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Anaerobic digestion of microalgae for gas production and nutrient recycling: Towards a sustainable closed loop

Lina Maria Gonzalez, Sergi Astals, Ngoc Minh Chau Nguyen, Paul Jensen, Steven Pratt and Peer Schenk
[1]University of Queensland, Australia

During the recent decades the world has been looking at renewable fuels as result of greenhouse gas pollution and the depletion of traditional fossil fuels. The demand for renewable energies has driven the efforts of scientists around the world to find a sustainable source of energy which eventually can replace traditional fuels. Anaerobic digestion is becoming an efficient system not just for treatment of wastes but for the generation of renewable energy through biogas production. Microalgae have shown to be a suitable substrate for such purpose. Besides gas production, anaerobic digestion of microalgae generates a digestate rich in nutrients that can be used as nutrients supply for microalgae cultures, resulting in a sustainable closed loop for biogas production. In this project, we evaluated the digestibility and biogas production potential of microalgae as well as the nutrient recovery of the process. The results show that microalgae are an efficient substrate for anaerobic digestion since they produce a high yield of bio-methane (220 L methane/kg dry biomass) compared to other crops/crops residues used for biogas production. Nitrogen recovery was highly efficient and nitrogen conversion to ammonium occurred. Although phosphorous recovery still requires optimization, as some of it becomes immobilized, preliminary experiments of algae growth on liquid digestate show its potential as culture medium. Current research is underway to recover the remaining immobilized nutrients (precipitates and organic solids) by applying pH changes and in-pond aerobic digestion.

Biography

Ms. Lina is a Biologist and Master in Sciences-Biology with emphasis in Ecology. Throughout her career she has been devoted to the study of the physiology, ecology and taxonomy of microalgae and my major area of research have been in microalgae biotechnology. Currently she is a PhD student at the School of Agriculture and Food Sciences at the University of Queensland. Her research project is focused on anaerobic digestion of microalgae for gas production and nutrient recycling.

micrasteria@gmail.com

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