World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:11, No:12, 2017

Recirculated Sedimentation Method to Control Contamination for Algal Biomass Production

Authors : Ismail S. Bostanci, Ebru Akkaya

Abstract : Microalgae-derived biodiesel, fertilizer or industrial chemicals' production with wastewater has great potential. Especially water from a municipal wastewater treatment plant is a very important nutrient source for biofuel production. Microalgae biomass production in open ponds system is lower cost culture systems. There are many hurdles for commercial algal biomass production in large scale. One of the important technical bottlenecks for microalgae production in open system is culture contamination. The algae culture contaminants can generally be described as invading organisms which could cause pond crash. These invading organisms can be competitors, parasites, and predators. Contamination is unavoidable in open systems. Potential contaminant organisms are already inoculated if wastewater is utilized for algal biomass cultivation. Especially, it is important to control contaminants to retain in acceptable level in order to reach true potential of algal biofuel production. There are several contamination management methods in algae industry, ranging from mechanical, chemical, biological and growth condition change applications. However, none of them are accepted as a suitable contamination control method. This experiment describes an innovative contamination control method, 'Recirculated Sedimentation Method', to manage contamination to avoid pond cash. The method can be used for the production of algal biofuel, fertilizer etc. and algal wastewater treatment. To evaluate the performance of the method on algal culture, an experiment was conducted for 90 days at a lab-scale raceway (60 L) reactor with the use of non-sterilized and non-filtered wastewater (secondary effluent and centrate of anaerobic digestion). The application of the method provided the following; removing contaminants (predators and diatoms) and other debris from reactor without discharging the culture (with microscopic evidence), increasing raceway tank's suspended solids holding capacity (770 mg L-1), increasing ammonium removal rate (29.83 mg L-1 d-1), decreasing algal and microbial biofilm formation on inner walls of reactor, washing out generated nitrifier from reactor to prevent ammonium consumption.

Keywords : contamination control, microalgae culture contamination, pond crash, predator control
Conference Title : ICBBT 2017 : International Conference on Biofuels, Bioenergy and Technology
Conference Location : Amsterdam, Netherlands
Conference Dates : December 04-05, 2017