



## THE BIOTECHNOLOGY CENTRE

**Dr. Rupika Delgoda, D.Phil. (Oxon), B.Sc. (Hons.) – Director (Acting)**

### WORK OF THE CENTRE

The Biotechnology Centre (BTC) witnessed a period a transition during 2022/2023 academic year. Our former Head Prof. Marcia Roye moved to lead the campus Office of Graduate Studies and Research, as well as Prof. Asemota retired. With an interim Head, Prof Rupika Delgoda, from the Natural Products Institute (NPI) the graduate students benefitted from the launch of a joint seminar series between NPI and BTC and an increased interactions with the NPI over technical skills enhancement. The training of MPhil and PhD students continued with support from Faculty members outside of the Centre, while communities, internationally and locally, continued as collaborative partners through research and training.

The Centre also hosted the Summer Internship Programme in Biotechnology. Over the internship period, the interns learnt how to use the Centre's laboratory instruments, participated in the extraction of nucleic acid from plants, bacterial cells (plasmid) and insects using various extraction techniques. The participants and BTC members also got an opportunity to work with the NPI where participating BTC members and interns benefitted from training in insecticide resistance assays.

Academic members continued to be highly engaged in providing presentations and papers at various local and international fora. We are particularly proud of the recognition received by Prof. Marcia Roye as the S&T XXTORDINEERS JA 2022 Award by Scientific Research Council in recognition of Significant Scientific Achievements in Jamaica.

The Centre's long awaited infrastructure improvement was initiated towards the end of the academic year, to mitigate damage from extended rain and water. Members of the BTC has been engaged in discussions as part of the merger with several other units within the Faculty of Science and Technology, and we look forward to enhanced and vibrant engagements within a larger research community in the future.

The **Academic Staff and Programmes** of the Centre are:

- a. Prof. Rupika Delgoda, Professor of Biochemical Pharmacology and Pharmacognosy, and the Director of the Natural Products Institute in the Faculty of Science and Technology, serves as the interim Director of the Biotechnology Centre.
- b. Prof. Marcia Roye, Professor of Molecular Virology, serves as the Director for the Office of Graduate Studies and Research, Mona campus leads the Geminivirus Research Group of the Centre.
- c. Professor Paula Tennant, Professor of Molecular Plant Pathology at the Life Sciences Department of the Faculty of Science & Technology, who also has served the Biotechnology Centre, who leads the Molecular Virology Research Group of the Centre.
- d. Dr. Sylvia Mitchell, FST, Senior Lecturer, coordinates the FST Foundation course, Foun1201 Science Medicine and Technology in Society and leads the Medicinal Plant Research Group at the Centre.
- e. Prof. Nouredine Benkeblia, Professor of Crop Science in the Department of Life Sciences, FST, leads the Tree Crops & Metabolomics Research Group.
- f. Mrs. Deiondra Tai, Assistant Lecturer and PhD candidate (Biotechnology) at the Biotechnology Centre.

The team at the Biotechnology Centre collaborate with other researchers at UWI, locally and globally to drive the research agenda, the MPhil & PhD programmes of the Centre, train both Centre-registered MPhil & PhD candidates and graduate students from other departments including the departments of the Life Sciences, Basic Medical Sciences (Biochemistry Section) and the Natural Products Institute. Professor Roye, Dr Mitchell and Mrs Tai have teaching assignments at the undergraduate and graduate levels and are also Principal Investigators (PI) or Co-PI of several research and developmental projects.

The **Support Staff** of the Centre in this period were: Mr. Carlton Barrows (Senior Laboratory Technologist), Ms. Karen Stewart (Senior Administrative Assistant II), Mr. Roy Dwyer (Handyman), and Ms. Shernette Banks-Ashman (Laboratory Attendant).

## ACCESS

### STUDENTS OF THE CENTRE

Seventeen (17) postgraduate students are enrolled in PhD or MPhil in Biotechnology degree programmes: **Princess Bell, Lowen Williams, Fabian Miller, Nikolai**

**Lutas, Tamara Grant, Chevaughn Witter, Julian Bailey, Orville Byfield, Bayode Bamikole, Donella Dawkins, Jordon Freeman, Kevon Stewart, Antoni Comrie, Cheryl Green and Patrice Pitter.** Associated postgraduate students (Department of Basic Medical Sciences – Biochemistry Section) include: **Keaton Logan** and **Sasha-Gay Williams**. The students were attached to various UWI research groups and supervised by collaborative teams locally and internationally.

