

Biomass Notes

ALGAE, Moderator- George Philippidis

Areas of Active R&D in Florida

- Strain Bioprospecting
 - Isolating and characterizing native Florida strains
 - Freshwater and Marine Algae
 - Cyanobacteria
- Nutrient Sources
 - Wastewater (municipal, farm)
 - Landfill leachate
 - Aquaculture wastewater
 - Biomass stillage
 - Glycerol from biodiesel production
- Carbon sources
 - CO₂ from flue gas (landfill gas)
- Cultivation systems
 - Floating bioreactors
- Products
 - Lipids for biofuels
 - Methane (via anaerobic digestion)
 - Polysaccharides
 - Protein (animal feed, fish meal)
 - Fertilizer (slow release of N and P)
 - Algae cells for bioremediations
 - Hydrogen
 - Ethanol

PATH FORWARD

- Learn about each other's interests and capabilities
- Explore complementary interests, especially with regards to systems integration
- Identify opportunities for joint proposals and collaboration
- Promote Florida as a leading place for algae R&D and technology deployment

Algae Round-table Attendees

	Name	Affiliation	E-mail	Phone
1.	Bailey Trump	UF- Fisheries	windwave@ufl.edu	9045019551
2.	Elton Goncalves	Plant Molecular and Cellular Biology - University of Florida	egoncalves@ufl.edu	3523016049

3.	Kimberly Hafner	University of Florida/ Institute of Food and Agricultural Sciences (IFAS)	hafnerk@ufl.edu	3526157550
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5.	Natalie Chavez	University of Florida/ Institute of Food and Agricultural Sciences (IFAS)	nchavez@ufl.edu	5614609663
6.	Eunyoung Lee	University of South Florida - Civil and Environmental	eunyounglee@mail.usf.edu	8134420031
7.	Lowell Collins	Florida Agricultural and Mechanical University (FAMU) - School of the Environment (SOE)	lcollins239@gmail.com	8508957941
8.	Alec Shoelson	University of Florida - Bioenergy & Sustainable Technology (BEST) Society	ashoelson@ufl.edu	9546954813
9.	Ann C. Wilkie	Soil and Water Science / University of Florida/ Institute of Food and Agricultural Sciences (IFAS)	acwilkie@ufl.edu	3523928699
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BIOCHEMICAL CONVERSION, Moderator- Lonnie O. Ingram

Sustainable job creation for rural Florida

1. Identification of carbohydrate rich crops / feedstock for fuels and chemicals (replacement crops for 500,000 acres idled by citrus diseases)
 - o Sugar crops – energy beets, sweet sorghum, sugarcane
 - o Starch crops – energy tubers, other?
 - o Cellulosics – eucalyptus for South Florida; pine, oak and sweet gum for North FL
 - o Agroindustrial waste (fruits, vegetables and wood processing)
 - o Potential oils for biodiesel: seed crops, pongamia, algae
2. Verification of freshstock performance during multiyear cultivation (Establishment of Florida version of BCAP for FL certified bioconversion)
3. Improvement of germplasms, best practices and cost estimates for crops
4. Stepwise plan to scale up production
 - o Sugar platform as intermediate stage
5. Stan Mayfield Biorefinery and Pilot Plant
 - o Florida’s regional test facility for bioconversion
6. Development fo biocatalysts and processes for new products
7. Development of improved biocatalysts for lignocellulose deconstruction
8. Development of co-products: nutraceuticals, bio based plastics, nano tubes, fertilizers, feeds, etc.

Benefits

1. Sustainable jobs for rural Florida
2. Replacement crops for former citrus farms
3. Increased energy independence
4. Economic development
5. Water and mineral sustainability – closed loop processes

Closed loop processes could borrow water and chemicals allocated for irrigation and crops. Water and chemicals could be used in processes and as fermentation nutrients. Emerging water and nutrients could be added to the field for new crops.

Biochemical Conversion Round-table Attendees

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1.	Lonnie O Ingram	University of Florida	ingram@ufl.edu	352392817 6
2.	Don Rockwood	University of Florida	dlrock@ufl.edu	352256347 4
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THERMOCHEMICAL CONVERSION & WASTE TO ENERGY, Moderator- Janan Balaban, John N. Kuhn

Challenges

- Availability of sustainable feedstocks
- Limitations due to decentralized facilities (i.e. distance to transport feedstocks)
- Partially finished products, training of farmers for initial treating of energy crops to prevent premature decomposition
- Feedstock heterogeneity (food waste, MSW, waste water, sludge, agricultural waste, etc.) – flexibility of technology to handle various and varying feedstocks
- Time scale of processes
- Economy of scale

Recommendations for SUS Proposals

- Waste feedstocks – type, amount, characterization and inventory needed
- Feedstock homogeneity
 - Torrefication of biomass to increase shelf life
 - Preprocessing waste for consistency
- Life cycle inventory / analysis
- Distributed systems for small farmers
- Include needs of community
- Selection of targeted product (i.e. diesel, jet fuel, methanol, etc.)

Proposal Ideas

- Energy and mass integration to balance the economy-of-scale challenge
- Conversion process sensitivity to feedstock heterogeneity
- Decentralized biomass pre-treatment technologies to overcome distance and time limitations

Benefits

- Diversification of farming/economy development
- Job creation in (bio)chemical processing
- Increased energy independence

- Identified 5 challenges to WTE technology.
 - The first and the third challenges are generally identified as major challenges for gasification.
 - Another two that were not mentioned are hydrogen deficiency compared to desired organic products and separation of oxygen from air.
- I think proposals could be centered around these three topics (in no particular order)
 - (1) energy and mass integration to balance the economy-of-scale challenge
 - (2) conversion process sensitivity to feedstock heterogeneity
 - (3) decentralized biomass pre-treatment technologies to overcome distance&time limitations.

Challenges:

1. Feedstock heterogeneity (flexibility of technology to handle various and varying feedstocks) 2. Energy integration 3. Economy of scale 4. Limitations due to decentralized facilities (ie, distance to transport feedstocks / partially finished products, training of farmers for initial treating of energy crops to prevent premature decomposition) 5. Time scales of processes

Information needed

1. Waste feedstocks - type, amount, characterization, and inventory needed 2. Life cycle inventory / analysis 3. Selection of targeted product (ie, diesel, jet fuel, methanol, etc.) including any govt incentives

Benefits to the state of FL

1. Diversification of farming /economic development 2. Job creation in (bio)chemical processing 3. increased energy independence

Thermochemical Conversion & Waste to Energy Round-table Attendees

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