarum* on litchi leaves in the laboratory. Mospilan 20 SP (acetamiprid) at a rate of 0.25 g/L was used as standard insecticide and water as control. The percentage reduction of *I. seychellarum* per twig in Terra Neem Biostar, Neem Oil A<sup>+</sup>, Vermiwash, Seaweeds with Neem Oil, and Mospilan 20 SP, five days after treatment was 70 %, 64 %, 23 %, 58 % and 79 % respectively. Results

indicate that Terra Neem Biostar and Neem Oil A<sup>+</sup> gave satisfactory control of the soft scale, *Icerya seychellarum*. Seaweeds with Neem oil had suppressive effect on the soft scale while Vermiwash wash ineffective.

The efficacy of Fenomite (Fenpyroximate) @ 1 mL/L, Terra Neem Biostar @ 5 mL/L, Maugreen (black soap) @ 20 mL/L and Greenmix (*Urtica* spp.) @ 6 mL/L was tested against red spider mites on bean leaves in the laboratory. Vertimec @ 0.5 mL/L (abamectin) was used as standard pesticide and water as control. The percentage reduction in mite population one day after treatment in Fenomite, Greenmix, Maugreen, Terra Neem Biostar and Vertimec was 100, 100, 98, 98 and 100 respectively. All products were effective for the control of red spider mites.

The efficacy of Wetcit Duo (orange oil) @ 2 mL/L and Movento (spirotetramat) @1 mL/L was evaluated against tomato russet mites on tomato leaf disc in the laboratory. Vertimec (abamectin) @ 0.5 mL/L was used as standard pesticide and water as control. The percentage reduction in mite population two days after treatment in Control, Movento, Wetcit Duo and Vertimec was 0%, 96%, 6% and 99% respectively. It can be concluded that Movento is effective against tomato russet mites while Wetcit Duo was ineffective.

The efficacy of Terra Neem Biostar @ 5 mL/L, Neem oil A<sup>+</sup> @ 3 mL/L, Vermiwash @ 1 mL/L, Seaweed + Neem oil @ 0.6 mL/L and Tinto @ 3 mL/L was tested against thrips, *T. tabaci* in onion. Tracer 480 SC (Spinosad) @ 0.25 g/L was used as standard insecticide and water as Control. The Percentage reduction in number of thrips seven days after treatment in Terra Neem Biostar, Neem oil A<sup>+</sup>, Vermiwash, Seaweed + Neem oil, Tinto, Tracer 480 SC was 24.7, 13.1, 20, 25.6, 20.5 and 42.9 respectively. All products tested were ineffective in controlling *T. tabaci*.

### Pest and disease diagnosis

Disease and pest diagnosis were carried out on 650 and 96 samples of plants respectively and appropriate control measures were recommended.

The loop-mediated isothermal amplification (LAMP) technology was used for detection of major diseases of potato and bean. Research Scientists of the plant pathology division were trained on the use of LAMP in detection of plant pathogens.

### New pest/disease detected

The rusty plum aphid, *Hysteroneura setariae* Thomas was detected on stargrass, *Cynodon plectostachyus* at Réduit.

### Pest and Disease alert

- Powdery Mildew on vegetable crops
- Anthracnose on chilli, sweet and cucurbits
- Late Blight on tomato and potato
- Downy mildew in onion

### Insect as feed for livestock

#### Black Soldier Fly

The Black Soldier Fly (BSF) *Hermetia illucens*, a potential alternative feed in poultry and fish production, was successfully reared in the laboratory at 29 °C and RH 80 %. Adult BSF (Fig. 96a) lived on an average of 12 to 13 days. The duration of the larval stage lasted  $38.0 \pm 2.3$  days. Eggs (Fig. 96b) were laid in masses of about 400 to 600 eggs. Eggs hatched in  $3.9 \pm 0.3$  days. The time taken for the adults to emerge from pupae was  $12.6 \pm 0.6$  days. The life cycle from egg to adult was completed in about 56 days. Sex ratio, male : female was 1.2 : 1. The crude protein content of powdered dehydrated of 2 to 3 weeks larvae (Fig. 96c) was found to be 41.3 % which is comparable to that reported for soybean meal (41 % to 49 %). Compost derived from decomposed waste by BSF contained 2.98 % Nitrogen.



Fig. 96a: Adult BSF



Fig. 96b: Eggs of BSF



Fig. 96c: Larvae of BSF

## Biofarming Unit

### Introduction

From July 2022 to June 2023, activities of the Biofarming Unit focused on promoting organic farming and fostering the empowerment of local communities through a range of projects, training initiatives, development of informative resources and strategic collaborations.

### Organic Household Gardening Project

This project operates at locality level, focusing on training participants within the locality in the practices of backyard organic gardening and the advantages of organic farming, in view of promoting consumption of safe food. Upon the successful conclusion of the project, the participants were awarded a start-up kit (Fig. 97), empowering them to establish their own gardens. From July 2022 to June 2023, six trainings and distribution of kits were carried out for a total of 229 beneficiaries in the region of Rose Belle, Baie du Tombeau, Grand Sables, Surinam and L'Escalier.



Fig. 97: Beneficiary of Household garden using start-up kit

### Compost Unit

The Biofarming Unit has developed an innovative composting model in collaboration with the Engineering Division. This model features six compartments and has been successfully implemented at Flacq Model Farm where it is fully operational with a potential production of one ton of compost every two weeks. A second compost unit is currently under construction at Rivière des Anguilles Model Farm. This new unit is similar to that of Flacq Model Farm but incorporates a vermicompost component. The vermicompost produced will be utilised directly or transformed into compost tea, suitable for foliar application or fertigation. Both structures will serve as demonstration models for local farmers. One farmer at Mare Longue has already adopted the model. Furthermore, the Ministry of Environment adopted the same

model to establish a similar setup at Paroisse de St Jean Organic Community Garden. The model has been improved by introducing mechanization to streamline the composting process. This improved design will be utilised for composting green wastes at Gymkhana.

### FAREI Ecocert Certified Farms

The FAREI manages three farms that hold certifications under the European Organic Standards. These farms undergo an annual audit conducted by Ecocert Madagascar, a certification body for organic agriculture. The Biofarming Unit plays a pivotal role as the central liaison with Ecocert, facilitating all audit exercises and exchanging vital information between the organisation and Ecocert.

### Organic Community Garden

The Organic Community Garden initiative began after the training of participants at Pavillon, Quatre Bornes, where the Municipality of Quatre Bornes provided a plot of land for establishment of an organic garden to some volunteers. Since then, the FAREI, through the Biofarming Unit has actively supported and encouraged the development of community gardens. Presently, three community gardens are fully operational at Pavillion, St Jean (Fig. 98) and Ferney offering a space for sustainable and organic cultivation. In line with the growing interest and success of these gardens, the Biofarming Unit is currently in the process of establishing three more community gardens at Cascavelle, Cite La Cure and St Croix, further expanding the reach and impact of the Organic Community Garden initiative.



Fig. 98: Volunteers working in St Jean Community Garden

### Organic Farms

The Biofarming Unit also gave support and carried out regular visits to some 130 organic farms including those from the Britannia Organic Zone, the Ferney AgriHub (Fig. 99) and Permaculture farms found at Bambous Virieux, Deux Bras and L'Espérance Quartier Militaire.



Fig. 99: Organic Garden at Ferney

### Movies

An informative movie showcasing the benefits of producing and consuming organic products (Benefice produire et consomme bio) is being finalized. The Biofarming Unit also contributed to a special gardening clip in partnership with the Early Childhood Care and Education Authority.

### Meetings

Other Activities of the BFU includes: 5 Group meetings; 7 Demonstrations; 5 Conducted tours; and 8 Talks

### MQA Approved trainings

- Training on guidelines to organic crop production was carried out with a total of 111 participants
- Training in 'Subhash Palekar Natural Farming' (SPNF) with a practical session on the preparation of Jeewamitram was carried out engaging a total of 20 participants from NCC. Training in Agroecology namely "Definir son systeme Agricole et Design de la Ferme" was carried out with 18 participants.

## Livestock Research Department

### Introduction

From July 2022 to June 2023 activities of the Crop Research Department focused on the development of new crop varieties through breeding, the introduction and evaluation of new improved germplasm, crop productivity and quality improvement, new crop production techniques, crop protection and the development of sustainable and climate-smart packages for crop production.

### Animal Nutrition and Management

#### Evaluation of sugar cane trash for fattening of cattle weaners

The effect of sugar cane trash-based ration was tested on the performance of weaner cattle. Fourteen cattle weaners comprising eight males and six females with an average weight of 123 kg were allocated to a control and treatment group. The control group was fed a diet of *ad lib* chipped green forage comprising mainly sugar cane tops and chipped Guatemala supplemented with 2 kg of dairy trial. The treatment group received 4 kg of the sugar cane trash-based ration. The sugar cane trash ration comprised 38% cane trash, 35% concentrate (dairy trial), 25% molasses and 2% urea to meet the needs of ruminants during growth. An adaptation period of one month was observed before start of the study.

The animals were switched over after 75 days with a transition period of ten days between the two phases whereby animals in control were shifted to the treatment group and vice versa for another period of 76 days. The parameters monitored were: daily feed intake, live weight and proximate analysis.

Results showed that in the first phase the average daily gain (ADG) of males and females in the treatment group were  $470 \pm 89$  and  $531 \pm 159$  respectively compared to  $576 \pm 121$  and  $526 \pm 264$  in the control group. Following the switch over the ADG of males and females in the treatment group were  $610 \pm 74$  and  $740 \pm 133$  respectively compared to  $703 \pm 198$  and  $871 \pm 130$  in the control group. There were no significant differences (5%), between the treatment and control groups in both males and females for both the live weight and cumulative ADG.

Similarly, no significant differences at 5% were observed between the treatment and control groups in both males and females for the daily Dry Matter Intake.

It was concluded that irrespective of the diet, all animals achieved a cumulative ADG above 500g which is the minimum benchmark value for this category of animals at CLRS. This indicates that the sugar cane-based ration was able to meet the nutritional requirements of the weaner cattle as the live weight gain was similar compared to animals given fresh forage along with concentrate.

#### Effect of replacing sweet potato vines by *Setaria* grass (*Setaria sphacelata*) in the diet of growing rabbits

In its endeavour to promote rabbit (*Fig. 100*) production by the smallholder farmers as an alternative source of animal protein and for quick benefits, an observational trial was carried out to compare practices at CLRS comprising sweet potato vines and that at farmer's place comprising fodder Graminae supplemented with concentrate. Rabbit in the control group were fed potato vines (*Ipomea batatas*, 15.5% CP) and those in the treatment group were fed *Setaria* (*Setaria sphacelata*, 10.1% CP). Both received concentrate at the rate of 60 g/d for the first 30 days and 120 g/d above 30 days and water *ad lib*. The trial lasted 84 days.

Results showed an average intake of  $484.5 \pm 20$  g/d and  $376 \pm 10.3$  for animal



Fig. 100: Feeding of rabbits

in the control group and treatment group respectively.

Animals in the control group and the treatment group had ADGs of  $24 \pm 3$  g/d and  $21 \pm 8$  g/d and the final liveweights were  $2.92 \pm 0.21$  and  $2.76 \pm 0.06$  respectively. There was no significant difference ( $p > 0.05$ ) in the final weight and ADG for animals in treatment and control group. It was observed that the DMI of sweet potato vines and Setaria grass was  $118 \pm 28$  and  $110 \pm 21$  g/d for animals in control and treatment group respectively. There was no significant difference ( $p > 0.05$ ) between the two groups. Further studies will be carried out to confirm results.

### Comparison of 2 different milk replacers on the growth of calves from birth to weaning at CLRS

Fifteen calves were selected based on their sex, breed and weights and assigned to a feeding regime using a stratified randomized design. The calves were given 6 litres of colostrum for the first three days following birth, after which they were fed milk replacer. Calves in the control group were fed 'Cremoelevage' which is the normal feeding regime at CLRS while those in the treatment group were fed 'Newean Pro'. Fresh fodder was given *ad-lib* as from one month of age.

Preliminary findings show that Average Daily Gain (ADG) for calves fed on Cremoelevage and Newean Pro was  $539 \pm 71$  and  $442 \pm 78$  g/d respectively. Animals in the control group on Cremoelevage have a significantly better pre-weaning average daily gain ( $p < 0.05$ ) than those fed the new milk replacer Newean Pro. This could be due to the lower nutritive value of Newean Pro which has a lower fat content (17.5%) than Cremoelevage (19%).

The cost per kg liveweight gain from birth to weaning is Rs 173 and Rs 225 for Cremoelevage and Newean Pro respectively.

### Effect of substituting concentrate by wheat bran on performance of growing cattle

The high price of concentrate impacts on the cost of production of animals. As an alternative and promoting use of locally available material to replace partly or completely the concentrate in the diet of ruminant's the use of wheat bran is being investigated. Wheat bran, a by-product of the dry milling of common wheat (*Triticum aestivum* L.) into flour and is one of the major agro-industrial by-products used in animal feeding. Wheat bran is suitable for livestock feeding and very palatable to most classes of animals. The objective of the study was to evaluate the effect of substituting concentrate by wheat bran in the diet of weaners cattle. A group of 16 cross bred (Creole x Freisian) weaners cattle weighing on average  $123 \pm 12$  Kg were selected and separated randomly in 4 groups according to sex and weights in a completely randomized design each animal representing a block. 8 animals were in control group receiving fodder and dairy trial, while 8 animals were in treatment, receiving fodder and wheat bran. The experiment lasted for 90 days. At the start of the experiment the animals in the treatment group weighed on average  $108 \pm 13$  kg compared to the control group which weighed on average  $106 \pm 13$  kg. At the end of the experiment the animals in the treatment group weighed on average  $127 \pm 18$  kg compared to the control group which weighed on average  $140 \pm 28$  kg, there was no significant difference ( $P > 0.05$ ) between the treatment groups. The average daily gain (ADG) for the control group of animals in the experiment was  $347 \pm 150$  g/day and was significantly different ( $P < 0.05$ ) compared to the treatment group which was  $144 \pm 88$  g/day. From the results obtained wheat bran can substitute concentrate to feed in growing animals as a supplement.

### Effect of replacement of concentrate by *Calliandra calothyrsus* on performance of growing rabbits

Rabbits contribute to improved nutrition and household economies, as they are both a source of animal protein, as well as providing extra income through the sale of animals. Rabbits can be given a wide variety of feeds, such as of grasses, leaves from trees, fruits, roots or by-products from the kitchen and crops. However, locally rabbits are fed with sweet potato vines forages and supplemented with concentrates.

The concentrates are bought and have an impact on cost of production. Calliandra is a relatively new feed in Mauritius, and there have been few studies carried out on its nutritive value. Calliandra has a high biomass yield (55-60 tonnes/ha) and the leaves have high protein content (20% in DM) and can be used in cut and carry systems and as living fences. The objective of the experiment was to evaluate the effect of replacement of concentrate by calliandra in growing rabbits. A group of 8 cross bred rabbits weighing on average  $849 \pm 115$  g was selected and separated randomly in 2 groups in a completely randomized design each animal representing a block. 4 animals were allocated to control group with normal feeding receiving forages and concentrates, 4 animals were allocated in treatment group, receiving forages and Calliandra. At the start of the experiment rabbits in the control group weighed on average  $796 \pm 55$  g compared to the treatment group which weighed on average  $903 \pm 142$  g. At the end of the experiment the animals in the control group weighed on average  $2027 \pm 103$  g compared to the treatment group which weighed on average  $1502 \pm 38$ g, there was significant difference ( $P < 0.05$ ) between the treatment groups. The average daily gain (ADG) for the control group of animals was  $16 \pm 1$  g/day and was significantly different ( $P < 0.05$ ) compared to the treatment group which was  $27 \pm 2$ g/day. It can be concluded that calliandra alone cannot replace concentrate in the diet of rabbits.

## Farm Animal Genetic Resources

### Conservation and utilization of farm animal genetic resources

The conservation and utilisation project for the Creole cattle is ongoing. The *in-situ* component which was initiated under an AU-IBAR funded project with the setting up of four nucleus units has been expanded with the establishment of a fifth unit at Anse Jonchée. Three calves (2M, 1 F) were born with a calving interval of  $16.0 \pm 3.9$  months. One heifer progeny gave birth to a female calf at an age of 32.2 months. The *ex-situ* nucleus for the Creole cattle is being consolidated and comprised of a total of 42 heads, of which, 39 heads were at CLRS and 3 at Casela World Adventures Ltd (Fig. 101). At CLRS, 8 calving (6 males and 2 females) were obtained. The average birth weight was  $31.7 \pm 3.5$  kg and  $28.7 \pm 3.2$  kg for the males and females respectively. The weaning weights were  $68.0 \pm 10.6$  kg and  $55.5 \pm 3.5$  kg for the males and females respectively and ADG were  $473 \pm 77$ g/d and  $376 \pm 32$  g/d for the males and females' respectively. Two heifers calved for the first time at an age at first calving of 35.5 months. One adult bull has been sold for breeding purposes to consolidate an *in-situ* nucleus farm. Data collection on the productive and reproductive parameters is on-going in view of establishing the profile of the Creole breed

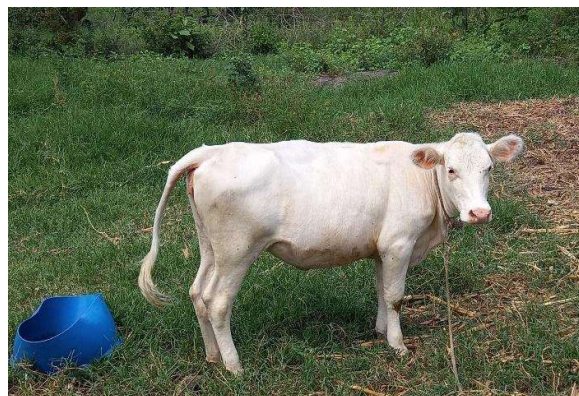


Fig 101: Creole cattle at Casela

### Evaluation of the performance of progenies of imported South African dairy animals

Two consignments of 57 and 80 heifers were imported from South Africa in 15 October 2014 and 25 March 2015 respectively. Forty-six animals were transferred to CLRS and their productive and reproductive performances were established. The average milk production for the imported animals was  $11.7 \pm 4.1$  l/day over the first 305 days. The age at first calving was  $26.9 \pm 4.8$  months. The performance of the progenies is presently being followed and the average milk production for the F1 progenies was  $13.5 \pm 1.8$  l/day over the first 305 days. The age at first calving was  $34.5 \pm 3.7$  months.

### Performance of Local, Boer and crossbred goats in Mauritius

The local goat breed is regarded as less productive and therefore subjected to replacement and cross-breeding with imported breeds like Boer. A study is being conducted at Curepipe Livestock Research Station aimed in determining the productive and reproductive performance of cross bred progenies to the local and Boer goats. 27 adult goats (16 Local, 11 Boer) have been randomly selected and assigned in three groups for breeding (Pure line breeding of Local goats, pure line breeding of Boer goats and Cross breeding of Local with Boer). A total of 14 kiddings were recorded pooled for the 3 groups giving 21 kids (12 males, 9 females). The pre-weaning performance of each group was determined through the Average daily Gain (ADG). A pre-weaning ADG of  $94.6 \pm 41.5g$ ,  $71.5 \pm 41.2g$  and  $106.8 \pm 29.1g$  was recorded for Local group, Boer group, and Crossbred group respectively. From birth to weaning, crossbred progenies have better growth rate compared to Local and Boer progenies.

### Phenotypic characterisation Local, Boer and crossbred goats in Mauritius

Records on morphological characteristics have been taken on all the adult goats randomly selected for the study. Traits scored were colour of coat, hair length and type, absence or presence of toggles, presence or absence of beards, face profile, presence or absence of horns, horn shape and orientation, ears orientation. Quantitative traits such as body length, chest girth, and ear length, height at withers, horn length and circumference were also recorded. Based on the data collected, adult Local and Boer goats in the study can be categorized as small to medium in size with long and straight hair, straight facial profile and long ears being predominantly pendulous. Goats in the study had long horns curved backwards. Only 18.8% and 27.3% of the animals from the Local and Boer breeds respectively had beards. None of the goats in the study had wattles/toggles. Local goats (Fig. 102) have variable coat colour compared to Boer goats where the coat colour is uniformly white.



Fig. 102: Local goats

### Promotion of local poultry species

To promote small livestock production as a climate smart adaptation measure and to encourage production of local genetic resources, breeding units 10 heads of local chicken (Fig. 103), 4 heads local turkey and 14 heads quails were set up at Plaisance Model Farm. The objectives are to collect baseline data and eventually produce breeding stocks for farmers involved in backyard livestock rearing. In addition, three electric incubators were purchased under DESIRA project and farmers were empowered in its use in order to improve hatchability of local poultry eggs as there are large variations in brooding. Data collected showed that the mean number of eggs laid by quails was  $0.9 \pm 0.2$  eggs per head per day and the hatchability of quail eggs was 85%. For local chicken, out of the 9 adult hens, the mean number of eggs laid was  $0.8 \pm 0.1$  eggs per head per day with clutch size of around 12 eggs. The hatchability was around 75%.



Fig. 103: Local chicken

## Fodder Research and Development

### Fodder germplasm collection

The fodder germplasm collection is being maintained to showcase the diversity of locally available species that can be used for livestock feeding, cover crops or integration in pasture and crop systems. The collection covers a total area of over a total size 1500 m<sup>2</sup> to potentially accommodate about 63 plots of size 4m x 4m (16m<sup>2</sup>) each. Fodder species that are being maintained include includes Gramineae, trees grown as shrubs and leguminous species that are either naturally growing, introduced or endemic species. Species are propagated for large scale cultivation and for dissemination to farmers to promote fodder production.

As at December 2022, the collection consisted of 32 species including 4 varieties of sugarcane and 5 varieties of sweet potato.

### Silvopastoral model farm to demonstrate innovative approach towards sustainable livestock production

A silvopastoral farm is being set up at Petit Merlo by conversion of an ex-tea fallow land to demonstrate sustainable practices in fodder and livestock production using an integration approach combining trees, pastures and livestock. The project started in August 2021 over an area of 4A77 and included the following activities: fencing of the premises, road access pathways and track; land clearing for establishment of a tree-crop-fodder system; planting of fodder trees, namely, *Flemingia macrophylla* and *Pterocarpus indicus* as live fences for setting up of paddocks; planting of leguminous fodder species such as *Arachis pintoii* and *Desmodium intortum* for upgrading existing naturally growing vegetation; vegetation biodiversity assessment; profiling of biomass and nutritive value of naturally growing fodder such as *Ischaemum aristatum* and *Paspalum conjugatum*; identification of naturally growing species having ethno-veterinary properties.

### Supporting the national fodder strategy through implementation of fodder research and development project

The project consists of the establishment of fodder plots to showcase large scale cultivation and setting up of infrastructure for conservation of fodder as hay and silage. The project started in June 2021 and is being implemented on Richelieu CRS and Curepipe LRS. Activities comprised of the following: consolidation of plant nursery for propagation of planting materials; construction of nursery for propagation of planting materials land preparation; installation of sprinkler irrigation system; purchase of tools and farm equipment; cultivation and harvest of fodder species, namely lucerne, Rhodes grass, maize and mucuna; rehabilitation of structure for drying fodder for hay making; preparation of hay bales; monitoring of nutritive value of fresh fodder and hay; monitoring of storage conditions for hay.

