THE BIOTECHNOLOGY CENTRE

Prof. M. Ahmad, BSc *Bhagal,* **MSc, PhD** *IARI* **– Director**

WORK OF THE CENTRE

The general aims and objectives of the Biotechnology Centre were met for the academic year 2004 -2005 as the staff advanced the work of the Centre through teaching, training and supervision of graduates and undergraduates.The Environmental Foundation of Jamaica funded the sum of approxiately JMD5,000,000.00 for a research project to establish *ex situ* and *in vitro* gene banks of Jamaican medicinal plants. The project commenced in July 2004 and so far, of the 334 plants identified as having medicinal purposes over 70% of them have been obtained and placed into tissue culture, in addition to 15 other plants not previously identified. Dr. Sylvia Mitchell, working in association with the Inter American Institute for Cooperation in Agriculture (IICA) and the Social Development Council (SDC), hosted a workshop in Charles Town, Portland in April 2005. The workshop, which was very well attended and included speakers from the SDC, the EFJ, and the Institute of Jamaica, was held to sensitize the participants about the benefits and the use of medicinal plants and the need for sustainable development of these resources.

The Citrus Replanting project being sponsored by the Ministry of Agriculture entered its final year of activity in February 2005. The project commenced in February 2003 and is part of a larger project of the Ministry of Agriculture to control citrus diseases in Jamaica and develop virus free certifiable planting material for local varieties of tangerine and grapefruit through the development of tissue culture (shoot tip grafting) protocols.
The objectives of this project are being met to some extent. Thus far the Citrus tristeza virus (CTV) has been found more widespread than the incidence reported in 1999. The biological properties of the CTV and viroids isolates are presently being assayed. Shoot tip grafting experiments to produce virus free certifiable planting material were established but obtaining successful grafts has been low. A number of new resistance gene constructs have been engineered, transformations of papaya conducted and papaya plantlets are being rooted in vitro. The aim of this trial will be to collect the final data on the inheritance of resistance of the first set of transgenic lines and to assess that of the new lines. The principal investigators and team leaders are Drs. Wayne McLaughlin and Paula Tennant.

A workshop on the "Concepts of Biotechnology and Genetic Engineering" was hosted by the Biotechnology Centre July 18 – 22, 2005. The objective of the workshop was to provide an avenue for some science teachers to increase their knowledge and to provide practical hands on laboratory experience in Biotechnology and Genetic Engineering. The workshop was organized by Dr. Marcia Roye and lectures were delivered by members of staff of the Biotechnology Centre and the Department of Basic Medical Sciences. The programme was very successful with approximately twenty teachers from a variety of high schools participating. The workshop was partly sponsored by the Ministry of Education.

One MPhil student of Dr. Marcia Roye, Miss Melessa Brown, visited the John Innes Centre in the

UK to conduct research on gene silencing on geminiviruses under the supervision of Dr. John Stanley. Miss Brown was sponsored by two grants, one from the Office of the Principal and another from the Campus Committee for Research and Publication and Graduate Grant Awards.

The Research group led by Prof. Helen Asemota and Dr. Andrew Wheatley was granted two patents in 2005 for work done in Yam Bioengineering research:

. • The procedure for a simple, efficient, and inexpensive method for acclimatization of *in vitro* derived yam (*Dioscorea sp.*) plantlets.
. • The assessment of the efficacy of acclimatization of tissue culture derived plantlets by the use of a biochemical indicator.

PAPERS PRESENTED

. • Abdulkadri, A., **Pinnock, S.,** and **Tennant, P**. (2004). "Public perception of Genetic engineering and the choice to purchase genetically modified food". Annual Meeting of the American Agricultural Economics Association, Denver, Colorado, August1-4, 2004.
. • **Bahado-Singh P. S., Wheatley**, A.O., Morrison, E.Y., **Ahmad, M.H**. and **Asemota, H.N.** (2005). "Glycemic Index: Distinction between 'good' and 'bad' carbohydrates for effective diabetes management". 7th Conference, Faculty of Pure and Applied Sciences, Mona, May 16 -19, pg 55 -56.
. • Bennett, S., **Tennant, P** and McLaughlin, P. (2005).

