THE BIOTECHNOLOGY CENTRE

Prof. Marcia Roye · Director (Acting)
Ph.D

OVERVIEW

The Centre started the 2021/2022 year with great dreams and plans to engage its Triple A strategic plan, with enhanced outreach and collaborative alliances with communities far and near, to further showcase the Centre's key efforts at training MPhil and PhD students as distinctive student, and becoming more local, regional and world-acclaimed. Additionally, communities, internationally and locally, were collaborative partners through research and training.

The Centre also hosted the High School Students' Summer Internship Programme in Biotechnology. Over the internship period, the interns learnt how to use the Centre's laboratory instruments, prepare reagents for protein analysis, conduct DNA extraction and analysis through agarose gel electrophoresis with the guidance of the Biotechnology team including Research Group Leaders, Research Assistant, postgraduate students and the scientific officer.

The Academic Staff and Programmes of the Centre are:

a. 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. She also previously served as the Acting Director for the Centre since Prof. Helen Asemota's retirement.
b. 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.
c. Dr. Sylvia Mitchell, FST, Senior Lecturer, coordinates the FST Founda-

tion course, Foun1201 Science Medicine and Technology in Society and leads the Medicinal Plant Research Group at the Centre.

d. Prof. Noureddine Benkeblia, Professor of Crop Science in the Department of Life Sciences, FST, leads the Tree Crops & Metabolomics Research Group.
e. Professor Helen Asemota, Professor of Biochemistry and Molecular Biology retired from her post as Director of the Centre. She served as Director of the Biotechnology Centre, Faculty of Science & Technology (2013-2021) and in the Department of Basic Medical Sciences (Biochemistry Section), Faculty of Medical Sciences for many decades (1991-2021) before retirement. She lead two large research teams consisting of postgraduate students from both faculties, collaborating in the UWI Yam Biotechnology & Biomedical Research Group, for which she was principal investigator for more than twenty-five years. The Biotechnology Centre, the faculties of Science & Technology and Medical Sciences and The Mona campus, thanks Professor Asemota for her service to the university, the Latin American and Caribbean region for the many decades of distinguished undergraduate teaching, postgraduate training, research, mentorship and grantsmanship.
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 are 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

Twenty (20) 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, Jordan Freeman, Dwight Lewis, Kevon Stewart, Antoni Comrie, Cheryl Green, Patrice Pitter** and **Kimberley Foster**. Associated postgraduate students (Department of Basic Medical Sciences [Biochemistry Section]) include: **Kenroy Wallace, 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

- Mr Jordon Freeman, PhD student received the Prime Minister Youth Awards for Excellence for 2021 in the area of Innovation in Science and Technology.
- Kevon Stewart was the Biotechnology Centre nomination to the FST Graduate Council for 2021/2022.
- Ms Kimberley Foster successfully defended her PhD thesis on December 15, 2021.
- Mr Lloyd Johnson an associate graduate student (Department of Life Sciences) of the Centre completed his PhD in 2022. His research topic was entitled "Isolation and characterization of select sweet potato viruses in Jamaica." Supervisor: Professor Paula Tennant, co-supervisor: Prof Marcia Roye.
- In April 2022, Kenroy Wallace, (Department of Basic Medical Sciences [Biochemistry Section]) an associate student, successfully defended his PhD thesis entitled "Biochemical comparison of white yam biomaterials and synthesized anticancer compounds. Award pending.
- Ms. Tamara Grant prepared a proposal in pursuit of upgrade from MPhil to the PhD in Biotechnology degree programme. The title of her proposed research project is "Biotechnological approaches for improved productivity of yams threatened by yam anthracnose disease".
- Mr. Bayode Bamikole is exploring "production of biodegradable plastics from starches of three yam cultivars (yellow yam, white yam, and

negro yam).

- Mr. Nikolai Lutas and Mr. Chevaughn Witter upgraded their enrolment from MPhil to PhD. Mr. Lutas' and Mr. Witter's upgrade seminars were in October 2021 and February 2022, respectively. While Mr. Lutas' research topic is entitled "Investigation of Clonality among Isolates of the Causative Agent of the Coffee Leaf Rust Disease (Hemileia vastatrix) across farms in Jamaica." Mr. Witter's research work encompassed "Evaluation of the effect of alcohol, nicotine and cannabis on heart rate and rhythm of Danio rerio (zebrafish) larvae.

