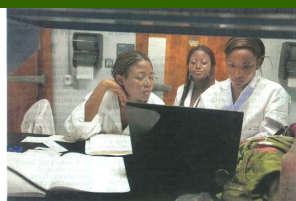




Camelina



From left, Ruffael, Adeyiga, Monica Efi and Myriam McQueen have been taking part in a 10-week program at Penn State Harrisburg's biofuels laboratory and greenhouse.



Jatropha



Jatropha

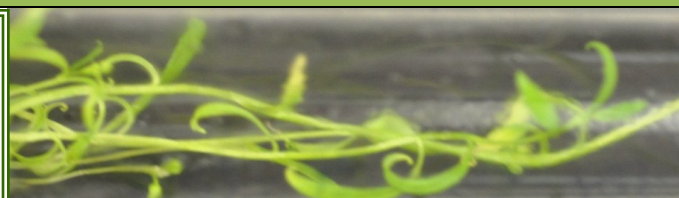
## NSF-REU Penn State Harrisburg– Sustainable BioEnergy

# Green Power

Beginning the first week of June 2011, ten undergraduate students from nine different schools were initiated into the world of cutting-edge research and biotechnology at the new **Central Pennsylvania Laboratory for Biofuels (CPLB)** located at Penn State Harrisburg's (PSH) campus in Middletown, PA. The first of its kind in the Susquehanna Valley, this state of the art facility with renovated laboratory and new greenhouse was initiated by researchers who opened its doors to a unique **Research Experience for Undergraduate (REU) students.** (*cont'd*)



Above: Dr. Shobha Potlakayala demonstrates molecular techniques to students during **Molecular Biology** training.



### Our Mission

In the increasingly complex world of scientific research, **PSH's REU program** is dedicated to **researching new ways of learning.** Committed to instilling a **spirit of col-**



Above: Tissue culture of *Simarouba glauca*.

**laboration**, PSH's REU model combines **education and internship** with a primary objective of **re-igniting the imaginations** of students from diverse backgrounds towards a passion for **biology** and other **STEM subjects.** **CPLB** aims for potential talents from under-represented populations across the country to gain **hands-on experience** when they are thoroughly immersed into **the pioneer field of biotechnology** with cutting-edge training, field trips, seminars, and other **non-traditional methods of education and inspiration.**

# Student Profiles



Rafiyat Adeyiga, Cheyney University: Genetic Transformation of *Simarouba glauca*



Nasie Constantino, Ohio Wesleyan University: Genetic Transformation of *Camelina sativa*



Alex Goertel, Oberlin College: The Effect of Physical Agents (Laser and EMR) on Germination and Biomass Production of Switchgrass (*Panicum virgatum*)



Ulysius S. McGhee, Fort Valley State University: Effect of Genotypes on Micropropagation of *Jatropha curcas* L.



Joe Meisenbach, Penn State Harrisburg: Molecular Analysis of Transgenic Plants

Through this REU program, a group of talented students from diverse backgrounds were **trained in advanced biotechnology laboratory techniques** by a group of dedicated mentors that staff or support CPLB. Over the course of ten weeks, these students were immersed into the world of biotechnology through a combination of seminars, field trips, writing workshops, and hands-on, potentially publishable/real world applicable, research. This National Science Foundation (NSF) funded research exemplifies the type of collaborative work the investigators of CPLB wish to make standard at their laboratory as well as at educational institutions across the nation.



Above: Students busy at work during the **Proteomics** workshop led by Dr. Katam, Dr. Shobha, and Dr. Josekutty.

Principal Investigator Dr. Sairam Rudrabhatla has spearheaded this innovative research effort in the hopes of **building a culture of intelligent, tech-savvy, Science, Technology, Engineering and Mathematics (STEM) literate base** of employees for this rapidly growing business sector. The dedicated mentors for this REU program are a group of talented faculty from universities across the region who spent their summers initiating these young students into the field of ongoing research through teaching them to use **cutting-edge technology and research techniques**, the likes of which are usually reserved for at least graduate level experimentation. In addition to **hands-on research**, the students were introduced to a variety of advanced subject matters through **seminars, field trips, journal clubs, and other experimental learning opportunities** during which they were able to engage with a wide range of scientific applications.



Above: Dr. Josekutty offers **tissue culture** training.



Above: **Biosafety** training with Mr. Spear.





Above: Field Trip to Cheyney University's aquaponics facility with Dr. Steven Hughes.

The tone of the experience was set by the CPLB opening ceremonies where students were introduced to the evolution of sustainable biofuels as well as the pros and cons of **cellulosic ethanol** by special guest Dr. Mariam Stricklen from Michigan State University. Director of Penn State's Institute for Energy and Environment Dr. Thomas Richard spoke to the students about **bioconversion technologies** to prepare them for the high-end lab work that lay ahead of them. Over the next ten weeks, students were immersed in **seminars** starting with **biosafety and research ethics** with such training sessions as: **Responsible Conduct of Research Training** by Dr. Brad Woods, Dr. Thomas Eberlein, and Dr. Gaylen Bradley; **Lab and Bio Safety Training** by Mr. Mitch Spear and Mr. Thomas Kell, Lab Supervisors at PSH; **Tissue Culture Training** by Co-Principal Investigator Dr. P.C. Josekutty of Penn State and CPLB; and **Genetic Transformation Training** by Principal Investigator Dr. R.V. Sairam of Penn State and CPLB.