### Performance assessment of goats and sheep using the LASER2 software as a tool for livestock data management (DeSIRA)

The LASER2 software is being used as a management tool for monitoring herd dynamics, performance of animals and farm productivity for meat and milk production. Retrospective data on the CLRS and BMRS have been compiled and are being analysed using the LASER2 software. Expertise from CIRAD was solicited for the conduct of training by 2 CIRAD consultants from 3 to 11 November 2022 to apprise livestock researchers, livestock extension officers and farmers who will be involved in the project, of the functionalities of the software for herd management (Fig. 104 a,b,c) and performance assessment.



Fig. 104a: integrated system

Fig. 104b: Livestock data Management



Fig. 104c: Herd management

### Supporting Climate Change Adaptation for Communities Through Integrated Soil–Cropping–Livestock Production Systems (AFRA) (RAF5090)

The project started in March 2022 and is being implemented on 3 sites, namely Petit Merlo, Curepipe LRS and Richelieu CRS to promote the concept of climate smart practices through integrated tree-crop-livestock production systems for improving soil fertility, livestock and crop production using nuclear technologies. Land has been cleared at Petit Merlo for the setting up of a tree-crop-pasture system for the integration of small ruminants (sheep and goats) to showcase the concept and to assess the impacts on soil fertility and the ecosystem. Land has been cleared at Curepipe LRS for trials to demonstrate the integration of livestock in fodder production system by using manure as alternative to fertilizer for sustainable practices. Analysis of physico-chemical properties of soil was done on the three sites. A Regional (AFRA) Training Course on Integrated Cropping Livestock Production System with a Focus on Soil Fertility was held on 28 November to 9 December 2022, Nairobi, Kenya.

### Managing livestock waste

#### Performance of the Home Biogas (HBG 4.0) system in the local context

Home biogas 4.0 is a tubular model of biogas plant (Fig 106) and has a digester chamber of 2650 L plus a gas chamber of 1200 L. The length, width and height of home biogas are 3m, 1.50 m and 1.35 m, respectively. Outer bag material of home biogas is made of high-quality Polypropylene sheet laminated with Polyethylene for both UV protections. The biogas system is also equipped with an H<sub>2</sub>S gas filter and the gas outlet pipe is connected to a double-burner table top biogas stove. The microbial activation

process was done with 200 litres manure mixed with 200 litres water. Thereafter, 75 litres of slurry comprising 25 litres manure mixed with 50 litres of water were continually fed to the system daily. The gas tank expanded to full capacity after four weeks. The pH of the digestate was 6 -7. A maximum cooking time of 4 hours 45 minutes was obtained compared to 1 hour 15 minutes in the f-reinforced plastic portable biogas system. A consistent blue flame with no inconvenient smell was observed at the stove.



Fig. 106: Home Biogas

### Setting up of pilot Biogas Demonstration plant at CLRS

Under the SAGP, FAREI is implementing the project “*Setting up of pilot Biogas Demonstration plant for the production of electricity*” at Curepipe Livestock Research Station. This project was funded by UNEP. The project is being executed in collaboration by Ministry of Environment, Solid Waste Management and Climate Change and Ghana Cleaner National Production Centre (GNCPC). Since 20 March 2023, two Ghana technicians delegated by GNCPC are giving technical assistance for the setting up of a 15 m<sup>3</sup> digester capacity (Wasaza model) (fig 107). The civil works are expected to be completed by end of August 2023.



Fig. 107: Digestor (Wasaza model)

## Extension and Training

### Introduction

Extension is an informal educational process which provides advice and information to assist farmers in their decision-making process, while aiming at increasing their productivity and the efficiency of use of their resources. Our stakeholders include agro-processors, farmers in the crop and livestock sectors and also new promoters. Communicating efficiently through our extension activities is meant for better dissemination of information towards the farming community.

As per recent years, the major thrusts were to promote sustainable management such as good agricultural practices and adoption of climate-smart agricultural methods, with the objective of minimising the usage of chemical fertilisers and pesticides. The Extension Department also aimed at encouraging the use of biopesticides especially in green vegetables for producing safer food-crops. The adoption of agro-ecological approach remained crucial within an integrated approach towards a sustainable development. Ensuring minimal food-crop losses and safeguarding our productivity remained our primary objectives in order to ensure food security in Mauritius.

### Crop Extension

The latest survey revealed that an estimated acreage of 6,032 ha is under permanent garden for vegetable production involving 11,103 planters and 1,251 ha is dedicated for fruit production by 1,647 planters. There has been substantial development for cultivation in greenhouses/hydroponic units, where the total area has reached 802,805 m<sup>2</sup> (1,898 Units) involving 1,035 planters. In addition, cultivation in Net houses is being done over an area of 149,102 m<sup>2</sup> (175 units) by 104 planters. Production of ornamentals is carried out mainly inside protected structures on a total acreage of 378,633 m<sup>2</sup>, involving 73 planters.

The crop extension department organized 112 group meetings based on 11 themes for 1188 planters, 42 field demonstrations on eight themes attended by 195 planters and 60 conducted tours on seven themes with 515 planters. A total of 69 MQA approved training courses was completed and was attended by 946 trainees. To ensure sustainability for food-crop production these major themes were undertaken through our different extension activities. All the agricultural schemes under the purview of FAREI were processed by regional officers.

The Flacq and Rivière des Anguilles Model Farms served as models for organic food crop production.

The main themes for group activities (group meetings, demonstrations, conducted tours) are:

- Integrated pest management with emphasis on insect pests such as *Tuta absoluta*, diamond back moth and thrip, management of seed borne disease using HWT.
- Safe and judicious use of pesticides and alternatives to chemical pesticides such as bio pesticides, calibration of sprayers.
- Integrated approach to use of chemical fertiliser and alternatives to chemical fertiliser such as bio fertilisers.
- Common pests and diseases control in vegetables crop under hydroponics and open fields. Identification, symptoms and management.
- Technical Review Meeting on strategic crops: onion and potato cultivation.
- Sensitization on agricultural schemes.
- Promotion of new taro variety PNG 13, pulses- Ferrina, Bokla, mangetout and greenpeas and tomato variety Jupiter.

- Training on hydroponic cultivations. Emphasis on cultural practices in tomato, sweet pepper and lettuce under hydroponics.
- Soil fertility management with emphasis on use of Trichoderma, organic element and bio fertilisers.
- Mechanization opportunities through clustering.
- Orchard management – Litchi production and pruning.
- Improving tomato seedlings performance and resistance by using Mycorrhizal fungi (AMF) and Trichoderma spp in hydroponics.
- Manual weeder – sarclage for mechanical control of weeds
- Trellising in cucumber under hydroponics
- Control of Melon fly in creepers – Integrated approach
- Gravity fed fertigation system
- Aquaponics Project at Reduit CRS
- Mushroom production
- Whole sale market

#### On Farm Trials & other collaborative work with research

- Promotion of peas and snow peas
- Onion variety trials
- Potato variety trials

#### Surveys

The field staffs were involved in field concerning food crops statistics mainly and also in connection with cyclone and torrential rainfall, collection of market prices and field data for 'Mokaro' application regarding new plantations of potato, onion, carrot, tomato and sweet pepper.

Some 46,067 field visits were conducted for food crop surveys. Other than collection of food crops statistics, an additional of 490 field surveys was carried out on the following fields:

- i. State Land occupancy.
- ii. Pests and Diseases incidences.
- iii. Market price.
- iv. Impact of adverse climatic conditions.

Mauritius was affected by the cyclone Freddy during the month of February 2023. Surveys concerning damage assessment were carried out by the extension department and a rehabilitation scheme was implemented where seeds were distributed freely to 1384 planters across the island. Strategic crops such as carrots and onions were part of the distribution scheme. Only planters whose took advantage of the registration at the SFWF were compensated.

#### Other Services to Planters

Extension staff collected 77 soil samples and appropriate recommendations were provided after laboratory analysis. A total of 390 samples were forwarded to Entomology and Plant Pathology Laboratory for pest and diseases identifications. 215 seed vouchers were given to planters for seeds to be purchased

at the Agricultural Services. 470 planters were assisted in their request for loan facilities at the Development Bank of Mauritius (DBM). In view of minimizing use of chemicals in disease management, 102 hot water treatments of seeds were effected on model farms. A total of 81 applications for duty exemption were processed and 2755 vouchers were issued for paraquat permit.

### Successful adoption by planters

Following a conducted tour at Richelieu CRS to observed the tomato variety Jupiter, one planter established a plantation with 1 g of seeds provided by crop extension at Notre Dame. The plantation was under drip irrigation with natural mulching, showed good tolerance to pests and diseases. Harvest lasted more than 4 months, the fruits remained fairly uniform in size. The performance of Jupiter outperformed several hybrid varieties grown in adjacent plots.

The estimated average yield was 52 tonnes/hectare. Given that Jupiter is an open-pollinated variety, the planter extracted seeds for future plantations. The Extension Department will be sensitising tomato growers region-wise about the potential of the variety, with the objective of reaching an adoption rate of 25% by 2024.

### Management of *Tuta absoluta* using electric fly trap

*Tuta absoluta*, also known as the tomato leaf miner, has been in Mauritius for a few years. The pest has been particularly destructive in hydroponics greenhouses where they proliferated in masses because of the favourable conditions such as higher temperatures and abundant food (tomato crop). The Extension Department has been at the forefront in implementing sustainable and eco-friendly control strategies (Fig 108). One such initiative was initially studied and successfully implemented in the northern region which was later extended to other regions island wide.



Fig. 108: The blue electric traps installed in greenhouse (on the floor and suspended)

It is now common that hydroponics tomato growers, especially in the northern and eastern region where the pest has been particularly active, have adopted this technology. In addition to this strategy, as the extension staff observed that chemical insecticides were not achieving good control as such, where bio products such as neem were tested and was found to be effective.

Yellow sticky traps also resulted in considerable captures. The combined practice of sanitation, use of electric fly traps, yellow sticky traps and Neem oil have been adopted in the management *Tuta absoluta*. The control strategy has been disseminated during advisory visits and in group meetings with hydroponics tomato growers. Other than an eco-friendly approach, the strategy has also resulted in a reduction in the use of pesticides used in *Tuta* management by an estimated 40%. The adoption rate of the technology proposed was around 80% especially in the region of the North and Eastern region where the attack was more pronounced.

The pictures below show on the left, the devastating impact of *Tuta* (Fig 109) and on the right, the same plantation (same spot) (Fig 110) after one month with combined action of sanitation, use of fly traps, yellow sticky traps and Neem oil.



Fig. 109: Before demonstration (severe attack)  
recovered)



Fig. 110: After demonstration (partially  
recovered)

Integrated pest management with emphasis on insect pests such as diamondback moth

The Officers of the region of centre west carried out demonstration with the collaboration of the Entomology Division on the benefits of sustainable management practices on the control of *Plutella xylostella* Diamond Black Moth (DBM). This pest has been constantly a major threat to cabbage production in the region of La Marie, Plaine Sophie, Mare Longue, Closel, Bonnefin where the crop has been extensively cultivated over the years. It has negatively impacted on the quality and yield of crucifers. The main constraint has been during the summer season with limited control of the pests due to limited control by chemical pesticides.

The main objectives behind the demonstration were to:

- Showcase an alternative approach towards management of DBM while limiting the use of chemical pesticides.
- Adoption of a more sustainable method of cabbage production.
- Production of safe vegetable with zero tolerance for pesticide residues for protecting consumers health.

The demonstration was implemented as from February to May 2022 in the region of Bigara. Planting materials (marigold & cabbage seedlings), delta traps & augmentorium were provided by FAREI. Monitoring and field visits were jointly conducted by research and extension staff of the region. (Fig 111)



Fig. 111: Conducted tour by  
Extension Department



Fig. 112: Cabbage field with  
melliferous plants

Consequently, there was a considerable reduction in the frequency of pesticides application (from 12 to 4) while improving the quality of the produce. Two conducted tours were organised to showcase the success of the project. 12 planters attended the sensitisation and were willing to adopt the new practice for cultivation of cabbage. Accordingly, planters of the region started using bio pesticides as per FAREI's recommendations list. The adoption rate is actually 15% and the extension department is planning to increase the same up to 50% by the year 2024. A calendar of activities has been proposed.

### Promotion of new taro variety PNG 13



Fig. 114: Taro plants

Taro (*Colocasia esculenta* spp.) is an important crop grown mainly for its leaves and corms. It has both medicinal and nutritional benefits. Taro can be eaten in many forms; roasted, boiled, fried and baked.

### Demonstration at Clemencia

Mass propagation of variety PNG 13 was undertaken since April 2021 Island wide by the Crop Extension Division. To fast track and increase awareness on the new taro variety PNG 13, planting materials (Fig 115) were provided to existing and potential taro growers for cultivation. As regards to its promotion, some 12 planters from the Eastern region benefitted over 1000 units as planting materials covering a total acreage of 0.84 ha and 300 units distributed in the northern region. This initiative was highly appreciated by the farming community and continues to gain momentum among taro growers who have adopted the variety due to its good resistance to leaf blight disease and satisfactory performance under a range of diverse environments. Actually, there is an estimated 10 ha under this particular variety in the northern and eastern region mainly. The adoption rate has been up to 25% among the taro growers. As such, the Crop Extension division will continue with the mass propagation and the promotion of the PNG 13 variety to more farmers across the island



Fig. 115: Taro plantlets

### Improving tomato seedlings performance and resistance by using Mycorrhizal fungi (AMF) and *Trichoderma* spp in hydroponics.

Beneficial symbiotic microorganisms such as arbuscular mycorrhizal fungi (AMF) and *Trichoderma* spp. amongst others are increasingly being recognized as key elements of a more sustainable and eco-friendly approach to agricultural production. The use of these beneficial microorganisms in soilless cultivation may enhance plant performance and reduce biotic and abiotic stresses occurring during the production cycle with a significant decrease in synthetic chemical use.



Fig. :116 Inoculated seedlings

AMF and *Trichoderma* spp. are absent in soilless substrates and fungal pathogens such as *Rhizoctonia*, *Pythium* and *Sclerotinia* are the most common ones and at present chemical fungicides are being mainly employed in soilless cultivation for disease suppression.

The objectives of this demonstration were to provide a sustainable alternative to chemical approach for controlling plant pathogens and as well explore their biocontrol effects on tomato seedlings and eventually on plant growth.

A demonstration on tomato seedlings was carried out in May 2023 under soilless conditions over a total area of 1000 m<sup>2</sup> (320 m<sup>2</sup> each) at Camp Thorel using Premium VAM HD (Vesicular Arbuscular Mycorrhiza) and a biological fungicide Shield containing *Trichoderma harzianum* 2% A.S + *Bacillus subtilis*. Floradur substrate was thoroughly mixed with the VAM and Shield and inoculated for a few days prior seed sowing. Seeds of tomato (*Solanum lycopersicum* L.) varieties Star 9064, Star 9065 and Rouven were used for the demonstration. Drenching of coco coir was done using a biological fungicide BACTVIPE (*Pseudomonas fluorescens* 2% A.S) prior transplantation of seedlings.

Preliminary observations indicated:

- A germination rate of 100% was observed in all tomato seeds sown.
- Seedlings development: vigorous and robust root system.
- Rapid plant growth and development noted.
- Early flowering observed in all 3 tomato varieties. In variety Star 9065, flowering of plants started only after 3 weeks of transplantation demonstrating a shortening in vegetative phase to flowering phase as compared to other 2 varieties.
- No incidence of damping off has been recorded so far in the inoculated seedlings.

Monitoring of this demonstration is ongoing with regular observations of root and plant biomass development. Analysis of inoculated tomato root fragments will be undertaken to examine for root colonization by AMF and *Trichoderma* spp. So far, the hydroponic growers are satisfied with the plant growth and development recorded in their hydroponic crops.

This demonstration will be further disseminated among the hydroponic grower's community through advisory visits and group meetings. The actual adoption rate is 5% and the target is 25% by next year region wide.

#### Hydroponic production, aquaponics and sheltered production

Fluctuating climatic conditions and erratic weather patterns have significantly impacted on agricultural production, thereby resulting in failure to satisfy the growing food demand in the local market. This has led to an increased demand for alternative production methods namely hydroponics which is expected to drive revenue growth in the coming years. Incentives such as the Sheltered Farming Scheme have greatly contributed to the transition from conventional to soilless culture.

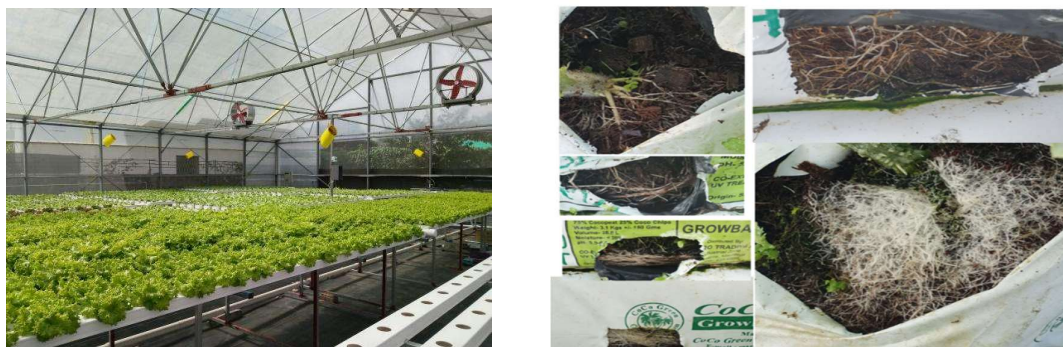


Fig. 117 conducted tours

20 Conducted tours/visits (Fig 117) were organised by the Extension Department for visiting hydroponic production region wide for promoting the same. Planters and newly interested promoters were sensitized on the sheltered farming schemes and the advantages associated with. This led to an increasing interest among the farming community, leading to an encouraging number of applications under this scheme.

The table below shows the hydroponic production nationwide for the financial year July 2022-June 2023 under the sheltered farming scheme.

|                                            |        |
|--------------------------------------------|--------|
| Total Number of applications (received)    | 149    |
| Total Number of applications (approved)    | 117    |
| Estimated New Total Area (m <sup>2</sup> ) | 46,800 |
| Estimated Additional Production (T)        | 1029   |



A sum of Rs 53,929,297 were disbursed under the sheltered farming scheme for a total of 117 beneficiaries covering an additional area of 46,800 m<sup>2</sup> under hydroponic culture. This accounted for an additional estimated production of 1029 Tonnes of vegetables.

### Other Activities

#### Survey on Vulnerability Assessment and Analysis of Small Farmers

The survey was carried out by the extension department on the vulnerability assessment of the small holder farmers to determine the socio-economic impact due to climate change. A total of 715 farmers was surveyed. A report has been produced based on the outcomes of the survey.

#### Survey on “Les semences dans la filière pomme de terre et de l’haricot”

The survey was carried out by the extension officer’s region wide. The objective was to have a better understanding on the seed sector within an agro-economic context as well as the national seed requirements. This activity is part of the SANOI project.

#### Roselle Day at Riviere Des Anguilles Model Farm

The extension department organised the roselle day on the 10<sup>th</sup> of June 2023 at the Riviere Des Anguilles MF. The objective was to promote the plant roselle and its agro processing potentials. Five entrepreneurs were invited which displayed the different types of processing products such as jam, pickles, cakes, juice etc. An overview of the development and potentials of roselle was presented to the public. There was a high demand for roselle plants and the Riviere des Anguilles extension department is catering for the needs.

### Livestock Extension

The Livestock Extension Division provides services to operators in the livestock sector to improve production and productivity. Training in different sectors (cattle, goat, pig and poultry) was maintained for livestock keepers and potential new breeders. Technical assistance was provided to entrepreneurs for writing up of their livestock projects. Applications for grants under the schemes for ‘Modernisation and Innovation in the Food Crop and Livestock sectors’ were processed and evaluated by FSF Evaluation committee. National projects such as fodder production, multiplier goat farm, MSPA land projects, cooperative pig farms and other livestock projects were regularly visited and monitored. Regular meetings were attended at the different sectoral Committees. Extension continued to act as an interface with other stakeholders such as DBM, LFPS, DVS, SFWF, Statistics Mauritius Ministry of Environment, Ministry of Cooperatives, Ministry of Labour and Local Authorities with respect to loan, subsidised livestock feed, veterinary services, breeder’s card, environment issues as well as application for work permit respectively.

Extension also maintained its collaboration with the Research Department on livestock projects. Livestock production data and market data were collected and updated.



Fig. 118: Demonstration in fodder rack and equipment purchased from grant (Scheme)

### Livestock Statistics

As at June 2023, the livestock population and corresponding farmers comprise 3,512 cattle (538 farmers), 21,608 goats (1,856 farmers), 4,367 sheep (375 farmers), 21,484 pigs (429 farmers), 6,580 ducks (269 farmers), 1,713,198 broilers (355 farmers), 591,825 layers (142 farmers) and 1,280 rabbits (107 farmers).

### Training of farmers at Model farms and other venues.

Training was conducted for farmers through MQA certified training courses along with other extension activities. 33 meetings, 28 conducted tours and 42 demonstrations were organized and attended by a total of 993 farmers. 28 training courses (MQA approved) were effected, namely on goat production, egg production, broiler production and piglet production and operation of a dairy farm for a total of 447 participants.



Fig. 119: Conducted tour for goat and sheep breeders and new entrepreneurs at Belle Mare RS. (LS2)

### Support to Livestock Cooperatives (Cattle and Goat)

There are 8 cooperative societies/companies involved in dairy production with a herd status of 412 heads of which 139 lactating cows with a milk production of 1720 L daily.

Furthermore, among the 8 cooperatives, there are 5 cooperatives involved in milk processing, the value-added products are Greek yoghurt, Cottage Cheese (Paneer), Rasmalai, Curd (Lait Caillé/drinking yoghurt), Mozzarella, Alouda, Fenousse, Yoghurt, Ghee, Pasteurised milk and Kokhorni.

Two cooperative societies are involved in goat/sheep production with a herd status of 12 goats and 56 sheep and two cooperative societies benefited from the grant scheme from Ministry of Cooperatives

### Support to Pig sector

At Saint Martin, 219 farmers are operating with a total herd of 13,619 heads while at Bassin Requin 19 farmers are operating with total herd of 1608 heads.

Support is also being given to the 3 beneficiaries of pig reproduction farm project namely Paradise Integrated Farming, Mr. G. Lavigilante and Mr F. Legallant in terms of waste management and alternative feeding practices. They are operating with a total herd of 157 heads.

One farmer has been allocated a meat shop (Salle de Decoupe) at Bambous. The meat shop is operational.



Fig. 120: Planting of winged beans at St Martin as greens for pig feed

### Other Services

Livestock Extension supported the livestock farmer's community by processing applications for animal (112), feed (2196), molasses (75), bagasse (34), bona fide for DBM & NTA permit (64) and effected 8292 advisory individual field visits. 1913 persons called at Extension offices for support and advice.

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### Livestock activities on Demonstration Centre

Herd status as at June 2023 on demonstration centres and model farms is at follows, Goat:4, Rabbits: 2, Turkey: 2, Quails: 15, Local hens: 7, Ducks (Muscovy): 10

### Information and Training

This division comprises three distinct units dealing respectively with matters pertaining to information, training in addition to initiation of Women & Youths to the field of food production agriculture. The latter one being especially dedicated to encourage venture of women and the youth agriculture, or otherwise, moving higher up in the value chain with development of agro-processing enterprises.

