



Food and
Agricultural
Research and
Extension
Institute

**Annual
Report
2021/2022**

Contents

Chairperson’s Statement.....	3
Chief Executive Officer’s Statement.....	4
Section 1: Vision, Mission and Objectives	8
Section 2: Organisational Structure	10
Section 3: Corporate Governance Report	14
Section 4: Technical Highlights.....	33
Crop Research and Development.....	33
Livestock Research and Development.....	82
Extension and Training	86
DeSIRA Initiative	95
Section 5: Report of the Director of Audit and Financial Statements for year ended 30 June 2022.....	97
Section 6: Publications.....	125
Section 7: Employees List	128
Section 8: Staff Missions, International On-line Meetings; Trainings / Workshops	130
Section 9: Statistics	131
Crop Production	
Livestock	
Population	

Chairperson's Statement

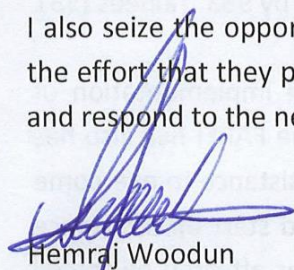
The FAREI faced significant challenges during the year 2021-2022 with the triple shocks related to Covid-19 pandemic, conflict between Ukraine and Russia and climate change which impacted on the global and local economic situation. Following the resignation of the Chief Executive Officer in September, the board assigned new responsibilities of the Chief Executive Officer to the Assistant Director (Livestock). This has enabled the FAREI to meet its obligations, maintain FAREI's R & D activities and ensure service delivery.

The FAREI participated and organised several events during the year to showcase achievements in its work programme and also to sensitise on the need to engage in food production to contribute to food sovereignty. Emphasis was also laid on biofarming and minimising use of agrochemical in foodcrop production and ensure production of safe food.

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

It is with much pleasure that I present this report which highlights the Research and Development and extension activities during the period July 2021 to June 2022.

I also seize the opportunity to thank members of the board, management and staff of FAREI for the effort that they put to enable FAREI to meet its objectives of serving the farming community and respond to the need of the stakeholders.



Hemraj Woodun
Chairperson

28 April 2023

Chief Executive Officer's Statement

During the year 2021-2022, the country has faced significant challenges in the wake of the covid-19 pandemic, exacerbated by the conflict between Ukraine and Russia. This situation has impacted adversely on food supply as a result of soaring food prices and ban imposed by certain countries. Furthermore, farmers were confronted with the impact of adverse climatic conditions following flash floods and cyclones Batsirai and Emnati. Amidst this challenging situation, the FAREI has been solicited on all fronts to provide support for recovery process and to increase local production. Actions focussed on the adoption of sustainable practices with emphasis on agro ecological practices in a bid to ensure production of safe food and reduce use of costly agrochemical inputs.

Extension activities were resumed normally following lifting of sanitary restrictions. In view of registration of planters by the Small Farmers Welfare Fund extension staff was assigned the responsibility to validate the planters and breeders whose registration was to be renewed and for those eligible for compensation under the Crop loss compensation scheme and the ACASS.

Some 11,213 field visits for food crop surveys were conducted and 1,620 additional visits were carried out in connection to State Land occupancy, pests and diseases, market price, impact of adverse climatic conditions and to report on crop loss and ACASS. A total of 57 MQA approved training courses (33 crop and 24 livestock) was completed and was attended by 963 trainees (531 crop and 432 livestock).

Within the Economic Recovery Programme the FAREI collaborated in the implementation of National Training and re-Skilling Scheme (NTRS) supported by the HRDC. The FAREI has also benefited a grant of MUR 1,758,020, under the Humanitarian Emergency Assistance to overcome the oil spill crisis in Mauritius. The fund was used for capacity building and start up assistance regarding organic crop production and egg production to those communities affected by the oil spill.

Research and Development activities was maintained on introduction and evaluation of new germplasm to identify best performing varieties. Higher yield of potato variety Everest was obtained compared to variety Spunta. Seven heat tolerant bean varieties and six groundnut varieties were introduced from CIAT and ICRISAT respectively for evaluation. Sixteen tomato and eight chilli varieties were also evaluated in 2021. Production potential of new mushroom strains, king oyster, lions' mane and ganoderma was studied. Sweet potato and cassava varieties were multiplied for production of planting materials for potential growers. New crops such as quinoa, chinese broccoli (kailaan), kale, spinach, swiss chard, asparagus and artichoke were also evaluated.

Conventional breeding programme on potato, tomato and chilli and mutation breeding of colocasia, carrot, cabbage and cauliflower were pursued. Improvement of Local cauliflower and

cucumber varieties using maintenance breeding continued and S7 seeds has been produced for both crops.

In hydroponics trials, promising results for cooking tomato varieties KSP 1430 and HVTM 215 and cucumber varieties Snow Cherry and Boing were obtained.

Studies have been carried out on anthurium and use of plug plants as planting materials. Evaluation of introduced rose were undertaken and cultural practice for orchids and chrysanthemum were studied.

Fruit species namely avocado, banana, litchi, longane, pomegranate, berries (blueberry, youngberry, red raspberry and cape gooseberry) were introduced for evaluation. A new banana plot including 13 varieties was established at Wooton while 11 banana accessions and six plantains were introduced from Biodiversity International for multiplication and field.

Novel technologies to improve agricultural resource use efficiency (Nutrients, Water and Seed) and productivity at farm level was developed. Water saving irrigation systems such as the KSNM Drip Irrigation, the KSNM Spray Irrigation were tested and found very promising. Organic fertiliser packages have been developed for a range of crops.

A model agroforestry plot has been successfully set up at Britannia. Another plot aiming at demonstrating sylvopastoral system is also being set up at Petit Merlo. The project is also benefitting from IAEA support under the AFRA project “Supporting Climate Change Adaptation for Communities Through Integrated Soil-Cropping-Livestock Production systems”.

A colony of Black Soldier flies (BSF), *Hermetia illucens* was successfully reared for production of larvae which can be used to feed livestock, poultry or fish and also convert waste into compost. The predatory activity of the bug, *Nesidiocoris* sp. on *Tuta absoluta* larvae was confirmed. 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. Two new pests were detected namely, the leafminer, *Aproaerema modicella* on groundnut and the impatiens thrips, *Echinothrips americanus* on Youngberry plants.

A new emerging virus, *Tomato mottle mosaic virus* (ToMMV), was confirmed by RT-PCR. Powdery mildew disease in cucurbits was effectively controlled by bio-fungicides Biotilis, Bontera (*Bacillus* sp) and Romeo. The microbial soil enhancer Bontera was also found to be effective in the control of root knot nematodes.

Research in livestock endeavored to find sustainable alternatives to costly concentrates and feeding trials in goats showed that browse species (*Calliandra calothyrsus*) can replace partly or completely the concentrate in their diet. Studies were also carried out to determine antibiotic residues in livestock products and results indicated the phenomenon of “crossover-use” of

antibiotic in livestock production where human-intended antimicrobial products like chloramphenicol were administered to livestock animals. It was also found that the local poultry products contained antibiotics residues like chloramphenicol, sulfonamides and tetracyclines. The incidence of sub-clinical mastitis in the dairy herd at CLRS was reduced by 30 % using post teat dip with 0.5 % active iodine. In this respect farmers were sensitized on the adoption of good animal husbandry practices.

The FAREI also collaborated with several institutions/NGOs local and abroad to further develop the local agro-industrial sector. In this respect, the collaboration between FAREI and the Commission for Agriculture in Rodrigues was strengthened through the setting up of an Office in Citronelle. The launching ceremony was held on 5 June 2022 by the Minister of Agro Industry and Food Security and the Chief Commissioner. The objective of the office is to Strengthen and steer the R & D activities and development of capacity of ARES for better output.

In the budget 2020-2021, provision was made for the setting up of a FAREI antenna in Rodrigues. However due to issues related to Covid-19 Pandemic the project was delayed. During the mission effected by a delegation led by the Minister of Agro Industry and Food Security on 13-14 April 2022, the setting up of FAREI/SFWF antennae in Rodrigues was discussed and agreed.

The main objectives of setting up the FAREI Office are to (i) strengthen and steer the R & D activities and development of capacity of ARES for better output and (ii) cooperate with respect to research, development, technology transfer and training in the field of agricultural (including agroforestry) and agro-industry sectors.


The ex-Office used to host the DCP project financed by the EU was renovated to house the FAREI and SFWF Office as well as the Public Relation Unit of the Commission for Agriculture.

The launching ceremony was held on 5 June 2022, at Citronelle, in the presence of the Minister of Agro Industry and Food Security, Honourable Maneesh Gobin, the Chief Commissioner, Mr John Roussety, the Commissioner for Agriculture, Mr Ange Perrine, the Speaker of the Rodrigues Regional Assembly, Mr F Leopold, the Island Commissioner, Mr Pierre Louis, the Departmental Head Mr Genave, Mrs Allas member of the Regional Assembly, amongst other Officials.

The proposed thematic for collaboration was presented and same would be discussed in view of finalising a work programme for implementation during the next financial year. It was also stressed that Knowledge, skills and technologies developed from research conducted at FAREI for different themes for both the food crop and livestock sector will be adapted to the Rodriguan context, taking into account the specificity of the island.

Booklets on crop production, livestock production and agro-processing were displayed in the FAREI office and some 500 copies were handed over to the Commission of Agriculture for distribution to farmers upon request.

Though the year 2021-2022 has been very challenging at different levels, the FAREI spared no effort to meet its obligations and deliverables as well as attend to farmers and other stakeholders needs. The support of the Board and the parent ministry as well as the staff of FAREI is herewith acknowledged.



M. Micheline Scenevassen 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

- 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.

SERVICES PROVIDED

- ☐ Evaluation of agricultural inputs
- ☐ Training of farmers in production practices
- ☐ Advisory service
- ☐ 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 for the common goal of optimising its strategic role. Linkages and participatory collaboration with stakeholders and farmer associations in the elaboration of our research and development agenda are also of high priority.

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 improving the cost-effectiveness, quality of services and optimal use of human resources in both organisations.

The FAREI is administered by a Board and is managed by a Chief Executive Officer who is also the Accounting Officer and is 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 Ornamental, Fruit, Resource Management, Plant Pathology and Entomology Divisions
- **Livestock Department**
Animal Production and Animal Health Divisions
- **Extension and Training Department**
Crop, Livestock and Information and Training Divisions

Crop Research

- **Agronomy and 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 productivity and income. This is effected by timely cost-effective technology transfer of innovative production practices through a customer focus and participatory approach. The Department has a comprehensive network of sub offices, model farms, demonstration centres and a Farmer Training School to meet the objectives. With the growing challenges in agriculture, the thrust is towards professionalization of farm operations; promoting value addition and agribusiness development.

Support Services

The Biometry and Engineering Divisions; the Economic, Business Development and IT units are cross-cutting entities and work with the various sections to ensure that FAREI's research is problem-oriented and quality-controlled. Appropriate technologies in irrigation, farm mechanisation, protected cultures and agro-processing are developed. Support is also provided to access agricultural information.

- **Biometry and Statistics Division**

Statistical support to research and extension activities of the Institute was ensured by the Biometry and Statistics Division. Research Divisions were assisted in developing research protocols, design and layout of experiments, field trials.

- **Business Development 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 Government goals. Support was provided for the research and development activities so as to ensure effective management of overall activities and ensure good corporate Governance.

- **Engineering Division**

The division provided support for empowerment of potential and existing local agricultural operators in various areas namely hydroponics, irrigation and fertigation technology, protected structures, sheltered farming, rainwater harvesting systems, etc.

- **Economics Unit**

During the period under review, around 95 prospective entrepreneurs requesting for support for leased state land at the MAIFS were counselled and provided assistance in the preparation of agri-business projects. The cost of production of the major economic food-crops (25) were reviewed and updated for the year 2021 and 2022. Likewise, the national cost of production for strategic crops, namely onion, potato and garlic were prepared and validated at their respective national committees in connection with floor price determination to be adopted by the AMB.

- **Health and Safety**

FAREI recognises the need for protection of employees from hazards. In line with legal parameters it makes provision for a safe working environment through (i) issue of adequate Personal Protective Equipment to prevent risk of adverse effect on health of its employees (ii) Risk assessments as control measures and (iii) regular conduct of Safety and Health Committee, a forum where Union partners with Management for the Health, Safety and Welfare of the employees.

With prevalence of COVID 19, FAREI put in place a protocol reinforcing safety measures which was strictly adhered to, at all its sites.

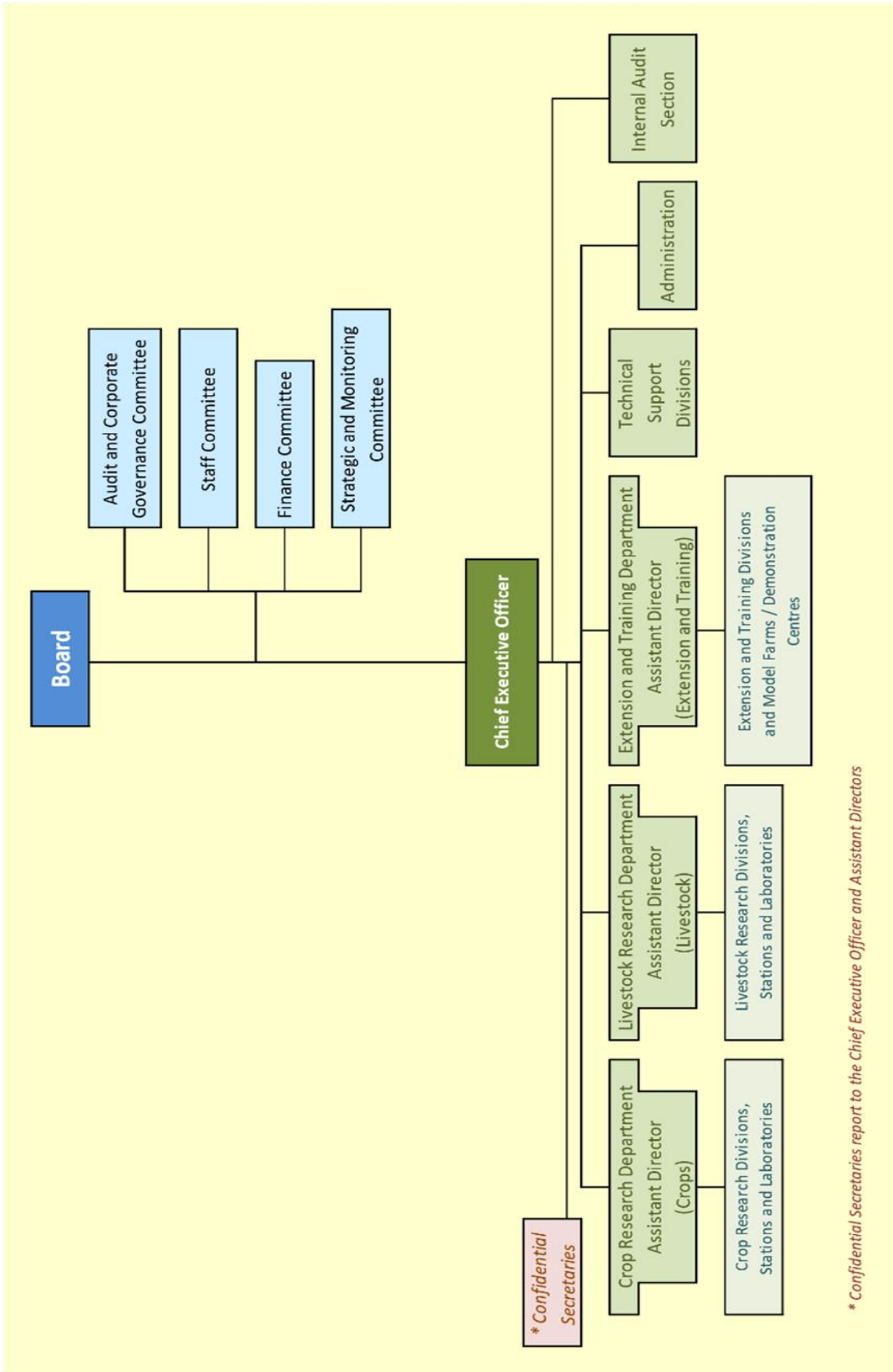
- **Procurement Section**

The main function and the mission of the Procurement Section is to assist and support the management to attain its objectives by ensuring that purchase of goods and services are effected by adopting the best practice in the procurement method.

The Procurement Section processes all approved requests for goods, works, consultancies and services in compliance with the Rules and Regulations of the Public Procurement Act 2006, the Financial Management Manual and the Code of Ethics of the ICAC.

Since January 2021, public bodies were called upon to use the e-Procurement System to conduct bidding exercises. FAREI aligned with this initiative and the e-Procurement System was implemented in the year 2021-2022.

Organigram



* Confidential Secretaries report to the Chief Executive Officer and Assistant Directors

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;
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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

Professionalism

To demonstrate high level professionalism in our day-to-day initiatives in relation to the business of the Institute and to achieve continuous self-improvement.

Commitment

To develop the right attitude towards the job we undertake, to encourage individual initiative and to express our dedication in achieving our objects and functions.

Integrity

To express what we mean, to deliver what we promise and to stand for what is lawful.

Respect

To treat one another with dignity and fairness, appreciating the diversity of our workforce and the uniqueness of each employee.

Trust

To build confidence through open and frank communication.

Honesty

To be truthful in all our endeavors, to be honest and straightforward with one another and with our policy makers, service providers and stakeholders of the agri-food sector.

Principle One – Governance Structure

Corporate Profile

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 prepared 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;

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;
- 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 acknowledges that it should lead and control the organization and be collectively responsible for its long-term success, reputation and governance. In so doing, the Board assumes responsibility for meeting all regulatory and legal requirements.

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 ;

Mr S.Naidu is the Chairperson of the Audit and Corporate Governance Committee.

Board Secretary

The role of the Board Secretary is to ensure that the Board Members have the proper advice and resources for performing their duties under the relevant legal frameworks. The Board Secretary is also responsible for the organization and coordination of the Board and Committee 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.

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

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 2021 to 30 June 2022 was as follows:

Remarks	
Chairperson	
Mr Hemraj Woodun	Appointed by Minister
Members	
Mrs Soondaree Soborun	Representative of Ministry of Agro-Industry and Food Security
Mrs Jacqueline Sauzier	Representative of Mauritius Chamber of Agriculture
Mr R Kissoonah	Representative of Mauritius Agricultural and Marketing Cooperative Federation
Dr 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
Dr S Ganeshan	Chief Executive Officer, FAREI -from 1 July 2021 to 3 September 2021
Mrs M. Seenevassen Pillay	Acting Chief Executive Officer as from 4 September 2021
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 Soboron 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 are as follows:

- Management of agricultural research and extension
- Statistics and agricultural surveys
- Capacity building of Non-State Actors/civil society organisations
- 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 L Mungry

Mr L 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.

Dr 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.

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 2021 to 30 June 2022 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	Chairperson
Mr M Rughoo	Member
Mr L Mungry	Member
Mr K Seechurn	Member

In Attendance

Dr S Ganeshan	Chief Executive Officer (from 1/7/2021 to 3/9/2021)
Mrs M.Seenevassen Pillay	Acting CEO as from 4/9/2021
Mrs B Radha	Manager Finance
Mrs S Auguste	Administrative Manager
Mrs V Hardowar	Stores Superintendent replaced by Mr K Cheekhoory, Acting Stores Superintendent, as from 3 November 2021 to 30 June 2022
Ms A Dunputh	Administrative Manager <i>Secretary</i>

At its meeting of 23 March 2022, the Board reviewed the composition of the Finance Committee as follows : Mrs S.Soborun as Chairperson and Mr M.Rughoo, Mr L.Mungry and Mr R.Kisssoonah as members.

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.

One meeting of the Finance Committee was held during the period 01 July 2021 to 30 June 2022.

Staff Committee (SC)

Composition of the SC and its functions:

Mrs S Soborun	Chairperson
Mr S Naidu	Member
Mr M Rughoo	Member
Mr K Seechurn	Member

In Attendance

Dr S Ganeshan	Chief Executive Officer (from 1/7/2021 to 3/9/2021)
Mrs M. Seenevassen Pillay	Acting CEO as from 4/9/2021
Ms A Dunpath	Administrative Manager <i>Secretary</i>
Mrs B Veerapen	Acting Human Resource Manager

At its meeting of 23 March 2022, the Board reviewed the composition of the Staff Committee as follows : Mrs S.Soborun as Chairperson and Dr D.Puchooa, Mr K.Seechurn and Mr R.Kissoonaah as members.

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 four meetings of the Staff Committee during the period 01 July 2021 to 30 June 2022.

Strategic and Monitoring Committee (SMC)

The composition of the SMC was as follows:

Mr M Rughoo	Chairperson
Dr D Puchooa	Member
Mrs J Sauzier	Member
Mr L Mungry	Member

In Attendance:

Dr S Ganeshan	Chief Executive Officer (from 1/7/2021-3/9/2021)
Mrs M Seenevassen Pillay	Acting CEO as from 4/9/2021
Mr A Goolaub	Assistant Director (Extension and Training)
Mrs M Gungadurdoss	Assistant Director (Crop)
Ms A Dunpath	Administrative Manager, <i>Secretary</i>

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.

At its meeting of 23 March 2022, the Board reviewed the composition of the Strategic and Monitoring Committee as follows: Mr M. Rughoo as Chairperson and Dr D.Puchooa, Mrs J.Sauzier and Mr S.Naidu as members.

There was one meeting of the Strategic and Monitoring Committee (SMC) during the period 01 July 2021 to 30 June 2022.

Audit and Corporate Governance Committee (ACGC)

Composition of the ACGC

Mr S Naidu	Chairperson
Mrs J Sauzier	Member
Mr R Kissoonah	Member
Dr D Puchooa	Member

In Attendance

Ms A Dunputh	Administrative Manager, <i>Secretary</i>
Ms P Sevathian	Internal Auditor, FAREI

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

- 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.

At its meeting of 23 March 2022, the Board reviewed the composition of the Audit and Corporate Governance Committee as follows: Mr S. Naidu as Chairperson, Dr D.Puchooa, Mrs J.Sauzier and Mr K.Seechurn as members.

Only one meeting of the Audit and Corporate Governance Committee was held from 1 July 2021 to 30 June 2022.

Anti-Corruption Committee

The FAREI in collaboration with the ICAC, has implemented an Anti-Corruption Framework to detect and prevent fraud and corruption in the Public Sector. An Anti-Corruption Committee, comprising staff from various grades, has thus been set up at FAREI.

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 Key Performance Indicators (KPIs) namely:

- (i) Overtime allocation to Stockmen, Gardeners/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, through the Parent Ministry, and are in the process of being implemented at FAREI.

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.

The remuneration of the Chairperson for the period 01 July 2021 to 30 June 2022 amounted to MUR 384,220. 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 96,432 for the period 01 July 2021 to 30 June 2022.

Total number of Board meetings held from 01 July 2021 to 30 June 2022 was eight.

Name	Board meetings attended
Mr H Woodun	8/8
Mrs S D Soborun	7/8
Mrs Jacqueline Sauzier	5/8
Mr R Kissoonah	7/8
Dr D Puchooa	8/8
Mr S Naidu	8/8
Mr M Rughoo	7/8
Mr K Seechurn	8/8
Mr L Mungry	7/8
Mrs K.Jugroo	1/8

Name	Fees (MUR)							
	FAREI Board	Telephone Allowance	FC	SC	SMC	ACGC	Travelling	Total
Chairperson								
Mr H Woodun	371,070	12,000					1,150.00	384,220.00
Members								
Mrs S D Soborun	6,452.50		1,176.00	4,648.00			2,070.00	14,346.50
Mr S Naidu	7,387.00			2,526.50	855.75	1,176.00	2,990.00	14,935.25
Mr M Rughoo	6,452.50			2,526.50	1,176.00		2,530.00	12,685.00
Mrs J Sauzier	4,583.50					855.75	1,380.00	6,819.25
Mr K Seechurn	7,387.00		855.75	3,382.25			2,990.00	14,615.00
Mrs A.Pompon*					855.75		230.00	1,085.75
Dr D Puchooa	7,387.00			855.75	855.75	855.75	2,530.00	12,484.25
Mr L Mungry	6,452.50		855.75				1,840.00	9,148.25
Mr R Kissoonah	6,452.50			855.75			1,840.00	9,148.25
Mrs K.Jugroo**	934.50						230.00	1,164.50
Total	424,559.00	12,000	2,887.50	14,794.75	3,743.25	2,887.50	19,780.00	480,652.00

* 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
Chairperson				
Mr H Woodun	Nil	Nil	Nil	Nil
Members				
Mrs S D Soborun	1/1	4/4	Nil	Nil

Mr S Naidu	Nil	3/4	1/1	1/1
Mr M Rughoo	Nil	3/4	1/1	Nil
Mrs J Sauzier	Nil	Nil	Nil	1/1
Mr K Seechurn	1/1	4/4	Nil	Nil
Mrs A.Pompon *	Nil	Nil	1/1	Nil
Dr D Puchooa	Nil	1/1	1/1	1/1
Mr L Mungry	1/1	Nil	Nil	Nil
Mr R Kissoonah	Nil	1/1	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.

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. Fulfill 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

Board members are requested to disclose any interest in writing in matters referred to the Board for approval. They are also required to disclose any Related Party Transaction.

Related Party Transactions

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

Principle Five – Risk Governance and Internal Control

The Internal Audit section of FAREI is responsible for providing assurance to the Board with regard to the implementation, operation and effectiveness of internal controls in place at the organization and risk management. Internal Audit reports are taken up at the level of the Audit and Corporate

Governance Committee which in turn submits regular reports to the Board on the effectiveness of the internal audit systems and procedures at FAREI.

Risk Management

Risk management is closely linked to Corporate Governance. The FAREI has set up an Audit and Corporate Governance Committee.

The objective of risk management is not to eliminate risks altogether but to mitigate them to a minimum acceptable level in line with the objectives of the Board.

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 examined at the 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 processes.

Policies and systems will be put in place to ensure a systematic and continuous identification and evaluation of risks and actions to terminate, transfer, accept or mitigate each risk.

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.

An Internal Audit Charter which describes the internal audit's purpose, scope, authority, responsibility and position within the FAREI is being prepared. The Internal Audit Charter will set out the nature of services that the Internal Audit section would provide to the FAREI to enable it to achieve its objectives. The line of reporting of the Internal Auditor will be clearly defined in the Charter and will be in accordance with the Code of Corporate Governance. The Charter will also review the work program of the Internal Audit to include more aspects of risk management, system evaluation and an audit of the operational performance of the FAREI.

The Internal Audit section is also being reinforced with the creation of a new post of Internal Control Officer/Senior Internal Control Officer in the PRB 2021 report.

Principle Six – Reporting with Integrity

The FAREI has presented a fair, balanced and understandable assessment of the organization's financial, environmental, social and governance position, performance and outlook in this Annual Report.

The FAREI's core values 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.

Financial Capital

The revenue of the Institute consists mainly of:

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

These funds are used to meet its objectives and functions and on a broader scale to contribute to the growth of the Agri-Business sector.

Human Capital

Human capital is an asset of the Institute as the skills, knowledge, qualifications and experience of its people are vital for the success of the FAREI.

The Board acknowledges that organizational objectives can only be achieved through its employees. Accordingly, a lot of emphasis is placed on the human capital by providing a healthy and safe working environment and adopting an equitable and fair approach towards employees' remuneration and benefits.

Intellectual Capital

The FAREI continuously invests in technology solutions and IT tools to help manage documents, facilitate knowledge sharing, improve delivery of services to customers and safeguard customer and corporate data.

Management considers that Information and Communication Technology can be harnessed as an essential tool towards bringing service innovations to the stakeholders of the FAREI. In this context, the digitalization of FAREI's operations is being prepared with the objective of bringing quality service to its stakeholders.

Safety and Health Policy Statement

The FAREI complies with the Occupational Safety and Health Act 2005 and other legislations and regulatory frameworks.

The FAREI is fully committed to maintain safety and health for its employees. In order to provide a safe system of work in all worksites, a Safety and Health Policy has been set up. A Safety and Health Committee meets every two months in the presence of Unions to ensure that all worksites are complying with the related legislations and sub-legislations.

A culture where employees' ways of working and attitude which encompasses safety and health is being promoted at the FAREI.

Political and Charitable Donations

The FAREI's activities and projects are financed by the Ministry of Agro-Industry and Food Security. During the period under review, no political or charitable donations were made.

Transparency, Accountability and Integrity

To ensure maximum transparency within the organization, clear sets of internal procedures have been devised to eliminate the risks of fraud, errors and corruption. All internal and external circulars are sent by e-mail to ensure that all employees of FAREI are duly aware and updated.

Well established and comprehensive procedures have been formulated by the Anti- Corruption Committee of FAREI in its Anti- Corruption Policy.

Environmental and Social Responsibilities

The FAREI recognizes that it operates within a social and economic community. The organization highly values its social role as a "responsible corporate citizen" and acts in a manner which is non-exploitative, non-discriminatory and respectful of human rights.

Ethics

Every member of staff at FAREI is expected to conduct his/her work with utmost integrity, objectivity, fairness and professionalism. Staff members are required to uphold the reputation of the organization by treating its stakeholders, clients and the general public in a helpful and courteous manner, on a timely, reliable and where appropriate on a confidential basis, in an open, fair and efficient way. The senior management team ensures equality of opportunity and an open climate in which employees can have confidence in the fairness and impartiality of procedures.

Gender Policy Statement

The FAREI seeks, through its recruitment practice and Equal Opportunity Policy, to encourage the recruitment, development and retention of women at all levels of the organization and is committed to employing a diverse workforce.

The FAREI remains duty bound to recruit and invest in the best available talents and commits itself to having an increasing number of women throughout the organization. It recognizes that the provision of equal opportunities in the workplace is not only good management practice but it also makes sound business sense. Our Code of Ethics/Conduct as well as our Equal Opportunities Policy help all those who work for the FAREI to develop their full potential and talents.

Female employees are encouraged to participate in the decision-making processes and are empowered to take on higher responsibilities.

Accordingly, FAREI’s human resources are utilized optimally in order to maximize the efficiency of the organization.

The staffing position gender-wise is as follows:

Grades	Male	Female
Directorate , Scientific, Technical and Administrative Staff	113	124
Workmen’s Group	255	21
Sub total	368	145
Total	513	

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 process.

The Internal Auditor has unrestricted access to review all activities and transactions undertaken within the organization and to appraise and report thereon. There are no restrictions placed over the right of access of the Internal Auditor to records, documents and files kept by FAREI.

The Scope of Work of the Internal Audit function comprises:

- An assessment of financial and operating information and the means used to initiate, authorize, record, process and report such information to validate the reliability and integrity of the process;
- Ascertaining the extent of compliance with good internal accounting controls, established policies and procedures, laws and regulations;
- Reviewing the means to safeguard assets as well as the adequacy and effectiveness of applicable policies and practices;
- Appraising the economy and efficiency with which processes are executed and resources are employed;
- Reviewing operations and programs to ascertain whether results are consistent with established objectives; and
- Carrying out special assignments as directed by the Audit and Corporate Governance Committee.

External Audit

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

An Internal Audit Charter which describes the internal audit's purpose, scope, authority, responsibility and position within the FAREI is being prepared. The Internal Audit Charter will set out the nature of services that the Internal Audit section would provide to the FAREI to enable it to achieve its objectives. The line of reporting of the Internal Auditor will be clearly defined in the Charter and will be in accordance with the Code of Corporate Governance. The Charter will also review the work program of the Internal Audit to include more aspects of risk management, system evaluation and an audit of the operational performance of the FAREI.

The Internal Audit section is also being reinforced with the creation of a new post of Internal Control Officer/Senior Internal Control Officer in the PRB 2021 report.

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 crop 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.

Employees

The FAREI maintains constant dialogue with its employees. Employees are unionized and Management keeps an open communication channel with the FAREI Unions. The training needs of employees are assessed on a regular basis and addressed in a transparent manner.

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 offices to provide research, advisory and extension services to the farming community.

The FAREI ensures that its staff members possess the necessary skills, experience and knowledge to better serve its customers with professional advice and timely service delivery while abiding with all relevant legislations, rules and regulations.

Suppliers

In its dealings with suppliers of goods, works and services, the FAREI ensures that ethical standards are applied consistently to ensure that value for money goods, works and services are procured for the organisation in the most efficient way.

Parent Ministry

The FAREI maintained its collaboration with the Ministry of Agro Industry and Food Security in the implementation and monitoring of government projects and schemes to enable farmers to improve their production and productivity. The FAREI has been actively involved in facilitating the implementation of several schemes announced by the Government namely Sheltered Farming, Rain Water Harvesting, Purchase of Agricultural/ Processing Equipment (Crop), Purchase of Equipment (Livestock) , CCTV Camera, Upgrading of Livestock Farm and Cattle Breeding. Field visits were carried out to monitor these schemes.

Agricultural Marketing Board (AMB)

FAREI is the certification body for the local seeds marketed by the Agricultural Marketing Board. Assessment and follow up on the local harvest of potatoes, onions and garlic are also carried out by FAREI.

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 is posted on its website.

Other Stakeholders

The FAREI acted as an interface with other stakeholders such as the Development Bank of Mauritius, the Division of Veterinary Services for the Livestock Feed Production Scheme, the Small Farmers Welfare Fund and the Ministry of Environment with respect to loan requests, subsidized livestock feed, veterinary services, farmer's card and environment issues respectively.

Statement of Directors' Responsibility

The FAREI acknowledges its responsibilities for:

- Adequate accounting records and maintenance of effective internal control systems;

- The preparation of financial statements which fairly present the state of affairs of the Institute as at the end of the financial year and the results of its operations and cash flows for that period and which comply with International Public Sector Accounting Standards (IPSAS); and
- The selection of appropriate accounting policies supported by reasonable and prudent judgments.

