# THE BIOTECHNOLOGY CENTRE

**Professor Helen Asemota,** BSc, *Univ. of Benin, Nigeria*, MSc, *Ahmadu Bello University, Nigeria*, PhD, *Univ. of Benin/Frankfurt*, Germany
**Director**

## INTRODUCTION

In the period under review, The Biotechnology Centre focused on research training and outreach services to both local and international communities. In keeping with its global outreach endeavour, the Centre started the year 2016/2017 with the conveying of the weeklong International Training Workshop in Agro-biotechnology in collaboration with the United Nations University Biotechnology Programme for Latin America and the Caribbean (UNUBIOLAC) countries, from August 8 to 12, 2016 at Mona. Fifty one (51) trainees from 8 Latin American & Caribbean countries attended the training and the Trainers were pooled from the UWI Campuses and Latin American countries. Within the year, the Centre also attracted Pacific Scientists from 10 Pacific Islands for training at the Centre in collaboration with CARDI. The Centre then ended the year collaborating with Dr. Rachel Irving of Basic

Medical Sciences along with the University of East London in the London Symposium "Sports Meet Science: Jamaica Quest for Greatness" held in London, UK, July 29–30, 2017; and with the Pan-American University of Mexico, as well as the University of Salento, Italy and internally with the International Centre for Environment and Nuclear Sciences (ICENS), in the staging/conveyance of the IMEKO TC19 International Symposium on Measurements and Instrumentation, August 2–4, 2017 in Aguascalientes, Mexico, with the Director of the Centre, Professor Asemota, as the General Co-Chair along with Professor Aime of the University of Salento, Italy.

## BIOTECHNOLOGY CENTRE STAFF

**The Academic Staff** at the Centre are Professor Helen Asemota (Director, also Professor of Biochemistry and Molecular Biology at the Basic Medical Sciences of the Faculty of Medical Sciences – FMS, Yam Biotechnology & Biomedical Research Group Leader), Professor Paula Tennant (also Professor of Virology at the Life Sciences Department of the Faculty of Science & Tecnology – FST, Molecular Virology Research Group Leader), Professor Marcia Roye (promoted to Professor in the period, Associate Dean of Graduate Studies, FST, Geminivirus Research Group Leader), Dr. Sylvia Mitchell (Medicinal Plants Research Group Leader) and Professor Noureddine Benkeblia (Professor at the Life Sciences Department of FST, Tree Crops & Metabolomics Research Group Leader). All of the Centre's Academics teach courses at the Basic Medical Sciences or Life Sciences departments or within the Faculty of Science and Technology foundation programmes.

**The Support Staff** of the Centre in the period were: Mrs. Shivanjali Dondapati (Research Assistant to Professo Asemota), Ms. Latoya Bailey (Research Assistant to Professor Roye), Ms. Lamar Thomas (Research Assistant to ProfessoTennant, later Senior Laboratory Technologist), Mr. Carlton Barrows (Laboratory Technician), Mrs. Karen Stewart (Senior Administrative Assistant II), Mr. Roy Dwyer (Handyman), Ms. Elizabeth Mills (NSF BREAD Yam Project Field Assistant), Ms. Shernette Banks-Ashman (Laboratory Attendant).

## TEACHING & RESEARCH

### Postgraduate Students

Post-graduate Student Researchers at the Centre were 24 in the year under review. Those studying for the PhD or MPhil in Biotechnology degrees in the period, included: Kimberly Foster, Chantal Marriott, Princess Bell, Nikashae Scott, Lowen Williams, Chenielle Delahaye-McKenzie, Cheryl Green, Nikolai Lutas, Tamara Grant, Vanessa Williams, Latoya Bailey, Chevaughn Witter, Deiondra Robinson, Racquel Wright, Rashaun Harris, Sharae Clark, Julian Bailey, Jordan Freeman and Shivanjanli Dondapati. The Centre also catered for some students registered in other departments but conduct all or aspects of their research at the Centre, namely: Ryan Francis, Keaton Logan, Melissa Williams, Sasha-Gay Williams and Kenroy Wallace of the Department of Basic Medical Sciences. The students were attached to various research groups of the Centre depending on their research supervisors.

### Research Areas

The research areas in the period under review, were mainly agro-focused and biomedical and are shown under the various research groups (with the group leaders):

**Molecular Plant Virology Research Group** – led by Professor P. Tennant (in partnership with Life Sciences Department). Using a number of advanced scientific techniques approximately ten viruses were detected in food crops such as papaya, pumpkin, citrus and sweet potato. Knowledge of this distribution has led to an understanding of the effect of virus and viroid diseases on agricultural production.

**Molecular Virology Research Group** – led by Professor M. Roye. Research on Geminiviruses. The group has identified over 22 geminivirues infecting crops and weeds in Jamaica. This has helped to develop disease management strategies for the associated crops. Research on HIV has shown that antiretroviral drug resistance is associated with children and

adults infected with HIV in Jamaica. This information can be used to develop individual treatment plans.

**Medicinal Plant Biotechnology Research Group** – led by Dr. S. Mitchel, Senior Lecturer. This group has developed advanced propagation protocols for approximately 30 medicinal and economically important plants. Through this group, the Centre maintains an in vitro gene bank for various crop/plants such as ginger, turmeric, sarsaparilla, chainy root, sugar loaf, cowboy pineapple, sweet potato, yellow yam, negro yam, sweet yam, Lucea, St. Vincent, yampie, cassava and Guinea hen weed and an in vivo medicinal plant germplasm garden. The in vitro physiology of the Smilax and Dioscorea has also been studied. The group collaborates with the UHWI microbiology lab for anti-microbial tests; TRAMIL, SRC for biochemical analysis of turmeric, the New York Botanical Gardens in ethnobotanical studies in Jamaican communities; and the Bureau of Standards for the development of standards in the nursery, plantation and making of biochar from bamboo, while the Group also conducts field studies of medicinal and economically important plants. The group motto is "Harness the potential of our plants for health and wealth".

