Abstract of the Week: Microalgae Lipid and Protein Isolation Process (LPIP) using Wastewater Cultivated Microalgae | Sustainable Waste-to-Bioproducts Engineering Center

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Human dependencies on fossil fuels from fracing and drilling of limited resources and on protein from agriculture has become major concern that has motivated research with the objective to decrease these dependencies. One of the areas of research to address these problems is the cultivation of microalgae utilizing wastewaters, whereby the microalgae could be utilized for both biofuels and feed for aquaculture and agriculture.

A new procedure known as the Lipid and Protein Isolation Process (LPIP) uses sodium hydroxide and chilled acetone to extract algal lipids and proteins for agricultural and aquaculture applications. The process uses the base NaOH to lyse the microalgae cells, whereby the lipids and proteins are partitioned from the solid phase to the solution phase. The lipids provide a pathway to biodeisel production and the protein may provide a source of feed for fish and cattle. Chilled acetone is then added to the solution phase to precipitate the algal lipids and proteins for collection and applications in the bioproducts identified. This process is being compared to a similar process using sulfuric acid for protein precipitation on the basis of lipid and protein yield, relative amounts of chemicals used, and cost.

Results thus far have shown that the LPIP produces an increase in protein yield, but a decrease in the lipid yield compared with the process that utilizes sulfuric acid. Testing is ongoing to evaluate the effect of downstream parameters including time, temperature, and strength of solvent (acetone) on the yields and costs associated with lipid and protein production.