

## THE BIOTECHNOLOGY CENTRE

Marcia Roye, BSc, PhD *UWI*  
– Head of Centre (Actg) & Associate Dean, FPAS

### WORK OF THE CENTRE

The Centre's work is concentrated on agricultural biotechnology and throughout 2010 – 2011 the staff focused on various projects involving medicinal plants, forestry preservation, molecular biological studies on geminiviruses, HIV, citrus research, glycemic indices of Jamaican foods, and studies on root and tuber crops. During the year under review, all the members of staff were involved in the training and supervision of projects being undertaken by postgraduates, as well as the teaching and supervision of undergraduate programmes and projects in the departments of Basic Medical Sciences, and Life Sciences. Annually, the Centre hosts outreach and educational workshops for various groups including teachers, sixth form science students, and farmers.



In March 2011, Dr. Marcia Roye received the prestigious 2010-2011 **L’Oreal-UNESCO Advanced Fellowship** “in the footsteps of Marie Curie” for Women in Science. Dr. Roye’s award was presented in Paris, France where she travelled to attend the ceremony. The award was the first of its kind, having recently been initiated by L’Oreal-UNESCO to mark the centennial of Marie Curie’s Nobel Prize in Chemistry. Dr. Roye was a previous recipient of the L’Oreal-UNESCO for women in Science award in 2000-2001.

Under the project “Enhancing productivity of medicinal plants during cultivation and processing using innovative machines”, three pieces of equipment (shredder, brush cutter, and chainsaw) have since been obtained to manufacture mulch, prepare field, and conduct field testing to compare tissue culture with traditional planting material of ginger and

turmeric. In addition, a Biochar machine is being manufactured by a Jamaican non-profit entity and is in the process of completion. Biochar is charcoal produced at a lower temperature, which is a more efficient process, and it is used especially for farming. It is a soil ameliorant which will lessen nutrient leaching and improve water-balance in the soil and therefore increase plant yields. Biochar produced from the machine will be used to test the technology in Jamaica by field trials and lab analysis using micropropagated plants. The Biochar machine is a first for Jamaica and will also be used to dry 400 lbs/day of farm produce (ex. ginger and turmeric). The project, whose Principal Investigator is Dr. Sylvia Mitchell, is funded by the Environmental Foundation 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 many others have now been collected under “Identification, propagation and dissemination of native forest species of Jamaica”, a special project lead by Dr. Mitchell. 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.

## PAPERS PRESENTED

- Perceval S. Bahado-Singh, Henry I.C. Lowe, Cliff K. Riley, Andrew O. Wheatley and Errol St. A.Y. Morrison (2011). Wound healing potential of *Tillandsia recurvata* and *Guaiaacum officinale* in Type 1 Diabetic rats. University Diabetes Outreach Programme (UDOP) Conference, Ocho Rios Jamaica. March 24-27.
- Delahaye-McKenzie C.M., Rainford L., Nicholson A., Mitchell S.A., Lindo J.F and M.H. Ahmad (2010). Bioactive analysis of crude extracts derived from *Callistemon viminalis*. International Biotechnology Symposium and Exhibition, Rimini Italy. September 14-16, 2010.
- Francis T.K., Mitchell S.A. and M.H. Ahmad (2010). Micropropagation of a Jamaican Non-Timber Forest Species -

Sarsaparilla (*Smilax regeli*). ISHS 1st International Symposium on Tropical Horticulture. November 22-26, 2010.

- Fisher L, Bennett S, Tennant P, McLaughlin W (2010). Detection of Citrus tristeza virus and Citrus viroid species in Jamaica. Acta Horticulturae. 1st International Symposium on Tropical Horticulture. International Society for Horticultural Science and the UWI Kingston, Jamaica, November 22-26.
- C. C. Hamilton, M. E. Roye, P. Figueroa, L. M. Eyzaguirre, J. K. Carr, 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.
- C. C. Hamilton, M. E. Roye, P. Figueroa, L. M. Eyzaguirre, J. K. Carr, J. Duncan (2010). Analysis of protease and reverse transcriptase genes of HIV for antiretroviral drug resistance in Jamaican adults. 19th Annual Research Conference Faculty of Medical Sciences, University of the West Indies, Mona, Kingston, Jamaica. November 11-12.
- R. Jagnarine, S.A. Mitchell, M. Roye, M.H. Ahmad (2010). Micropropagation and genetic analysis of a Jamaican endemic medicinal plant: Piper amalago (*var. nigrinodum*). 1st International Conference on Tropical Horticulture, Kingston, Jamaica. November 26.
- Lee D. and SA Mitchell (2010). Potential for Carbon Forestry. FAO National Forest Program facility meeting, Jamaica Tree Growers Association, November 9.
- Mitchell SA and MH Ahmad (2010). Opportunities in biotechnology for the production and survival of forests. FAO National Forest Program Facility Workshop, Jamaica Tree Growers Association, November 9.
- M. E. Roye, A. Ramkissoon, I. I. Amarakoon, C.C. Hamilton, L. M. Eyzaguirre, R. B. Pierre, P. Figueroa and J. K. Carr (2010). Multiple drug resistance in Jamaican pediatric patients infected

with HIV-1. 19th Annual Research Conference Faculty of Medical Sciences, University of the West Indies, Mona, Kingston, Jamaica. November 11-12.

