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Production of 16.5% conc. ethanol from seagrass seeds

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Abstract

Bioethanol (EtOH) production from aquatic plant biomass has a growing interest in this decade. However, aquatic plant biomass contains moisture at high percentage (87.5% on average, n=104) and the final products obtained by fermentation contain EtOH at a low concentration in the range of 0.1-5.5% vol/vol (usually less than 1%). This study used seeds of *Zostera marina* (seagrass) as a raw material and developed EtOH-fermentation technology. *Zostera marina* known by the common names of eelgrass is the most-ranging marine flowering plant in the Northern Hemisphere. This plant produces large quantities of seeds, at times numbering several thousand seeds per square meter of plants. The seeds (62.0% moisture) were collected at annual plant colony of *Z. marina* distributed in Japan, and dried for the use of fermentation. The seeds contained 83.5% carbohydrates including 48.1% crude starch on a dry basis, which is the same level with cereals such as wheat flour and corns. The seeds were saccharified with glucoamylase (50 ^{o}C, 96h) and obtained 10.3% glucose juice. This juice was further fermented (23-35 ^{o}C, 15 days) with *Saccharomyces cerevisiae* and obtained EtOH at a 8.2% level by monographic double-fermentation and at a 16.5% level by parallel double-fermentation.

The fermented products are expected to be utilized not only as biofuel but also as alcohol beverages in future. Culturing of seagrass seeds as a crop may open a new marine fermentation industry.

Biography

Motoharu Uchida has obtained his Ph.D degree at the age of 40 years from Kyoto University. He is a chief of coastal fisheries and environment division, National Research Institute of Fisheries and Environment of Inland Sea, Fisheries Research Agency, Japan. He has published more than 50 papers in reputed journals and books.