

What Can Grow In Hawaii - Algae

Presented at Kickoff Meeting for the Development
Of Hawaii's Bioenergy Master Plan
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by

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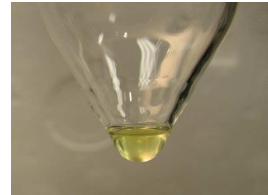
with input from

Michael Cooney

Jaw-Kai Wang

Brandon Yoza

Michael Champ



The Promise of Microalgae

- **High growth rate**

Among the world's fastest growing source of biomass

- **High yield of feedstock for fuel production**

> 50% lipids by dry weight

Good FAMES profiles (mole weight distribution) for biodiesel

- **Sustainable**

Does not divert prime food crops away from human and animal consumption

Marine algae do not need or divert freshwater from other uses

Does not need prime farmland

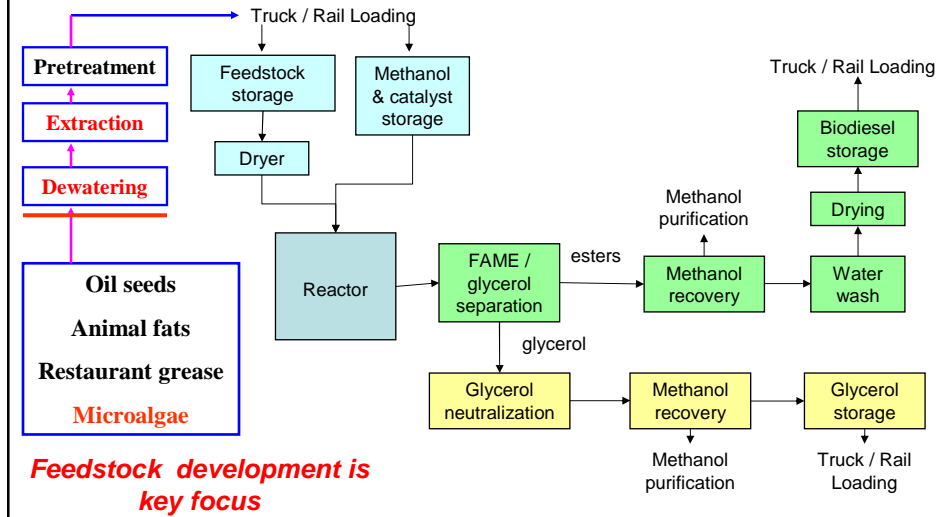
- **Sunlight as energy source**

Converts solar energy into carbs & oils

- **Potential for carbon sequestration**

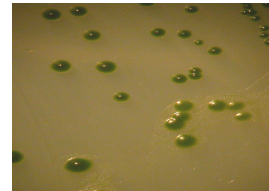
When carbon dioxide utilized as carbon source

Overview of Biodiesel Production Process



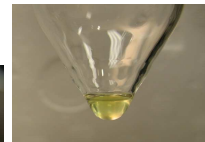
Microalgae Research

Strain selection –rapid growth, high lipid productivity, robust to contamination and growth conditions

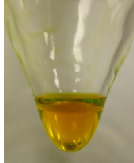
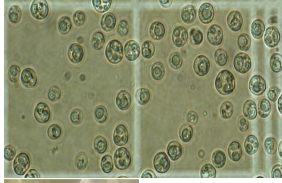


Photobioreactor technologies – open raceways .vs. closed reactors, contamination .vs. cost

Harvesting and processing - dewatering, extraction (no proven, cost-effective commercial technology)



Why Hawaii



C. protothecoides

	FAMES %
C16:0	30.95
C18:0	9.96
C18:1n-7	15.4
C18:2n-6	43.63
C20:0	30.95

- The climate is good for year-round algal growth
- Availability of cold nutrient-rich deep ocean water for marine algae
- Hawaii has experience and success in farming large quantities of algae
- Local demand for alternative fuel for both electricity and transportation

Hawaii Activities

- HRbio - industrial collaboration on marine algae
- Jaw-Kai Wang Corp. - patented commercial open production system
- HNEI's - pending partnerships with mainland companies (two phototrophic, one heterotrophic) focused on extraction technology
- NREL biofuels collection at UH
- UH partnering in development of Southwest Center for Sustainable algal biofuels (under development)
- DARPA has expressed interest in Hawaii programs

Summary

- Biofuel production from algae has significant promise but also faces significant challenges
- Robust cost-effective growth and extraction are critical elements for sustained fuels production
- Hawaii offers ideal location for development of this technology
- Collaborative effort between academia and industry will be critical for successful implementation

