Experimental Algae Wheel Feasibility Study

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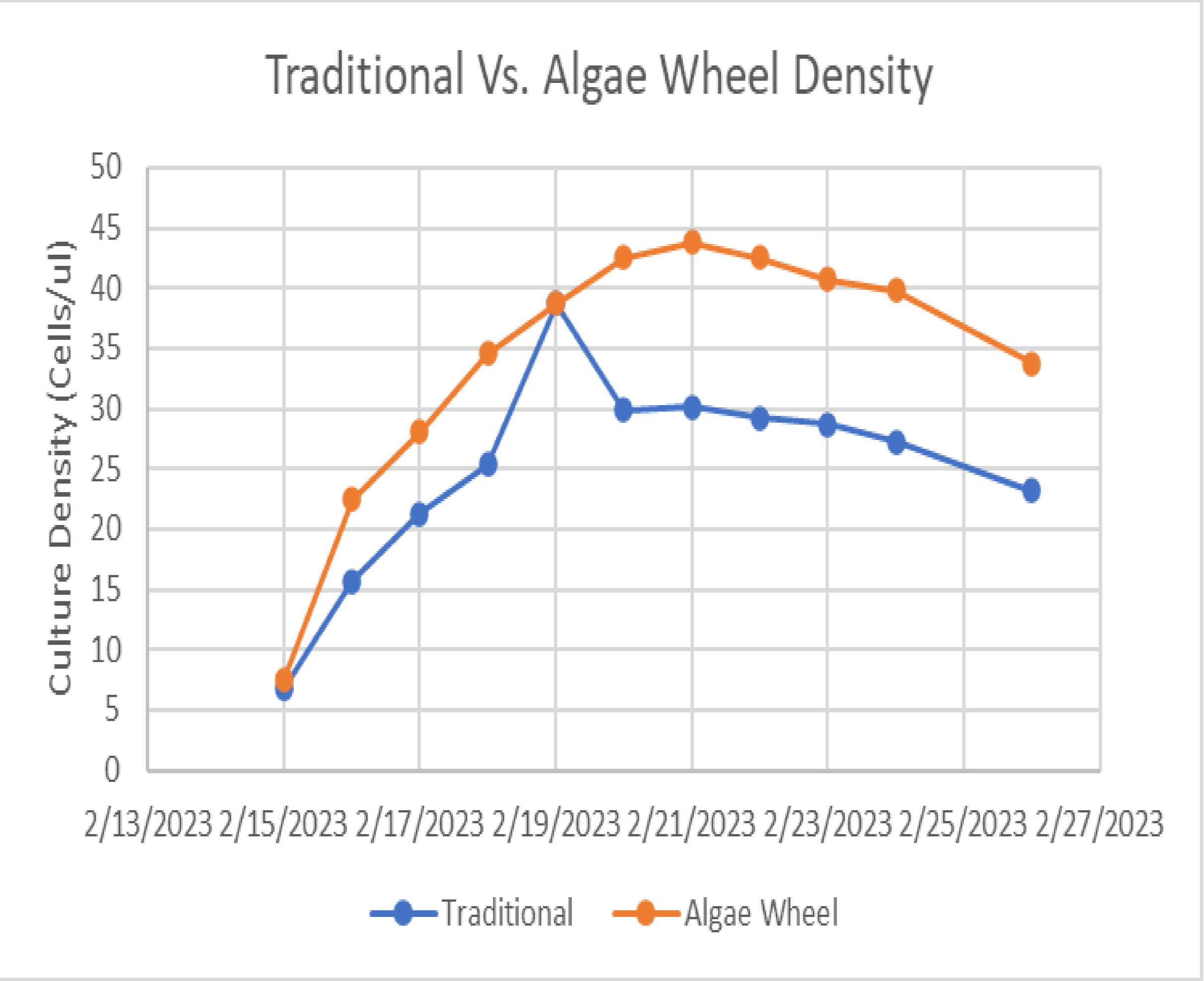
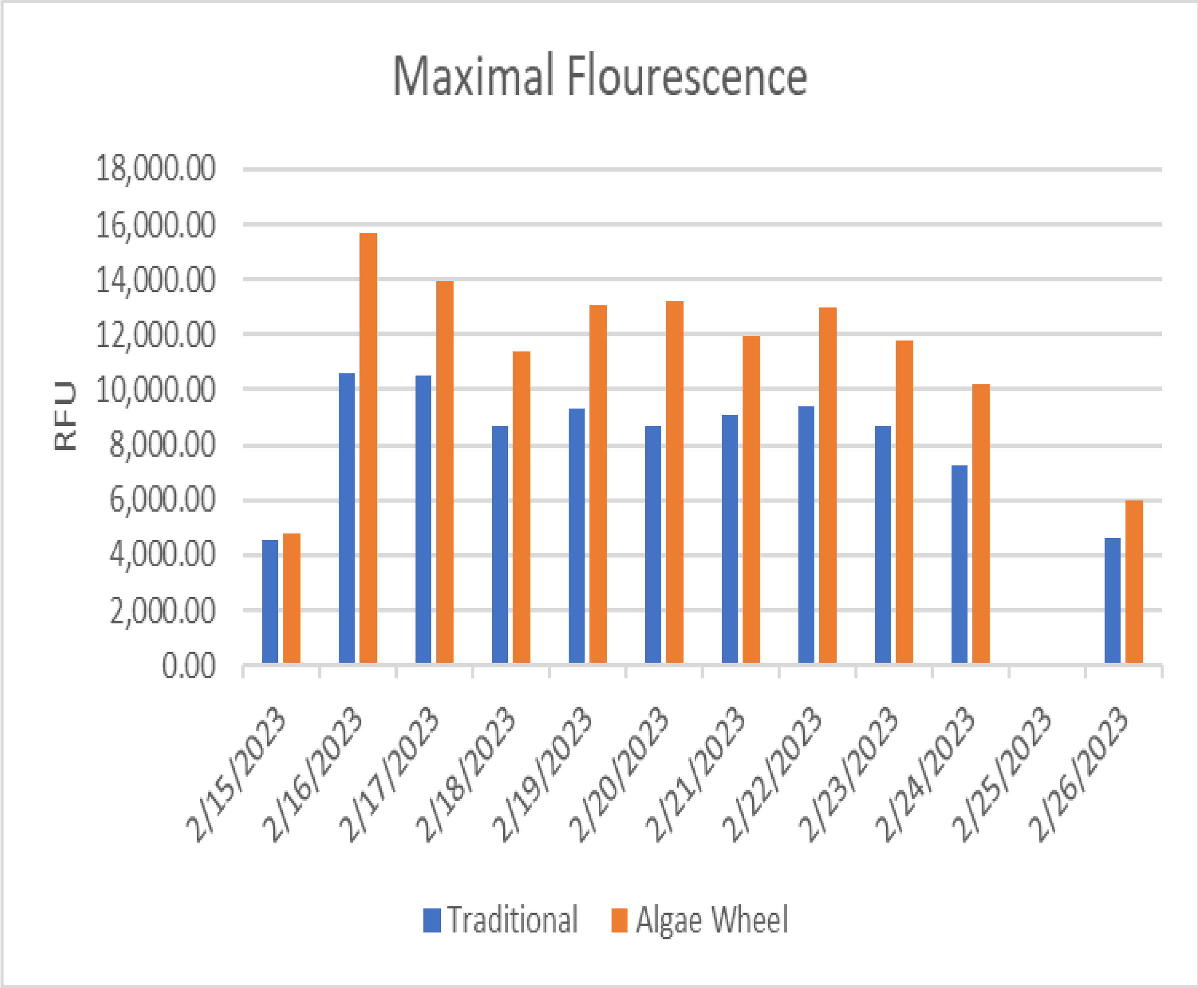
Introduction