## STUDENTS OUTPUT/DEVELOPMENT

### Graduates

- Mr Jordon Freeman, PhD student, was among nine Jamaicans who were selected for the US Department of State's Young Leader of the Americas Initiative (YLAI) Fellowship Programme, who left the island for the US to commence four-week professional placements with US businesses during the period May to June 2023. The participants collaborated with their peers to address shared business challenges, as well as engage in virtual and in-person events and cross-cultural activities.

### Undergraduates

- Jodi-Ann Henry (2023) Using leaf-of-life (*Bryophyllum pinnatum*) propagules to identify local tissue culture media components to substitute for imported ones. BIOC3413 Research Project, 2023.05.11, supervised by Dr Sylvia Mitchell.
- Britney Francis (2023) Exploration of factors affecting the initiation, multiplication and rooting of Bamboo (*Bambusa vulgaris*). Undergraduate Research supervised by Dr Sylvia Mitchell.
- Charisma Minnis, Tavar Harriott and Mpule Clarke undergraduates volunteered with Dr Mitchell during this year.

## PUBLICATIONS

### Referred Journal Publications:

- **Mitchell SA** (2022) Status of Jamaica's Bamboo Industry, Emphasizing Research and Innovation, SIBGUADUA, 7th International Symposium on Bamboo and Guadua, September 15th, 2022
- **Mitchell SA** (2022) Use Access and Benefit Sharing (ABS) to turn Value Chains into Value Rings to Ensure Biodiversity Hotspots Survive & Flourish for Future Generations, Online Poster, Future Earth Assembly Global Peace Annual Summit

- **Mitchell SA** (2022) Creating Alternative Modes of Development Cooperation for Food Sovereignty and Reparatory Justice. GPN-UWI-ICKL Farmers Empowerment Event. September 29th, 2022.
- Plummer N; Wilson M; Yaneva-Toraman I; McKenzie C; **Mitchell S**; Northover P; Crowley K; Edwards T; Richards A (2022) Recipes for Resilience: Engaging Caribbean Youth in Climate Action and Food Heritage through Stories and Song. In Special Issue “The Role of Culture and Food Heritage in Promoting Sustainable Food Choices and Tackling Global Challenges”, *Sustainability*, 14, 8717.

### Book & Book Chapter

- Amarakoon I.I., Hamilton C-L, **Mitchell SA**, **Tennant PF**, **Roye ME**. (2023) Chapter 28: Biotechnology, Part VII Technology Applications using biological systems, In: S. Badal and **Y Clement** (Eds) *Pharmacognosy: Fundamentals, Applications and Strategy*. Elsevier Academic Press, USA. 2nd Edition, 738 pgs; ISBN 9780443186578; 01.08.2023 (<https://www.elsevier.com/books/pharmacognosy/badal-mccreath/978-0-443-18657-8>)

## ALIGNMENT

### PAPERS PRESENTED

- **Roye M.** (2023) “Virus Discovery and Evolution: Geminivirus and HIV”, “The Professor Speaks” Lecture Series, Faculty of Science & Technology, UWI, July 06, 2023.
- **Mitchell SA**, Lindsay K, Richards A (2023) Bioprospecting and biopiracy in the Caribbean: Challenges and opportunities for the region, 1st Frontiers of Research in Caribbean Science and Technology Conference, *Journal of Arts, Science and Technology* (FORECAST Special Edition), 15: 11–42.
- **Mitchell SA** (2023) Ethnobiotechnology: A way to look backward and forward at the same time. Science Awareness Webinar Series IV, Future Earth South Asia Hub, July 26, 2023
- **Mitchell SA** (2023) Aligning academics, educators, local leaders and funding sources to co-develop ethnobiotechnological solutions ensures technology transfer is ecologically-sound, aligned to indigenous and local community needs, sustainable and successful. Sustainable Research Innovation (SRI) conference, June 26–30, 2023, Panama.
- Yaneva-Toraman I, Edwards T, **Mitchell S**, Wilson M, Northover P, Plummer N, Richards A, McKenzie C, Pairman R (2023) ‘Forgotten Foods’ and Ancestral

