

## THE BIOTECHNOLOGY CENTRE

Professor M. Ahmad, BSc *Bhagal*, MSc, PhD LARI – Director

### WORK OF THE CENTRE

*T*he Biotechnology Centre continued its mandate of teaching and research under the Directorship of Prof. M. Ahmad and with the assistance of the hardworking and dedicated staff.

During the year under review, the Biotechnology Centre underwent a Quality Assurance Review (December 2007). All staff members contributed significantly to this very important exercise. The review provided a chance to highlight some of the challenges faced by both staff and students at the Centre.

One such challenge is the need for increased resources and particularly for additional space to carry our research, in light of the increased number of students currently conducting research at the centre and many others wishing to enter. One recommendation from the review team is for a third floor to be constructed on the Biotechnology building so as to provide well needed space to carry out research. Other important recommendations made by the review team have been duly noted and action plans are being devised.

Some research groups were successful in obtaining significant funding to assist with research. Organizations such as the Environmental Foundation of Jamaica, USAID, Environmental Health Foundation, National Foundation for the Development of Science and Technology among others, are some of the main sources of funding.

As part of its outreach training component geared towards increasing awareness of Biotechnology to prospective tertiary science students and to secondary and tertiary science teachers, the Biotechnology Centre hosted the 5th workshop on “Concepts in Genetic Engineering” for CAPE and A level biology high school students and teachers in Jamaica (December 19-21, 2007). More than 150 students from high schools in Jamaica were trained in recombinant DNA technology, biotechnology



and related areas. The workshop was conducted by Dr. Marcia Roye and her research team (graduate students) in the Biotechnology Centre and some graduate students from the Department of Basic Medical Sciences, UWI.

The medicinal plant research group (MPRG) headed by Dr. Sylvia Mitchell also conducted outreach training programmes with farmers, to teach them how to harden plants and take data of rooted micropropagated plants. Farming groups in Glengoffe, St. Catherine (hardening facility established) are obtaining yields of about 300 plantlets per month and have already reaped pineapple this year from micropropagated plantlets. These were supplied by the MPRG and three groups in the Cockpit Country (presently establishing their hardening facility).

The MPRG also provided tissue culture training to ten participants at the Christiana Potato Growers Micropropagation Training Workshop held in Christiana.

### **Academic Visits**

Professor Ahmad invited to speak at the Visva Bharti, in Santiniketan, India. This University is one of the pioneers founded by Nobel Prize Winner H.E. Rabindranath Tagore.

Dr. Marcia Roye visited the Institute of Human Virology (IHV), University of Maryland School of Medicine (Baltimore) in the summer of 2008. The objective of the visit was to learn cutting edge molecular biology techniques for the detection, subtype and drug resistance determination of human immunodeficiency virus (HIV) in Jamaica and the Caribbean region. The research was conducted under the supervision of Drs. Jean Carr and William Blattner, Principal Investigators and Miss Lindsay Eyzaguirre, Senior Research Assistant.

Dr. Paula Tennant visited the Department of Plant Pathology and Plant Microbe Biology Cornell University, New York, USA (May 31- June 30, 2008) and conducted research on the molecular analysis of Papaya ringspot virus isolates from Jamaica.

## PAPERS PRESENTED

- Bennett S.M., **Tennant P.F.**, McLaughlin W (2008) “Biological and molecular characterisation of citrus viroids in Jamaican citrus orchards”. Joint Annual Meeting of the American Society of Plant Biologists and the Sociedad Mexicana De Bioquímica Rama: Bioquímica y Biología Molecular de Plantas. Merida Mexico June 26 – July 1, 2008.
- **Mitchell, S. A.** (2008) Biofuel development in the Caribbean - the pros and cons. In: Plenary session: ‘Biofuels - a ripe field for research or not?’ World In Vitro Congress, Tuscon, Arizona, USA. June 14-18<sup>th</sup>, 2008. Abstract PS-13, In Vitro Cellular and Development Biology, Abstract Edition, pg S6.
- Bahado-Singh, P.S., **Wheatley, A.O.**, Osagie, A.U., Boyne, M., Choo-Kang, E., Morrison, E.Y.St.A., Ahmad, M.H. and Asemota, H.N. (2007) Glycemic indices of Caribbean foods: Use in dietary/lifestyle management of type 2 diabetes and cardiovascular disease prevention. *Second International Symposium on Human effects of Fruits and Vegetables. FAV Health* 2007, October 9-13. 2007, Houston, TX, USA. pg. 57.
- Riley, C.K., **Wheatley, A.O.**, Adebayo, S.A. and Helen. N. Asemota (2008) A comparative investigation of the effect of physicochemical properties on the in vitro digestibility of yam (*Dioscorea sp.*) starches. *Institute of Food Technologist Annual Meeting and Food EXPO*, New Orleans, USA.
- Riley, C.K., **Wheatley, A.O.**, Adebayo, S.A. and Asemota, H.N. (2008). Dissolution of N- (4- hydroxyphenyl) acetamide from granules formulated with yam (*Dioscorea spp.*) starch as binder. *Particulate Process in the Pharmaceutical Industry II*, Puerto Rico, (2008).
- Riley, C.K., **Wheatley, A.O.**, Adebayo, S.A. and Asemota, H.N. (2008) Improved Sweet potato production and exploitation of its starches in Pharmaceutics and functional foods. *Proceedings of Regional Sweet Potato Workshop*, St. Vincent and the Grenadines.
- Stennett, D., Asemota, H.N., Oladeinde F.; **Wheatley, A.O.**, Dilworth L., Simon, O., Hohman, C. Bronner, Y. and Bryant, J.