**Yam Biotechnology & Biomedical Research Group** – led by Professor H. Asemota (Director) aided by Dr. A. Wheatley (and operated in partnership with the Basic Medical Sciences Department). The bio-interdisciplinary research areas include: improvement of production, storage and utilization of Yam as food, as medicine and as industrial raw materials, inclusive of value-chain expansion studies, and innovation of value-added products with a theme of "From Farm to Finished Products". Tools used are from biotechnology, biochemistry, molecular genetics, nanobiotechnology. Work includes analyses of yams, cocoyams and dasheens biodiversity, DNA profiling; studies on Yam Starch quality and applications for commercial purposes, bioengineering of yam biomaterials; biochemical studies on bioactivity of plants' extracts and associated metabolic mechanisms of action of secondary metabolites/natural products/supplements in normal and diseased states in selected non-communicable diseases, experimental diabetes, hypercholesterolemia,

cancer and drug abuse; Studies of Glycemic indices and applications (in collaboration with the SRC) and Coffee rust disease (in partnership with the SRC and IICA). Other research areas of the group are: Moringa phytochemistry and Moringa-based nutritional products derivation; Biomagnetic Therapy and associated metabolic effects in diabetes mellitus. Collaborates with researchers in Department of Surgery, TMRU, Community Health, Physics, Chemistry and Chemical Pathology. The group also embraced Cannabis-based principles and exploitation for technology derivation; antibodies production against agents of Yam diseases; Yam Anthracnose research and biosensor fabrication and field testing (in an NSF BREAD PHENO Project in collaboration with SUNY) as part of the development of low-cost technology to aid smallholder farmers in developing countries. The group extensively collaborates and networks with various former students of the group serving in other departments and with various local (NCU, STEA) and foreign experts/institutions.

**Tree Crops Research Group** – led by ProfessorNoureddine Benkeblia (in partnership with Life Sciences). The research group's aims to investigate the application of modern agronomic technologies, particularly metabolomics, considering various aspects of specific tree and aromatic local and regional crops such as onion, pimento, ribena, soursop, custard Appl etc. with a primary objective to introducing them as profitable venture, and new products in the local and regional value chain, at first instance. The outcomes of the laboratory will be contributing in increasing the productivity, the quality attributes, storability and potential by-products of these crops, aiming to develop the agro-processing sector, contribute to the self-sufficiency in some of these commodities (particularly onion which is mostly imported) food security and rural development and prosperity in Jamaica. The group collaborates with many local, Caribbean and overseas laboratories in the Caribbean, USA, Mexico, Brazil, France, UK Ireland and japan among other laboratories.

### Teaching

In addition to the research and supervision of post graduate research students, the academic members of the Centre during this period, were involved in teaching at both undergraduate and postgraduate levels at other departments and/or in the Faculty Foundation programmes.

**Undergraduate courses** taught were within the Department of Basic Medical Sciences (BMS) of the Faculty of Medical Sciences (FMS) and the Department of Life Sciences of the Faculty of Science and Technology (FST). The courses included: Biotechnology I, Biotechnology II, Molecular Biology I, Molecular Biology II, Introduction to Microbiology and Molecular Biology, Food Microbiology and Biotechnology, Plant Biotechnology, Science Medicine and Technology, Biochemistry for Physical Therapy Students, Biochemistry Laboratory Research Project, and Plant Biochemistry & Physiology, along with their associated lab classes. In the Department of Life Sciences, members of staff taught in Molecular Biology & Genetics, Principles of Plant Biotechnology, Virology, and Plant Biotechnology.

**Postgraduate courses**: Members of Biotechnology Centre's staff also taught in the following postgraduate course: "Standards and Risk Management in Agricultural Production Systems", one of the courses in the MSc in Agricultural Entrepreneurship Programme in the FST. The Centre's approved MSc. Programme, coordinated by Dr. Sylvia Mitchell and facilitated by Professor Roye is expected to start soon.

## OTHER ACTIVITIES OF THE CENTRE

### Bio-Skills Training & Workshops Effected

In addition to her regular teaching and research training of both postgraduate and interested undergraduate students, the Centre also effects bio-skills training and bioservices as part of its agenda.

**United Nations' University Biotechnology Programme For Latin America and Caribbean Countries – The 2016 International Symposium & Training Workshop**

The weeklong training was executed by the Biotechnology Centre within the year under review, from August 8 to 12, 2016. The conveyor, Professor Asemota – facilitated by the Pro Vice-Chancellor for Graduate Studies & Research, Professor D. Webber, and the Dean for Science and Technology, Professor P. Reese along with the Dean's Office, Mrs. Mariam Lindo and her team as well as Biotech Centre Staff, Professor Benkeblia, Shivajanli Dondapati and Steven Brown, collaborated with other Stakeholders such as the Basic Medical Sciences Department, Medical Faculty Dean (ProfessorH. Fletcher), Scientific Research Council (Dr. Cliff Riley), FST Life Sciences Department, MSET (Dr. Andrew Wheatley), MICAF (Dr. Lisa Myers, the National Commission on Science and Technology –NCST (Professor Errol Morrison), the IICA (Dr. Elizabeth Johnson), Caribbean Maritime Institute, now University – CMU (Drs. Pinnock and Ajagunna), JIPO (Ms. L. Bellamy), PIOJ (Ms. C. Bernard), Northern Caribbean University (Professor V. Wright), CARDI (Dr. C. Roberts), University of Los Andes (Professor Gustavo Femmin), University of Venezuella (Professor Palmira Guevara), UWI St. Augustine (Professor Jayaraj Jayaraman), Cocoa Research Institute at St. Augustine, Trinidad (Dr. Lambert Motilal & Professor Pathmanathan Umaharan), and UWI Bursary (Mr. H. Pearce) to effectively stage the Symposium and the training for 51 trainees from 8 Latin American and Caribbean countries and the UWI. For this, the Biotech Centre secured USD26,000 Grant funds from the United Nations University. Afterwards, The Academic Report on the **2016 UWI-UNUBIOLAC International Biotechnology Symposium and Training Workshop on "DNA Fingerprinting of Plants: Approaches, Applications and Relevance to the Agricultural Sector in the Caribbean and Latin America"** with the developed associated **Lab Manual on Plant DNA Fingerprinting** were submitted to the United Nations University in September 2016 and very positive feedback was received.