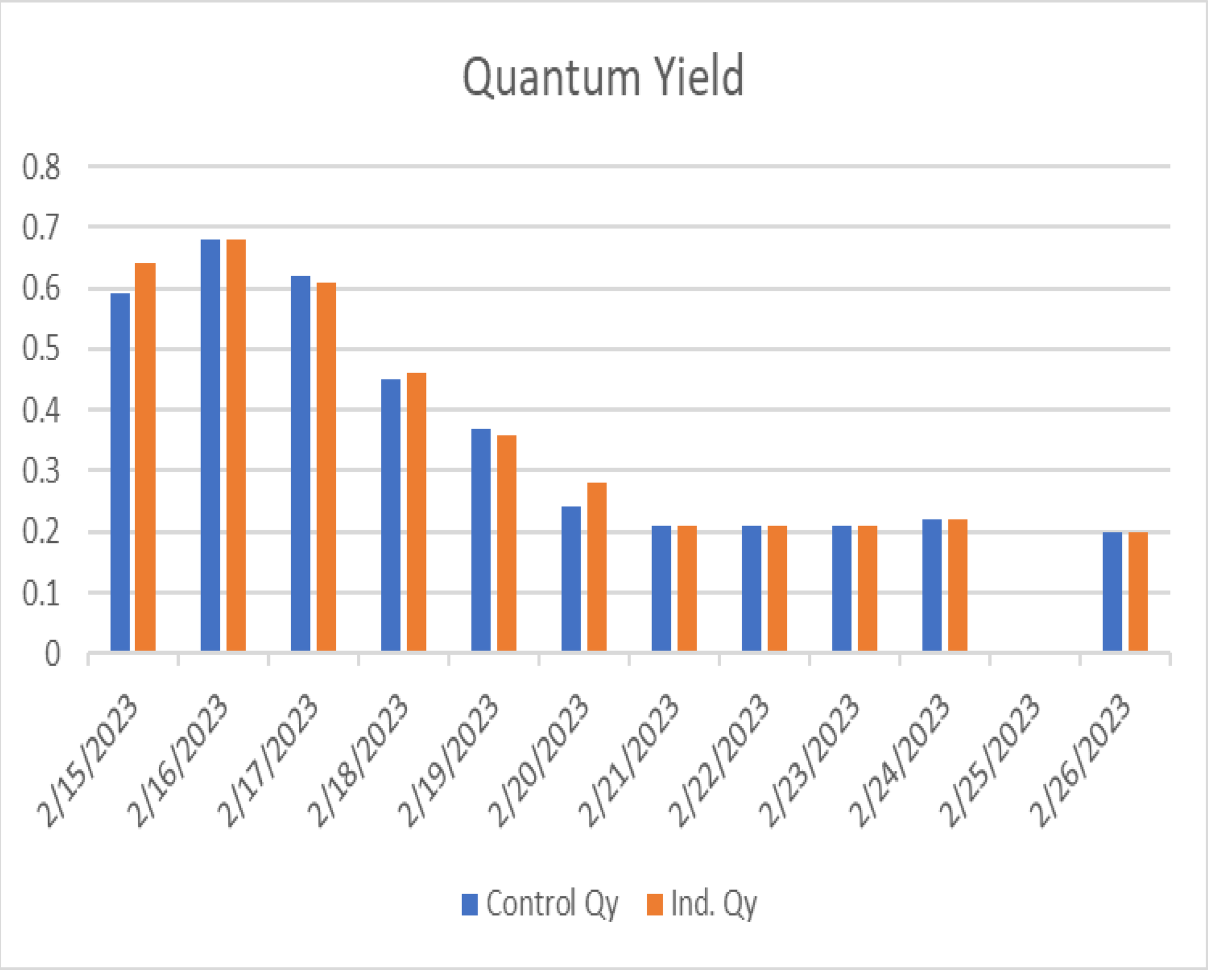
Our experiment seeks to find a method to mitigate harmful algal blooms. Harmful algal blooms (HABs), sometimes referred to as red tide, is a phenomenon that occurs in many marine environments, including the Gulf of Mexico. HABs occur when harmful algae blooms, becoming concentrated, and produces toxins. In this experiment, we conducted preliminary trials to assess the viability of a newly created algae wheel. This algae wheel controls environmental conditions while rotating twice an hour to reduce settling in trial cultures. In this study, we assessed if cultures normally developed, any algae wheel limitations, and made inferences on growth variability between traditional and algae wheel cultures.

