Make Way for Duckweed: Observing the Growth Rates of Lemna and Its Effect on Atmospheric Carbon Dioxide Concentrations in a Simulated Carbon Sink

Shaw, Casey

With the increasing prospect of large-scale climate change due to anthropogenic carbon dioxide (CO2) emissions, propositions for controlling effects remain focused in reducing emissions as opposed to directly combatting them. Paleontological evidence suggests massive CO2 sequestration in the early Cenozoic by way of the floating fern Azolla; this experiment revolves around testing the capacity of a hardy analogue, duckweed (Lemna sp.), as a candidate for reducing atmospheric CO2 concentrations on a large scale. Three replicate trials were conducted to measure CO2 levels and duckweed growth with dry ice added as CO2. Trials were comprised of three groups – C (increased CO2), DC (100 g Lemna, no CO2), and DE (100g Lemna, elevated CO2). Hypotheses included: 1) Presence of Lemna in high-CO2 environments would lead to prominent rates of localized atmospheric CO2 depletion. 2) Lemna populations exposed to higher CO2 levels would experience greater overall growth. CO2 readings were taken every four hours during a 48 hour trial period, while a single duckweed measurement was taken following all three trials' completion. Data analysis has indicated that although Lemna populations exhibited no determinable growth differences between different CO2 concentrations, a statistically significant decrease of approx. 30.30% in CO2 levels in the DC and DE groups compared to the control groups was observed. Extrapolated into a larger scale, this indicates removal rates of up to 698.2 kg per day by an acre of duckweed, making it conclusive that Lemna is capable of rapidly reducing elevated CO2 levels in a simulated carbon sink.

Awards Won: