

THE BIOTECHNOLOGY CENTRE

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Associate Dean, FPAS**

WORK OF THE CENTRE

During the period under report, the Centre's work focused on agricultural research involving medicinal plants, forestry preservation and molecular virology of begomoviruses and virus associated with citrus, potato, curcubits and other crops. Research was also conducted investigating antiretroviral drug resistant of HIV and the glycemic indices of Jamaican foods, including studies on root and tuber crops. All the members of staff were involved in teaching various undergraduate courses in the Departments of Basic Medical Sciences and Life Sciences, as well as the training and supervision of postgraduates conducting research at the Biotechnology Centre.



Prof. Mohammed Ahmad, Prof. of Biotechnology and past Director of the Biotechnology Centre, retired September 30th, 2011. Effective February 2012, he was appointed as Professor Emeritus by the UWI Finance and General Purposes Committee.

During December 19-21, 2011, Dr. Marcia Roye, with the assistance of Dr. Cheryl Stewart and other postgraduates from the Centre, hosted the ninth annual workshop on “Concepts in Genetic Engineering” for Cape and A level biology high school students in Jamaica. More than one hundred students from numerous high schools in Jamaica were trained in recombinant DNA technology, biotechnology and related areas. The workshop included five (5) hours of lectures and seven (7) hours of laboratory sessions conducted by Dr. Roye and her research team.

The project “Enhancing productivity of medicinal plants during cultivation and processing using innovative machines”, now in its second

year, was developed to encourage more environmentally-friendly livelihoods by developing viable and sustainable cultivation and processing methods for medicinal plants. Pineapple, turmeric, blue and yellow ginger, and arrowroot, as well as traditional and tissue cultured material from pot experiment using soil and biochar were reaped in January 2012, and data taken. Biochar is a soil ameliorant which lessens nutrient leaching and improve water-balance in the soil to increase plant yields. The biochar equipment and dryer unit is now being used to produce larger quantities of the substance to be used for field experiments. Interest has been expressed from the Bureau of Standards Bamboo Project, and from the Jamaica Bauxite Institute for soil remediation to be done. The project, whose Principal Investigator is Dr. Sylvia Mitchell, is funded by the Environmental Foundation of Jamaica (EFJ).

Under the project “Identification, propagation and dissemination of native forest species of Jamaica”, a number of native indigenous trees, for examples Bitterwood (*Picrasma excelsa*), West Indian Mahogany (*Swietenia mahogany*), Yacca (*Podocarpus urbanii*), Juniper (*Juniperus lucayana*), Braziletto (*Peltophorum linnaei*), and others were collected and have now been established in the *in vivo* gene bank and are being initiated into culture. To date, the economically important forest biodiversity used by local people for medicine, fruit, fodder etc., is being identified using an ethno-botanical questionnaire. So far, this questionnaire has been given to approximately 250 people in Flagstaff (St. James), Bunker’s Hill and Deeside (Trelawny). Funded by the Forest Conservation Fund, the objective of the forestry project is to find and use macro-and micropropagation methods to conserve and multiply rare, indigenous and native trees of Jamaica. Dr. Sylvia Mitchell is the principal investigator.

The first Undergraduate Symposium was hosted on January 20, 2012. The objective of this workshop was to allow final year undergraduate students the opportunity to interact with recent graduates of the UWI to discuss local and international opportunities and challenges in the work environment, and in pursuing graduate studies. It is expected that these discussions will inspire, give direction, and help undergraduates to focus. Symposium speakers included graduates currently undertaking postgraduate work, and those working in various industries in Jamaica and abroad. The inaugural workshop was attended by 30 finalizing

undergraduates from the Biochemistry Section of the Department of Basic Medical Sciences. The Symposium was organised by Drs. Marcia Roye and Cheryl Stewart.

