

Abstract

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Project Title : Characterization and Isolation of Duckweed for Biomass and Starch Production for Bioethanol Conversion

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Abstract:

Lemnaceae or duckweed has been known as an aquatic plant with a great potential for wastewater treatment. It also has a potential as a good resource of proteins and starch, which can be utilized for the production of value-added products such as animal feed and fuel ethanol. In this project, 24 duckweed strains were collected and isolated from the northern part of Thailand. They were morphologically characterized and categorized into 4 groups, which were *Wolffia arrhiza* (2 samples), *Lemna aequinoctialis* (9 samples), *Lemna perpusilla* (9 samples) and *Landoltia punctata* (4 samples). The best growing strains were selected for each species, which were *W. arrhiza* SC004, *L. aequinoctialis* SC022, *L. perpusilla* SC024 and *L. punctata* SC016 with biomass productivity of 16.3 g/m², 93.5 g/m², 78.6 g/m² and 129.2 g/m² and starch content of 9.7%, 21.4%, 17.8% and 26.2% respectively. Nutrients starvation, 6-BA and ABA could induce starch accumulation of those strains up to 70.5% (8.2 g/m²), 88.9% (56.3 g/m²), 63.9% (37.0 g/m²) and 66.5% (61.6 g/m²). The starch and cellulose of those strains were used as the substrate for SSF (simultaneous saccharification and fermentation) with the ethanol yield of 0.12 ± 0.009 g/g, 0.34 ± 0.012 g/g, 0.37 ± 0.018 g/g and 0.28 ± 0.010 g/g respectively. Pilot scale of polyculture of those strains was performed for 12 months with the average biomass productivity of 23.5 t DM/ha/yr, average starch production of 12 t DM/ha/yr. and ethanol yield of 6,521 l/ha. The duckweed cultivation system in this experiment could be improved to be more efficiency and eco-friendly by using wastewater as the main source of nutrients, which could cut down the fertilizer requirement and reduce methane gas emission from waste water pond.

Keywords : 3-5 words Duckweed, Biomass, Starch, Ethanol