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

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With the increasing prospect of large-scale climate change due to anthropogenic carbon dioxide (CO_2) emissions, propositions for controlling effects remain focused in reducing emissions as opposed to directly combatting them. Paleontological evidence suggests massive CO_2 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 CO_2 concentrations on a large scale. Three replicate trials were conducted to measure CO_2 levels and duckweed growth with dry ice added as CO_2. Trials were comprised of three groups – C (increased CO_2), DC (100 g Lemna, no CO_2), and DE (100g Lemna, elevated CO_2). Hypotheses included: 1) Presence of Lemna in high-CO_2 environments would lead to prominent rates of localized atmospheric CO_2 depletion. 2) Lemna populations exposed to higher CO_2 levels would experience greater overall growth. CO_2 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 CO_2 concentrations, a statistically significant decrease of approx. 30.30% in CO_2 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 CO_2 levels in a simulated carbon sink.