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/Molecular characterisation, prevalence and distribution of th

citrus viroids in citrus from Jamaica". Conference, Faculty of Pure and Applied Sciences. Mona, May 16 -19, p 45

. • Bennett, S., **Tennant, P** and McLaughlin, P. (2005). Identification of citrus viroids in Jamaica by RT-PCR and SSCP. Sixteenth Annual Conference of the Jamaican Society for Agricultural Sciences (JSAS). Kingston, Jamaica June 15 16, 2005
. • **Collins, A.M., and Roye, M.E.** (2005). Geminivirus infection of the weed *Wissadula amplissima* and its implications for Jamaican agriculture. Seventh Conference, Faculty of Pure and Applied Sciences. Mona, May 16 -19, p. 46
. • Fisher, L., **Tennant, P.** and McLaughlin, W. (2005). Detection and differentiation of *Citrus tristeza virus* (CTV) in Jamaica using ELISA, RT-PCR, DNA hybridisation and RFLP. Seventh Conference, Faculty of Pure and Applied Sciences. Mona, May 16 -19, 2005, p. 48
. • Fisher, L., **Tennant, P**. and McLaughlin, W. (2005). "Distribution and molecular characterization of *Citrus tristeza virus* (CTV) in Jamaica". Sixteenth Annual Conference of the Jamaican Society for Agricultural Sciences (JSAS). Kingston, Jamaica June 15 -16.
 .• **Graham, A.P. and Roye, M.E**. (2005). Two novel geminiviruses participating in mixed infection of the weed
 .abutilon sp. In Jamaica. Seventh Conference, Faculty of Pure and Applied Sciences. Mona, May 16 -19, p. 49
. • **McKenzie, F. and Tennant, P.** (2005). Development of a regeneration and transformation system for West Indian Sea Island cotton (*Gossypium barbadense* L. cv. V135). Seventh Conference, Faculty of Pure and Applied Sciences. Mona, May 16 -19, p. 47
. • **Millar M, S.A. Mitchell, M.H. Ahmad** (2005). "Micropropagation Studies and Antimicrobial Evaluation of Neem (*Azadirachta indica* A. Juss)". Seventh Conference, Faculty of Pure and Applied Sciences. Mona, May 16 -19, p 36 -37.
. • **Mitchell, S.A., M Millar and M.H. Ahmad** (2005). "The potential of Jamaican-grown plants for health and wealth: the experience of the Medicinal Plant Research Group,

Biotechnology Centre, UWI, Mona". The 29th Caribbean Regional Conference on Nutrition and Dietetics: July 2-5th, Kingston, Jamaica. pg 18.

□ .• **Mitchell S.A.**, K. Scott and **M.H. Ahmad** (2005). "Propagation of neem (*Azadirachta indica*) using macro-and micropropagation methods". Jamaican Society for Agricultural Sciences Conference. June 15-16, Kingston, Jamaica. pg

□ .7.

. • **Mitchell S.A., M. Millar,** S. Miller and **M.H. Ahmad** (2005). "Post-harvest microbial analysis of turmeric (*Curcuma longa*) and curry products". Jamaican Society for Agricultural Sciences Conference. June 15 -16, pg. 18.

. • **Mitchell S.A.** (2005). "Plant growth phases affecting *in vitro* growth". Society of In vitro Biology 2005: In Vitro Biology Conference, Baltimore. June5-7, P-11, pg 15.

. • **Powell, M., Wheatley, A.O.,** Williams, N., Omoruyi, F., **Asemota, H.N., and Tennant, P.** (2005). "Safety assessment of transgenic papaya (*Carica papaya* L.) in rat models: Histopathology Studies". Seventh Conference, Faculty of Pure and Applied Sciences. Mona, May 16 -19, 2005, p. 53

. • **Riley, C.K.**, Adebayo, A.S., **Wheatley, A.O., Ahmad, M.H**. and **Asemota, H.N**. (2005). "Micrometrics of some Jamaican Yam (*Dioscorea spp.*) Starch Powders and implications in tablet

and capsule formulations". Seventh Conference, Faculty of Pure and Applied Sciences, University of the West Indies, Mona. May 16 -19, pg 57.

□ .• **Roye, M.E., Amarakoon, I., Stewart, C.S., Graham, A.P. Collins, A.M.,** McKoy R. (2005). "Genetic Diversity of the geminiviruses infecting weeds and crops in Jamiaca". XLV Annual Meeting of the American Phytopathological Society

□ .– Caribbean Division. San Jose, Costa Rica, June 27 – July 1,

□ .p. 50.