PUBLICATIONS:

Referred Journal Publications:

i. **Miller, F.**, Donovan A. McGrowder, Kurt Vaz, & Kaydian McLean-Miller. (2022). Are dietary supplements, harmful or good for athletes? Journal of Sports and Physical Education Studies, 2(1), 10–20. https://doi.org/10.32996/jspes.2022.2.1.2

ii. Rambaran Theresa F, J Ginigini, PA Mclenachan, CS Bowen-Forbes, **Mitchell S.A.** (2021) Morphological characterization of wild Rubus rosifolius (Rosaceae) plants growing in Jamaica prior to agricultural pursuits. Caribbean Journal of Science 51(1): 1-13 (Feb 3, 2021).

iii. Wallace, K., **Asemota, H.**, & Gray, W. (2021). Acetone extract of Dioscorea alata inhibits cell proliferation in cancer cells. American Journal of Plant Sciences, 12(03), 300

iv. Fevrier-Paul, Adwalia, AK Soyibo, N De Silva, **Mitchell, SA**, C Nwokocha, M Voutchkov (2021) Addressing the challenge of potentially hazardous elements in the reduction of hypertension, diabetes and chronic kidney disease in the Caribbean. Journal of Health & Pollution, 11(30): 1-; DOI 10.5696/2156-9614-11.30.210613 (June, 2021).

v. Fevrier-Paul, Adwalia, AK Soyibo, N De Silva, Mitchell, SA, D McGrowder, M Voutchkov (2021) Trace elements and chronic kidney disease: A cross-sectional study from Jamaica. EMJ Nephrol. 2021,:9[1]:79-90.

vi. Blythe-Mallett, A., Aiken, K. A., Segura-Garcia, I., Truelove, NK., Webber, MK., **Roye, ME.**, & Box, S. J. (2021). Genetic composition of queen conch (Lobatus gigas) population on Pedro Bank, Jamaica and its use in fisheries management. PlOS one, 16(4), e0245703.

BOOK & BOOK CHAPTER

i. Amarakoon I.I., C-L. Hamilton, **S.A. Mitchell, P.F. Tennant** and **Roye, M.E.** (2022). Chapter 28: Biotechnology, Part VII Technology Applications using biological systems, pgs 549-561, In: S. Badal and R. Delgoda (Eds) Pharmacognosy: Fundamentals, Applications and Strategy. Elsevier Academic Press, USA. 2nd Edition with lab exercise. 2022/05/15.

ALLIGNMENT

PAPERS PRESENTED

i. **Mitchell, SA** and AR Richards (2022) Assessment of bioprospecting and biopiracy in the Caribbean, SEB / ISE Joint Hybrid Meeting, May 2Z8-31, 2022; presented paper May 31st; also assisted Marc Williams with a session on botanical beverage fermentation, formulation and evaluation.

ii. **Mitchell, SA** (2022) Data analysis and natural suggestions for weathering the COVID storm in the Caribbean, Caribbean Food Security Summit 'Global impact on food security - Caribbean Resilience', Food Hygiene Bureau. May 10, 2022.

iii. **Tai, D.**, Holness, S., Tennant, P., **Roye, M.** (2022). Small-RNA next generation sequencing, a tool for discovery virome of Jamaican crops. FORECAST virtual conference 2022, UWI, Mona

iv. **Marriott, C.**, Amarakoon, I., Judith Brown, J., **Roye, M** (2022). Next Generation sequencing of geminiviruses in Jamaica. FORECAST virtual conference 2022, UWI, Mona.

v. Wilson M, **Mitchell SA**, P Northover, T Esnard, R Segal, A Richards, H Johnson (2021) Afrodescendant Seed Infrastructures: Decolonising the Conservation, Use and Value of Caribbean Plant Genetic Resources, IN: Interdisciplinary approaches to conserving endangered crop diversity, agricultural and food heritage, Panel P007b Challenges and Opportunities for Grassroots Conservation, RAI Anthropology and Conservation Virtual Conference, October 25-29, 2021.

vi. **Mitchell SA** (2021) FST in recognising World Teachers' Day 2021, October 5th, is hosting videos featuring "My FST Teaching Experience" as shared by STEM Educators in the Faculty as well as the student body expressing their appreciation.