Eight presentations were made by local or visiting experts to broaden exposure of personnel of the institute to novel as well as emerging technologies and was attended by 329 officers.

The Training Unit provided assistance in terms of invitations, coordination, logistics and preparation of training material as well as deployment of resource persons in support to the various training activities.

Number of attendance certificates issued to trainees totalled 923, who were equally provided, wherever required, with soft copy of the training material on 626 USB pens.

Interest in training kept on its rising pace with 1,466 applications received from members of the farming community as well as the general public expressing needs for knowledge enhancement on subjects related in particular to crop production, sheltered farming, home gardening, livestock rearing and mushroom cultivation.

#### **National Training and re-Skilling Scheme (NTRS)**

One of the key components of the Economic Recovery Programme is the implementation of National Training and re-Skilling Scheme (NTRS) supported by the HRDC. One batch of 23 participants for training on hydroponics production and crop and livestock production have been completed.

#### **Vocational training: National Certificate Course in Hydroponics Operations**

A one-year award training course in Hydroponics Operations (NC - level 3) is being run yearly in collaboration with the Mauritius Institute of Training and Development (MITD) under the NAP programme. Sixteen students were enrolled for year 2022 and the examination was held in December 2022.

#### **Office Call and Information Dissemination**

A total of 3426 calls for advice were attended and 2740 publications issued on request to farmers, general public and stakeholder institutions.

89 radio talks on agriculture related subjects were broadcasted weekly for general public and farmers in particular. This service provides timely information on latest farming techniques especially to farmers actively engaged in crop and livestock production.

4 alerts were sent by SMS to avert a total of 115 farmers registered to this service. SMS contained information on outbreak of Anthracnose in Onion, late blight tomato, powdery mildew on chilli and tomato. 22 publications were processed and edited.

#### **Women and Youth**

Agricultural Clubs numbering 35 with a total membership of 915, were registered with FAREI for support and assistance during the year. Of these, 19 were Agricultural Youth Clubs (AYC) regrouping in all 632 members, made up of 258 women and 374 men. One non-governmental organisation (NGO) with 42 members is also registered with FAREI.

Nine Agricultural Entrepreneur Clubs (AEC) representing a forum of 171 agro-entrepreneurs all actively engaged at commercial scale farming. Training activities and technical support were dispensed to leverage individual capability in the field of backyard gardening, food-crop, flower, livestock, mushroom production, compost making, plant propagation, irrigation and agro-processing techniques; and 7 Agricultural Women Clubs regrouping a total of 110 active members. Seven training courses were dispensed to leverage knowledge and capacity of 158 potential entrepreneurs in agro-processing techniques.

Some 66 talks were delivered at AWCs on 22 topics for enabling vegetable production, fruit production, flower production at household level and processing of fruits and vegetables at home level.

Sixteen (16) agro-entrepreneurs used the Agro-Processing Resource Centre in Wootton for testing and evaluation of their respective technical process as well as end products and 10 conducted tours organized for 128 visitors.

Thirteen (13) agri-business enterprises benefitted free advisory services on process and product improvement; 156 protocols developed or upgraded for processed food products.

The Division provided supports through talks, presentations and advice to 19 organisations, ministries and institutions. Assistance was provided for making a video clip for 'Les Assises De L'Agriculture'.

The Division organized and participated in the following exhibitions and events:

World Food Day, World Food Day organised by Gymkhana Club at Vacoas, Exhibition of processed horticultural produce at the Backyard Gardening Project and the Promotion of Entrepreneurship in Agriculture/Agro Processing, Strawberry field day at WCRS, Pulse Day, Les Assises De L'Agriculture, World Bee Day, Roselle Day, Rotary Club event at Albion, and the Science Week at Rajiv Gandhi Science Centre.

Twelve (12) trainings were organised and/or supported by the Training Unit under the project of DeSIRA Initiatives, GCCA+, SADC and the Ministry of Environment.

- Workshop on Pesticide Safety and Awareness under Switch Africa Green in collaboration with Ministry of Environment
- Enhancing climate resilience of tea cultivation and tea production under the project of GCCA+.
- Principles of marker-assisted breeding for selection of lines tolerant to biotic and biotic stresses under DeSIRA initiative.
- Technical Guidelines in Seed Production under DeSIRA
- Soil Fertility Management and Basic Analytical Methods under DeSIRA
- Implementation of an Aquaponics System under the project of GCCA+.
- Use of LASER 2 Software for Monitoring Animal Performance under DeSIRA
- Regional Workshop on 'Seed Potato in the Potato Value Chain in Mauritius' under FoodSec-Semence/SANOI regional project.
- Workshop on Regional Vulnerability Assessment & Analysis (RVAA) funded by SADC
- Workshop "Sustainable Soil Fertility Management" under DeSIRA initiative.
- Training in plant Physiology under the project of GCCA+.

## Technical Support

### Biometry and Statistics

Food-crops statistics were generated by the Biometry and Statistics Division (BSD) on a monthly basis from ongoing surveys carried out by the extension staff throughout the year. Monthly food crops statistics were provided to Statistics Mauritius on a quarterly basis. The BSD also provided annual Food Crops statistics – both open field and protected cultures – to Statistics Mauritius for publication in the Digest of Agricultural Statistics. These data are shared with other institutions and stakeholders upon request. Food Crops statistics were also provided to FAREI technical cadres to include in their work programmes, presentations, research papers amongst others. Food Crops production was analysed and forecasted during calamity periods.

Retail and wholesale market data of food crops were compiled and generated by the BSD. Price data are collected at three different markets – Port-Louis, Vacoas, Flacq on a regular basis by Extension staff.

### Regional Vulnerability Assessment and Analysis (RVAA)

Under the SADC RVAA programme, FAREI carried out a study on the Vulnerability Assessment and Analysis (VAA) in the Agricultural sector through a representative sample of small farmers to take stock of the vulnerabilities faced by this community with the view of addressing these issues. The Division played a leading role from the inception of this study, the preparation of the survey methodology, designing the survey questionnaire to writing the report. The BSD staff participated as resource persons in the inception workshop organised Palm Beach, Quatre Bornes and at the validation workshop held at Wootton FTS. The main findings of the study were presented at an online dissemination forum organised by SADC RVAA this year.

On the occasion of the African Statistics Day on 18 November 2022, a workshop was organised by Statistics Mauritius. The theme of that year was *“Strengthening data system by modernizing the production and use of agricultural statistics with a view of informing policies to improve resilience in agriculture, nutrition, and food security on the African Continent”*. The Ag. Principal Biometrician participated in the workshop and made a presentation on that theme.

In March 2023, the Ag. Principal Biometrician presented the work plan of the National Vulnerability Assessment Committee at the Annual Organisation Meeting of the SADC RVAA in South Africa.

The BSD is engaged in providing statistics to local and international institutions. The Acting Principal Biometrician was assigned as the focal point of FAREI, providing data on cost and staffing of ‘Research and Experimental Development’ activities carried in-house to the Mauritius Research and Innovation Council. In the context of the Comprehensive Africa Agriculture Development Programme (CAADP), five years data were provided.

### Engineering Division

During the period under review the division provided engineering support to other divisions in terms of preparation of scope of work, specification for procurement of equipment, implementation of externally funded projects such as setting up of pilot biogas project at CLRS, monitoring of the installation of a 10kWp grid-tied photovoltaic system at Belle Mare Research Station under the CEB Renewable Energy Schemes for Public Sector Entities, design and CAD drawings for construction work for the various sites of FAREI.

The State House was assisted for the setting up of a new sheltered farming structure to be used for the production of flowers and the renovation of two existing nurseries. Technical assistance was provided to the Rajiv Gandhi Science Centre for setting up of an aquaponic system.

Small Farmers Welfare Fund for the road mending scheme for tea growers at Bois Cheri, Nouvelle France and Grand Bois.

In view of setting up of an aquaponic system at the Rajiv Gandhi Science Centre, the division prepared the design, CAD drawings and scope of work for plastic tunnel and aquaponic system.

Technical assistance was also provided to Small Farmers Welfare Fund for the road mending scheme for tea growers at Bois Cheri, Nouvelle France and Grand Bois.

In addition to the above the division provided engineering support and expertise in the following project:

- setting up of a Pilot Biogas Project to produce electricity from cattle manure at Curepipe Livestock Research Station under the Switch Africa Green Project in collaboration with Ghana National Cleaner Production Centre (GNCPC) Consultant;
- Provision of technical specifications for procurement of equipment under DeSIRA project
- Preparation of scope of work and monitoring the drilling of boreholes for the provision of water for field irrigation and drip irrigation at Richelieu Crop Research Station and Plaine Magnien;
- Monitoring the installation of a 10kWp grid-tied photovoltaic system at Belle Mare Research Station under the CEB Renewable Energy (RE) Schemes for Public Sector Entities (PSEs);
- Preparation of preliminary layout drawing for relocation of greenhouses at Henrietta i.c.w. the construction of La Vigie – La Brasserie – Beaux Songes Link Road Phase 2;
- Preparation of scope of work for plastic greenhouse and multitier system to produce high quality potato mini-tubers at the Tissue Culture Lab, Réduit
- scope of work for sheltered farming structure and hydroponics greenhouse for Commission of Agriculture in Rodrigues,
- Rehabilitation of pesticide store, goat shed and poultry pen at Plaisance Demonstration Centre.

Technical advice was procured to promoters in greenhouse technology (2), rainwater harvesting (4) and shed for mushroom cultivation (1).

## **Business Development and Economics Unit**

During the financial year July 2022 to June 2023, the Business Development Unit (BDU) of FAREI has been actively involved in facilitating the implementation of several schemes announced by the Government. In line with its objectives, the unit geared resources mainly to assure a backup service to prospective entrepreneurs interested in the agri-business sector. In that context, key activities include provision of information to visitors calling at FAREI Head Quarters, advisory service and business facilitation as well as technical assistance for preparation of appropriate business plan. The unit also coordinate, process monitor the implementation of numerous applications under different Schemes. Evaluate projects submitted to MAIFS in connection with lease of state lands. The Unit also assist management in the submission of updated inputs for ePMIS and PIMA

### **Implementation and Monitoring of schemes**

Several schemes have been revised and new ones have been put in place by the Ministry of Agro-Industry and Food Security in 2022 – 2023, to boost-up, modernise and to innovate the Crop and Livestock Sectors.

During this financial year, 333 applications have been processed. 265 applications were approved for a sum of Rs 63, 361,370 and 224 beneficiaries were paid a total amount of Rs 26,371,879. Since the inception of schemes in the year 2014, the cumulative grant allocated was MUR 163,212,973 and were disbursed to 1275 beneficiaries.

57 applications have been processed and evaluated under the Biotechnology Loan Scheme and recommended to the Development Bank of Mauritius (DBM) for loan disbursement.

For the period July 2022 to June 2023, a total of 124 projects for which full disbursement was effected

were visited. Out of the 124 projects, 39 greenhouse projects were implemented under the Sheltered Farming Scheme, which covered a total area of 19,564 m<sup>2</sup> (1.9 ha), representing an estimated food crop production of 628 tonnes annually. Since 2019, field visits for 991, out of the 1275 beneficiaries, have been carried out by the BDU to monitor these schemes.

At least 12 to 15 surveys are being carried out per month within the monitoring exercise to ensure that the project are being implemented.

#### Promote and Encourage Agri-Business in line with Government policies

- Assistance has been provided in the preparation of project write and business plans for request of State Lands. For the period July 2022 to June 2023, a total of 150 requests have been entertained.
- Counselling and support were provided to 350 Agro-entrepreneurs and potential entrepreneurs
- Training was provided to Extension Officers in Entrepreneurship and agripreneurs as well as act as resource person for training of retrench workers
- About 40 prospective entrepreneurs were counselled in agri-business prospects, marketing and financials while assistance was also provided to 5 entrepreneurs in the preparation of their full business plans. Compensation estimate exercises were also conducted to 4 beneficiaries upon request of the Ministry of Land & Housing. Support was provided to the BFU to assist established organic producers in re-scheduling their existing loan structures through business valuation procedures and exit strategy assessments.

#### Other Activities

- Support was provided in the project “Analyse de la Filière Semencière de la pomme de terre et de l’haricot” commissioned by the CIRAD in collaboration with FAREI. The study started in early 2022 and was completed in March 2023. The final reports were compiled with the joint support of Mr J.F Belieres, CIRAD. The action plans for the potato and beans seed value chains were eventually validated with stakeholders.
- Advisory support was provided on socio economic issues and international trade affairs to other organisations/institutions viz. Economic Development Board, Ministry of Foreign Affairs, Agricultural Marketing Board. The MAIFS was assisted in the preparation of and compilation of relevant indicators falling under the purview of the CAADP. These indicators more specifically were related to the overall performance of the agricultural sector of the country over the past 5 years to give an indication of how effective agricultural policies were in the country.
- Assistance was also provided to the National Potato Committee and National Onion Committee in the preparation of the costing exercise. The cost of production of some 25 other major economic crops were reviewed while the cost of production of strategic crops, namely onion (medium and high yielding) garlic (seed and ware) were prepared towards assisting the AMB in floor-price determination of these strategic crops.
- Support was given for the analysis and preparation of the report on the Vulnerability Assessment and Analysis study for onwards transmission to the SADC. The major areas of vulnerability to the farming community identified were related to the adverse impacts of climate change, natural calamities through flash floods, cyclones, temperature rises, drop in yields besides other economic issues such as inflationary pressures leading to increased cost of production, labour shortages and soaring labour costs. An action plan was also prepared as part of the deliverables under the RVAA and this action plan was validated in consultation with the farming community and other relevant stakeholders at a workshop.

#### IT Unit

The IT Section has supported the institute's move towards more efficient and data-driven operations. A major undertaking of the unit was the implementation the Research and Extension Key Information Repository (REKIR) project funded under EU-DeSIRA. The system aims to digitalise processes across

departments involved in research, extension, station and laboratory management, market price statistics, biotechnology and tissue culture, nursery and seed productions, training and information, and sale of items. The ERP will provide a single source of information to help drive data-based decision-making. The first phase of the project which comprise the digitalisation of research and extension activities is expected to be completed in November 2023.

The Human Resources and Payroll departments play a crucial role in managing the organization's most valuable resource - its people. With growing headcount and increasingly complex compliance requirements, it was evident that the outdated manual systems could no longer support FAREI's needs.

In 2021, the FAREI embarked on a project to implement a new integrated HR/Payroll system to achieve operational efficiency, streamlined process and workflow automation. However, due to the pandemic and other unforeseen circumstances, the project was delayed. The project is still underway, and it is expected that it will go live in January 2024.

### DeSIRA Initiative

The activities progressed significantly during the period under review. A request was made to extend the contract period for another year, to catch up the delay encountered due to Covid -19 which impacted on procurement and travel of staff and consultants. The request was positively considered and an extension of one year to the project was granted.

Several infrastructural works were completed and are being used to enhance the Research and development Capacity of FAREI. These comprised upgrading of Curepipe Livestock Research Station, Wootton Crop Research Station, post-harvest and Agro processing facility, Réduit Crop Research Station, Mushroom Unit, Pamplémousses Organic Research Station, Molecular Laboratory, Belle Mare Research Station, Entomology Laboratory and Tissue Culture laboratory. New facilities were set up namely insect growth chambers and soil, water and plant laboratory. New equipment was procured such as TMR mixer wagon, autoclave amongst others.

A new research programme was initiated in the field of Agroforestry and the following programmes have been reviewed and consolidated: Introduction and evaluation of improved germplasm; Crop variety development; Integrated pest and disease management; Climate smart agriculture; sustainable agricultural practices; and Feed and fodder development.

Two new projects have been initiated namely the introduction of novel pressurized irrigation system and the development of fully automated drip fertigation system coupled with solar power-driven pumping system. The system is meant to demonstrate efficient irrigation systems and energy saving technologies. Better yields have been obtained with the new systems and higher water use efficiency has been reported. Field evaluation/demonstration are on-going. Within the introduction of novel technologies, a vertical farming unit has been set up. *In-vitro* culture technique has been developed as a tool for rapid propagation and production of garlic.

Under outcome "improved information flow and dissemination" field officers have been capacitated for better outreach to the farming community. Training unit has been consolidated to improved communication between farmers and extension officers.

Within the capacity building activities, three consultancy services were effected namely button mushroom production; operation of soil, water and plant analysis lab; and use of Laser 2 R Software for livestock data management. 23 Officers attended training and 14 Officers attended conferences/workshops abroad.

A calendar of activities was proposed for the outreach programme as well as visibility action. In this respect a "Caravane de Information pour L'Agriculture 4.0" aiming at promoting the utilisation of biopesticides and biofertiliser for sustainable agricultural production was organised. Four one-day workshops were organised at Mapou Model Farm, Flacq Model Farm, Rivière Des Anguilles Demonstration Centre and Plaisance Demonstration Centre and were attended by more than 130 farmers.

## Events

Several events were organised and include the following:

- Training on “Enhancing Climate Smart Resilience in the Tea Sector”, at the FTS, Wooton;
- Launching of ‘Bazar Moris E-Commerce platform; a new Tomato variety and a book on agro-processing at the Caudan Art Centre;
- World Pulse Day at the Esplanade of Renganaden Seenevassen Building, Port Louis;
- Signing of MoU between FAREI and CATAS, at the MAIFS;
- Roselle Day at Rivière des Anguilles Model Farm;
- Award of certificates for training on “Livestock Data Management’ under the EU-DeSIRA funded project at CLRS;
- Award of certificates for training on “The Use of Plant Physiology Markers for Screening Breeding Lines for Abiotic Stresses” under the GCCA+ funded project at FTS, Wooton;
- Validations workshop on “Seed Potato Value Chain” within the FoodSec-Semence/SANOI project, at Hennessy Park Hotel, Ebene;
- Validation workshop on regional project and “Vulnerability Assessment and Analysis” within the RVAA SADC project, at the FTS, Wooton;
- Launching of workshop on “Sustainable Soil Fertility Management” and inauguration of a Soil, Plant and Water Laboratory, at the FTS, Wooton;
- Sensitisation campaign on sustainable crop production: sustainable management of Diamondback Moth under EU-DeSIRA funded project. At the FTS, Wooton; and
- Launching of Aquaponic project and booklet under the GCCA+ funded project, FAREI Redit.



# NATIONAL AUDIT OFFICE

## **REPORT OF THE DIRECTOR OF AUDIT TO THE BOARD OF THE FOOD AND AGRICULTURAL RESEARCH AND EXTENSION INSTITUTE**

### **Report on the Audit of the Financial Statements**

#### **Qualified Opinion**

I have audited the financial statements of the Food and Agricultural Research and Extension Institute, which comprise the statement of financial position as at 30 June 2023 and the statement of financial performance, statement of changes in net assets/equity, cash flow statement and statement of comparison of budget and actual amounts for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In my opinion, except for the effects of the matter described in the Basis for Qualified Opinion section of my report, the accompanying financial statements give a true and fair view of the financial position of the Food and Agricultural Research and Extension Institute as at 30 June 2023, and of its financial performance and cash flows for the year then ended in accordance with International Public Sector Accounting Standards (IPSASs).

#### **Basis for Qualified Opinion**

##### ***Property, Plant and Equipment – Rs 98,959,702***

The residual value and useful life of fully depreciated assets totalling Rs 23.7 million which were still in use as at 30 June 2023, were not reviewed in line with IPSAS 17 *Property, Plant and Equipment* but were written off during the year.

I conducted my audit in accordance with International Standards of Supreme Audit Institutions (ISSAIs). My responsibilities under those standards are further described in the 'Auditor's Responsibilities for the Audit of the Financial Statements' section of my report. I am independent of the Food and Agricultural Research and Extension Institute in accordance with the INTOSAI Code of Ethics, together with the ethical requirements that are relevant to my audit of the financial statements in Mauritius, and I have fulfilled my other ethical responsibilities in accordance with these requirements. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my qualified opinion.

#### **Key Audit Matters**

Key Audit Matters are those matters that, in my professional judgment, were of most significance in my audit of the financial statements of the current period. These matters were addressed in the context of my audit of the financial statements as a whole, and in forming my opinion thereon, and I do not provide a separate opinion on these matters.

Except for the matters described in the Basis for Qualified Opinion section of my report, I have determined that there are no other key audit matters to communicate in my report.

### **Emphasis of Matter**

I draw attention to the General Fund in the statement of financial position which showed a deficit of Rs 806,106,469 as at 30 June 2023 as compared to a deficit of Rs 728,818,013 as at 30 June 2022.

My opinion is not modified in respect of this matter.

### **Other Information**

Management is responsible for the other information. The other information comprises the information included in the annual report of the Food and Agricultural Research and Extension Institute, but does not include the financial statements and my report thereon.

My opinion on the financial statements does not cover the other information and I do not express any form of assurance conclusion thereon.

In connection with my audit of the financial statements, my responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or my knowledge obtained in the audit or otherwise appears to be materially misstated. If, based on the work I have performed, I conclude that there is a material misstatement of this other information, I am required to report that fact. I have nothing to report in this regard.

### **Responsibilities of Management and Those Charged with Governance for the Financial Statements**

Management is responsible for the preparation and fair presentation of these financial statements in accordance with IPSASs, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Food and Agricultural Research and Extension Institute's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management intends to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Food and Agricultural Research and Extension Institute's financial reporting process.

### **Auditor's Responsibilities for the Audit of the Financial Statements**

My objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISSAIs, will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISSAIs, I exercise professional judgement and maintain professional scepticism throughout the audit. I also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Food and Agricultural Research and Extension Institute's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Food and Agricultural Research and Extension Institute's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my auditor's report. However, future events or conditions may cause the Food and Agricultural Research and Extension Institute to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

I communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

I also provide those charged with governance with a statement that I have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on my independence, and where applicable, related safeguards.

From the matters communicated with those charged with governance, I determine those matters that were of most significance in the audit of the financial statements of the current period and are therefore the key audit matters. I describe these matters in my auditor's report unless law or regulation precludes public disclosure about the matter or, when, in extremely rare circumstances, I determine that a matter should not be communicated in my report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

## **Report on Other Legal and Regulatory Requirements**

### ***Management's Responsibilities for Compliance***

In addition to the responsibility for the preparation and presentation of the financial statements described above, management is also responsible to ensure that the Food and Agricultural Research and Extension Institute's operations are conducted in accordance with the provisions of laws and regulations, including compliance with the provisions of laws and regulations that determine the reported amounts and disclosures in an entity's financial statements.

### ***Auditor's Responsibilities***

In addition to the responsibility to express an opinion on the financial statements described above, I am also responsible to report to the Board whether:

- (a) I have obtained all the information and explanations which to the best of my knowledge and belief were necessary for the purpose of the audit;
- (b) the Statutory Bodies (Accounts and Audit) Act and any directions of the Minister, in so far as they relate to the accounts, have been complied with;
- (c) in my opinion, and, as far as could be ascertained from my examination of the financial statements submitted to me, any expenditure incurred is of an extravagant or wasteful nature, judged by normal commercial practice and prudence;
- (d) in my opinion, the Food and Agricultural Research and Extension Institute has been applying its resources and carrying out its operations economically, efficiently and effectively; and
- (e) the provisions of Part V of the Public Procurement Act regarding the bidding process have been complied with.

