RESEARCH
Professor H. Asemota

My research areas span across:
Biochemistry, Biotechnology, Molecular Biology & Nanotechnology.

**RESEARCH AREAS:**

1. **Biotechnology Research:**
    a. Bioengineering Caribbean Yams – for quality improvement (UWI Yam Biotechnology Project - 1993 to date)
        i. Micropropagation
        ii. Production of disease-free yam planting materials for farmers' use
        iii. Research into alternative uses of yams
        iv. Yam biodiversity for sustainable development and wellness of the people.
    b. United Nations Food and Agriculture Organization (UN-FAO) Project - Potato Seed Production through biotechnology – first in Syria, now in the Republic of Tajikistan (2003 to date)
2. **Biochemistry Research:**
    a. Pre-harvest and post-harvest physiology of tuber crops.
    b. Metabolic analyses of diseases in animal models and effects of secondary metabolites (Natural products) from tuber crops
    c. Jamaica-Mexico Binational Commission Project – Screening of Caribbean food crops for antinutritional factors and analyses of their metabolic effects in normal and disease states (Natural products and their metabolic effects in animals – 1999 to date).
    d. UWI/EHF Research Project on "Nutritional Supplement as a tool for harm reduction in illicit drug addition" – 2006 to date
3. **Molecular Biology Research:**
    a. Molecular Marker technology
    b. Analyses of genetic diversity
        i. DNA fingerprinting analyses of Yams, Dasheen and cocoyams, sweet potatoes
4. **Nanobiology Research (plans):**
    a. Use of Nanotechnology in the study of pain biochemistry and physiology & Metabolism of diseases – hypercholesterolemia, diabetes (focusing on animal models)
    b. Biosensors fabrication and biomolecular designs
    c. Bio-nanotechnology applications in emerging situations

**RESEARCH IN PROGRESS**:

**At Shaw University (2005 to date):**

- DNA Fingerprinting of Sweet potato varieties produced in North Carolina and the encapsulation of Sweet Potato phytochemicals in diamond thin films.
- Plans underway for "Analysis of COX-NSAIDs interactions and the development of Nanosensors for pain".

**At the UWI. Mona:**

- Bioengineering Caribbean yams – application of *In vitro* technologies to the improvement of Yam (*Dioscorea sp.*) - popularly known as the **UWI Yam Biotechnology Project.** Ongoing since 1993.
    - Molecular changes associated with developmental processes in yam, focussing on salinity stress and *in vitro* tuberization mechanisms.
    - Biochemical assessments of yield factors in yams.
    - Yam Micropropagation and postflask management, Field experimentation of *in vitro* derived yam planting materials.
    - Biochemical, physiological and some environmental factors affecting acclimatization (hardening) and the **lab to field** transfer of *in vitro* derived yam planting materials.
- Molecular genetic characterization of roots and tuber crops -Yam, Dasheen and Cocoyam
    - The genetic diversity and relatedness among Dasheens (*Colocasia sp*.) and Cocoyams (*Xanthosoma sp*.) using PCR-based DNA fingerprinting techniques.
    - Genetic variation and cultivar identification of Jamaican yam germplasm by DNA fingerprinting techniques.
- Analyses of Anti-nutritional factors (ANFs) in selected Food Crops
    - Assessment of levels of various anti-nutritional factors in different yam cultivars and varieties.
    - Screening of selected Caribbean crops for anti-nutritional factors.
    - Analyses of anthocyanins in Jamaica Moonshine yam
    - Analyses of Polymethoxylated flavones in Citrus peels
- Metabolic assessments of safety of consumption of plants extracts and transgenic crop in rat models.
    - Studies on the metabolic effects of consumption of steroidal and other organic extracts of yams and dasheens in rat models.
    - Metabolic effects of consumption of some yam natural products in normal and disease states in rat models.
    - Metabolic assessment of the effect of consumption of transgenic papaya in rat models.
    - Metabolic effects of consumption of PMFs from Citrus peels in hypercholesterolemic and diabetic rats
- Postharvest biochemistry and physiology of tropical roots and tuber crops.
    - Postharvest biochemistry of *in vitro* derived yam tubers and traditionally produced tubers.

**At the UN-FAO Tajikistan (2003 to date):**

- International Consultant for - Disease-Free Seed Potato Production in Tajikistan and establishment of sustainable potato industry.

**RESEARCH GRANTS:**

**At UWI, Mona**

- Drug Abuse Research grant from Environmental Health Foundation, Jamaica – **J$1.1M** - July 2006 – Department of Basic Medical Sciences, UWI.
- Technical Cooperation programme of the Jamaica-Mexico Binational Commission: collaboration with UNAM, Mexico. Screening, Assessment and Identification of antinutritional factors in selected common Caribbean food crops and spices and study of

the effects of their consumption in normal and disease states – PHASE III. – **US$20,000** towards student exchange visit to National Autonomous University of Mexico (UNAM) for 2 UWI PG students - Feb. - Mar. 2006. Students who visited UNAM in 2006 are Dennis Bailey and Curtis Green.