vii. **Mitchell SA** (2021) Using biotechnology to protect and harness the potential of our biodiversity for sustainable development in the Carib-

bean. At: Forum on Science Solutions for Environmentally Sustainable Agriculture. Hosted by US Embassy and UWI, October 20, 2021.

viii. **Mitchell SA** (2021) Masks & Kids. In KIDS & COVID-19, A virtual Town Hall Meeting, The Diaspora Engagement Agenda, Hosted by Authentic Caribbean Foundation; October 24th, 2021.

ix. Wilson M, **Mitchell SA**, Northover P, Esnard T, Plummer N (2021) Revaluing Afrodescendant Seeds in the Age of the Plantationocene: Bridging Climate and Reparatory Justice. In: Climate Change and Social Justice, Reflections on COP26 from the Geographies of Social Justice Research Group, University of Edinburgh. Pg 12-15. https://www.ed.ac.uk/files/atoms/files/cop26_social_justice_research_group_reflections_booklet_-_reduced.pdf

x. **Mitchell SA** (2021) Tailoring Biotechnology to better serve Afrodescendant farmers and rural development in the Caribbean. SRAD Online Speaker Series, University of the West Indies, September 1, 2021. SRAD Speakers Series, SALISES, UWI. https://www.youtube.com/watch?v=wUY9cachy0c.

Newspaper Articles

i. **Mitchell, SA** (2022) Raining Science: Reporting from the Science Desk: Our line in the sky, Freedom Come Rain newspaper, Vol 2(42), pgs 6,22; 2022.05.21

ii. **Mitchell, SA** (2022) Raining Science: Reporting from the Science Desk: Sun's halo, Freedom Come Rain newspaper, Vol 2(41), pgs 6,9;22, 2022.05.14

iii. **Mitchell, SA** (2022) Jamaica's Nooks and Crannies: Jamaica's medicinal plants – The Pimenta racemosa – Bay Tree, Freedom Come Rain newspaper, Vol 2(31), pg 23, 2022.03.05

iv. **Mitchell, SA** (2021) Rainforest: Brand Jamaica, Jamaica's medicinal plants, The Annonaceae family of fruit, Freedom Come Rain newspaper, Vol 2(13), pg 14, 2021.10.30.

v. **Mitchell, SA** (2021) Revealing the Untold Stories of Our Scientists – Professor The Hon. Gerald Lalor, OM, OJ, CD – 'A Giant of a Man', Freedom Come Rain newspaper, Vol 2(12), pg 15, 2021.10.23

TECHNICAL REPORT/SCIENTIFIC REPORTS/WHITE PAPERS

The Jamaica-Mexico Bilateral Technical and Scientific Cooperation Project was renewed for two years, January 2020 to December 2021 period. The MOU was signed in 2018 for collaboration with CIAD and The Biotech-

nology Centre through Prof. Helen Asemota and her team. The expected project outcomes are expansion of value chains and technologies for health promoting products as well as other value-added products that boost agro industries. AdditionallyAdditionally, an initiative is to strengthen the capacity of the Biotechnology Centre and its associated network. This cycle is the last phase of the project and saw the inclusion of The Universidad Panamericana led by Dra Julieta Domínguez Soberanes. The emphasis for this cycle was the proposed development of value-added products for the Sports Food Market. It was set out to identify food sources especially those from yams that are ideal for the possible production of nutraceuticals with sporting performance enhancing effects. With this new focus the new project title was coined as "Screening, Assessment and Bioengineering of Naturally Occurring Biomaterials/Polymers of Jamaican Tuber Crops for Functionality Enhancement and Commercial Products Innovation".

On October 9, 2021 Professor Juliet Dominguez Soberanes reported that a poster on "Cuisine innovation as a driven sensory methodology to develop a yam snack as a value-added product" that was developed through the research project was accepted for presentation at the SenseAsia 2021-Asian Sensory and Consumer Research Symposium held on December 5-7, 2021. Dr. Julieta Domínguez-Soberanes subsequently received the Right Sensory Mix poster prize 2021 from Derval Research for the research she lead on "Cuisine innovation as a driven sensory methodology to develop a yam snack as a value-added product". The award was presented during the 4th Asian Sensory and Consumer Research Symposium, hosted by Elsevier. The research project was funded by the Mexican Agency for International Development Cooperation AMEXCID, and is a collaboration between the Food Business Management School of the Universidad Panamericana, in Aguascalientes México, represent- ed by Dr. Domínguez-Soberanes, Antonia Estéves-Rioja, Gerardo Erwin Alvarado-Ponce, Carolina Hernández-Lozano; The Biotechnology Centre of the University of West Indies in Mona, Jamaica, represented by Professor Helen Asemota; and the CIAD (Centro de Investigación en Alimentación y Desarrollo) repre sented by Aarón F. Gónzalez-Cordóva and Gustavo A. González-Aguilar;

A report was submitted by the Biotechnology Centre through Prof. Asemota and her graduate student, Ms Tamara Grant to close off this cycle. An official request will be made of CIAD for the renewal of the project.