- (2007). “Bitter Yam Biomaterials influence kidney function and electrolytes balance in transgenic mice model of hypercholesterolemia” Fourth International Congress of Nanotechnology & Clean Tech Congress 2007. Hyatt Regency San Francisco Airport. Nov. 5-8, 2007.
- Green, C.O., **Wheatley, A.O.**, Osagie, A.U., Dilworth, L.L., Morrison, E.Y.St.A and Asemota, H.N. (2007) Characterization of health-promoting Polymethoxylated Flavones from Jamaican and Mexican citrus peels. Second International Symposium on Human effects of Fruits and Vegetables. FAV Health 2007, October 9-13. 2007, Houston, TX, USA. pg. 57.
  - Asemota, H. N., Stennett, D., Green, C., **Wheatley, A.O.**, Bahado-Singh, P., Gardner, N., Luke, K., Harvey, A., Dilworth, L., Lobban, K., Earl-Barrett, S., Riley, C., and Bailey, D. (2007). Exploitation of Caribbean Indigenous Crops (especially yams) for Sustainable Development and Wellness. Poster Presentation at the University of Karlsruhe’s Center for Functional Nanostructures (CFN) 2007 Summer School on Nano-Biology, Bad Herrenalb, Germany, August 20-31, 2007. P-27.

## PUBLICATIONS

### Refereed Journal Articles

- \* **Mitchell S.A.**, M.H. Ahmad (2007) Medicinal Plant Biotechnology Research in Jamaica – Challenges and Opportunities. Proceedings of ISHS International Symposium on Medicinal and Nutraceutical Plants. Ed. A.K. Yadav. Acta Horticulturae. 756: 171-182.
- \* Riley, C.K., **Wheatley, A.O.**, Adebayo, S.A, **Ahmad, M.H.**, Morrison, E.Y.St.A. and Asemota, H.N. (2008) Evaluation of local tuber starches as excipients for tablet and reconstituted granule formulations for diabetic individuals. *WIMJ* 57 (Suppl. 1): 37.
- \* Roberts Madeen, Minott Donna A, **Tennant Paula F.**, and Jackson Jose C. (2008) Assessment of compositional changes during ripening of transgenic papaya modified for protection

against Papaya ringspot virus. *Journal of the Science of Food and Agriculture* 88: 1911-1920

- \* Chin M, Rhodes L, **Tennant P** (2008) Occurrence of Papaya ringspot virus in papaya orchards of St. Kitts. *Plant Pathology* 57:767
- \* Tennant, P.F., Fermin, G.A., **Roye, M.E.**, 2007. Viruses infecting papaya (*Carica papaya*), etiology, pathogenesis and molecular biology. *Plant Viruses* 1 (2):178-188.
- \* Hall, G.C., Graham, A.P., **Roye, M.E.** 2008. *Tobacco leaf curl Cuba virus* infects the weed *Malachra alceifolia* in Jamaica. *Plant Pathology* 57:388.
- \* Amarakoon, I.I., **Roye, M.E.**, Briddon, R.W., Bedford, I.D., Stanley, J. (2008). Molecular characterization of *Macropodium yellow mosaic virus* from Jamaica. *Plant Pathology* 57:417-426.
- \* Riley, C.K., Bahado-Singh, P.S., **Wheatley, A.O.**, Ahmad, M.H., Morrison, E.Y.St.A. and Asemota, H.N. (2008) Relationship between the physicochemical properties of starches and the glycemic index of some Jamaican yams (*Dioscorea* spp.). *Journal of Molecular Nutrition and Food Science*. #MNF-0461-2007.R1 (published online).
- \* Riley, C.K., Adebayo, S.A., **Wheatley, A.O.** and Asemota, H.N. (2008) The interplay between Yam (*Dioscorea* sp.) starch botanical source, micromeritics, and functionality in paracetamol granules for reconstitution. *Eur. J. Pharm. Biopharm.* DOI.org/10.1016/j.ejpb.2008.03.001
- \* Riley, C.K., Adebayo, S.A., **Wheatley, A.O.** and Asemota, H.N. (2008) Surface properties of yam (*Dioscorea* sp.) starch powders and potential for use as binders and disintegrants in drug formulations. *Powder Tech.* 185: 280-285.
- \* Green, C., **Wheatley, A.O.**, Osagie, A.U., Morrison, E.Y.St.A. and Asemota, H.N. (2007) Determination of polymethoxylated flavones in peels of selected Jamaican and Mexican Citrus (*Citrus* spp.) cultivars by High Performance Liquid Chromatography (HPLC). *Biomed. Chromatogr.* 21: 48-54.
- \* Green, C.O., **Wheatley, A.O.**, Dilworth, L.L., McGrowder, D., Mills, J., Morrison, E.Y.St.A., and Asemota, H.N. (2007).

