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Potential of *Ulva lactuca* for municipal wastewater bioremediation and fly food

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ABSTRACT

Macroalgae are considered a promising approach for wastewater treatment and could also ultimately provide an alternative animal food source 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 a feed for the fruit fly *Drosophila melanogaster*, an animal model for biological research. Results indicated that *U. lactuca* could successfully grow on three types of wastewaters studied with biomass productivities of 8.12–64.3 g·DW (dry weight)/(m^2·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 and SW, while the highest removal rates (N 24.7 ± 0.97 and P 0.69 ± 0.01 mg/(g·DW·d)) were obtained in centrate wastewater. Moreover, the addition of 20% washed *U. lactuca* into 80% standard fly food (w/w) led to an extended life span and stable body weights in flies while not for the food treatment with 20% unwashed *U. lactuca*. This study demonstrates an effective approach for the macroalgae-based treatment of municipal wastewater and the biomass for animal feed.

Keywords: Wastewater; Macroalgae; Nutrient recovery; *Ulva lactuca*; Animal feed; Flies

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