PUBLIC SERVICE/UNIVERSITY SERVICE:

Prof. Helen Asemota

- Ordained Minister (Reverend) with the Holiness Christian Church of Jamaica; Chairman of Board - International Centre for Environmental and Nuclear Sciences (ICENS); Member, PSOJ Innovative Committee; Member, NHMIJ Board, JIS; Chairman and Co-Founder, Imade Asemota Foundation for Sickle Cell Research and Patients' Welfare (IAF), North Carolina, USA; Director, Biotechnology Centre (FST, Mona); Country Representative, International Measurement Convention (IMEKO) Rep. in Jamaica; STEM Women of Science Concave (SWOC), USA. Founding Member; Conveyor, the 2016 United Nations University Biotechnology Programme for Latin American and Caribbean countries (UNUBIOLAC) Activities; General Co-chair, the 2017 IMEKO TC19 International Symposiumin Aguascalientes, Mexico.

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, 2nd Edition.

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/TTFX-KggSELs)

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. Noureddine 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, 26-27June, 2017, Baltimore, MD, USA.

AGILITY

INCOME GENERATION

SPECIAL PROJECTS

UWI Bamboo Project

Work continued with standards development by participation in the Bamboo and Indigenous Materials Products Standards Technical Committee (BIMPSTC). Work also continued with developing in vitro methods for conserving and multiplying bamboo varieties. The Biotechnology Centre is maintaining a collection of bamboo obtained from Clapham, Lamb's River, Harker's Hall and Peckham, 118 accessions in all, planted in 2017 in the UWI-Biotechnology Research Plot. Data is taken yearly on their growth. This year data taken included Base Circumference, Width of the culm, diameter of inner hole, and internode length. The number of culms produced per year per clump were also recorded. This year, three undergraduate teams from the Faculty of Engineering, supervised by Dr Omar Thomas, analysed these bamboo for density; tensile, flexural, and compression strength; and as a concrete reinforcement (slump and compression test).

CVNG3015, Civil and Environmental Engineering Department, FOE

a. Bamboo as green alternative to steel for reinforced concrete ground slab, 5 students
b. The engineering feasibility of bamboo as a structural component in Jamaica's construction industry, 6 students
c. Comparing bamboo and coconut fiber as concrete reinforcement material, 2 students

The Biotechnology Centre obtained permission from the Jamaica Bauxite Company to plant bamboo on mined-out land in Rio Hoe Pen, Clapham as part of the national bamboo project. The land, to be used for bamboo research, is designated by enclosure plan 069-02-003-204 (7 hectares @ Vol 1443, Fol 551) in Rio Hoe Pen, Moneague PO, St. Ann. The National Land Agency produced a lease agreement for the land to be leased to UWI for a period of 25 years at a rental of $100,000.00 per annum with 5 yearly rent reviews. We are presently, with assistance of the other partners in this project, namely the Bureau of Standards and PIOJ seeking for a reduction of this rental due to the research nature of the request. This is needed to import two new species of bamboo species. NEPA approval is awaiting assignment of the Clapham land to the Biotechnology Centre, UWI. This activity is ongoing.

- Recipes for Resilience: Engaging Caribbean Youth in Climate Action and Afrodescendant Food Heritage through Story Mapping and Song (RfR). The Biotechnology Centre joined forces with UWI academics from other departments and faculties in a project led by Dr Marisa Wilson, a Senior Lecturer in Human Geography in the School of

GeoSciences, University of Edinburgh. The project was co-developed with Co-Investigators at the University of Edinburgh (Dr Kate Crowley), The University of the West Indies (Drs Thera Edwards, Sylvia Mitchell, Patricia Northover and Nicole Plummer), and project partner, the Caribbean Youth Environment Network (CYEN). Funded by the United Kingdom Research and Innovation (UKRI), Arts and Humanities Research Council. (AHRC) (**£ 9,994.00**). The project ran from Sept 2021 to Feb 2022. Ethics approval was granted by UWI, UoE and CYEN. Outputs included four online workshops, two Story Maps, one song related to food and climate resilience, a short article, a BBC Scotland interview, a COP26 activity at Nourish Scotland, and a website: http://www.caribbeanfood4climate.com/.

