Recycling Water: one step to making algal biofuels a reality

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Background

Algal Biofuel:
- A renewable alternative to fossil fuels that is synthesized from algal lipids

Benefits:
- Algae cultivation does not put a strain on food resources
- Algae has faster growth rates than crops like corn, soybeans, and sunflowers
- Lipid extracted algae remains rich in proteins and carbohydrates that can be used in other products

Disadvantages:
- Costs associated with separating algae from media
- Large amounts of water are needed
- Disposal of exhausted media in accordance with local regulations
Regional Algal Feedstock Testbed [RAFT]

Four year partnership funded by the Department of Energy to investigate year-round algal growth in open ponds

The University of Arizona is the lead institution in collaboration with researchers from:

- Pacific Northwest National Laboratory
- New Mexico State University
- Texas A&M AgriLife
Experimental Design

**Batch Process:**
- Grow algae culture
- Complete harvest
- Analyze the Biomass
- Grow next generation
  - Exhausted media, nutrients, new inoculation

**Fed-Batch Process:**
- Grow algae culture
- Partial harvest
- Analyze the Biomass
- Grow next generation
  - Exhausted media, nutrients, inoculation from partial harvest
Select Growth Curves for *N. Salina*

**Biomass vs. Time**

- **Biomass (g/L)**
- **Time (days)**

- 1G-Batch
- 1G-Fed-Batch
- 2G-Batch
- 2G-Fed-Batch
- 4G-Batch
- 4G-Fed-Batch
- 7G-Batch
- 7G-Fed-Batch
# Fatty Acid Methyl Ester [FAME] Profile

## Lipid Content Batch vs. Fed-Batch

<table>
<thead>
<tr>
<th></th>
<th>Gen. 1</th>
<th>Gen. 2</th>
<th>Gen. 4</th>
<th>Gen. 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch</td>
<td>31.96%</td>
<td>55.96%</td>
<td>48.11%</td>
<td>44.85%</td>
</tr>
<tr>
<td>Fed-Batch</td>
<td>31.96%</td>
<td>56.14%</td>
<td>40.89%</td>
<td>24.98%</td>
</tr>
</tbody>
</table>
Fatty Acid Methyl Ester [FAME] Profile

Lipid Profile Batch vs. Fed-Batch

Percentage

Generations

0 10 20 30 40 50 60 70 80 90 100


Omegas

C18:3
C18:2
C18:1
C16:1
C16:0
C14:0
Acknowledgements

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- Juan Sandoval

Questions?