I performed procedures, including the assessment of the risks of material non-compliance, to obtain audit evidence to discharge the above responsibilities.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my qualified opinion.

### ***Statutory Bodies (Accounts and Audit) Act***

I have obtained all information and explanations which to the best of my knowledge and belief were necessary for the purpose of my audit.

As far as it could be ascertained from my examination of the relevant records, no direction relating to the accounts has been issued by the responsible Minister to the Food and Agricultural Research and Extension Institute.

Based on my examination of the records of the Food and Agricultural Research and Extension Institute, except for the matter reported below, nothing has come to my attention that causes me to believe that:

- (a) expenditure incurred was of an extravagant or wasteful nature, judged by normal commercial practice and prudence; and
- (b) the Institute has not applied its resources and carried out its operations economically, efficiently and effectively.

***Lapses in Contract Management***

Two construction contracts totalling Rs 61 million were awarded to two different contractors with completion dates of 28 March 2022 and 14 July 2023 respectively. As of mid-April 2024, the construction works were still in progress, hence hampering the operations of the Institute. Moreover, liquidated damages as per conditions of contracts were not applied for delay in completion of works.

***Public Procurement Act***

In my opinion, the provisions of Part V of the Act have been complied with as far as it could be ascertained from my examination of the relevant records.



**DR D. PALIGADU**  
Director of Audit

National Audit Office  
Level 14  
Air Mauritius Centre  
PORT LOUIS

30 April 2024

### STATEMENT OF FINANCIAL POSITION AS AT 30 JUNE 2023

|                                                    | Notes | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|----------------------------------------------------|-------|-------------------------------|-------------------------------|
| <b>ASSETS</b>                                      |       |                               |                               |
| <b>Current Assets</b>                              |       |                               |                               |
| Cash and cash equivalents                          | 6     | 159,926,510                   | 146,983,591                   |
| Receivables                                        | 7     | 12,964,175                    | 9,865,824                     |
| Inventories                                        | 8     | 8,877,100                     |                               |
| Prepayments                                        | 9     | 296,101                       | 249,229                       |
|                                                    |       | <u>182,063,886</u>            | <u>157,098,644</u>            |
| <b>Non-current assets</b>                          |       |                               |                               |
| Receivables                                        | 10    | 18,348,593                    | 20,923,580                    |
| Property, plant and equipment                      | 11    | 98,959,702                    | 79,689,709                    |
| Work in progress                                   | 12    | 28,942,534                    | 15,594,153                    |
| Intangible Assets                                  | 13    | 86,412                        | 152,655                       |
|                                                    |       | <u>146,337,241</u>            | <u>116,360,097</u>            |
| <b>Total assets</b>                                |       | <b><u>328,401,127</u></b>     | <b><u>273,458,741</u></b>     |
| <b>LIABILITIES</b>                                 |       |                               |                               |
| <b>Current liabilities</b>                         |       |                               |                               |
| Payables                                           | 14    | 7,779,752                     | 6,391,373                     |
| Car loan payable                                   | 15    | 8,406,849                     | 8,184,092                     |
| Employee benefit                                   | 16    | 16,351,621                    | 16,847,471                    |
| Liabilities recognized under transfer arrangements | 20    | 171,256,561                   | 162,440,459                   |
|                                                    |       | <u>203,794,783</u>            | <u>193,863,395</u>            |
| <b>Non-Current Liabilities</b>                     |       |                               |                               |
| Employee benefit                                   | 17    | 161,436,929                   | 150,943,879                   |
| Car loan payable                                   | 18    | 17,299,474                    | 20,546,410                    |
| Defined pension benefit                            | 19    | 734,127,855                   | 623,996,980                   |
| Liabilities recognized under transfer arrangements | 20    | 17,848,556                    | 12,926,090                    |
|                                                    |       | <u>930,712,814</u>            | <u>808,413,359</u>            |
| <b>Total liabilities</b>                           |       | <b><u>1,134,507,597</u></b>   | <b><u>1,002,276,754</u></b>   |
| <b>Net liabilities</b>                             |       | <b><u>(806,106,469)</u></b>   | <b><u>(728,818,013)</u></b>   |
| <b>NET ASSETS / EQUITY</b>                         |       |                               |                               |
| General fund                                       |       | <u>(806,106,469)</u>          | <u>(728,818,013)</u>          |
| <b>Total net assets / equity</b>                   |       | <b><u>(806,106,469)</u></b>   | <b><u>(728,818,013)</u></b>   |

The accompanying notes form an integral part of the financial statements.

Approved by the Board on 27 April 2024

H Woodun  
Chairman FAREI Board

L Mungry  
Board Member

**STATEMENT OF FINANCIAL PERFORMANCE FOR THE YEAR ENDED 30 JUNE 2023**

|                                               | Notes | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|-----------------------------------------------|-------|-------------------------------|-------------------------------|
| <b>Revenue</b>                                |       |                               |                               |
| <b>Revenue from non-exchange transactions</b> |       |                               |                               |
| Transfers from government                     | 21    | 491,383,113                   | 394,339,272                   |
| Transfers from other entities                 | 22    | 23,545,580                    | 13,747,506                    |
| <b>Revenue from exchange transactions</b>     |       |                               |                               |
| Sales of produce and rendering of services    | 23    | 13,688,450                    | 10,923,977                    |
| Other Revenue                                 | 24    | 1,765,265                     | -                             |
| <b>Total Revenue</b>                          |       | <u>530,382,408</u>            | <u>419,010,755</u>            |
| <b>Expenses</b>                               |       |                               |                               |
| Salaries and employee benefits                | 25    | 675,719,162                   | 341,941,603                   |
| Supplies and consumables                      | 26    | 48,068,609                    | 43,979,589                    |
| Depreciation and amortisation                 | 27    | 17,912,136                    | 16,096,886                    |
| Other expenses                                | 28    | 90,302,461                    | 61,824,443                    |
| <b>Total Expenses</b>                         |       | <u>532,002,368</u>            | <u>463,842,521</u>            |
| <b>Deficit for the year</b>                   |       | <u>(1,619,960)</u>            | <u>(44,831,766)</u>           |

### STATEMENT OF CHANGES IN NET ASSETS / EQUITY FOR THE YEAR ENDED 30 JUNE 2023

|                                             | Rs                   |
|---------------------------------------------|----------------------|
| <b>General fund</b>                         |                      |
| Balance as at 01 July 2021                  | (551,407,451)        |
| Remeasurement of Employee Benefit: IPSAS 39 | (132,578,796)        |
| Deficit for the period                      | (44,831,766)         |
| Closing balance at 30 June 2022             | <u>(728,818,013)</u> |
| <br>                                        |                      |
| Balance as at 01 July 2022                  | (728,818,013)        |
| Prior year adjustment                       | 8,563,052            |
| Remeasurement of Employee Benefit: IPSAS 39 | (84,231,548)         |
| Deficit for the period                      | (1,619,960)          |
| Closing balance at 30 June 2023             | <u>(806,106,469)</u> |

### CASH FLOW STATEMENT FOR THE YEAR ENDED 30 JUNE 2023

|                                                               | Notes | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|---------------------------------------------------------------|-------|-------------------------------|-------------------------------|
| <b>CASH FLOW FROM OPERATING ACTIVITIES</b>                    |       |                               |                               |
| Deficit for the year                                          |       | (1,619,960)                   | (44,831,766)                  |
| Prior year adjustment                                         |       | 8,877,100                     | -                             |
| <b>Non-cash movements</b>                                     |       |                               |                               |
| Depreciation for the year                                     |       | 17,845,893                    | 16,021,371                    |
| Amortisation of intangible asset                              |       | 66,243                        | 75,515                        |
| Exchange (gain)/loss                                          |       | (1,765,265)                   | 3,458,593                     |
| Increase / (Decrease) in defined pension benefit              |       | 25,899,325                    | 13,388,750                    |
| (Increase) / Decrease in receivables                          |       | (570,235)                     | 21,098,896                    |
| Increase / (Decrease) in payables                             |       | 12,102,768                    | (23,506,365)                  |
| Increase / (Decrease) in employee benefit                     |       | 9,997,200                     | (581,095)                     |
| <b>Net cash flows from operating activities</b>               |       | <b>70,833,068</b>             | <b>(14,876,101)</b>           |
| <b>CASH FLOW FROM INVESTING ACTIVITIES</b>                    |       |                               |                               |
| Purchase of property, plant and equipment                     | b     | (37,429,934)                  | (12,954,507)                  |
| Increase / (Decrease) in inventories                          |       | (8,877,100)                   | -                             |
| Increase in work in progress                                  |       | (13,348,380)                  | (11,585,968)                  |
| <b>Net cash flows from investing activities</b>               |       | <b>(59,655,414)</b>           | <b>(24,540,475)</b>           |
| <b>CASH FLOWS FROM FINANCING ACTIVITIES</b>                   |       |                               |                               |
| Exchange gain/(loss)                                          |       | 1,765,265                     | (3,458,593)                   |
| Loan received from Ministry                                   |       | 7,257,499                     | 8,117,000                     |
| Loan repaid to Ministry                                       |       | (10,281,678)                  | (8,103,510)                   |
| Loan repayment due to Ministry                                |       | (1,398,954)                   | -                             |
| Loan release to staff                                         |       | (7,257,499)                   | (8,117,000)                   |
| Loan refunded by staff                                        |       | 11,680,632                    | 8,103,510                     |
| <b>Net cash flow from financing activities</b>                |       | <b>1,765,265</b>              | <b>(3,458,593)</b>            |
| <b>Net increase in cash and cash equivalents</b>              |       | <b>12,942,919</b>             | <b>(42,875,169)</b>           |
| <b>Cash and cash equivalents at the beginning of the year</b> |       | <b>146,983,591</b>            | <b>189,858,760</b>            |
| <b>Cash and cash equivalents at end of the year</b>           | a     | <b>159,926,510</b>            | <b>146,983,591</b>            |

#### Notes to Cash Flow

##### a. Cash and cash equivalents

The cash and cash equivalents consist of cash in hand and bank balances. The cash and cash equivalents included in the cash flow statement comprise the following:

|              |                    |                    |
|--------------|--------------------|--------------------|
| Cash at bank | 159,897,385        | 146,958,157        |
| Cash in hand | 29,125             | 25,434             |
|              | <u>159,926,510</u> | <u>146,983,591</u> |

**b. Property, plant and equipment**

During the financial year ended 30 June 2023, FAREI acquired property, plant and equipment amounting to Rs37,461,516 which was financed by cash. A total of Rs5,915,278 funded by the Government in terms of capital contribution were spent on infrastructure assets.

**STATEMENT OF RECONCILIATION FINANCIAL STATEMENT AND ACTUAL FOR THE YEAR ENDED  
30 JUNE 2023**

|                                                                | Revised<br>Budget<br>Rs | Actual Amount<br>Rs | Accruals<br>Rs    | Prepayment<br>Rs | Financial<br>Statement<br>Rs |
|----------------------------------------------------------------|-------------------------|---------------------|-------------------|------------------|------------------------------|
| <b>Revenue</b>                                                 |                         |                     |                   |                  |                              |
| Government Grant                                               | 386,800,000             | 387,100,536         | -                 | -                | 387,100,536                  |
| Capital Grant                                                  | 88,300,000              | 55,781,999          |                   |                  | 57,830,113                   |
| Schemes                                                        | 46,000,000              | 79,427,415          |                   |                  | 69,998,044                   |
| Other Income                                                   | <u>10,000,000</u>       | <u>13,688,450</u>   |                   |                  | <u>13,688,450</u>            |
|                                                                | <b>531,100,000</b>      | <b>535,998,400</b>  | -                 | -                | <b>528,617,143</b>           |
| <b>Expenditure</b>                                             |                         |                     |                   |                  |                              |
| Salaries and other related costs                               | 262,482,466             | 241,587,224         | 9,086,780         | -                | 250,674,003                  |
| Pension cost (SICOM)                                           | 63,788,843              | 56,821,118          | 25,899,326        | -                | 82,720,444                   |
| Passage benefits                                               | 12,320,000              | 7,271,666           | 1,583,635         | -                | 8,855,300                    |
| Travelling and transport                                       | 33,833,547              | 33,200,270          | 269,146           | -                | 33,469,416                   |
| Office expenses                                                | 3,100,000               | 7,646,249           | -                 | -                | 7,646,249                    |
| Utilities                                                      | 7,000,000               | 7,825,064           | 54,542            | -                | 7,879,606                    |
| Rent                                                           | 1,045,623               | 1,215,363           | -                 | -                | 1,215,363                    |
| Maintenance and running cost of vehicles                       | 3,750,000               | 4,915,095           | 19,129            | -                | 4,934,224                    |
| Maintenance of building and equipment                          | 3,200,000               | 7,904,824           | 36,110            | 8,089            | 7,932,845                    |
| Training                                                       | 700,000                 | 1,140,917           | -                 | -                | 1,140,917                    |
| Information technology facilities                              | 200,000                 | 753,814             | 515               | 17,092           | 737,237                      |
| Uniform and protective clothing                                | 2,750,000               | 2,564,248           | -                 | -                | 2,564,248                    |
| Nursery and laboratory consumables                             | 325,000                 | 1,555,085           | 22,350            | -                | 1,577,435                    |
| Security services                                              | 13,000,000              | 7,906,001           | -                 | -                | 7,906,001                    |
| Other operating expenses (animal feed, fertiliser, seeds, etc) | 21,750,010              | 20,977,068          | 13,200            | 21,480           | 20,968,788                   |
| Schemes                                                        | 46,000,000              | 70,248,643          | -                 | -                | 70,248,643                   |
| Insurance non-motor                                            | 450,000                 | 452,125             | -                 | 17,959           | 434,166                      |
| Legal and professional fee                                     | 1,100,000               | 1,799,230           | -                 | 30,000           | 1,769,230                    |
| Chairman and board members fee                                 | 575,000                 | 1,374,768           | 41,350            | -                | 1,416,118                    |
| <b>Total expenditure</b>                                       | <b>477,370,489</b>      | <b>477,158,771</b>  | <b>37,026,083</b> | <b>94,620</b>    | <b>514,090,233</b>           |

### STATEMENT OF COMPARISON OF BUDGET AND ACTUAL AMOUNTS

FOR THE YEAR ENDED 30 JUNE 2023

|                                     | Original Budget    | Revised Budget     | Actual<br>Received/Paid | Difference Revised<br>Budget and Actual | Remarks                                                                                                         |
|-------------------------------------|--------------------|--------------------|-------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|                                     | Rs                 | Rs                 | Rs                      | Rs                                      |                                                                                                                 |
| <b>Revenue</b>                      |                    |                    |                         |                                         |                                                                                                                 |
| Government Grant                    | 386,800,000        | 386,800,000        | 387,100,536             | (300,536)                               | Includes funds received for YEP allowance                                                                       |
| Capital Grant                       | 88,300,000         | 88,300,000         | 55,781,999              | 32,518,001                              | The Government share of DeSIRA project was not disbursed                                                        |
| Schemes                             | 46,000,000         | 46,000,000         | 79,427,415              | (33,427,415)                            | Additional funds disbursed under National Resilience Fund for fruit protection and sheltered farming schemes    |
| Other Income                        | 10,000,000         | 10,000,000         | 13,688,450              | (3,688,450)                             | Favourable variance generated from sales and release of funds for implementation of project from donor agencies |
|                                     | <b>531,100,000</b> | <b>531,100,000</b> | <b>535,998,400</b>      |                                         |                                                                                                                 |
| <b>Expenditure</b>                  |                    |                    |                         |                                         |                                                                                                                 |
| Salaries and other related costs    | 262,482,466        | 262,482,466        | 241,587,224             | 20,895,242                              | Savings arising due to retirement of officers and non-filling of vacancies.                                     |
| Pension cost (SICOM)                | 63,788,843         | 63,788,843         | 56,821,118              | 6,967,725                               |                                                                                                                 |
| Passage benefits                    | 12,320,000         | 12,320,000         | 7,271,666               | 5,048,334                               | Decrease due to previous cashing of passage benefits                                                            |
| Travelling and Transport            | 33,833,547         | 33,833,547         | 33,200,270              | 633,277                                 | Savings due to retirement and non-filling of vacancies                                                          |
| Office Expenses                     | 10                 | 3,100,000          | 7,646,249               | (4,546,249)                             | Overspent on overseas study tours financed under DeSIRA                                                         |
| Utilities                           | 10                 | 7,000,000          | 7,825,064               | (825,064)                               | Increase in electricity charges by CEB                                                                          |
| Rent                                | 10                 | 1,045,623          | 1,215,363               | (169,740)                               | Increase in rental charge by MCIA for sub offices                                                               |
| Maintenance & Running cost vehicles | 10                 | 3,750,000          | 4,915,095               | (1,165,095)                             | Budgeted amount under estimated, increase in repairs and maintenance costs                                      |

|                                                                | Original Budget    | Revised Budget     | Actual Received/Paid | Difference Revised Budget and Actual |                                                                                                                                            |
|----------------------------------------------------------------|--------------------|--------------------|----------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                | Rs                 | Rs                 | Rs                   | Rs                                   |                                                                                                                                            |
| Maintenance of Building & Equipment                            | 10                 | 3,200,000          | 7,904,824            | (4,704,824)                          | Overspent amount financed under capital budget                                                                                             |
| Training                                                       | 10                 | 700,000            | 1,140,917            | (440,917)                            | Increase in training activities for farmers. Staff training funded under projects                                                          |
| Information Technology Facilities                              | 10                 | 200,000            | 753,814              | (553,814)                            | Increase due to hosting of websites and maintenance contract. Budget understated                                                           |
| Uniform and protective clothing                                | 10                 | 2,750,000          | 2,564,248            | 185,752                              | Savings due to non-filling of vacancies                                                                                                    |
| Nursery & Laboratory consumables                               | 10                 | 325,000            | 1,555,085            | (1,230,085)                          | Overspent due to additional consumables purchased for seed potato certification and implementation of Food Sec Semence (UN funded) project |
| Security services                                              | 10                 | 13,000,000         | 7,906,001            | 5,093,999                            | New security contract not yet awarded due to on going bidding exercise. Previous contract extended                                         |
| Other operating expenses (animal feed, fertilizer, seeds, etc) | 14,375,004         | 21,750,010         | 20,977,068           | 772,942                              | Savings from this item were used to finance deficit on nursery and laboratory consumables and rent                                         |
| Schemes                                                        | 46,000,000         | 46,000,000         | 70,248,643           | (24,248,643)                         | Overspent financed from unutilized funds from previous years and under National Resilience Fund                                            |
| Insurance non-motor                                            | 10                 | 450,000            | 452,125              | (2,125)                              |                                                                                                                                            |
| Legal & Professional Fee                                       | 10                 | 1,100,000          | 1,799,230            | (699,230)                            | Budget was underestimated for audit fee, selection panel and bid evaluation committee fees                                                 |
| Chairman and Board members fee                                 | 10                 | 575,000            | 1,374,768            | (799,768)                            | Increase due to revised fee payable to Board Members                                                                                       |
| <b>Total Expenditure</b>                                       | <b>432,799,990</b> | <b>477,370,489</b> | <b>477,158,772</b>   | <b>211,717</b>                       |                                                                                                                                            |

## NOTES TO THE ACCOUNT FOR YEAR ENDED 30 JUNE 2023

### 1A GENERAL INFORMATION ON REPORTING ENTITY

The Food and Agricultural Research and Extension Institute (FAREI), a body corporate which operates under the aegis of the Ministry of Agro Industry and Food Security, was established on 14 February 2014 and is regulated by the **Food and Agricultural Research and Extension Institute Act 2013**.

The establishment of the FAREI was to take over the activities of the Food and Agricultural Research Council (FARC), including the Agricultural Research and Extension Unit (AREU).

The objects of FAREI is to introduce, develop and promote such novel technologies in the food and non-sugar agricultural sector as may be approved by the Minister; to coordinate, promote and harmonise research activities in non-sugar agriculture, food production and forestry; promote and encourage agricultural and agribusiness development, through the setting up of agricultural youth clubs and agricultural entrepreneur clubs; and promote dissemination and practical application of the results of any research undertaken under the FAREI Act.

The Institute's principal place of business is at Reduit.

### 1B STATEMENT OF COMPLIANCE AND BASIS OF PREPARATION OF THE FINANCIAL STATEMENTS

#### a. Statement of compliance

The financial statements have been prepared in accordance with and comply with the International Public Sector Accounting Standards (IPSASs) issued by the International Public Sector Accounting Standards Board (IPSASB) which is a Board of the International Federation of Accountants Committee (IFAC).

Where an IPSAS does not address a particular issue, the appropriate International Financial Reporting Standards (IFRSs) and International Accounting Standards (IAS) of the International Accounting Standards Board (IASB) are applied.

#### b. Basis of preparation

The financial statements have been prepared on an accrual and on a going concern basis. The accounting policies have been applied consistently throughout the period. The measurement base applied is historical cost adjusted for revaluation of assets.

The presentation of Financial Statements as per IPSAS1 comprises:

- Statement of Financial Position
- Statement of Financial Performance
- Statement of changes in net assets and equity
- Cash Flow Statement
- Statement of comparison of actual and budget amounts, and
- Notes comprising of significant accounting policies and other explanatory notes

#### c. Reporting period

The financial statements and comparative figures cover transactions for twelve months period from 01 July to 30 June.

#### d. Level of rounding

The figures in the Financial Statements have been rounded to the nearest rupee.

#### e. Cash Flow

The Cash Flow Statement is prepared using indirect method.

**f. Standards issued to IPSAS but not yet effective**

IPSAS 41 - Financial Instruments – Effective as from January 2023 – date of issue: August 2018

IPSAS 42 - Social Benefits – Effective as from January 2023 – date of issue: January 2019

The Institute anticipates that the adoption of these Standards for the year ended 30 June 2023 and in future periods will have no material impact on the Financial Statements.

**g. Presentation currency**

The Financial Statements have been prepared and presented in Mauritian Rupee (Rs), which is the functional and reporting currency of the Institute.

**2. ACCOUNTING POLICIES**

**a. Revenue Recognition**

**Revenue from exchange transactions**

Revenue from sales, services provided and training activities are being recognised when the transactions have been performed and are billable.

**Revenue from non-exchange transactions**

Assets and revenue arising from transfer transactions are recognised in accordance with the requirement of IPSAS23, revenue from non-exchange transactions (taxes and transfers) and includes any grants (transfers) from Government and other institutions.

Advances received from non-exchange transactions are recognised as liability. The amortised amount of advances is treated as revenue in the Statement of Financial Performance.

**b. Property, Plant and Equipment**

Property, plant and equipment are stated at historical cost less accumulated depreciation. Historical cost is the amount of cash or cash equivalents paid to acquire an asset at the time of acquisition.

Property, plant and equipment valued at Rs10,000 and above are capitalised and treated as fixed assets. Depreciation is provided on straight line basis so as to write-off the depreciable value of the assets over their expected useful economic lives. Depreciation has been provided for in the month following the month of purchase.

No depreciation is provided in the month of disposal.

