MODELS FOR TEACHING INTERDISCIPLINARY BIOFUELS SCIENCE: A MULTIPRONGED APPROACH

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Objectives of the FIU-Agroecology Program

- Continue to offer a comprehensive agroecology program at FIU by targeting under-represented populations and a significant number of freshmen from high schools and transfer students from Miami Dade College with agriculture sciences background.

- Incorporate scientific instrumentation into the agroecology curriculum.

- Establish campus organic garden to provide students with hands on experience.

- Develop and incorporate biofuels education and research skills into the agroecology program.
USDA-NIFA-HSI Biofuels Education Grant

- Train undergraduate and graduate students of in the area of bioenergy science and technology.

- Implement a comprehensive hands-on training and field internship program in the area of biofuel science and technology.
Renewable Energy Sources - Biofuels

- Source of income and support community
- Energy Self-Reliance
- Biomass Recycle – Nutrient source
- Energy efficiency
- Climate Change
Myth: Interdisciplinary work is superficial

Myth: Interdisciplinary threatens the disciplines
Quality interdisciplinary education

- Invites students to integrate concepts, theories, methods and tools from two or more disciplines.
- Deepen their understanding of a complex topic.
- Interdisciplinary instruction enlists students’ multiple capabilities (aesthetic, social, analytical) and
- Prepares them to solve problems, create products or ask questions in ways that go beyond single disciplinary perspectives.
Problem
Disciplinary Insight
Integration
Understanding
Problem
Disciplinary Insight
Integration
Understanding
Facilitated Knowledge Diffusion

Educational visits

Experimental/Experiential Learning

Feedstock plots

HS Teachers

Students

Class room teaching

STUDENT
Class room teaching

- Freshman undergraduates
- Sustainable Agriculture class
- Sustainable Bioenergy class
- Guest lectures
- Projects
Experiential and experimental learning

- Conduct research on sustainable biodiesel crops
- Conduct research on algae
- Project on biodiesel production
- Project on biomethane production
Project on biodiesel production using waste vegetable oil
Screening for algal lipid accumulation with Nile red
Educational Tours

- Biodiesel and biofuel research centers in India
- Green Biodiesel company, Miami, FL
- Univ. of Florida, TREC research station, Homestead, FL
- Algenol, R & D facility, Fort Myers, FL
- Florida Crystals, Clewiston, FL
- FIU Advanced Research Center facility
TREC’s space experiments

Dr. Wagner Vendrame
Tropical Research and Education Center, UF/IFAS
- FIU organic garden
- Grow biofuel trees (*Jatropa, Simarouba*)
- Experimental field
- Sugarcane
- FIU Algae collection facility
- Biodigester
Jatropha curcas
Simarouba glauca
High school teachers

- Conducted several summer training workshops, one exclusively on biofuels
- Guest lectures
- Visits to lab and field
- Between university and high school students
- Between undergraduates and graduates
- International students
2011 USDA – FIU Internship for Fairchild Challenge High School Students: Biofuels
Majority of the high school teachers and students who participated in the workshop responded favorably (very good to excellent) in terms of content, relevance, field trip/demonstrations, interaction and understanding.
Lessons Learned

- Collaboration between university, K-12, research institutions, private companies, and staff, outreach personnel
- Time for planning, preparation and promotion
- Communication
- Involvement
Challenges

- Time constraint for certain groups
- Minimal education tools for certain groups
- Program reach
- Expansion of presenters – topics with broad interest and applicability
The Multipronged Approach has helped

- Increase in *student awareness and interest* in biofuel science related current events.

- To *connect and integrate* knowledge and skills from *across disciplines* to solve problems.

- Comfortable with *complexity and uncertainty*.

- To *work collaboratively* with others.

- Expand *cooperative network*. 
http://agroecology.fiu.edu

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Collaborators, Partners, Faculty, and Students