Engineered Environmental Containment: Converting Lemna minor L. into a Natural Fertilizer

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Fertilizers containing nitrogen continue to be an integral aspect of the farming economy in the Midwest. Excess run-off of nitrates has become an environmental hazard. When the growth of algae increases, the dissolved oxygen is depleted which suffocates aquatic life. Previous research concluded Lemna minor was able to metabolize and lower the nitrate level in water. Instead of reverting back to the harmful nitrate containing fertilizers and chemicals that have been hurting the environment, a containment system allowing duckweed to grow, while containing reproduction, resulted in a natural way to maintain safe levels of nitrates and phosphates in water systems. The system, scaled to cover one acre surface area of water, is cost efficient. The next step of the research was testing the ability of the duckweed as a natural fertilizer. While harvesting the duckweed after it has soaked up the chemicals in water, a simple process of drying and crushing allowed for the duckweed to be a fertilizer. Testing the organic fertilizer against the chemical fertilizer was found to be more proficient for the growth of Zea mays (field corn) and Glycine max (soy bean). In fact, the organic fertilizer, throughout a four-week growth period, allowed for Zea mays to possess 21.84% biomass than Zea mays grown with chemical fertilizer. Regarding Glycine max, the organic fertilizer, allowed for Glycine max to possess 20.9% more biomass than Glycine max grown with chemical fertilizer. The organic fertilizer can decrease the amount of chemical fertilizer applied to a field by 4-8%.

Awards Won:
Fourth Award of $500