Effect of Jamaican Ortanique peel polymethoxylated flavones on kidney and liver function in diet-induced hypercholesterolemic rats. *West Indies Medical Journal*. 56 (Suppl 3): 1-42.

- \* **Mitchell S.A.**, S.A. Webster and M.H. Ahmad (2008) Ackee (*Blighia sapida*) – Jamaica’s top fruit. *Jamaica Journal*, Institute of Jamaica, Kingston. 31 (1-2): 84-89.
- \* Webster S.A., **Mitchell S.A.**, Gallimore W., Williams L.A.D. and Ahmad M.H. (2008) Biosynthesis of Dibenzyl Trisulphide (DTS) from somatic embryos and rhizogenous/embryogenic callus derived from Guinea Hen Weed (*Petiveria alliacea* L.) leaf explants. *Vitro Cell. Dev. Biol.*, 44(2): 112-118.
- \* Gutierrez R.M.P, **Mitchell, S.A.** and R.V. Solis (2008) *Psidium guajava*: A review of its traditional uses, phytochemistry and pharmacology. *Journal of Ethnopharmacology* 117: 1-27.
- \* Green C.E., Hibbert S.L., Bailey-Shaw Y.A., Williams L.A.D., **Mitchell S.** and Garraway E. (2008) Extraction, Processing, and Storage Effects on Curcuminoids and Oleoresin Yields from *Curcuma longa* L. Grown in Jamaica. *J. Agric. Food Chem.*, 56: 3664-3670.
- \* **Mitchell, S.A.** (2007) Acquiring basic reading skills: an exploration of phonetic awareness in Jamaican primary schools. *Caribbean Journal of Education* 29(2): 327-358.

### Non-Refereed Publications

- \* **Mitchell SA** and R. Jagnarine (2007) Harnessing the potential of Aloe at last. ‘Eye on Science’ page, *Gleaner* page, December 20, 2007, repeated Jan 17, 2008.

### Technical Reports

- \* **Mitchell, S. A.**, D. Robertson, A. Smith, B. Goffe (2007) Jamaica Country Report on Medicinal and Aromatic Plants. Regional Workshop on ‘Quality control, scientific validation and business prospects of med and aromatic plants’, Trinidad and Tobago, Hosted by ICS-UNIDO with IICA and CHBA,

Oct. 1-3, 2007, 37 pgs. <http://www.caribbeanherbs.org/images/stories//jamaica%20report.pdf>

## **INCOME GENERATION**

### **Research Grants:**

#### **Dr. Sylvia Mitchell**

US\$65,000.00 – USAID - “Micropropagation so selected non-timber medicinal forest species”. (2007)

J\$4,997,000.00 – Environmental Foundation of Jamaica - “Production dissemination of medicinal plant monographs” (Sept. 2006- August 2008)

J\$1,000,000.00 – Environmental Foundation of Jamaica - Tuition Grant for “Postgraduate work on the establishment of medicinal plant gene banks”

#### **Dr. Andrew Wheatley**

US\$8,000.00 from the Environmental Health Foundation

US\$8,000.00 from UWI School of Graduate Studies

JMD\$150,000.000 from Scientific Research Council of Jamaica

JMD\$150,000.000 from Bureau of Standards of Jamaica

JMD\$150,000.000 from Environmental Health Foundation

#### **Dr. Paula Tennant**

J\$1,170,000.00 from the National Foundation for Development of Science and Technology (Technology Investment Fund)  
“Field safety assessment of transgenic papaya ringspot virus.

## **PUBLIC SERVICE**

#### **Prof. M. Ahmad**

- Board Member, National Commission on Science and Technology
- Member, National Biosafety Committee, NCST

**Dr. Sylvia Mitchell**

- Member, Biosafety Committee, NCST
- Member, Hope Gardens Landscaping Committee
- Member, Jamaican Chapter of the Caribbean Herbal Business Association
- Scientific Advisor, Ministry of Health Advisory Committee on Complementary and Alternative Medicine
- Member, Jamaican Society for Agricultural Sciences (JSAS)
- Part-time editor for 'Journal of Plant Growth Regulation' (JPGR), 'Journal of Ethnopharmacology' (JEP), and 'In Vitro-Plant'
- Member, Caribbean Association of Scientists (CAS)
- Registered member, Science Advisory Board (SAB).

**INFORMATION ON STUDENTS**

Currently, there are twenty-two (22) postgraduate students conducting research at the Biotechnology Centre; twelve (12) PhD candidates and ten (10) MPhil candidates.

**Prizes Awarded**

Mr. Seymour Webster received the 2007 SRC/JPS Young Scientist of the year award. Mr. Webster is a PhD candidate supervised by Dr. Sylvia Mitchell. This is the 2nd consecutive year that the award has been given to a student from the Biotechnology Centre.