

RAFT

Regional Algal Feedstock Testbed



Contact: Kimberly Ogden
Department of Chemical and Environmental Engineering
University of Arizona
Tucson, Arizona USA
ogden@email.arizona.edu



Project Goals

- Obtain long term algal cultivation data in outdoor pond systems
- Work with industrial, government, and academic partners to advance the algal biofuels and bio-products industry
- Optimize biomass and lipid content for production of biofuel using impaired waters
- Develop real time sensors and control strategies for efficient cultivation
- Improve and refine cultivation models, as well as system techno-economic models and life cycle assessments.

Testbed Facilities



**ARID Raceway US Patent
8,245,440**



**Ability to Cultivate GMO Algae
in Climate Controlled Green
Houses**



Testbed Facilities



Raceways and Solix System - Centrifuge harvester



Hot house with raceway for seasonal extension

Testbed Facilities



Multi-scale Testbed Facility with Harvesting Infrastructure

Cultivation of *Chlorella sorokinana*

Spring and Summer 2014

Media Optimization

Pe-06 (or Pe-02_B)

Required volume (L) =

1

Chemical	Common name	g/L	Total Grams	Total Kilograms
Na_2CO_3	Soda Ash	0.02	0.02	0.00002
NaCl	TruSoft	5	5	0.005
$(\text{NH}_2)_2\text{CO}$	Urea	0.05	0.05	0.00005
$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	Magnesium sulphate	0.012	0.012	0.000012
$\text{NH}_4\text{H}_2\text{PO}_4$	MAP	0.01	0.01	0.00001
KCl	Potash	0.129	0.129	0.000129
FeCl	Iron Chloride	0.0035	0.0035	
Di Sodium EDTA		0.00436	0.00436	
Trace metals solution		1	1	0.001
Vitamin solution (100 X)	Vitamin solution	0.005	0.005	ml

Trace metals solution

Common name	g/L	Vendor
Boric Acid	0.00286	VWR
Manganese Chloride	0.00181	VWR
Zinc Sulfate	0.000222	VWR
Copper Sulfate	0.000079	VWR
Cobalt Nitrate	0.0000494	VWR
Sodium Molybdate	0.000391	VWR

Data Collection

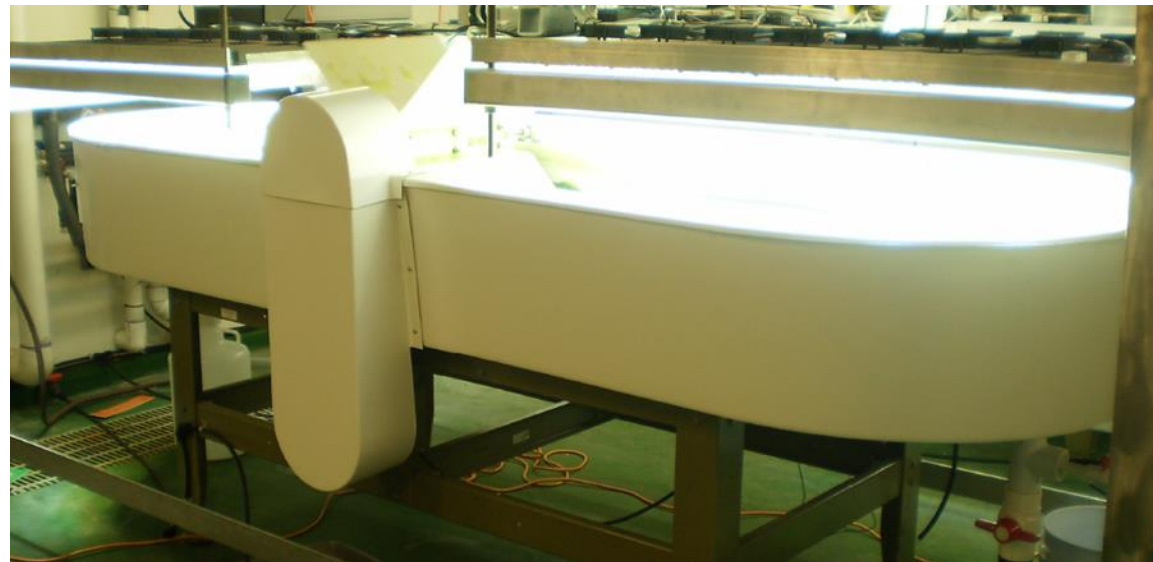
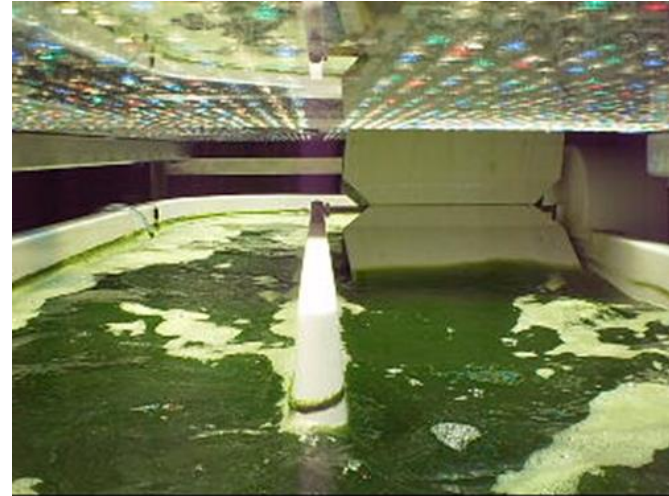
- Spreadsheet example data
- Growth rate modeling – Flask to field
- Techno-economic model - BAT