- 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, **£19,985.50**)

OUTREACH

Undergraduate Symposium

- Prof. Marcia Roye and team hosted 'NEXT STEPS', a virtual undergraduate symposium held on May 23, 2022. The aim was to have the undergraduate hear from a few of alums who are now successfully pursuing various careers or continuing their studies. There were approximately 200 students in attendance. The students were also given tip on preparing a resume. Speakers included: Dr. Keri Smith: Asst. Professor at University of North Carolina at Chapel Hill; Dr. Lloyd Johnson: Post-doctoral fellow, Ryerson University, Canada; Dr. Natwaine Gardener: Principal Director (Science) at Ministry of Science, Energy and Technology (MSET); Dr. Chenielle Delahaye-McKenzie: Science Programme Manager, MSET, CEO/ Founder De La Enzie Essen-

tials Ltd.; Miss Mandessa Jackson: Technical Manager of Microbiology, Scientific Research Council (SRC); Mr. Kevaugn Prout: MSc. Biotechnology, Alcorn State University, Mississippi; and Mr. Kevhvan Graham: Laboratory Analyst and Researcher Molecular Biology Technological Solutions Limited (TSL). The event was a major success and team is e hoping to make this annual event to mentor undergraduate students as they transition to the "next steps".

Undergraduate Research

- Three Faculty of Medical Sciences students carried out their undergraduate research project at the Biotechnology Centre under the supervision of Dr Mitchell.

Short Courses

- Biotechnology Online Workshop (tissue culture and wine making). Participants were Shortwood Teacher's College trainee teachers. This short course led by Dr Mitchell, February to March 2022, was carried out online and included one visit to the Biotechnology Centre. The participants developed course material for teaching tissue culture in our schools, initiated plants into tissue culture at home, and made home-made wine. Earned $90,000.
- On March 25, 2022 the Biotechnology Centre hosted seventeen (17) 5th form students from the Hillel Academy to participate in the Biotechnology workshop. The students were introduced to concepts in biotechnology and genetic engineering. The specific topics included recombinant DNA technology, genetically modified organisms, DNA replication, and protein synthesis. The day's activities include the following activities: Extraction of plasmid DNA from bacterial culture; restriction fragment length polymorphism (RFLP); agarose gel electrophoresis. Students were first introduced to the micropipettes and instructed on how to properly use them. With that knowledge and with supervision, they independently extracted plasmid DNA for E. coli cultures. The extracted plasmid DNA was subsequently digested using restriction enzymes. Finally, the students were allowed to load their digested DNA for agarose gel electrophoresis. The results of the experiment were later sent to students for analysis.
- The Mount Industry Medicinal Plant Gene Bank and Garden is a collaborative effort of the UWI Biotechnology Centre, several St. Catherine groups (4 H Club, Optimist Club, JAS and RADA), the Mount Industry Primary School, the 4H new MI group, and the Rio Pedro

Watershed Management Council. Upkeep and monitoring is done by the 4H staff and students. On Jan 28th, 2022, Dr. Mitchell visited the garden and planted a bay which joined lime tree, aloe, fever grass, otaheite tree, sarsaparilla, tuna and tissue cultured pineapple supplied earlier. The first bay tree planted was at Hope Gardens in 2006. It is now a big tree. The second one was at Mount Industry. The young 4H clubbites were very enthusiastic about trying to identify the tree. Living in the middle of the forest does not ensure students know plants! They were so excited to get the bay into the ground. More trees will be added to the space as the garden keeps growing. For example, a tangerine tree was planted in the garden from a seed dropped by students.

- The 'Inaugural Biotechnology Research Seminar Series' was coined by founding members of the Biotechnology Graduate Students Soci- ety (BGSS). The Biotechnology Graduate Students Society (BGSS) was formed on June 18, 2021 to cater specifically to the needs of post-graduates associated with the Biotechnology Centre. Graduate students within the UWI Biotechnology community have over the years, produced exceptional research, many of which could potentially be the next drivers of science-based business and economic growth. The leaders of the BGSS, have identified this opportunity and have taken the initiative to play an active role in helping to manage the transition between the academic and commercial contexts.