Peoples: Bridging Climate Adaptation with Cultural Recognition in Jamaica's 4-H School Gardening Program, Panel 48: Tradition is the new normal: food and farming revivalism as response to crises, ASA2023: An Unwell World? Anthropology in a Speculative Mode, Association of Social Anthropologists of the UK (ASA) Conference, SOAS, University of London, April 11–14, 2023. Paper presented April 11th, 2023. <https://nomadit.co.uk/conference/asa2023/p/12867>

- **Mitchell, SA** (2023) Twelve Ways to Realise the Potential of Biotechnology, Your Waste, Your Health, Microtalk, FST Science Festival, March 31, 2023.
- **Mitchell, SA** (2023) Transforming agriculture for us and future generations by judicious use of ethnobiotechnology in Jamaica: experience teacheth wisdom, HEART/NSTA Trust Ebony Park Academy Annual Open Day under the theme 'Revolutionizing the Agriculture and Hospitality sectors through Innovation, Technology and Training', seminar section 'Transformative Agriculture', March 17, 2023.
- **Mitchell SA** and Delahaye C (2022) Jamaica Essential Oil Research and Development: the good, the bad and the possibilities. 2nd Annual doTerra Essential Oil Research Symposium, Utah, USA, December 1, 2022.
- **Mitchell SA** (2022) Recycling used bottles, toilet rolls and other containers for use in the Biotechnology method of plant tissue culture, International Conference and Expo on Recycling and Waste Management, Global Scientific Forum, Virtual Event. November 09, 2022.
- Plummer N, Wilson M, **Mitchell SA**, Toraman IY, McKenzie C, Northover P, Edwards T, Donovan K, Richards A (2022) Connecting Caribbean Youth to Climate Justice through Plant Heritage Stories and Music. Theme: Culture, identity, the creative arts and the portrayal and representation of the environment and climate change in the ritualistic habits and emotional and aesthetic state of being; the use of the creative arts to raise environmental consciousness and agency. Institute of Technological and Educational Research, Mico University College Conference on the Environment and Climate Change Education, Mico, October 13–15, 2022, Kingston, Jamaica.
- **Mitchell SA** (2022) Creating Alternative Modes of Development Cooperation for Food Sovereignty and Reparatory Justice. GPN-UWI-ICKL Farmers Empowerment Event. September 29, 2022.
- **Mitchell SA** (2022) Use Access and Benefit Sharing (ABS) to turn Value Chains into Value Rings to Ensure Biodiversity Hotspots Survive & Flourish for Future Generations, Online Poster, Future Earth Assembly Global Peace Annual Summit, September 21–23, 2022
- **Mitchell SA** (2022) Status of Jamaica's Bamboo Industry, Emphasizing Research and Innovation, SIBGUADUA, 7th International Symposium on Bamboo and Guadua, September 15, 2022

- **Mitchell SA**, Lindsay K, Richards A (2022) Bioprospecting and Biopiracy in the Caribbean: Challenges and Opportunities. *Frontiers Of Research In Caribbean Science and Technology (FORECAST) Virtual Conference 2022 – Science And Technology: A Driver of Transformation*. August 10–12, 2022; Resilience Session, August 10, p. 37.
- **Mitchell, SA** (2022) Thirty-five years of tropical plant tissue culture R&D in Jamaica: the challenges and breakthroughs, Session 1: Botanicals of Caribbean Diaspora. *American Council for Medicinally Active Plants*, O2, June 29<sup>th</sup>, 11<sup>th</sup> Annual Hybrid Conference, Puerto Rico, June 28–July 2, 2022.