PAPERS PRESENTED

- **Bailey, D., H. Asemota,** T. Dasgupta, O. Sadik and Joseph Bryant (2011). “Investigations on the inhibitory effects of Jamaican purple yam (*dioscorea alata* ‘St. Vincent’ dark night) extract on the growth of cancer cells *in vitro*”. Ministry of Health 2nd National Health Research Day, October Jamaica Conference Centre, Kingston. October 27.
- Delgoda, R., D. Picking, and **S.A. Mitchell** (2012). “Investigating potential drug-herb interactions”. XIV TRAMIL Workshop, Cartagena des Indias, Colombia. February 15-20.
- **Hamilton, C. C., M. E. Roye,** P. Figueroa, L. M. Eyzaguirre, J. K. Carr, and J. Duncan. (2011). “Analysis of protease and reverse transcriptase genes of HIV for antiretroviral drug resistance in Jamaican adults”. CHART-CCAS-CDC 3rd Joint Meeting, Montego Bay, Jamaica. August 21-26.
- **Mitchell, S.A.** (2012). “Impacts of environmental pressure on Jamaica - Responses in terms of Bioresources and Technology”. Planet under Pressure Conference, London International Convention Centre, England. March 26-29.
- **Mitchell, S.A.** (2011). “Plants used in Jamaican folk medicine against the common cold, flu and diarrhea”. Proceedings of the International Conference and Exhibition on Virology, Baltimore, USA. September 5-7. *Journal of Antivirals and Antiretrovirals* 2011, 3:4 pg. 214.
- **Mitchell, S.A.** (2012). “Drug interaction with herbal medicine”. CARPIN, Montego Bay, Jamaica. March 1.
- **Mitchell, S.A.** (2012). “Use of microplants and associated biotechnologies to combat climate change in Jamaica, a Small Island Developing State (SIDS), by developing New Crops”. Proceedings of the Ninth Conference of the Faculty of Pure and Applied Sciences, Mona, Jamaica, April 13-15th, P28, pg 39.

- **Mitchell, S.A.** (2012). “A botanical reference of Jamaican root tonic plants to maintain health and strength”. XIV TRAMIL Workshop, Cartagena des Indias, Colombia. February 15-20.
- Picking D. and **S.A. Mitchell** (2012). “The prevalence of herbal medicine home use in treating illness in Jamaica” TRAMIL. XIV TRAMIL Workshop, Cartagena des Indias, Colombia. February 15-20.
- **Ramkissoon, A. I. I.** Amarakoon, L. M. Eyzaguirre, R. B. Pierre, J. K. Carr, and **M. E. Roye.** (2012). “Antiretroviral resistance in Jamaican HIV positive pediatric patients”. Northern Caribbean University Science Symposium, Mandeville, Jamaica. March 14.
- **Ramkissoon, A.,** I. Amarakoon, R. Pierre, L. Eyzaguirre, J. Carr, and **M. Roye.** (2011). “Analysis of Drug Resistance Mutations in Jamaican Pediatric Patients”. 2011 Caribbean HIV Conference, Nasau, Bahamas. November 18-21.
- **Ramkissoon, A.,** I. I. Amarakoon, R. Pierre, L. Eyzaguirre, J. Carr, and **M. Roye.** (2011) “Detection of Antiretroviral Resistance in HIV Positive Jamaican Pediatric Patients”. 10th TWAS Regional Office for Latin America and the Caribbean Young Scientist Conference, Tobago, Trinidad and Tobago. December 7-9.
- **Stewart, C.S.,** A.M. Collins-Fairclough, K.N. Smith, A.P. Graham, I.I. Amarakoon, and **M.E. Roye.** (2012). “The status of the begomovirus problem in Jamaica”. Northern Caribbean University Science Symposium, Mandeville, Jamaica. March 14.
- Williams, T.L., K.Coates-Beckford and **P. Tennant.** (2012). “Alternaria leaf spot on pumpkin in Jamaica”. Proceedings of the 9th conference of the Faculty of Pure and Applied Sciences. Mona, Kingston, April 13-15.

PUBLICATIONS

- * Bahado-Singh, P.S., C.K. Riley, **A.O. Wheatley,** and H.I.C. Lowe (2011). “Relationship between processing method and the glycemic indices of ten sweet potato (*Ipomoea batatas*) cultivars commonly consumed in Jamaica”. *Journal of Nutrition*

and Metabolism, Volume 2011, Article ID 584832.
<http://www.hindawi.com/journals/jnume/2011/584832>.