  Guided by the three C's: Connect, Collaborate, Commercialize, our aim is to use this platform to connect both local and international researchers and use this coalition of intellects to forge unique collaborative efforts. The seminar series were held on a quarterly basis. This ongoing project will highlight students' research, both past and present, in four areas of biotechnology such as, Medical, Agricultural, Industrial and Environmental.

  There were three staging of the Seminars on July 1, 2021, October 29. 2021 and February 25, 2022 respectively. The first staging was under the sub-theme Medical Biotechnology: "Strengthening global reproductive health: A novel protein is the target for vaccination" Our speaker was Ms. Lamar Thomas, PhD candidate, Microbiology and Immunology, Binghamton University, USA. Ms. Thomas, a past student of the Biotechnology Centre and the Faculty of Science and Technology shared her research on a novel protein Sak_1753, found in all sequenced strain of Streptococcus agalatiae its sub cellular location and assessing its role in the colonization of the vaginal tract.

The second Seminar Series (BRSS) was presented under the sub-theme Industrial Biotechnology: Navigating a Non-Traditional Career in the Sciences. Dr. Yolanda Nesbeth, PhD- Worldwide Medical Lead for Women's Cancers at Bristol Myers Squibb, New Jersey, USA shared the story of her career transition from The UWI to Dartmouth College to Celdara and her current post at Bristol Myers Squibb. She encouraged persons to take advantage of all the opportunities and resource persons that are available at the institutions. A key point made was to ask persons in your network (lecturers, peers, etc.) if they knew about opportunities and to let them know what you were interested in pursuing.

The third staging of the Biotechnology Research Seminar Series sub-themed Agricultural Biotechnology: Pursuing Growth, Levelling Up. Speaker, Dr. Chenielle Delahaye-McKenzie, PhD- Science Programme Manager at the Ministry of Science, Energy and Technology and CEO of De La Enzie Essentials Ltd, and past student of the Centre shared the story of her journey through graduate school and her goals. She also spoke about how her research in agriculture helped to inspire her to create her business while staying in Jamaica. A key point made was to seek out additional knowledge that may be needed to complement the knowledge that is already known. She encouraged persons to take advantage of all the opportunities that are available, learn from them and keep focused on the goal you have in mind. She also pointed out the benefits she received from going to various conferences and outings even if they weren't directly connected to her research field.

The seminars were coordinated by the founding members of the Biotechnology Graduate Students Society (BGSS) Ms. Kimberley Foster, Finalizing PhD candidate, Mr. Antoni Comrie, MPhil candidate, Ms. Racquel Wright, finalizing PhD candidate and Ms. Trichel Oconnor, MPhil candidate, from the Biotechnology Centre with the assistance from Ms. Karen Stewart, Senior Administrative Assistant at the Biotechnology Centre, as well as Mrs. Terry-Ann Collins-Fray, Administrative Secretary, and team at the Dean's Office, Faculty of Science and Technology. A special thank you was expressed to Ms. Karen Stewart for conceptualizing this project and for her unwavering effort in leading charge.

Other faculty and students leading out during the seminar series include: Prof. Marcia Roye, Director Office of Graduate Studies & Research brought greetings on behalf of the Faculty of Science and Technology. Dr. Sylvia Mitchell, Graduate Coordinator at the Biotechnology

Centre, gave an overview of the Centre's mandate and programmes of study available at the Centre. Seminar Moderators were Ms. Donella Dawkins, MPhil student and member of the Biotechnology Graduate Students Society (BGSS) and Ms. Chantal Marriott, member of the BGSS Executive. Mr. Kevon Stewart, member of the BRSS Organizing Committee and Mrs. Kimberley Foster-Francis, member of BGSS Executive and BRSS Organizing Committee, gave an overview of the Biotechnology Research Seminar Series (BRSS) along with introductions to the Biotechnology Graduate Students Society. Mr. Fabian Miller, BGSS member and Mr. Lowen Williams, BGSS member, gave the introductions to the seminar speakers. Ms. Julian Bailey, BGSS member, Dr. Racquel Wright, member of BGSS Executive and BRSS Organizing Committee and Ms. Princess Bell, PhD student and BGSS member were responsible for seminar series question-and-answer sections. Ms. Venessa Williams, BGSS member and Ms. Princess Bell, PhD student and BGSS member, gave the vote of thanks over the seminar series. A total of 100 participants attend the virtual seminar series over the period. The seminars attracted persons internationally as well persons in business and industry. Mention was made of improved collaboration towards the integration of business and science towards entrepreneurship. Contacts were exchanged in an effort to improve the collaborative effort across faculties and international interests. As we embark on the continuation of this initiative at the Biotechnology centre, we anticipate continued participation and support from all stakeholders.

