Lemnoideae: A Sustainable Bioremediation Treatment Targeting Eutrophication

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Eutrophication is a severe type of water pollution from excess nutrient inputs (NO3 and PO4). Many nations cannot maintain its expensive chemical treatments. Lemniodeae, a macrophyte known as duckweed, has strong potential as a financially accessible bioremediation program. This study's aims were to evaluate duckweed's eutrophic water management (Lily Pond, Australia and Ba Mau Lake, Vietnam), and to form duckweed's optimum application. Duckweed was applied in 4 densities (20%, 25%, 33% and 50%) and 7 parameters were measured every 48 hours. The results indicated duckweed's success, with nitrate reduction being extremely high at 92% and 96% for Lily Pond and Ba Mau Lake respectively. Moreover, duckweed did not negatively affect pH or alkalinity, ensuring ecosystem stability. The hypothesis predicted a 25% covering, but the most suitable density is concluded to be 20% for low-risk bodies and a 33% density for over-enriched sources. A 20% ratio had the ideal water colour, pH and alkalinity levels whilst its nitrate deletion mirrored larger densities. However, in the more eutrophic Ba Mau Lake, the 33% density was more appropriate. A 10-day program is proposed as after this time, duckweed's productivity ceases. A 20% covering would be removed after this period for use as a terrestrial fertiliser or animal feed, due to duckweed's nutrient content. This is necessary to prevent large nitrate levels being released upon duckweed's death. Furthermore, during application, aquatic life can consume duckweed. Duckweed's varied output and strength as a sustainable water nutrient regulator greatly increases its global viability to treat eutrophication.

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