**Pacific-Caribbean Exchange Scientists Biotechnology Training:**

Also in the year under review, the Centre collaborated with the Caribbean Agricultural Research & Development Institute (CARDI) Trinidad and Jamaica Offices, to host the Pacific – Caribbean Exchange Scientists Training Programme from October 10–27, 2016. Other Collaborators in the programme were Northern Caribbean University (NCU), Scientific Research Council (SRC), and the Bodles Agricultural Research Centre. The Biotechnology Centre (UWI) and the Scientific Research Council exposed the Pacific Visiting Scientists to crop improvement and biodiversity of Jamaican Yams, Dasheen (taro), and Cocoyam (Xanthosoma sp) as well as to Sweet potato. The Biotechnology Centre and the NCU took the Scientists to visit Yam farmers in Manchester and Southern Trelawny (facilitated under the NSF Yam Project and CARDI). They interacted with Jamaican Yam farmers and gained some indigenous knowledge from the farmers in tuber crop production viewed from the perspectives of the common farmer. This was exciting experience for them. The visiting ten scientists came from the following Pacific countries – Fiji, Papa New Guinea, Samoa, Micronesia, Netherlands and Vanuatu. They were hosted at the Centre for laboratory training in Yams biodiversity and DNA Fingerprinting. Professor Asemota gave the training on Jamaican Yams Biodiversity, Taxonomy and Biomaterials, using the extensive UWI Yam Research outputs. Other Research Group Leaders of the Centre, Professors Roye, Benkeblia, and Dr. Mitchell also interacted with the Pacific Scientists, while several postgraduate students made presentations and discussed their research activities at different periods during the visit. Areas of mutual interest and possible collaboration were discussed. A Lab Manual on Yam Taxanomic Diversity and DNA Fingerprinting was developed for the training purpose.

The Scientists also visited the Scientific Research Council (SRC), Northern Caribbean University (NCU), and Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF) – Boodles Research Station, and Red Stripe Beer Factory. They were also taken to Yam Farms and interacted with Farmers in Manchester and Trelawny. The Scientists were excited at getting the farmers' stories in the production of yams.

Other interesting initiatives included the UWI-Columbia Cassava flour project, Red Stripe cassava beer, and bammy making. The Scientists later travelled to Trinidad and the focus there was on: 1) Breeding/DNA work in cocoa (SPC expressed interest last year in linking with UWI on cocoa research), hot pepper and anthurium, as well as microbial DNA work and 2) Roots and tubers value added products – composite bread/ bakery products from sweet potato, cassava, taro, etc. in collaboration with the Caribbean Agri-Business Association (CABA).

### CAPE Workshop on Genetic Engineering

The CAPE Workshop in Genetic Engineering staged by Professor Roye attracted approximately 400 students in December 2016. It was held over 3 days (December 16, 21 & 22, 2016) with the participation of students and teachers from the following Schools: Campion College, Glenmuir High School, Merl Grove High School, Mount Alvernia High School, Mannings' School, Ardenne High School, Holy Childhood High School and Montego Bay Community College. This was the largest staging in the workshop's 10 years history. The venue of the workshop was the Department of Basic Medical Sciences Molecular Biology Laboratory North A.

### Laboratory Experience for Montego Bay Community College Students

The Biotechnology Centre hosted nine students from Montego Bay Community College on July 6, 2017. The Coordinator from the College, Mrs Alicea Bigby-Smart, requested the Centre to help give their Associate Degree students in Agricultural Science Programme some first-hand experience in gel electrophoresis and nucleic acid isolation/extraction from yeast cells or bacteria. Most of the students work with RADA in the western end of the country. The one day training included: 1) brief introduction by Miss Latoya Bailey (Research Assistant for Professor Roye), on basic background to bacteria and its DNA in the form of plasmid and nucleoids, and on the current usage of microbial DNA in plant protection and improvement, 2) introduction to the instruments

and materials that are used in Molecular Biology\Microbiology – how to use the instruments, safety precautions in the lab, 3) working in pairs with a given sample to work with. The cultured microbes were prepared for the students, but the rest of the protocol was conducted by the students under the supervision of the Lab technologist and the Research Assistants of the Centre. The students were given a set of reagents that they used to isolate their DNA for PCR and for Gel electrophoresis. The results gotten were explained to them. 4) A tour of the Centre labs and Tissue Culture facility, which sparked their interest, especially when they saw how plants are cultured in tubes and preserved. 5) The tour ended in the Yam Biotechnology & Biomedical research lab, where newly developed by-products opened their eyes to the potential in Agricultural biotechnology and bioentrepreneurship. 6) The students had a twenty minutes session to ask questions about the exercise and other topics relating to crop improvement and food security. They requested the Centre to develop a part of their course, because this was the only laboratory experience they got and thought the information was too much for one visit.

### Volunteerism and Internship at The Centre

- The Gemini virus research group of Dr. Roye had a volunteer for Semester 1-Travis Garnett. He was trained in the following techniques: DNA extraction (plasmid miniprep and plant DNA extraction), Rolling circle amplification; pour and streak plates (for bacteria), Agarose Gel electrophoresis.
- Other Interns at the Centre were Mr. Kevin Sampson (from Mico University College) Mr. Randy Clarke (from Caribbean Maritime University) and Mr. Mike Dwyer (from Papine High School).

## GRANTS

- Dr. Sylvia Mitchell rendered bioservices to the Government of Jamaica and received a grant for a Bamboo Project in the sum of Thirty Thousand Dollars ($30,000 USD), out of which US$2,000 USD has been paid to UWI Bursary Special Projects.

- United Nations University Grant for Biotechnology Programme Training for Latin America and the Caribbean (US$26,000). PI - Professor Asemota for the planning and conveying of the International Biotechnology Symposium and Training Workshop in Agro Biotechnology.
- NSF BREAD PHENO Yam Project. Co-PI – Professor Asemota. Amount received is about US$104,800 for years 1 & 2. Subaward from SUNY Professor Sadik -PI. UWI Bursary Special Projects
- Caribbean-Pacific Exchange Scientists Bio-skills Training – J$221,600 from CARDI. UWI Bursary Special Projects –Income Generation from Bio-Skills training.