Speakers on a variety of topics, including **genetic and plant engineering**, provided the students with insights into the field of biotechnology as well as into how students can be successful during school and throughout their careers. Hands-on training with cutting edge techniques was provided during the **Proteomics Workshop**, taught by Special Guest Dr. Ramesh Katam of Florida A&M University; and the three-day **Molecular Biology** workshop led by Program Mentor Dr. Shobha Potlakayala of PSH and CPLB. (cont'd)



This summer ten undergraduate students from nine colleges and universities participated in biotechnology research at the new Central Pennsylvania Laboratory for Biofuels for Penn State Harrisburg's first ever National Science Foundation (NSF) grant for Research Experience for Undergraduates (REU). An NSF-REU grant provides funding for students to participate in various types of research activities each summer.

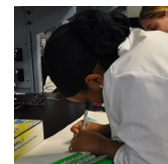
## Student Profiles

Olivia Campbell, Alfred University: Synthesis and Characterization of a Series of Zinc and Nickel Dithiolate Complexes



Monica Effi, Cheyney University of Pennsylvania: Response of *Camelina sativa* varieties to NaCl Salinity

Krysta Haggins, Marygrove College: Improving Stress Tolerance in *Camelina sativa*



Emily P. McGlone, James Madison University: *In vitro* Flowering and Seed Set in Switchgrass

Aurellia M. Whitmore, Southern University at New Orleans: Genetic Transformation of *Jatropha curcas*







Above: Andy Ernst addresses the students on the **benefits of switchgrass as a biofuel** at the opening day ceremony.

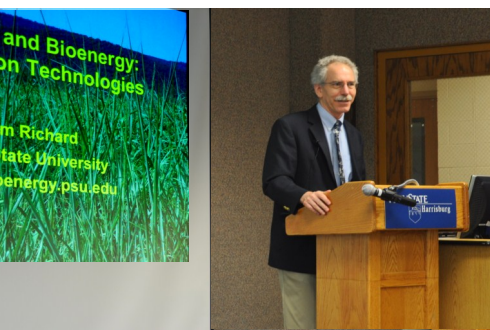
In addition to learning these advanced new skills, students demonstrated their understanding of the science behind the techniques through the Journal Club, Colloquia, and **Writing Workshop**. Through the weekly **Journal Club**, students presented their independent research to both their peers and their mentors. The **Colloquia** were presentations of their ongoing laboratory research, where they presented the results of their experiments on a weekly basis.



Above: Dean Tiessen of New Energy Farms describes **biofuel efforts** at his company.



Above: Dr. Thomas Eberlein aids students in his **RCR training activity**.



Above: Dr. Thomas Richard speaks about **bioconversion techniques** at the opening day ceremony.



Above: REU students enjoy a **field trip** to Longwood Gardens in Philadelphia.



Above: Dr. Mike Haas of USDA speaks on **biodiesel**.

AG • WEDNESDAY, AUGUST 10, 2011

LOCAL & STATE

**PENN STATE HARRISBURG** | A grant is making it possible for 10 students from across the country to conduct research at a new biofuels lab and greenhouse.

# Hungry to learn

BY DIANA FISHLOCK  
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The PSH NSF-REU program concluded on August 9th, 2011 with a **symposium** where students **presented their research projects** to a group of their peers, mentors, and guests. The two keynote speakers of the day were **Dr. Bob Harriman, Vice President of Scott's Miracle-Gro Company** and **Dr. Mike Haas, Research Scientist at USDA**.

## CURRENT RESEARCH INTERESTS IN Dr. SAIRAM'S LABORATORY

- Cellulosic ethanol (switchgrass and sweet sorghum), Biodiesel (*Jatropha*, *Camelina*, and *Simarouba*), and Metabolic Engineering of Algae.
- Genetic engineering of Soybean, Alfalfa, and Corn with avian flu vaccine and type 1 diabetes.
- Genetic Engineering of Tomato with nutritionally enriched genes
- Biosafety and risk assessment of transgenic plants.
- A New Platform for Cancer Prevention/Cure using Bioactive Compounds from Nature/Plants.

**Dr. Sairam V. Rudrabhatla**  
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<http://harrisburg.psu.edu/reu/sustainable-bioenergy>

**Lab Personnel:** Dr. P. Josekutty, Dr. P. Shobha Devi, J. Dauber, A. Shuler, D. Karelia (Ph. D Student), B. Tabatabai (MS student), F. Fofanah (MS student), D. Morales (MS student), M. Reitzel, C. Maini, A. Maini, F. Ansary, S. Patel, J. Patel, A. Qarooni  
**Collaborators:** Dr. Autar Mattoo (USDA), Prof. Narendra Singh (Auburn University), Prof. Shantu Amin, Dr. Dhiman Desai, Dr. Arun Sharma, Prof. Michael Chorney (PSCOM), Dr. Steven Hughes, Dr. Nilkamal Karelia (Cheyney University), Dr. Mohammed Tofighi, Dr. Balwant Chohan (PSH)  
**Donors:** Kunj Biotech LLC, UGI Utilities, Ernst Conservation Seeds, Keystone Biofuels

Special Thanks to National Science Foundation REU Program for funding.