The annual rates of depreciation are as follows:

|                                                             |     |
|-------------------------------------------------------------|-----|
| Buildings                                                   | 2%  |
| Office equipment                                            | 20% |
| Furniture and fittings                                      | 10% |
| Infrastructure Assets                                       | 10% |
| Field equipment                                             | 25% |
| Heavy duty field equipment                                  | 20% |
| Motor vehicle                                               | 20% |
| Computer hardware                                           | 20% |
| Laboratory equipment                                        | 15% |
| Food processing and PCR Laboratory                          | 15% |
| Greenhouse                                                  | 25% |
| Greenhouse equipment, fog unit and polycarbonate greenhouse | 10% |

**c. Intangible Assets**

Intangible assets comprise computer software which is recorded at cost. Computer software is amortised using straight line method over a useful life of five years (20%). Cost incurred towards licence renewal is expensed.

**d. Impairment of non-current assets**

At the balance sheet date, the carrying amount of tangible assets was reviewed to determine whether there was an indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss and the carrying amount of the asset is reduced to its recoverable amount.

**e. Inventories**

FAREI holds cattle and goats on its livestock research stations at Curepipe and Belle Mare. The animals are kept for research purposes and can be sold at any time depending on physiological status and when in excess of requirement for production.

The animals are evaluated on live weight basis at a predetermined selling price.

**f. Operating Lease**

Rentals payable under operating lease agreements are charged to the Statement of Financial Performance on straight line basis over the term of the relevant lease.

Operating leases are leases and assets, the ownership of which is retained by the lessor (see note 28).

**g. Leasehold Land and Building**

Land occupied by the Institute is owned by the Ministry of Agro Industry and Food Security and has not been capitalised.

The buildings occupied by FAREI, apart from the Head Office building at Reduit, the Tissue Culture Laboratory and the Farmers Training School at Wooton, belong to the Ministry and are as such not reflected in the Financial Statements. However, buildings and structures that have been refurbished or constructed during the financial period under review, are reflected in the financial statements.

**h. Transaction and balances**

Foreign currency transactions are translated into the measurement currency using the exchange rates prevailing at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such transactions and from the translation at year end exchange rates of monetary assets and liabilities denominated in foreign currency are recognised in the surplus/deficit.

**i. Employee Benefits**

All permanent employees of FAREI have pension plans which are managed by the State Insurance Company of Mauritius Limited.

**i. Defined Benefit Pension**

Provision for retirement benefits to employees of the FAREI is made under the Statutory Bodies Pension Funds Act, as subsequently amended. The scheme is a Defined Benefit Pension for employees who joined

FAREI prior to 2013. The contribution rate by employees is 6% and 19% for employer. The cost of providing benefits is actuarially determined using the projected unit credit method (see note 19).

The present value of these funded obligations is recognised in the Statement of Financial Position as a non-current liability after adjusting for the fair value of plan assets, any unrecognised actuarial gains and losses and any unrecognised past service cost.

The net total of the current service cost, interest cost, expected returns on plan assets, current service cost, any recognised actuarial gains and losses, any recognised past service cost and the effect of any curtailment or settlement is recognised in the Statement of Financial Performance.

#### ii. Defined Contribution Scheme

As from January 2013, the Public Pensions Defined Contribution Pension Scheme (PPDCS) was set up. Consequently, with effect from January 2013, all new entrants shall join the new PPDCS and shall earn benefits according to the new provisions as compared to existing members who shall continue to be members of the existing Defined Pension Scheme (DPS) and earn benefits accordingly. The contribution rate for the PPDCS is 6% for employees and 12% for employers.

FAREI makes separate contribution into the two pension plans.

#### iii. Contribution Sociale Généralisée (CSG)

With the changes brought by the Finance (Miscellaneous Provisions) Act 2020, the Contribution Sociale Généralisée (CSG), has been introduced and was applicable as from the month of September 2020. This new system of social contributions replaced the National Pensions Fund (NPF).

Under the CSG, Public Sector employees are exempt from the contribution. FAREI contributes 4.5% of salaries for employees earning a basic salary not exceeding Rs50,000 in a month and 9% for employees earning a basic salary exceeding Rs50,000 in a month.

#### iv. State Pension Plan

Contribution to the National Pension Fund (NPF) on behalf of temporary and contract employees are expensed in the Statement of Financial Performance in the period in which they fall due. As from September 2020, the NPF has been replaced by CSG.

#### v. Family Protection Scheme

A Family Protection Scheme exists at the FAREI whereby 4% of monthly salary of each employee on a permanent and pensionable establishment is paid to either the Civil Service Family Protection Scheme or the State Insurance Company of Mauritius Limited (SICOM) which manage the scheme. A contribution of 2% respectively by FAREI and the employee is made towards the schemes. (See note 24).

#### vi. Other Employee Benefits

Other employee benefits include accumulated sick leave, passage benefits and refund of unutilized vacation leave.

Employees are allowed to accumulated sick leaves not taken at the end of each year up to a maximum of 110 days, in a sick leave bank as at 30 June 2023. The balance of banked sick leave is valued at the end of the financial year and is recognized as long term payables. Beyond the ceiling of 110 days, officers are refunded part of the annual entitlement of sick leaves up to a maximum of 16 days, not taken at the end of every calendar year and is expensed to the Statement of Financial Performance.

A provision is made for the estimated liability for passage benefits. The passage benefit for each staff is valued at year end and is included as short term liabilities. The annual increase in passage benefit is expensed to the Statement of Financial Performance.

Vacation leave has been computed for all permanent and pensionable staff.

**j. Key Management Personnel Compensation**

Key management personnel are those persons having authority and responsibility of planning, directing and controlling the activities of the Institute, directly or indirectly, including directors (whether executive or otherwise) of the Institute.

The compensation paid to key management personnel is based on the recommendation of the Pay Research Bureau Report.

**k. Provisions**

Provisions are recognised when there is a present or constructive obligation as a result of past events which it is probable will result in an outflow of economic benefits that can be reasonably estimated.

**l. Use of estimates and judgement**

The preparation of financial statements, in accordance with the International Public Sector Accounting Standards requires the use of estimates and assumptions that affect the reported amounts of assets and liabilities and disclosures of contingent assets and liabilities at the date of the Financial Statement and the reported amounts of revenues and expenses during the reporting period. Although these estimates are based on management's best knowledge of current events and actions, actual results ultimately may differ from these estimates.

**m. Car Loan**

Car loan is granted to eligible officers at the rate of 3% per annum. The funding of the loan is from the Ministry by way of advance to FAREI which is subsequently advanced to employees.

**n. Presentation of budget information in financial statements**

The Institute presents its approved budget on a cash basis and the financial statements on an accrual basis. The budget is approved on a cash basis by classification and by nature. The approved budget covers the period 1 July 2022 to 30 June 2023.

**3. RELATED PARTY TRANSACTIONS**

Related parties are considered to be related if one party has the ability to control the other party and exercise significant influence over the party in making financial operating decisions. The immediate and ultimate controlling party of the Institute is the Government of Mauritius.

Transactions undertaken with related parties were at arms' length. One board member was granted Rs50,000 under the plastic/net replacement scheme.

**4. FOREIGN CURRENCIES**

Transactions denominated in foreign currencies are translated into Mauritian Rupees and recorded at the rate of exchange prevailing at the date of the transactions. Balances at the end of the financial period denominated in foreign currencies are translated into Mauritian Rupees at the rate prevailing at that date.

## 5. RISK MANAGEMENT POLICIES

A description of the various risks to which the FAREI is exposed, as well as the approach taken by management to control and mitigate those risks is shown below.

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Liquidity Risk</i>              | This refers to the possibility of default by the FAREI to meet its obligations because of the unavailability of funds to meet both operational and capital requirements. There is a cash management system to ensure that the FAREI is able to fund its expenditure in a timely manner and meet its obligations as they fall due. To secure liquidity, FAREI benefit from credit facilities provided by suppliers.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>Credit Risk</i>                 | Credit risk relates to the possibility of default by employees in settling their loan obligations towards the FAREI. The FAREI has established a “lien” policy on cars purchased by those employees who benefit from such car loans.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>Currency Risk</i>               | Fund received in foreign currency is kept in a foreign currency account in order to mitigate the risk of loss in exchange rate. Operating transactions are effected from a rupee account for externally funded project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>Actuarial Risk</i>              | FAREI has pension plans and insurance cover for its employees and assets. These plans are exposed to actuarial risks such as: investment risk, interest rate risk, longevity risk and salary risk.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>Health and safety Risk</i>      | FAREI complies with provisions of the OSHA 2005 so as to provide a safe working environment for its employees. Management of Safety and Health issues is effected by the Safety and Health Committee which provides the appropriate platform for both Management and Unions. On the operational side, Health Surveillance is being undertaken for all employees who may be exposed to hazards by virtue of their duties. MSB certified personal protective equipment are provided to employees. Risk Assessments are duly carried out at all sites and Material Safety Data Sheets are available on each site.<br><br>With the emergence of the COVID 19 pandemic, FAREI has devised protocols which are being implemented in line with parameters set by the Government to curtail the risk of spread of the Corona virus at the workplace. |
| <i>Legal and Regulatory Risk</i>   | Legal risk is the risk of financial or reputational loss that can result from non-compliance to legal requirement either from lack of awareness or misunderstanding of, ambiguity in, or reckless indifference to, the way law and regulation apply. To mitigate such risk an annual retainer fee is paid to Solicitor General to provide assistance on legal matters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>External and strategic Risk</i> | Strategic risk refers to the internal and external events that may make it difficult, or even impossible, for the Institute to achieve its objectives and strategic goals. The internal risks, like employee turnover is addressed through the Institute’s succession planning and recruitment policy. The impact of external risks which are outside the control of FAREI or resulting from a change in legislation is mitigated through Government intervention/assistance to ensure continuity.                                                                                                                                                                                                                                                                                                                                           |

|                                                                                                                                                                                                                          | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|
| <b>6. CASH AND CASH EQUIVALENTS</b>                                                                                                                                                                                      |                               |                               |
| Cash at Bank                                                                                                                                                                                                             | 159,897,385                   | 146,958,157                   |
| Cash in hand                                                                                                                                                                                                             | 29,125                        | 25,434                        |
|                                                                                                                                                                                                                          | <b>159,926,510</b>            | <b>146,983,591</b>            |
| <b>7. RECEIVABLES – CURRENT ASSETS</b>                                                                                                                                                                                   |                               |                               |
| Debtors - car loan                                                                                                                                                                                                       | 7,007,896                     | 8,184,092                     |
| Grant receivable from MAIFS                                                                                                                                                                                              | 4,457,313                     | -                             |
| Sundry debtors                                                                                                                                                                                                           | 6,249                         | 96,715                        |
| Debtors - chargeable services                                                                                                                                                                                            | 1,492,717                     | 1,585,017                     |
|                                                                                                                                                                                                                          | <b>12,964,175</b>             | <b>9,865,824</b>              |
| <b>8. INVENTORIES IN PROGRESS</b>                                                                                                                                                                                        |                               |                               |
| Inventories comprise of animals held for research                                                                                                                                                                        |                               |                               |
| Animals                                                                                                                                                                                                                  | <b>8,877,100</b>              | -                             |
| <b>9. PREPAYMENT</b>                                                                                                                                                                                                     |                               |                               |
| Prepayments are recognised as financial assets when payment for goods and services has been made in advance of obtaining a right to access those goods or services. Prepayments were made with respect to the following: |                               |                               |
| Insurance                                                                                                                                                                                                                | 17,959                        | 17,748                        |
| Rent                                                                                                                                                                                                                     | 48,000                        | 48,000                        |
| Maintenance Contract                                                                                                                                                                                                     | 200,142                       | 153,481                       |
| Legal and professional fee                                                                                                                                                                                               | 30,000                        | 30,000                        |
|                                                                                                                                                                                                                          | <b>296,101</b>                | <b>249,229</b>                |
| <b>10. RECEIVABLES – NON-CURRENT ASSETS</b>                                                                                                                                                                              |                               |                               |
| Grant receivable from MAIFS                                                                                                                                                                                              | 1,049,143                     | 377,193                       |
| Debtors-car loan falling due more than one year                                                                                                                                                                          | 17,299,450                    | 20,546,387                    |
|                                                                                                                                                                                                                          | <b>18,348,593</b>             | <b>20,923,580</b>             |

## 11. PROPERTY, PLANT AND EQUIPMENT

|                                 | Buildings  | Furniture and Fittings | Office Equipment | Computer Hardware | Infrastructure Assets | Motor Vehicle and Heavy Duty Field Equipment | Laboratory Furniture, Fittings and Equipment | Fog Unit and Polycarbonate and Hydroponic Greenhouse | Food Processing and PCR Laboratory | Light Field Equipment | Total        |
|---------------------------------|------------|------------------------|------------------|-------------------|-----------------------|----------------------------------------------|----------------------------------------------|------------------------------------------------------|------------------------------------|-----------------------|--------------|
|                                 | Rs         | Rs                     | Rs               | Rs                | Rs                    | Rs                                           | Rs                                           | Rs                                                   | Rs                                 | Rs                    | Rs           |
| <b>Cost and Valuation</b>       |            |                        |                  |                   |                       |                                              |                                              |                                                      |                                    |                       |              |
| At cost as at 01 July 2022      | 41,067,721 | 9,046,480              | 9,468,954        | 8,452,026         | 30,883,506            | 41,293,891                                   | 18,816,615                                   | 30,597,778                                           | 3,296,454                          | 7,797,292             | 200,720,719  |
| Additions                       | -          | 188,472                | 1,630,040        | 1,957,909         | 13,227,621            | -                                            | 3,623,164                                    | 11,779,355                                           | 117,985                            | 4,905,388             | 37,429,934   |
| Disposal                        | -          | (5,756,011)            | (3,587,014)      | (3,796,988)       | -                     | -                                            | (9,190,388)                                  | -                                                    | (41,001)                           | (1,337,489)           | (23,708,891) |
| At cost as at 30 June 2023      | 41,067,721 | 3,478,941              | 7,511,980        | 6,612,947         | 44,111,127            | 41,293,891                                   | 13,249,391                                   | 42,377,133                                           | 3,373,438                          | 11,365,191            | 214,441,761  |
| <b>Depreciation</b>             |            |                        |                  |                   |                       |                                              |                                              |                                                      |                                    |                       |              |
| Depreciation as at 01 July 2022 | 12,834,678 | 5,784,653              | 6,178,676        | 6,065,673         | 8,414,311             | 36,605,827                                   | 13,774,209                                   | 26,513,390                                           | 1,636,934                          | 3,222,657             | 121,031,010  |
| Charge for the year             | 821,355    | 336,769                | 1,284,494        | 891,692           | 3,526,673             | 3,036,546                                    | 1,733,084                                    | 3,558,687                                            | 501,048                            | 2,155,544             | 17,845,893   |
| Disposal                        | -          | (5,756,011)            | (3,587,014)      | (3,796,988)       | -                     | -                                            | (9,190,388)                                  | -                                                    | (41,001)                           | (1,023,441)           | (23,394,843) |
| Depreciation as at 30 June 2023 | 13,656,033 | 365,411                | 3,876,156        | 3,160,377         | 11,940,984            | 39,642,373                                   | 6,316,905                                    | 30,072,077                                           | 2,096,981                          | 4,354,761             | 115,482,059  |
| <b>Carrying Amount</b>          |            |                        |                  |                   |                       |                                              |                                              |                                                      |                                    |                       |              |
| As at 30 June 2023              | 27,411,688 | 3,113,530              | 3,635,824        | 3,452,570         | 32,170,143            | 1,651,518                                    | 6,932,486                                    | 12,305,056                                           | 1,276,457                          | 7,010,431             | 98,959,702   |
| As at 30 June 2022              | 28,233,043 | 3,261,827              | 3,290,278        | 2,386,352         | 22,469,195            | 4,688,064                                    | 5,042,406                                    | 4,084,389                                            | 1,659,520                          | 4,574,634             | 79,689,708   |

|                                                                              | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|------------------------------------------------------------------------------|-------------------------------|-------------------------------|
| <b>12. WORK IN PROGRESS</b>                                                  |                               |                               |
| This relates to ongoing infrastructure works                                 |                               |                               |
| Changing room & conversion of ex quarter into office at Curepipe LRS         | -                             | 153,320                       |
| Payroll and HR system                                                        | 285,604                       | 285,604                       |
| Construction of building head office                                         | 26,086,796                    | 14,686,377                    |
| Construction of garage at Richelieu                                          | 150,020                       | 150,020                       |
| Rooftop rainwater harvesting                                                 | 242,636                       | 242,636                       |
| Biogas unit at Curepipe LRS                                                  | 810,835                       | -                             |
| Toilet facilities at Wootton and TC Lab                                      | 249,891                       | -                             |
| Nursery facilities -Tissue Culture Lab                                       | 54,213                        | -                             |
| Data repository                                                              | 799,961                       | -                             |
| Compost unit at Flacq                                                        | 262,578                       | 76,196                        |
|                                                                              | 28,942,534                    | 15,594,153                    |
| <b>13. INTANGIBLE ASSETS – SOFTWARE COSTS</b>                                |                               |                               |
| Software costs are capitalized in accordance with the provisions of IPSAS 31 |                               |                               |
| At cost as at 01 July 2022                                                   | 701,826                       | 701,826                       |
| Additions                                                                    | -                             | -                             |
| Disposal                                                                     | (304,377)                     | -                             |
| At cost as at 30 June 2023                                                   | 397,449                       | 701,826                       |
| Amortisation as at 01 July 2022                                              | 549,171                       | 473,656                       |
| Amortisation for the year                                                    | 66,243                        | 75,515                        |
| Eliminated on disposal                                                       | (304,377)                     | -                             |
| Amortisation as at 30 June 2023                                              | 311,037                       | 549,171                       |
| <b>Written down value as at 30 June 2023</b>                                 | <b>86,412</b>                 | <b>152,656</b>                |
| <b>14. PAYABLES</b>                                                          |                               |                               |
| Creditors falling due within one year                                        | 1,403,917                     | 626,600                       |
| Accruals                                                                     | 6,375,835                     | 5,764,773                     |
|                                                                              | <b>7,779,752</b>              | <b>6,391,373</b>              |
| <b>15. CURRENT PORTION OF LONGTERM BORROWING</b>                             |                               |                               |
| Car loan falling due within one year                                         | <b>8,406,849</b>              | <b>8,184,092</b>              |
| <b>16. EMPLOYEE BENEFIT</b>                                                  |                               |                               |
| Sick Leave                                                                   | 17(a) 7,370,745               | 7,308,107                     |
| Passage Benefits                                                             | 17(b) 8,768,891               | 8,338,057                     |
| Vacation Leave                                                               | 17(c) 211,985                 | 1,201,307                     |
|                                                                              | <b>16,351,621</b>             | <b>16,847,471</b>             |

|                                                                             |       | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|-----------------------------------------------------------------------------|-------|-------------------------------|-------------------------------|
| <b>17. EMPLOYEE BENEFIT (LONG TERM)</b>                                     |       |                               |                               |
| Provision for sick leave                                                    | 17(a) | 71,794,012                    | 64,737,381                    |
| Provision for passage benefits                                              | 17(b) | 16,285,082                    | 15,484,963                    |
| Provision for vacation leave                                                | 17(c) | 73,357,834                    | 70,721,535                    |
|                                                                             |       | <b>161,436,929</b>            | <b>150,943,879</b>            |
| <b>17(a) Provision for sick leave</b>                                       |       |                               |                               |
| Opening balance                                                             |       | 72,045,488                    | 69,449,255                    |
| Less: Payment during the year                                               |       | (11,687,236)                  | (8,391,175)                   |
| Add: Provisions for the year                                                |       | 18,806,506                    | 10,987,408                    |
| Closing balance                                                             |       | 79,164,758                    | 72,045,488                    |
| Less Amount falling due within one year                                     |       | (7,370,745)                   | (7,308,107)                   |
| Amount falling due more than one year                                       |       | 71,794,012                    | 64,737,381                    |
| <b>17(b) Provision for passage benefits</b>                                 |       |                               |                               |
| Opening balance                                                             |       | 23,823,020                    | 27,174,598                    |
| Less: Payment during the year                                               |       | (7,624,347)                   | (11,947,211)                  |
| Add: Provisions for the year                                                |       | 8,855,300                     | 8,595,633                     |
| Closing balance                                                             |       | 25,053,973                    | 23,823,020                    |
| Less Amount falling due within one year*                                    |       | (8,768,891)                   | (8,338,057)                   |
| Amount falling due more than one year                                       |       | 16,285,082                    | 15,484,963                    |
| * It is assumed 35% of the provision shall be payable within one year       |       |                               |                               |
| <b>17(c) Provision for vacation leave</b>                                   |       |                               |                               |
| Opening balance                                                             |       | 71,922,842                    | 71,748,593                    |
| Less: Payment during the year                                               |       | (3,055,764)                   | (721,229)                     |
| Add: Provisions for the year                                                |       | 4,702,741                     | 895,478                       |
| Closing balance                                                             |       | 73,569,819                    | 71,922,842                    |
| Less Amount falling due within one year                                     |       | (211,985)                     | (1,201,307)                   |
| Amount falling due more than one year                                       |       | 73,357,834                    | 70,721,535                    |
| <b>18. LONG TERM BORROWING</b>                                              |       |                               |                               |
| Car loan amount falling due more than one year                              |       | <b>17,299,474</b>             | <b>20,546,410</b>             |
| <b>19. DEFINED BENEFIT PENSION</b>                                          |       |                               |                               |
| Employee benefit                                                            |       | <b>734,127,855</b>            | <b>623,996,980</b>            |
| <b>Employee benefit statement as per IPSAS 39</b>                           |       |                               |                               |
| <b>Amounts recognised in statement of financial position at end of year</b> |       |                               |                               |
| Defined benefit obligation                                                  |       | 1,234,834,951                 | 1,106,818,618                 |
| Fair value of plan assets                                                   |       | (500,707,096)                 | (482,821,638)                 |
| Liability recognized in statement of financial position at end of year      |       | <b>734,127,855</b>            | <b>623,996,980</b>            |

|                                                                  | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|------------------------------------------------------------------|-------------------------------|-------------------------------|
| <b>Amounts recognised in statement of financial performance:</b> |                               |                               |
| Service cost:                                                    |                               |                               |
| Current service cost                                             | 35,610,980                    | 33,896,009                    |
| (Employee contributions)                                         | (10,309,402)                  | (10,913,852)                  |
| Fund expenses                                                    | 982,556                       | 901,671                       |
| Net interest expense / (revenue)                                 | 32,261,068                    | 23,674,628                    |
| P & L charge                                                     | 58,545,202                    | 47,558,456                    |
| <b>Remeasurement</b>                                             |                               |                               |
| Liability (gain) / loss                                          | 80,123,121                    | 108,158,024                   |
| Assets (gain) / loss                                             | 4,108,427                     | 24,420,770                    |
| Net assets / equity (NAE)                                        | 84,231,548                    | 132,578,794                   |
| <b>Total</b>                                                     | <b>142,776,750</b>            | <b>180,137,250</b>            |

**Movements in liability recognized in financial position:**

|                                  |                    |                    |
|----------------------------------|--------------------|--------------------|
| At start of year                 | 623,996,980        | 478,029,433        |
| Amount recognized in P&L         | 58,545,201         | 47,558,456         |
| (Contributions paid by employer) | (32,645,875)       | (34,169,703)       |
| Amount recognized in NAE         | 84,231,548         | 132,578,795        |
| At end of year                   | <b>734,127,855</b> | <b>623,996,981</b> |

The plan is a defined benefit arrangement for the employees and it is a funded plan. The assets of the funded plan are held independently and administered by the SICOM Ltd.