- S.A. Webster, S.A. Mitchell, M. Roye and M.H. Ahmad (2010). Assessment of genetic stability in repetitive somatic embryogenic cultures of cheese ackee (*Bligbia sapida*) using ISSRs and RAPDs markers. The First International Conference on Tropical Horticulture, Kingston Jamaica. November 26.

## PUBLICATIONS

- \* Fermin GA, Tennant PF (2011). Opportunities and constraints to biotechnological applications in the Caribbean: Transgenic papayas in Jamaica and Venezuela. *Plant Cell Reports* 30: 681-687.
- \* Fermin GA, Castro LT, Tennant PF (2010) Virus resistant transgenic papaya: Current opportunities and challenge. *Transgenic Plant Journal* 4: 1-15.
- \* Fisher L, Bennett S, Tennant P, McLaughlin W (2011). Detection of Citrus tristeza virus and citrus viroid species in Jamaica. *Acta Horticulturæ* 894: 117-122.
- \* Green, C.O., Wheatley, A.O., McGrowder, D., Dilworth, L. and Asemota, H.N. (2011). Hypolipidemic effects of ortanique peel polymethoxylated flavones in rats with diet-induced hypercholesterolemia. *J. Food Biochem.* (35) 1555-1560.
- \* Mitchell, S.A. (2011). Development of optimised microropagation protocols for turmeric (*Curcuma longa*) and ginger (*Zingiber officinale*) plantlets. SIVB *In Vitro* Biology Conference, Raleigh, North Carolina, USA, June 6-10th, Poster Abstract P-2000, *In Vitro Cellular and Development Biology*, Abstract Edition, pg 860
- \* Oliver JE, Tennant PF and Fuchs M (2011). Virus-resistant transgenic horticultural crops: Safety issues and lessons from risk assessment studies. In: Transgenic horticultural crops: Challenges and opportunities- Essays by experts, Mou B and

- Scorza R (Eds). CRC Press, Taylor and Francis Group, Boca Raton, FL. pp 263-287.
- \* Picking D., Younger N., Mitchell S.A. and R.Delgoda (2010). The prevalence of herbal medicine home use in rural and urban communities in Jamaica. *West Indian Medical Journal* 59 (Suppl 4): 1-53. O-22, pg 33.
  - \* Roye, M.E., Amarakoon, I.I., Hamilton, C-L. Eyzaguirre, L. M Figueroa, P., Carr J.K. (2010). Genotypic characterization of HIV-1 virus in Jamaica. *AIDS Research and Human Retroviruses* 26:1-5. 2.
  - \* Stewart, C.S., Kon, T, Gilbertson, R.L., Roye, M.E. (2011). First report of the complete sequence of Sida golden yellow vein virus from Jamaica. *Archives of Virology* 156:1481-1484.
  - \* Tennant PF, Pinnock SE, Powell M, Wheatley AO, Minott DA (2010). An overview of the safety assessment of transgenic papaya for the management of Papaya ringspot virus in Jamaica. *Transgenic Plant Journal* 4: 29-36.
  - \* Tennant P (Ed.) (2010). Transgenic Papaya. *Transgenic Plant Journal* Vol., 4 (Special Issue 1), 96 pp.

## **INCOME GENERATION**

The annual workshop on “Concepts in Biotechnology and Genetic Engineering” lead by Dr. Marcia Roye, was held December 20-22, 2010. Over one hundred students from across the island participated this year. Methods in recombinant DNA technology, production of transgenic animals and plants, extraction of plasmid DNA, and agarose gel electrophoresis were some of the areas covered in the workshop. The programme generated approximately \$300,000.00 for the Biotechnology Centre.

## **PUBLIC SERVICE**

### **Dr. Sylvia Mitchell**

- Chair, Advisory Board, Centre of Excellence for Advanced Technology in Agriculture (CEATA)
- Member, Society of In Vitro Biology (SIVB), Secretary of the Plant biotechnology Section of the SIVB
- Member, Biosafety committee, National Commission on Science and Technology (NCST)
- Scientific Advisor, Ministry of Health Advisory Committee on Complementary and Alternative Medicine.
- Reviewing editor for a number of Scientific Journals (JEP, FACT, JMPR, AJPP, JPGR, IVP, PCTOC), and Scientific Research and Essays (SRE). E-newsletter editor of the Medicinal Plant Network for TWAS.

### **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 July 1, 2011, Cheryl Stewart was awarded the degree of Ph D in Biotechnology. Her research, supervised by Dr. Marcia Roye, was entitled “The Molecular Characterisation of the Begomoviruses Infecting *Sida* spp. in Jamaica”.