Culture Diagnostics

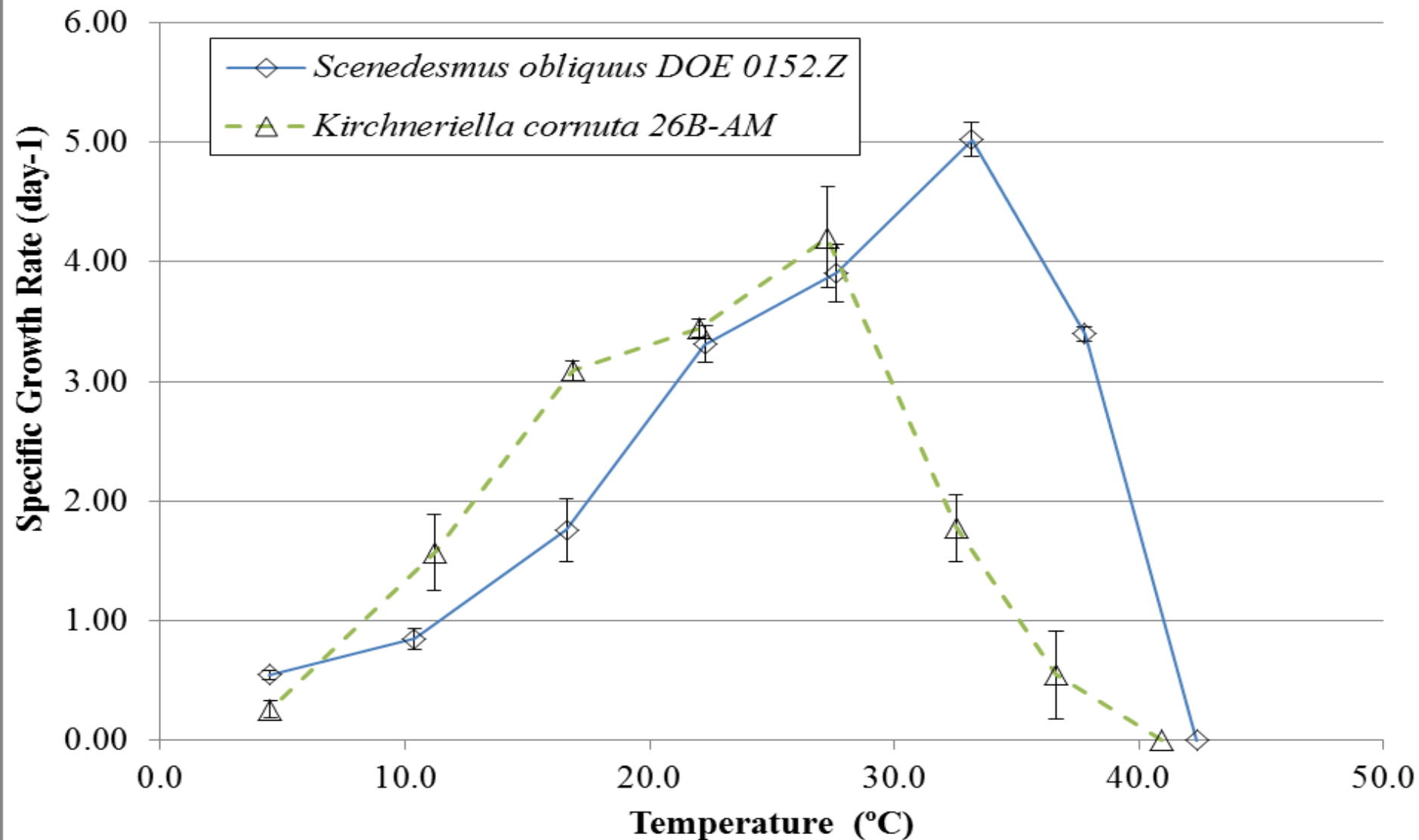
- PCR diagnostics of invasive strains identified by 18S rRNA gene fragment sequencing
- Specific primers for algae and bacterial contaminants
- Flow Cam Systems for monitoring
- Real time OD monitor and flow cell – Invention disclosure and patent
- Contaminant Control to maintain *Chlorella* *sp.*

Testbed Facilities

**Climate Controlled Cultivation
Systems for Growth and Biomass
Optimization and Modeling**



Characterizing Cold Weather Strains



Opportunities for Collaboration

- Production of algal biomass for a variety of applications
 - Fuel
 - Feed
 - High value Products
- Cultivation of genetically modified algae
- Design and implementation of integrated, controlled systems for cultivation, harvesting, and conversion.
- Optimization of algal productivity in impaired waters
- Culture diagnostics using molecular markers