The Director of Audit of the National Audit Office is responsible for reporting on whether the financial statements are fairly presented.

The Board of Directors reports that:

- Adequate accounting records and an effective system of internal control have been maintained;
- Appropriate accounting policies supported by reasonable and prudent judgments and estimates have been used consistently;
- Applicable accounting standards have been adhered to; and
- The Code of Corporate Governance as applicable to State-Owned Enterprises has been adhered to.

Directors' Statement for Internal Control

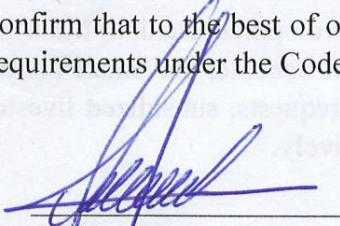
The FAREI acknowledges its responsibility for the setting up of adequate systems of Internal Control and for the setting up of appropriate policies to provide reasonable assurance that the control objectives have been attained. The activities of the Institute are closely monitored by the Board and its Sub-Committees. Procedures and policies are well documented and consistently applied. Management has the relevant experience and skills to ensure proper running of the Institute.

An effective system of Internal Control providing for the following has been implemented:

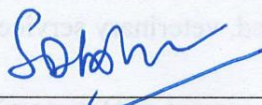
- Proper segregation of duties whereby the different functions in process are cross-checked and verified;
- Follow up and implementation of the recommendations of the Director of Audit by the divisions concerned in order to improve processes and to ensure proper accountability;
- Adequate supervision of duties is performed by staff members;
- The assets of the Institute are properly safeguarded;
- All cheques issued by the Institute are signed by two authorized signatories; and
- Compliance with relevant laws, rules and regulations.

Statement of Compliance

We, the Board Members of the Food and Agricultural Research and Extension Institute (FAREI), confirm that to the best of our knowledge, that the FAREI has complied with all its obligations and requirements under the Code of Corporate Governance whenever applicable.



H Woodun
Chairperson



S D Soborun (Mrs)
Board Member

28 April 2023

Section 4: Technical Highlights

Crop Research and Development

Introduction

From July 2021 to June 2022 activities at the Food and Agricultural Research and Extension Institute focused on the development of new crop varieties through breeding programme, the introduction and evaluation of new improved germplasm, crop productivity and quality improvement, new crop production techniques, crop protection and the development of eco-friendly and climate-smart packages for crop production.

The FoodSec Semence Project

Within the framework of the regional programme to support food and nutritional security in the Indian Ocean region, the FoodSec Semence Regional Project (2021-2025) funded by the European Union under the 11th European Development Fund (EDF) is being implemented in partnership with the Indian Ocean Commission (IOC), Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) in Reunion, Food and Agricultural Research and Extension Institute (FAREI) in Mauritius and the Centre National de la Recherche Appliquée au Développement Rural (FOFIFA) in Madagascar.

In Mauritius, potato and bean were selected and four tasks were identified to achieve the above objectives namely:

1. inventory of each targeted crop to identify the major players in the supply of planting materials, the main beneficiaries, practices and the main blocking points;
2. establishment of a catalogue of potato and bean varieties;
3. production of improved, certified and healthy starting planting material; and
4. on-farm farmer participatory trials to integrate the selected healthy seeds into agro-ecological systems.

In 2021, the agronomic, morphological description in line with the requirement for DUS (Distinctness, Uniformity and Stability) and VCU (Value for Cultivation and Use) as per the Seeds Act 2013 and inventory of pests and diseases of potato and bean were started. Molecular characterisation will be undertaken as a complementary tool to morphological characterisation for ultimate acquisition of Plant Breeders Rights. 167 kg mini-tubers and 2 tonnes of basic seeds of potato *Vigora* as well as 20 kg and 120 kg of bean varieties *FBS1* and *Ferrina* respectively were produced.

Potato

The agronomic performance of the promising variety Everest and the introduced varieties *Lucinda*, *Hermosa*, *Santana*, *Panamera*, *Sababah* and *Tyson* were assessed and compared to the commercial variety *Spunta* during the first and second cropping seasons.

In the first season at St Antoine, *Everest* was the highest yielder (30.8 t/ha) with yield increase of 41.3% over *Spunta* while at Rivière Baptiste, marketable tuber yield of Everest was comparable to *Spunta* and *Santana* although the variety was more affected by late blight. At Plaine Sophie, marketable tuber yield was significantly higher in *Spunta* (44.2 t/ha) followed by *Tyson* (38.0 t/ha) and *Lucinda* (34.0 t/ha). Low yields (12.7-24.6 t/ha) were recorded in *Sababah*, *Hermosa* and *Panamera* and was attributed to soft rot incidence in tubers.



- ✓ High yielding variety
- ✓ Table potato variety
- ✓ Early bulking crop
- ✓ Good reaction to bacterial wilt

In the second season at each site, significant differences ($P \leq 0.05$) in marketable tuber yield were observed among varieties. At Riche-en-Eau and Médine marketable tuber yield was significantly higher in *Everest* (36.2 and 42.7 t/ha respectively) compared to the remaining varieties including the control variety *Spunta* (20.9 and 33.4 t/ha) while at Bel Air, tuber yield of *Hermosa* and *Spunta* were at par with *Everest* (42.2 t/ha). The combined analysis over sites showed that *Everest* was the highest yielder with yield significantly higher by 29.6% compared to *Spunta*. The results of the yield evaluation trials conducted in the first and second potato seasons in different agro-climatic regions demonstrate that the variety *Everest* out-performed the commercial variety *Spunta* and the introduced varieties *Hermosa*, *Lucinda*, *Panamera*, *Sababah* and *Tyson* in terms of marketable tuber yield. It will be recommended for commercial cultivation in 2022.

The post-harvest characteristics of the introduced potato varieties *Everest*, *Sababah*, *Hermosa*, *Lucinda* and *Panamera* were determined to assess their suitability as table potato compared to control varieties *Spunta*, *Vigora* and *Delaware*. All varieties presented desirable tuber characteristics like *Spunta* in terms of tuber shape, eye depth and flesh colour. Tuber dry matter (TDM) differed significantly among varieties with values ranging from 17.2% (*Everest* and *Hermosa*) to 24.6% (*Delaware*). The results on TDM showed that *Everest*, *Hermosa* and *Lucinda* (19.5%) can be used for cooking as table potato. The flesh colour of *Sababah* is predominantly white while *Panamera*, *Everest* and *Spunta* are yellow-fleshed varieties. *Vigora* has a predominantly cream flesh colour after boiling. *Everest* presented desirable tuber and sensory attributes and could therefore be retained as a high yielding table potato variety destined for the fresh market segment.

The sensory characteristics of 6 local potato clones and 2 imported varieties namely, *Santana* and *Spunta* for French fries' quality using quantitative descriptive analysis (QDA) were determined.

Santana was rated as the variety which presented all the desired sensory attributes required for excellent French fries' quality. These were:

1. attractive fry colour with yellow, bright and light-coloured chips;
2. high ease of breaking when either hot or warm;
3. high degree of crunchiness and hardness;
4. low degree of oiliness during chew down;
5. high fried potato aroma and flavour; and
6. negligible level of sweet taste and bitter aftertaste.

Next to *Santana*, clones 29/5/10 and 29/5/16 by virtue of their light-coloured chips with very few brown ends as well as low degree of oiliness can be retained as candidate parents in the breeding and selection programme for the development of high yielding cultivars with excellent processing qualities. Sensory evaluation of eight potato genotypes for French fries' texture characteristics showed that varieties *Santana*, *Spunta*, clones 29/5/10 and 29/5/16 obtained the lowest scores for oiliness during chew down. The fat content of the fried potato chips was significantly lower in *Spunta* (23.99%) followed by 29/5/10 (24.23%) and *Santana* (28.87%) compared to 29/5//16 (32.87%).

Breeding and selection of local potato clones for ware production, processing and resistance to biotic and abiotic stresses was pursued. Seven promising local potato genotypes (142/161/4, 142/161/5, 161/142/16, 29/5/10, 29/5/16, 29/5/14 and *Belle Isle*) with high yield and late blight disease resistance were multiplied in the second potato season (July -August) at Bel Air SE to produce disease- free seed potato using the clonal method of selection. Certified seeds of each genotype ranging from 25 to 65 kg conforming to the standard seed size (50 g – 150 g) and free from external defects were selected and stored at 4°C at the AMB for future multiplication.



142/161/4

29/5/10

142/161/5

High Yielding and late blight resistant local potato genotype

To promote the cultivation of the newly developed and released potato variety *Vigora*, seed production was pursued and upscaled. A total of 1.8 tonnes of disease- free basic seeds of sizes 28 – 35mm (1.0t) and 35 – 55mm (0.8t) was produced and stored at the AMB for production of first year certified seeds in the crop season 2022. In addition, ten tonnes of 1st year certified *Vigora* seeds were produced, out of which 7.5 tonnes and 2.5 tonnes will be used for seed to ware production and seed to seed production respectively for the next potato campaign.

The incorporation of 6 local potato clones (142/161/4, 142/16/5, 161/142/16, 29/5/10, 29/5/14 and 29/5/16) conferring resistance to late blight (*Phytophthora infestans*) in an organic production system using both a no-spray fungicide strategy for late blight control and an organic fertiliser regime

while maintaining optimal tuber yield was investigated at Wooton and Réduit. Variety *Spunta* was used as control. Results of this study revealed that under conditions of high disease pressure, marketable tuber yield of the resistant to highly resistant clones was below the average tuber yield of 22 t/ha under both the conventional and organic fertiliser regimes. In *Spunta*, marketable tuber yield decreased drastically below 7.5 t/ha due to severe leaf defoliation. Findings of the trials also indicated that the yield performance of the advanced clones was higher using chemical fertilisers compared to an organic fertiliser regime.

For the National Seed Potato Programme, ELISA Testing and Field Performance Evaluation were conducted. 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 both by ELISA test and during field performance evaluation. For active growth inspection and seed inspection at harvest, 76.8 ha of potato seed plantation was surveyed.

Onion

The performance of seven promising (*SON 1806, 243, SON 1807, Askari, 404, Irati* and *Rosada*) and two control onion varieties (*Local Red* and *Veronique*) for sets production was assessed at Richelieu. Highest yields of sets were obtained with varieties *SON 1806* (2.9 kg/m²) followed by varieties *Rosada* (2.6 kg/m²), *243* (2.2 kg/m²) and *SON 1807* (2.1 kg/m²) as compared to the control varieties *Local Red* and *Veronique* (1.2 kg/m²).

The agronomic performance of four hybrid onion varieties identified as promising in 2019 (*SON 1806, SON 1807, 243, 404*) and one introduced in 2021 (*Africa Red*) were compared to three control varieties (*Rubex, Askari* and *Francia*) at Réduit and Richelieu. At Réduit CRS, though non-significant ($P>0.05$), highest marketable yield was obtained with control variety *Askari* (29.5 t/ha) followed by varieties *SON 1806* (28.0 t/ha), *SON 1807* (27.5 t/ha) and *243* (24.2 t/ha). At Richelieu CRS, there was significant difference ($P\leq 0.05$) for the marketable yields between promising variety *SON 1807* (52.6 t/ha), new variety *Africa Red* (49.5 t/ha) and promising variety *SON 1806* (46.7 t/ha) compared to the control variety *Francia* (28.3 t/ha). Variety *404* was found to be a low yielding variety with a high unmarketable yield (42%) due to high thick-neck plants. Variety *Africa Red* is a poor yielder (18 t/ha) and had dark red bulbs which are not acceptable by growers and consumers.



Onion 243



Son 1806



Son 1807

Promising hybrid onion varieties

Five on-farm trials were set up to evaluate three red onion varieties (*404, SON 1806, SON 1807*) and one yellow variety (*243*) at L'Espérance Trébuchet, La Chaumière, Camp Fouquereau and La Marie.

The control varieties were Francia and Askari. At L'Espérance Trebuchet, marketable yield of promising variety *SON 1807* (32.0 t/ha) was at par with control variety *Askari* (30.7 t/ha), but significantly higher ($P \leq 0.05$) than the other varieties (23.6 - 26.4 t/ha). *SON 1807* had higher marketable yield (32.0 t/ha) compared to variety *Francia* (23.7 t/ha). Variety *404* had the lowest marketable yield (20.0 t/ha). The marketable yield of the 2 yellow varieties *243* (26.4 t/ha) and *Askari* (30.7 t/ha) did not differ significantly. Variety *Askari* had a lower unmarketable yield of 12.1 % compared with variety *243* (44.6%). At Camp Fouquereaux, marketable yields were at par for the control variety *Askari* (33.6 t/ha) and *SON 1806* (32.8 t/ha) and were significantly higher ($P \leq 0.05$) than the other varieties (25.6 - 30.9 t/ha). They were followed by variety *SON 1807* (30.9 t/ha) and *243* (28.0 t/ha). Variety *404* had lowest marketable yield (14.4 t/ha) and higher unmarketable yield (35.0 %) compared with variety *Francia* (23.4 %). Marketable yields of the varieties *SON 1806* (32.8 t/ha) and *SON 1807* (30.9 t/ha) differed significantly with variety *Francia* (25.6 t/ha). At La Marie, highest marketable yields were obtained in the control variety *Askari* (48.5 t/ha) followed by the promising varieties *SON 1807* (41.6 t/ha), *243* (39.2 t/ha) and *SON 1806* (38.4 t/ha). Variety *404* had the lowest marketable yield (23.2 t/ha) and differed significantly from the control variety *Francia* (35.5 t/ha).

Assessment of the storage potential of four red promising open pollinated onion (*AVON 1067*, *AVON 1031*, *AVON 1056* and *Roxa*) over a period of 4 months under two storage conditions (ambient and cold) at AMB revealed that storage loss of variety *Roxa* (27.2%) was significantly higher ($P \leq 0.05$) compared to varieties *AVON 1031* and *AVON 1067* (16.0 – 16.2%) under ambient condition. In cold condition, there was no significant difference between the four varieties. Based on results of on-farm trials and storage trial, all the four varieties were found promising and will be evaluated again for data validation in 2022.



Avon 1056



Avon 1031

Promising open-pollinated onion varieties

Onion breeding activities focused on the improvement of the Brazilian variety *Roxa*. In 2021, 21.5 kg of Year 6 *Roxa* seeds were produced for the production of Year 6 bulbs in 2022. Similarly, regarding improvement of varieties from World Vegetable Center, 90.8kg and 117.7kg of Year 4 mother bulbs of variety *AVON 1031* and *AVON 1056* respectively were produced. For *Avon 1067*, 0.44 kg of Year 4 seeds were produced for production of Year 4 bulbs in 2022.

Taro

Trials were implemented at Camp de Masque and Riche Mare to assess the performance of 3 promising Fiji colocasia varieties namely *PNG13*, *SM152* and *MAL08*. Significant differences in yield, weight of corm and corm diameter were observed among varieties. The yields ranged from 12.9 - 24.7 t/ha with variety *PNG13* and *SM152* giving significantly higher yields of 24.7 and 20.6 t/ha respectively as compared to *MAL08* (12.9 t/ha). The average weight of corm ranged from 0.58 - 1.1 kg, diameter from 7.9 - 9.8 cm and length from 18.8 - 24.1 cm. Varieties *PNG13* and *SM152* gave the highest corm weight of 0.93 kg and 1.1 kg and corm diameter of 9.8cm and 9.6cm respectively. They were also found to be more tolerant to taro leaf blight as compared to variety *MAL08*. *PNG13* was well appreciated by the grower for its yield performance and prolific sucker production (15-20 / plant). With the planting material obtained, he was able to extend his plantation to over 0.5 arpent. *PNG13* also gained good consumer acceptance.

Sensory evaluation showed that boiled corms of *PNG13* had better taste, aroma and texture than *SM152*. Based on its yield, tolerance to TLB and taste, the variety *PNG13* was recommended for commercial cultivation in 2021. Around 8100 suckers from the multiplication plots were provided to demonstration centres, Women and Youth Agricultural Entrepreneur Club and growers for the promotion of the variety island wide.

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. Two promising lines namely, *AL1* and *AL2* were selected for further evaluation based on their yields that were comparable to our local cultivar. 500 suckers of these lines were provided to 2 growers for setting up of on-farm trials at Camp de Masque and Fond du sac. The trials are on-going. Additionally, the processing potential of the two lines was assessed. They were both found suitable for processing and cooking. The corms of both lines lacked acidity and were highly appreciated as boiled and for chips making. Chips made from the 2 lines are crispy and have very good keeping quality with an attractive pink colour. The cooking time was also less for both lines as compared to the control variety.

Pulse crops

Seven introduced heat tolerant CIAT bean varieties (*AP82*, *Namtupa*, *Myyambitira*, *Chitedze bean 4*, *Chitedze bean 1*, *2*, *3*) were evaluated so as to identify a summer variety and subsequently to extend the bean growing season to increase pulse production. Varieties *Ferrina*, *Long Tom* and *Red Pearl* were the control varieties. Dry pods were harvested 85-115 days after planting (DAP) with the control variety *Red pearl* being the earliest maturing variety (85-90 DAP), the remaining varieties being mid-maturing (90 - 105 DAP). Significant differences were observed in 100 seed weight and seed yield. The 100 seed weight of variety *Namtupa* (48.2 g) was at par with the control varieties *Red pearl* (50 g) and *Long Tom* (46.4 g). Lowest 100 dry seed weight was recorded in varieties *Myyambitira*, *Chitedze bean 1* and *Chitedze bean 2* (33 -35 g). Dry seed yield ranged from 0.17 - 1.42 t/ha. The control variety *Red pearl* gave the highest seed yield of 1.42 t/ha followed by *Chitedze bean 1* (1.07 t/ha), *Chitedze bean 2* (1.01 t/ha). The yields of *AP82* (0.67 t/ha) and *Chitedze bean 4* (0.47 t/ha) were comparable to control variety *Long Tom* (0.6 t/ha) and *Ferrina* (0.51 t/ha). The lowest yielding variety was *Chitedze bean 3* (0.17 t/ha).

Amongst the varieties tested, Red pearl, *Chitedze bean 1* and *Chitedze bean 2* were found to adapt well in summer with seed yields of 1.0 - 1.4 t/ha. The overall low yield was also due to unfavourable weather conditions prevailing (flash floods) during the crop cycle. No significant difference was observed in number of seeds per pod which ranged from 3.3 - 4.3. The varieties *Myyambitira*, *Namtupa*, and *Chitedzean 3* were severely affected by seed borne Bean Common Mosaic Virus (BCMV) and Bean Yellow Mosaic Virus (BYMV) and were rejected. A total of 15 kg nucleus bean seeds of the remaining 4 heat tolerant varieties were produced for further evaluation in 2022.



Newly released bean variety *Ferrina*

To increase the availability of *Ferrina* seeds for growers and to promote *Ferrina* pulse production and consumption, 10 kg disease-free, good quality seeds were provided to Senneville Agricultural Limited and 5 kg to St Antoine for seed production. 165 kg seeds were produced by Senneville Agricultural Limited and St Antoine respectively.

Broad bean variety *Local* was grown at Wooton in August 2021 to assess its agronomic performance. Severe incidence of chocolate spot and black root rot were noted at vegetative and flowering stage causing up to 60% damage to the crop. Poor yield of the order 4.5 t/ha was recorded but with good pod quality of average length and diameter of 7.4 and 1.5 cm respectively and with 3 - 4 seeds per pod. The pod quality indicates that harvest can be extended up to early summer period as good pod filling was achieved. An observational on-farm trial was also set at Valentina in June 2021 to demonstrate the agronomic performance of broad bean variety *Local* and to promote its cultivation and availability for consumption. The crop gave an outstanding yield of 18 t/ha of mature green pods with an average length and diameter of 8.7 cm and 1.5 cm respectively and 3 - 4 seeds per pod. The grower was very satisfied and is willing to extend the area under cultivation for next cropping season.

Breeding activities were conducted for pea and bean. For pea, two promising green pea lines, *LS54* and *LS148*, emanating from the cross *Local* x *Star 6007*, were assessed on-farm at Valentina in June 2021. Good yields of the order of 16.0 and 12.5 t/ha were recorded for *LS54* and *LS148* respectively. The plants of both lines were shorter (103 to 105 cm) than the *Local* variety (158 cm) and their pods were longer and larger. Due to their pod quality, the grower decided to extend area under cultivation for both lines in the next cropping season. The line *LS54* LS, was released for commercial cultivation under the name *Green Beauty* in 2021.



Green Beauty
A locally developed green pea variety

For the crosses *Local x Arcadia*, one promising line, *LA160*, was recommended under the name *Sweet snow pea* as an edible podded pea variety in 2021. To promote the variety, it was grown on-farm at Clemencia and compared to the local variety Chinese pea. Higher yield of 9.2 t/ha of immature pods was recorded in *Sweet snow pea* as compared to the local variety (7.5 t/ha). Pods of *Sweet snow pea* were longer and larger than those of the local variety. Grower intends to increase area under its cultivation for next cropping season. An observational plot was also set up at Wooton CRS in September 2021 to study the agronomic performance of *Sweet snow pea* in late winter and early summer. A good yield of 7.4 t/ha was recorded indicating that production period can be extended. Demonstrations and conducted tours were carried out in October 2021 at Réduit CRS to apprise Extension officers and growers about the Green beauty and Sweet Snow Pea varieties.



Sweet Snow Pea
A locally developed edible-podded pea variety

For bean, F7 seeds of 19 selected lines were space-planted at Réduit CRS for the evaluation and selection of F8 progenies and production of F8 seeds. 12 lines were selected based on plant vigour, number of pods/plant and pod quality. Dry pods were harvested, processed and 8 kg of F8 seeds were produced for further evaluation.

Garlic

Seventeen garlic accessions (*DRR 220, Unuth, AMB20, Abyusuf, Boodnah, RAMjee, Didarally, RAmpall, Gooniah, G0619, DRR171, VFG158, Haulkhory, Sookun, Sujeebun* and *Beeharry*) and 40 kg of cloves of the promising accession *ACC 36* were sown at Réduit CRS end May/start June 2021 as per recommended practices. The marketable yields of garlic ranged from 5t/ha for accession *Beeharry* to 11.3 t/ha for accession *DRR220*. Apart from *Beeharry* and *Sujeebun* the yields of the other accessions were above the national yield of 6.5 t/ha. The yields of accessions *Unuth* and *AMB20* were on average 11.5 t/ha and those of accessions *Abyusuf, Boodnah, Ramjee, Didarally* and *Rampall* were on average 9.5 t/ha. 237 kg of garlic bulbs of accession *ACC 36* representing a yield of 11.9 t/ha were harvested. After selection based on size, 160 kg bulbs were stored at the AMB for on-farm observation trials in 2022.

One hand pushed garlic planter, two hand pushed single weed weeders and one hand pushed double weed weeder were purchased under the DeSIRA project in 2021. The wide variation in the intra-row spacing ranging from 2 cm to 30 cm and the horizontal position of the cloves are the major drawbacks of the garlic planter. The hand-pushed single wheel weeder fitted with a blade of 30 cm wide as well as a tine 15 cm wide can be used in widely spaced crop especially in organic cropping systems. One hand-pushed double wheel weeder could not be tested in the garlic fields as the critical weed control stage was over. However, the equipment could be useful in organic cropping systems where chemical herbicides are not allowed.

Cardamom

A cardamom plot was set up at Wooton CRS with three accessions (*Wooton, Midland* and Réduit accessions) Cardamom plants are now established and characterisation will start once flowering occurs in 2022.

Cassava

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

Quinoa

Trials were set at Richelieu and Réduit in June 2021 to assess the agronomic performance of six quinoa accessions (*P1510543, P1510548, P1510551, P1596293, P1596498, P1634919*). At Richelieu CRS, the average seed yield ranged from 0.08 to 2.84 t/ha with *P1634919* giving significantly highest yield of the order 2.84 t/ha. Regarding the 1000 seed weight, the accession *P1596293* was found to have the highest weight of the order of 3.36 g followed by *P1510551* (3.04 g) and *P1634919* (3.01 g).

The plant height ranged from 78.6 to 99.2 cm with their panicles being in the range of 30.9 to 36.0 cm long and 11.1 to 15.4 cm wide respectively. At Réduit CRS, trial was not successful.

Vanilla

The agronomic performance of vanilla using 3 types of support (concrete, wooden and galvanised metal) is being assessed at Réduit. Vegetative development of vanilla cuttings on concrete and wooden supports was observed to be better compared with metal support with a success rate of vanilla cuttings for establishment into vines of 54.2% on galvanised metal support, 68.0% on wooden support and 72.2% on concrete support

A germplasm collection with 12 accessions of vanilla has also been set up for morphological characterization. Plants are at vegetative stage.

Sweet potato

Ten sweet potato varieties namely, *Raisin*, *U9*, *U11*, *U12*, *Chestnut*, *Leek*, *Zapello*, *Patate mauve*, *Unk* and *Little Leaf* were planted for multiplication while *Little Leaf*, *U9*, and *U12* only were evaluated in field at Richelieu Crop Research Station. Estimated yield and quality of tubers for *Little leaf*, *U12* and *U9* were 22.4 t/ha, 12.5 t/ha and 29.4 t/ha, with red outer skin and cream flesh, brownish orange outer skin and orange flesh and white outer skin and white flesh respectively.

Sensory evaluation of the ten sweet potato varieties showed that varieties Little leaf, Raisin, Leek and Patate mauve were the best varieties for consumption after boiling and for processing into crisps, fries and flour whereas Zapello and Unknown had good taste with good potential for processing into flour only. Varieties Unknown and U9 lacked sweetness and varieties chestnut, U12 and U 11 were moderately sweet as the most appropriate variety for further studies.



Leek



Little leaf



Patate Mauve



Zapello

Sweet Potato varieties under test

Groundnut

Ten groundnut varieties namely, *ICGV 171174* (Three seeded), *ICGV 10176* (Rust and leaf spot resistant), *ICGV 171181* (Three seeded), *ICGV 171176* (Three seeded), *ICGV 86699* (Rust and leaf spot resistant), *ICGV 06040* (Heat tolerant), *Ramtohul*, *Ramtohul* (Rough seeded), *Lee* and *Local cabri* were sown in April 2021 at Richelieu for multiplication and characterisation purposes. Pod yield ranged from 1.4 t/ha in variety *ICGV 06040* to 0.206 t/ha in variety *ICGV 171176* and the corresponding seed yield from 1.07t/ha to 0.338 t/ha. The shelling out percentage varied from 80% (*Ramtohul*) to 54.3% for the groundnut variety *Lee*. The highest 100 seed weight was recorded in variety *Lee* (96.6g) followed by *ICGV 86699* (66.7g) and *ICGV 10176* (66.1g) and the lowest was noted in *ICGV 171176* (32.2g).

Tomato

The performance of 8 hybrid tomato varieties (*Ryna*, *Disha*, *KSP 1430*, *KSP 1431*, *Cobra*, *HVTM 215*, *Sultan* and *Meenakshi*) was assessed at Réduit and Richelieu from August 2021 to January 2022. *Swaraksha* and *TH N 988* were the control varieties. Most of the varieties have semi determinate growth habit except for varieties *Cobra*, *KSP 1430* and *Meenakshi* which are determinate. Fruit shape varied from oblong, square round to round. The oblong varieties had 2-3 locules compared to 3-4 for the square round and round ones. Yields did not differ significantly among the varieties on both stations but a relatively higher yield was observed at Réduit (45.0 to 76.3 t/ha) compared to Richelieu (7.2 to 18.3 t/ha). At Réduit, variety *Cobra* recorded the highest yield of 76.3 t/ha followed by *Ryna* (73.1 t/ha) and *Sultan* (65.1 t/ha) compared to the control varieties *Swaraksha* and *TH N 988* (56.7 and 62.8 t/ha respectively). At Richelieu, variety *Disha* had the highest yield of 18.3 t/ha followed by *Ryna* (17.5 t/ha) and *Sultan* (11.9t/ha). The control varieties *Swaraksha* and *TH N 988* yielded 9.3 and 10.5 t/ha respectively. All the varieties appear to be promising in terms of yield and fruit quality and need to be re-evaluated to confirm their potential.



Sultan



Ryna



KSP 1431

Promising tomato varieties

In 2 other trials conducted at Réduit and Richelieu, eight promising new tomato lines introduced from World Vegetable Center (*CLN 3024A*, *CLN 3212 C*, *CLN 3241 Q*, *CLN 3736 D*, *CLN 4018 B*, *CLN 2498 D*, *CLN 3241 H- 27*, and *CLN 3938 C*) were under test and compared to the control variety *Swaraksha* and *TH N 988*. Yields differed significantly ($P \leq 0.05$) among the varieties on both stations with higher yields being recorded at Richelieu (9.6 – 34.3 t/ha) compared to Réduit (3.39 -17.47 t/ha). At Richelieu, highest yield was recorded in *CLN 2498 D* (34.30t/ha) followed by *CLN 4018 B* (21.26

t/ha) and *CLN 3212 C* (19.42 t/ha). Significantly lower yield of the order of 12.55 t/ha was recorded in the control variety *Swaraksha*.

Variety *CLN 3736 D* had the lowest yield of 9.60 t/ha. At Réduit, the control variety *Swaraksha* produced the highest yield of 22.3 t/ha followed by *CLN 2498 D* (17.47 t/ha), *CLN 4018 B* (17.36 t/ha) and *TH N 988* (16.11 t/ha). A total of 310 g seeds of the eight varieties were produced and will be used for further evaluation in 2022.



CLN 2498D Tomato varieties introduced from World Vegetable Center



CLN 3938C

Tomato conventional breeding activities were conducted whereby F3 seeds of 49 selected lines, from cross *Calora x Swaraksha*, were grown at Réduit for evaluation and selection of F3 lines. A total of seventy progenies were selected. Fruits from these progenies were processed and F4 seeds obtained will be used for further evaluation and selection.

From the cross *Metis x Wild type*, F3 seeds of fifty lines were sown at Réduit and Richelieu for evaluation and selection purposes. 113 and 74 progenies were selected based on plant and fruit characteristics at Réduit and Richelieu respectively. Among the progenies selected, variation was noted on the growth habit and canopy size. 90% of progenies were of determinate type, the remaining 10% being of semi-determinate and intermediate type. Height of plants ranged from 25 cm to 100 cm. Fruit shape varied from small round, round, round with lobes and oblong. Fruits were harvested and processed to obtain F4 seeds.

Chilli

The agronomic performance of 9 chilli varieties (*APC 4*, *BSS 273*, *KSP 1471*, *KSP 1251*, *KSP 1350*, *NS 203*, *KSP 1472*, *BSS 919* and *KSP 1470*) was assessed and compared to the control variety *Indam 5* at Réduit and Richelieu. At Réduit, yields ranged from 7.08 to 31.98 t/ha and differed significantly among varieties. Variety *BSS 273* gave the highest yield of 31.98 t/ha followed by *KSP 1470* (31.09 t/ha), *KSP 1350* (24.41 t/ha) and *APC 4* (23.75 t/ha) as compared to the control variety *Indam 5* (23.49 t/ha). At Richelieu, the highest yielder was variety *BSS 273* (16.19 t/ha) followed by *APC 4* (12.65 t/ha) and *KSP 1470* (12.65t/ha) and they were all at par with *Indam 5* (15.07 t/ha). Variety *NS 203*, bearing small fruits, produced a yield of 9.92 and 10.63 t/ha at Richelieu and Réduit respectively. All the varieties have elongated fruits except for variety *BSS 919* which bears triangular fruits. Varieties

NS 603 and *KSP 1472* are highly pungent compared to *BSS273* and *BSS 919* which had low pungency. Remaining varieties had medium pungency.

The varieties *KSP 1470*, *KSP 1350*, *ACP 4*, *KSP 1471*, *KSP 1251*, *KSP 1472* and *NS 203* are promising in terms of yield, pungency, fruit shape and fruit size.



KSP 1472



KSP 1470



NS 203

Promising chilli varieties

On farm evaluation of two anthracnose tolerant chilli lines namely, *AVPP 9813* and *AVPP 0514* from the World Vegetable Centre, was carried out in 8 different regions across the island and on 3 model farms of FAREI. Most of the growers did not appreciate the two lines due to their mild pungency. However, two planters at Britannia and Roche Terre have shown interest for *AVPP 0514* which is more pungent than *AVPP 9813*. Both growers have saved seeds for further plantation.

The improved chilli line *APC 4*, tolerant to anthracnose, was evaluated Roche Terre, Britannia and Camp de Masque. Although the trials were affected by heavy rain at Camp Masque and Britannia, the growers showed a high appreciation for the variety. Hundred and eighty-five grams of seeds of improved *APC 4* were produced and will be distributed to more growers for further evaluation in 2022.

Crucifers

• Chinese cabbage

The performance of 4 varieties of Chinese cabbage (*V1060 641*, *V1060 643*, *V1060 644* and *V1060 646*) introduced from the World Vegetable Centre (WVC) was assessed at Réduit in April 2021 using variety *Pomme Type* as control. No significant difference was observed for yield, head weight, circumference and compactness among the varieties of Chinese cabbage under test. Variety *V1060641* gave the highest yield of 107.20 t/ha compared to 80.00 t/ha for the control variety *Pomme Type*. All Four varieties from WVC were of heading type with variety *V1060641* having the

most compact head of 41.42 g/cm. The 4 varieties are promising and will be further evaluated in 2022.

- **Chinese Broccoli (Kailaan)**

Four varieties of Kailaan, 2 from World Vegetable Centre (*AVLB 1201*, *AVLB 1202*) and 2 commercial ones (*NKL 01* and *KL 01*) were under test at Réduit. Yields did not differ significantly among varieties with 12.54 t/ha, 10.27 t/ha, 9.78 t/ha and 8.85 t/ha for varieties *KL01*, *AVLB 1201*, *AVLB1202* and *NKL 01* respectively.