VISITORS TO THE BIOTECHNOLOGY CENTRE

- The Centre accepted five interns from July 5, 2021, to August 13, 2021, for three days per week (Tuesday to Thursday). The students were trained in the areas of tissue culture, molecular biology, and basic analytical chemistry. The students participating in this year's internship programme included both university and high school students: two students from FST pursuing Microbiology and Chemistry majors, two students attending from universities in Florida, USA, and one student from Kingston College. There were three females and two males' participants, all pursuing science programmes at their respective schools.

  The students expressed that they did not get a chance to sit in a physical lab due to the covid-19 pandemic and as such consideration was

given for the opportunity to gain this experience. All students were supervised by the Senior Laboratory Technologist, Mr Carlton Barrows and Research Assistant Ms Deiondra Tai, along with two graduate students, Tamara Grant and Damien Neath.. They were assigned specific tasks that were completed each week concluding a competency test. The list of tasks are as follows: DNA extraction; tissue culture; phytochemical extraction and analysis; inventory taking; wine making; tree transplanting (seedling); and equipment management and usage. At the end of the internship the students were required to submit a laboratory report and a reflective essay on their experiences. They were given a letter indicating that they have completed an internship with the Centre. The Biotechnology Centre continue to engage students who wish to gain laboratory experience.

Five Shortwood Teacher trainees visited the Biotechnology Centre for their field trip on February 9, 2022. They were shown the tissue culture facility and were given instructions on how to do tissue culture and make wine at home.

WORKSHOPS/EVENTS ATTENDED BY BIOTECH STAFF/STUDENTS:

- Dr Sylvia Mitchell attended the following conferences, webinars and workshops: International Bamboo and Rattan Organization (INBAR) webinars on bamboo weaving, supply chain integration, tropical sympodial bamboo, August 24, October 11, 26-28, November 4, 29, Dec 14-16, 20, 2021; Consultation Seminar: Jamaica: Catalysing the Sustainable and Inclusive Transformation of Food Systems, Food System Assessment, a global initiative launched by EU, FAO and CIRAD. September 7, 2021; SRAD lecture series webinar, Tamisha Lee, President, Jamaica Network of Rural Women Producers, Challenges and Experiences of Rural Women in the midst of COVID-19, SALISES, Sept 30; Good Standardization Practises Training, BSJ, October 11, 2021; BIDEM 2021 International Caribbean Diaspora Entrepreneurs' Conference and Trade Show, Magate Wildhorse Ltd., October 15, 2021; WIPO Workshop on Examination in the Patent Cooperation Treaty (PCT) National Phase, WIPO in cooperation with JIPO and TTIPO, October 19-21 and 26-28; Anthropology and Conservation Virtual Conference, Hosted by Royal Anthropological Institute, of Great Britain and Ireland, October 25-29; National Training Seminars for Coffee Rust diagnosis and screening, funded by the International Atomic Energy Agency (IAEA), hosted by SRC, November 29-30 and December 6-7,