- * Benkebelia, N., **P. Tennant**, S.K. Jawandha, and P.S. Gill (2011). “Pre-harvest factors influencing fruit quality after harvest”. In: Yahia EM and Brecht JK (eds.). *Postharvest Biology and Technology of Tropical and Sub-Tropical Fruits*. Volume 1. Woodhead Publishing, Cambridge. pp 112-141.
- * **Mitchell, S.A.** (2011). “Folk medicine should be integrated into the formal, conventional medical system in the Caribbean”. Focus on *Alternative and Complementary Therapies*. Volume 16(4): 285-288.
- * **Mitchell, S.A.** (2011). “The Jamaican root tonics: a botanical reference”. *Focus on Alternative and Complementary Therapies*. Volume 16(4):271-280.
- * Olarte Castillo X.A., G. Fermin, J. Tabima, Y. Rojas, **P. Tennant P**, M. Fuchs, R. Sierra, A.J. Bernal, and S. Restrepo. (2011). “Phylogeography and molecular epidemiology of Papaya ringspot virus”. *Virus Research* 159: 132-140
- * Picking D., N. Younger, **S.A. Mitchell**, and R. Delgoda (2011). “The prevalence of herbal medicine home use and concomitant use with pharmaceutical medicines in Jamaica”. *Journal of Ethnopharmacology*. 137(1):305-311.
- * **Tennant, P.**, G. Fermin, **L. Fisher**, and M. Fuchs. (2011). “Virus diseases of fruit crops”. In: UNESCO-EOLSS Joint Committee (eds) Agricultural Sciences. *Encyclopedia of Life Support Systems (EOLSS)* Publishers, Oxford, UK. <http://www.eolss.net>
- * **Stewart, C.S.**, T. Kon, R.L. Gilbertson, and **M.E. Roye**. (2011). First report of the complete sequence of Sida golden yellow vein virus from Jamaica. *Archives of Virology* 156: 1481-1484.

- * McLaughlin, P.D., W.A. McLaughlin, D.P. Maxwell, I.I. Amarakoon and **M.E. Roye**. (2011). “Detection of begomoviruses in Caribbean crops and weeds in Antigua, Barbados, and St. Kitts & Nevis. *Tropical Agriculture* 88(4) pp. 211 - 224

INCOME GENERATION

The Third World Academy of Sciences Research Grant (TWAS) awarded a grant of US\$30,000.00 to the Biotechnology Centre in July 2012 . The fund, which is expected to be disbursed in September 2012, will support investigations on the molecular characterization of sweet potato begomoviruses in Jamaica. The application was submitted by **Prof. Paula Tennant** and **Dr. Marcia Roye**.

The annual workshop on “Concepts in Biotechnology and Genetic Engineering” held December 19-21, 2011, generated approximately Two Hundred and Fifty Thousand Dollars (\$250,000.00).

PUBLIC SERVICE

Dr. Sylvia Mitchell

- Management Board Member, College of Agriculture and Science Education (CASE),
- Standards Council Member, Jamaica Bureau of Standards (BJS), Standards and Technical sub-committee, National Quality Awards Member and Chair of Board of Examiners
- Member, Hope Garden’s Education and Research Sub-Committee, and Landscaping Sub-Committee NPF
- Member, Society of In Vitro Biology (SIVB). Co-Editor of *In Vitro* Reports, and Education Chair

Dr. Andrew Wheatley

- Director, Jamaica Anti-Doping Commission (JADCO)

- Chair, JADCO Subcommittee on Science and Education and Chair, Education and Outreach Committee
- Director, Jamaica National Commission for UNESCO
- Chairman, St. Catherine Parish Council

STUDENTS

Effective March 7th, 2012, **Melessa Brown** was awarded the degree of Ph D in Biotechnology. Her research, supervised by Dr. Marcia Roye, was entitled “Biological Characterization of the Geminiviruses Associated with Cabbage Leaf Curl Disease and Elucidation of the Recombinant Events That Generated Cabbage Leaf Curl Jamaica Virus (CaLCuJV)”.