Kailaan varieties under test

- **Cabbage and Cauliflower**

Improvement of landraces of cabbage and cauliflower through the use of nuclear techniques for mutation breeding and biotechnology is on-going. M5 seeds of 26 and 101 cabbage and cauliflower lines respectively were sown at Réduit for evaluation and selection of M5 lines. 25 cauliflower and



Selected cauliflower and cabbage lines

15 cabbage M5 lines were selected based on head characteristics and susceptibility to black rot. M6 seeds harvested and processed will be used for selection and evaluation of M6 lines and production of M7 seeds.

Studies were conducted at Richelieu, Wooton and Réduit to determine the optimum planting distance for cabbage production. Four planting distance (0.5 x 0.5m, 0.5 x 0.6 m, 0.6 x 0.6 m and 0.7 x 0.6 m) were tested and compared to the standard practice (0.45 x 0.6 m). At Richelieu, highest yield of the order of 40.96 t/ha with a head weight of 1.02 kg was recorded at a planting distance of 0.5 m x 0.5 m followed by the recommended spacing with a yield of 28.82 t/ha and head weight of 0.78 kg. At Wooton, highest yield of 42.84 t/ha with a head weight of 1.16 kg was recorded in the standard practice followed by spacing 0.5m x 0.5 m with a yield of 34.57 t/ha and head weight of 0.85 kg. At Réduit, significantly higher yield of 118.67 t/ha and head weight of 2.97 kg was recorded at a spacing of 0.5 m x 0.5 m followed by the recommended spacing with a yield of 98.97 t/ha and head weight of 2.67 kg.

Trials were set up at Réduit, Richelieu and Wooton to determine the optimum farmyard manure rate (FYM) for production of cauliflower variety Tropical eleven. Five different FYM rates namely, 0 t/ha, 10.5 t/ha, 21 t/ha (the recommended practice), 30t/ha and 40.5 t/ha were tested. No significant difference was observed for yield, fresh weight, curd weight circumference and compactness among the different FYM rate at all 3 sites. Yields ranged from 13.3 -14.4 t/ha, 10.9 – 11.5 t/ha and 5.3 -9.6 t/ha for Réduit, Richelieu and Wooton respectively.

Salad crops

The performance of 6 varieties of Rocket salad (*Wild Rocket*, *Rocket cultivé-Aragula*, *Rocket Green-Italy*, *Roquette Cultivée*, *Sweet Rocket*, *Rocket Green-Malaysia*) was evaluated at Wooton and Réduit. Harvest was carried out by cutting the whole plant in one single cut. Yields ranging from 10.7 - 15.8 t/ha were obtained at Réduit compared to Wooton (1.2 to 2.5 t/ha.). Low yields at Wooton were attributed to unfavourable weather conditions. At Réduit, the best performing varieties were *Wild Rocket* (15.8 t/ha) followed by *Sweet Rocket* (14.7 t/ha), the remaining varieties yielding 10.7 - 13.7t/ha.

A study was conducted at Réduit to determine the optimal within row spacing for 3 lettuce varieties (Batavia -variety *MLT06*, Iceberg- *MLT05* and Romaine - *Auvona*) whereby five within rows spacings (20 x 30 cm, 25 x 30 cm, 30 x 30 cm (control), 35 x 30 cm and 40 x 30 cm) were tested. Results showed that there was no significant difference among the five spacings for average head weight, head circumference and head compactness. However, significant difference in yields was observed. All three varieties gave highest yield at a spacing 20 x 30 cm with variety *Auvona* yielding 127.5 t/ha, *MLT05* 89. t/ha and *MLT06* 31.8 t/ha as compared to the control (*Auvona*: 89.1, *MLT05*: 63.4 t/ha and *MLT06*: 21.1 t/ha).

The performance of four varieties of carrot namely, *Verano*, *K1000*, *Vivian* and *Samba* was assessed at Réduit. Varieties *Samba* and *Verano* were the control varieties. No significant difference was observed among the varieties for yield with leaves, yield without leaves, percentage of grade 1, grade

2 and grade 3 carrots. Variety *Samba* gave the highest yield (without leaves) of 52.00 t/ha followed by *K1000* (50.50 t/ha), *Verano* (43/17 t/ha) and *Vivian* (41.50 t/ha). Variety *K1000* gave the highest yield of grade one carrots (26.5 t/ha) followed by variety *Samba* (24.5 t/ha). Varieties *K1000* and *Vivian* will be further tested in 2022.

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

Asparagus

Seeds of 6 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 at Réduit in August 2021. Two months later the seedlings were transplanted at Réduit and Richelieu on raised beds for crown formation.

Artichoke

A collection of local Artichoke germplasm is being conducted. Plants already collected have been planted at Réduit for mass multiplication and for studies on cultural practices.

Spinach

The agronomic performance of three varieties of spinach (*GLB01*, *Dash* and *Viroflay*) was assessed at Réduit. Poor germination was obtained with variety *Viroflay* as compared to 90% for the remaining 2 varieties. Harvest was carried out according to the one-cut method. No major pests and diseases were recorded. The variety *Dash* performed better with a yield of 33.2 t/ha as opposed to 26.8 t/ha for *GLB01*. Higher number of leaves per plant (24) and greater plant height (33.5 cm) was recorded in variety *Dash* as compared to *GLB01* (16 and 29.9 respectively). The two varieties were found promising in terms of yield and growth characteristics and consumer acceptance. They will be re-evaluated to confirm results.



Spinach varieties under test

Swiss chard

The agronomic performance of four Swiss chard varieties namely, *Fordhook Giant*, *Greenwave*, *Lucullus* and *Argentata* was evaluated at Réduit. At Richelieu, an additional variety Charlie was included in the trial. The outer leaves at the base of the stalk were harvested, leaving four to five inner leaves to continue growing. At Réduit, no significant difference ($P \leq 0.05$) was found in yield and average number of leaves/plant among the different varieties evaluated. Highest yield was observed in variety *Lucullus* (51.4 t/ha) followed by *Greenwave* (45.5 t/ha), *Argentata* (42.5 t/ha) and *Fordhook Giant* (36.1 t/ha). The number of leaves per plant for the different varieties varied from 15 - 19. Significant difference ($P \leq 0.05$) in the average length and width of leaf was recorded among varieties. Variety *Lucullus* produced the longest leaf of the order of 43.0 cm followed by *Greenwave* (42.2 cm), *Argentata* (36.9 cm) and *Fordhook Giant* (29.0cm). Wider leaves were produced by *Argentata* (17.4 cm) followed by *Greenwave* (15.8 cm,) *Lucullus* (15.2 cm) and *Fordhook Giant* (13.3 cm).

At Richelieu CRS, highest yield was recorded in variety *Lucullus* (52.9 t/ha) followed by *Argentata* (45.2 t/ha), *Charlie* (27.7 t/ha) and variety *Fordhook Giant* (35.7 t/ha). Lowest yield was recorded in variety *Greenwave* (24.5 t/ha). Significant difference ($P \leq 0.05$) was noted in the number of leaves/plant for the different varieties. It varied from 18 to 23 leaves/plant with variety *Lucullus* producing the maximum number of leaves (23) and variety *Argentata* the lowest number (18). Same trend as Réduit was observed regarding leaf characteristics with *Lucullus* producing the longest leaves and *Argentata* the widest leaves.

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 will be further evaluated to confirm results.



Swiss Chard varieties under test

Cucurbits

- **Squash**

Crosses were made between Squash variety Golden custard (female parent) and variety SQ 4401 (male parent). Sixteen mature fruits were harvested in November 2021. Extracted F1 seeds have been stored and will be planted in 2022 for selection of promising F1 lines.

- **Zucchini**

A trial was set up at Wooton to determine the optimum planting distance for zucchini under protected structure. Treatments consisted of 3 spacings namely, 1.0m x1.5m (control), 1.2 m x1.5 m and 1.5m x1.5m. No significant difference was obtained among the different planting distance for the total number of fruits/plant (7 to 9 fruits/plant).

- **Cucumber**

The effect of 2 fertiliser regimes namely, the recommended fertilizer rate (manure @ 3.0 kg/m² + Triple Superphosphate @ 29.6 g/m² + Sulphate of Ammonia @ 58.0 g/m² + Muriate of Potash @ 18.9 g/m²) and a new fertiliser formulation (Locastart @ 64.0 g/m² + Physiolith @78 g/m² + 14:8:20 @ 78 g/ m²) on yield of two varieties of cucumber (Acylia and White Cucumber) was assessed. No significant difference in yield was observed between the two fertilizer regimes evaluated. A yield of 2 fruits/plant and fruits of length 24.55 to 24.46 cm and diameter 4.59 to 4.63 cm was recorded in both treatments.

Mushroom

- **Coloured oyster mushroom**

To promote the three new strains of coloured oyster mushroom, (Grey, yellow and pink), they were grown in 3 on-farm trials set up at Albion, Solferino and Curepipe together with the control variety *CC114*. At Curepipe, highest yield was recorded in the yellow oyster mushroom (312 g/750 g fruiting bag) followed by Pink oyster mushroom (258g/750 g fruiting bag) and Grey oyster mushroom (204g/750 g fruiting bag).

At Albion and Solferino, the highest yielding strain was the common oyster mushroom *CC114* with a yield of 146.8g /bag and 223.9 g/bag respectively. The feedback from new growers was very positive. All three participating in the on-farm trial indicated interest in continuing mushroom cultivation.



Pink oyster mushroom



Yellow oyster mushroom



Grey oyster mushroom

- **King Oyster mushroom**

Pleurotus eryngii, also known as King Oyster mushroom was evaluated at Wooton. As noted in previous year's trials, the pinhead and fruit development were irregular. A yield of 89.7 g/ 0.75kg bag was recorded.



King oyster mushroom

- **Ganoderma mushroom**

Ganoderma mushroom was sub-cultured and evaluated at Wooton. Yield recorded for the first flush was of 6.75g/fruiting bag of 0.75 kg capacity for the first flush. On average, each bag yielded 1 fruiting body of diameter 4.4 cm with multiple lobes (5). The fruiting body's thickness at point of attachment was of 0.4-0.9 cm. Trial is on-going.



Ganoderma mushroom

Crop production under protected structures

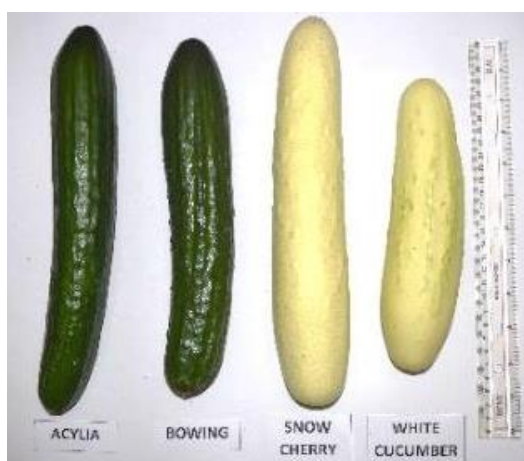
- **Butternut**

Two butternut varieties (*Pluto* and *Sibelle*) were evaluated at Réduit in soil under protected structure. No significant difference was observed between the varieties for yield which was of 2.27 kg/m² and 2.43 kg/m² for *Pluto* and *Sibelle* respectively. Significantly bigger fruits with a length of 25.7 cm and a diameter of 8.8 cm were recorded in *Pluto* as compared to *Sibelle* (Length: 22.23 cm; Diameter: 8.08 cm). No pest infestation or disease was encountered during the trial which allowed for no use of chemicals. Both varieties were found to be suitable for sheltered cultivation.

Since the success of a butternut crop in hydroponics depends on effective and timely pollination, a trial was set up at Wooton and Réduit to optimize manual pollination in view of improving fruit set and reducing fruit cracking in butternut variety *Pluto F1*. With respect to yield, each plant produced an average of 1.0 fruit/plant both at Wooton and Réduit. However, fruits harvested at Réduit had a higher average fruit weight of 1.80 kg compared to 1.60 kg at Wooton. As variety *Pluto F1* has shown excellent vegetative development and good yields with excellent fruit characteristics, it will be recommended for cultivation in hydroponic greenhouses.

- **Cucumber**

The agronomic performance of three cucumber varieties, namely *Bowing*, *Local White* and *Snow Cherry*, was assessed at Richelieu under protected structure in winter off-season. Varieties *Bowing* and *Snow Cherry* are parthenocarpic while *Local White* is open pollinated. *Snow Cherry* and *Bowing* are early varieties with harvest starting one month after transplantation as opposed to 2 months for *Local White*. Highest yield was recorded in *Snow Cherry* (16 fruits/m²) followed by *Bowing* (15 fruits/m²) with 6 fruits/plant for both varieties as compared to *Local White* (3 fruits/m² and one fruit/plant). It was observed that *Local White* had more male flowers and required hand pollination unlike the other two varieties. *Bowing* and *Snow Cherry* are suitable for cultivation under protected



Cucumber varieties under test in hydroponics

structure especially in warm regions where fruit flies are a great nuisance to cucurbit plantation in open field.

The performance of 2 white parthenocarpic cucumber varieties (*Cucumber white* and *Snow cherry*) was compared with that of 2 English cucumber varieties (*Bowing* and the control *Acylia*) under hydroponics system of production. Incidence of powdery mildew was more pronounced in white varieties. Significant differences were recorded among the varieties for all parameters observed. Results showed that yields of varieties *Bowing*, *Acylia* and *Snow cherry* were at par with 10.70, 9.60 and 8.23 fruits/plant respectively but significantly different from variety *White cucumber* (7.61 fruits/plant). Variety *Snow Cherry* produced the biggest fruits with an average weight of 471.4 g/fruit and fruit length of 30.55 cm. The smallest fruits were produced by *White cucumber* (fruit weight: 197.0, Fruit length: 15.9 cm).

- **Spinach**

The performance of three varieties of spinach (*GLB01*, *Dash* and *Red Tabby*) was assessed at Wooton under protected structure versus open field. No harvest was carried out in open field due to early bolting of plants. Under protected structure, highest yield was recorded in variety *Dash* (29.2 t/ha) followed by *GLB01* (23.4 t/ha) and *Red Tabby* (10.4 t/ha). Highest number of leaves per plant was observed in *Dash* (59) followed by *GLB01* (38). Maximum plant height was recorded in variety *Dash* (44.3 cm) followed by *GLB01* (39.3) and *Red Tabby* (10.4 cm). The leaves of varieties *Dash* and *GLB01*

were dark green in colour, smooth and spade shaped. Red Tabby produced oval shaped leaves that were green with red veins and stem. *Red Tabby* is a baby spinach which accounts for the lower yield and plant height recorded. The three varieties were found promising in terms of yield and growth characteristics Spinach can be easily cultivated during cooler months in super humid zones under protected structure.

- **Tomato**

A trial was set up at Wooton to assess the adaptability of 10 tomato lines introduced from the World Vegetable Centre (*CLN 3024A*, *CLN 3212 C*, *CLN 3241 Q*, *FMTT 1733 E*, *CLN 3736 D*, *CLN 4018 B*, *CLN 2498 D*, *CLN 3241 H- 27*, *FMTT 1733 D* and *CLN 3938*) together with *Swaraksha* and *TH N 988* as control varieties under the low cost protected structure. Apart from variety *CLN 3024A* which is determinate and varieties *MTT 1733 E* and *FMTT 1733 D* which are indeterminate, all remaining varieties had semi- determinate growth habit. Yields ranged from 1.7 to 5.27 kg per plant with the highest yielder being *T HN 988* (5.27kg/plant) followed by *CLN 4018 B* (4.63 kg/plant), *CLN 3938 C* (4.03 kg/plant) and *Swaraksha* (3.9 kg/plant). Variety *CLN 3736 D* the lowest yield of 1.7 kg/plant. Significantly bigger fruits were produced by variety *CLN 3938 C* with an average fruit weight of 182.1g followed by *FMTT 1733 D* (155.1 g) and *CLN 4018 B* (137.0 g). Tomato growers who visited the trial, showed a preference for varieties *CLN 4018B*, *CLN 3024A*, *FMTT 1733 E* and *CLN 2498 D*. Seeds of these varieties



CLN 4018B

CLN 3024A

**Promising tomato varieties for
protected cultivation**

The agronomic performance of 6 varieties of cooking tomato namely, *TH N 988* (control), *KSP 1430*, *KSP 1431*, *Ryna*, *HVTM 1215* and *Disha* was assessed under hydroponic system of production at Réduit. *KSP 1430* proved to be a determinate variety whereas all the other varieties had a semi determinate growth habit. Significant difference in yield was noted among the varieties. *HVTM 1215* was the best performer with an average yield of 6.03 kg/plant followed by *KSP 1430* (5.67 kg/plant) and the control variety *THN 988* (5.32 kg/plant). The yield of varieties *Disha*, *Ryna* and *KSP 1431* were comparable (4.85 to 5.08 kg/plant). All 6 varieties produced oblong fruits which were of bigger size in *T HN 988* (average fruit weight: 105.2 g, fruit length: 6.09 cm, fruit diameter: 5.46 cm) All varieties had 3 locules with a brix° varying from 4.00° to 5.40°. Varieties *HVTM 1215* and *KSP 1430* will be further evaluated prior to recommendation for hydroponic production.



KSP 1430



HVTM 215

Promising tomato varieties for hydroponics

- **Swiss Chard**

The performance of four varieties of Swiss chard namely, *Fordhook Giant*, *Greenwave*, *Lucullus* and *Argentata* was assessed at Wooton under protected structure versus open field. Under protected culture, harvest was carried out 46 days after transplantation with 7 harvest rounds as compared to 60 days with 2 harvest rounds for open field. No significant difference was observed in yield and number of leaves /plant among varieties for both protected and open field cultivation. Higher yields of the order of 20.6 - 26.0 t/ha were recorded under protected structure as compared to open field (9.7 - 15.9 t/ha). The average number of leaves/plant ranged from 12-13 under protected structure and 9 -16 in open field.

- **Strawberry**

Six strawberry varieties (*Ruby Gem*, *Camarosa*, *Manon des fraises*, *Agathe*, *Armelle* and *Charlotte*) were evaluated under hydroponics system at Wooton using 2 planting densities namely, 5 and 7 plants/coconut coir bag. Results showed that variety *Manon des Fraises* had highest TSS (10) followed by *Ruby Gem* (9.5) and *Camarosa* (8) while lowest TSS (7) was noted in varieties *Agathe*, *Armelle* and *Charlotte*.

Highest yields were obtained in treatment 7 plants/bag (29.2 -216.7 g/plant) compared to treatment 5 plants/bag (21.2-189.1 g/plant). At 7 plants/bag, the highest yielder was variety *Agathe* (216.7 g/plant) followed by *Charlotte* (147.4 g/plant) and *Armelle* (95.2 g/plant). At 5 plants/bag, highest yield was recorded in *Charlotte* (213.0 g/plant), *Agathe* (189.1 g/plant) and *Armelle* (69.1 g/plant).

Varieties *Ruby Gem*, *Manon des fraises* and *Camarosa* gave low yields of 49.0 and 41.7 g/plant, 44.5 and 41.7 g/plant and 29.2 and 21.2 g/plant at a planting density of 7 plants/bag and 5 plants/bag respectively.

Based on performance and fruit characteristics, varieties Charlotte, Armelle and Agathe were retained for trial under hydroponics in 2022.



Agathe



Armelle

The nutrient requirement for strawberry grown from cold runners under hydroponics was studied and a new fertilizer formulation for the two stages of growth and development was worked out using premix fertilisers. The formulation was based on a stage 1 which favours root and vegetative development and stage 2 which favours flowering and fruiting. The formulation used is given in table below.

Table 1: Fertiliser formulation for Strawberry in hydroponics

Fertiliser (Premix Timasol)	Fertiliser	Stage 1	Stage 2
Bac (A)/50 L of water	13:8:24+ micro	5.0 kg	Nil
	8:10:40+ micro	5.0 kg	8.0 kg
Bac (B)/50 L of water	Calcium Nitrate	8.0 kg	8.0 kg

With the given formulation, the vegetative, flower and fruit development were excellent with no symptoms of major deficiencies. However, the only problem encountered was that the fruits were not as sweet as imported fruits. The EC had to be increased for increasing sweetness of fruits and the level of increase differed with varieties.

Maintenance Breeding

Maintenance breeding programme is being implemented for local cauliflower and local cucumber. S7 seeds were produced for both crops.

Biotechnology

• Potato

In-vitro potato plantlets were hardened and potting undertaken. A total of 4,300 potted plants were harvested and 167.8 kg mini-tubers were produced and graded. These were stored at AMB at 4°C for production of basic seeds in 2022.

• Colocasia

The three Fiji Colocasia varieties namely, *PNG 13*, *Mal 08*, *SM 152* and the two promising lines emanating from mutation breeding programme (*AL1* and *AL2*) were conserved in slow growth medium for short to mid-term conservation.

Seven hundred hardened potted plants of *PNG 13*, 430 of *AL 1* and 530 of *AL 2* were supplied for plantation at Réduit Crop Research Station.

• Banana

Twelve accessions of banana (out of which 7 are meant for fibre), introduced from Bioversity International, were micro-propagated, hardened and potted in shade house. A total of 564 banana plants of these twelve different accessions are available in nursery.

In vitro propagation of the banana cultivars *Williams*, *Petite Naine*, *Goldfinger*, *local Gingely*, *Mammoul*, *Ollier*, *Formosana*, *FHIA17*, and *FHIA25* are on-going for supply to growers. Banana cultivars *Novaria*, *Formosana*, and *Silk* have been conserved in slow growth media.

• Garlic

In vitro trials for multiplication and bulbification of local garlic accessions are on-going. Explants of garlic accessions were inoculated on Murashige and Skoog (MS) medium supplemented with different concentrations and combinations of 6-benzyladenine (BAP), gibberellins, isopentenyl adenine (2iP), kinetin and naphthaleneacetic acid (NAA). Sixteen shoot multiplication media were tested and six shoot multiplication media were retained for further trials. Shoot multiplication media G (0.25 mg/ LNAA



Shoots clusters formed in shoot multiplication media (G, G1, G2 or G6)



Vigorous shoots formed in shoot growth media (G14 or G15)

+ 0.5 mg/L 2iP), G1 (1.5 mg/L BAP + 0.5 mg/L NAA), G2 (0.3 mg/L NAA + 3 mg/L 2iP) and G6 (MS supplemented with 0.5 mg/L NAA + 2 mg/L 2iP) promoted shoot multiplication while shoot multiplication media G14 (2 mg/L BAP + 2 mg/L NAA) and G15 (MS supplemented with 1 mg/L BAP + 0.5 mg/L NAA) promoted shoot growth. These six multiplications media also reduced vitrification.

Out of seven bulbification media tested in 2020, three (B2, B4 and B5) were retained for trials in 2021. Results showed that bulbification media, B2 (MS salts enriched with 12% sucrose) and B5 (MS salts enriched with 9% sucrose and supplemented with 2mg/L of BAP and 1 mg/L of Gibberlin acid) promoted bulbification while media B4 (MS salts enriched with 3% sucrose and supplemented with 2mg/L of Kinetin and 1 mg/L of Gibberlin acid) had low frequency of bulblets formation indicating concentration of sucrose has an effect on bulblet induction



**Bulblets induced in
bulbification media**

Two washing protocols, the standard protocol (control) and a new protocol consisting of an additional step of hot water treatment (35°C for 30 sec) were tested for surface-sterilization of healthy garlic cloves.

The new protocol was found to be more effective with a lower contamination percentage varying from 5 -10% as compared to 20 -35% for the standard protocol.

A study was conducted to determine the optimal explant size for garlic meristem culture. Three different sizes of explants (1mm, 3mm and 5mm) were excised from healthy garlic cloves and tested. Results showed that explants of size 3mm and 5mm had the highest survival rate of 75 - 80% and 90-100% respectively compared to explant of 1mm (30-55%). Since smaller sizes of explants are considered to be more effective in virus elimination from the original explants in meristem culture, explants of 3mm can be considered to be the optimal size.

- **Anthurium**

About 800 plantlets of a new promising line (coded as Ca) are available in nursery and 700 in growth room. *In vitro* propagation of this new line has been initiated to produce around 2,000 plantlets for release. A total of 45 potted plants at flowering stage were supplied to research for evaluation purposes.

In-vitro stock plantlets of 8 lines (A2, C2, D1, D2, PVGR, PVR, Mar4 and Mar 5) are being maintained in slow growth medium.

- **Pomegranate**

Trials were initiated for fine-tuning of protocol for *in vitro* rooting of pomegranate. The influence of five different media was studied on *in vitro* shoot tip and internodal cuttings of pomegranate.

Full strength Kunisaki gave optimal shoot growth and leaves development without initiation of roots. Highest percentage ($90 \pm 2.13\%$) rooting with root length of approximately 0.3 ± 0.03 cm to 3.4 ± 0.04 cm was obtained in $\frac{1}{2}$ MS supplemented with 1mg/ml IBA followed by subculture to $\frac{1}{2}$ MS.

- **Supply of plants**

A total of 13,148 plants were sold to growers. These included 3,385 hardened, potted banana plants, 7,736 semi-hardened banana in trays 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.

Ornamentals

• Anthurium

Anthurium breeding activities were continued. From 2014 crosses, four lines have been identified as promising based on their colour, length of flower stalk and spathe size. These lines are being mass multiplied *in-vitro*. Of the four lines, one standard type with brown spathe and desirable traits (sturdiness of spadix, turgid spathe, good keeping quality, angle of inclination of spadix) is ready for release in 2022. From 2017 crosses between *Midori X Tropical*, *Midori X Northflora* and *Tropical X Northflora*, three lines with red, white and grey spathe have been found promising and are being evaluated. For new crosses made in 2019, the spadix with embryo was sent to the Tissue culture laboratory for embryo culture. In 2021, the hardened lines were transferred in field for evaluation. The lines are being characterised according to UPOV guidelines.



Selected Anthurium Lines



In view of reviving the anthurium industry as well as reducing its dependency on bagasse as substrate, twenty new varieties (14 standard and 6 potted types) introduced from Netherlands in 2018 were evaluated under the hydroponics system of production. Plug plants of the 20 varieties were transplanted in a substrate mixture of perlite, peat and coir in the ratio of 1:1:1. They were fertilized daily with hydroponic fertilisers. For standard varieties, the yield varied from 15.0 to 19.0 flowers/plant annually, the best performing ones being *Rosa* (19.0 flowers/plant/year), *Carisma* (18.0 flowers/plant/year), *Bon Ami* (18.0 flowers/plant/year), *Zafira*, *Tropic night* and *Terrasol* (17.0 flowers/plant/year). Lowest yield of the order of 15.0 blooms/plant/year was recorded in varieties *Arena*, *Xavia* and *Pistache*. *Maravilla*, *Marysia* and *Bon Ami* were found to be early varieties. The potted varieties produced 15.0 to 19.0 flowers/plant/year, the best performing ones being *Utah* and *Nebraska*.

Plug plants have shown to be a good alternative as planting material, producing flowers of commercial size earlier than tissue culture plantlets. The hydroponics system is a good alternative for cultivation of anthurium with higher production of blooms and improved quality in terms of glossiness.

The same fourteen standard varieties were evaluated on raised bed with bagasse as substrate at Réduit. The Variety *Terrasol* had the greatest plant height (66.0 cm) followed by *Maravilla* (59.5 cm), *Midori* (54.5 cm) and *Marysia* (52.5 cm). Shortest plants were noticed in *Xavia* (24.0 cm). Variety *Maravilla* had the maximum plant spread (73.2 cm) followed by *Terrasol* (67.2 cm) and *Marysia* (42.5

cm). Yields ranged from 2.0 to 8.0 flowers/plant/year with the highest yielder being *Terrasol* (8.0 blooms/plant/annum) followed by *Maravilla* (7.0 blooms/plant/annum) and *Zafira* (6.0 blooms/plant/annum).

- **Rose**

The agronomic performance of 7 Rose varieties (*Avalanche Pink*, *Avalanche*, *Suez*, *Clarence*, *Fuego*, *Pink Fragrance* and *Penny Lane*) was assessed at Wooton. Yields varied from 73.3- 171.2 flowers/plant/year with Clarence being the highest yielder (171.2 flowers/plant/year) followed by Fuego (131.3 flowers/ plant/year). *Avalanche Pink* produced the lowest number of flowers. (73.3 flowers/plant/ annum).

- **Chrysanthemum**

The performance of 4 chrysanthemum varieties (White, Yellow, Dark Red and Green) was assessed in protected culture v/s open field at Réduit and Wooton. At Réduit, results showed that flowers had longer stalks (20.7 - 27.4 cm), a greater number of florets stalk (6.6 -7.1) and bigger florets (1.6 - 3.5 cm) in protected culture as compared to open field (Length of flower stalk: 12.4 - 27.3 cm; number of florets/stalk: 2.8 - 5.1, Size of floret: 1.1 - 2.0 cm).

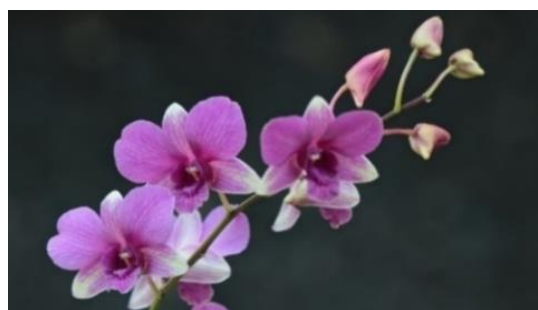
Same trend was observed at Wooton with longer flower stalks (12.5 - 26.6 cm), a greater number of florets/stalk (6.4 - 9.5) and bigger florets (3.3 - 5.1 cm) in protected culture as compared to open field (Length of flower stalk: 9.8 - 19.3 cm; number of florets/stalk: 3.9 - 6.2, size of floret: 1.5 - 3.5 cm).



Chrysanthemum under protected structure

- **Orchid**

The performance of orchid varieties from different families (*Dendrobium*, *Oncidium*, *Cymbidium*, *Tolumnia*, *Grammatophyllum*, *Vanda*, *Fragrance Orchids*, *Cattleya*, *Phalaenopsis* and *Aerides*) are being assessed at Réduit . The plant and flower characteristics were recorded. Plant heights varied from 4.1 to 19.0 cm with the tallest ones belonging to the families *Grammatophyllum* (19.0 cm) followed by *Dendrobium* (12.3 cm) and *Fragrance orchids* (12 cm) while shortest plants were those of *Tolumnia* (4.1 cm). The number of leaves varied from 3.3 to 8.4 with the highest number recorded in *Grammatophyllum* and lowest number in *Oncidium*. An average of one to two spikes was produced per plant with 2.3 to 9.2 florets/spike. The length of the spike ranged from 4.3 to 19.1 cm with a floret diameter of 1.2 to 3.1 cm with *Phalaenopsis* producing the biggest flowers and *Tolumnia* the smallest.



Orchid varieties under test

Fruits and Nuts

• Banana

On-farm evaluation of varieties *Novaria*, *Formosana*, *FHIA17* and *FHIA18* was conducted at St Antoine. The performance of *Novaria*, *Formosana* and *FHIA17* was found to be satisfactory and they were propagated by suckers for commercial production. However, variety *FHIA18* was observed to be susceptible to banana freckle, produced low bunch yield and fruits with low consumer acceptability. Consequently, new TC material of *FHIA18* was introduced from Bioversity International in 2020. They were multiplied, hardened for field evaluation to confirm their yield performance and response to disease.

Formosana, a Giant Cavendish tissue culture variant (GCTCV218), reported as tolerant to TR4 in other countries, was introduced in Mauritius, multiplied at the FAREI tissue laboratory and evaluated over a period of 4 years at Wooton, Réduit, St Antoine and Medine. *Formosana* was found to perform well under irrigation in warm conditions (St Antoine, Medine). Its plants were intermediate in height (245-270 cm tall with girth 50-60 cm). It reached bearing stage 7 to 8 months after planting and produced bunches that matures within 3.3 to 3.4 months. Its fruits were on average of 177g, 24 cm long and 3.5 cm in diameter with total soluble solid of 12° Brix and total acidity of 0.48% at ripe stage. It was equally appreciated as the Cavendish banana. However, *Formosana* performed poorly under rainfed (Réduit), and in superhumid/cool conditions (Wooton).

The germplasm collection at Pamplémousses (established in 2014/15) comprising of 40 local and introduced accessions and maintained under organic farming started showing a decline in performance probably due to the age of the plant and minimal inputs. The banana germplasm collection at WCRS was renewed in 2021 and it included the following varieties: *Ice Cream*, *P.lilin*, *Mamoul*, *Mysore*, *GCTCV106*, *Namwa Khom*, *Williams*, *FHIA 17*, *FHIA 25*, *P. Awak*, *Formosana*, *FHIA 01* and *Novaria*. The aim of the collection is to provide basic information on the varieties' agronomic performance, their response to biotic/abiotic stresses and their acceptability to customers.

One of the stools of *FHIA23* identified as promising was maintained at Réduit. It was found to be affected by freckle and Eumusae leaf spot disease. Unlike previous observation on other *FHIA23* stools, no finger drop of the mature fruits was noted from the hanging bunch. The bunch development stage was noted to be relatively longer (4 to 5 months depending on season) compared 3.5 to 4 months in Dwarf Cavendish. It yielded bunches of 20-26 kg with 10-12 hands and 145-160 fruits. *FHIA23* fruit showed good postharvest quality. The *FHIA23* stool has been identified for propagation and further evaluation as an alternative to Dwarf Cavendish.

Variety *FHIA25* also maintained good bunch characteristics. It produced bunches 30 to 33 kg, 12 hands and 210 fruits. Its fruits had a mean weight of 130g, length of 19 cm, diameter of 3.4 cm. The ripe fruit pulp total soluble solid was of 16° brix and total acidity of 0.5%.