2021; Agricultural Genome to Phenome Initiative (AG2PI) webinars Nov 12, 17, Dec 15, 2021, February 8, 9, 16, 24, March 16, April 20, May 18, 2022, June 23, July 12, 2022; National Certification Body of Jamaica (NCBJ) Stakeholders Forum, in celebration of World Quality Week, Topic was Sustainability: Improving our Products, People and Planet, November 12, 2021; Society for Scientific Advancement 10th Annual Conference, Nov 18-19, 2021; The impact of extrativism: Eco-cide, Climate Crisis and Human Rights Abuses in the Caribbean, Centre for International Environmental Law (CIEL), November 30, 2021; 2nd National Biodiversity Conference: Living in harmony with Nature: Issues, Challenges and Solutions, Ministry of Housing, Urban Renewal and Climate Change (MHURECC), December 7-8, 2021; Data as Pow-er: The Next 100 Generations of Indigenous Data Sovereignty by Prof Keolu Fox, Edinburgh Centre for Data, Culture & Society, University of Edinburgh, December 13, 2021; Innovative Tools: Emerging digital applications in Climate-Smart Agriculture, Regional Climate Resilience Workshop, UWI, CSGM, CCRIF-SPC, CIF, IDB: Day 1 – Crop Modelling; Day 2 – Are you Climate Smart?; Day 3 – Innovative Caribbean Impact Assessment Tools, Jan 11-13, 2022; Endurance Nutrition For Fitness & Sports Success, Jamaica Island Nutrition Network, February 23, 2022; JIPO UPOV meeting, Plant Variety Protection and the Cannabis Industry, JIPO, Feb 24, 2022; Features of the Patent and Designs Act, 2022, JIPO, March 29, 2022; Forum on Public Financing for Sustain-able Development in the COVID-19 & War Era and Beyond, SALISES, April 7, 2022; GPN farmers workshop, June 23, 2022; Global Peace 4th Anniversary Event, July 18th, 2022.

- Mr Carlton Barrows participated in the Jamaica 60th Independence celebrations organized by the government of Jamaica.

STRATEGIC PLAN

BIOTECHNOLOGY CENTRE - STRATEGIC PLAN 2017 - 2022			
TRIPLE A	**CAMPUS STRATEGIC OBJECTIVE**	**DEPARTMENT STRATEGIC OBJECTIVE**	**PERFORMANCE INDICATORS**
Access AC1	**To be a University for all.**		
		1.1 Work with low income community	**1.1.1 Indication of low community collaboration**
		1.2 MPhil/PhD	**1.2.1 The Centre has direct and associate research students, annually it has increase, increase in MPhil/PhD registration**
		1.3 MSc	**1.3.1 Evidence of registered MSc programme**
		1.4 Short Courses	**1.4.1 Several short courses executed by face to face contact and online**

AC2	**To be the University of first choice for alumni and non-student customer seeking products and services for all things Caribbean.**	**2. 1 To produce regular Newsletters (online & through Mona Messager).**	**2.1.1 Newsletter series sent out**
		2.2 To produce reviews for the Biotechnology Centre with Graduate Students.	**2.2.1 Research students partaking in review publications with supervisors**
		2.3 Product Development & Bioskills.	**2.3.1 Students participate in products development locally and internationally**
AC3	**Improving the quality of Teaching and Learning and Student Development.**	**3.1 At least once a semester should attend a CETL training.**	**3.1.1 At least one staff attending CETL training per year**
		3.2 Bring students together to present an academic talk on their choosen topic (Contemporary topic) each semester.	**3.2.1 Students particpate through seminar presentations**
		3.3 Bring together students for a student lime each semester.	**3.3.1 Students meeting at the Centre and faculty level**
AC4	**Improving the quality, quantity and impact of Research, Innovation**	**4.1 Increase student engagement in problem-solving research**	**4.1.1 Student group meetings with supervisors**

			1.2.3 Number of collaborators
			1.2.4 Evidence of contact list
AL2	**Increase and Improve Academic/Industry Research Partnerships**	**2.1 Improve academic/ industry partnership**	**2.1.1 Number of partnership activities done with industry**
		2.2 Seek internship with industry for students	**2.2.1 Number of programmes involving partnership with organizations**
		2.3 Seek input of experts from industry to train students	**2.3.1 Number of students being co-supervised by industry experts**
AL3	**Promote a cohesive Single UWI Brand Consciousness**	**3.1 To promote UWI consciousness locally, regionally and internationally**	**3.1.1 UWI brand promoted at research days, conferences and on collaborative visits internationally**
Agility AG1	**Establish a physical presence of The UWI on all continents**	**1.1 Alliances with foreign universities in different continents**	**1.1.1 Evidences of staff and student exchanges**
AG2	**Restore Financial Health to the UWI**	**1.2 Improve management of financial standings**	**1.2.1 Evidence of financial savings and generating**
AG5	**Foster the Digital Transformation of The UWI**	**1.5 To encourage and enhance transformation from paper-based to a digital Centre**	**1.5.1 Reduced number of physical printing and improved digital storage**