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Bioenergy 2020: Seawater-to-Biomass: The process and mechanism of efficiently producing limnetic algal biomass with seawater and wastewater

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Microalgae are considered a promising feedstock for biofuel, but expansion of algal lipid production commercially remains on its way, blocking by its demand on chemical nutrients and freshwater. Inexhaustible seawater, with a touch wastewater added, has great potential to optimize microalga production in order that biodiesel production can thrive cost-effectively and sustainably. as compared to regular medium, limnetic Chlorella SDEC-18 achieved fast growth, high lipid content, enlarged cells, fragile cell walls and efficient settling during this cultivation method referring seawater, alongside anaerobically digestion effluent of kitchen waste. Among these advantages of lipid yield and extraction, the response of microtubles to salinity critically contributed to the regulation of carbon metabolites. In detail, osmotic stress depolymerized microtubule, followed by delocating cellulose synthase, which redirected carbon flow to lipid instead of starch or cellulose. Hence, the algal cells cultured in saline environments exhibited superiorities on lipid production and extraction showing as above 60% in lipid content and 80% in first extraction efficiency. The promoted settling behavior saved harvest energy input and was resulted from ions in seawater and extracellular polymeric substances secreted by algae. After clarifying the benefits of algal biomass produced from seawater, the follow-up research includes construct a transcriptomics and metabolomics network of algae in salinity ambience for concisely understanding algal cell metabolism and foundating the flowery control of lipid synthesis in several conditions. Eventually, a scale-up process for algal biomass production might be established with the goal of sustainable and economic biodiesel generation

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