Eleven banana accessions (*FHIA03*, *FHIA23*, *FHIA25*, *FHIA18*, *Balbisiana*, *Cameroun*, *Butuhan*, *Butuhan apex*, *M.balbisiana*, *P. Klutuk wulung*, *M. balbisiana var luikiuensis*) were introduced from Bioversity International (BI) in 2020. These were multiplied and hardened for field planting. Six plantain accessions (*Kar Ngou*, *Kelong Mekintu*, *Akpakpak*, *Maiden Plantain*, *Plantain No.2*,

Popoulou/Maia Maoli) were also introduced from BI in 2021. They are being multiplied and hardened for evaluation in 2022.

A FAREI/HEC/UoM project was initiated in 2019, with the aim of screening existing banana varieties for their suitability for fibre production, studying methods to improve the quality of fibres (cellulosic content) and also investigating into the production of composites for agricultural applications such as mulches/weedmat. In 2020, only the screening part was carried out and 8 varieties were selected. However, taking into consideration, the relative abundance of the variety on the island and the volume of fibres that can be extracted per stem, variety *Dwarf Cavendish* was selected as the most appropriate variety for further studies. In 2021, analyses were performed to explain the variation in mechanical properties of the fibres among the different accessions. The genomic group, relative ligno-cellulosic composition, the crystallinity Index and the arrangement of the cellulose microfibril along the main axis could not explain the variations. The microstructure of the fibres is currently under study.

A mutation breeding programme for improvement of banana variety *Gingeli* to induce tolerance to fusarium wilt (race 1) and improve yield is being conducted. A last batch of 60 mutant lines of variety *Gingeli* was planted Wooton in December 2021 for evaluation against natural infection by Panama disease. Surviving plants will be multiplied for dissemination as relatively tolerant *Gingeli* banana.

- **Avocado**

Evaluation of previously introduced varieties and promising local accessions of avocado was conducted. The estimated fruit yield recorded on 20 - 24 year-old trees of introduced varieties was 63 kg/tree in Rincon, 36 kg/tree in Ettinger, 34 kg/tree in Fuerte and 10 kg /tree in Hass. The low yield in Hass was attributed to the smaller fruit size as compared to the other varieties. The fruits of these varieties were prone to fruit fly damage. Due to the punctures caused by the fruit fly during oviposition, the fruits were observed to be susceptible to anthracnose during late stages of fruit development that often coincided with heavy rains and also during postharvest ripening.

Among the local variety/accessions under evaluation at Pamplemousses Organic Research Station (PORS), *Tortue* was identified to be a regular high yielding variety (around 50 kg of fruits/tree/year) However, the fruits were mostly infested by anthracnose and fruit fly which was difficult to manage under organic production system. It was noted that significant fruit drop occurred between November to February and only 25 to 40 % of the fruit load recorded in December reached harvest maturity in March /April. Four-year old avocado trees (grafts) planted in 2018 reached commercial production stage with fruit set varying between 30 to 180 fruits / tree. In 2021, new avocado plots were set up at Réduit and Richelieu.

With the aim to broaden the range of varieties for commercial production, 500 grafted avocado plants were introduced from New Zealand in November 2021. They included 440 of variety *Hass* (flowering type 'A') and 60 plants of the 'B' type flowering varieties (*Ettinger, Zutano, Edranol, Fuerte and Bacon*). The grafts were hardened prior to dissemination to growers in 2022.

To promote avocado cultivation, support was provided to potential avocado growers in terms of training on avocado grafting and tree pruning. Grafting service was provided to individual and

corporate sector and a total of 60 plants were successfully grafted and supplied. In 2021, new plots were set up at Réduit and Richelieu CRS.

- **Litchi**

In view of enhancing the diversity of local litchi germplasm, nine late-season varieties (*Bengal, Jensen, Heiye, Huan Zhi, Casino, B3, Waichee, Salathiel and Kwai May Pink*) introduced in 1989/99 were retained and evaluated at Réduit, Savannah, Moka and Bord Cascade. Similar to last year, the low prevailing temperatures ranging between 12.5°C to 19.5°C favoured flowering in the late litchi varieties at Réduit. The low precipitation recorded in the month of June (29.2 mm) also caused the varieties *Casino* and *Heiye* to flower abundantly. Poor flowering (less than 5%) was observed on *Jensen, Bengal, Kwai May Pink, Waichee* and *Salathiel* which can be explained by the high soil moisture recorded in July and August (77.2 mm and 86.8 mm of rainfall respectively). Very poor fruit set was observed in the varieties.

The late variety *Heiye* flowered at Pamplemousses and fruit reached maturity by mid-December. The average number of fruits recorded per panicle varied from 10 to 14. The fruits were round in shape and small in size with weight varying from 12 g - 15 g. The fruit pulp to seed ratio ranged from 2.6: 1 to 2.8: 1 and the pulp Brix value ranged from 19.3 to 21.1. Variety *Heiye* can be recommended as a late variety in warmer regions.

At Savannah, flowering in the varieties was relatively late and poor. Only varieties *Bengal, Faysishu, Huan Zhi, Waichee* and *B3* showed panicle emergence in August and September. Flowering in *Waichee* and *B3* was earlier with fruit set recorded in the first week of September in *B3*. At Bord Cascade, fruit set was observed on *Bengal* only in mid of October.

The new litchi variety *Kiamana* transplanted at Pamplemousses and Réduit in 2018 flowered in 2021. Panicle emergence was noted in 1st week of August at Pamplemousses and one week after in Réduit. No fruit set was observed at Pamplemousses while fruit set was recorded in 4th week of September in one of the 3 trees at Réduit. However, they were damaged by birds and bats.

- **Longan**

Six local accessions and three introduced longan varieties (*Biew Kiew, Chompoo and Kohala*) were under evaluation at Réduit, Pamplemousses and on farm at Deux Bras, Bord Cascade, Palma and Moka. *Biew Kiew* and *Chompoo* were identified as promising. The fruit yield recorded per tree was of 41.6kg in *Biew Kiew* and 63.7 kg in *Chompoo*. *Biew Kiew's* fruit weight ranged from 9.23 to 11.54 g with mean pulp to seed ratio of 3.1: 1 and pulp °Brix value from 21 to 23 while *Chompoo's* fruit weight was from 7.9 to 10.5 g with mean pulp to seed ratio of 2.8:1 and pulp °Brix value from 20.5 to 24.0.

Among the local accessions, *Moka* and *T8* were identified for propagation and further evaluation. Fruits of accession *Moka* were relatively small in size with fruit weight varying from 5.2 to 7.7 g and pulp °Brix value of 23, while fruits of accession *T8* were larger in size with fruit weight varying from 10.14 to 11g and pulp °Brix value varying from 21 to 23.5.

A new longan accession which flowers and produces fruits 2 to 3 times over a year was identified at Petit Raffray. Trees with fruits at harvest maturity were observed in late August 2021. The characteristics of fruits harvested from one of the trees was as follows: small sized fruit of 7.0g with

seed weight of 1.64 g, pulp: seed weight ratio of 1.5:1 and pulp °Brix value of 18. Given the interesting fruiting habits of this new accession, seedlings as well as layers will be produced for further evaluation on research stations to assess the growth habits and yield performance.

- **Papaya**

Ten new papaya varieties (*Neo 253*, *Neo 225*, *Neo 246*, *Neo 237*, *Neo 203*, *Neo 209*, *Neo 202*, *Neo 223*, *Neo 232* and *Neo 261*) introduced from Neofresh, South Africa along with variety *Jhurry* are under evaluation on research stations (Réduit and Pamplémousses) and on farm (Bois Pipe, L'Esperance Trebuchet). At Bois pipe, varieties *Jhurry* and *Neo 253* were found to bear their first mature fruit at average height of 50 cm above ground. Similarly, at L'Esperance Trebuchet, *Neo 253* was identified as the shortest variety bearing its first fruit at average height of 70 cm aboveground. Moreover, of all the varieties under evaluation at Bois Pipe, *Neo 253* had the smallest canopy diameter of 196 cm. The newly introduced varieties *Neo 203* and *Neo 223* were found to be tall with the first fruit harvested at average height of 125 to 126 cm respectively.

Among the 10 varieties under evaluation, only varieties *Neo 223*, *Neo 253*, *Neo 261*, *Neo 202*, *Neo 232* and *Neo 246* produced their first fruit around 8 months after planting.

Based on the fruit weight, fruits of the varieties under evaluation could be categorised into small (400 to 750), medium (751 to 1150 g) and large (> 1151g) sized fruits. *Neo 223* produced the largest fruit of 1940 g while *Neo 202* produced the smallest fruit (405 g) followed by *Neo 209* (430 g). The ripe fruit flesh colour of all Neo varieties were orange to yellow orange. The Brix value of the ripe fruits varied from 7.5 to 12 °. The maximum brix value of 12 was recorded in *Neo 253* and *Neo 232*. The pulp of ripe fruits of varieties *Neo261* and *Neo 202* were very firm while that of variety *Neo223* was relatively soft in texture (mean firmness of 0.1 kg/m²).

- **Coffee**

The new germplasm collection established at Wooton in December 2020 and consisting of the locally identified varieties/accessions (Dewevrei, Excelsa, Arabica and an unidentified named 'small seeded') was maintained. Plants are at vegetative stage.

- **Coconut**

A coconut germplasm plot consisting of seven accessions (from Plaisance) planted in 2011 and four accessions (from Agalega) planted in 2015/2016 was maintained at Pamplémousses. Nuts of different accessions collected around the island was characterised and 2 accessions were found to have promising traits for further evaluation and dissemination, one of the accession was *Clavet T1* with nut of greenish brown colour, weight 4.16 kg and having 760 ml of liquid endosperm with a brix value of 6.1. The other accession was *Belle Mare T6* with nut of pinkish orange colour, weight 1.62 kg and having 370 ml of liquid endosperm with a °Brix a value of 6.3. Seedlings of the accession *Belle Mare T6* (Gueule Rose) was planted at Richelieu and Réduit for further evaluation and production of seeds for propagation.

- **Cocoa**

Phenological observations on mature cocoa plants was conducted in four growing sites namely Clavet, Moka, Chamarel and Pamplemousses. Flower buds were observed from January to March, followed by pod setting as from end of March to June and pod harvest from Nov to Dec in 2021.

Agronomic evaluation of cocoa variety *Criollo* from different sources (Clavet, ENL/Moka, St Aubin, Beau Sejour (BS) and Labourdonnais (L) is ongoing in plots established in 2018 at Réduit and Pamplemousses. At both sites, flowering was observed on *Criollo* sourced from Beau Sejour (BS) and Labourdonnais (L) in February and March. Abundant pod set were observed on the accession BS at both sites as from end March to May. The number of pods recorded per 3-year old plants varied from 10 to 30 in accessions BS and from 0 to 30 in accession L. Despite sanitation and phytosanitary treatments, high incidence of anthracnose due to *Colletotrichum* and *Thielaviopsis* spp. was noted on 90 % of the developing pods at Pamplemousses. This is attributed to the high prevailing humidity in the plot (cocoa intercropped with avocado). On the other hand, cocoa pods at Réduit (cocoa intercropped with litchi) did not show symptoms of any disease.

Cocoa budwoods of eight different clones (*ICS 6, ICS 46, UF 613, ICS 68, ICS 84, ICS 48, ICS 29, ICS 35*) were introduced from the International Centre for Quality Cocoa, University of Reading, UK and grafted on variety *Criollo* used as rootstock. 94 seedlings were grafted using side by side grafting method and 91 of the grafts were successful. These were planted at Réduit and Pamplemousses.

- **Pomegranate**

The 3 year-old plants of the new pomegranate variety *Ind19*, introduced from India is being evaluated at Richelieu. Main fruit harvest lasted from mid-June to early July. The average number of fruits recorded per plant was of 46.3 with an average fruit weight 255g.

- **Macadamia**

Macadamia is being promoted as an alternative cash crop for diversification in abandoned sugarcane lands. A total of 3942 grafts (including 2418 introduced from S. Africa and 1074 produced at FAREI) were distributed to some 17 individual growers and 3 corporates (Alteo, Sennville and Bel Ombre Ltd). The varieties of macadamia distributed and grown on the island include *A16, A4, 816, 849, 842, 814, 816, N2, 695, 791, GVE* and *Beaumont*. In August 2021, some 3000 budwoods including varieties *Beaumont, 695, A4, A16* and *N2* were introduced from South Africa and were grafted on potted seedlings. Out of 4900 grafts effected, 2795 grafts were successful (58% success rate).

On-station evaluation plots were set up at Réduit (in 2018 and 2021), Wooton (in 2020) and Richelieu (in 2021) for agronomic evaluation. Some of the trees in plot set up at Réduit in 2018 have reached the reproductive stage. Variety *A4* was observed to be early bearing with over 60% trees flowering in December 2021 as compared to only 10% in varieties *GVE* and *695 (Beaumont)*. Despite multiple fruit set in each raceme, up to 90% fruit drop was noted in *A4* within the first 2 months. The average number of nutlets per raceme which was of 25 shortly after fruit set dropped to 2 per raceme after

2 months. *A4* was observed to have a wider flowering window (from July/August to November) compared *GVE* (from early October to November) and *695* (end October to November).

- **Strawberry**

The agronomic performance of six strawberry varieties (*Ruby Gem*, *Charlotte*, *Camarosa*, *Armelle*, *Manon des fraises* and *Mara des Bois*) was assessed at Wooton in May 2021 using frigo plants planted at a spacing of 40cm. The crop was fertilised using fertigation techniques. Based on the canopy development, the planting distance of 40 cm was observed to be too close for varieties *Armelle* and *Camarosa* which had a mean canopy diameter of 54.2 cm and 47.5 cm respectively. Highest yielder was variety *Armelle* with an average total fruit yield of 795 g/plant followed by *Mara des Bois* (644g/plant), *Camarosa* (623g/plant), *Ruby Gem* (567g/plant), *Charlotte* (358g/plant) and *Manon des Fraises* (345g/plant).

The % of marketable fruits (weight basis) was found to vary from 53.3 to 75.3 % among the varieties. It was highest in *Ruby Gem* (75.3%) followed by *Armelle* (68.8%). The % of unmarketable fruits (weight basis) varied from 24.7 % to 46.7 % and was mainly due to fruits that were undersized, malformed, diseased or eaten by rats. The highest % of unmarketable fruits was recorded in variety *Charlotte* (46.7%) mostly due to malformation and damage by rats.

Camarosa produced the largest fruits in size with an average weight of 11.7g/ fruit followed by *Ruby Gem* (11.1g), *Charlotte* (10.8g) and *Armelle* (9.7g). Variety *Mara des Bois* and *Manon des fraises* produced relatively small-sized fruits with mean fruit weight of 5.8 g and 6.0 g respectively. *Mara des Bois* and *Charlotte* were identified as early bearing varieties with first harvest starting around 15 weeks after planting compared to *Armelle*, *Camarosa* and *Ruby Gem* (around 17 weeks after planting).

Manon des fraises was a late bearer with harvest starting around 18 weeks after planting. Fruits of *Manon des Bois* had the highest °Brix value (10.8).

Of the 6 varieties, *Mara des Bois*, *Charlotte* and *Manon des Fraises* were found to show high tolerance to foliar diseases. *Armelle*, *Mara des Bois* and *Manon des fraises* produced high number of runners that provided planting materials for establishment of new plantation. *Camarosa* produced



Strawberry evaluation plot at Wooton

- **Pineapple**

A trial was set up at Wooton to assess the potential of pineapple cultivation under 4 different organic fertilizer packages. Application of the organic fertiliser package comprising of FYM @50t/ha + + BIO CAT 15 @ 6 L/ha + GLS enrich @185.5 kg /ha + Wonderlife G @185.5 kg /ha+ K- Active @3L/ha on sucker size of 251 - 300 g was found to yield fruits with a mean weight of 356.65g comparable to that obtained with recommended synthetic fertiliser under long crop cycle of 18 months at Wooton.

- **Atemoya**

The new atemoya variety *African Pride*, under evaluation at both Pamplémousses and Réduit, was found to start bearing quite early from the 2nd year after planting. The 3-years old trees yielded 79 fruits/tree as compared to 50 fruits/ tree in the variety *Local*. The fruit quality was comparable to that of the variety *Local*. *African pride*, identified as an early bearing, a high yielding new atemoya variety is recommended for backyard and commercial production. Budwoods of the variety were provided to Barkly for production and dissemination of grafted plants.

- **Berries**

In view of extending the range of fruit species grown locally, cuttings of 5 berry species (Blueberry, Gooseberry, Raspberry Red, Youngberry, Goji berry and Blackberry) were introduced from Berries of Africa, South Africa in 2021. The Gogi berry plants received were in very poor conditions and only 3 survived. All the plants were potted and acclimatised for a period of 6 months prior to transplanting under field conditions at Wooton CRS in Oct 2021. Gooseberry and blueberry appear to adapt to the local conditions as both flowered and set fruits. The berries appear susceptible to *Pestalotiopsis* which was controlled with fungicides and sanitation. The Gooseberries were susceptible to thrips, red spider mites and white flies while the raspberries were susceptible to *Cratopus*. One to two plants of each of the 5 berry species were planted in soil media under plastic tunnel to assess their growth and fruiting potential under sheltered warmer conditions.

- **Mangosteen**

Four seedlings of mangosteen variety *Purple* sourced from a private nursery were transplanted at Réduit and Pamplémousses in December 2021 for evaluation purposes.

- **Fig**

Different accessions sourced from Riche terre, Belle Mare, Bord Cascade, Moka, Coromandel and St Croix were propagated by cuttings for the setting up of a germplasm collection at Richelieu and Pamplémousses.

- **Jackfruit**

In view of characterising the diversity of jackfruit germplasm in Mauritius, 5 different jackfruit accessions were identified from 6 locations namely Pamplémousses, Réduit, Richelieu, St. Antoine, Labourdonnais and Albion. Phenological observations made on each of these accessions revealed that flowering with dominance of male flowers was noted as from 2nd week of June and fruit set as from July. Fruits reached mature green stage as from September and ripe stage as from December. Green immature and ripe fruits of the different accessions are being collected and characterised. Promising accessions identified will be propagated and disseminated.

Extending shelf life of whole fresh produce

Studies have been carried out on different treatments, packaging and storage conditions for several crops and protocols have been developed for fresh butternut, pineapple, sweet potato, guava, papaya, breadfruit and marigold flower.

A low-cost method of generating ethylene to induce banana ripening was investigated. 24-hour exposure of mature green banana fruits to ethylene generated by mixing a 10% caustic soda solution with 0.01% ethephon solution was found effective in triggering ripening without leaving ethephon residue in the pulp. Ripening of fruits was uniform and they reached colour score 6 after 6 days under ambient room conditions (minimum of 20 - 21°C and maximum of 33 - 37°C) as compared to 8 days when stored in the evaporative cooling chamber (minimum 17 - 20°C and maximum 23 - 29°C). The practical application of this low-cost technology needs to be explored for small banana growers or fruit handlers who cannot afford to invest in temperature-controlled ripening facilities.

Processing is a means to extend shelf life of vegetables and fruits. Protocols for some 20 agro-processed products with commercial potential were developed. They included: dried whole green chilli, green chilli powder, frozen pre-baked butternut cubes, jackfruit burgers, oyster mushroom mixed with breadfruit or potato burgers, mushroom kofta, green banana hashbrown, pumpkin jam and herbal and fruity teas.

The processing potential of different commodities including 9 different sweet potato varieties for flour making, new potato variety *Santana* for crisps and french fries production, ten new tomato varieties for making of puree and dehydrated tomatoes and 3 strains of oyster mushroom (pink, grey and Yellow) for freezing and preservation in brine was investigated. Sweet potato varieties *Leek*, *Raisin*, *Orange*, *T10* and *Patate Mauve* (purple coloured flesh) were found suitable for flour production while only varieties *Leek* and *Raisin* were found suitable for production of crisps. The protocol for sweet potato flour production was amended to be able to retain the purple colour of flour made from variety *Patate Mauve*. Potato variety *Santana* was found suitable for French fries. However, its suitability for crisps needs to be re-evaluated. Fruits of tomato varieties *CLN 3241Q*, *CLN 3736D*, *CLN 2498D* and *FMTT 1733D* were found suitable for making of puree. Fruits of tomato varieties *CLN 3212C*, *CLN 3241Q*, *CLN 3736D*, *CLN 4018B* and *FMTT 1733D* were found suitable for making of dehydrated tomatoes with yield of around 5.5%. The dehydrated tomatoes were preserved in olive oil and rosemary. The 3 mushroom strains were found suitable for freezing only after pre-cooking (stir-frying) and vacuum packing at 60% and also for preservation in brine. None of the strains were found suitable for making of dehydrated mushroom.

Technical support was provided to agro-entrepreneurs for the development of ready to use cassava and noni flavoured mix cereal/dessert, formulation of peanut butter, garlic paste and pickle, dried seaweed flakes and powder to be used as a nutritional supplement. Assistance was also provided in shelf-life assessment of dried seaweed products packed in different packaging materials (Biaxially oriented Polypropylene (BOPP), high density polyethylene (HDPE), Aluminium pouch) and in determination of nutritional value of fresh and dried *Ulva lactuca*.

Soil and water management

• Irrigation and fertigation technologies

A novel water saving irrigation technology, the small-scale KSNM Spray Irrigation system (SIP) was introduced and tested in Chinese Cabbage, Pakchoi, Lettuce and White Raddish, and compared to the conventional sprinkler irrigation system. Higher yields of 37.8 %, 29.2 %, 30.6 % and 14.5 % were recorded for Chinese Cabbage, Pakchoi, Lettuce and White Raddish respectively. The KSNM – SIP proved to be a more appropriate irrigation system for leafy vegetable crops and spices and is suitable for farmers in pressurized irrigated project zones of Mauritius.



**KSNM Spray Irrigation System
in Leafy Vegetables at Wooton**

• KSNM Spray Irrigation System in Leafy Vegetables at Wooton CRS

The yield and quality of Cauliflower and Cabbage were assessed under the KSNM drip fertigation system (DFS) and the conventional pressurized drip fertigation system. Cauliflower curd weight and Cabbage head weight were increased by 49.4 % and 18 % respectively under the KSNM – DFS which is an alternative to the conventional pressurized Venturi drip fertigation system, and is suitable for farmers in pressurized irrigated project zones managed by the Irrigation Authority.



KSNM Drip Fertigation

The yield and quality of Cabbage were evaluated under the climate smart gravity-fed ETA fertigation system and the gravity-fed drip fertigation system. An increase of 33.6 % and 12.1 % in Cabbage head weight and head size were respectively obtained under 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 supply at the root zone level by the 100 % porous textile hose of the ETA gravity-fed fertigation system.



**ETA Gravity-Fed Fertigation
System in Cabbage at Wooton**

The yield of Broccoli was assessed under the ECOFLO solar power-driven drip irrigation system of 500 m² and under rainfed conditions. A 47.8 % higher curd weight with leaves and 56 % higher curd yield were obtained under the ECOFLO solar power-driven drip irrigation. Although tested under conventional practices, this promising energy-efficient technological package is also suitable for farmers practicing organic farming under small plots of 500 m² whereby yield can be maintained or increased.

The effectiveness of the ECOFLO solar power-driven fertigation system was also compared with the conventional electricity driven pressurized drip fertigation system in Cauliflower. Similar yield and quality were achieved under both drip 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 and for farmers cultivating under rainfed conditions using in-field rainwater harvesting.



Broccoli and Cauliflower under ECOFLO 500 m² and

Eight double-span tunnels comprising of the gravity-fed drip irrigation system were installed and made operational at La Chaumière, Surinam, Esperance Trébuchet, Triolet, Camp Thorel, St. Pierre, Palma and Wooton CRS. Beneficiaries, zonal Extension Officers and Extension Assistants were trained on irrigation, water and fertigation management of vegetable crops under double-span tunnel.

The yield and quality of Cucumber, Red cabbage and Chinese cabbage were assessed under drip fertigation and drip irrigation with conventional fertilizer recommendation in soil culture under protected conditions. Higher yields of 28.7 %, 35.3 % and 40.9 % were recorded for Cucumber, Red cabbage and Chinese cabbage respectively with drip fertigation. Farmers are encouraged to produce local white Cucumber, Red Cabbage and Chinese Cabbage under sheltered farming conditions during periods of heavy rainfalls.

Sustainable drip fertigation packages using inorganic fertilizers were evaluated for the production of cucumber, red cabbage, and Chinese cabbage at Wooton and compared to drip irrigation with conventional fertilizer recommendation, both systems being in soil culture under protected conditions. Higher yields of 28.7 %, 35.3 % and 40.9 % were recorded for cucumber, red cabbage, and Chinese cabbage respectively with drip fertigation.

• Organic fertilisers

Two new ECOCERT certified organic fertilisers namely, *Ever 7* and *Osiry1* along with *GLS Enrich*, *Wonderlife G* and *Seasol* were evaluated on 5 crops under an integrated soil fertility, pest and disease management approach. Depending on the crop tested, manure at the rate of 20 - 30 t/ha were used together with the organic fertilisers at the recommended rate of the manufacturer, whereas in the control plots only manure was used. Based on results obtained organic fertiliser packages have been subsequently developed for Chilli, Taro, Onion and Garlic.

- **Organic substrates**

The sustainability of two organic substrates namely *Orgasyl* and *Peat Moss* was assessed for the production of seedlings of tomato and chilli. Soil was used as the control substrate. Seedling weight in *Orgasyl* (0.58 g and 1.87 g for tomato and chilli respectively) was at par with that of *Peat Moss* (0.49 g and 1.66 g) but differed significantly from soil treatment (0.29 g and 0.18 g). Similarly, length of seedlings was higher in *Orgasyl* as compared to the 2 other treatments.

Peat Moss can be considered for use in smart agriculture since it is not certified and cannot be used in organic farming. *Orgasyl* can be recommended for use as an organic substrate in organic farming.



Tomato seedlings grown in *Peat Moss* (1), *Orgasyl* (2) and Soil (3)



Chilli seedlings grown in *Orgasyl* (1), *Peat Moss* (2) and Soil (3)



Root development of chilli seedlings in *Orgasyl* (1), *Peat Moss* (2) and Soil (3)

- **Agri-waste recycling/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. Sanitisation of both cattle and poultry manure by solarisation has been completed. Field and pot trials have been set up at Wooton and Réduit in order to evaluate the potential of the solarised manure along with recommended chemical fertilisers in two vegetable crops namely, bean and cabbage. Trials are on-going.

- **Inorganic fertilisers**

A New NPK fertiliser rate (127 kg/ha N, 57 kg/ha P₂O₅ and 173 kg/ha K₂O), known as maintenance fertiliser was calculated based on soil NPK nutrient content and potato crop nutrient uptake kg/ha. Two on farm trials were set up at La Marie and one at St Pierre to evaluate and validate the New NPK fertiliser rate on yield of potato variety *Spunta*.

Results showed that, across sites, total tuber yield of 21.2 - 38.0 t/ha recorded in the New NPK fertiliser were comparable to Standard farmer’s mineral fertiliser rate (24.1-38.3 t/ha). Furthermore, by reducing the New NPK fertiliser rate by 25%, (95 kg/ha N, 42 kg/ha P₂O₅ and 129 kg/ha K₂O), a comparable tuber yield t/ha can be achieved. This is explained by the high total Phosphorous, total Potassium, available Phosphorous and available Potassium shown by the initial soil analysis results obtained at the three sites

- **Use of Nuclear Techniques in Nutrient and Water Management**

An IAEA project was implemented in order to assess the Biological Nitrogen Fixation in Bean and Cowpea in an organic production system by using the ^{15}N tracer technique. The use of ^{15}N tracer techniques in this study has enabled the assessment of % Nitrogen derived from air (%*Ndfa*) and the amount of N fixed by the two legumes namely Bean and Cowpea. Field experiments conducted demonstrated that local indigenous rhizobia in French bean cv *Long Tom* can fix up to 25.2 % of the nitrogen requirement equivalent to 20.3 kg/ha N while cowpea cv *local* can fix up to 47 % equivalent to 37.4 kg/ha N. Thus, the fertiliser regime of both legumes can be reviewed for both organic and conventional agriculture. It is thus, reasonable to conclude that these major grain legumes can contribute to the annual N requirement of an organic production system, a contribution that is of great economic and environmental value.

- **Agroforestry**

A model Agroforestry plot over an area of 4.6 arpents has been set up at Britannia to collect important biological and economic information so as to determine the challenges and viability of such production systems in the Mauritian context. Till date the following species have been planted: 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, Chayotte, Sweet Potato, Taro, Lemon Grass, Turmeric and Ginger. At planting of the tree crops, data for plant height, stem girth diameter and average plant canopy were taken and same was repeated after 6 months. The aim is to monitor all changes over time to be able to monitor growth and calculate the Carbon sequestered. The mean organic matter content was 5.43 % in 2021 across the 4.6 arpents plot.

- **Quality Declared seed**

Technical support was provided to six Francia and two Bellarose seed producers at Rivière des Anguilles, Bon Espoir, St Antoine, La Ferme and Belle Mare. The seed producers comprised of four corporate sectors and four individual small planters. 25.96 tonnes Francia and 84 kg Bellarose mother bulbs were planted on 5.18 ha and 290 m² of land respectively. 894.0 kg Francia seeds have been processed as at 30th of May 2022 of which 570 kg is marketable. Two kilogram of Bellarose seeds were also produced.

For bean variety Ferrina, 18.0 kg seeds were planted and 170.5 kg quality seeds were produced. These seeds will be made available in 2022 for bean production.

- **Support to Climate Change programme**

Ten species of annual crops and three species of perennial crops were collected from different localities to determine selected local Emission Factors (EFs) for the Food crop, Fruit and Tea sector. Analysis of total Nitrogen, Potassium, Phosphorous and % Carbon content was carried out at the Faculty of Agriculture. Primary data were used to calculate above ground biomass (td.m/ha), Carbon fraction of dry matter (tC/td.m) and Carbon stock in biomass (tC/ha/yr) for the annual crops.

For annual crops, the highest aboveground biomass was obtained in pineapple (11.3 td.m/ha) followed by Pumpkin, Cabbage, Eggplant, and Banana. The smallest aboveground biomass was observed in beetroot (1.86 td.m/ha) whereas for carrot, onion, cauliflower, tomato, potato and chayotte, the aboveground biomass ranged from 2.29 td.m/ha - 3.95 td.m/ha. The Carbon fraction of dry matter tC/td.m averaged 0.357 tC/td.m, with a total % Carbon between 33.78 - 38.90 %.

The mean aboveground fresh biomass for tea and mean dry matter biomass were of 55 t/ha and 26.18 td.m/ha respectively. The mean annual Carbon stock in biomass determined and the mean Carbon stock in biomass removed were of 11.36 tC/ha and 0.54 tC/ha/yr respectively. For mango and litchi, the Carbon stock in biomass removed is considered negligible. The calculated targeted Emission Factors determined were published in the Biennial Update Report-1 and UNFCCC on 31 December 2021.

Crop Protection

• Weed management

The efficacy of 7 herbicides in the control of weeds in target crops was investigated. Results are listed below:

1. 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 at 6 to 12% concentration at immature (3-5 leaf stage) weed stage. High spray volumes (above 400 L/ha) are required for weeds with well-developed canopies and therefore a high amount of *Katoun Gold* (15-20% concentration) is required for effective control. Thus, for the control of mature weeds the use of *Katoun Gold* is not economical on a large scale. A concentration of 10% is optimum for immature weeds and needs to be validated through further trials. *Katoun Gold* can be applied to fallow lands and for wide spaced plantations, but directed application is necessary for closely spaced crops. Moreover, several applications are necessary during the critical stages of the crop.
2. *Sulfentrazone* was found to be more effective than *oxadiazon* in weed control in groundnut and the optimum rate lies between 400 and 800 g a.i./ha. Trials will have to be repeated to determine the optimum rate and any residual effect on subsequent crops.
3. For weed control in potato, *sulfentrazone* was less effective than *metribuzin*. In addition, it was phytotoxic to potato and thus cannot be recommended for weed control in potato
4. The application of *glufosinate ammonium* as desiccant does not affect sprouting and growth of seed potato in subsequent crop.
5. Trials to investigate any phytotoxic effect of *fluazifop-P-butyl* at 255 g/ha on transplanted squash and Zucchini squash for the control of *poaceae* weeds revealed that *fluazifop-P-butyl* can be safely applied to both crops to control *poaceae* weeds.
6. *Oxyfluorfen* @ 50 and 100 g/ha, *fluroxypyr* @ 50 and 100 g/ha and *ioxynil* @ 125 and 250 g/ha only gave partial control of weeds in onion seedlings and will have to be re-evaluated.

• Disease management

The efficacy of sixteen products was evaluated against target diseases. Results are listed below:

1. The disinfectant *Anolyte*, reported to have bactericidal, virucidal, fungicidal and algicidal properties, was tested against papaya leaf disorders. *Anolyte* solution diluted at a rate of 1:1.5 was sprayed on 10 tagged symptomatic papaya plants of variety *Neo*. Ten other symptomatic papaya plants equally of variety *Neo* were used as control. A total of five sprayings with *Anolyte* water were done. After two weekly applications of *Anolyte*, one spraying with a mixture of *PF Control 83* @ 1.3 ml/L water together with *Biotilis* @10g/L water was carried out, followed by two additional weekly sprayings with *Anolyte* water. A remarkable decline in disease incidence (80% to 60%) was observed as from the 4th week of the trial and by the end of the trial, leaf spots had completely disappeared with only some negligible leaf distortions (2%). On the untreated papaya trees, both disease incidence and severity remained high throughout the nine weeks of the experiment.
2. The food grade version of the plant extract Thymol and plant extracts of betel (*Piper betle*), neem (*Azadirachta indica*) and henna (*Lawsonia inermis*) were evaluated *in vitro* for their efficacy to

suppress the growth of *Ralstonia solanacearum*, the causal pathogen of bacterial wilt disease. Thymol most effectively suppressed growth of *Ralstonia solanacearum* at a dosage of 15000 ppm with the largest inhibition zone with a diameter of 5.0 cm observed on petriplates, while extracts from betel, neem and henna were less effective with inhibition zones ranging in diameter from 2.8 to 3.0 cm only.