**Reconciliation of the present value of defined benefit obligation**

|                                                |               |               |
|------------------------------------------------|---------------|---------------|
| Present value of obligation at start of period | 1,106,818,618 | 952,259,738   |
| Current service cost                           | 35,610,980    | 33,896,009    |
| Interest cost                                  | 57,992,058    | 47,612,987    |
| (Benefits paid)                                | (45,709,826)  | (35,108,140)  |
| Liability (gain)/loss                          | 80,123,121    | 108,158,024   |
| Present value of obligation at end of period   | 1,234,834,951 | 1,106,818,618 |

**Reconciliation of fair value of plan assets**

|                                                      |              |              |
|------------------------------------------------------|--------------|--------------|
| Fair value of plan assets at start of period         | 482,821,638  | 474,230,305  |
| Expected return on plan assets                       | 25,730,990   | 23,938,359   |
| Employer contributions                               | 32,645,875   | 34,169,703   |
| Employee contributions                               | 10,309,402   | 10,913,852   |
| (Benefits paid and other outgo)                      | (46,692,381) | (36,009,811) |
| Asset gain/(loss)                                    | (4,108,427)  | (24,420,770) |
| Estimated Fair value of plan assets at end of period | 500,707,097  | 482,821,638  |

**Distribution of plan assets at end of period**

|                                            |      |      |
|--------------------------------------------|------|------|
| <i>Percentage of assets at end of year</i> | %    | %    |
| Fixed interest securities and deposits     | 53.9 | 58.0 |
| Loans                                      | 2.8  | 2.9  |
| Local equities                             | 14.0 | 13.6 |

|                             | Year Ended<br>June 2023 | Year Ended<br>June 2022 |
|-----------------------------|-------------------------|-------------------------|
|                             | Rs                      | Rs                      |
| Overseas bonds and equities | 28.8                    | 25.0                    |
| Property                    | 0.5                     | 0.5                     |
| Total                       | 100.0                   | 100.0                   |

**Additional disclosure on assets issued or used by the reporting entity**

| <i>Percentage of assets at end of year</i>            | % | % |
|-------------------------------------------------------|---|---|
| Assets held in the entity's own financial instruments | 0 | 0 |
| Property occupied by the entity                       | 0 | 0 |
| Other assets used by the entity                       | 0 | 0 |

**Components of the amount recognized in NAE**

| Year                                                 | Rs           | Rs            |
|------------------------------------------------------|--------------|---------------|
| Currency                                             |              |               |
| Assets experience gain / (loss) during the period    | (4,108,427)  | (24,420,770)  |
| Liability experience gain / (loss) during the period | (80,123,121) | (108,158,024) |
|                                                      | (84,231,548) | (132,578,794) |

| Year                            | 2023/2024  |
|---------------------------------|------------|
| Expected employer contributions | 34,251,549 |

Weighted average duration of the defined benefit obligation 16 years

(Calculated as a % change in PV of liabilities for a 1% change in discount rate)

The plan is exposed to actuarial risks such as investment risk, interest rate risk, longevity risk and salary risk.

The cost of providing the benefits is determined using the Projected Unit Method. The principal assumptions used for the purpose of the actuarial valuation were as follows:

|                             | Year Ended<br>June 2023              | Year Ended<br>June 2022 |
|-----------------------------|--------------------------------------|-------------------------|
|                             | %                                    | %                       |
| Discount rate               | 6.00                                 | 5.35                    |
| Future salary increases     | 4.50                                 | 3.50                    |
| Future pension increases    | 3.50                                 | 2.50                    |
| Mortality before retirement | Nil                                  | Nil                     |
| Mortality in retirement     | PA (90) Tables rated down by 2 years |                         |
| Retirement age              | 65 years                             |                         |

|                                                                                                                                                                                                                                             | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|
| <b>20. LIABILITIES RECOGNISED IN RESPECT OF TRANSFERS</b>                                                                                                                                                                                   |                               |                               |
| FAREI received advances from the Government and other institutions for the implementation of projects and payment of schemes to beneficiaries. As at 30 June 2023 there were on-going projects and outstanding claims due to beneficiaries. |                               |                               |
| Opening balance                                                                                                                                                                                                                             | 175,366,549                   | 189,989,694                   |
| Receipts                                                                                                                                                                                                                                    | 139,666,727                   | 90,148,433                    |
|                                                                                                                                                                                                                                             | 315,033,276                   | 280,138,127                   |
| Expenses                                                                                                                                                                                                                                    | (125,928,159)                 | (104,771,578)                 |
| Closing balance                                                                                                                                                                                                                             | <b>189,105,117</b>            | <b>175,366,549</b>            |
| Current liabilities                                                                                                                                                                                                                         | 171,256,561                   | 162,440,459                   |
| Non-current liabilities                                                                                                                                                                                                                     | 17,848,556                    | 12,926,090                    |
|                                                                                                                                                                                                                                             | <b>189,105,117</b>            | <b>175,366,549</b>            |
| <b>21. REVENUE FROM NON-EXCHANGE TRANSACTIONS: TRANSFERS FROM GOVERNMENT</b>                                                                                                                                                                |                               |                               |
| Recurrent Grant                                                                                                                                                                                                                             | 387,100,536                   | 333,315,200                   |
| Projects                                                                                                                                                                                                                                    | 34,284,533                    | 17,605,793                    |
| Schemes                                                                                                                                                                                                                                     | 69,998,044                    | 43,418,279                    |
|                                                                                                                                                                                                                                             | <b>491,383,113</b>            | <b>394,339,272</b>            |
| <b>22. REVENUE FROM NON-EXCHANGE TRANSACTIONS: TRANSFERS FROM OTHER INSTITUTIONS</b>                                                                                                                                                        |                               |                               |
| DeSIRA EU-funded project                                                                                                                                                                                                                    | 18,677,572                    | 11,418,544                    |
| UNDP                                                                                                                                                                                                                                        | 3,720,602                     | 1,725,684                     |
| Small Grant Scheme Australia                                                                                                                                                                                                                | -                             | 8,625                         |
| CIAT                                                                                                                                                                                                                                        | 1,147,406                     | 594,653                       |
|                                                                                                                                                                                                                                             | <b>23,545,580</b>             | <b>13,747,506</b>             |
| <b>23. REVENUE FROM EXCHANGE TRANSACTIONS SALES OF PRODUCE AND RENDERING OF SERVICES</b>                                                                                                                                                    |                               |                               |
| Sales of booklets and publications                                                                                                                                                                                                          | 342,355                       | 103,937                       |
| Sales of animals                                                                                                                                                                                                                            | 1,231,079                     | 1,852,284                     |
| Sales of vegetables and produce                                                                                                                                                                                                             | 3,937,762                     | 3,671,568                     |
| Sales of milk and manure                                                                                                                                                                                                                    | 5,290,700                     | 3,774,582                     |
| Revenue from testing and diagnosis                                                                                                                                                                                                          | 205,805                       | 420,735                       |
| Training and registration fee                                                                                                                                                                                                               | 383,065                       | 265,750                       |
| Sundry Income                                                                                                                                                                                                                               | 2,297,684                     | 835,121                       |
|                                                                                                                                                                                                                                             | <b>13,688,450</b>             | <b>10,923,977</b>             |
| <b>24. REVENUE FROM EXCHANGE TRANSACTIONS</b>                                                                                                                                                                                               |                               |                               |
| Other revenue: Exchange gain                                                                                                                                                                                                                | 1,765,265                     | -                             |

|                                             |       | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|---------------------------------------------|-------|-------------------------------|-------------------------------|
| <b>25. SALARIES AND EMPLOYEE BENEFITS</b>   |       |                               |                               |
| Salaries and other benefits                 | 25(a) | 259,529,303                   | 242,120,435                   |
| Employer's contribution                     |       |                               |                               |
| - Defined pension contribution (DPC)        |       | 58,545,251                    | 47,558,456                    |
| - Defined contribution scheme               |       | 3,314,049                     | 2,896,694                     |
| - Civil Service Family Protection Scheme    |       | 596,167                       | 678,412                       |
| - SICOM Family Protection Scheme            |       | 3,294,213                     | 3,297,330                     |
| - NPF / EWF / Levy                          |       | 12,714,473                    | 14,025,805                    |
| - CSG                                       |       | 4,256,291                     | 2,113,323                     |
| Travelling and Transport                    |       | 33,469,416                    | 29,251,148                    |
|                                             |       | <b>375,719,162</b>            | <b>341,941,603</b>            |
| <b>25(a) Salaries and employee benefits</b> |       |                               |                               |
| Salaries                                    |       | 198,888,038                   | 197,366,342                   |
| Acting allowance                            |       | 799,565                       | 616,472                       |
| Extra remuneration                          |       | 4,332,400                     | 1,914,279                     |
| Overtime                                    |       | 3,654,384                     | 3,170,470                     |
| Other allowance                             |       | 2,689,455                     | 1,757,173                     |
| End of year bonus                           |       | 16,780,915                    | 16,520,349                    |
| Retirement / death benefits                 |       | 4,722,741                     | 925,478                       |
| Passage benefits                            |       | 8,855,300                     | 8,595,633                     |
| Sick leave                                  |       | 18,806,506                    | 10,987,408                    |
| Gratuity                                    |       | -                             | 266,831                       |
|                                             |       | <b>259,529,303</b>            | <b>242,120,435</b>            |
| <b>26. SUPPLIES AND CONSUMABLES</b>         |       |                               |                               |
| Office expenses                             |       | 4,874,616                     | 2,853,508                     |
| Electricity, water and telephone            |       | 7,879,606                     | 9,068,032                     |
| Maintenance and running of vehicles         |       | 4,934,224                     | 4,250,176                     |
| Repairs and maintenance                     |       | 7,932,845                     | 5,513,793                     |
| Uniforms and protective clothing            |       | 2,564,248                     | 2,161,770                     |
| Apparatus and supplies of laboratory        |       | 1,577,435                     | 1,724,932                     |
| On farm trial*                              |       | 461,548                       | 3,347,176                     |
| Other operating expenses                    |       | 2,322,936                     | 2,317,655                     |
| Seeds and plantlets                         |       | 1,934,752                     | 1,487,507                     |
| Animal feed, drug and fodder                |       | 10,149,239                    | 7,870,918                     |
| Fertilizers and pesticides                  |       | 2,919,368                     | 2,439,206                     |
| Small tools and equipment                   |       | 517,793                       | 944,916                       |
|                                             |       | <b>48,068,609</b>             | <b>43,979,589</b>             |

\* This relates to planting materials, tools, equipment, etc disbursed to farmers

|                                          | Year Ended<br>June 2023<br>Rs | Year Ended<br>June 2022<br>Rs |
|------------------------------------------|-------------------------------|-------------------------------|
| <b>27. DEPRECIATION AND AMORTISATION</b> |                               |                               |
| Depreciation (Note 11)                   | 17,845,893                    | 16,021,371                    |
| Amortisation (Note13)                    | 66,243                        | 75,515                        |
| Depreciation                             | <b>17,912,136</b>             | <b>16,096,886</b>             |

**28. OTHER EXPENSES**

|                                           |                   |                   |
|-------------------------------------------|-------------------|-------------------|
| Office expenses and incidental            | 3,508,870         | 1,080,948         |
| Rent (Note 28)                            | 1,215,363         | 1,041,623         |
| Training of staff                         | 450,102           | 518,525           |
| Training of farmers                       | 690,815           | 251,272           |
| Collaborative links                       | 415,147           | -                 |
| Security services                         | 7,906,001         | 7,619,826         |
| Miscellaneous expenses                    | 1,436,681         | 543,106           |
| Legal and professional fees               | 1,769,230         | 1,136,998         |
| Board members fee                         | 1,416,118         | 481,987           |
| Contribution to local organisation        | 220,840           | 1,268,863         |
| Open Day and other events                 | 574,390           | 341,515           |
| Insurance                                 | 434,166           | 434,468           |
| Books and publications                    | 10,504            | 8,558             |
| Exchange loss                             | -                 | 3,458,593         |
| Schemes                                   | 70,248,643        | 43,418,279        |
| Expenses in connection with IAEA projects | 5,590             | 219,882           |
|                                           | <b>90,302,461</b> | <b>61,824,443</b> |

**29. OPERATING LEASE**

Rent is paid for rental of office space as follows:

- a. Extension head office at St Pierre: 500 m<sup>2</sup>
- b. Goodlands sub-office: 27.2 m<sup>2</sup>
- c. Petite Rivière sub-office: 150 ft<sup>2</sup>
- d. Vacoas sub-office: 53.75 m<sup>2</sup>
- e. Long Mountain sub-office: 40.05 ft<sup>2</sup>
- f. Beau Champs sub-office: 16.17 m<sup>2</sup>
- g. Rivière du Rempart sub-office: 22.42 m<sup>2</sup>

The future minimum lease payments under non-cancellable operating leases are as follows:

|                                      | 2023<br>Rs       | 2022<br>Rs       |
|--------------------------------------|------------------|------------------|
| Up to one year                       | 1,122,913        | 1,041,623        |
| After one year and before five years | 205,000          | 665,900          |
|                                      | <b>1,327,913</b> | <b>1,707,523</b> |

**30. KEY MANAGEMENT PERSONNEL COMPENSATION**

The compensation paid to key management personnel is based on the recommendation of the Pay Research Bureau Report.

The key management personnel of FAREI comprise Chairman and board members and directorate (Acting Chief Executive Officer and Assistant Directors).

Key management personnel emoluments:

|                            | 2023      | 2022      |
|----------------------------|-----------|-----------|
|                            | Rs        | Rs        |
| Chairman and board members | 1,374,768 | 481,987   |
| Directorate                | 6,149,820 | 5,765,490 |

**31. CONTINGENT LIABILITIES**

**Pending Litigation**

As at 30 June 2023, there was no litigation, claims, judgement, settlements or transactions or changes in the business activities and policies of the FAREI that might have significant effect on the FAREI's financial statement.

**Bank Guarantee**

As at 30 June 2023, the FAREI provided a guarantee in favour of the Mauritius Revenue Authority for the issue of a license to operate stills at the Plant Pathology Laboratory and the Soil Laboratory for Rs10,000 respectively.

**32. EVENTS AFTER REPORTING DATE – IPSAS 14**

There were no events after 30 June 2023 that would affect the financial position of FAREI.

## Section 6: Publications

### 1.0 Fact Sheet/Recommendation Sheet

- Hybrid onion variety 243
- Hybrid onion variety SON1807
- Strawberry
- Black Soldier Fly
- Tomato Variety – Jupiter
- Herbicide Fluazifop-P-butyl for control of annual and perennial grasses
- Herbicide pendimethalin for the control of broadleaf weeds and annual grasses in asparagus, carrot, bean, leek, groundnut, soyabean and transplanted onion.

### 2.0 Booklets:

- Commercial production of certified bean seeds
- Roselle Production and processing
- Sustainable management of Diamondback moth

### 3.0 Book

Guide de La Transformation et la Conservation des produits agricoles - Republique de Maurice 2022

### 4.0 Scientific papers

- Audi L, Shallow G, Robertson E, [Bobo D](#), [Ragone D](#), [Gardner E M](#), [Jhurree-Dussoruth B](#) (2023). [Linking breadfruit cultivar names across the globe connects histories after 230 years of separation](#). Current Biology, Volume, pp . (doi)
- [Jhurree-Dussoruth B](#) (2022). Low-Cost In Vitro Options for Banana Mutation Breeding. In: Efficient Screening Techniques to Identify Mutants with TR4 Resistance in Banana. Jankowicz-Cieslak, I. L. Ingelbrecht, (eds.) ( [https://doi.org/10.1007/978-3-662-64915-2\\_10](https://doi.org/10.1007/978-3-662-64915-2_10))
- [Cadersa Y](#), Santchurn D, Govinden-Soulange J, Saumtally S, Parmessur Y (2022). Genotype-by-environment interaction for marketable tuber yield in advanced potato clones using AMMI and GGE methods, African Crop Science Journal, Volume 30, No. 3, pp. 331 – 346. (<https://dx.doi.org/10.4314/acsj.v30i3.5>)
- Boyer C , Lefeuvre P , Richard D , [Lobin K K](#) and Pruvost O. ( 2023). Complete genome sequence of a copper-resistant *Xanthomonas campestris* pv. *campestris* strain isolated from broccoli in Mauritius suggests adaptive gene gain through horizontal gene transfer. *Phytopathology* ( <https://doi.org/10.1094/PHYTO-05-23-0177-SC>).
- [Lobin K K](#) , Booluck K , Ramessur I and Taleb-Hossenkhan N. ( 2023). First report of tomato yellow leaf curl virus (TYLCV) infecting *Solanum nigrum* plants in Mauritius. *Journal of Plant Pathology*, pp.1-2.
- [Bunwaree A G](#) , Contaldo N and Bertaccini A. ( 2023). Seed transmission of phytoplasmas in tomato and chilli varieties commonly grown in Mauritius. *Phytopathogenic Mollicutes*, 13(1), pp.55-56.
- [Gokool A](#) , [Unmole L](#) . ( 2022). Status of the tomato leaf miner, *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae) in Mauritius and potential effective insecticides for its control. . Book of Abstracts. Research Week of the University of Mauritius. 10 November 2022.
- [Gokool A](#) , [Unmole L](#) . ( 2022). Effectiveness of pheromone traps for the management of the

- tomato leaf miner, *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae) in Mauritius. . Book of Abstracts. Research Week of the University of Mauritius. 10 November 2022.
- **Kowlessur P , Unmole L.** ( 2022). Comparative efficiency of *Cheilomenes sulphurea* and *Micromus timidus* as predator of *Sipha flava* . Book of Abstracts. Research Week of the University of Mauritius. 10 November 2022.
- **Saraye G.** (2022). Substitution of concentrate by *Calliandra calothyrsus* in the diet of goats' . Book of Abstracts. Research Week of the University of Mauritius. 10 November 2022.

#### 5.0 Video

- Strawberry production and propagation
- Sustainable management of Diamondback moth

#### 6.0 Presentations

- 'A ten-year status of litchi phenological response to climatic variation in Mauritius' at the 7th International Symposium on litchi, longan and other Sapindaceae held at the South China Agricultural University
- A pitch session presentation by Mrs Y Luchoomun made to the Technical Panel on Blue and Green Economy at the MRIC
- 'Plantation and Early plant care of macadamia and avocado' by Mrs B. Jhurree-Dussoruth
- Harvest, Postharvest and Processing of macadamia' to macadamia stakeholders
- Status of *T. absoluta* in tomato fields by A.Gokool
- Sustainable management of the diamondback moth in cabbage cultivation by S. Peerboccus
- Integrated pest management through the Caravane des biopesticide in the Desira project.
- Insect pest identification and their biological control in Rodrigues by P. Kowlessur.
- Management of insect pests in potato and bean seeds production by V. Dooblad
- Management of insect pests in potato production by D. Lalsing
- Management of insect pests in onion production by K. Naojee
- Research update and prospects for Button mushroom production by Mrs P Fatty-Beejan
- Sustainable Soil Fertility Management by Ms S Dumur
- Production of Organic Fertilisers in Mauritius and their use in the Agricultural Sector by Mrs R Mohee

#### 6.0 Poster presentation

- Saraye B., 2023. Development of high yielding and heat tolerant varieties through mutation induction to enhance tomato production at GC 66 AFRA Exhibition (IAEA)
- Saddul D., 2022. Goat production in Mauritius – Perspectives for contribution to enhancing food security. Gender-Responsive Climate Smart Agriculture, Policy Dialogue for Eastern, Central and Southern Africa. Virtual conference, 25-29 October 2022, Mombassa, Kenya (Virtual Oral presentation)
- Saraye G., 2022. Nutrition Chemical composition and the *in-vitro* fermentation of tropical fodder resources in Mauritius. 7th EAAP International Symposium on Energy and Protein Metabolism, Granada, Spain (12-15 September 2022).