### Newspaper articles

- **Mitchell, SA** (2023) Jamaica’s medicinal plants, Aloe vera – my healing recipes, *Freedom Come Rain* newspaper, Vol 3 (49), pg 23, July 29, 2023
- **Mitchell, SA** (2023) Jamaica’s medicinal plants, Aloe vera, *Freedom Come Rain* newspaper, Vol 3 (48), pg 23, July 22, 2023
- **Mitchell, SA** (2023) Science and Farming: Sugarcane tissue culture – a technology waiting on a believer, *Freedom Come Rain* newspaper, Vol 3 (46), pg 23, July 01, 2023
- **Mitchell, SA** (2023) Farming and Science: Tissue culture – experience of a local farmer in Harker’s Hall, St Catherine, *Freedom Come Rain* newspaper, Vol 3 (43), pg 23, June 10, 2023
- **Mitchell, SA** (2023) Raining Science: Irish potato tissue culture, *Freedom Come Rain* newspaper, Vol 3 (42), pg 23, June 03, 2023
- **Mitchell, SA** (2023) Raining Science: The IITA / SRC / UWI project revitalized the yam industry in Jamaica, *Freedom Come Rain* newspaper, Vol 3 (40), pg 23, May 20, 2023
- **Mitchell, SA** (2023) Raining Science: UWI, Mona salutes Dr Sylvia Mitchell, *Freedom Come Rain* newspaper, Vol 3 (40), pg 14, May 20, 2023

### COLLABORATIONS AND TECHNICAL REPORT/SCIENTIFIC REPORTS/ WHITE PAPERS

The Biotechnology Centre, UWI, Mona, has been engaged in a Scientific and Technical Cooperation project with The Government of Mexico over many years. The MOU was initially signed in 2018 for collaboration with CIAD and The Biotechnology Centre. The last approved project is entitled “Bioengineering of Yams & Other Selected Caribbean Roots and Tuber Crops Biomaterials for Value-chain Expansion & Pre-commercialization Analyses”. This project was designed to expand value chain of selected Caribbean and Mexican crops. It was specifically set out to facilitate the screening of biochemicals from selected crops, identification of

biomaterials with health benefits, production of innovative by-products and also to conduct pre-commercialization analyses for enhanced competitiveness in the agro-industry. Also, an important objective of this engagement is to strengthen the capacity of the Biotechnology Centre, UWI, Mona and its associated network.

A report was submitted by the Biotechnology Centre through the Acting Director Prof. Delgoda and graduate students, Ms Tamara Grant and Mr Jordon Freeman to close off this cycle. The Project was subsequently renewed for two years, January 2023 to December 2025 period. The Biotechnology Centre is seeking to re-establish its precommercial arm. The aim is to select potential research that may have commercial prospects and develop value added products for the market. This will in return support one of the main objectives of the Biotechnology Centre which is to invest in commercial opportunities that will allow for science to meet the market.

## **PUBLIC SERVICE/UNIVERSITY SERVICE**

### **Prof. Thejani Delgoda**

Details for public service, publications etc for Prof. Delgoda can be found in the Annual Report for the NPI.

### **Dr. Sylvia Mitchell**

- Team member, reviewed HEART-NCVET Cannabis Teaching Units;
- Member, Technical Working Group, Cannabis Licensing Authority, 2016 to Present;
- Member, ABS working group meeting, MEGJC;
- Founding Member, Bamboo Industry Association of Jamaica (BIAJ), 2016 to Present;
- Member, Peckham Steering Committee for bamboo development, PIOJ; Vice Chairman, Bamboo and Indigenous Material Products Standards Technical Committee (BIMPSTC), Bureau of Standards Jamaica;
- Member, Bamboo In Construction Standards Working Group (BICWG), Bureau of Standards; Pension Trustee, Bureau of Standards Jamaica, 2013 to Present;
- Member, Sustainable Rural and Agricultural Development Research Cluster (SRAD), a research group coordination and advocacy team hosted by SALISES, UWI. 2020 to present;
- Member, Society of in Vitro Biology (SIVB), Co-editor of in Vitro Reports (posted on their website every three months), Social Engagement Ad Hoc Committee, Publication Committee and Education Committee;
- Member; Country Representative, International Association of Plant Biotechnology; Organization for Women in Science for the Developing World (OSWD);

- Member of the State of the African Diaspora (SOAD) Seed Bank Project.
- Reviewing Editor for 24 Journals (related to pharmacy, Complementary and Alternative Medicine, Ethnopharmacology, Ecology, Agriculture and Plant Tissue Culture); Reviewed book manuscript for UWI Press: “*Medicinal Plants of Barbados for the Treatment of Communicable and Non-communicable Diseases*” by Damian Cohall, 2<sup>nd</sup> Edition.
- Director and Interim board member of the Bamboo Industry Association of Jamaica (BIAJ).
- St. Catherine 4H Clubs Parish Patron for two years 2023–2024 in first instance
- Certificate of Contribution (November 2022), World Justice Project Rule of Law Index 2022

