

Potential of Macroalgae *Ulva lactuca* for Municipal Wastewater Treatment and Fruitfly Food

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Abstract : Macroalgae are considered a promising approach for wastewater treatment as well as an alternative animal feed in addition to a biofuel feedstock. Their large size and/or tendency to grow as dense floating mats or substrate-attached turfs lead to lower separation and drying costs than microalgae. In this study, the macroalgae species *Ulva lactuca* (*U. lactuca*) were used to investigate their capacity for treating municipal wastewaters, and the feasibility of using the harvested biomass as an alternative food source for the fruitfly *Drosophila melanogaster*, an animal model for biological research. Results suggested that *U. lactuca* could successfully grow on three types of wastewaters studied with biomass productivities of 8.12-64.3 g DW (dry weight)/(m²·d). The secondary wastewater (SW) was demonstrated as the most effective wastewater medium for *U. lactuca* growth. However, both high nitrogen (92.5-98.9%) and phosphorus (64.5-88.6%) removal efficiencies were observed in all wastewaters, particularly in primary wastewater (PW) and SW, however, in central wastewater (CW), the highest removal rates were obtained (N 24.7 ± 0.97 and P 0.69 ± 0.01 mg/(g DW·d)). Additionally, the inclusion of 20% washed *U. lactuca* with 80% standard fruitfly food (w/w) resulted in a longer lifespan and more stable body weights in flies. On the other hand, similar results were not obtained for the food treatment with the addition of 20 % unwashed *U. lactuca*. This study suggests a promising method for the macroalgae-based treatment of municipal wastewater and the biomass for animal feed.

Keywords : animal feed, flies, macroalgae, nutrient recovery, *Ulva lactuca*, wastewater

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