. • **Stewart, C.S., and Roye, M.E.** (2005). "Three distinct geminiviruses infecting Sida spp. in Jamaica and implications for agriculture". Seventh Conference, Faculty of Pure & Applied Sciences, University of the West Indies, Mona. May 16-19,p51

. • **Turner, S. G. and Tennant, P.** (2005). "Differential reactions to *Papaya ringspot virus* of progenies obtained from crossing tolerant papaya cultivars". Sixteenth Annual Conference of the Jamaican Society for Agricultural Sciences (JSAS). Kingston, Jamaica June 15 -16, 2005

. • **Webster S.A., Mitchell S.A.,** Reid W and **M.H Ahmad** (2005). "Somatic Embryogenic Response and Embryo Conversion in *Petiveria alliacea (*Guinea hen weed)". 7th Conference, Faculty of Pure and Applied Sciences, University of the West Indies, Mona. May 16, 190 -30, pg 53.

PUBLICATIONS

Books & Monographs

* **Mitchell S.A.** (2005) "The Role of Biotechnology" In:
Sharing Innovative Experiences, Volume 10. Examples of the Development of Pharmaceutical Products from Medicinal Plants. UNDP-SSS, TWAS, TWNSO. Pp 164 -176

* Fermin, G., **Tennant, P.**, Gonsalves, C., Lee, D., and Gonsalves, D. (2004). "Comparative development and impact of transgenic papaya in Hawaii, Jamaica and Venezuela". In Transgenic plants: Methods and Protocols, Vol. 286, Methods in Molecular Biology. L. Pena (Ed.). Humuna Press, Totowa, New Jersey pp 397 -428.

Refereed Journals

□ .* **Tennant, P., Ahmad, M. H.**, and Gonsalves, D. (2005). "Field resistance of coat protein transgenic papaya to *Papaya ringspot virus* in Jamaica". *Plant Disease* 89: 841 -847

□ .* **Tennant, P**., Souza, M., Gonsalves, D., Fitch, M., and Slightom, J. (2005). "Line 63 -1: A new virus-resistant transgenic papaya". *HortScience* 40: 1196 -1199

INCOME GENERATION

Grants

JM$5M. – Environmental Foundation of Jamaica – to establish gene banks of Jamaican medicinal plants. July 2004–July 2006

USD149,911.00 – Ministry of Agriculture – Citrus Replanting Project. February 2003 – January 2006.

USD36,000.00 – Office of the Principal Special Initiative Fund

□ .– Molecular Investigations of Recombination between Crop and Weed-infecting Geminiviruses from Jamaica. March 2003

□ .– February 2006.

USD2000.00 – Campus Committee for Research and Publication and Graduate Grant Awards – Molecular Characterizaton of the Geminiviruses infecting *Wissadula amplissima* in Jamaica. April – September 2005.

USD6000.00 – Campus Committee for Research and Publication and Graduate Grant Awards and the Office of the Principal–Gene Silencing of cabbage leaf curl virus in Jamaica. April to September 2005

Funded Activities

J$400,000 from the Ministry of Education, Youth & Culture for Science Teachers Workshop, July 18 -22, 2005.

J$120,000 from the Tropical Battery Company for the distribution of Neem and other medicinal plants.

J$100,000.00 from the Juici Beef Patties for quality testing and training

PUBLIC SERVICE

Prof. M. H. Ahmad

□ .– Board Member, National Commission on Science and Technology

□ .– Member, CARICOM Working group on genetically modified organisms (GMOs)

□ .– Member, National Bio Safety Committee, NCST

Prof. Helen Asemota

□ .– International Consultant for the Food and Agriculture Organization, UN

□ .– Member, Steering Committee for the Development of a Caribbean Food Composition Programme organized by the Caribbean Food & Nutrition Institute (CFNI) and PAHO

Dr. Sylvia Mitchell

□ .– Member of the Pharmaceutical Council of Jamaica

□ .– Secretary, Caribbean Herbs Business Association of Jamaica

Dr. Marcia Roye

– Member, Biodiversity Committee, NEPA

Dr. Paula Tennant

- Board Member, Papaya Growers Association
- Member of the National Biosafety Committee (NCST)

Dr. Andrew Wheatley

- Mayor, Spanish Town, St. Catherine
- Vice-Chairman, St. Catherine Parish Council

CATEGORY OF STUDENTS

Postgraduates:

Twenty postgraduates are currently doing research at the Biotechnology Centre, thirteen M Phil and Seven Ph D students. One MPhil and one PhD candidate have submitted their thesis and two other Ph D candidates are completing.

In September 2004, two new students, Messrs. Cornelius Pyne and Curtis Greene started their research at the Biotechnology Centre under the supervision of Dr. Andrew Wheatley and Prof. Helen Asemota.