## PRODUCTS DISPLAY AND OUTREACH

- The Centre participated in the National Science and Technology month in November 2016. The Centre represented the Faculty of Science & Technology, UWI Mona at the Fourth Biennial National Science and Technology Conference & Exposition at the Jamaica Pegasus Hotel on November 14 & 15, 2016. The Centre displayed products such as candles, soaps and organic pesticides that were produced from students' biotechnology research.
- Staff and students of the Centre prepared with Professor Asemota and Dr. Rachael Irving, various Yam-based Products for limited display at the "Sports meets Science: Jamaica Quest for Greatness" Symposium in London in July 30, 2017. The products were termed **'Jamaica Yam BioSports Foods**' and were first displayed, by Helen Asemota, Carlton Barrows, Rachael Irving, Elizabeth Mills, Shiva Dondapati, Tamara Grant and members of the UWI Marketing & Mass Communications Office at one of UWI Mona Students' Halls of Residence, with **Frederick Dacres (2017 World Championship finalist in Discus Throw)** and others in June 2017.

## PARTICIPATION IN THE UWI HOSANG VENTURE COMPETITION

To promote developments towards biotechnology marketplace at the Centre, Professor Asemota has being encouraging and supporting Biotechnology students to make products and participate in the Vincent Hosang UWI Venture Competitions organized by the Mona School of Business and Management (MSBM) in collaboration with Mr. Vincent Hosang.

In the year before, two Biotech Centre groups had won the 1st and 2nd positions. The Centre plans to have its students partake in venture competitions regularly to promote bioenterpreneurship and bio-economic advances. Four (4) Biotechnology students groups partook in the 2016 competition namely: *Yard Vines & Mint, Kiwi Blend Teas, Yam Nuts and Yammitos.*

## UWI MONA RESEARCH DAYS – FEBRUARY 2017

The Biotechnology Centre participated and mounted a display at the UWI Research Day Launch in January 2017. During Research Days in February 2017, the Biotechnology Centre participated in the following ways:

- Displayed finished products at the Centre's tables/booths in the Main Exhibition Tent. Wine products, Sweet Potato Pudding made from tissue culture derived sweet potatoes, and Moringa Bites and Bars.
- Presentations – Seventy Five students and teachers from various Colleges and High schools toured the Centre where they viewed displays and attended various presentations about the Centre's research.
- Staff members and students from the Biotechnology Centre demonstrated lab activities- Simple DNA extractions, tissue culture, soap making, wine making, candle making, paper making and potato cloning at the main tent and also at the Centre.
- Professor Asemota and her Research Group also conducted 'Jamaica

Yams Taxonomy/Biodiversity Quiz' at the main tent and presented certificates to over seventy (70) participants who passed the quiz.

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

- Professor Helen Asemota and Shivanjali Dondapati attended a workshop on NIH – "Protecting Human Research Participants" organized by MORI and held at the Faculty of Medical Sciences on April 5, 2017. Professor Asemota and Ms. S. White were the resource persons along with Drs. L. Young & Lindo.
- A team from the Biotechnology Centre including Mr. Carlton Barrows, Ms. Tamara Grant, Mr. Roy Dwyer and Ms. Elizabeth Mills, participated in the STEM, Projects and Career Day held at the Sydney Pagon STEM Academy on May 31, 2017.
  - The team engaged with students and teachers from over 10 Highs Schools & Colleges from across the island. They showcased products such as wines, soaps and organic products among other items. Students were able to view demonstrations of wine making.
  - Ms. Tamara Grant, post graduate student of Professor Asemota engaged students in a Yam taxonomy/biodiversity game to identify local yam varieties in Jamaica.
  - The team spoke to students about the bioservices of the Biotechnology Centre and careers in Biotechnology. The event was covered by the media houses, Television Jamaica (TVJ) and Jamaica Information Service (JIS).
- Postgraduate students of the Biotechnology Centre (Nikolai Lutas & Keaton Logan) along with members from the Chemistry Department were the key Presenters at an event at Mona Baptist Church in July 2017. This event was attended by children and teenagers of age groups 6–18 years of varying socio-economic backgrounds. Various products (Fruits Wines, Moringa Bars, Yam Spreads and Yam based snacks, Candles, Soaps, Pesticides and Bio-fertilizers) made at the Centre were displayed. These demonstrations provided an excellent opportunity to explain the fundamental scientific principles behind

every day products. These interactions also develop our students' communication skills. It was a truly exciting experience as children and teenagers who were not overtly interested in Science became excited about the prospects of doing scientific research at the UWI MONA in the future.

## FOREIGN VISITS BY BIOTECHNOLOGY STAFF

- The Director of the Biotechnology Centre, Professor Helen Asemota visited Mexico under the Jamaica-Mexico Bilateral Commission from March 10–20, 2017 along with her Research Assistant and PG student, Mrs. Shivanjali Dondapati. They visited *Yucatan Center for Scientific Research (CICY) and* the *Research Centre for Food and Development (CIAD)* in Mexico.
- Ms. Sasha Gay Wright and Mr. Kenroy Wallace visited Southern University of Baton Rouge (SUBR), USA to carry out research which forms part of their Graduate programme.
- Professor Asemota and Tamara Grant travelled to London and presented at the University of East London at the "Sports meet Science: Jamaican Quest for greatness" Symposium on July 29–30, 2017, and displayed some *Bio-Sports Products*.
- Professor Asemota and two of her students as well as three Researchers including the Executive Director of the ICENS, Charles Grant, travelled to Mexico for the 2017 IMEKO TC 19 International Conference at Aguascalientes, Pan American University, August 2–5, 2017. Five papers were presented by the UWI Researchers, and Professor Asemota was the General co-chair of the Conference.

## VISITORS TO THE BIOTECHNOLOGY CENTRE

- Sir Professor Kenneth Hall, former Governor-General of Jamaica and former Principal of UWI Mona, paid a courtesy call to the Biotechnology Centre on April 5, 2017. Professor Hall was welcomed by the Director, the staff members and students of the Centre. Professor Asemota's postgraduate students gave Professor Hall a tour

of the Centre's facilities and briefed him about their research work. Professor Hall admired the enthusiasm of the students and their interest sustained in research.