3. The efficacy of four different fungicide combinations against fungal leaf spots caused by *Colletotrichum sp* in avocado trees was evaluated. The trial comprised of 5 treatments as follows:

T1: Weekly application of a combination of *PF Control 83* @ 1.3mL/L water together with *Fungus Leaf Control* @ 0.5mL/L water and *Tricholife*@4g/L water

T2: Weekly application of a combination of *PF Control 83* @1.3mL/ L water together with *Romeo* @ 2g/L water and *Biotilis* @ 10g/L water

T3: Weekly application of a combination of *PF Control 83* @1.3mL/L water together with *SuperStar* @ 1mL/L water and *Romeo*@2g/L water, per week

T4: Two weekly applications of *PF Control 83* @1.3mL/ L water together with *Romeo* @ 2g/L water and *Biotilis*@ 10g/L water followed by one application of *Anolyte* 500 ppm diluted in a ratio of 1:3 and again two applications of *PF Control 83* together with *Romeo* and *Biotilis*.

T5: No spraying done (control)

Although all the bio-fungicide combinations under evaluation were effective in controlling fungal leaf spots in avocado, best leaf spots control including algal spots control was obtained with treatment T4.

4. Bio-fungicides *Biotilis* (*Bacillus subtilis*), *Bontera* (*Bacillus sp*) and *Romeo* (*Saccharomyces cerevisiae*) were evaluated against Powdery mildew disease (*Podosphaera xanthii*) of cucurbits. *Biotilis* gave effective control of powdery mildew up to fruiting and harvest stages. *Romeo* also gave control of powdery mildew at low disease pressure. The recommended rates are 10g-15g/l water and 1g/l water for *Biotilis* and *Romeo* respectively. The products can be used preventively alone or alternatively.
5. The bio-product *Virosan*[®] (Active ingredient: Natural Enzymes, Clove Oil, Ginger oil, Basil oil) at 1g/l water was evaluated against leaf curl disorder in papaya. The product was not effective in controlling the disorder
6. *Consento*[®] SC 450 (Propamocarb hydrochloride 375g/l + Fenamidone 75g/L) at 2ml/l water, *Vallistar* at 2.5g/l water; *Kocide 2000* at 2g/L water + *DM45* at 2g/l of water and *Ridomil gold MZ 68 WG* (Pepite) at 3g/l water was evaluated against Late blight/Early blight disease of tomato. Application started at first symptom appearance of late blight and early blight diseases and continued up to 5 applications on a weekly basis. *Consento*[®] SC 450 and *Vallistar* gave effective control of late blight compared to control (no spraying). The products also gave control against early blight at low disease pressure. Product mixture *Kocide 2000/DM45* was not effective for control of the diseases at high disease pressure.

Potato clones/varieties (*Spunta*, *Vigora*, *Everest*, *Belle-Isle*, *clone 5*, *clone 6*, *clone 9* and *clone 27*) were screened for tolerance to early blight, an economically important foliar disease, caused by the fungus *Alternaria solani*. Results showed significant difference in tolerance to early blight among clones/ varieties. *Clones 6* and *27* and varieties *Vigora* and *Everest* were found to be resistant to early blight. However, they need to be re-evaluated owing to the low disease pressure observed in the control treatment *Spunta* where leaves on about 25% of the total plant area were infected (mean severity score 2.4).

Six selected potato clones/varieties (*Vigora*, *Belle Isle*, *Clone 5*, *Clone 6*, *Clone 9*, *Clone 27*) were screened for tolerance to bacterial wilt disease based on the 'CIP Protocol for assessing bacterial wilt resistance in greenhouse and field conditions, 2017'. Results showed that variety *Vigora* was susceptible to bacterial wilt disease. *Clone 5*, *clone 9* and variety *Belle Isle* were moderately susceptible, while *clone 6* and *clone 27* were moderately resistant to bacterial wilt disease.

The tolerance of two AVRDC chilli lines (*AVPP9813* and *AVPP0514*) and an improved AVRDC chilli line (*APC4*) to anthracnose was monitored in several regions on-farm and on model farms. No anthracnose disease was observed in the three chilli lines in any of the regions.

A new project was initiated in October 2021, on the use of bacteriophages as biocontrol agents against bacterial wilt disease. The objective was to test 9 new species of Mauritian *Ralstonia* phages, in order to select the better candidates or mixes to protect plants from bacterial wilt. Three *Ralstonia* strains (*RUN5263*, *RUN4833* and *RUN4382*) were used to amplify the 9 candidate phages (1Ca, 2A, 3Fb, 8G, 9Ga, 22A, 23E, 23F and 30B). Phage extraction and quantification from the amplified phage preparations were carried out to remove the bacteria and assess the phage quantity of each preparation in the laboratory. No phage plaques (lysis holes) were observed in the 3 *Ralstonia* strains tested.

A potted trial on tomato was carried out to test the virulence of 5 *Ralstonia* strains (*RUN 4382*, *RUN 4680*, *RUN 4833*, *RUN 5163* and *RUN 3665*) used either alone or in a mix. Bacterial strain *RUN 4833*, caused death of tomato seedlings @ 10^8 cfu/mL and 5×10^8 cfu/mL. Strain *RUN 4680* caused plant death at a low concentration of 10^8 cfu/mL compared to *RUN 4382* at a higher dose 5×10^8 cfu/mL. Wilting and plant death were also observed in three sets of mix @ 10^8 cfu/mL (*RUN 4382*, *RUN 4680*, *RUN 4833*, *RUN 5163* and *RUN 3665*), (*RUN 4833*, *RUN 4382* and *RUN 5163*) and (*RUN 4680*, *RUN 4833* and *4382*). Incidence of wilt ranged from 10 to 20%. No wilting was observed in the control treatment.

Three bean varieties (*Ferrina*, *FBS1* and *FBS2*) were screened for tolerance to major diseases (Rust, *Sclerotinia* Rot, Angular Leaf Spot, Common Bacterial Blight, Halo Blight, Cucumber Mosaic Virus, Bean Common Mosaic Virus and Bean Yellow Mosaic Virus) at Richelieu and Réduit. At Réduit CRS, virus incidence ranged from 3% to 20% and was highest in *FBS2* variety. Anthracnose disease ranged from 7% to 43% and was highest in *FBS1* variety. Leaf Spot disease ranged from 27% to 73% and was highest in *FBS1* variety. Common blight ranged from 27% to 37% and was highest in *Ferrina* variety. Halo blight was detected in *FBS1* only, most probably due to low inoculum pressure. Likewise, at Richelieu CRS, halo blight was present in var *FBS1* only with a low incidence of 3.3%. The incidence of virus diseases ranged from 0% to 42.3% and was highest in var *FBS2*. Anthracnose disease was present in var *FBS2* only with a low incidence of 3.8%. Leaf spot disease ranged from 73.1% to 100% and common blight ranged from 76.9% to 93.3%, and was highest in var *Ferrina*.

Disease screening for tolerance to taro leaf blight (TLB) was carried out on-farm in the regions of Riche Mare, Grande Chartreuse and Camp de Masque for introduced Fiji *Colocasia* varieties namely, *MAL 08*, *SM 152* and *PNG 13*. A *Violette local* was used as control varieties. At Grande Chartreuse and Riche Mare no symptom of blight was observed in the varieties *SM 152* and *PNG 13* confirming their high tolerance to TLB these regions. At Camp de Masque TLB incidence ranged from 16.6 to 75%. The highest incidence was recorded in *MAL 08* (highly susceptible) while the lowest disease incidence was recorded in *SM 152*. The lowest disease index of 2 was recorded in *SM 152* while *PNG 13* was free from the disease. An unusual leaf spot was observed at Grande Chartreuse on the variety *SM 152* with incidence as high as 90%. Two fungal pathogens namely, *Alternaria* and *Colletotrichum* sp. forming a disease complex were detected by microscopy analysis. Variety *PNG 13* has been released for commercial plantation for its tolerance to TLB and interesting agronomic characteristics

Disease monitoring of 6 Quinoa varieties (*P1510543*, *P1510548*, *P1510551*, *P1596293*, *P1596498*, *P1634919*) was carried out through regular visits at Réduit Crop Research Station. Only *P1596293* and *P1596498* showed leaf spot caused by the fungal pathogen *Colletotrichum* sp. with a mean leaf spot incidence of 2%. No seed blight was observed prior to harvest.

Twenty-nine and 101 M5 cabbage and cauliflower lines respectively were screened against Black rot/leaf spot diseases caused by the bacterial pathogen *Xanthomonas campestris* pv *campestris* (XCC) and other major diseases of crucifers. Each line expressed different degree of susceptibility to the disease ranging from slightly susceptible to highly susceptible. No resistant lines were obtained for both cauliflower and cabbage.

Papaya leaves expressing leaf distortion, curls and mosaics were collected from papaya plants variety *NEO* and *Jhurry* to determine the causal agents. No viruses were detected on symptomatic papaya leaves of both varieties from PCR tests. However, the involvement of a phytoplasma is associated with the symptoms observed. Sequencing is ongoing.

PCR tests were carried out on symptomatic chilli and sweet pepper samples with leaf curls and distortions for the detection of Tomato Yellow Leaf Curl Virus (TYLCV). The PCR product generated from the amplification of the TYLCV C1 gene (replication-associated protein) using primer pair TYLCV-1840F and IL-2642R was sequenced directly by the dideoxy method. Sequence analysis of TYLCV isolates from both chilli and sweet pepper revealed that they were 100% identical and showed 97.51% nucleotide identity to a TYLCV isolate previously collected from tomato in Mauritius in 2009 (KX347172). This is the first report of TYLCV in *Capsicum* sp. in Mauritius.

A total of 298 *Xanthomonas campestris* pv *campestris* (XCC) isolates collected from cauliflower, cabbage and broccoli fields, situated in the centre, east and south regions of the country, were screened for resistance to Copper based fungicides. Growths were observed with 10 isolates of *Xanthomonas* sp on YPGA + Cu medium, SPA and YPGA only (control). Growth of isolates on YPGA + Cu medium indicated the presence of XCC strains(s) resistant to copper. The 10 isolates were sent to CIRAD, Reunion for confirmation of results. Copper resistant strain of XCC from broccoli was confirmed by PCR. The strain was isolated on symptomatic leaves from broccoli infected fields at Phoenix.

The diversity and Geographical Structure of *Xanthomonas citri* pv. *citri* on Citrus in the South West Indian Ocean Region (SWIO) was studied in collaboration with CIRAD. The project was completed and no copper resistant strains of *Xanthomonas citri* pv. *citri* (XCC) were obtained for Mauritius and Rodrigues as opposed to Reunion island where copper resistant strains are present. There is a predominance of Pathotype A genetic lineage 1 strains in the SWIO (including Mauritius and Rodrigues). The presence of genetic lineage 4 Pathotype A* strains in the three islands of the SWIO namely Moheli, Mauritius and Reunion is also first reported. No pathotype A* was detected in Rodrigues island. Since no copper resistance had been detected in isolates from Mauritius and Rodrigues, copper-based fungicides can be continued in a holistic approach to management of XCC in Mauritius and Rodrigues. Growers need to make rational use of the fungicide and apply recommended dosage.

Around 200 banana mutant lines were screened for tolerance to *Fusarium Wilt* (Panama Disease). None of them showed tolerance/resistance to the disease.

Onion leaf samples displaying *Stemphylium* leaf blight (SLB) symptoms were collected and pathogen was isolated by single spore culture. Koch's postulates were fulfilled by inoculating onion plants with conidial suspension (at a concentration of 5×10^4 per mL) of the fungus. After 7 days of incubation, re-isolation yielded *Stemphylium* sp which confirmed pathogenicity test. Around 70 isolates presumably identified as *Stemphylium* sp. are stored for molecular characterization work. DNA of same is being extracted using modified CTAB method.

Virus indexation of 12 seed lots of potato variety *Vigora* was carried out in April 2021 for mini-tubers (4 samples) and basic seeds (8 samples) prior to plantation in the field. The samples were tested for the presence of PVX, PVY and PLRV and they were all found to be free from these viruses. The seeds were planted in the regions of St Antoine (mini-tubers) and Cote d'Or (basic seeds). Active growth inspection was carried out in the fields as per the seed certification protocol of FAREI. Plants showing symptoms of PVY infection were rogued. Owing to the high incidence of PVY and bacterial

wilt recorded in the region of Cote d'Or, specific areas in the field showing low incidence of these diseases were earmarked for harvest of seed potatoes that will be dispatched to Comoros in 2022.

A potted trial was initiated to determine the tolerance of variety *Vigora* to bacterial wilt. Isolates of *Ralstonia solanacearum* were collected from major potato growing regions and characterized by PCR as Phylotype I (previously Race 1). Plants were inoculated two times with a mixture of six isolates and also with sterile water (negative control). No symptom of bacterial wilt was observed in the different treatments used. Trial will be repeated.

Field visits were conducted to Chilli, Macadamia, Litchi, Vanilla and Gerbera plantations for sampling of *Colletotrichum sp.* infected samples. Out of 21 isolates subjected to PCR and sequencing, 3 different strains of *Colletotrichum sp.* were identified.

- **Insect pest management**

Black Soldier Fly is a potential alternative feed in poultry production. In this context, adult Black Soldier flies (BSF) were collected from livestock and poultry farms. They were kept in Perspex cages and provided with water soaked in sponge and decomposing vegetable and fruit peels in a Petri dish. Adult females laid egg masses and died just after egg laying. Eggs hatched four days after egg laying and neonates moved to the decomposing vegetable and fruit peels to feed. Larval period lasted about three weeks. Pupal period lasted between 3 weeks to 2 months. Out of 30 emerged adults, 13 were males and 17 females. All adults died within 10 days. Collection of adults and BSF larvae from pig and poultry farms has been undertaken and rearing of BSF in laboratory is on-going.

Surveys were carried out to identify existing natural enemies attacking whiteflies. Five species of coccinellid beetles (*Exochomus sp.*, *Scymnus sp.* and 3 unidentified species), 1 mirid bug (*Nesidiocoris sp.*) and 1 species of chrysopid (*Chrysoperla sp.*) larvae were collected on wild tobacco and eggplant plants. A preliminary study on the potential of *Exochomus* and *Chrysoperla* as predators of whiteflies (*T. vaporariorum* and *B. tabaci*) was undertaken. *Exochomus* adults and *Chrysoperla* larvae were exposed separately in petri dishes to whitefly nymphs. Both species were found to feed actively on the whitefly nymphs. An adult *Exochomus* ate an average of 15 nymphs per day while a *Chrysoperla* larva (first instar) ate an average of 12.5 nymphs per day. The evaluation of efficiency of natural enemies of whitefly will be pursued once the whitefly colony in laboratory has built up.

A search for pollinator species of solanaceous crops that could be more efficient than honey bees for pollinating crops in greenhouses was undertaken. The mining bee, *Halictus (Seladonia) orientalis* was observed on flowers of chilli and wild eggplant. In contrast, the carpenter bee, *Xylocopa fenestrata* was observed mainly on eggplant flowers. The woolly wall bee, *Megachile lanata* and the disjunct resin bee, *Megachile disjuncta* were observed pollinating pigeon pea flowers. The hoverfly, *Eumerus sp.* was observed buzzing around and foraging on chilli flowers at Réduit and Triolet while the hoverfly, *Syritta sp.* was observed in high numbers in most chilli plantations around the island foraging on chilli flowers. The potential of the hoverfly, *Eumerus sp.* and *Syritta sp.* as pollinators of sweet pepper in greenhouses will be investigated.

An attempt at recovering parasitoids of *B. dorsalis* from attacked fruits namely, Indian almond, mango and guava was made. The oriental fruit fly, *B. dorsalis* was the only fruit fly species that emerged from the fruits irrespective of species. The egg-pupal parasitoid, *Fopius arisanus*, was the only parasitoid species that emerged from pupae recovered from collected fruits. During the study

period, percentage parasitism of *B. dorsalis* by *F. arisanus* in Indian almond, guava and mango was 64.3 %, 25 % and 33.3 % respectively. A colony of the parasitoid, *Fopius arisanus* is being maintained in laboratory for eventual release in mango orchards. During 2021, 2,168 adults (1508 ♂ and 660 ♀) of *F. arisanus* were produced in the laboratory.

An IPM package consisting of scouting, establishment of flowering plants (marigold, Indian mustard) on field borders, mass trapping with pheromone baited traps @ 152 traps/ ha and use of IPM compatible insecticides was tested on farm at La Laura and on station at Richelieu CRS for the management of Diamond Back Moth (DBM) on cabbage. At La Laura, the number of insecticide applications was reduced from six (farmers' practice) to three (IPM package) and at Richelieu CRS, no insecticide was applied in the IPM plot. Results indicated that flowering plants and trapping of DBM adults contributed in suppressing DBM in the IPM plots and that flowering plants were effective in attracting the parasitoid of DBM, *C. vestalis*, as well as other species of natural enemies that presumably suppressed *C. binotalis* in the IPM plot at Richelieu CRS. At both sites, the quality of cabbage in the IPM plots was better compared to those in the control plot.

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. In open fields, neither damage symptoms of *T. absoluta* nor presence of its eggs or larvae was observed on cultivated crops and alternate hosts examined. 27.5 % of the protected tomato cultivations surveyed were infested with *T. absoluta*. They were located at Réduit CRS, Camp de Masque, Clemencia, Camp de Masque Pave, Mare D'Albert and Deux Bras. The average number of mines in the protected cultures ranged from 0 to 6 mines/3 upper leaves/plant with the highest population of *T. absoluta* adults in greenhouses at Camp de Masque and Clemencia. The predatory bug, *Nesidiocoris* sp. was recorded in two greenhouses at Réduit CRS and its predatory activity on *T. absoluta* larvae was confirmed in the laboratory. Furthermore, two unidentified predatory mite species were recorded on tomato leaves feeding on exposed *T. absoluta* eggs. Rearing of the recovered predatory mites on *T. absoluta* eggs in the Laboratory failed.

The efficacy of the pheromone bait, Tuta Pro Caps® syringe from Life Sciences was compared with the currently recommended pheromone bait formulation (Last Call gel from Insect Science) for attracting *T. absoluta* male adults in Russell IPM sticky traps was studied in a tomato greenhouse. The control consisted of a trap without pheromone bait. Results indicated that the new pheromone formulation was effective in attracting *T. absoluta* males (117.75 moths/trap/week) as compared to Last Call Gel (69.75 moths/trap/week) and the control (32.5 moth/trap/week). The new pheromone formulation can therefore be recommended for monitoring/mass trapping of *T. absoluta*.

A trial was undertaken in an onion field at Belle Mare to study the effect of fertilization and incorporating manure and *Trichoderma* sp. on *Thrips tabaci* population in onion plants. The average number of thrips per plant per week was not significantly different between plots treated with manure, *Trichoderma* and adjusted fertilisation (11.3) compared to farmer's practice (10.5). Results indicate that amendment of soil with manure and *Trichoderma* sp. did not lead to lower population of *T. tabaci*.

An experiment was carried out at Belle Mare to evaluate the efficacy of blue sticky traps for mass trapping thrips and their impact in thrips infestation in an onion plot. Treatments consisted of T1- blue sticky traps at a density of 1 trap/m², T2- blue sticky trap at density of 2 traps/m² and T3- control (free of traps). Results indicated that blue sticky traps at density 1/m² and 2/m² were not effective in suppressing the population of thrips in a standing onion crop.

A study was carried out in a banana plot at Médine to evaluate the resistance/tolerance of 8 banana varieties (*Dwarf Cavendish*, *Valery*, *Novaria*, *Mamoul*, *FHIA 01*, *FHIA 17*, *FHIA 23* and *FHIA 25*) to the banana weevil. The corm of harvested banana trees were cut into two halves and assessed for weevil galleries. Corm damage varied among varieties and it was highest in variety *Valery* (75%) followed by *FHIA 25* (60%) and *Novaria* (60%). In contrast, lowest corm damage was recorded in varieties *FHIA 23* (15%) followed by *Mamoul* (20%) and *FHIA 17* (20%), *Dwarf Cavendish* (30%) and *FHIA 01* (40%). It is concluded that varieties *Valery*, *FHIA 25* and *Novaria* are susceptible to the banana weevil while varieties *FHIA 23*, *Mamoul* and *FHIA 17* are comparatively resistant to the weevil.

The newly introduced papaya varieties *Neo 232*, *Neo 261*, *Neo 237*, *Neo 247*, *Neo 203*, *Neo 209*, *Neo 202* and *Neo 253* were evaluated for their tolerance/susceptibility to key pests namely, broad mite and papaya mealy bug along with the local accession *Jhurry* at Réduit, Medine Sugar Estate and L'Escalier. Mites and papaya mealy bugs were absent on the leaves at Réduit and L'Escalier. At Médine, percentage of plants attacked by mites in varieties *Jhurry*, *Neo 232*, *Neo 261*, *Neo 237*, *Neo 247*, *Neo 203*, *Neo 209*, *Neo 202* and *Neo 253* were 100,100,100,100, 80, 90, 100, 60 and 70 respectively. All the papaya varieties showed a high susceptibility to mites in the dry and hot climatic region of Medine SE. On the other hand, the papaya mealybug was present on only 1% of papaya trees irrespective of varieties.

The effect of eco-service plants on biological indicators and abundance on cultivated crops was studied on farm at Plaine Sophie where plants such as castor bean, clerodendrum, vetiver, wild yellow chrysanthemum flowers, rows of rosemary and pigeon pea have been established in field borders. The vegetable crops namely, sweet potato, beetroot, carrot, cabbage and bean were cultivated. Use of pesticides was avoided as far as possible with only IPM compatible products used whenever the need arose. Fertilisers were used along with manure. No herbicide was applied in the cultivation except in the cabbage and carrot plots where only 1 application was made at the beginning of the crop cycle. The abundance of arthropods in ecoservice plants and cultivated crops was assessed on (i) yellow sticky traps, (ii) fixed quadrat in cultivated crops and (iii) inflorescence of ecoservice plants. Pest on crops under study was assessed on leaves with damaged symptoms in the laboratory (bean and sweet potato) and *in situ* (cabbage and carrot). In total, natural enemies from 23 families belonging to six insect orders (*Hymenoptera*, *Diptera*, *Coleoptera*, *Hemiptera*, *Thysanoptera* and *Neuroptera*) and one *Araneae* (spiders), were identified from a set of 5492 individuals caught on the yellow sticky traps and consisted predominantly of parasitoid wasps (4,642) followed by tachinid flies (310), pirate bugs (191), rove beetles (147), mirid bugs (108), lady birds (58), hoverflies (22), damsel bugs (6), predatory thrips (1), assassin bug (1), brown lacewing (1) and spider (1). A more diverse group of natural enemies such as hoverflies, lady birds, tachnids, mirids and damsel bugs visited wild yellow chrysanthemum. In contrast, castor was visited only by hoverflies and parasitoid wasps while clerodendrum was visited only by hoverflies and ladybirds.

Natural enemies observed in fixed quadrat in cultivated crops (bean, beetroot, cabbage, carrot and sweet potato) were parasitoid wasps, ladybirds, hover flies, tachinid flies, pirate bugs, mirid bug, damsel bugs and spiders. Bean harboured all the natural enemies mentioned. In cabbage, only parasitoid wasps were recorded. Tachinid flies were recorded only on bean while hover flies only on bean, carrot and sweet potato. Parasitoid wasps consisted mainly of egg parasitoids of lepidopteran pests and larval parasitoids of leafminers and lepidopteran pests. Tachinid flies are mainly larval parasitoids of lepidopteran pests. Pirate bugs are mainly predators of aphids and whiteflies. Hoverflies are predators of aphids. Ladybirds are predators of aphids, whiteflies and mealybugs while damsel bugs are predators of lepidopteran pests. These natural enemies were associated with cultivated crops as well as with ecoservice plants indicating that the ecoservice plants act as a reservoir for natural enemy diversity.

The efficacy of 22 products were evaluated against target pests. Results are listed below:

1. The efficacy of *M-Pede* (Potassium-fatty acid soap salt) @ 10 and 20 mL/L water and *Proud-3* (Thyme oil) @ 5 and 10 mL/L water was tested against the yellow sugar cane aphid, *Sipha flava*. Above 80% reduction in number of *S.flava* was observed in *M-Pede* at both rates and in *Proud-3* @ 10 mL/l water. *M-Pede* at the rate of 10 mL/l water and *Proud 3* @ 10 ml/l water can be recommended for the control of *S. flava*. Larvae and adult of coccinellid beetles were present in plots treated with *M-Pede* and *Proud-3* irrespective of dosages, showing no adverse effect on beneficial insects.
2. The efficacy of *No Fly* (*Isaria fumosoroseus*) at the rate of 1.8 g/L water and 3.6 g/L water was tested against the yellow sugar cane aphid (YSCA). Percentage reduction in aphid population in *No Fly* treatment at 1.8g/L water and 3.6g/L water was 83.9% and 66.4% respectively. *No Fly* at the rate of 1.8 g/L water was effective against the YSCA. Larvae and adult coccinellid beetles were found feeding actively on yellow aphid showing that *No Fly* did not have any adverse effect on the predators.
3. The efficacy of *Wetcit Duo* (Orange Oil), *PQZ* (Pyrifluquinazon) and *Greenmix* (*Urtica spp.*) were tested against 2nd instar nymphs of the whitefly, *Trialeurodes vaporariorum* on eggplant leaves in the laboratory. The percentage reduction of whitefly five days after treatment in leaves treated with *Mospilan* @ 0.25g/L, *Wetcit Duo* @ 2.0ml/L water, *PQZ* @ 0.4ml/L water and 0.6 ml/L water, *Greenmix* @ 3.0 mL/L water and 4.0 mL/L water were 8.3%, 50.3%, 23.1%, 19.5%, 26.1 and 56.7 respectively. Only *Greenmix* @ 4.0 mL/L water was comparable with *Wetcit Duo*. *PQZ* and *Mospilan* were found to be ineffective against whitefly.
4. The efficacy of *No Fly* (*Isaria fumosoroseus*) @ 2.0g/L water and *Celite 60* (Diatomaceous earth) @ 20g/L water, 30g/L water and 60g/L water was tested against the yellow aphid (*S. flava*). Both *No Fly* and *Celite 60* were ineffective against *Sipha flava*.
5. *Wetcit Duo* at the rate of 2 mL/L water was tested against *I. seychellarum* on combava leaves in the laboratory. *Mospilan 20 SP* at the rate of 0.25 g/L water was used as standard insecticide. The percentage reduction of *I. seychellarum* in twigs treated with *Wetcit Duo* and *Mospilan 20 SP* was 7% and 76% respectively. indicating that *Wetcit Duo* is not effective against the soft scale, *Icerya seychellarum*.

6. *Maugreen* was tested at 20 mL/L water and at 20 mL/L water mixed with *Neem-A-Life* at the rate of 3mL/L water of against mealybug on combava leaves in the laboratory. *Neem-A-Life* at 3 mL/L water and *Mospilan 20 SP* at a rate of 0.25 g/L water were used as a standard insecticide and water as control. The percentage reduction of mealybug in twigs treated with *Maugreen* (20 mL/L water), *Maugreen* (20 mL/L water) + *Neem-A-Life* (3 mL/L water), *Neem-A-Life* (3 mL/L water) and *Mospilan 20 SP* (0.25g/L water) was 6%, 5%, 5% and 76% respectively. It was, thus, concluded that *Maugreen* is not effective against the mealybug, *Icerya seychellarum*.
7. *Celite 60* (diatomaceous earth) was tested at 20 g/L water, 30 g/L water and 60 g/L water against the mealybug, *Icerya seychellarum* on mango leaves. *Celite 60* at 60 g/L was found to be effective with a percentage reduction of 77% in mealybug numbers compared to the standard insecticide *Mospilan 20 SP* (83%).
8. The efficacy of *Lufenuron* @ 1.0 ml/L water, *Chlorantraniliprole* @ 0.25 ml/L water, *Spinosad* @ 0.25 ml/L water, *Spinetoram* @ 0.5 ml/L water, *Azadirachtin* 0.1 % @ 3 ml/L water, *No Fly (Isaria fumosoroseus)* @ 2g/L, *Flubendiamide* @ 0.1 ml/L water and *Abamectin* @ 0.5 ml/L water against *Tuta absoluta* larvae in laboratory was tested. Except for *No Fly*, all the products tested were found effective with a cumulative mean percentage mortality of larvae ranging from 87.5 – 97.5 (72 hours after treatment)
9. Field testing of *Greenmix-SB* @ 4 ml/L water against *Amrasca biguttula* in Eggplant was conducted. *Greenmix* @ 4 ml/L water was found to provide satisfactory control against *A. biguttula* with 73.1% reduction in its number compared to the standard insecticide *Teppeki* @ 0.2g/L water (95.5%)
10. Field testing of *PQZ* (pyrifluquinazon 200 g/L water) @ 0.4 ml/L water, *PQZ* @ 0.6 ml/L water and *No Fly* @ 2.0 g/L water against *Amrasca biguttula* on okra was undertaken. Both *PQZ* and *No Fly* were found to be ineffective in controlling *A. biguttula*.
11. *Buprofezin* @ 1 g/L water was tested against *Thrips tabaci* in onion. It was found to be effective with 67.2% percentage reduction of thrips seven days after treatment as compared to *Tracer* (70.2%)
12. *PQZ* (pyrifluquinazon) @ 0.4, 0.8, 1.2, and 1.6 mL/L water, *Maugreen* @ 20mL/L water, *Maugreen* @ 20mL/L water + *Neem oil* @ 3 mL/L water, *Neem oil* @ 3mL/L water, *No Fly* @ 4g/L, *Greenmix* @ 4 mL/L water, *Wetcit Duo* @ 2 mL/L water, *Tracer 480 SC* (*Spinosad*) @ 0.25 g/L water were tested against *Thrips tabaci* in onion. *Maugreen*, *Maugreen+Neem Oil*, *Neem Oil*, *Wetcit Duo*, *NoFly*, *Green mix* and *PQZ* at tested rates were not effective against thrips
13. The efficacy of *PQZ* (pyrifluquinazon) at 0.4 mL/L water, *No Fly (Isaria fumosoroseus)* @ 1.8g/L water and *M-Pede* (Potassium-fatty acid soap salt) @ 20mL/L water against *T. tabaci* was tested. *No Fly*, *PQZ* and *M-Pede* were not effective against thrips
14. The efficacy of *Wetcit Duo* (orange oil) @ 2 mL/L water, *No Fly (Isaria fumosoroseus)* @ 2g/L water and *Buprofezin* @ 0.5 g/L against chilly thrips on roses was tested. All products were found to give effective control of chilly thrips with a reduction of more than 73% of adult and nymph

15. The Efficacy of *Bio-Anosom* (squamocin 1%) @ 2 mL/L water against chilly thrips on roses was tested. *Bio-Anosom* was found effective against adult chilly thrips only with a decrease of 97%

- **Pest and disease surveillance**

A pest and disease surveillance system was maintained on major crops around the island. Disease and pest diagnosis were carried out on 691 and 109 samples of plants respectively and appropriate control measures were recommended.

- **New pest/disease detected**

Two new pests were detected

- The groundnut leafminer, *Aproaerema modicella*
- The impatiens thrips, *Echinothrips americanus* Morgan (Thysanoptera: Thripidae) detected on Youngberry plants

- **Pest and Disease alert**

- Powdery Mildew on cucurbits
- Phytophthora on solanaceous crops

Livestock Research and Development

Introduction

Activities pertaining to nutritional and reproductive management in ruminants, fodder and pasture development and conservation, livestock waste management, conservation of farm animal genetic resources and genetic improvement were pursued. Further studies were carried out on control of subclinical mastitis and detection of antibiotics in products of animal origin.

The activities related to fodder development were strengthened through additional funding for setting up of additional facilities for fodder production and conservation. A new project on setting up a sylvopastoral production system on a plot of land at Petit Merlo was initiated. The project “Supporting Climate Change Adaptation for Communities Through Integrated Soil–Cropping–Livestock Production Systems” was approved for funding under IAEA.

Animal Nutrition

Effect of replacement of concentrate by browse species (*Calliandra calothyrsus*) on performance of growing goats

A sustainable alternative to mitigate the high price of concentrate is to produce good quality fodder to replace partly or completely the concentrate in the diet of ruminants. The utilization of locally available and home-grown high protein forages and browses is therefore being encouraged. *Calliandra (Calliandra calothyrsus)* is a browse species with crude protein of 20% dry matter, has a good potential for replacing concentrate in the diet of ruminant. The effect of replacing concentrate by *Calliandra* in growing goats was investigated at Curepipe Livestock Research Station (CLRS). Two experiments with six cross bred goats each were conducted. The animals in the first experiment were fed individually in cages while in the second experiment the animals were in groups in a completely randomized design. Animals in treatment group were fed with fresh fodder supplemented by *Calliandra* and animals in control group received fresh fodder and concentrate. The experiment lasted 44 days. In the trial with individual feeding method, the animals in the treatment and control group weight were on average $15.2 \pm 2\text{kg}$ and $14.8 \pm 0.3\text{kg}$ respectively. At the end of the trial, goats in the treatment and control group weighed on average $17.7 \pm 1\text{kg}$ and $16.7 \pm 0.6\text{kg}$ respectively, there was no significant difference ($P < 0.05$) between the groups. The average daily gain (ADG) for the animals in treatment and control group was $56.8 \pm 19\text{g}$ and $41.7 \pm 6\text{g}$ respectively. In the second trial, at the start experiment, the average weight of animals in the treatment and control were $21.3 \pm 3\text{kg}$ and $26 \pm 5\text{kg}$ respectively. At the end of the trial, goats in the treatment and control group weighed on average $24 \pm 3\text{kg}$ and $29 \pm 5\text{kg}$ respectively and there was no significant difference ($P < 0.05$) between the two groups. The ADG was 68g for animals in both control and treatment group. This study has shown that the concentrate can be replaced with browse species (*Calliandra*) in the diet of goats.