## Section 7:

### Senior Staff List from 01 July 2022 to 30 June 2023

Ag. CHIEF EXECUTIVE OFFICER

Micheline SEENEVASSEN PILLAY, BSc  
(with effect from 04 September 2021)

ASSISTANT DIRECTORS

**Livestock Research**

M Micheline SEENEVASSEN PILLAY, BSc

**Extension and Training**

Shri Swami A M GOOLAUB, BSc, MSc

**Crops Research**

Lalini Unmole, DMS, BSc, PhD  
(with effect from 01 November 2022)

CROP RESEARCH DEPARTMENT

- **Agronomy Division**

Principal Research Scientist

Satyabhama LUTCHOOMUN BSc

- **Fruit Division**

Principal Research Scientist

Indoomatee RAMMA, BSc, MSc

- **Vegetables and Ornamentals Division**

Principal Research Scientist

Rita D NOWBUTH BSc, MSc

- **Resource Management Division**

Principal Research Scientist

Alfaz ATAWOO, BSc, MSc

- **Plant Pathology Division\***

Principal Research Scientist

Maudarbaccus Fazal BSc  
(up to 08 November 2022)  
Overseen by AD Crops  
(With effect from 09 November 2022)

- **Entomology Division**

Principal Research Scientist

Lalini UNMOLE, PhD  
(up to 31 October 2022)

Ag Principal Research Scientist

Vishwanath DOOBLAD, BSc  
(as from 29 December 2022)

- **Tissue Culture Laboratory**

Laboratory & Nursery Manager

Kumari Indira D BOODHRAM BSc(H), Adv. Cert. MSc

**Agricultural Coordinators**

Soleman M Daldine JAUNBOCUS BSc, MSc

Vijay Kumar BISSESSUR BSc, MSc

**LIVESTOCK DEPARTMENT**

● **Livestock Research Division**

**Principal Research Scientist**

Parmessur TOOLSEE PG Diploma, BSc, MBA

**EXTENSION AND TRAINING DEPARTMENT**

● **Crop Extension**

**Principal Extension Officer**

Mahmad Iqbal DAMOO, Diploma

(Up to 12 February 2023)

Arvind R S SHIMADRY BSc

(with effect 13 February 2023)

● **Training Division**

**Principal Extension Officer**

Dharmasdev DODLA BHEMAH Diploma

(Up to 21 February 2022)

Nankessor PRATAB Diploma

(with effect from 22 February 2022)

● **Livestock Extension**

**Principal Extension Officer**

Arvind R S SHIMADRY BSc

(up to 12 February 2023)

Chaya Teeluck Diploma, MBA

(with effect from 13 February 2023)

**TECHNICAL SUPPORT SERVICES**

● **Biometry Section**

**Principal Biometrician**

Rajendr K RAMNAUTH BSc, MSc

(up to 31 December 2022)

**Ag Principal Biometrician**

Macktoobah DOOKHAN, BSc

(with effect from 01 January 2023)

**Engineering Section**

**Principal Agricultural Engineer**

Vickram BUSSUNTH BEng

● **Business Development Section**

**Research Scientist/**

Mahendre NATHOO DMS, BSc, MSc

**Senior Research Scientist**

## ADMINISTRATION

- **Finance Section**

**Manager, Finance**

Bhindoomatee RADHA, ACMA

- **Human Resource Section**

**Human Resource Manager**

Avinaash Seebocus, BSc, MBA

(with effect from 02 February 2023)

Bindeshwaree VEERAPEN, DMS, BSc

(Actingship 2018 up to 01 February 2023)

- **Administrative Section**

**Administrative Managers**

Suzy Dominique AUGUSTE, ACIS

Arti DUNPUTH, ACIS

- **Procurement and Supply Section**

**Stores Superintendent**

Veena Kumari HARDOWAR BSc

## Section 8: Staff Missions, Meetings/Visits/ Conferences/Trainings / Workshops

### DIRECTORATE

#### MISSIONS

##### Goolaub Sri Swami Akhilalandjee

Mission: Establishment of Procedures and Processing of various Schemes, Rodrigues, 29 November to 01 December 2022

#### MEETINGS/VISITS/CONFERENCES

##### Goolaub Sri Swami Akhilalandjee

- Green Jobs Modelling under PAGE Green Recovery Fund Programme, Madagascar, 12-16 September 2022
- 'Comité de Suivi Opérationnel' of the 'Programme SANOI', Madagascar, 06 - 10 December 2022
- Meeting of SADC Directors of Agricultural Research and Deans of Faculties of Agriculture, South Africa, 06 - 08 February 2023
- 8th Africa Agribusiness and Science Week (AASW), South Africa, 05 - 08 June 2023

##### Lalini Unmole

- 50th Plenary session of the Committee on World Food Security (CFS) (Online), 19 September 2022
- G20 Meeting of Agricultural Chief Scientists (MACS), India, 17 - 19 April 2023
- 8th Africa Agribusiness and Science Week (AASW), South Africa, 05 - 08 June 2023

### CROP RESEARCH DEPARTMENT

#### ● Agronomy Division

##### Principal Research Scientist

##### Satyabhama Lutchoomun

- Annual Meeting FoodSec Semence Project, Madagascar, 25 January to 27 January 2023

##### Research Scientist/Snr Research Scientist

##### Anita Awotarowa

- Millets for Global Food Security (Online), 13 February to 16 February 2023

##### Mohammad Yusuf Cadarsa

- Seed Equal Initiative Potatoes Seed Systems, Kenya, 29 September to 30 September 2022
- 'Comité de Suivi Opérationnel' of the 'Programme SANOI', Madagascar, 06 December to 10 December 2022

##### Vanishta Devi Maunkee Cantiah

- Bean Breeding Training, Tanzania, 15 May to 18 May 2023

**Krishtee Devi Samputh**

- Regional (AFRA) Training Course on Statistically Rigorous, Pre-field and Field Screening to select Improved Mutant Lines, Senegal, 08 August to 19 August 2022
- AARDO Online Training Programme on Agri-Innovation and Technology Transfer for Sustainable Development (Online), 26 July to 29 July 2022

**Assistant Research Scientist**

**Nitin Dev Naik**

- Regulation of Agricultural Production Environment for Developing Countries, Seminar (Online), 25 October to 03 November 2022

● **Fruit Division**

**Principal Research Scientist**

**Nandini Ramma**

- African Union Expert Meeting and Strategy Session in preparation for the 45th session of the Codex Alimentarius Commission, Kenya, 17 October 2022 to 19 October 2022
- Sixth Informal Joint Meeting of the FAO Council, IFAD Executive Board and WFP Executive Board, (Online), 30 November and 01 December 2022
- 7th Session of the Codex Committee on Spices and Culinary Herbs, (Online), 03 February, 03 April, 31 May, 30 July and 30 August 2023.

**Research Scientist/Senior Research Scientist**

**Roop Soodha Munbodh**

- Green Ecological and Safe Storage Technology, (Online), 18 October to 27 October 2022

**Babita Dussoruth**

- Training on Phenotyping for Drought Tolerance, India, 07 March to 11 March 2023
- Global Workshop on Digital Sequence Information and Genetic Resources for Food and Agriculture (online), 14 November to 15 November 2022

**Veenayakraye Koopla**

- Study Tour at the Pomegranate Association of South Africa (POMASA), South Africa, 12 June to 15 June 2023.

**Yogeeta Devi Luchoomun**

- Cocoa Production, Processing and Value Addition, University of West Indies, 13 March to 17 March 2023
- VII International Symposium on lychee and other Sapindaceae fruits, 27 June to 01 July 2023

**Premalee Vishwanath Rao Kadam Dhesmook Rama-Pattoo**

- 8th International Online Training Course on Post Harvest and Fresh Cut Technologies, (Online), 01 May to 31 October 2023

**Saraspadee Subramaniam**

- 6th Virtual session of the Committee on Spices and Culinary Herbs, (Online), 26 September to 30 September & 03 October 2022.

● **Vegetable and Ornamentals Division**

### **Principal Research Scientist**

#### **Rita Nowbuth**

- IAEA Scientific Visit (TC Project MAR5029), Turkey, 05 September to 09 September 2022

### **Research Scientist/Senior Research Scientist**

#### **Banumaty Saraye**

- IAEA Scientific Visit (TC Project MAR5029), Turkey 05 September to 09 September 2022
- Global Workshop on Digital Sequence Information and Genetic Resources for Food and Agriculture, (online), 14 November to 15 November 2022
- Application of Molecular Breeding Tools for Early Selection of Lines Bearing Traits of Interest, Polish Academy of Sciences, Poland, 03 April to 14 April 2023

#### **Hiranee Gowreesunkur**

- Production and Utilisation of Tropical Medicinal Plants for Developing Countries, (Online), 05 September to 24 September 2022

#### **Priya Huzar Futti-Beejan**

- Mushroom Growing and Composting, Netherlands, 06 March to 17 March 2023

#### **Ravi Seewoogoolam**

- IAEA Fellowship (FS-MAR5029-2202300), Serbia, 10 January to 23 February 2023

#### **Nema Devi Cahoolessur**

- Specialised Training Programme on IoT Applications in Agriculture, India, 23 February to 22 March 2023

### **Assistant Research Scientist**

#### **Aneera Devi Purmessr-Mayeputh**

- Fellowship on Improving Landraces of Crucifers (cauliflower and cabbage) and carrot through the use of Nuclear Techniques for Mutation Breeding and Biotechnology, Austria 14 May to 12 August 2023

## **● Resource Management Division**

### **Principal Research Scientist**

#### **Mohammad Alfaz Atawoo**

- COMESA Regional Dissemination Meeting on Climate Smart Agriculture, 12 December to 13 December 2022
- Study Tour under the joint SDG Fund (Resilient Food Systems in Mauritius and Seychelles), 26 March to 29 March 2023

### **Research Scientist/Senior Research Scientist**

#### **Ram Vencatasamy**

- IAEA Training Course and Symposium, Austria, 18 July 2022 to 29 July 2022
- Solar Water Pumping Systems, (Online), 19 December to 23 December 2022

#### **Vishal Bheekhar**

- Study Tour on Agroforestry, India, 10 April to 14 April 2023

- Sustainable Soil Management Practices to Increase Crop Productivity, ITEC, (Online), 19 July to 23 July 2022

#### **Rajeswaree Dumur**

- World Science Day for Peace and Development, Event (Online, 10 November 2022
- EVT2204036-RAF5090- Regional Training Course on Integrated Cropping Livestock Production System with a focus on soil fertility, Kenya, 28 November to 09 December 2022

#### **Rucheeta Mohee**

- Certificate Course on Fertiliser Technology, India, 10 October to 21 October 2022
- Production Protocol for Bio Fertilisers and Bio Control Agents, ITEC, Training (Online), 25 July to 29 July 2022
- Study Tour under the Joint SDG Fund (Resilient Food Systems in Mauritius and Seychelles), Seychelles, 26 March to 29 March 2023

#### **Prathima Seechurn-Poonpoo**

- 4th Focus - Africa Stakeholders Workshop, Mozambique, 10 May 2023 to 12 May 2023
- Regional (AFRA) Training Course on High-resolution solid moisture monitoring using Cosmic Ray Neutron Sensor and remote sensing digital technology, Morocco, 21 November to 25 November 2022.

#### **Riteshwaree Ramchurn**

- Soil and Water Management. AARDO, Egypt, 15 October to 15 December 2022.

### ● **Plant Pathology Division**

#### **Principal Research Scientist**

##### **Kanta Kumar Lobin**

- Modern Concepts in Plant Diseases and Pest Management for Enhancing Quality and Productivity, (Online), 11 October to 14 October 2022

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#### **Research Scientist/Senior Research Scientist**

##### **Arty Gungoosingh-Bunwaree** -

- Side Event of the UN Commission for Science and Technology Development (CSTD), Geneva, 28 March 2023
- 5th Meeting of the International Phytoplasmologist Working Group, DeSIRA, Oman, 21 May to 25 May 2023

##### **Vivian Vally**

- SADC Seed and Plant Protection Technical Meeting, (Online), 21 August to 23 August 2022
- LAMP - Molecular Diagnostic Technology Workshop, Reunion, 13 December 2022
- Modern Concepts in Plant Diseases and Pest Management for Enhancing Quality and Productivity, (Online), 11 October to 14 October 2022

##### **Jean Max Bernard Pecheur**

- Annual Meeting FoodSec Semence Project, CIRAD, Madagascar, 25 January to 27 January 2023

##### **Isha Devi Aumeer-Khooblal**

- SADC Seed and Plant Protection Technical Meeting, (Online), 21 August to 23 August 2022

**Chandasa Koyelas**

- Plant Pest Surveillance Training (Online), 13 March to 17 March 2023

**Entomology Division**

**Research Scientist/Senior Research Scientist**

**Vishwanath Dooblad**

- Production Protocol for Bio Fertilisers and Bio Control Agents, ITEC, (Online), 25 July 2022 to 29 July 2022

**Leekcha Mattee Devi Lalsing**

- Green Ecological and Safe Storage Technology Training, (Online), 18 October 2022 to 27 October 2022

**Ashvin Gokool**

- Plant Pest Surveillance Training, (Online), 13 March 2023 to 17 March 2023

● **Tissue Culture Laboratory**

**Research Scientist/Senior Research Scientist**

**Pratima Greedharry**

- Crop Seed Production and Management for Developing Countries Seminar (Online, )10 October to 21 October 2022

**Assistant Research Scientist**

**Shahin Kauroo**

- Training on Mutation Breeding in Vegetatively Propagated Crops, Senegal, 24 October to 04 November 2022

**Jean Denis Lionel Daugnette**

- Production, Application and Demonstration of Eco-Friendly Fertiliser for Developing Countries, (Online) Seminar, 11 October to 31 October 2022

● **Crop Research Station**

**Trilock Ram**

- Solar Water Pumping Systems under IAS Program 01 - "Scaling Solar Applications for Agriculture" (Online), 04 July to 08 July 2022

**Mandakini Kumari Sojaguen**

- Training on Juncao Technology for Developing Countries, China, 16 May to 29 June 2023

● **Bio Farming Unit**

**Vikash Raj Teeluck**

- Visite d'Echange à la Reunion, SANOI, Reunion, 15 May to 17 May 2023

## **LIVESTOCK RESEARCH DEPARTMENT**

### ● **Livestock Research Division**

#### **Principal Research Scientist**

##### **Parmessur Toolsee**

- Sixth Informal Joint Meeting of the FAO Council, IFAD Executive Board and WFP Executive Board Meeting (Online), 30 November and 01 December 2022.
- 50th Plenary session of the Committee on World Food Security (CFS) (Online), 19 December 2022.

#### **Research Scientist/Snr Research Scientist Livestock Research**

##### **Devika Saddul**

- Mission to Rodrigues - Training in Goat Production, Rodrigues, 23 May to 26 May 2023
- Scientific Visit on Sheep and Goat, Israel, 04 July to 14 July 2022
- Regional Training Course on Integrated Cropping Livestock Production System with a focus on soil fertility, Kenya, 28 November to 09 December 2022

##### **Geerjanand Saraye**

- 7th European Federation of Animal Science (E.A.A.P) International Symposium on Energy and Protein Metabolism, Spain, 12 September 2022 to 15 September 2022

##### **Mohammad Noor Ehsan Newaz Gobindram**

- Mission on Genetic Characterisation of native chicken and goats, Rodrigues 13 September to 14 September 2022
- Agriculture and Livestock Products and Processing Seminar for Developing Countries (Online), 26 October to 15 November 2022
- Study Tour on Pig Breeding Systems and Slaughtering Procedures, Italy, 18 July to 22 July 2022

##### **Avinash Keesoonny**

- Climate Change Challenge: The Way Forward to Reinforcement of Livestock Systems in Developing Countries, (Online), 23 August to 26 August 2022
- Study Tour on Pig Breeding Systems and Slaughtering Procedures, Italy, 18 July 2022 to 22 July 2022

##### **Vidyanand Ramlugun**

- Scientific Visit at l'UMR-SELMET "Système d'élevage méditerranéen et Tropicaux France 22 May 2023 to 26 May 2023

## **EXTENSION AND TRAINING DEPARTMENT**

### ● **Crop Extension Division**

#### **Principal Extension Officer**

##### **Damoo Iqbal**

- Mauritius Country Water Sector Profile, (online), 01 December 2022

##### **Dev Pravin Erigadoo**

- Salon Internationale de l'Agriculture, France, 28 February 2023 to 05 March 2023

##### **Devanand Bhurtun**

- Potato Development Industries, Potato Seminar 2023, (Online), 25 May 2023 to 07 June 2023

##### **Nalini Chukowry**

- Sustainable Soil Management Practices to Increase Crop Productivity, ITEC, (Online), 19 July to 23 July 2022.

- **Information and Training Division**

**Reshma Balgobin-Basenoo**

- Production and Utilisation of Tropical Medicinal Plants for Developing Countries (Online), 05 September to 24 September 2022.

- **Livestock Extension Division**

**Chaya Teeluck**

- Virtual Dialogue on the Regional Centre for Excellence for Nutrition, (Online), 08 February to 09 February 2023

- **Business Development Unit**

**Research Scientist/Senior Research Scientist**

**Mahendre Nathoo**

- Mission to Rodrigues: Establishment of Procedures and Processing of various Schemes by the ARES/Commission for Agriculture, Rodrigues, 29 November to 01 December 2022.

**Economist/Senior Economist**

**Swarnkumar Prabhakar Aujayeb**

- Thirteenth Session of the Multi-Year Expert Meeting on Commodities and Development, (Online), 10 October to 12 October 2022.

**Extension Officer/Senior Extension Officer**

**Roshan Lotla Parepiah**

- Agri-Entrepreneurship and Supply Chain Management, India, 16 January to 24 February 2023.

- **Technical Support Services**

**Biometry & Statistics Division**

**Principal Biometrician**

**Ramnauth Rajendr Kumar**

- Virtual RVAA Programme Annual Dissemination Meeting, (online), 05 July to 08 July 2022.
- Virtual RVAA Programme Steering Committee (online), 12 July 2022.

**Macktoobah Dookhan**

- 2023 Regional Vulnerability Assessment and Analysis (RVAAO programme Annual Organisation Meeting, South Africa, 21 March to 23 March 2023.

- **Engineering Division**

**Principal Agricultural Engineer**

**Vickram Bussunth,**

- Solar Water Pumping Systems under IAS Program 01 - "Scaling Solar Applications for Agriculture" (Online), 04 July to 08 July 2022.
- Mission to Rodrigues - Training in Hydroponics/Sheltered Farming, Rodrigues, 13 February to 17 February 2023.
- Promotion of Sustainable Agricultural Mechanization for Enhanced Efficiency Income and Resilience among Smallholders (Online), 01 March 2023.
- Emerging Trends in Agricultural Technologies, (online), 27 March to 30 March 2023 and 03 April to 04 April 2023.
- Africa Agri Tech Conference, South Africa, 14 March to 16 March 2023.
- Solar Water Pumping Systems, (Online), 19 December to 23 December 2022.

## Section 9: Statistics

### Production for 2022 - 2023

For the Financial year 2022-2023, Food Crops production of some sixty crops were recorded throughout the Island of Mauritius in both open field and protected cultures. As at date, the open field continues to be the prevalent system of production requiring usually less monetary initial investment. On the other hand, there has been an ongoing expansion of protected cultures comprising mainly hydroponics and to a much lesser extent soil culture. Protected Cultures usually offer farmers more protection from bad weather, more appealing products and most importantly much higher yields. During the period under study, food crops production was affected by climatic conditions such as dry spells in November and December 2022. Only 60 mm of rain was recorded in December 2022 making it an unusually dry month receiving only 37% of the Long Term Mean rainfall (1991-2020). Summer rainfall onset was late, arriving only during the second week of January 2023. In February 2023, very intense cyclone Freddy, the longest lasting tropical cyclone, skirted Mauritius but did not make landfall. However, it brought rain which was considered beneficial to food crops production specially in the North. Food crops production for the approximately sixty crops recorded were estimated to be 139,211 tonnes.

Area harvested for major crops, i.e food crops published by Statistics Mauritius in the Digest of Agriculture, was estimated at 8,044 hectares with a production of 121,280 tonnes. This is a significant rise from the last financial year 2021/2022 when area harvested and production were 7,722 hectares and 97,845 tonnes respectively. Harvest for minor food crops covered some 538 hectares with a production of 7,560 tonnes. Some 83 hectares of crops comprising mainly tomato, sweet pepper, lettuce and cucumber, were cultivated in protected cultures. Production under the protected culture systems, mainly hydroponics, amounted to some 9,971 tonnes.

Production of strategic crops was quite significant in the open field. Some 16,532 tonnes of potato were harvested over an area of 687 hectares while 7,447 tonnes of onion were produced from cultivated area of 329 hectares. Carrot production reached 5,667 tonnes from harvested area of 356 hectares while 9,300 tonnes of tomato were produced in open field from 513 hectares harvested. Creepers, which include bittergourd, calabash, chouchou, courgette, cucumber, patole, pipengaille, pumpkin and squash were harvested over an area 2,257 hectares with a production of approximately 31,085 tonnes. Crucifers' (broccoli, cabbage, cauliflower and petsai) production was estimated at 11,729 tonnes for a harvested area of 485 hectares.

### Monthly Area harvested of food crops (Whole Island) - Jul 22 to Jun 23

|                                                  | Area (ha)  |            |            |            |            |            |            |            |            |            |            |            | Total (ha)   |
|--------------------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
|                                                  | Jul-22     | Aug-22     | Sep-22     | Oct-22     | Nov-22     | Dec-22     | Jan-23     | Feb-23     | Mar-23     | Apr-23     | May-23     | Jun-23     |              |
| Open Field - Major food crops                    | 599        | 711        | 813        | 907        | 857        | 661        | 536        | 559        | 612        | 538        | 560        | 691        | 8,044        |
| Open Field - Minor food crops                    | 26.08      | 24.55      | 61.97      | 29.11      | 50.16      | 74.07      | 72.78      | 55.09      | 41.21      | 29.08      | 33.45      | 40.66      | 538.22       |
| Protected Cultures (Hydroponics & Soil Cultures) | 6.88       | 7.38       | 6.57       | 6.47       | 6.32       | 6.48       | 7.52       | 7.83       | 8.93       | 6.91       | 7.13       | 7.99       | 86.41        |
| <b>Total (ha)</b>                                | <b>632</b> | <b>743</b> | <b>882</b> | <b>943</b> | <b>913</b> | <b>742</b> | <b>616</b> | <b>622</b> | <b>662</b> | <b>574</b> | <b>601</b> | <b>740</b> | <b>8,668</b> |

N.B. - Major food crops are published by Statistics Mauritius unlike Minor food crops.

### Monthly Production of food crops (Whole Island) - Jul 22 to Jun 23

|                                                  | Prod. (t)    |               |               |               |               |               |              |              |              |              |               |               | Total (t)      |
|--------------------------------------------------|--------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|---------------|---------------|----------------|
|                                                  | Jul-22       | Aug-22        | Sep-22        | Oct-22        | Nov-22        | Dec-22        | Jan-23       | Feb-23       | Mar-23       | Apr-23       | May-23        | Jun-23        |                |
| Open Field - Major food crops                    | 8,365        | 10,624        | 13,054        | 15,573        | 14,611        | 10,343        | 6,739        | 6,586        | 7,461        | 7,515        | 8,674         | 11,737        | 121,280        |
| Open Field - Minor food crops                    | 285          | 264           | 1,089         | 346           | 731           | 1,097         | 1,379        | 767          | 653          | 448          | 459           | 443           | 7,960          |
| Protected Cultures (Hydroponics & Soil Cultures) | 872          | 811           | 723           | 744           | 657           | 711           | 851          | 916          | 982          | 856          | 888           | 962           | 9,971          |
| <b>Total (t)</b>                                 | <b>9,522</b> | <b>11,698</b> | <b>14,866</b> | <b>16,664</b> | <b>15,998</b> | <b>12,151</b> | <b>8,969</b> | <b>8,268</b> | <b>9,095</b> | <b>8,818</b> | <b>10,021</b> | <b>13,142</b> | <b>139,211</b> |

N.B. - Major food crops are published by Statistics Mauritius unlike Minor food crops.