- Ten (10) Pacific – Caribbean Exchange Scientists visited the Centre during the period October 10 –27, 2016. They were from the Pacific Islands, Fiji, Papa New Guinea, Samoa, Micronesia, Vanuatu and the Netherlands.
- The Biotechnology Centre partnered with SRC to accommodate 85 students from primary to tertiary institution across Jamaica. A total of 85 students, from Sydney Pagon STEM Academy was given a tour of the Centre on December 1, 2016 by Carlton Barrows and Shivanjali Dondapati. The Centre showed them a variety of products that are made from local resources, such a candles, Moringa bars, yam chips and other products, and given a talk on how to become better student. Most of the students came from yam farming communities hence they could relate to varieties of yams on display and also the mint species being cultivated.
- The NSF-BREAD PHENO Yam Project Collaborators from SUNY Binghamton, Professor Omowunmi Sadik, the Project PI at SUNY and her PG student, Mr. Roland Miller, visited the Centre from July 16–23, 2017. They also visited Yam farms in Manchester and Trelawny as part of the project field trip. They facilitated training in nanoparticles formulation at the Centre.
- Professor Ibrahim Ajaguuna, former Director of Academics, now Deputy President of the Caribbean Maritime University (CMU), along with his Assistant, visited the Centre in July 2017 (11th & 13th) for ongoing discussions re their proposed Marine Biotechnology Degree programme at the CMU. Collaboration with the Biotechnology Centre was re-affirmed and the need for an MOU/MOA was re-tabled and is to be pursued.
- The final year Biotechnology undergraduate students taking the Course BIOT3113 (Biotechnology I) toured the Centre's facilities on November 11, 2016.

## COLLABORATIONS AND MOUS

The Centre collaborates internally with various Departments in the FMS and FST for Research and Teaching, particularly the Departments of Basic Medical Sciences, Psychiatry and Community Health, Chemistry, Life Sciences, and Physics. The Centre remains grateful to the host of Experts/Professors/Lecturers in the FMS and FST, neighboring universities/research institutions and foreign institutions who support in group co- supervising of our postgraduate students.

Our current list of international and local collaborators include: Morehouse School of Medicine, USA; School of Pharmacy, Roosevelt University, USA; SUNY Binghamton, USA; University of Toronto, Mississauga, Canada; Albany State University, USA; University of Salento, Italy; Cordoba University, Colombia; Redeemers University, Nigeria; Trees that Feed Foundation, Illinois, USA; University of California, Davis (US-Davis); The Bamboo Project, Government of Jamaica; Bureau of Standards, Jamaica; JAMPRO; The National Environment and Planning Agency (NEPA); OAS; The 4H Club, Jamaica; Agro-Systems Consultants, Jamaica; Grace Kennedy Limited; National Committee on Science and Technology; Northern Caribbean University; STEA; Scientific Research Council (SRC); MSET; Peckham Development Council, Pan-American University, Aguascalientes, Mexico, CICY and CIAD, Mexico, IICA, CARDI, CMI, UTECH, Southern University of Baton Rouge(SUBR), SUNY Binghamton.

## SPECIAL PROJECTS

### Development and Field Testing Of Paper-Based Biosensors to Increase Agricultural Productivity of Small Holder Farmers In Developing Countries

This is a National Science Foundation (NSF) sponsored project, under the BREAD PHENO program and it is in collaboration with the State University of New York (SUNY) at Binghamton. Professor O. Sadik of SUNY is the PI and Professor H. Asemota of UWI is co-PI. Local

collaborators in the project are Northern Caribbean University (NCU) and the Southern Trelawny Environmental Agency (STEA), as well as selected local farmers. This project seeks to revolutionize yam production in Jamaica through the development and field testing of low-cost genotyping and phenotyping biosensors and molecular genetic tools, UWI works with small holder yam farmers in Jamaica with the help of NCU in Manchester and STEA Trelawny and their Extension Officers. The project operates under a sub award agreement between SUNY and UWI.

Researchers from the Biotechnology Centre and NCU together visit local Yam Farmers in Manchester and Trelawny on a regular basis for sampling, data collection and observation. Laboratory activities take place at the UWI Biotech Centre as well as at the NCU. Regular meeting with Collaborators is facilitated through Skype and/or ZOOM. The first year report to the Funding Agency has been achieved with a very positive feedback. In July 2017, members of the SUNY team visited the Centre to join forces with UWI and NCU to advance project activities through technology infusion activities. This project facilitates employment and as such the Centre employed in April 2017 Ms. Elizabeth Mills as Project Field Assistant, liaising with local farmers and coordinating field-based activities of the project with collaborators and project researchers. The Project also facilitates engagement of student researchers.

### Bioengineering of Yams & Other Selected Caribbean Roots and Tuber Crops Biomaterials for Value-Chain Expansion & Pre-Commercialization Analyses

This Jamaica–Mexico Bilateral Commission Project involves collaboration with Mexican Scientists. The project focuses on bioengineering biomaterials from selected crops for value-chain expansion & pre-commercialization analyses. This proposed project is intended to boost agro industry via expansion of value chain of selected Caribbean crops- especially Yams, Sweet potato, Dasheens, Cocoyam as well as plants such as Moringa, Sugarcane and some herbs. The project is operated with Mexican counterparts – Dr. Fernando of CIAD and Dr. Carlos Borroto of CICY

in Mexico, and locally in collaboration with Professor Benkeblia of UWI, Dr. Cliff Riley of the SRC and Dr. Elizabeth Jonson of IICA.

The Project PI and Director of the Biotechnology Centre, Professor Helen Asemota along with her Research Assistant, Mrs. Shivanjali Dondapati, visited collaborating institutions in Mexico in March 2017 to discuss and partake in project analytical activities. Discussions were held with the participating institutions regarding possible MOUs for student and staff exchange between institutions. The Mexico visit report was submitted in April 2017 to the Mexican Embassy in Jamaica. The Centre received a positive feedback on the report. Professor Asemota along with her research Assistant, Mrs. Shivanjali Dondapati and graduate student Ms. Tamara Grant, attended a meeting with Ms. Araceli Grave about the project activities.