Monitoring of sub-clinical mastitis through the use of locally developed screening kit

Sub-clinical mastitis has a direct impact on milk yield with infected cows producing less milk than healthy cows. The incidence of sub-clinical mastitis in a herd is not at zero level, however, it should be maintained at an acceptable level below 30 %. Adoption of Good Animal Husbandry Practices (GAHP) stress on the use of post milking teat dip solution to disinfect the cow's teats after milking. The recommended application rate of the active iodine in the solution varies between 0.01% to 2 %. Past research studies carried out at CLRS have shown the effectiveness of using 0.5 % active iodine. A trial was implemented at CLRS, to monitor sub-clinical mastitis using locally developed screening kit and using 0.5 % active iodine solution as post milking teat dip as a control measure. A total of 115 screening tests were carried out using the locally developed screening kit, 41 lactating cows were screened per batch. At the start of the trial, the incidence of the sub-clinical mastitis measured in the dairy herd was 88 % (41 heads). After six months of using post teat dip with 0.5 % active iodine, the incidence of sub-clinical mastitis was 58 % indicating a reduction of 30 % in the incidence of sub-clinical mastitis in the dairy herd at CLRS.

Promotion of local dairy products

In the endeavour to boost the local production in line with the "Made in Moris" label, Government is encouraging the setting up of enterprises willing to venture in processing and value addition of agricultural products. There are opportunities and interest among entrepreneurs to embark into milk processing and value addition activities. However, the technology and the know-how to process dairy products are limited. FAREI has validated protocol and developed various dairy products such as soft cheese, mozzarella, kefir and feta using fresh milk as ingredients. These dairy products were prepared at CLRS and were displayed in several exhibitions, whereby the public and potential entrepreneurs were apprised of opportunities in milk processing using local fresh milk.

The events were held at Wooton Agro-Processing Centre, Mapou Agro-Processing Unit, during World Food Day 2021 held at the Multi Purpose Centre of Plaine des Papayes, and at launching ceremony of Black River Gorges Bel Ombre Biosphere Reserve at Alexandra Falls.

Farm Animal Genetic Resources

Conservation and utilization of Creole cattle

The *in-situ* and *ex-situ* conservation of the Creole cattle were pursued. Under *in-situ*, four small farmers are participating in the project with a total of 19 animals which includes 9 progenies. An average age at first calving of 32.4 ± 3.7 months (n=5) and an average calving interval of 14.5 ± 2.5 months (n=6) have been obtained. Under the *ex-situ* at CLRS the nucleus is being consolidated and comprises of a total of 41 animals consisting of 22 females and 19 males. Another nucleus unit of one male and one female Creole cattle was set up at Casela World of Adventures in September 2017. Four progenies 2 males and 2 females have been obtained and have been made available for breeding purposes to individual farmers. An average daily gain of 607 ± 112 g have been obtained

over 475 days and a calving interval of 11.7 ± 0.9 months. Under good management practices, *in situ* Creole cattle performances can easily reach the targeted average daily gain of 500g and one calf a year.

Performance of progenies of imported South African dairy cattle

The progenies of dairy cattle imported in 2015 were monitored for their productive and reproductive performances.

The average milk production of the progenies compared to their parents were 13.2 ± 1.6 and 11.7 ± 4.1 litres per day respectively, over a lactation period of 305 days. Similarly in terms of reproductive performance the progenies have a calving interval of 14.0 ± 2.1 months as compared to 25.4 ± 11.9 months for the parents. The improved performances of the progenies, born locally, over their parents indicate the phenomenon of acclimatization.

Research and development and support to national fodder development strategy

Developing technologies for drying of fodder to promote homegrown haymaking for sustainable livestock production

Fodder production and preparation of hay from different grass and high protein species are being carried out on FAREI stations, namely CLRS and Richelieu CRS. A drying structure has been rehabilitated at Richelieu CRS for preparation of hay from Lucerne, Rhodes grass, Bois Noir, Cratylia as well as leaf meal from Calliandra and Acacia. The hay is being used for feeding goats at CLRS.

Developing a silvopastoral model as innovative approach to sustainable livestock production project at Petit Merlo

The project is being implemented at Petit Merlo over an area of 4.8 Arpents. Fencing work as well as plantation fodder in paddocks is ongoing, Taro and vetiver plants have been planted along the natural fences that have been developed.

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

The project RAF5090 has been approved for funding by the IAEA and involves the integration of crop and livestock systems with focus on soil fertility. The project will be implemented at Petit Merlo and a first virtual Regional Coordination Meeting was held on 11 and 12 April 2022.

Managing livestock waste

Fiber reinforced plastic (FRP) portable kitchen biogas system using cattle manure.

Biogas technology adheres to the concept of green/circular economy and is pursued in an effort to treat livestock waste leading to reduction of surface and ground water pollution, mitigating climate change and at the same time converting waste into valuable resources such as electricity and organic

fertilizer. A fiber reinforced plastic (FRP) portable kitchen biogas with a gas holder capacity of 0.5m³ was tested at CLRS. The objective was to measure the gas production generated by FRP portable kitchen biogas digester using cattle manure. 250kg of fresh cattle manure and equal volume of water was added at the start of the trial. 3kg fresh manure mixed with equal volume of water was then added on a daily basis. As from the 3rd day, the gas holder rose by 5cm and reached an optimum height of 48cm at day 24 indicating full biogas capacity production of 0.5m³ gas. Upon first flushing, the gas holder took 19 days to rise to the optimum height of 48cm. Over a period of 200 days, 650 litres of digestae were collected from the kitchen portable biogas units with a feedstock of 1700 Kg (50% manure and 50% water). The pH value of the resulting digestae ranged between 6.8 and 7.9. An average cooking time of 1hour 15 minutes and an average boiling time of 17 minutes for 1.5 litres of water were recorded. Biogas for cooking from such model remains a major challenge as the cooking time recorded is less than 3 hours per day.

Food Safety

Assessing veterinary drug residues and related chemical contaminants in products of animal origin

The project seeks to support national efforts to ensure safer/quality animal food products and feed that are available for the local and international market, with acceptable levels of veterinary drug residues and related contaminants. A study on the status of antibiotic residues was carried out in fresh livestock products in Mauritius. 150 samples of fresh meat were collected across the island. The detection of antibiotic residues was carried out using a Radio Receptor Assay (RRA) tool from the CHARM Enterprise Ltd and it was found that the prevalence was 72 %, 65%, 60%, 30% and 10% for chicken, beef, pork, egg and venison respectively. Samples from chicken which had the highest prevalence contained four different classes of antibiotic residues namely Chloramphenicol (30%), Sulfonamides (26%), Tetracycline (22%) and Betalactam (4%). The positive samples were quantified using HPLC-DAD (Model 1260 Infinity II system Agilent Technologies). The concentration of Chloramphenicol whose usage is banned in livestock production in Mauritius, ranged between 72.6ng/g to 196.7ng/g in egg, 8.0ng/g to 603.6ng/g in chicken meat and 155.0ng/g to 397.7ng/g in beef. Sulfaquinoxaline which is often used as coccidiostat in the formulation of poultry feeds was also detected in chicken meat at concentration varying between 64.4 ng/g to 750.0 ng/g and between 65.0 ng/g to 5 268.0 ng/g in egg. According to the Codex Alimentarius/FAO, Maximum Residue Limit (MRL) for all sulfa drug residues to be below 100ng/g. The HPLC analysis also confirmed the samples collected from venison and pork were free from antibiotics residues. This study has shown that the samples of livestock products contained four classes of antibiotics residues and has also revealed the phenomenon of “*crossover-use*” of antibiotic in livestock production where human-intended antimicrobial products like chloramphenicol were administered to livestock animals. It was also found that the local poultry products contained antibiotics residues like chloramphenicol, sulfonamides and tetracyclines.

Extension and Training

Introduction

Advisory and training activities to the farming community and other stakeholders including agro-processors and new promoters were disrupted with the confinement; the approach and strategies were reviewed. The sanitary curfew and sanitary conditions had changed our mode of operation with minimum contact as well as group activities were stopped momentarily and was resumed after

A total of 177 extension activities were organised and were attended by 1,818 farmers/entrepreneurs. As per recent years, the major thrusts were to promote safe food production while reducing the use of chemicals in food crop production and adoption of agro-ecological principles. The objectives were to increase farmers' productivity thus improving their income and also aimed at increasing farmers' and agro-entrepreneurs' knowledge and skills through a participatory approach. The focus for the livestock sector was on production of small ruminant and value addition.

The southern regions and Plateau Central received an unprecedented rainfall causing flash flood and losses up to 100 % in certain fields, following surveys carried out rapidly. Field officers had been given an additional task in view of certifying fields affected by the cyclone and heavy rainfall for compensation paid by the Small Farmers Welfare Fund (SFWF).

In addition, all the schemes pertaining to FAREI were implemented along with the new Household Gardening scheme. Model Farm at Flacq and Rivière Des Anguilles served as models for organic production. The department organised five national dialogues on food systems from 7 to 14 July 2021. National Food Systems Dialogue via Zoom: held at 4 places as follows: Flacq MF on 07/07/2021 (crop sector), Wooton FTS 08/07/2021 (Agro processing), FSC Goodlands 12/07/2021 (livestock) and Riviere des Anguilles MF (value chain) on 14/07/2021 enabled a diverse set of stakeholders to work together to discuss challenges and opportunities for building more sustainable food systems.

Crop Extension

A total of 14,364 advisory visits were effected and 11,563 office calls from farmers have been recorded. Moreover, 93 extension activities were organized and attended by 1,120 planters. Assistance was also provided in Crop Loss Assessment under insurance scheme and ACASS and certification for planters' card.

The department organized 63 group meetings based on 11 themes for 840 planters, 13 field demonstrations on nine themes attended by 59 planters and 17 conducted tours on seven themes with 221 planters. A total of 33 MQA approved training courses was completed and was attended by 531 trainees.

Surveys

The field staffs were involved in field surveys 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 30,404 field visits for food crop surveys were conducted. 132 additional field visits were carried out to 17,271 fields and were related to:

- i. State Land occupancy
- ii. pests and diseases
- iii. market price
- iv. impact of adverse climatic conditions and
- v. Report for crop loss and ACASS

Other Services to Planters

Extension staff collected 33 soil samples and appropriate recommendations were provided after laboratory analysis. A total of 181 samples were forwarded to Entomology and Plant Pathology Laboratory for pest and diseases identifications. 274 seed vouchers were given to planters for seeds to be purchased at the Agricultural Services. 581 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, 13 hot water treatments of seeds were effected on model farms.

A total of

- 34 applications for duty exemption were processed.
- 1,822 vouchers were issued for paraquat permit.

Onion - Control of thrips with new insecticide buprofezin (for use in IPM programs)

The demonstrations started at the onset of the building up (during the period October to November) of the level of thrips population at Belle Mare and Trou D'eau Douce. The product had a very good knock down effect, an estimated 80% control was obtained. This product has the potential of controlling thrips effectively within a well-designed IPM approach.

Chilly: Evaluation of new chilli varieties tolerant to anthracnose (PPD) at Beau Champ

Field surveys for identification of chilli plantation (carri) with high incidence of anthracnose (PPD) at Bon Accueil and Lallmatie.

Control of *Tuta absoluta* were demonstrated in hydroponics greenhouses

In view of the shortage of fertiliser, crop extension team organised 5 group meetings for 74 participants on the theme 'Integrated approach to chemical fertiliser'.

5 group meetings were organised on Solarisation techniques for poultry manure for having a safe, odourless and marketable product for readily use in horticultural crops. 9 trainings conducted for 150 beneficiaries of Household Gardening Scheme

World Food Day 2021: Held on 16/10/2021 at Plaine des Papayes Multipurpose Complex - National theme 'Manz seki nou prodwir, prodwir seki nou manze'. Also 2 new schemes were launched on that date: Acquisition of solar powered cold room and refund on sheltered farming plastic cover/net.

Smart Agriculture - Survey with planters on going icw Questionnaire pour la cartographie de l'utilisation des pesticides dans l'agriculture vivriere'.

For promoting new variety of peas and Chinese peas, we have organised conducting tour for both planters and officers of the Crop Extension to assess their performance at Reduit CRS. Some 11 planters were provided seeds of peas and Mange-tout.

New production units set up with our assistance



Livestock Extension

The Livestock Extension Division provides services to operators in the livestock sector to improve livestock production and productivity through training (group meetings, conducted tours, demonstrations) and advisory field visits. Training in different livestock sectors (cattle, goat, pig and poultry) was maintained for livestock keepers and others. 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 milk village, fodder production, multiplier goat farm, MSPA land projects, cooperative pig farms and other livestock projects were also 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. Under APMIS, livestock data were updated with resources available.

Livestock Statistics

As at end of year 2021, the livestock population and corresponding farmers comprise 3,734 cattle (520 farmers), 22,142 goats (1,968 farmers), 5,034 sheep (307 farmers), 22,422 pigs (438 farmers), 4,467 ducks (249 farmers), 413,987 broilers (265 farmers with up to 5,000 birds), 127,376 layers (132 farmers with up to 5,000 birds) and 1,107 rabbits (116 farmers).

Training of farmers at Model farms and other venues.

Training was conducted for farmers through MQA certified training courses along with meetings/conducted tours/demonstrations. 37 meetings, 11 conducted tours and 36 demonstrations were organized and attended by 798 farmers. 24 training courses (MQA approved) were effected, namely on goat production, egg production, broiler production and piglet production. 432 persons attended these training courses.

Support to Livestock Cooperatives

Comprehensive support was provided to Cow Breeders Cooperative Society and Northern Livestock Cooperative Society (Nouvelle Decouverte) and Morcellement Saint Andre Livestock Cooperative Society owing around 280 cattle heads and producing around 1300 L of milk per day.

Assistance is also provided to Friesian Dairy Company Ltd, Cheng Cheng Mixed Farming Coop Society, Cowshed at Mont Gout L'Esperance, Pamplémousses, Creole Breed conservation Project (AU-IBAR project)

Monitoring of MSPA Land

Mare D' Albert

A total of 57A of land that was allocated at Mare D'Albert in February 2011 t. The stus are as follows:

- Roodurin Farming Cooperative Sty. Ltd, Plot 1 (9 A) for dairy project and only 1.0 A of land are presently under preparaton for crop production.
- Dream cows and Veggie Mixed Farming Coop. Sty Ltd, Plot 2 (9.02A) for goat/sheep project Around 75 coconut trees and 75 banana suckers previously planted along the field border are partly at fruiting stage. App. 4 Arp has been cleared and the rest (5 A02) is in an abandoned state.
- EscaleSud Cow breeders Coop. Sty. Ltd, Plot 3 (9.01A) for dairy project. The land was retrieved and cleared in March 2022 by the authorities. Presently the farm has 3 pregnant heifers.
- Les Palmiers Multipurpose Coop. Sty. Ltd, Plot 6 (10.32A) for model goat farm project. The herd status as at March 2022 was 60 goats. Around 1.80 A of land is under fodder production. Other plantations consist of some fruit trees planted on farm premises.

Mare Tabac

- A plot of land of 24A31P was earmarked at Joli Bois, Mare Tabac for livestock development. Land was divided into 8 plots and 5 of them have been leased to agricultural promoters.
- The Satte Pe Satta Cooperative Sty Ltd was allocated 2A83 P for mixed farming. A fodder plot of an extent of about 1 Arp has been set up on site. The cooperative is involved in mixed farming and ruminants were introduced in July 2021.
- The Herd Status at Joli Bois as at March 2022 includes 48 goats, 12 sheep, 1 young bull, 3 young heifers. The beneficiary also rears 500 broilers per production cycle on farm.

Rouge Terre

Vipra Livestock Farm Cooperative Society was allocated Plot 17B has set up a goat shed and is rearing 50 goats/sheep and around 100 poultry.

Support to Pig sector

- *Plaisance Pig Credit and Marketing Coop Society*

There are 38 active farmers out of 46 members at St Martin Phase 1, owning 4031 pigs. For St Martin phase 2, out of a total of 193 plots, 173 plots have been allocated. 161 farmers have started trenching work, foundation and erection of pigsties. 145 farmers are rearing 8733 pigs on site. No waste treatment plant is available, 12 farmers are equipped with a septic tank while most of them are using an absorption pit to collect the waste.

The Meat shop at Bambous allocated to Mr G. Lavigilante is operational as from 23 December 2021.

- Mr. Legallant Jean Francois is operating with a stock of 71 pigs at La Laura.
- *Poste de Flacq Pig Credit Cooperative Society Ltd situated at Bassin Requin*

Nineteen pig farmers operate on the farm with a total stock of 1749 pigs. Since the setting up of the treatment plants, maintenance has been the main issue and related to its cost and where to dispose the sludge.

Other Services

Livestock Extension supported the livestock farmer's community by processing applications for animal (102), feed (246), molasses (87), bagasse (51), bona fide for DBM & NTA permit (81) and effected 6507 advisory individual field visits. 2218 persons called at Extension offices for support and advice.

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 other younger section of the population in primary agriculture, or otherwise, moving higher up in the value chain with development of agro-processing enterprises.

Eight presentations attended by 242 officers were made by local or visiting experts to broaden exposure of personnel of the institute to novel as well as emerging technologies

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 1507, who were equally provided, wherever required, with 504 copies of training course material on CDs and pen drives for their personal records.

Interest in training kept on its rising pace with 1000 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. Two batches of training on hydroponics production and crop and livestock production have been completed

A tripartite Funding and Implementation Agreement was signed among AFDB, Government of Mauritius and the UNDP for Humanitarian Emergency Assistance to overcome the oil spill crisis in Mauritius. FAREI has benefited a grant of MUR 1,758,020 for capacity building and start up assistance regarding organic crop production and egg production to those communities affected by the oil spill.

In line with above, 225 households, concerning 1000 to 1200 beneficiaries were earmarked for the humanitarian emergency assistance in the south east and eastern regions mainly at Quatre Soeurs, Grand River South East, Grand Sable, Mahebourg and Vieux Grand Port.

The training program was launched on 16th September 2021. Distribution of pullets and battery cages were carried out to participants. An award ceremony was held on 26 Feb 2022 at Camp de Pecheurs, Mahebourg to hand over certificates and starter kit.

Vocational training: National Certificate Course in Hydroponics Operations [NC - level 3]

A one-year award training course in Hydroponics Operations [NC-level3] is being run in collaboration with the Mauritius Institute of Training and Development (MITD) under the NAP programme. 20 students are enrolled for year 2021-2022 and this course is being run on yearly basis.

A total of 3912 calls for advice were attended and 2458 publications issued on request to farmers, general public and stakeholder institutions.

133 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.

Three alert was sent by SMS to avert 48 farmers on potential risk of *Stemphylium* leaf blight, bacterial leaf blight and downy mildews in onion

Forty-five Agricultural Clubs, with a total membership strength of 1047 were registered with FAREI for support and assistance during period under review, of which 22 Agricultural Youth Clubs (AYC) regrouping in all 655 members, made up of 276 women and 379 men.

Nine Agricultural Entrepreneur Clubs (AEC) representing a forum of 176 agripreneurs all actively engaged in commercial scale farming. Training activities and technical support were dispensed to leverage individual capability in the field of backyard gardening, foodcrop/flower/livestock/mushroom production, compost making, plant propagation, irrigation and agro-processing techniques; and 14 Agricultural Women Clubs regrouping a total of 216 active members. Four training courses dispensed to leverage knowledge and capacity of 56 potential entrepreneurs in agro-processing techniques.

Nine agro-entrepreneurs entertained at the Agro-Processing Resource Centre in Wooton for testing and evaluation of their respective technical process as well as end products and seven conducted tours organized for 46 visitors.

Twenty agri-business enterprises benefitted free advisory services on process and product improvement; 139 protocol developed or upgraded for processed food products.

The Division provided supports to the following events:

- launching of the Mapou Agro Processing Centre
- Award ceremony of certificates and starter kit at Maison des Pecheurs at Mahebourg
- Citizen Support Unit programmes
- Celebrations of the World Food Day at Plaines des Papayes whereby the Women & Youth Unit organized a culinary competition in the region.
- launching of the Bel Ombre Biosphere Reserve.

Training materials were developed in household gardening and 339 beneficiaries were trained.

The training unit also collaborated with other stakeholders as follows:

- Ministry of Labour to showcase the success stories of entrepreneurs in agro industry who benefitted from trainings provided by FAREI. These were broadcasted in the Magazine de l'Emploi et des Metiers
- With farmers for the "Production of Quality Fertiliser" from livestock manure. This project was funded under the Switch-Africa Green (SAG) programme funded by UNEP MS196/2018 for the development of a concept note, provision of training.
- EU under the Desira initiative: training on the principles of mushroom production were conducted from 16 to 27 May 2022 at Mushroom Unit/ FTS.

Biofarming Unit

Since the setting up of the unit in January 2018, the number of planters/promoters involved in organic farming has increased from 78 planters (133A) in 2019, 110 (180A) in 2020, 116 planters (204A) in 2021, and 128 planters (225A) in 2022

BFU has carried out training in organic farming for MFR Rodrigues and some organic planters were visited.

Permaculture farms are found at Bambous Virieux, Deux Bras and L'Esperance Quartier Militaire. There is also the Britannia Organic Zone with 7 promoters on leased state land.

Ferney Agri Hub (FAH)

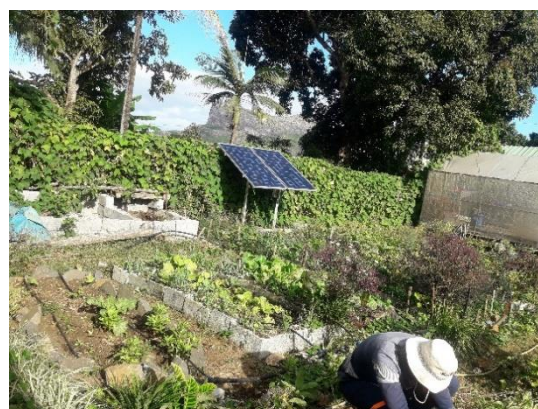
The BFU maintained its support to FAH. Presently 8.4 ha (20 Arpents) are actively being occupied, and under production of vegetables, fruits, medicinal and other endemic plants and spirulina for pharmaceutical and/or cosmetic purposes.

Organic Community Gardens

Biofarming Unit is involved, since 2020, in the development of organic community gardens for promotion of chemical-free vegetables and fruits. As at date, there are four organic community gardens namely at Pavillion, Quatre Bornes, Paroisse St Jean, Ferney AgriHub and Cascavelle. Action is underway for setting up of another Community garden at Ste Croix.



Ti Zardin Bio Pavillion



Paroisse St Jean

Organic Home Gardening Project

The BFU continued to provide support to the participants who benefitted training within the project in the 13 different sites across the island as follows: Union Park (40); St Julien (40);

Panchvati (15); La Gaulette (35); Amaury (35); Surinam (45); Coteau Raffin (50); Quatre Bornes – Pavillon (55); Rivière des Creoles (40); Rose Hill (78); Ferney (51) Paroisse St Jean (72); and Mon Gout (31).

Certification of FAREI MFs and Pamplémousses Organic Research Station

Flacq Model Farm, Rivière Des Anguilles Model Farm and Pamplémousses Organic Research Station have been successfully certified organic for the European standards by Ecocert, as from June 2022.

Compost units

Compost is the very essence in the production of organic vegetables and fruits. BFU has designed, with the help of engineering division, two models of compost units for Flacq and Rivière dea Anguilles MFs. Construction at Flacq compost shed has been completed and is presently producing 1.5 tonnes of compost per month.



Compost unit under construction at Flacq MF

Training/Advice to Institutions

- Set up of organic farm and training at the State House
- Training and regular visits to Caritas Farms at Robinson Curepipe and Solitude/APEIM/Safire/Open Mind/Ferney Hub/Cascavelle
- Assistance to schools/colleges (La Confiance/BPS/Mayflower/Universal College and ANFEN network)
- Assistance to set up community gardens regionwide
- Promoting Organic Home Gardening throughout the country.

BFU activities July 2021 to June 2022

8 group meeting, 10 demonstrations, 4 regular trainings and 2 talks were held and were attended by a total of 318 persons.

Britannia Organic Zone

As at June 2022, Smart Biofarming Ltd, Moringa Mru and OT Greenhouse Organic Farm ceased their activities. Lavani International Ltd was allocated plot 5 for extension of its activities. The average annual production is estimated at 10 tonnes organic vegetables and fruits. The status of activities for the 7 occupants are as per table below.

No	Farm	Plot No	Acreage (ha)	Production	Remarks
1	Mega Organic Farming	6	1.68	Banana, greens, cabbage, herbs, passion fruit and roselle	Sheltered greenhouse 150m ² but damaged by cyclone
2	MN Safe Grow Co Ltd	12	2.1	Tomato, zucchini, squash, calabash, beet, cucumber, brinjal, butternut, cabbage, cauliflower, broccoli, coriander, carrot, shallot, greens, cauliflower	Sheltered greenhouse 2,880m ² Ecocert certified Two additional greenhouse constructed
3	CP Organic Farming Ltd	11	2.1	Greens, lady finger, calabash, brinjal, turnip, banana and mixed fruits	Sheltered greenhouse 150 m ² but damaged by cyclone, nursery 80m ² operational
4	Gefutur Co Ltd	9	2.1	Banana and mixed fruit	greenhouse still under construction 4,000m ²
5	Lavani International Ltd	7&5	2.1 + 1.5	Tomato, Ladyfinger, greens, ginger, chilli, brinjal, ginger, cassava, chouchou, colacasia, beet, carrot, turnip	Sheltered greenhouse 1,357m ²
6	JRS Integrated Farms Ltd	13	2.1	Ladyfinger, turnip, greens, cucumber, squash, ginger, banana	Sheltered greenhouse 150m ² but damaged by cyclone
7	Phylak Organic Farming Ltd	2	2.1	Banana, greens, ginger, saffron, cassava, calabash, pumpkin, carrot, shallot	Sheltered greenhouse damage by cyclone

DeSIRA Initiative

The implementation of the activities within the DeSIRA (Development Smart Innovation through Research in Agriculture) progressed significantly following lifting of sanitary protocol. Consultants were recruited and scientific visits and trainings abroad were resumed.

Achievements/ Activities undertaken

- The services of a consultant, Mr Thirugnanasambandam Ramachandran from Chennai, India was enlisted for assistance in the production of button mushroom. He carried out a training on “Techniques of button mushroom Production” from 17 May 2022 to 26 May 2022. He also delivered a talk on “Prospects of button mushroom production in Mauritius at the Farmers Training School on 26 May 2022. Following the consultancy, Button mushroom was successfully produced.
- Setting up of: (i) Model Agroforestry plot, (ii) Soil, water and plant laboratory, (iii) new ruminant research facility, (iv) post-harvest and Agro processing facility (v) small livestock research unit.
- The construction of a composting shed and the construction of a nursery at Pamplemousses Organic Research Station have been completed.
- The contract for the installation of a photovoltaic system at Belle Mare Livestock Research Station has been awarded. Agreement has been signed with the CEB for connection to the grid system.
- Dairy type goats were procured under the project and presently being kept at Curepipe Livestock Research Station for research work.
- The contract for the supply of a vertical farming unit was awarded. Civil work initiated on site and completion is expected before end of 2022.
- Ten units of I-Metos Automatic Weather Station (AWS) fully equipped with solarimeter, soil moisture sensors and disease forecasting facility were received in December 2021. Automatic weather station (I Metos) have been procured from Austria.
- The Pig Back fat scanner was commissioned and will be a useful tool to determine leanness of pork and help to develop a grading system for pig carcass quality. This will enable farmers to meet the requirements of processors.
- Novel irrigation systems (KSNM spray irrigation and KSNM drip irrigation) were installed in field.
- 15 units of the SF2 Future pump solar water pumping system have been procured from India. 1 unit of the future pump with drip irrigation has been installed at Wooton Crop Research Station.
- Two new litchi varieties namely Fayzeesui and Red Garnet were introduced from Agricultural Research Council of South Africa for evaluation purposes.
- Training Abroad:
 - (a) Mr A. Ellapen attended the Green Tech Event in Amsterdam from 14 to 16 June 2022.

(b) Mrs B.Dussoruth proceeded to Red Sun Hortitech Perfect Plants , South Africa from 16 to 21 May 2022 for a study tour on Macadamia and Avocado.



Use of Pig Back Fat scanner for evaluation of body fat

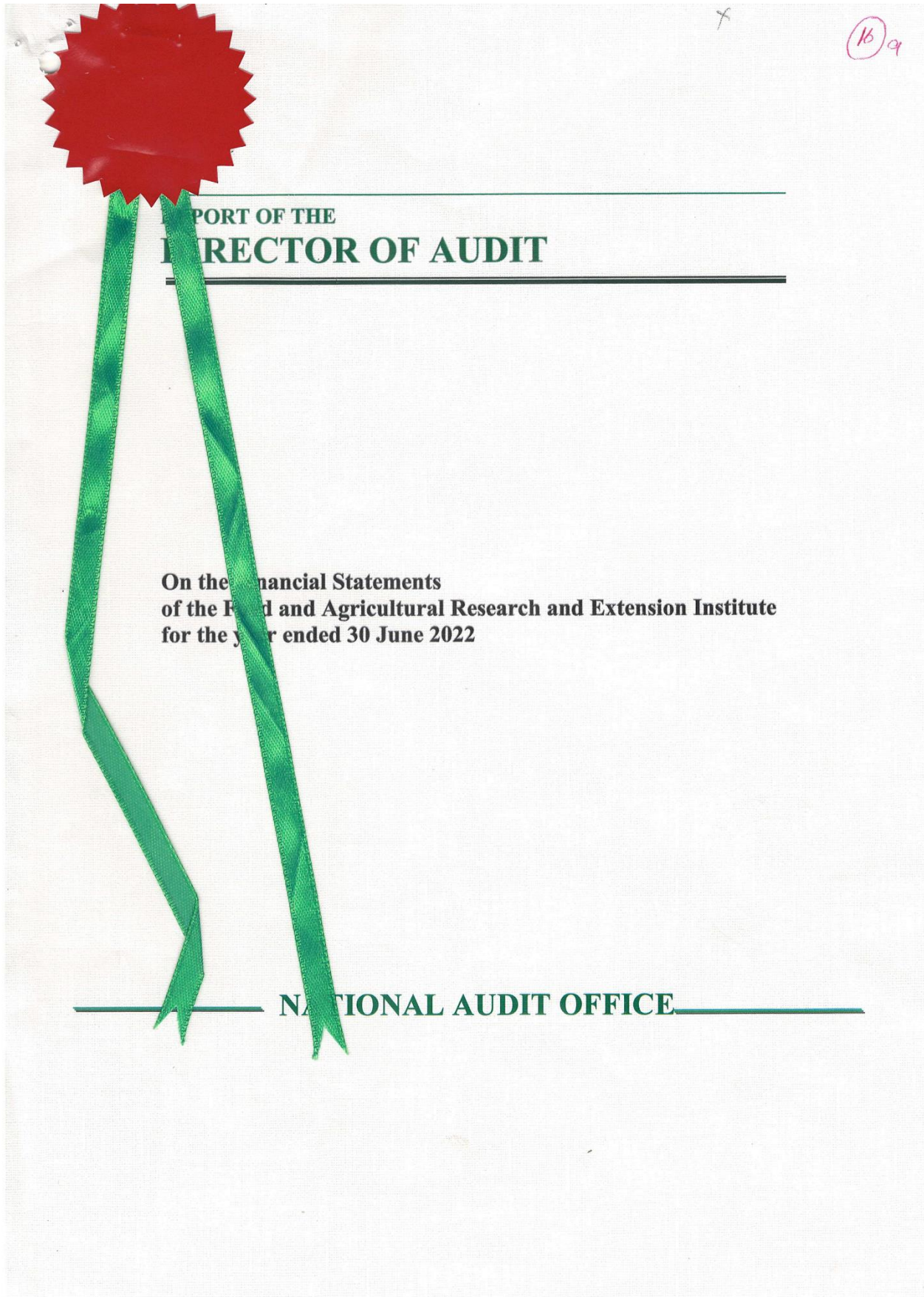


KNSM Spray Irrigation System in farmers' field



Electric fencing

**Section 5: Report of the Director of Audit and
Financial Statements for year ended 30 June 2021**





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

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 2022 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, 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 2022, and of its financial performance and cash flows for the year then ended in accordance with International Public Sector Accounting Standards (IPSAS).

Basis for Opinion

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 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.

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 728,818,013 as at 30 June 2022 as compared to a deficit of Rs 551,407,451 as at 30 June 2021.

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 auditor's 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 International Public Sector Accounting Standards (IPSAS), 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 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:

- (a) the Food and Agricultural Research and Extension Institute has complied with the Statutory Bodies (Accounts and Audit) Act; and
- (b) no direction relating to the accounts has been issued by the responsible Minister to Food and Agricultural Research and Extension Institute.

Based on my examination of the accounts of the Food and Agricultural Research and Extension Institute, nothing has come to my attention that causes me to believe that:

- (a) any 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.

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.