Methods

- The algae wheel is designed so that flasks rotate around a common shaft. Flasks are contained within an environmental chamber made of 1" thick insulation panels, with a 12/12 day/night cycle illuminated to ~125PAR.
- Before cultures are inoculated, the flasks are cleaned with a sequential soap and 1 molar HCl acid wash. The cultures were grown in prefiltered Aquil media and were sterilized by microwaving them with DI water before they are rinsed with prefiltered media.
- Cultures were sampled under a fume hood which maintains the positive air pressure to ensure that cultures are not contaminated during transfer. To ensure the algae wheel was rotating twice an hour a marked string was attached to the algae wheel shaft so that the number of rotations could be counted over a given period. The temperature within the box was kept between 23.9C (75F) and 26.7C (80F) by a small heater. The light within the environmental chamber was maintained at a 12:12 light-dark cycle, and a light 12/12 day/night light cycle illuminated to -139 PAR. To test growth variability, we employed two culture types.
- A standard culture was set on a raised platform parallel to the algae wheel culture. Data was collected over a 14-day period using a Beckman coulter counter, to measure culture density, a fluorometer to measure maximum fluorescence, and an aqua pen, to measure the quantum yield which indicates algae photosynthetic efficiency.







Results

Results indicate that there is more variability in stationary cultures, due to culture settling. Additionally, culture grew to higher densities in the algae wheel and had more consistent growth trends than the stationary culture. Furthermore, algae wheel cultures initially developed at a faster rate that the stationary culture.

Conclusion

The algae wheel was successful as cultivating algae and operated as designed. Furthermore, it provided more consistent growth than in stationary cultures. This is beneficial as future trials into algal allelopathy could not have been assess without first assessing variability in the system.

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