### Bamboo Project

This is a collaborative project with the Government of Jamaica. According to Dr. Sylvia Mitchell, the PI of the UWI component of the Project, the activities listed below are being managed by the Bamboo Research Project Management Committee (BRPMC) on which both UWI and Bureau of Standards and other relevant persons sit in order to provide oversight. The BRPMcC operates under the MOU between UWI and the Bureau of Standards. The activities below represent the work of the Biotechnology Centre and the Bureau of Standards as part of the 'Peckham Bamboo Pre-Processing Project' being funded by OAS.

Between January 27th, 2017 to August 31st, 2017, training has been provided to at least 153 people on 9 separate occasions in Peckham, Clapham, Lamb's River, Harker's Hall, Holland Bamboo and UWI.

195 Bamboo (*Bambusa vulgaris*) culms obtained from Peckham, Clapham, Lamb's River, Harker's Hall and Holland Bamboo has been planted on the UWI-Biotechnology Centre field plot. Also bamboo culms of *Dendrocalamus asper* have been planted on the field plot.

In all, over 489 bamboo culm pieces have been planted – at UWI, Holland Bamboo, Clapham and Peckham - in this period.

Growth Data obtained from these plants was presented as a poster at SIVB: Mitchell S.A. (2017) *Developing a vibrant and sustainable Jamaican industry with* Bambusa vulgaris*: establishing standard macro and micropropagaation protocols as a key part of the process.* June 10–13, 2017 In Vitro Biology Meeting. P-3051. Pg 26.

- Bamboo from these plants listed above have been initiated into tissue culture, these experiments are ongoing.
- The OAS and PIOJ representatives visited the Biotechnology Centre on August 1st and was happy with the work of the Biotechnology Centre.

The following meetings were attended: Community Consultation on Policy for the Bamboo Industry in Jamaica, Peckham, April 20, 2017, Organized by MICAF, Bamboo Policy Consultation Forum, July 6, 2017 and Organic Framework Meeting, July 11, 2017.

**New Projects Proposals submitted for funding:**

***Smokable herbs: using IKS tools to document the medicinal uses and abuses of plant-derived smoke in South Africa and Jamaican Communities.***

- This South African project was submitted to National Council on Science and Technology (NCST) in July, 2017 as a joint project between South Africa (PI, Dr. Ashwell Ndhlala, Vegetable and Ornamental Plant Institute, Agricultural Research Council, Roodeplaat) and Jamaica (PI, Dr. Sylvia Mitchell, The Biotechnology Centre, UWI Mona.

***"Harnessing the good and the bad in Ganja for pain therapy/management and biomedical device: Developing the Therapeutic & Biosensing Tech Potentials in Jamaica Cannabis for Pain Treatment and Management"***

- Submitted to NIH (in response to FOA PA-15-188, R01 category) from UWI, Mona, in September 2016. The PI is Professor H. Asemota along with other UWI Investigators: Profs. W. McLaughlin, H. Jacobs, W. Abel, L. Young, L. Lindo, R. Porter, M. Reid, Drs. M. Scarlett and McGawn and with co-PI – Professor O. Sadik of SUNY and her team. Review comments received for re-submission, which

is underway. Project facilitators/manager and assistant – MORI, S. White and S. Dondapati. Project is Collaborative effort of FMS – clinical & pre-clinical Researchers and FST Researchers along with foreign collaborators, with UWI leading the effort.

## BIOTECHNOLOGY CENTRE SEMINAR SERIES

- October 2016 – Group Seminar organized in collaboration with CARDI and SRC on "Agro-biotechnology of Roots and Tuber Crops: Production, Value Addition, Education & Networking" by Visiting Pacific Scientists, as part of the ACP Pacific-Caribbean Visiting Scientists Exchange Programme – 2016. There were 8 Speakers:
  - Dr. Paula Tuione (from Fiji),
  - Ms. Ulamila Duguci Lutu (from Fiji),
  - Ms. Silika Naidugu Vurebe, (from Fiji),
  - Mr. Nacanieli Sikinairai Tuivavalagi (from Federal States of Micronesia),
  - Mr. Rosivela Dresu (from Fiji),
  - Dr. Siope Leameivaka Uluakimano Pele (from Samoa),
  - Dr. Joshua Mael (from Vanuatu),
  - Ms. Helmtrude Sikas (from Papua New Guinea),
  - Ms. Salome Tukuafu (from Fiji)

- Professor Asemota gave a seminar presentation on "Application of Biotechnology to Yam Production Improvement & Innovative Products Development for Value Chain Extension" on October 12, 2016, to the Intra-ACP Caribbean-Pacific Exchange Programme Scientists, at the Dean's Conference Room, in the Faculty of Science and Technology, UWI, Mona.
- Student Seminars – The Biotechnology Postgraduate students presented seminars at the Basic Medical Sciences as part of their research programme.
  - Julian Bailey presented a seminar on "Analyses of Environmental factors effecting cancer in Jamaica" on October 06, 2016.

- Kimberley Foster presented a seminar on "Assessing the prevalence of medicinal plant use asking cancer patients in Jamaica" on October 13, 2016.
- Lowen Williams presented a seminar on "Metallic Semicarbazone Complexes in the management of Diabetes" on December 8, 2016.

## STAFF/STUDENTS ACHIEVEMENTS/AWARDS

- The Biotechnology Centre congratulates to Dr. Marcia Roye on her promotion to the rank of Professor. Professor Marcia Roye was awarded by the HOGA (Hampton Old Girls Association) Award 2016 for outstanding professional achievement and/or committed service to HOGA/Hampton over the past many years.
- The Centre also congratulates Jordon Freeman and Carlton Barrows for receiving the Distinguished Student Award, from the Faculty of Science and Technology on placing 2nd and 3rd Places in the Third Annual National Business Model Competition 2016, for Biotech product development. Jordan and Carlton were the first two Biotechnology Centre Incubatees in Product development.

## STAFF APPRECIATION & STAFF TRAINING

The Biotechnology Centre presented two of its former staff members with appreciation awards in December 2016:

1. Ms. Karen Levy – Admin for 24 years' service to the Biotechnology Centre, from its inception.
2. Dr. Melaine Randle – 5 years to the Biotechnology Centre
3. The Centre supported two staff members – Shivanjali Dondapati & Carlton Barrows – for training in the handling of dangerous goods, by the Bureau of Standards of Jamaica.