### **Prof. Marcia Roye**

- Director, Graduate Studies and Research, University of the West Indies, Mona Campus (August 1, 2021–present). Board for Graduate Studies and Research; August 2021–Present Senior Management Team, University of the West Indies, Mona.
- August 2021–Present Board of Director, Mona School of Business and Management
- Member of the Advisory Board of the National Compliance Regulatory Authority of the Bureau of Standards, Jamaica.
- Chair, Technical Committee, Advisory Board of the National Compliance Regulatory Authority of the Bureau of Standards, Jamaica
- Received the S&T XXTORDINEERS JA 2022 Award by Scientific Research Council in recognition of Significant Scientific Achievements in Jamaica. Scientific Research Council, Jamaica. (<https://youtu.be/TTFXKggSEls>)

### **Prof. Paula Tennant**

- Professor of Virology in the Department of Life Sciences, Mona;
- Member, American Psychopathological Society;
- Member, Caribbean Academy of Sciences, Jamaica Chapter;
- Member, Jamaica Society of Scientists and Technologists.

### **Prof. Nouredine Benkeblia**

- Scientific Activities Appointed “Associate Editor”, Canadian Journal of Plant Science;
- Member of the Canadian Society of Plant Science International Symposia;
- Member of the Organizing Committee of the 2nd Asian Horticultural Congress, 26–28 September, 2017, Chengdu, China;



- Member of the Organizing Committee of the International Conference on Food Technology and Nutritional Science, 26–27 June, 2017, Baltimore, MD, USA.

## **AGILITY**

### **INCOME GENERATION**

#### **Special Projects**

*Teaching Climate Justice and Resilience through Ancestral Plant Heritage in Jamaica (ASG)*

The same group from the previous RfR project led by Dr Marisa Wilson, University of Edinburgh plus new members were successful in another project. Co-applicants were Dr Kate Crowley, Edinburgh Climate Change Institute; Prof Judith Carney, University of California; Dr Inna Yaneva-Toraman, University of London; Dr Charmaine McKenzie, Dr Patricia Northover, Dr Sylvia Mitchell, Dr Nicole Plummer, Dr Thera Edwards, The University of the West Indies; and Dr Anthony Richards, Wild Caribbean. Project by the Economic and Social Research Council [ESRC] Impact Acceleration Grant [IAA] and is supporting a workshop in October, 2022, input into the 4H school garden curriculum and an Ancestral School Garden and Cookbook; Duration of project is 13 June to 31 December 2022, and generated £19,985.50.

*Laboratory Services offered to Caribbean Maritime University (CMU)*

During the month of February 2023, the Caribbean Maritime University (CMU) through its course Marine Biotechnology and curriculum requirement of laboratory hours for students, has again partnered with the Biotechnology Centre, UWI to allow students to complete the required laboratory work at the Centre. This is an ongoing partnership and this year eleven (11) students were hosted over two days following a workshop format. The students were accompanied by their lecturer and carried out experiments which were supervised by Mrs Deiondra Tai, Assistant Lecturer and Mrs Carlton Barrows, Senior Laboratory Technologist from the Biotechnology Centre. A Memorandum of Understanding (MOU) is in its draft stage to continue this partnership between the UWI and CMU. This two day workshop generated an income of \$200,000.00JMD.

*Mount Industry School Garden (MISG)*

The Mount Industry School Garden was initiated in 2015 as a joint venture between the Rio Pedro Valley Watershed Management and Development Council (RPVW-MDC), the 4H Clubs, the Optimist Club and the Medicinal Plant Research Group (MPRG) of the Biotechnology Centre, UWI Mona Campus. Since 2022 several plants have been donated to this garden, this continued in January 2023.

*Youth Yam Farmers Training Program (YYFTP) at Jupiter Hill*

A request came in December 2022 from the Rio Pedro Valley Watershed Management and Development Council (RPVWMD) to extend the successful field testing done in St Catherine (Glengoffe, Harker's Hall) with tissue cultured pineapple between 2006–2009 to yam (*Dioscorea* spp). A field site was been identified at Harker's Hall, St Catherine. The training will take on a structured approach with Academics to Farmers, Farmers to Academics, Farmers to Farmers, and from the elders to the youth on all matters yam.