**Monthly Area harvested of major food crops (Whole Island) for the period July 22 to June 23**

| Major Food Crops | Area (ha) |        |        |        |        |        |        |        |        |        |        |        | Total (ha)    |
|------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------|
|                  | Jul-22    | Aug-22 | Sep-22 | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 |               |
| Banana           | 47.70     | 47.77  | 48.06  | 49.34  | 49.65  | 50.31  | 55.18  | 53.54  | 56.40  | 58.27  | 58.40  | 57.92  | <b>632.53</b> |
| Bean             | 21.12     | 22.50  | 27.97  | 21.49  | 21.45  | 20.15  | 18.71  | 21.44  | 24.71  | 20.66  | 27.52  | 29.26  | <b>276.96</b> |
| Beet             | 3.39      | 3.63   | 3.96   | 4.02   | 6.78   | 3.40   | 2.33   | 1.35   | 2.07   | 0.74   | 2.02   | 4.45   | <b>38.14</b>  |
| Bittergourd      | 19.09     | 17.79  | 20.10  | 20.76  | 19.77  | 17.04  | 14.93  | 15.34  | 16.32  | 16.33  | 16.42  | 19.68  | <b>213.56</b> |
| Brinjal (A)      | 4.18      | 4.52   | 5.25   | 5.77   | 5.84   | 5.45   | 5.78   | 5.26   | 5.34   | 5.88   | 6.86   | 7.85   | <b>67.99</b>  |
| Brinjal (C)      | 19.75     | 20.55  | 21.60  | 23.14  | 22.07  | 20.74  | 20.69  | 19.67  | 18.83  | 18.01  | 19.60  | 21.95  | <b>246.58</b> |
| Broccoli         | 2.58      | 3.38   | 2.40   | 4.55   | 0.45   | 0.63   | -      | 0.36   | -      | 0.10   | -      | 1.79   | <b>16.24</b>  |
| Cabbage          | 31.86     | 30.20  | 29.34  | 32.36  | 30.32  | 29.38  | 17.70  | 19.49  | 26.06  | 23.73  | 27.89  | 52.57  | <b>350.90</b> |
| Calabash         | 43.23     | 40.17  | 36.11  | 36.47  | 39.58  | 37.78  | 37.58  | 39.78  | 42.56  | 41.68  | 35.94  | 39.07  | <b>469.95</b> |
| Carrot           | 28.15     | 26.71  | 25.15  | 23.17  | 18.71  | 34.03  | 27.87  | 31.06  | 27.60  | 45.28  | 29.92  | 38.30  | <b>355.95</b> |
| Cauliflower      | 11.30     | 14.36  | 14.76  | 11.31  | 5.73   | 3.62   | 2.65   | 2.30   | 0.47   | 0.42   | 4.37   | 10.16  | <b>81.45</b>  |
| Chillies (C)     | 1.90      | 2.82   | 3.30   | 4.42   | 4.69   | 4.11   | 5.58   | 4.33   | 4.37   | 3.75   | 3.27   | 5.02   | <b>47.56</b>  |
| Chillies (L)     | 19.54     | 20.61  | 22.69  | 23.13  | 23.04  | 22.51  | 22.27  | 21.60  | 20.28  | 18.72  | 18.13  | 18.81  | <b>251.33</b> |
| Chillies (S)     | 5.07      | 5.27   | 5.57   | 5.84   | 5.67   | 5.59   | 5.61   | 5.74   | 5.71   | 5.63   | 5.66   | 5.95   | <b>67.29</b>  |
| Chouchou         | 12.66     | 13.15  | 16.32  | 18.82  | 19.33  | 17.34  | 16.13  | 17.61  | 14.93  | 13.95  | 13.85  | 14.99  | <b>189.06</b> |
| Courgette        | 2.27      | 2.87   | 2.75   | 1.98   | 2.06   | 2.44   | 0.91   | 1.59   | 0.82   | 1.58   | 6.96   | 5.52   | <b>31.76</b>  |
| Cucumber         | 29.69     | 29.95  | 26.60  | 27.52  | 24.69  | 26.70  | 30.50  | 31.18  | 33.49  | 30.32  | 27.38  | 35.65  | <b>353.65</b> |
| Echalote         | 14.58     | 13.80  | 16.21  | 13.58  | 11.71  | 10.80  | 12.23  | 12.54  | 12.86  | 12.37  | 21.12  | 18.79  | <b>170.59</b> |
| Eddoes (C)       | 5.06      | 7.83   | 4.91   | 2.73   | 3.68   | 3.91   | 5.72   | 5.30   | 8.46   | 6.67   | 7.81   | 9.48   | <b>71.56</b>  |
| Eddoes (V)       | 7.87      | 7.38   | 11.06  | 9.42   | 5.79   | 5.93   | 6.56   | 5.69   | 10.58  | 4.90   | 4.54   | 8.77   | <b>88.48</b>  |
| Garlic           | -         | 2.07   | 2.07   | 2.43   | 0.02   | -      | -      | -      | -      | -      | -      | -      | <b>6.59</b>   |
| Ginger           | 0.42      | -      | 13.77  | 10.01  | 11.06  | 6.58   | 5.12   | 2.80   | 0.24   | 0.21   | 1.26   | -      | <b>51.47</b>  |
| Green Peas       | 0.06      | 0.11   | -      | -      | -      | 0.08   | -      | -      | 0.01   | -      | -      | -      | <b>0.26</b>   |
| Greens           | 24.23     | 23.38  | 25.70  | 25.39  | 19.79  | 21.99  | 18.90  | 23.58  | 20.85  | 23.08  | 25.06  | 28.71  | <b>280.66</b> |
| Groundnut        | 3.75      | 10.24  | 6.03   | 6.55   | 23.65  | 9.73   | 9.29   | 15.00  | 32.49  | 5.81   | 5.87   | 12.60  | <b>141.01</b> |

**Monthly Area harvested of major food crops (Whole Island) for the period July 22 to June 23**

| Major Food Crops   | Area (ha)     |               |               |               |               |               |               |               |               |               |               |               | Total (ha)      |
|--------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|
|                    | Jul-22        | Aug-22        | Sep-22        | Oct-22        | Nov-22        | Dec-22        | Jan-23        | Feb-23        | Mar-23        | Apr-23        | May-23        | Jun-23        |                 |
| Ladies Finger      | 18.94         | 16.95         | 15.15         | 14.21         | 12.65         | 13.40         | 12.46         | 12.79         | 14.63         | 14.52         | 15.69         | 16.86         | 178.26          |
| Leek               | 0.59          | 0.51          | 1.03          | 1.35          | 2.31          | 1.24          | 1.68          | 0.39          | 0.76          | 0.68          | 2.20          | 1.78          | 14.50           |
| Lettuce            | 14.38         | 14.90         | 13.90         | 13.63         | 12.11         | 14.71         | 13.30         | 16.88         | 14.80         | 12.92         | 15.33         | 20.86         | 177.72          |
| Maize              | 8.58          | 10.59         | 7.96          | 8.98          | 6.37          | 3.85          | 4.99          | 3.78          | 4.72          | 6.07          | 11.32         | 16.07         | 93.27           |
| Manioc             | 5.65          | 5.81          | 5.32          | 4.44          | 5.06          | 3.11          | 4.78          | 3.59          | 3.67          | 3.68          | 7.00          | 4.36          | 56.47           |
| Onion              | -             | 23.39         | 67.50         | 111.56        | 107.96        | 17.96         | -             | -             | -             | -             | -             | 0.90          | 329.28          |
| Patole             | 10.95         | 10.18         | 10.10         | 12.20         | 7.29          | 5.52          | 7.61          | 6.89          | 9.58          | 9.04          | 8.29          | 12.39         | 110.05          |
| Petsai             | 3.18          | 3.06          | 3.44          | 4.40          | 4.61          | 2.35          | 2.58          | 2.15          | 2.43          | 1.49          | 2.32          | 4.28          | 36.29           |
| Pineapple          | 16.19         | 20.21         | 25.76         | 26.27         | 23.30         | 29.15         | 21.60         | 21.53         | 20.18         | 21.87         | 22.89         | 13.84         | 262.80          |
| Pipengaille        | 13.97         | 14.94         | 15.62         | 14.69         | 11.45         | 9.71          | 11.76         | 10.28         | 9.56          | 10.81         | 11.53         | 12.95         | 147.27          |
| Potato             | 25.98         | 99.62         | 149.43        | 190.62        | 161.46        | 59.18         | -             | -             | -             | -             | -             | 0.99          | 687.29          |
| Pumpkin            | 42.68         | 48.52         | 42.83         | 47.13         | 62.45         | 81.21         | 52.38         | 58.00         | 74.67         | 45.46         | 38.93         | 65.27         | 659.53          |
| Squash             | 8.80          | 11.20         | 8.92          | 11.28         | 5.07          | 7.64          | 4.44          | 2.48          | 1.19          | 3.26          | 5.92          | 11.83         | 82.02           |
| Sweet Pepper       | -             | 0.01          | 0.01          | 0.02          | 0.03          | 0.41          | 1.06          | 0.33          | -             | -             | -             | 0.21          | 2.08            |
| Sweet Potato       | 6.74          | 5.26          | 7.89          | 10.36         | 5.16          | 3.87          | 5.46          | 4.16          | 8.09          | 4.78          | 4.44          | 5.34          | 71.54           |
| Tomato (HYV)       | 52.32         | 44.83         | 38.64         | 41.48         | 44.91         | 38.62         | 37.63         | 48.04         | 51.23         | 36.16         | 34.64         | 44.42         | 512.92          |
| Voëhm              | 10.49         | 10.05         | 8.10          | 10.16         | 9.31          | 8.92          | 11.56         | 11.09         | 10.58         | 9.65          | 9.82          | 11.38         | 121.11          |
| <b>Grand Total</b> | <b>239.42</b> | <b>340.03</b> | <b>421.61</b> | <b>522.78</b> | <b>481.48</b> | <b>300.85</b> | <b>535.54</b> | <b>558.94</b> | <b>611.56</b> | <b>538.47</b> | <b>560.15</b> | <b>691.01</b> | <b>5,801.82</b> |

N.B. - All figures reported refer to open field production

Legend: HYV - High Yielding Varieties including Hybrid varieties

'-' denotes nil

**Monthly Production of major food crops (Whole Island) for the period July 22 to June 23**

| Major Food Crops | Prod. (t) |        |        |        |        |        |        |        |        |        |          |          | Total (t) |
|------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|----------|-----------|
|                  | Jul-22    | Aug-22 | Sep-22 | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23   | Jun-23   |           |
| Banana           | 753.85    | 760.05 | 759.68 | 781.73 | 796.72 | 818.46 | 859.25 | 819.86 | 864.53 | 931.86 | 939.46   | 922.07   | 10,007.53 |
| Bean             | 150.55    | 163.54 | 217.00 | 177.66 | 120.03 | 153.72 | 124.69 | 133.15 | 183.62 | 164.23 | 177.41   | 259.40   | 2,025.00  |
| Beet             | 36.30     | 36.89  | 51.92  | 48.44  | 60.25  | 58.45  | 26.00  | 21.11  | 24.95  | 18.70  | 50.38    | 119.64   | 553.01    |
| Bittergourd      | 135.76    | 125.45 | 150.68 | 159.35 | 142.91 | 117.81 | 103.31 | 108.58 | 116.62 | 115.66 | 116.60   | 147.64   | 1,540.37  |
| Brinjal (A)      | 20.72     | 21.87  | 26.19  | 29.86  | 27.48  | 26.80  | 25.43  | 20.84  | 26.64  | 35.64  | 44.38    | 56.90    | 362.75    |
| Brinjal (C)      | 292.53    | 299.86 | 295.53 | 319.28 | 290.60 | 276.28 | 245.96 | 227.58 | 225.64 | 215.04 | 232.27   | 253.48   | 3,174.05  |
| Broccoli         | 18.14     | 14.59  | 13.92  | 34.14  | 1.73   | 5.20   | -      | 1.28   | -      | 0.47   | -        | 21.37    | 110.83    |
| Cabbage          | 666.19    | 563.82 | 580.29 | 795.68 | 747.71 | 940.57 | 428.31 | 273.14 | 513.85 | 739.73 | 1,096.02 | 2,509.39 | 9,854.69  |
| Calabash         | 630.07    | 580.66 | 534.62 | 545.43 | 508.80 | 517.74 | 445.18 | 484.07 | 550.40 | 571.74 | 518.19   | 616.19   | 6,503.10  |
| Carrot           | 421.60    | 433.54 | 450.33 | 475.38 | 349.51 | 504.61 | 465.43 | 399.34 | 366.66 | 612.79 | 452.59   | 735.36   | 5,667.15  |
| Cauliflower      | 173.02    | 180.43 | 219.99 | 153.00 | 68.86  | 54.12  | 21.95  | 23.92  | 7.13   | 2.47   | 65.40    | 176.00   | 1,146.27  |
| Chillies (C)     | 11.23     | 16.52  | 20.28  | 28.11  | 27.85  | 28.23  | 47.57  | 36.07  | 32.69  | 26.71  | 20.67    | 31.15    | 327.08    |
| Chillies (L)     | 159.11    | 146.51 | 187.13 | 190.16 | 180.59 | 178.28 | 164.05 | 165.99 | 162.67 | 154.10 | 159.31   | 155.69   | 2,003.59  |
| Chillies (S)     | 27.76     | 28.67  | 31.46  | 33.02  | 30.77  | 31.47  | 28.74  | 25.87  | 28.48  | 35.73  | 38.78    | 46.55    | 387.27    |
| Chouchou         | 206.53    | 194.07 | 210.90 | 217.82 | 231.50 | 214.97 | 171.83 | 168.70 | 273.76 | 275.04 | 310.10   | 308.52   | 2,783.73  |
| Courgette        | 20.70     | 18.37  | 17.33  | 14.19  | 13.98  | 16.69  | 5.97   | 9.09   | 5.64   | 12.59  | 135.14   | 83.53    | 353.21    |
| Cucumber         | 461.89    | 441.09 | 393.70 | 422.24 | 364.34 | 397.70 | 419.16 | 376.37 | 409.59 | 481.64 | 461.25   | 595.32   | 5,224.28  |
| Echalote         | 189.52    | 180.79 | 202.99 | 171.68 | 144.72 | 120.88 | 129.07 | 146.18 | 143.98 | 147.56 | 304.27   | 249.14   | 2,130.78  |
| Eddoes (C)       | 59.58     | 71.16  | 59.36  | 28.46  | 36.80  | 40.78  | 57.76  | 51.98  | 82.48  | 65.52  | 76.34    | 89.81    | 720.04    |
| Eddoes (V)       | 89.08     | 82.84  | 122.49 | 112.74 | 65.69  | 67.15  | 68.99  | 61.77  | 122.15 | 64.11  | 64.42    | 122.97   | 1,044.41  |
| Garlic           | -         | 14.30  | 17.51  | 17.07  | 0.04   | -      | -      | -      | -      | -      | -        | -        | 48.92     |
| Ginger           | 11.34     | -      | 297.45 | 231.28 | 252.25 | 153.49 | 132.62 | 74.80  | 6.00   | 5.25   | 29.82    | -        | 1,194.30  |
| Green Peas       | 0.19      | 0.16   | -      | -      | -      | 0.47   | -      | -      | 0.01   | -      | -        | -        | 0.83      |
| Greens           | 216.08    | 195.90 | 213.17 | 212.69 | 155.04 | 173.11 | 136.05 | 166.02 | 154.15 | 162.12 | 226.86   | 219.21   | 2,230.39  |
| Groundnut        | 7.75      | 22.67  | 15.69  | 15.81  | 60.32  | 19.49  | 20.02  | 29.79  | 68.02  | 14.27  | 15.76    | 28.53    | 318.12    |

**Monthly Production of foodcrops (Whole Island) July 22 to June 23**

|                    |                 |                  |                  |                  |                  |                  |                 |                 |                 |                 |                 |                  |                   |
|--------------------|-----------------|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|-------------------|
| Ladies Finger      | 146.08          | 127.89           | 90.45            | 80.74            | 73.07            | 78.59            | 80.60           | 75.00           | 106.59          | 130.70          | 158.62          | 175.26           | 1,323.59          |
| Leek               | 2.08            | 2.16             | 7.26             | 6.51             | 8.97             | 12.64            | 15.39           | 1.91            | 3.50            | 2.52            | 9.59            | 12.47            | 84.99             |
| Lettuce            | 122.89          | 137.38           | 134.14           | 120.12           | 88.48            | 125.60           | 98.21           | 119.20          | 116.35          | 96.37           | 228.22          | 285.66           | 1,672.63          |
| Maize              | 85.53           | 112.37           | 86.28            | 85.66            | 54.99            | 33.79            | 41.08           | 27.54           | 43.56           | 58.29           | 135.73          | 180.58           | 945.40            |
| Manioc             | 115.85          | 103.66           | 91.00            | 79.80            | 88.16            | 56.72            | 81.48           | 60.54           | 61.46           | 59.58           | 135.61          | 70.49            | 1,004.34          |
| Onion              | -               | 477.15           | 1,377.03         | 2,333.45         | 2,803.69         | 439.79           | -               | -               | -               | -               | -               | 16.20            | 7,447.32          |
| Patole             | 106.24          | 92.90            | 96.13            | 121.58           | 59.97            | 41.18            | 58.18           | 56.04           | 69.88           | 68.83           | 65.24           | 102.70           | 938.86            |
| Petsai             | 62.08           | 62.77            | 65.76            | 81.51            | 37.36            | 24.79            | 48.52           | 25.15           | 38.11           | 24.66           | 54.73           | 91.35            | 616.78            |
| Pineapple          | 322.57          | 389.53           | 495.51           | 529.48           | 493.67           | 627.06           | 435.69          | 426.77          | 410.78          | 392.23          | 492.80          | 281.63           | 5,297.71          |
| Pipengaille        | 182.10          | 185.87           | 208.99           | 197.50           | 137.87           | 115.88           | 130.60          | 112.89          | 102.12          | 120.85          | 147.98          | 167.09           | 1,809.74          |
| Potato             | 564.78          | 2,337.41         | 3,537.84         | 4,693.83         | 3,909.47         | 1,475.61         | -               | -               | -               | -               | -               | 12.90            | 16,531.84         |
| Pumpkin            | 733.03          | 883.84           | 744.53           | 874.97           | 1,093.46         | 1,492.97         | 761.16          | 802.73          | 943.78          | 806.36          | 745.87          | 1,411.33         | 11,294.03         |
| Squash             | 62.96           | 82.66            | 69.79            | 74.51            | 35.62            | 65.32            | 27.23           | 14.10           | 8.37            | 20.18           | 63.65           | 112.87           | 637.27            |
| Sweet Pepper       | -               | 0.05             | 0.05             | 0.12             | 0.29             | 2.43             | 7.51            | 1.95            | -               | -               | -               | 1.24             | 13.64             |
| Sweet Potato       | 120.22          | 98.68            | 133.58           | 145.63           | 83.63            | 71.78            | 107.50          | 70.37           | 151.74          | 154.07          | 138.47          | 165.31           | 1,440.98          |
| Tomato (HYV)       | 859.53          | 829.22           | 734.42           | 812.53           | 862.43           | 671.52           | 615.77          | 870.96          | 939.04          | 635.23          | 672.11          | 797.23           | 9,300.00          |
| Voëhm              | 119.58          | 106.42           | 91.34            | 120.17           | 101.11           | 90.97            | 102.26          | 94.91           | 95.79           | 91.98           | 90.36           | 104.60           | 1,209.48          |
| <b>Grand Total</b> | <b>8,365.01</b> | <b>10,623.69</b> | <b>13,053.69</b> | <b>15,573.31</b> | <b>14,610.74</b> | <b>10,343.10</b> | <b>6,738.51</b> | <b>6,585.56</b> | <b>7,460.71</b> | <b>7,514.83</b> | <b>8,674.38</b> | <b>11,736.79</b> | <b>121,280.30</b> |

N.B. - All figures reported refer to open field production

Legend: HYV - High Yielding Varieties including Hybrid varieties

'-' denotes nil

(cont.)

| Major Food Crops | Prod. (t) |        |        |        |        |        |        |        |        |        |        |        | Total (t) |
|------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|
|                  | Jul-22    | Aug-22 | Sep-22 | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 |           |

### Area harvested of food crops in protected cultures for the period July 22 to June 23

(Provisional)

| Protected Cultures | Area(ha)    |             |             |             |             |             |             |             |             |             |             |             |              |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|                    | Jul-22      | Aug-22      | Sep-22      | Oct-22      | Nov-22      | Dec-22      | Jan-23      | Feb-23      | Mar-23      | Apr-23      | May-23      | Jun-23      | Total(ha)    |
| Hydroponics        | 6.62        | 6.46        | 6.36        | 6.18        | 6.18        | 6.39        | 7.22        | 7.47        | 8.58        | 6.79        | 7.05        | 7.86        | 83.16        |
| Soil Culture       | 0.27        | 0.92        | 0.20        | 0.29        | 0.14        | 0.10        | 0.30        | 0.36        | 0.36        | 0.11        | 0.07        | 0.13        | 3.25         |
| <b>Total(ha)</b>   | <b>6.88</b> | <b>7.38</b> | <b>6.57</b> | <b>6.47</b> | <b>6.32</b> | <b>6.48</b> | <b>7.52</b> | <b>7.83</b> | <b>8.93</b> | <b>6.91</b> | <b>7.13</b> | <b>7.99</b> | <b>86.41</b> |

### Production of food crops in protected cultures for the period July 22 to June 23

| Protected Cultures | Production (t) |               |               |               |               |               |               |               |               |               |               |               | Total (t)       |
|--------------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|
|                    | Jul-22         | Aug-22        | Sep-22        | Oct-22        | Nov-22        | Dec-22        | Jan-23        | Feb-23        | Mar-23        | Apr-23        | May-23        | Jun-23        |                 |
| Hydroponics        | 865.21         | 791.12        | 718.39        | 734.90        | 654.25        | 709.13        | 835.01        | 899.08        | 964.73        | 853.21        | 886.29        | 958.63        | 9,869.93        |
| Soil Culture       | 6.90           | 19.58         | 4.72          | 9.38          | 2.58          | 1.55          | 15.82         | 16.56         | 16.94         | 2.42          | 1.38          | 3.33          | 101.18          |
| <b>Total (t)</b>   | <b>872.11</b>  | <b>810.70</b> | <b>723.11</b> | <b>744.27</b> | <b>656.83</b> | <b>710.68</b> | <b>850.83</b> | <b>915.64</b> | <b>981.67</b> | <b>855.64</b> | <b>887.67</b> | <b>961.96</b> | <b>9,971.11</b> |

## Livestock Population as at December 2022

Number of small breeders and estimated number of livestock by district as at December 2022

| District               | Cattle         |              | Goats          |               | Sheep          |              | Pigs           |               | Broilers       |                  | Layers         |                | Rabbit         |              |
|------------------------|----------------|--------------|----------------|---------------|----------------|--------------|----------------|---------------|----------------|------------------|----------------|----------------|----------------|--------------|
|                        | No. of farmers | No. of heads | No. of farmers | No. of heads  | No. of farmers | No. of heads | No. of farmers | No. of heads  | No. of farmers | No. of Broilers  | No. of farmers | No. of layers  | No. of farmers | No. of heads |
| Pamplemousses          | 73             | 574          | 259            | 2,908         | 63             | 961          | 12             | 452           | 26             | 69,751           | 22             | 198,827        | 10             | 83           |
| Rivière du Rempart     | 107            | 711          | 390            | 4,783         | 79             | 811          | 18             | 279           | 52             | 232,211          | 14             | 68,351         | 18             | 108          |
| Flacq                  | 98             | 425          | 484            | 4,946         | 59             | 546          | 63             | 2,721         | 111            | 527,675          | 25             | 17,239         | 31             | 256          |
| Grand Port             | 55             | 240          | 180            | 2,449         | 23             | 315          | 32             | 1,186         | 28             | 99,640           | 14             | 20,750         | 5              | 98           |
| Savanne                | 38             | 182          | 152            | 2,120         | 55             | 542          | 10             | 274           | 35             | 379,650          | 13             | 224,025        | 5              | 58           |
| Plaine Wilhems         | 71             | 615          | 127            | 1,302         | 34             | 386          | 16             | 439           | 50             | 199,075          | 22             | 29,887         | 6              | 127          |
| Moka                   | 32             | 313          | 31             | 269           | 10             | 208          | 0              | 0             | 24             | 54,412           | 9              | 23,658         | 4              | 125          |
| Black River/Port Louis | 64             | 452          | 233            | 2,831         | 52             | 598          | 278            | 16,133        | 29             | 150,779          | 23             | 9,088          | 28             | 301          |
| <b>Total</b>           | <b>538</b>     | <b>3,512</b> | <b>1,856</b>   | <b>21,608</b> | <b>375</b>     | <b>4,367</b> | <b>429</b>     | <b>21,484</b> | <b>355</b>     | <b>1,713,198</b> | <b>142</b>     | <b>591,825</b> | <b>107</b>     | <b>1,151</b> |

## List of Events



Launching of Bazar Moris  
and Book on Agro-processing



Pulse Day at Esplanade  
Renganaden Seeneevassen



Climate-Smart  
irrigation system



Les Assises de l'Agriculture : Cote D'Or



Training on sustainable soil fertility management and launching of new soil, water and plant lab.



Signing MoU with CATAS,  
MAIFS



Training on GIS,  
Caudan Art Centre



Training on LASER 2 R Software  
CLRS



Sensitisation on control of DBM



Roselle Day –



Rivière des Anguilles



Launching of Aquaponics project – FAREI, Reduit



Validation workshop –  
Potato Seed Value Chain