C. ROMOOAH
Director of Audit

National Audit Office
Level 14,
Air Mauritius Centre
PORT LOUIS


2 May 2023


STATEMENT OF FINANCIAL POSITION AS AT 30 JUNE 2022

	Notes	Year Ended June 2022 Rs	Year Ended June 2021 Rs
ASSETS			
Current Assets			
Cash and cash equivalents	6	146,983,591	189,858,760
Receivables	7	9,865,824	8,918,466
Work in progress	8	15,594,153	4,008,185
Prepayments	9	249,229	1,349,406
		<u>172,692,797</u>	<u>204,134,817</u>
Non-current assets			
Receivables	10	20,923,580	41,869,657
Property, plant and equipment	11	79,689,709	82,756,572
Intangible Assets	12	152,655	228,170
		<u>100,765,944</u>	<u>124,854,399</u>
Total assets		<u>273,458,741</u>	<u>328,989,216</u>
LIABILITIES			
Current liabilities			
Payables	13	6,391,373	15,246,360
Car loan payable	14	8,184,092	7,443,463
Employee benefit	15	16,847,471	15,322,106
Liabilities recognized under transfer arrangements	19	162,440,459	175,426,247
		<u>193,863,395</u>	<u>213,438,175</u>
Non-Current Liabilities			
Employee benefit	16	150,943,879	153,050,340
Car loan payable	17	20,546,410	21,315,271
Defined pension benefit	18	623,996,980	478,029,433
Liabilities recognized under transfer arrangements	19	12,926,090	14,563,447
		<u>808,413,359</u>	<u>666,958,491</u>
Total liabilities		<u>1,002,276,754</u>	<u>880,396,667</u>
Net liabilities		<u>(728,818,013)</u>	<u>(551,407,451)</u>
NET ASSETS / EQUITY			
General fund		<u>(728,818,013)</u>	<u>(551,407,451)</u>
Total net assets / equity		<u>(728,818,013)</u>	<u>(551,407,451)</u>

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

Approved by the Board on 28 April 2023


H Woodun
Chairman FAREI Board


S Sobgrun (Mrs)
Board Member

**STATEMENT OF FINANCIAL PERFORMANCE FOR THE YEAR ENDED
30 JUNE 2022**

	Notes	Year Ended June 2022 Rs	Year Ended June 2021 Rs
Revenue			
Revenue from non-exchange transactions			
Transfers from government	20	394,339,272	438,332,679
Transfers from other entities	21	13,747,506	10,412,706
Revenue from exchange transactions			
Sales of produce and rendering of services	22	10,923,977	10,926,207
Other Revenue	23	-	6,168,066
Total Revenue		<u>419,010,755</u>	<u>465,839,658</u>
Expenses			
Salaries and employee benefits	24	341,941,603	380,026,420
Supplies and consumables	25	43,979,589	40,907,104
Depreciation and amortisation	26	16,096,886	15,031,359
Other expenses	27	61,824,443	82,964,288
Total Expenses		<u>463,842,521</u>	<u>518,929,171</u>
Deficit for the year		<u>(44,831,766)</u>	<u>(53,089,513)</u>

STATEMENT OF CHANGES IN NET ASSETS / EQUITY FOR THE YEAR ENDED 30 JUNE 2022

	Rs
General fund	
Balance as at 01 July 2020	(395,956,210)
Prior year adjustment	222,976
Restated opening balance as at 1 July 2020	<u>(395,733,234)</u>
Remeasurement of Employee Benefit: IPSAS 39	(102,584,704)
Deficit for the period	<u>(53,089,513)</u>
Closing balance at 30 June 2021	<u><u>(551,407,451)</u></u>
Balance as at 01 July 2021	(551,407,451)
Remeasurement of Employee Benefit: IPSAS 39	(132,578,796)
Deficit for the period	<u>(44,831,766)</u>
Closing balance at 30 June 2022	<u><u>(728,818,013)</u></u>

CASH FLOW STATEMENT FOR THE YEAR ENDED 30 JUNE 2022

	Notes	Year Ended June 2022 Rs	Year Ended June 2021 Rs
CASH FLOW FROM OPERATING ACTIVITIES			
Deficit for the year		(44,831,766)	(53,089,513)
Non-cash movements			
Depreciation for the year		16,021,371	14,954,836
Amortisation of intangible asset		75,515	76,523
Exchange (gain)/loss		3,458,593	(6,168,066)
(Gain) / Loss on disposal of fixed assets		-	(283,759)
Increase / (Decrease) in defined pension benefit		13,388,750	5,011,565
(Increase) / Decrease in receivables		21,098,896	(24,379,504)
Increase / (Decrease) in payables		(23,506,365)	17,227,214
Increase / (Decrease) in employee benefit		(581,095)	81,421,016
Net cash flows from operating activities		(14,876,101)	34,770,313
CASH FLOW FROM INVESTING ACTIVITIES			
Purchase of property, plant and equipment	b	(12,954,507)	(23,842,387)
Purchase of intangible assets		-	(89,015)
Increase in work in progress		(11,585,968)	(1,877,583)
Proceeds from disposal of fixed assets		-	283,759
Net cash flows from investing activities		(24,540,475)	(25,525,226)
CASH FLOWS FROM FINANCING ACTIVITIES			
Exchange (gain)/loss		(3,458,593)	6,168,066
Loan received from Ministry		8,117,000	13,501,940
Loan repaid to Ministry		(8,103,510)	(8,254,087)
Loan release to staff		(8,117,000)	(13,501,940)
Loan refunded by staff		8,103,510	8,254,087
Net cash flow from financing activities		(3,458,593)	6,168,066
Net increase in cash and cash equivalents		(42,875,169)	15,413,152
Cash and cash equivalents at the beginning of the year		189,858,760	174,445,608
Cash and cash equivalents at end of the year	a	146,983,591	189,858,760

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	146,958,157	189,801,811
Cash in hand	25,434	56,949
	<u>146,983,591</u>	<u>189,858,760</u>

b. Property, plant and equipment

During the financial year ended 30 June 2022, FAREI acquired property, plant and equipment amounting to Rs12,954,507 which was financed by cash. A total of Rs1,112,925 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 2022**

	Revised Budget Rs	Actual Amount Rs	Accruals Rs	Prepayment Rs	Financial Statement Rs
Revenue					
Government Grant	315,500,000	408,086,778	-	-	408,086,778
Other Income	<u>10,000,000</u>	<u>10,923,977</u>			<u>10,923,977</u>
	<u>325,500,000</u>	<u>419,010,755</u>	-	-	<u>419,010,755</u>
Expenditure					
Salaries and other related costs	228,131,435	230,969,476	2,555,326	-	233,524,803
Pension cost (SICOM)	56,352,951	57,181,267	13,388,753	-	70,570,020
Passage benefits	4,000,000	5,244,055	3,351,578	-	8,595,633
Travelling and transport	28,500,000	28,717,891	533,257	-	29,251,148
Office expenses	2,800,010	3,486,796	20,090	-	3,506,886
Utilities	6,600,000	7,974,762	1,093,270	-	9,068,032
Rent	987,312	1,089,623		48,000	1,041,623
Maintenance and running cost of vehicles	3,500,000	4,221,276	28,900	-	4,250,176
Maintenance of building and equipment	3,000,000	5,484,235	29,559	-	5,513,793
Training	900,000	405,796	364,001	-	769,797
Information technology facilities	500,000	580,535	515	153,481	427,570
Uniform and protective clothing	2,000,000	2,161,770	-	-	2,161,770
Nursery and laboratory consumables	300,000	1,709,916	15,016	-	1,724,932
Security services	8,450,000	7,619,826	-	-	7,619,826
Other operating expenses (animal feed, fertiliser, seeds, etc)	16,850,000	20,591,914	197,386	-	20,789,300
Schemes	0	43,418,279	-	-	43,418,279
Insurance non-motor	500,000	452,216	-	17,748	434,468
Legal and professional fee	475,000	1,166,998	-	30,000	1,136,998
Chairman and board members fee	450,000	481,987	-	-	481,987
Total expenditure	364,296,708	422,958,619	21,577,650	249,229	444,287,041

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

STATEMENT OF COMPARISON OF BUDGET AND ACTUAL AMOUNTS

FOR THE YEAR ENDED 30 JUNE 2022

	Original Budget	Revised Budget	Actual Received/Paid	Difference Revised Budget and Actual	Remarks
	Rs	Rs	Rs		
Revenue					
Government Grant	315,500,000	315,500,000	408,086,778	(92,586,778)	Receipt of grant for schemes
Other Income	10,000,000	10,000,000	10,923,977	(923,977)	Favourable variance generated from sales and release of funds for implementation of project from donor agencies
	325,500,000	325,500,000	419,010,755		
Expenditure					
Salaries and other related costs	216,165,900	228,131,435	230,969,476	(2,838,041)	Savings arising due to retirement of officers and non filling of vacancies.
Pension cost (SICOM)	56,352,951	56,352,951	57,181,267	(828,316)	Increase due to implementation of CSG
Passage benefits	5,000,000	4,000,000	5,244,055	(1,244,055)	Increase in cashing of passage extended to house improvement
Travelling and Transport	28,500,000	28,500,000	28,717,891	(217,891)	
Office Expenses	10	2,800,010	3,486,796	(686,786)	Budgeted amount under stated
Utilities	10	6,600,000	7,974,762	(1,374,762)	Budgeted amount under stated
Rent	10	987,312	1,089,623	(102,311)	additional rent charged by MCIA for sub offices
Maintenance & Running cost vehicles	10	3,500,000	4,221,276	(721,276)	Budgeted amount underestimated, increase in fuel price
Maintenance of Building & Equipment	10	3,000,000	5,484,235	(2,484,235)	Budgeted amount under stated
Training	10	900,000	405,796	494,204	
Information Technology Facilities	10	500,000	580,535	(80,535)	Overspent due to prepayment

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

Uniform and protective clothing	10	2,000,000	2,161,770	(161,770)	Additional items had to be purchased to replace damaged protective equipment and also to cater for health and safety requirement
Nursery & Laboratory consumables	10	300,000	1,709,916	(1,409,916)	Budgeted amount understated
Security services	10	8,450,000	7,619,826	830,174	Losses and absenteeism were recouped from fee
Other operating expenses (animal feed, fertilizer, seeds, etc)	9,480,989	16,850,000	20,591,914	(3,741,914)	Budgeted amount understated
Schemes	10		43,418,279	(43,418,279)	Budgeted by the Ministry and implemented by FAREI
Insurance non-motor	10	500,000	452,216	47,784	
Legal & Professional Fee	10	475,000	1,166,998	(691,998)	Budget was underestimated for audit fee, selection panel and bid evaluation committee members
Chairman and Board members fee	10	450,000	481,987	(31,987)	Increase in the number of meetings and sub-committees
Total Expenditure		315,499,980	422,958,619	(58,661,911)	

NOTES TO THE ACCOUNT FOR YEAR ENDED 30 JUNE 2022

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 comprise of:

- 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

- f.** The Cash Flow Statement is prepared using indirect method.

g. 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 2022 and in future periods will have no material impact on the Financial Statements.

h. 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 amounts of advances are 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. 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).

f. 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.

g. 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.

h. Employee Benefits

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

i. Defined Pension Benefit

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 Pension Benefit 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 18).

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 Generalisee (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 2022. The balance of banked sick leave is valued at the end of the financial year and is recognized as long term payables. Beyond this 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.

i. 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 (See note 29)

j. 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.

k. 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.

l. 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.

m. 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 2021 to 30 June 2022.

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 Rs350,000 under the purchase of equipment 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>	<p>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.</p> <p>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.</p>
<i>Legal and Reaulatorv 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 June 2022 Rs	Year Ended June 2021 Rs
6. CASH AND CASH EQUIVALENTS		
Cash at Bank	146,958,157	189,801,811
Cash in hand	25,434	56,949
	<u>146,983,591</u>	<u>189,858,760</u>
7. RECEIVABLES – CURRENT ASSETS		
Debtors - car loan	8,184,092	7,443,463
Sundry debtors	96,715	6,206
Debtors - chargeable services	1,585,017	1,468,797
	<u>9,865,824</u>	<u>8,918,466</u>
8. WORK IN PROGRESS		
This relates to on-going infrastructure works		
Changing room and conversion of ex-quarter into office at Curepipe LRS	153,320	-
Payroll and HR system	285,604	114,241
Construction of building Head Office and Wooton	14,686,377	3,394,522
Construction of garage at Richelieu	150,020	109,300
Rooftop rainwater harvesting structure	242,636	-
Irrigation system	-	238,463
Conversion of container Réduit	-	125,925
Setting-up nursery and compost Unit at Flacq	76,196	25,734
	<u>15,594,153</u>	<u>4,008,185</u>
9. PREPAYMENT		
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	17,748	1,109,838
Rent	48,000	45,000
Maintenance Contract	153,481	194,568
Legal and professional fee	30,000	-
	<u>249,229</u>	<u>1,349,406</u>
10. RECEIVABLES – NON-CURRENT ASSETS		
Grant receivable from MAIFS	377,193	20,554,409
Debtors-car loan falling due more than one year	20,546,387	21,315,248
	<u>20,923,580</u>	<u>41,869,657</u>

11. PROPERTY, PLANT AND EQUIPMENT

	Buildings Rs	Furniture and Fittings Rs	Office Equipment Rs	Computer Hardware Rs	Infrastructure Assets Rs	Motor Vehicle and Heavy Duty Field Equipment Rs	Laboratory Furniture, Fittings and Equipment Rs	Fog Unit and Polycarbonate and Hydroponic Greenhouse Rs	Food Processing and PCR Laboratory Rs	Light Field Equipment Rs	Total Rs
Cost and Valuation											
At cost as at 01 July 2021	40,604,271	8,978,308	7,970,849	6,927,748	29,770,582	41,293,891	19,084,218	28,720,971	3,307,264	6,404,995	193,063,096
Additions	463,450	389,465	1,793,219	1,781,569	1,112,925	-	3,007,096	1,876,807	14,375	2,515,601	12,954,507
Disposal	-	(321,292)	(295,114)	(257,291)	-	-	(3,274,699)	-	(25,185)	(1,123,304)	(5,296,885)
At cost as at 30 June 2022	41,067,721	9,046,481	9,468,954	8,452,026	30,883,507	41,293,891	18,816,615	30,597,778	3,296,454	7,797,292	200,720,719
Depreciation											
Depreciation as at 01 July 2021	12,017,185	5,775,798	5,470,111	5,526,084	5,414,114	32,184,129	15,644,536	24,100,992	1,173,385	3,000,189	110,306,524
Change for the year	817,493	330,147	1,003,679	796,880	3,000,198	4,421,698	1,404,372	2,412,397	488,734	1,345,772	16,021,371
Eliminated on disposal	-	(321,292)	(295,114)	(257,291)	-	-	(3,274,699)	-	(25,185)	(1,123,304)	(5,296,885)
Depreciation as at 30 June 2022	12,834,678	5,784,653	6,178,676	6,065,673	8,414,312	36,605,827	13,774,209	26,513,390	1,636,934	3,222,657	121,031,010
Carrying Amount											
As at 30 June 2022	28,233,043	3,261,828	3,290,278	2,386,353	22,469,195	4,688,064	5,042,406	4,084,388	1,659,520	4,574,635	79,689,709
As at 30 June 2021	28,587,086	3,202,510	2,500,738	1,401,664	24,356,467	9,109,762	3,439,682	4,619,979	2,133,879	3,404,806	82,756,572

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

		Year Ended June 2022 Rs	Year Ended June 2021 Rs
12. INTANGIBLE ASSETS – SOFTWARE COSTS			
Software costs are capitalized in accordance with the provisions of IPSAS 31			
At cost as at 01 July 2021		701,826	2,808,932
Additions		-	89,015
Disposal		-	(2,196,121)
At cost as at 30 June 2022		<u>701,826</u>	<u>701,826</u>
Amortisation as at 01 July 2021		473,656	2,593,255
Amortisation for the year		75,515	76,522
Eliminated on disposal		-	(2,196,121)
Amortisation as at 30 June 2022		<u>549,171</u>	<u>473,656</u>
Written down value as at 30 June 2022		<u>152,655</u>	<u>228,170</u>
13. PAYABLES			
Creditors falling due within one year		626,600	989,016
Accruals		5,764,773	14,257,344
		<u>6,391,373</u>	<u>15,246,360</u>
14. CURRENT PORTION OF LONG TERM BORROWING			
Car loan falling due within one year		<u>8,184,092</u>	<u>7,443,463</u>
15. EMPLOYEE BENEFIT			
Sick Leave	16(a)	7,308,107	5,494,621
	16(b)		
Passage Benefits)	8,338,057	9,511,109
Vacation Leave	16(c)	1,201,307	316,376
		<u>16,847,471</u>	<u>15,322,106</u>
16. EMPLOYEE BENEFIT (LONG TERM)			
Provision for sick leave	16(a)	64,737,381	63,954,634
	16(b)		
Provision for passage benefits)	15,484,963	17,663,489
Provision for vacation leave	16(c)	70,721,535	71,432,217
		<u>150,943,879</u>	<u>153,050,340</u>
16(a) Provision for sick leave			
Opening balance		69,449,255	65,167,693
Less: Payment during the year		(8,391,175)	(2,412,801)
Add: Provisions for the year		10,987,408	6,694,363
Closing balance		<u>72,045,488</u>	<u>69,449,255</u>
Less: Amount falling due within one year		7,308,107	5,494,621
Amount falling due more than one year		<u>64,737,381</u>	<u>63,954,634</u>
16(b) Provision for passage benefits			
Opening balance		27,174,598	21,783,738

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

	Year Ended June 2022 Rs	Year Ended June 2021 Rs
Less: Payment during the year	(11,947,211)	(2,296,432)
Add: Provisions for the year	8,595,633	7,687,292
Closing balance	23,823,020	27,174,598
Less: Amount falling due within one year*	8,338,057	9,511,109
Amount falling due more than one year	15,484,963	17,663,489
* It is assumed 35% of the provision shall be payable within one year		
16(c) Provision for vacation leave		
Opening balance	71,748,593	-
Less: Payment during the year	(721,229)	-
Add: Provisions for the year	895,478	
Closing balance	71,922,842	71,748,593
Less: Amount falling due within one year	(1,201,307)	(316,676)
Amount falling due more than one year	70,721,535	71,432,217
17. LONG TERM BORROWING		
Car loan amount falling due more than one year	20,546,410	21,315,271
18. DEFINED PENSION BENEFIT		
Employee benefit	623,996,980	478,029,433
Employee benefit statement as per IPSAS 39		
Amounts recognised in statement of financial position at end of year		
Defined benefit obligation	1,106,818,618	952,259,738
Fair value of plan assets	(482,821,638)	(474,230,305)
Liability recognized in statement of financial position at end of year	623,996,980	478,029,433
Amounts recognised in statement of financial performance:		
Service cost:		
Current service cost	33,896,009	29,873,598
Past service cost	-	-
(Employee contributions - FAREI)	(10,913,852)	(9,360,160)
(Employee contributions - MCIA)	-	(30,206)
Fund expenses	901,671	785,970
Net interest expense / (revenue)	23,674,628	13,432,397
P & L charge	47,558,456	34,701,599
Remeasurement		
Liability (gain) / loss	108,158,024	116,416,586
Assets (gain) / loss	24,420,770	(13,831,882)
Net assets / equity (NAE)	132,578,794	102,584,704
Total	180,137,250	137,286,303

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

	Year Ended June 2022 Rs	Year Ended June 2021 Rs
Movements in liability recognized in financial position:		
At start of year	478,029,433	370,433,164
Amount recognized in P&L	47,558,456	34,701,599
(Actuarial Reserves transferred in)	-	-
(Past service funding)	-	-
(Contributions paid by employer - FAREI)	(34,169,703)	(29,629,622)
(Contributions paid by employer - MCIA)	-	(60,412)
Amount recognized in NAE	132,578,795	102,584,704
At end of year	623,996,981	478,029,433

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	952,259,738	809,859,534
Current service cost	33,896,009	29,873,598
Interest cost	47,612,987	29,559,873
(Benefits paid)	(35,108,140)	(33,449,853)
Liability (gain)/loss	108,158,024	116,416,586
Present value of obligation at end of period	1,106,818,618	952,259,738

Reconciliation of fair value of plan assets

Fair value of plan assets at start of period	474,230,305	439,426,370
Expected return on plan assets	23,938,359	16,127,476
Employer contributions - FAREI	34,169,703	29,629,622
Employee contributions - FAREI	10,913,852	60,412
Employer contributions - MCIA	-	9,360,160
Employee contributions - MCIA	-	30,206
(Benefits paid + other outgo)	(36,009,811)	(34,235,823)
Asset gain/(loss)	(24,420,770)	13,831,882
Fair value of plan assets at end of period	482,821,638	474,230,305

Distribution of plan assets at end of period

<i>Percentage of assets at end of year</i>	%	%
Fixed interest securities and cash	58.0	54.8
Loans	2.9	2.8
Local equities	13.6	11.8
Overseas bonds and equities	25.0	30.1
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

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

	Year Ended June 2022 Rs	Year Ended June 2021 Rs
Property occupied by the entity	0	0
Other assets used by the entity	0	0

Components of the amount recognized in NAE

Year	30 June 2022	30 June 2021
Currency	Rs	Rs
Assets experience gain / (loss) during the period	(24,420,770)	13,831,882
Liability experience gain / (loss) during the period	<u>(108,158,024)</u>	<u>(116,416,586)</u>
	(132,578,794)	(102,584,704)

Year	2022/23
Expected employer contributions	33,823,145

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 June 2022 %	Year Ended June 2021 %
Discount rate	5.35	5.00
Future salary increases	3.50	3.00
Future pension increases	2.50	2.00
Mortality before retirement	Nil	
Mortality in retirement	PA (90) Tables rated down by 2 years	
Retirement age	65 years	

The discount rate is determined by reference to market yields on bonds.

Significant actuarial assumptions for determination of the defined benefit obligation are discount rate, expected salary increase and mortality. The sensitivity analyses below have been determined based reasonably on possible changes of the assumptions occurring at the end of the reporting period.

- If the discount rate would be 100 basis points (one percent) higher (lower), the defined benefit obligation would decrease by Rs157.5M (increase by Rs198.3M) if all other assumptions were held unchanged.

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

	Year Ended June 2022 Rs	Year Ended June 2021 Rs
- If the expected salary growth would increase (decrease) by 1%, the defined benefit obligation would increase by Rs99.5M (decrease by Rs86.9M) if all assumptions were held unchanged.		
- If life expectancy would increase (decrease) by one year, the defined benefit obligations would increase by Rs31.5M (decrease by Rs31.3M) if all assumptions were held unchanged.		

In reality one might expect interrelationships between the assumptions, especially between discount rate and expected salary increases, given that both depend to a certain extent on expected inflation rates. The analysis above abstracts from these interdependence between the assumptions.

	Year Ended June 2022 Rs	Year Ended June 2021 Rs
19. LIABILITIES RECOGNISED IN RESPECT OF TRANSFERS		
FAREI received advances from the Government and other institutions for the implementation of projects and payment of schemes to beneficiaries. As at 30 June 2022 there were on-going projects and outstanding claims due to beneficiaries.		
Opening balance	189,989,694	188,923,276
Receipts	90,148,433	85,877,859
	280,138,127	274,801,135
Expenses	(104,771,578	(84,811,441)
)	
Closing balance	175,366,549	189,989,694
Current liabilities	162,440,459	175,426,247
Non-current liabilities	12,926,090	14,563,447
	175,366,549	189,989,694
20. REVENUE FROM NON-EXCHANGE TRANSACTIONS:		
TRANSFERS FROM GOVERNMENT		
Recurrent Grant	333,315,200	353,964,359
Schemes and projects	61,024,072	84,368,320
	394,339,272	438,332,679
21. REVENUE FROM NON-EXCHANGE TRANSACTIONS:		
TRANSFERS FROM OTHER INSTITUTIONS		
DeSIRA-EU funded project	11,418,544	10,055,884
UNDP	1,725,684	-
Small Grant Scheme Australia	8,625	37,250
CIAT	594,653	319,572
	13,747,506	10,412,706

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

	Year Ended June 2022 Rs	Year Ended June 2021 Rs
REVENUE FROM EXCHANGE TRANSACTIONS		
22. SALES OF PRODUCE AND RENDERING OF SERVICES		
Sales of guide agricole	103,937	245,368
Sales of animals	1,852,284	1,498,234
Sales of vegetables and produce	3,671,568	4,281,066
Sales of milk and manure	3,774,582	3,160,640
Revenue from testing and diagnosis	420,735	318,125
Training and registration fee	265,750	491,026
Sundry Income	835,121	647,989
Gain on disposal of fixed assets	-	283,759
	<u>10,923,977</u>	<u>10,926,207</u>
23. OTHER REVENUE		
Exchange gain	-	6,168,066
24. SALARIES AND EMPLOYEE BENEFITS		
Salaries and other benefits	24(a) 242,120,435	300,152,770
Employer's contribution		
- Defined pension contribution (DPC)	47,558,456	34,641,187
- Pension contribution ex. MCI A	-	60,412
- Defined contribution scheme	2,896,694	2,365,894
- Civil Service Family Protection Scheme	678,412	607,636
- SICOM Family Protection Scheme	3,297,330	2,807,339
- NPF / EWF / Levy / CSG	16,139,128	11,860,706
Travelling and Transport	29,251,148	27,530,476
	<u>341,941,603</u>	<u>380,026,420</u>
24(a) Salaries and employee benefits		
Salaries	197,366,342	188,378,723
Acting allowance	616,472	421,142
Extra remuneration	1,914,279	1,743,978
Overtime	3,170,470	3,156,482
Other allowance	1,757,173	2,996,147
End of year bonus	16,520,349	14,910,752
Retirement / death benefits	925,478	73,468,607
Passage benefits	8,595,633	8,097,546
Sick leave	10,987,408	6,687,390
Gratuity	266,831	292,004
	<u>242,120,435</u>	<u>300,152,770</u>

Food and Agricultural Research and Extension Institute
Annual Report 2021/2022

	Year Ended June 2022 Rs	Year Ended June 2021 Rs
25. SUPPLIES AND CONSUMABLES		
Office expenses	2,853,508	2,794,562
Electricity, water and telephone	9,068,032	7,391,190
Maintenance and running of vehicles	4,250,176	4,025,163
Repairs and maintenance	5,513,793	5,174,563
Uniforms and protective clothing	2,161,770	2,437,067
Apparatus and supplies of laboratory	1,724,932	861,685
On farm trial	3,347,176	5,609,012
Other operating expenses	2,317,655	1,906,918
Seeds and plantlets	1,487,507	1,499,670
Cowfeed, drug and fodder	7,870,918	6,887,591
Fertilisers and pesticides	2,439,206	1,663,893
Small tools and equipment	944,916	655,790
	<u>43,979,589</u>	<u>40,907,104</u>
26. DEPRECIATION AND AMORTISATION		
Depreciation (Note 11)	16,021,371	14,954,836
Amortisation (Note12)	75,515	76,523
Depreciation	<u>16,096,886</u>	<u>15,031,359</u>
27. OTHER EXPENSES		
Office expenses and incidental	1,080,948	449,566
Rent (Note 28)	1,041,623	1,022,304
Training of staff	518,525	180,315
Training of farmers	251,272	230,837
Security services	7,619,826	8,213,313
Miscellaneous expenses	543,106	805,686
Legal and professional fees	1,136,998	734,650
Board members fees	481,987	539,990
Contribution to local organisation	1,268,863	23,940
Open Day and other celebrations	341,515	414,445
Insurance	434,468	416,138
Books and publications	8,558	8,006
Exchange loss	3,458,593	-
Schemes	43,418,279	69,699,522
IAEA expenses	219,882	225,576
	<u>61,824,443</u>	<u>82,964,288</u>

28. OPERATING LEASE

Rent is paid for rental of office space as follows:

- a. Extension head office at St Pierre: 500 m²
- b. Goodlands sub-office: 27.2 m²
- c. Petite Rivière sub-office: 150 ft²
- d. Vacoas sub-office: 53.75 m²
- e. Long Mountain sub-office: 40.05 ft²
- f. Beau Champs sub-office: 16.17 m²
- g. Rivière du Rempart sub-office: 22.42 m²

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

Up to one year	1,041,623	1,022,304
After one year and before five years	665,900	455,575
	1,707,523	1,477,879

29. KEY MANAGEMENT PERSONNEL COMPENSATION

The compensation paid to key management personnel is based on the recommendation of the Pay Research Bureau Report and is included in salaries and benefit.

The key management personnel of FAREI comprised the Chief Executive Officer and Assistant Directors.

Key management personnel emoluments:

Year ended 30 June 2021	6,662,633	(
Year ended 30 June 2022	5,765,490)

30. CONTINGENT LIABILITIES

Pending Litigation

As at 30 June 2022, 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 2022, the FAREI provided a guarantee in favour of the Mauritius Revenue Authority for the issue of a license to operate still at the Plant Pathology Laboratory and the Soil Laboratory for Rs10,000 respectively.

31. EVENTS AFTER REPORTING DATE – IPSAS 14

There were no events after 30 June 2022 that would affect the financial position of FAREI.

Section 6: Publications

- Technical bulletins

15 Technical bulletins were published

- Booklets

2 booklets are at editing stage

- Litchi in Mauritius
- Egg production in Mauritius

- Recommendation / Fact Sheet

Eight publications were produced on the following topics and released to meet information needs of agro-entrepreneurs and farmers:

1. Chilli variety Bandhai F1
2. Promising tomato varieties (NS7043, NS 1315, NS 626, Hero and Jarrah F1)
3. Tomato variety TH N 988
4. Short day hybrid onion variety Askari
5. Green pea variety Green Beauty
6. Edible podded pea variety Sweet Snow Pea
7. Colocasia variety PNG13 and the herbicide pendimethalin were published in 2021
8. The use of herbicide pendimethalin for weed control in asparagus, carrot, bean, leek, groundnut, soyabean and transplanted onion

- Scientific papers

1. Management of the Fall army worm, *Spodoptera frugiperda* (Smith) in Mauritius. M.J. Caphane Victoire and D. Lalsing 2021. Book of Abstracts. Virtual Research Week of the University of Mauritius. 8-12 November 2021.
2. First report of *Tomato mottle mosaic virus* on tomato in Mauritius. *New Disease Reports*. Vol. 44, issue 2: 2021. P62
<https://sites.uom.ac.mu/rw2021/images/FILES/VRW21BookAbstracts.pdf>. M Maudarbaccus, K. Lobin, A. Gungoosingh Bunwaree and W.Menzel (2021)
<https://doi.org/10.1002/ndr2.12041>
3. "Diversity and Geographical Structure of *Xanthomonas citri* pv. *citri* on Citrus in the South West Indian Ocean Region." Diversity and geographical structure of *Xanthomonas citri* pv. *citri* on citrus in the South West Indian Ocean Region. *Microorganisms*, 9(5), p.945. Pruvost, O., Richard, D., Boyer, K., Javegny, S., Boyer, C., Chiroleu, F., Grygiel, P., Parvedy, E., Robène, I., Lobin, K.K., Maillot-Lebon, V. and Hamza, A., 2021.
4. "Draft genome sequences of 284 *Xanthomonas citri* pv. *citri* strains causing Asiatic citrus canker". *Microbiology Resource Announcements*, 10(1), pp.e01024-20. Richard, D., Rieux, A., Lefeuvre, P., Hamza, A., Lobin, K.K., Naiken, M., Stravens, R., Boyer, C., Boyer, K., Javegny, S. and Pruvost, O., 2021.

5. Main producing and exporting countries: Mauritius. *Crop Watch Bulletin* - Quarterly Report on Global Crop Production, Vol 1, no.2 2021. A.Gungoosingh Bunwaree and Chang Sheng (2021). <http://cloud.cropwatch.com.cn/report/29771>
6. First report of Pineapple mealybug wilt-associated virus-1 and -2 associated with mealybug wilt disease of pineapple in Mauritius. *New Disease Reports*. Vol. 44 issue 1: 2021. A. Gungoosingh-Bunwaree, F. Maudarbaccus, D. Knierim, P. Margaria, S. Winter and W. Menzel (2021). <https://doi.org/10.1002/ndr2.12037>
7. Status of Pineapple Mealybug Wilt-associated Virus across Major Pineapple Growing Localities in Mauritius. UOM VRW 2021 Book of abstractsp 67. A. Gungoosingh Bunwaree, F. Maudarbaccus and W. Menzel (2021). <https://uom.ac.mu/rw2021/ /VRW21Book of Abstract>
8. First report of tomato yellow leaf curl virus infecting chilli and sweet pepper plants in Mauritius. Lobin, K.K., Booluck, K., Ramessur, I. and Taleb-Hossenkhan, N., 2021. *Journal of Plant Pathology*, pp.1-1
9. First report of banana freckle disease caused by *Phyllosticta cavendishii* in Mauritius. *New Diseases Reports* 45 (1). Vally, V., Maudarbaccus, F., Henderson, J., and O'Dwyer, C., 2022. <https://doi.org/10.1002/ndr2.12060>
10. Selection of local potato breeding clones for yield and tuber characteristics in two cropping seasons” was submitted by Mr Y. Cadessa and published in the *Indian Potato Journal: Volume 46 (2): page 149-162 (2020)*
11. Genotype – by – environment interaction for marketable tuber yield in advanced potato clones using AMMI and GGE methods was submitted by Mr Cadessa for publication to the *African Crop Science Journal* on 15 March 2021 and is under review.
12. Banana Sector in Mauritius- Status and Challenges. In *Bananas and Plantains: Leading-Edge Research and Development*. Jhurree-Dussoruth, B (2020). Vol. 1: Diversity, Improvement and Protection. India (Published in 2022).

- **Video**

Two short video clips were produced and posted on FAREI website as an additional means to enhance dissemination of technical information to the general public.

- Milk processing
- Judicious use of pesticides

- **Presentations**

1. Recent advances on biological control of key pests in Mauritius
2. Virtual oral presentation on 'Sustainable approach for the management of the tomato fruit fly, *Neoceratitis cyanescens* Bezzi in tomato cultivation' at the virtual Research Week of the University of Mauritius.
3. Presentation of the status of activities under Epibio project during videoconference of the COPIL Epibio.