- Travel grant to PG student to visit Morgan State University, from MSU Alternative and Complementary Medicine Center **US$ 600** given to UWI PG student Perceval Bahado-Singh in May 2006.
- UN-FAO/ISTRA Regional workshop on testing of genetically modified crops. **US$20,000** attracted from ISTRA through FAO to host this workshop at UWI Mona, Basic Medical Sciences Department. Workshop was hosted here in May 2005.
- UN-FAO **US$450** for TCDC Consultation to Basic Medical Sciences Dept, UWI . 2003.
- European Union - Lome III Regional - grant for "Bioengineering Caribbean yams" project. Amount: **115,000ECU.** 1993 to 1997.
- Financial aid from the Nigerian High Commission, Kingston to facilitate the Nov. 1995 UWI Yam Workshop for farmers. Amount: **J$25,000.** 1995.
- Environmental Foundation of Jamaica (EFJ) for Yam Project Workshop for farmers Amount: **J$200,000.** 1996 to 1999.
- Financial aid from the JADF towards effecting training in the area of genetic engineering and transfer of modern techniques. Amount: **J$10,000.** 1996
- Proposal for the "Screening, Assessment and Identification of antinutritional factors in selected common Caribbean food crops and spices and study of the effects of their consumption in normal and disease states" with a financial requirement of **US$336,050.00** submitted to **PIOJ was approved** in August 1999 by the IV Jamaica-Mexico Bi-National Commission under the Commission's Technical Cooperation programmes.
- **J$40,000** from RADA for the production of yam experimental plants. 1999.
- **J$50,000** from the West Indies Alumina Company (Windalco) for supply of yam plantlets for field experimentation. 2001.
- **US$8,000** from the UWI Postgraduate Research Fund-Centre for the purchase of equipment required for the Antinutritional Factors Project. 2002
- Grant of **J$253,000** from the Mona Campus Committee for Research & Publications and Graduate Awards for reagents for Yam Research. 2002
- Other grants received by various postgraduate students under my supervision approximately **US$40,000.00** from UWI Postgraduate Research Fund since 1995/96 session, and about **US$20,000** from Rotary International for one year study visit of Victor Brown to Wye College, towards his Ph.D.

**<u>Other Research grants obtained for my PG students' research:</u>**

- PhD student, Cliff Riley**- US $1,475** was granted by the School of Graduate Studies and Research to attend the HUPO 2nd & IUBMB XIX World Congress in Montreal Canada, in October 2003.
- PhD student, Lowell Dilworth- **US $1,080** granted by the School of Graduate Studies and Research to attend the 49th Annual Caribbean Health Research Council – St. Georges, Grenada- April 2004
- MPhil. Student, Dennis Bailey **– US$2,000** granted by School of Graduate Studies and Research for visit to overseas laboratory (Morgan State University, USA – May 2004.
- PhD student, Kathleen Lobban – **US$3,400** granted by School of Graduate Studies and Research for visit to Morgan State University, Maryland, USA to complete laboratory work. – June 2004
- MPhil. student, Dewayne Stennett – **US$3,000** by School of Graduate Studies and Research, to purchase equipment/supplies for the project "Carbohydrate metabolism and anti-oxidant enzymes in hypercholesterolemic rats fed bitter yam (*Dioscorea polygonoides*) proprietary preparations." – March 2004
- MPhil. Student, Curtis Green – **US$2,000** from the Postgraduate Research Fund towards purchase of supplies for "Metabolic assessment of the effect of Citrus peel on diabetes-related hypercholesterolemia in rats" – March 2005
- MPhil student, Dewayne Stennett – **US$2,000** by Mona Campus Committee for Research & Publications and Graduate Awards towards foreign visit to Morgan State University, USA – May 2005
- PhD student, Melissa Powell – **US$2,000** from School of Graduate Studies and

Research to purchase reagents/supplies for the project “Metabolic Effects of consumption of coat protein transgenic papaya (*Carica papaya L.*) in rats” - March 2006.