Youth farmers are being identified by the RPV Elder Farmers (each participant has to complete a form). The motto of the program is '*The Cost is Your Success and the Data You Collect*' and was launched in January 2023. On January 13th, 2023, a field training session was carried out. The Elder farmers have been locating yam varieties for this project since December 2022. So far twelve (12) yam varieties from four (4) yam species have been donated for this project, which will be initiated into tissue culture.

**OUTREACH****Yam Farmers Initiative**

A program to reach yam farmers was initiated by Dr Sylvia Mitchell in January 2023 in collaboration with a team of farmers in Harker's Hall, St Catherine and endorsement by the St Catherine 4h Clubs. The program is named the Yam Youth Farmers Training Program and brings together academics, young and old yam farmers, and agricultural educators. This collaboration has proven a good route to take for outreach with several firsts being recorded (such as *D. trifida* true seeds being germinated in vitro). Several field farmer training days and presentations on this program have been accomplished.

A new research cluster began in 2022, which has been named the 'Caribbean Foods for Climate Justice Research Group'. The CFCJ has been successful at getting two projects funded, one which ended in February, 2022 and the other, which is still active.

## Summer Internship Programme

In the summer of 2023, the Biotechnology Centre hosted a total of eight Summer Interns through its yearly Summer Internship Programme during the period July 3 to 28. The participants included five high school 6<sup>th</sup> Form students and three students from the Biochemistry Department, UWI. The students were trained in the areas of Tissue Culture, Molecular Biology, and Basic Analytical Chemistry. The students participated in the extraction of nucleic acid from plants, bacterial cells (plasmid) and insects using various extraction techniques. The participants also got an opportunity to work with the Natural Products Institute (NPI) where they conducted insecticide resistance assays. The Biotechnology Centre continue to engage students who wish to gain laboratory experience.

Four volunteers of the Medicinal Plant Research Group over summer 2023 and two farmers in the YYFTP were recommended by Dr Mitchell to take part in the online Bamboo Training Program, hosted by INBAR, and paid for by the Chinese Embassy.

As of September 2023, The Centre now has three 3 volunteers assigned to the Molecular Biology Lab. They will be working extraction of nucleic acid and PCR analyses for plant viruses.

## VISITORS TO THE BIOTECHNOLOGY CENTRE

### UNESCO Visit

Representatives from UNESCO visited and toured the Biotechnology Centre on June 27, 2023. The UNESCO team met with student researchers where they were given an opportunity to speak briefly about their research being carried out at the Centre. In addition, UNESCO be promoted its fellowships for Caribbean researchers that would be available for application in the upcoming months.

### Caribbean Maritime University (CMU) Visit to the Biotechnology Centre

On October 13, 2022 students in the Marine Biotechnology programme at the Caribbean Maritime University (CMU) toured the Biotechnology Centre and also observed a demonstration of microbial techniques as well as antimicrobial susceptibility testing. Students got an opportunity to view in person some microbial techniques and practices associated with microbiology. This has greatly assisted the students in their understanding of the applications of concepts they learnt in their theoretical courses.

**WORKSHOPS/EVENTS ATTENDED BY BIOTECH STAFF/STUDENTS:**

- Dr Sylvia Mitchell, Senior Lecturer of the Biotechnology Centre attended the following conferences, webinars and workshops in December 2022 attended the doTerra Essential Oils Symposium and the Information Session, Global Institute for Climate-Smart and Resilient Development (GICSRD).
- She also attended SOAD workshop; UWI Child Research Conference; SOAD workshop (Kenya 254-793-747-568; Global Peace annual human rights forum; Future Earth LMIC meeting – upcoming Future Earth SRI conference; Advisory Panel Meeting for CRITICAL, a project in South Africa, Indonesia; 4H St Catherine committee meeting.); Launch, Caribbean Strategy for Climate Resilient Forests and Rural Livelihoods, FAO in collaboration with CANARI; Meeting at Papine High re planning for display for 4H St Andrew.
- In May 2023 Dr Mitchell also attended the Global Peace Annual SDGs Summit 2023; Global Peace Biodiversity Forum 2023; and Paul Reese, Harvesting a selection of the fruits of nature: Isolation of a range of natural products, A UWI 75th Special Lecture, Online.
- Mr Carlton Barrows participated in the Supervisory Management training offered through the Mona School of Business and Management in July 2023.