Petrochemistry-2013

OMICS Group Conferences
Accelerating Scientific Discovery

World Congress on
Petrochemistry and Chemical Engineering

November 18-20, 2013 Hilton San Antonio Airport, USA

Using concentrate from desalination and reusing anaerobic digested sludge to grow algae

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Abstract

Renewable Energy; algae are the best economical choice for biodiesel production, because of its availability and low cost. Microalgae is one of the world recognized oldest life forms and one of the future green energy. The idea of using microalgae as a source of fuel is not new but it is now being taken seriously because of global warming that is associated with burning fossil fuels and the escalating price of petroleum. Microalgae was cultured reusing desalination concentrate and supernatant from anaerobic digested sludge (ADS) to conserve the water resource, energy-dependent nutrient, and reduce inland desalination and microalgae cost. Algae use nutrients from wastewater (such as anaerobic digested sludge) and have a capability to grow in low quality land without competition with the lands that's were specifically used to grow food which reduces the costs of desalination and microalgae production. It provides a treatment for the waste from desalination and reduces the need to buy nutrients for algae. Microalgae requires water, light, CO2, appropriate pH, suitable salinity, macronutrients (nitrates and phosphates), vitamins and trace elements for their growth (Chisti, 2007; Brennan and Owende, 2010; Mutanda et al., 2011). Microalgae grow well if all these requirements are available in the appropriate ratio. If freshwater is used without recycling, 3726 kg water, 0.33 kg nitrogen, and 0.71 kg phosphate are required to produce 1 kg of biodiesel. Recycling harvest water reduces the water and nutrients usage by 84% and 55%. Using sea/wastewater decreases 90% water requirement and reduces the requirement of all the nutrients except phosphate (Yang et al., 2011). Microalgae require 20.3 L of water, 134 g salt, 147g nitrogen, 20g phosphorus for each kg of dry microalgae to grow (Batan et al., 2010). The produced microalgae slurries contain green, protein, nutrient, and moisture that can be fed to cattle by mixing with feed stocks especially in Southwest of the United States (US) where fresh water and green material diminishing.

Biography

Waddah Hussein is a master student, pursuing he's degree in chemical engineering in NMSU. He is a graduate research assistant at IEE/WERC working with algae and waste.