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Optimizing agitation rate and hydraulic retention for wastewater remediation by *Lemna* species and *Azolla filiculoides*

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Lemnaceae (duckweeds) and *Azolla*, are floating aquatic plants, that exhibit rapid growth in nutrient-rich waters and have considerable potential for biomass production using wastewater derived nutrients. This study evaluated *Lemna* species and *Azolla filiculoides* (*Azolla*) growth performance on industrial meat processing effluent under controlled laboratory conditions. Growth effects of agitations (0, 30, 60, 90, 120 rpm) and surface covers (10, 20, 40, 80%) were investigated over 7 days (Exp.1), followed by continuous cultivation of *Azolla* under different hydraulic retention times (HRT; 3, 5, 7 days) at 10% surface cover for 15 days (Exp.2). *Lemna minor* and *Lemna minuta* exhibited great growth at 60 rpm, achieving RGRs of $0.290 \pm 11.34 \text{ day}^{-1}$ and $0.293 \pm 2.23 \text{ day}^{-1}$, respectively. *Azolla* cultivated at lower-moderate surface covers at 60 rpm achieved the highest RGR (20%: $0.10 \pm 0.006 \text{ day}^{-1}$). For Exp.2, 3-day HRT supported greater growth (RGR: $0.067 \pm 0.002 \text{ day}^{-1}$) than 5- and 7-day HRTs for 9 days. Findings provide insights into the development and optimisation of floating macrophyte-based phytoremediation systems and plant biomass generation.

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References

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