## PUBLICATIONS

### Refereed Journal Publications

- Delahaye CM, SA Mitchell and D Robinson (2017) Potential of two Jamaican essential oils against mosquitoes and bacteria. Jamaica Journal of Science and Technology 26: 26–33.
- Morgan, K. and **Benkeblia, N.** (2017). Effects of modified atmosphere packaging (MAP) on microbiological and sensory quality of ackee fruit arils (Blighia sapida Köenig) stored under refrigerated regimes. *Packaging Research* 2: 12–21.
- Dewayne Stennett, Andrew Wheatley, Lowell Dilworth, **Helen Asemota**. (2016). Optimal dosage determination of a hypocholesterolemic bitter yam proprietary preparation in diet-induced hypercholesterolemic mice. *Journal of Basic and Applied Research* 2(3): 281–290.
- **Benkeblia, N**. (2016). Fructans and mineral nutrition. *Journal of Nutritional Therapeutics,* 5: 68–74.
- **Benkeblia, N.** (2016). Application of metabolomics to postharvest science of fresh crops. *CAB Reviews*, 11: 1–8.
- Lopez M.G. and **Benkeblia, N.** (2016). Profiling of short chain fructooligosaccharides (scFOS) of two ackee (Blighia sapida Köenig) varieties through different maturation stages. *Current Nutrition and Food Science,* 13: 37–42.
- Natwaine Sherune Gardner, Kedon JS Luke, Andrew O. Wheatley, Winston G. De La Haye, Perceval Bahado-Singh, Lowell Dilworth, Donovan A. McGrowder, Everard Barton, Lauriann Elizabeth Young, Ajibike Salako-Akande, Errol Morrison, NCST, Kingston, Denise Eldemire-Shearer, Henry Lowe, and **Helen N. Asemota.** (2015). Plasma Cocaine Metabolite and Liver CYP450 3A4 Isoenzyme Levels as Indicators of Cocaine Dependence in Rats Treated with Nutritional Supplements. *International Journal of Measurement Technologies and Instrumentation Engineering,* 5(2), 28–43.
- Marsha-Lyn McKoy, Kevin Grant, **Helen Asemota**, Oswald Simon & Felix Omoruyi. (2015). Renal and Hepatic Function in

Hypercholesterolemic Rats Fed Jamaican Bitter Yam (Dioscorea polygonoides). *Journal of Dietary Supplements* 12 (2): 173–183

### Technical Reports

- **Asemota H.** (2016). Academic Report to the United Nations University Biotechnology Programme for Latin America and the Caribbean on DNA Fingerprinting of Plants: Approaches, Applications and Relevance to the Agricultural Sector in the Caribbean and Latin America, pages: 1–33.
- Brown S., Randle M., Motilal L., Amarakoon I., Tennant P., Asemota H. (2016). DNA Fingerprinting of Plants: Approaches, Applications and Relevance to the Agricultural Sector in the Caribbean and Latin America. Laboratory Manual. Submitted to the United Nations University Biotechnology Programme.
- **Asemota H., Thomas L., Dondapati S., and Brown S.** (2016). DNA Fingerprinting of Yams using RAPD Primers. Laboratory Manual. CARDI-Intra-ACP Pacific Exchange-Scientists Training Programme. October 2016.
- **Asemota H.** and **Dondapati, S**. (2017). Progress Report to Mexico SRE & the Embassy in Jamaica, on 'Bioengineering of Yams & Other Selected Caribbean Roots and Tuber Crops Biomaterials for Value-Chain Expansion & Pre-Commercialization Analyses' Project & the Exchange Visit to Mexico. May 2017.
- **Asemota, H., Dondapati, S.**, Alonge, P., Wright, V., **Grant, T**. (2017). First Annual Progress Report to the USA National Science Foundation (NSF), through O. Sadik (PI at SUNY) on the BREAD PHENO Project "Development and Field Testing Of Paper-Based Biosensors to Increase Agricultural Productivity of Small Holder Farmers In Developing Countries". April 2017.

### Book Chapters

- Amarakoon I.I., C-L. Hamilton, **S.A. Mitchell**, **P.F. Tennant** and **M.E. Roye** (2017) Chapter 28: Biotechnology; Part VII Technology

Applications using biological systems. In: S. Badal-McCreath and R. Delgoda (Eds) *Pharmacognosy: Fundamentals, Applications and Strategy*. Elsevier Academic Press, USA. 416 pgs. Pp. 549–563.

- **Benkeblia, N**. (2016). Chromatographic techniques of mono- and di- saccharides analysis. In: *Carbohydrates in food*. A-C. Eliasson (Ed.). CRC Press, Boca Raton (FL), pp. 1–27.

### News Media Report

**Asemota, Helen**. Yam Biotech Research Group Aiming to Boost Bio-Economic Growth. *Mona News*, December 2016.

## CONFERENCE PRESENTATIONS & ABSTRACTS

- **Mitchell, S.A.** (2016) Global Perspectives on the Biotechnology and Tissue Culture Propagation of Cannabis. In session: Cannabis sativa: the Science Behind the Smoke. World Congress on In Vitro Biology, San Diego, California, June 10–15, PS-3.
- **Mitchell S.A.** (2017) Developing a vibrant and sustainable Jamaican industry with Bambusa vulgaris: establishing standard macro and micropropagaation protocols as a key part of the process. June 10–13, 2017 In Vitro Biology Meeting. P-3051. Pg 26.
- **Mitchell, S.A.** (2017) Encouraging scientific study on medicinal plants in the Caribbean so as to safely integrate folk medicine into conventional medicine healthcare. In: Des iles en clair-obscur. La recherche scieintifique en milieu insulaire tropical (Ed JP Claude and N Chonville), Connaissances et Savoirs, Anatole, France. pg 41–71.
- Francis, R., **Asemota, H.** Glycaemic Index for Caribbean Foods. The Fourth Biennial National Science and Technology Conference & Exposition on "Science, Technology and Innovation: Stimuli for Health Wealth and Wellness" Jamaica Pegasus Hotel, November 14–15, 2016. Oral Presentation.
- Scott, N., Stennett, D., Wright, R., and **Asemota, H.** Investigating the Anti-diabetic Properties of Dioscorea alata cv Renta. FMS Conference. Oral Presentation.