**At Shaw University (2005 – present):**

- Shaw University Faculty Development Mini Award – Jan. 2006. US$2,000

**SUPERVISION OF RESEARCH STUDIES**

- **POSTDOC RESEARCH FELLOWS SUPERVISED:**
    1. Felix Omoruyi, Ph.D. "Anti-nutritional Factors Studies on selected Caribbean crops". Mar. 2000 to Dec. 2004. UWI, Mona
    2. Andrew Wheatley, Ph.D. "Bioengineering Caribbean Yams: Production of high yielding yam planting materials for farmers use". Sept. 2000 to Aug. 2002. UWI, Mona
    3. Lowell Dilworth, Ph.D. "Yam Improvement Research Project: Antinutritional Factors subgroup" Aug. 2005 to date

- **POSTGRADUATE RESEARCH STUDENTS SUPERVISED:**
  Supervised the following postgraduate research studies:
    **1.** Omoregie Samson. 1998. "Biotechnological approaches to *Dioscorea* yam improvement" **Ph.D. Thesis**, University of Benin (Sept. 1993 to 1998). **European Union Exchange student.**
    2. Wheatley Andrew. 2000. "Biochemical, physiological and environmental factors affecting the Laboratory to field transfer of *in vitro* derived yam (*Dioscorea* spp.) plantlets" **Ph.D. Thesis**, University of the West Indies, Mona. (Aug. 1995 to 2000) **Student awarded Commonwealth Scholarship, tenable at Wye College, 1999-2000.**
    3. Brown Victor. 2000. "The genetic diversity of dasheens (*Colocasia* sp.) and cocoyams (*Xanthosoma* sp.) and molecular characterization of the common Leaf Blight Disease of dasheen caused by *Xanthomonas campestris*" **Ph.D. Thesis**, University of the West Indies, Mona (Aug.1995 to May 2000) **Student awarded Rotary Ambassadorial Scholarship. 1997 – 1998. ht**
    **4.** Grindley Phillip. 2001. "The metabolic effects of the consumption of organic extracts of yam (*Dioscorea cayenensis*) and dasheen (*Colocasia esculenta*) in normal, protein malnourished and streptozotocin-induced diabetic rats. **Ph.D. Thesis**, University of the West Indies, Mona (Aug. 1993 to May 2001).
    5. Mullings Keith. 2001. "Effect of storage and processing on levels of cyanoglucosides in Jamaican *Dioscorea* yams" **MPhil. Thesis**. University of the West Indies, Mona (1994 to 2001)
    6. Marie McAnuff. 2003. "Analyses on some Yam (*Dioscorea sp.*) Natural products and the Metabolic Effect of Consumption of Bitter yam steroidal sapogenin extract on lipid metabolism in Streptozotocin-induced diabetic rats" **PhD Thesis** UWI, Mona (Aug. 1999 to Feb. 2004)
    7. Flora Chisholm. 2004. "Effects of interactions of microorganisms on postharvest decay of yam tubers" **PhD Thesis.** UWI, Mona – was Co-supervisor
    8. Odette McKnight. 2005. "In Vitro Analysis of Plant-Microbe interactions involving Dasheen (*Colocasia esculenta*) and *Pseudomonas*" **MPhil. Thesis.** UWI, Mona (August 2005)
    9. Cliff Riley. 2005 **"**Physiochemical characterization of starches from Jamaican yams (*Dioscorea spp.*) and assessment of their utilization as binders in Paracetamol formulations" **PhD Thesis.** UWI, Mona (October 2005)
    10. Lowell Dilworth. 2005. "Anti-nutritional factors in selected Caribbean food crops and the metabolic effects of consumption of sweet potato (*Ipomea batatas*) phytate extract in rats" **PhD Thesis.** UWI, Mona (November 2005)
    11. Suzette Curtello. 2006. "Bacterial Infections in Jamaica Poultry Industry: Focus on the epidemiology of *Salmonella"* **MPhil Thesis.** UWI, Mona. (Thesis under examination).
    12. Perceval Bahado-Singh. 2006. "Glycemic indices of Caribbean foods and application in dietary lifestyle intervention for management of type 2 diabetes" **PhD Thesis**. UWI, Mona. (Thesis under examination).

- **CURRENT POSTGRADUATE STUDENTS:**

13. Kathleen Lobban. Ph.D. "Molecular changes associated with developmental processes in *in vitro* yam (*Dioscorea* sp.) plantlets" Sept. 2000 to date
14. Simone Earle-Barrett. PhD. "DNA fingerprinting and Cultivar identification of 25 varieties of Jamaican Yams" Sept. 2002 to date. Converted to PhD studies in June 2004.

15. Melissa Powell PhD. “The metabolic effect of the consumption of coat protein transgenic papaya (*Carica papaya*) in rats”. Sept. 2001 to date. Converted to PhD 2005.
16. Dewayne Stennett MPhil. “Carbohydrate metabolism and antioxidant enzymes in hypercholesterolemic rats fed bitter yam proprietary preparation” Oct. 2003 to date. Now converted to PhD
17. Dennis Bailey MPhil. “Studies on the Jamaican Moonshine Yam (*D. alata*) anthocyanins. Oct. 2002 to date
18. Curtis Green MPhil “Characterization of polymethoxylated flavones in Jamaican and Mexican Citrus peels by High Performance Liquid Chromatography” 2004 to date. Newly converted to PhD.

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