

Simultaneous biodiesel generation and municipal wastewater treatment by indigenous microalgae strain

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Microalgae-based wastewater treatment system has demonstrated excellent nutrient removal efficiency, high microalgae biomass yield, and production of valuable by-products, while significantly reduced the required capital and operational costs. Moreover, utilization of locally isolated microalgae strain may improve the biomass productivity and wastewater treatment efficiency. This study presented the cultivation of indigenous microalgae strain *Desmodesmus maximus* CN06 in municipal wastewater by considering its growth rate, biomass productivity, nitrogen and phosphorus removal efficiencies and prospective biodiesel production. *D. maximus* CN06 exhibited a rapid growth rate of 0.23/day and achieved 91% total nitrogen removal efficiency. Complete total phosphorus removal was also accomplished within 7 days. Substantial lipid production was demonstrated during cultivation in municipal wastewater, resulting in 3.43 mg/L.d lipid productivity and 41.115 mg/L lipid production. Upon transesterification process, hexadecanoic acid (C16:0) emerged as the dominant fatty acid, followed by octadecanoic acid (C18:0). The extracted fatty acid successfully fulfilled the requirements set by American Society of Testing Materials (ASTM) D6751 and European Standard EN 14214, in terms of cetane value,



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kinematic viscosity, cloud point and iodine value. This study demonstrated that cultivation of indigenous microalgae strain in municipal wastewater offers a simultaneous advantage of efficient nutrient removal and biodiesel production.