- **Asemota, H.** (2017). Research at the Biotechnology Centre and Bioengineering of Yams biomaterials for value-chain expansion & pre-commercialization analyses. The Research Centre for Food and Development (CIAD), Mexico. Oral presentation.
- **Asemota, H.** (2017). Research at the Biotechnology Centre and Bioengineering of Yams biomaterials for value-chain expansion & pre-commercialization analyses. Yucatan Center for Scientific Research (CICY), Mexico. Oral presentation.
- Dondapati, S., **Asemota, H.**, Alonge, P., Sadik, O. (2017). National Science Foundation Project- BREAD: Development and Field Testing of Paper-based Biosensors to Increase Productivity of Smallholder Agriculture in Developing Countries. Ginger/Sweet Yam Stakeholders meeting, Jamaica. Oral presentation.
- Grant, T., **Asemota, H**. (2017). An Opportunity for Improvement of Yam Production in Jamaica, via Biotechnology. Athletics Meets Science in London: Jamaica's Pursuit of Greatness Symposium. Oral presentation.
- **Asemota, H.** (2017). Yams: Natural Steroids or Myths? Athletics Meets Science in London: Jamaica's Pursuit of Greatness Symposium. Oral presentation.

## INCOME GENERATION

The various Workshop and Bio-skills Trainings as well as Grants, as indicated within the Report, have also been means of Income Generation for the Centre. The October 2016 Workshop for Pacific Scientists (Asemota/Dondapati) generated approximately Two Hundred & Twenty One Thousand, Six Hundred Jamaican Dollars (J$221,600.00). The August 2016 UN Biotechnology Programme Workshop (Asemota/Guevera) generated US$26,000 and approximately three hundred thousand Jamaican dollars (J$300,000). The December 2016 CAPE Workshop (Roye) also generated some income. The NSF Yam Grant (Asemota/Sadik) generated approximately US$104,800 and the Bamboo Project (Mitchell) generated US$2000.

## PUBLIC SERVICE

**Professor Helen Asemota**

- Ordained Minister (Reverend) – Pastor 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, The Biotechnology Centre (FST, Mona).
- 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 Caribbean and Latin American countries (UNUBIOLAC) International Biotechnology Training Workshop/Symposium
- General Co-chair, the 2017 IMEKO TC19 International Symposium in Aguascalientes, Mexico.

**Dr. Sylvia Mitchell**

- Member of Caribbean Access and Benefit Sharing (ABS) Development Initiative Steering Committee.
- Member of the Society for In vitro Biology – Education Chair, and Co-Editor of *In vitro Report*.
- Member, Management Board, College of Agriculture and Science Education (CASE).
- Member, Standards Council, Standards and Technical Sub-Committee, National Quality Awards, and Chair of the Board of Examiners, Bureau of Standards of Jamaica (BJS).

– Member, Hope Garden's Education and Research Sub-Committee, NPF.

– Alingment: Skyers, J. *Money in medicinal plants – researcher.* Observer newspaper article, December 8, 2016.

– Member, Technical Working Group, Cannabis Licensing Authority, 2016-present

– Member, Health and Wellness Network Committee, Linkages Council, Ministry of Tourism: 2016–present.

– Assisted in Jamaica's preparation for the Convention of Biological Diversity, COP Convention, November 17, 2016

– Technical Secretary, Bamboo and Indigenous Material Products Standards Technical Committee (BIMPSTC), Bureau of Standards Jamaica, 2016–present

– Founding Member, Bamboo Industry Association of Jamaica, 2016–present

– Bureau of Standards Jamaica, Pension Trustee, 2013–present.

– Co-editor of *In Vitro Reports* (posted on their website every three months), *Society of In Vitro Biology* (SIVB), 2009–present

– Member, Organization for Women in Science for the Developing World (OSWD).

– Convenor, Working Group, Bamboo Charcoal, TC296, ISO. Organizer first meeting of the WG1, Indonesia, held August 23, 2017

– Judge, SRC INVOCAB Innovation Competition, Mico College Auditorum, July 28, 2017

– Displayed tissue culture plantlets and Sweet Potato pudding made from tubers reaped from tissue cultured plants, Research Day, February 1–3, 2017

– Panelist, Regulating the Cannabinoids – An Investor Perspective, A Status of Pharmacy Roundtable Discussion – 'Status of Pharmacy: From Galenicals to Nutraceuticals', College of Health Sciences in collaboration with UTECH Jamaica Pharmacy Alumni and the

Caribbean Institute of Pharmacy Policy, Practice and Research, UTECH, March 9, 2017.

**Cannabis**

- Member of Technical Working Group, Cannabis Licensing Authority (CLA)
- Made presentation entitled 'Cannabis Botany' to the CLA, December 7, 2016
- Submitted draft – 'Draft Protocol Manual for Jamaican Cannabis cultivators' to the Cannabis Licensing Authority (CLA) (*Comments received by UWI and UTECH were incorporated into the document*).
- Biotechnology Centre Tissue Culture Laboratory was visited by the CLA on December 1st, 2016 as prerequisite for UWI license.

**ABS**

- Assisted with IUCN ABS project along with other Caribbean colleagues entitled '*Advancing the Nagoya Protocol in Countries of the Caribbean Region: ABS – Bio-prospecting in the Caribbean Region*
- Assisted Jamaica ABS group with preparations to Jamaica signing the Nagoya Protocol for monitoring Access and Benefit sharing of Jamaica's Biodiversity and Traditional Knowledge

**Professor Marcia Roye**

- Assistant Dean for Graduate Studies & Research, Faculty of Science & Technology, Mona
- Member of the Advisory Board of the National Compliance Regulatory Authority of the Bureau of Standards, Jamaica.
- Volunteer Cape Biology Teacher at Wolmer's Boys' School and St Andrew High School for Girls. Topic: Genetic engineering.

**Professor 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, 26–27 June, 2017, Baltimore, MD, USA.

**Professor Paula Tennant**

– Professor of Virology in the Department of Life Sciences, Mona