4. Power point presentation on «Activities of FAREI PPD to support plant health and contribute towards zero hunger» in the context of the International Year of Plant Health (ITYPH) at Rajiv Gandhi Science Centre.
5. Presentation on Controlled Environment Greenhouse and Vertical Farming following study tour of Mr A Ellapen and Mr R Seewoogoolam in Italy under DeSIRA project for staff of FAREI.

Section 7: Senior Staff List from 01 July 2021 to 30 June 2022

CHIEF EXECUTIVE OFFICER	Seelavarn GANESHAN, BSc, MSc, PhD (Up to 03 September 2021)
Ag. CHIEF EXECUTIVE OFFICER	Micheline SEENEVASSEN PILLAY, BSc (With effect from 04 September 2021)
ASSISTANT DIRECTORS	
Livestock Research	Micheline SEENEVASSEN PILLAY, BSc
Extension and Training	S S AKhilandjee M GOOLAUB, BSc, MSc
Crops Research	Mala GUNGADURDOSS Lic & Maitrise
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	Fazal MAUDARBACCUS, BSc
• Entomology Division Principal Research Scientist	Lalini UNMOLE, DMS, BSc, PhD
• 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 Dip, BSc, MBA

EXTENSION AND TRAINING DEPARTMENT

- **Crop Extension**
Principal Extension Officer Mahmad Iqbal DAMOO, Dip. Agric.
- **Training Division**
Principal Extension Officer Dharmasdev DODLA BHEMAH Dip. Agric.
- **Livestock Extension**
Principal Extension Officer Arvind R S SHIMADRY BSc

TECHNICAL SUPPORT SERVICES

- **Biometry Section**
Principal Biometrician Rajendr K RAMNAUTH BSc, MSc
- **Engineering Section**
Principal Agricultural Engineer Vickram BUSSUNTH BEng
- **Business Development Section**
Research Scientist/
Senior Research Scientist Mahendre NATHOO DMS, BSc, MSc

ADMINISTRATION

- **Finance Section**
Manager, Finance Bhindoomatee RADHA, ACMA
- **Administrative Section**
Administrative Managers Suzy Dominique AUGUSTE, ACIS
Arti DUNPUTH, ACIS
- **Human Resource Section**
Ag. Human Resource Manager Bindeshwaree VEERAPEN, DMS, BSc
- **Procurement and Supply Section**
Stores Superintendent Veena Kumari HARDOWAR BSc (on leave without Pay from 01 November 2021 to 30 June 2022)

Section 8: Staff Missions, International On-line Meetings; Trainings / Workshops

MISSIONS

Marie Micheline Seenevassen Pillay

- Launching of the FAREI Antenna, Rodrigues, 04 June 2022 to 06 June 2022

Goolaub Sri Swami Akhilalandjee

- Launching of the FAREI Antenna, Rodrigues, 03 June 2022 to 07 June 2022

Dobee Bhednundun

- Launching of the FAREI Antenna, Rodrigues, 03 June 2022 to 07 June 2022

Devika Saddul

- Launching of the FAREI Antenna, Rodrigues, 03 June 2022 to 07 June 2022

MEETING

Mohammad Noor Ehsan Newaz Gobindram

- CCARDESA Special Board Meeting, South Africa, from 11 April 2022 to 14 April 2022

Ram Vencatasamy

- Promoting Sustainable Agriculture under Changing Climatic Conditions Using Nuclear Technology, IAEA-RAF, Austria, from 09 May 2022 to 13 May 2022

TRAININGS/WORKSHOPS

Babita Dussoruth

- Study Tour on Macadamia and Avocado under DeSIRA, South Africa, from 11 May 2022 to 18 May 2022

Kaminibye Naojee

- Plant Health Approaches, Plant Biosecurity and Food Security ITEC, India, 07 June 2022 to 20 June 2022

Technology Review Meetings

TRM could not be conducted as there were sanitary restriction in place.

Presentations

Training of Growers/Extension staff

1. Training of staff and flower producers on Chrysanthemum production
2. Training of staff and entrepreneurs on button mushroom production

Section 9: Statistics

Production for 2021 - 2022

During the period under study, a large variety of food crops, around 60, were grown throughout the island. Open field production is by far the prevalent agricultural system. However, there has been a considerable rise in the production of food crops in protected cultures – hydroponics or soil culture - over the years. The major events affecting supply of fresh vegetables during that financial year was cyclones Batsirai and Emnati in February 2022. On the other hand, the COVID-19 pandemic has affected demand of foodcrops from the tourist industry. Even though lock downs were lifted, tourist arrivals have not recovered completely. Mauritius being a touristic destination, a significant amount of the local production is destined for tourists. Nonetheless, production in both open field and hydroponic systems were maintained.

Food Crops production (including fruits: banana, pineapple and watermelon) was above 110,300 tonnes despite unfavourable climatic conditions that prevailed during the rainy and cyclonic season of the year. Area harvested for major crops was estimated at 7,710 hectares with a production of 97,718 tonnes. Less frequently consumed vegetables, condiments and watermelon are not included in the list of major crops. Harvest for minor foodcrop covered some 400 hectares with a production of 4,375 tonnes. Some 72 hectares of crops - mainly tomato, sweet pepper, lettuce and cucumber - were cultivated in protected cultures. Production under the protected culture systems – mainly hydroponics - amounted to some 8,213 tonnes.

Production of strategic crops was quite significant in the open field. Some 12,786 tonnes of potato were harvested over an area of 662 hectares while 5,587 tonnes of onion were produced from a cultivated area of 244 hectares. Carrot production reached 4,618 tonnes from a harvested area of 361 hectares while production of tomato in open field produced 8,005 tonnes from 577 hectares harvested. Creepers, which includes bittergourd, calabash, chouchou, cucumber, patole, pipengaille, pumpkin among others, were harvested over an area 2,112 hectares with a production of approximately 25,000 tonnes. Crucifers (broccoli, cabbage, cauliflower and petsai) production was estimated at 5,458 tonnes for a harvested area of 445 hectares.

Monthly Area harvested of Food Crops (Whole Island) – 2021-2022

Food Crops	Area (ha)												Total (ha)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Open Field - Major food crops	652.25	717.56	783.95	913.54	894.73	646.71	531.53	502.69	511.38	497.27	502.37	556.86	7,710.83
Open Field - Minor food crops	27.64	29.60	25.00	37.22	41.18	55.87	42.42	28.70	27.66	37.25	25.87	22.48	400.89
Protected Cultures (Hydroponics & Soil Cultures)	4.26	4.49	4.85	4.73	4.95	4.98	6.29	5.69	6.57	6.59	7.55	10.57	71.52
Total (ha)	684.15	751.66	813.80	955.49	940.85	707.56	580.23	537.08	545.62	541.11	535.78	589.90	8,183.24

Monthly Production of Food Crops (Whole Island) – 2021-2022

Food Crops	Production (t)												Total (t)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Open field - Major food crops	7,972.21	9,325.72	11,639.34	13,788.00	12,766.67	8,123.98	6,235.59	4,654.20	4,905.15	4,995.51	5,979.63	7,332.17	97,718.18
Open Field - Minor food crops	256.29	278.32	250.33	447.91	459.29	594.00	521.85	206.30	226.52	470.68	399.80	264.05	4375.34
Protecte Cultures (Hydroponics & Soil Cultures)	499.15	503.19	548.69	532.73	527.76	483.63	716.77	721.38	819.98	811.00	911.23	1,137.41	8,212.94
Total (t)	8,727.65	10,107.24	12,438.36	14,768.64	13,753.73	9,201.61	7,474.21	5,581.89	5,951.65	6,277.19	7,290.66	8,733.63	110,306.45

Monthly Area harvested of major food crops (Whole Island) for the period Jul 21 to Jun 22

Major Food Crops	Area (ha)												Total (ha)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Banana	49.97	52.09	49.84	45.29	48.03	48.53	49.01	50.07	49.60	48.65	48.66	48.56	588.30
Bean	28.38	32.12	30.07	25.57	25.98	17.38	17.51	18.76	14.73	20.59	16.01	22.42	269.49
Beet	3.67	2.54	4.12	4.59	2.70	2.78	2.77	2.09	1.35	2.60	3.24	1.68	34.13
Bittergourd	17.52	18.99	19.41	21.03	18.72	17.86	14.10	12.84	15.59	16.74	18.68	18.29	209.78
Brinjal (A)	4.21	4.47	4.46	4.28	4.53	4.14	4.04	3.58	3.35	3.70	3.71	4.08	48.54
Brinjal (C)	19.15	20.18	18.70	18.10	18.20	18.11	14.59	16.05	16.48	15.83	16.13	17.22	208.74
Broccoli	1.38	1.61	3.08	2.13	2.87	2.57	0.27	-	0.43	-	0.28	0.12	14.74
Cabbage	32.97	29.66	29.61	29.63	31.04	22.76	15.44	19.50	20.26	22.30	18.97	32.75	304.89
Calabash	27.71	34.76	41.18	39.14	36.31	36.54	30.29	26.95	32.10	30.40	35.96	41.62	412.94
Carrot	26.81	30.57	35.07	32.59	25.58	29.65	30.51	33.73	27.47	27.07	25.32	32.50	356.87
Cauliflower	17.55	13.89	16.35	9.51	8.65	4.82	4.34	3.20	1.24	0.87	2.51	6.05	88.98
Chillies (C)	2.38	2.35	3.02	2.50	2.86	2.85	2.24	2.21	1.79	1.70	1.39	1.49	26.77
Chillies (L)	20.59	21.74	19.55	19.39	19.73	20.05	19.48	17.75	18.02	17.91	17.58	17.91	229.69
Chillies (S)	4.51	4.64	4.58	4.58	4.65	4.54	4.56	4.47	4.39	4.55	4.71	4.91	55.08
Chouchou	12.12	12.76	12.95	15.40	16.57	14.26	15.72	13.69	11.15	9.40	6.79	8.29	149.09
Courgette	2.12	0.61	1.28	1.11	3.74	1.57	0.71	1.16	0.49	0.96	2.76	2.09	18.59
Cucumber	28.43	33.67	32.54	31.56	31.65	30.26	35.93	31.58	37.17	32.45	30.80	27.51	383.54
Echalote	15.54	12.91	12.16	11.55	12.97	13.15	12.38	9.78	8.38	7.41	10.48	18.43	145.15
Eddoes (C)	4.65	9.03	5.38	9.44	5.33	5.66	10.78	7.46	5.10	7.87	6.69	8.82	86.21
Eddoes (V)	5.29	5.21	3.84	5.64	2.92	4.85	4.27	8.68	8.03	7.91	10.47	10.56	77.67
Garlic	-	0.37	0.85	3.51	0.39	-	-	1.00	-	-	-	-	6.12
Ginger	12.32	16.74	30.93	35.38	16.53	19.84	2.82	10.86	0.06	-	-	0.02	145.50
Green Peas	0.04	-	0.05	-	0.06	-	-	-	-	0.11	-	0.04	0.30
Greens	28.15	31.59	27.21	25.42	27.23	23.34	18.97	19.55	24.36	21.62	20.45	19.22	287.11
Groundnut	11.98	7.50	5.95	4.57	17.00	15.54	11.59	28.74	12.32	13.05	7.58	8.17	143.99
Ladies Finger	22.08	21.77	19.96	19.02	17.62	15.90	15.48	15.84	16.34	17.06	23.36	18.43	222.86

Monthly Area harvested of major food crops (Whole Island) for the period Jul 21 to Jun 22

Major Food Crops	Area (ha)												Total (ha)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Green Peas	0.04	-	0.05	-	0.06	-	-	-	-	0.11	-	0.04	0.30
Greens	28.15	31.59	27.21	25.42	27.23	23.34	18.97	19.55	24.36	21.62	20.45	19.22	287.11
Groundnut	11.98	7.50	5.95	4.57	17.00	15.54	11.59	28.74	12.32	13.05	7.58	8.17	143.99
Ladies Finger	22.08	21.77	19.96	19.02	17.62	15.90	15.48	15.84	16.34	17.06	23.36	18.43	222.86
Leek	0.59	0.27	0.83	0.45	1.10	1.28	0.76	0.48	0.58	0.38	0.40	0.78	7.90
Lettuce	13.37	14.31	9.72	10.55	12.29	12.99	10.48	12.73	9.25	7.85	12.56	12.98	139.08
Maize	13.51	7.35	13.46	11.36	12.78	9.65	9.09	6.30	6.97	5.67	8.10	6.04	110.29
Manioc	9.74	7.29	6.11	2.23	3.29	4.06	6.40	6.06	5.82	4.79	5.58	6.74	68.11
Onion	1.40	0.08	6.51	10.62	2.10	-	2.21	4.00	3.40	-	-	1.02	31.34
Onion (HYV)	-	2.18	21.75	80.63	101.48	17.02	-	-	-	-	-	-	223.06
<i>Total Onion</i>	<i>1.40</i>	<i>2.26</i>	<i>28.26</i>	<i>91.25</i>	<i>103.58</i>	<i>17.02</i>	<i>2.21</i>	<i>4.00</i>	<i>3.40</i>	<i>-</i>	<i>-</i>	<i>1.02</i>	<i>254.40</i>
Patole	10.17	10.59	9.68	9.92	10.68	8.82	7.35	7.20	12.49	13.96	8.87	8.87	118.59
Petsai	4.45	3.02	3.65	3.16	3.37	3.43	1.98	1.48	3.30	1.03	3.88	3.49	36.24
Pineapple	22.93	28.46	22.79	24.41	26.24	21.75	21.67	22.44	26.15	18.19	20.90	22.01	277.93
Pipengaille	11.90	13.13	12.25	12.33	12.47	11.68	8.59	7.77	9.75	9.55	9.34	11.68	130.42
Potato	51.77	83.12	123.17	182.22	169.70	51.92	0.50	8.50	0.10	-	-	-	671.00
Pumpkin	37.29	40.89	35.99	40.80	44.60	54.86	39.50	32.38	41.02	51.90	48.37	40.58	508.18
Squash	5.80	3.62	6.38	5.34	8.00	5.62	4.58	2.47	4.18	2.62	1.90	8.77	59.24
Sweet Pepper	0.03	0.05	0.06	0.07	0.07	-	0.11	0.12	0.01	-	-	-	0.50
Sweet Potato	8.46	7.54	5.52	26.55	18.88	6.77	27.90	6.09	5.86	3.60	8.57	6.39	132.13
Tomato (Hybrid)	48.19	62.38	64.62	61.34	54.58	49.19	41.40	37.00	39.25	37.20	35.26	46.58	576.98
Voëhm	13.13	11.52	9.32	10.67	11.28	10.73	7.97	7.61	10.97	10.40	8.59	8.60	120.76
Total (ha)	652.25	717.56	783.95	913.54	894.73	646.71	528.26	522.17	509.27	497.87	504.81	555.67	7,726.79
Legend: HYV- High Yielding Varieties (incl. Hybrids). Symbol: '-' denotes nil													
Onion	1.40	218.22	233.10	263.87	254.04	-	2.21	4.00	3.40	-	-	1.02	2,288.92

Monthly Production of major food crops (Whole Island) for the period Jul 21 to Jun 22

Major Food Crops	Prod. (t)												Total (t)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Banana	835.04	862.74	846.24	771.84	805.10	808.47	812.42	764.45	759.98	749.90	750.41	763.78	9,530.38
Bean	183.68	220.32	189.73	178.31	152.44	95.42	88.01	62.45	61.42	105.13	92.42	146.15	1,575.49
Beet	47.27	30.32	46.82	47.49	26.46	25.91	21.74	15.83	14.03	9.92	17.49	10.23	313.50
Bittergourd	155.91	176.48	175.59	205.69	171.99	166.54	134.91	84.61	98.22	131.50	130.64	128.38	1,760.48
Brinjal (A)	31.32	31.73	30.08	29.09	31.94	27.84	27.44	19.26	13.96	15.30	20.94	19.48	298.37
Brinjal (C)	179.95	205.54	191.67	197.78	191.56	185.28	159.84	129.47	128.50	142.20	240.87	255.41	2,208.07
Broccoli	9.59	11.53	31.11	14.79	15.40	7.51	0.65	-	5.16	-	3.36	0.81	99.90
Cabbage	445.83	421.11	422.70	406.10	383.73	275.56	159.06	163.58	189.34	255.06	286.37	547.46	3,955.92
Calabash	356.32	465.40	562.39	543.35	508.89	495.43	398.51	309.94	380.90	379.46	489.86	579.38	5,469.83
Carrot	376.06	414.44	531.94	532.53	421.38	430.41	278.51	244.40	246.93	218.65	288.30	521.20	4,504.77
Cauliflower	200.40	176.85	192.66	118.32	78.82	40.03	31.80	29.05	7.77	4.72	10.38	69.97	960.78
Chillies (C)	15.12	15.97	21.01	14.87	15.04	14.46	11.25	6.41	5.34	7.37	6.74	8.62	142.19
Chillies (L)	126.72	118.87	106.98	110.09	128.39	160.57	147.82	75.89	77.24	94.08	126.02	131.51	1,404.20
Chillies (S)	15.30	15.59	15.75	15.38	17.37	20.12	22.49	14.46	9.84	15.20	24.00	25.42	210.90
Chouchou	166.74	178.07	182.36	192.77	197.87	164.86	192.26	107.13	120.51	87.14	104.81	143.38	1,837.90
Courgette	12.48	6.20	13.28	4.94	26.67	6.83	4.55	5.70	3.02	3.04	16.27	13.92	116.90
Cucumber	312.60	375.57	369.64	393.54	407.76	377.53	412.68	310.21	418.05	394.10	456.83	415.71	4,644.21
Echalote	159.05	121.98	128.73	110.98	129.63	135.38	132.67	78.23	81.26	63.46	136.37	249.19	1,526.94
Eddoes (C)	37.32	72.24	43.44	75.71	42.94	46.91	86.36	51.61	54.63	69.47	70.77	95.06	746.45
Eddoes (V)	64.57	66.94	42.05	68.97	35.27	58.64	54.97	98.95	85.16	88.70	122.54	128.45	915.20
Garlic	-	2.18	5.79	20.66	2.07	-	-	2.04	-	-	-	-	32.74
Ginger	184.80	280.91	527.97	542.25	278.64	357.12	50.76	167.66	0.72	-	-	0.19	2,391.02

Monthly Production of major food crops (Whole Island) for the period Jul 21 to Jun 22

Major Food Crops	Prod. (t)												Total (t)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Green Peas	0.08	-	0.08	-	0.07	-	-	-	-	0.06	-	0.14	0.42
Greens	247.60	264.70	223.94	219.60	217.57	187.72	137.25	115.26	148.71	124.05	154.95	164.22	2,205.57
Groundnut	26.02	17.15	14.46	10.67	37.90	31.86	28.68	42.55	22.93	27.32	19.35	18.24	297.14
Ladies Finger	138.10	115.80	94.97	85.32	72.86	69.30	77.78	73.26	93.49	146.30	176.95	155.63	1,299.76
Leek	2.51	1.19	7.61	1.92	5.48	11.66	3.34	1.28	1.38	1.08	3.32	4.75	45.50
Lettuce	86.90	95.91	70.55	80.91	97.52	94.83	70.47	61.22	57.29	40.69	86.18	108.60	951.07
Maize	105.76	61.33	124.70	107.08	115.79	84.75	80.90	39.74	51.09	55.52	72.30	64.88	963.84
Manioc	134.20	98.35	95.84	40.16	50.40	65.72	110.34	100.36	99.24	87.20	116.66	132.47	1,130.94
Onion	16.10	0.88	78.12	127.44	25.20	-	110.80	84.01	54.01	-	-	11.22	507.78
Onion (HYV)	-	88.34	1,088.40	1,753.61	2,142.57	265.93	-	-	-	-	-	-	5,338.85
<i>Total Onion</i>	<i>16.10</i>	<i>89.22</i>	<i>1,166.52</i>	<i>1,881.05</i>	<i>2,167.77</i>	<i>265.93</i>	<i>110.80</i>	<i>84.01</i>	<i>54.01</i>	<i>-</i>	<i>-</i>	<i>11.22</i>	<i>5,846.63</i>
Patole	74.60	81.16	76.69	82.75	84.90	86.38	67.69	50.40	81.92	105.96	76.27	83.83	952.54
Petsai	68.34	42.93	58.38	38.17	48.52	39.04	26.44	6.94	25.79	4.39	21.32	55.68	435.93
Pineapple	502.56	582.03	516.43	536.48	555.93	473.39	463.64	467.08	527.62	375.51	429.91	455.86	5,886.46
Pipengaille	138.95	155.02	135.42	139.24	142.56	133.94	91.23	53.85	72.54	94.79	107.63	150.18	1,415.34
Potato	961.04	1,604.98	2,537.34	3,696.75	3,102.74	883.38	7.00	140.00	1.00	-	-	-	12,934.24
Pumpkin	615.33	644.00	593.81	663.27	686.27	792.40	621.92	420.17	508.93	681.54	655.16	668.02	7,550.84
Squash	47.12	29.31	25.44	41.72	40.28	29.96	19.70	7.67	10.93	10.41	12.78	64.88	340.20
Sweet Pepper	0.34	0.58	0.69	1.06	0.89	-	0.62	0.28	0.01	-	-	-	4.47
Sweet Potato	100.69	102.12	68.75	499.62	309.22	92.16	504.58	94.34	70.74	45.32	158.27	131.80	2,177.62
Tomato (Hybrid)	691.04	981.33	1,077.87	984.79	875.69	798.93	602.39	294.16	302.19	294.50	437.64	664.21	8,004.73
Voëhm	98.85	87.62	71.96	81.97	84.95	81.82	56.58	44.93	68.74	71.43	82.87	96.42	928.13
Total (t)	7,972.21	9,325.72	11,639.34	13,788.00	12,766.67	8,123.98	6,310.08	4,838.84	4,960.52	5,000.48	6,006.92	7,284.74	98,017.51

Legend: HYV- High Yielding Varieties (incl. Hybrids). **Symbol:** '-' denotes nil

N.B.: Data above refer to open field production.

Area harvested of food crops in protected cultures for the period Jul-21 to Jun-22

(Provisional)

Protected Cultures	Area (ha)												Total (ha)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Hydroponics	4.08	4.22	4.54	4.41	4.71	4.62	6.14	5.59	6.40	6.50	7.44	10.18	68.83
Soil Culture	0.18	0.28	0.31	0.32	0.23	0.36	0.15	0.10	0.17	0.09	0.11	0.08	2.39
Total (ha)	4.26	4.49	4.85	4.73	4.95	4.98	6.29	5.69	6.57	6.59	7.55	10.27	71.22

Table 12

Production of food crops in protected cultures for the period Jul-21 to Jun-22

(Provisional)

Protected Cultures	Prod. (t)												Total (t)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Hydroponics	498.46	501.67	546.54	528.39	524.42	478.17	716.72	721.40	819.92	811.02	911.11	1,100.07	8,157.90
Soil Culture	2.44	3.28	4.02	4.46	3.34	5.57	3.31	1.50	2.76	2.28	1.71	2.19	36.87
Total (t)	500.91	504.95	550.56	532.85	527.76	483.75	720.03	722.90	822.68	813.30	912.82	1,102.26	8,194.76

Hydroponics Culture : Area harvested of food crops for the period Jun 21 - Jul 22

Food Crops	Area (ha)												Total (ha)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Aubergine	0.02	0.03	0.04	0.05	0.06	0.04	0.03	0.03	0.05	0.05	0.06	0.08	0.55
Bean	0.01	0.01	0.01	-	-	0.02	0.49	-	0.01	0.03	0.05	0.03	0.66
Broccoli	-	-	-	0.02	0.01	-	-	-	-	-	-	-	0.03
Cabbage	0.03	-	0.03	0.03	0.04	0.03	-	-	-	-	-	-	0.14
Cauliflower	0.04	-	-	0.05	0.02	-	-	-	-	-	-	0.01	0.13
Chillies	0.01	0.01	0.01	0.04	0.01	0.01	-	-	-	0.00	0.00	0.01	0.10
Coriander	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.03	0.05	0.23
Courgette	0.07	0.04	0.03	0.02	0.06	0.03	0.01	0.01	0.01	0.01	0.05	0.07	0.40
Cucumber	0.57	0.69	0.62	0.74	0.57	0.47	0.73	0.79	0.58	0.49	0.60	0.54	7.40
Echalote	0.04	0.04	-	-	-	-	-	-	-	-	-	-	0.08
Greens	0.04	0.04	0.04	0.04	0.09	0.09	0.04	0.05	0.05	0.05	0.04	0.04	0.60
Ladies Finger	0.00	0.00	0.01	0.00	0.01	0.01	0.04	0.08	0.08	0.06	0.06	0.01	0.37
Leek	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01
Lettuce	0.73	0.87	0.84	0.78	1.16	1.49	1.31	1.06	1.22	1.10	1.02	1.56	13.15
Melon	-	-	-	-	0.03	-	-	-	-	-	-	-	0.03
Petsai	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.36
Pipengaille	0.00	0.00	-	-	-	-	0.03	0.03	0.03	-	-	0.00	0.09
Squash	0.01	-	0.02	0.03	0.05	0.02	0.01	0.04	0.03	0.05	0.09	0.04	0.37
Strawberry	-	-	-	-	-	0.03	-	0.01	-	-	-	-	0.04
Sweet Pepper	0.57	0.69	0.83	0.74	0.62	0.51	0.48	0.47	0.66	0.71	0.83	0.83	7.93
Tomato	1.87	1.75	1.97	1.80	1.93	1.81	2.93	2.97	3.56	3.78	4.56	6.86	35.79
Voëhm	0.02	0.02	0.05	0.03	0.04	0.03	0.01	0.01	0.04	0.12	0.01	0.02	0.37
Watermelon	-	-	-	-	-	-	-	-	0.02	-	-	-	0.02
Total (ha)	4.08	4.22	4.54	4.41	4.71	4.62	6.14	5.59	6.40	6.50	7.44	10.18	68.83

Symbol: '-' denotes nil

Hydroponics Culture : Production of food crops for the period Jun 21 - Jul 22

Food Crops	Prod. (t)												Total (t)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Aubergine	1.66	2.19	2.85	3.63	3.97	2.74	2.19	2.05	3.69	3.15	4.53	5.65	38.29
Bean	0.09	0.09	0.11	-	-	0.30	7.35	-	0.11	0.44	0.81	0.49	9.79
Broccoli	-	-	-	0.80	0.40	-	-	-	-	-	-	-	1.20
Cabbage	1.95	-	0.86	1.05	1.53	0.84	-	-	-	-	-	-	6.23
Cauliflower	2.40	-	-	3.00	1.40	-	-	-	-	-	-	0.72	7.52
Chillies	0.15	0.08	0.08	0.46	0.08	0.16	-	-	-	0.03	0.03	0.10	1.18
Coriander	0.30	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.75	0.15	0.41	0.75	3.41
Courgette	2.24	1.07	0.96	0.55	1.67	0.91	0.16	0.19	0.15	0.40	1.36	2.21	11.88
Cucumber	85.49	102.79	93.65	111.49	85.72	70.71	109.06	118.49	86.68	74.19	89.84	81.49	1,109.60
Echalote	0.60	0.60	-	-	-	-	-	-	-	-	-	-	1.20
Greens	0.68	0.68	0.68	0.68	1.38	1.38	0.68	0.83	0.83	0.83	0.68	0.68	9.95
Ladies Finger	0.03	0.03	0.18	0.00	0.11	0.17	0.61	1.26	1.15	0.95	0.85	0.16	5.49
Leek	-	-	-	-	-	-	-	-	-	-	-	0.13	0.13
Lettuce	13.17	15.70	15.18	14.11	20.81	26.80	23.49	19.08	22.02	19.82	18.43	28.05	236.66
Melon	-	-	-	-	1.89	-	-	-	-	-	-	-	1.89
Petsai	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	18.00
Pipengaille	0.03	0.03	-	-	-	-	0.75	0.75	0.75	-	-	0.03	2.34
Squash	0.14	-	0.53	0.83	1.31	0.53	0.21	1.15	0.76	1.44	2.51	1.06	10.47
Strawberry	-	-	-	-	-	0.13	-	0.06	-	-	-	-	0.19
Sweet Pepper	51.12	62.11	74.53	66.83	55.61	45.75	42.99	42.29	59.23	63.66	75.09	74.37	713.58
Tomato	336.67	314.41	354.58	322.87	346.36	325.71	527.49	533.50	640.85	642.64	714.92	902.42	5,962.43
Voëhm	0.25	0.25	0.71	0.44	0.54	0.39	0.10	0.10	0.56	1.82	0.14	0.27	5.56
Watermelon	-	-	-	-	-	-	-	-	0.90	-	-	-	0.90
Total (t)	498.46	501.67	546.54	528.39	524.42	478.17	716.72	721.40	819.92	811.02	911.11	1,100.07	8,157.90
Symbol: ⁻¹ denotes nil													

Soil Culture : Area harvested of food crops for the period Jun 21 - Jul 22

Food Crops	Area (ha)												Total (ha)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Bean	-	0.02	0.02	-	-	-	-	-	-	-	-	-	0.03
Bittergourd	0.02	0.02	0.02	0.02	0.01	0.02	-	-	-	-	-	-	0.10
Cabbage	-	-	-	-	-	-	0.03	-	-	0.03	-	0.02	0.07
Cauliflower	-	-	-	-	-	0.03	-	-	0.03	-	-	-	0.06
Chillies	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.07
Cucumber	-	-	0.01	0.01	0.02	0.02	0.01	0.00	0.01	-	0.02	-	0.09
Eddoes (V)	-	-	-	0.02	-	-	-	-	-	-	-	-	0.02
Greens	-	0.05	0.06	0.03	0.03	0.01	0.02	0.02	0.06	0.03	0.03	0.02	0.35
Lettuce	-	-	0.02	0.02	0.02	0.02	0.02	-	-	-	-	-	0.11
Patole	0.03	0.03	0.03	0.03	0.01	0.02	-	0.00	0.00	0.00	-	-	0.15
Pipengaille	-	-	0.00	-	-	0.00	0.00	0.00	0.00	-	-	-	0.01
Strawberry	-	0.04	0.04	0.04	0.03	0.03	-	-	-	-	-	-	0.17
Sweet Pepper	-	-	-	-	-	0.03	-	-	-	-	0.02	-	0.04
Tomato	0.09	0.08	0.09	0.12	0.09	0.15	0.06	0.06	0.06	0.02	0.03	0.03	0.88
Voëhm	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.25
Total (ha)	0.18	0.28	0.31	0.32	0.23	0.36	0.15	0.10	0.17	0.09	0.11	0.08	2.39

N.B. : '0.00' to be considered as negligible. **Symbol:** '-' denotes nil

Soil Culture : Production of food crops for the period Jun 21 - Jul 22

Food Crops	Prod. (t)												Total (t)
	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	
Bean	-	0.15	0.15	-	-	-	-	-	-	-	-	-	0.30
Bittergourd	0.17	0.17	0.17	0.17	0.11	0.23	-	-	-	-	-	-	1.02
Cabbage	-	-	-	-	-	-	1.38	-	-	1.41	-	1.32	4.10
Cauliflower	-	-	-	-	-	0.81	-	-	0.76	-	-	-	1.57
Chillies	0.12	0.12	0.04	0.07	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.00	0.47
Cucumber	0.00	0.00	0.35	0.30	0.45	0.58	0.13	0.03	0.13	0.00	0.50	0.00	2.47
Eddoes (V)	-	-	-	0.38	-	-	-	-	-	-	-	-	0.38
Greens	-	0.55	0.73	0.38	0.38	0.14	0.29	0.19	0.74	0.33	0.33	0.19	4.25
Lettuce	-	-	0.32	0.32	0.32	0.32	0.32	-	-	-	-	-	1.58
Patole	0.26	0.26	0.27	0.27	0.13	0.24	-	0.00	0.02	0.02	-	-	1.47
Pipengaille	-	-	0.02	-	-	0.02	0.02	0.01	0.02	-	-	-	0.08
Strawberry	-	0.20	0.20	0.20	0.10	0.08	-	-	-	-	-	-	0.77
Sweet Pepper	-	-	-	-	-	0.30	-	-	-	-	0.18	-	0.48
Tomato	1.48	1.43	1.47	2.07	1.60	2.48	0.96	1.04	0.94	0.37	0.55	0.55	14.93
Voëhm	0.41	0.41	0.31	0.31	0.23	0.37	0.21	0.21	0.14	0.14	0.14	0.14	3.01
Total (t)	2.44	3.28	4.02	4.46	3.34	5.57	3.31	1.50	2.76	2.28	1.71	2.19	36.87

N.B. : '0.00' to be considered as negligible. **Symbol:** '-' denotes nil

Livestock Population as at December 2021

- Number of small breeders and estimated number of livestock by district as at December 2021

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	65	407	355	3,427	66	995	34	1,170	32	75,770	27	143,765	10	83
Rivière du Rempart	129	801	453	5,243	73	922	21	254	73	313,014	11	41,231	18	108
Flacq	79	340	486	4,480	35	337	48	1,871	75	338,770	17	9,536	31	256
Grand Port	43	221	163	1,974	15	257	23	592	18	62,975	10	5,835	5	98
Savanne	53	284	151	1,732	54	605	12	242	50	700,950	18	233,930	5	58
Plaine Wilhems	42	221	49	518	12	267	10	338	37	176,870	19	40,140	6	127
Moka	30	255	32	275	4	110	3	63	34	72,540	13	62,930	4	125
Black River/ Port Louis	67	435	252	3,119	45	436	254	12,040	35	159,079	30	20,009	28	301
Total	508	2,964	1,941	20,768	304	3,929	405	16,570	354	1,944,968	145	557,376	107	1,151