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Abstract

The Bay Mills Community College research team will present information about anaerobic digestion that the college is presently working on. Our Group will illustrate how to create an anaerobic digester using a fish waste mix to create methane. We will explain the difference between anaerobic digestion (using microorganisms to break down biodegradable material with lack of oxygen) and aerobic digestion (decomposing organic material with microorganisms with oxygen present) along with background information about processes. We will also explore how recycling fish waste may have a positive effect on the environment. Our research will conclude what ways the fuel produced can be used and how the community can benefit.

Introduction

- Bay Mills Indian Community
 - As Anishinabe people of the Great Lakes region
 - it is our duty to preserve our waters
 - 420,000 lbs. of fish caught by local fishermen annually
 - 30-40% of total weight is not usable for human consumption
- Reclamation of fish waste
 - Anaerobic
 - Occurs when microorganisms break down biodegradable material with lack of oxygen
 - Aerobic
 - Occurs when another microorganism decomposes organic material with the presence of oxygen
 - Less fish waste will decrease the amount of nitrogen levels in the lake which will decrease the chance of eutrophication (lack of oxygen due to increased plant growth).

Methods

Phase 1. Small-scale investigation of fish waste production of methane through anaerobic digestion

- create 1 L airtight digestion reactors (n=12)
- flow methane production into inverted graduated cylinder
- measure daily volume of methane production
- Determination of required ratio of fish waste to restaurant waste



Phase 2. Large-scale comparison of fish waste decomposition between aerobic and anaerobic digestions

- measure time needed for a given volume of fish waste to be decomposed through each method
- further investigation of anaerobic abilities in Upper Michigan climate



Phase 3. Investigation digestion products

- Comparison nitrogen concentrations in fertilizer products of aerobic and anaerobic digestion
- Investigation of methane quality and potential uses

Objectives

- Determine alternative sources of waste removal through anaerobic and anaerobic digestion
- Investigate production of methane biogas for energy use
- Decrease the environmental impact of fish waste on land and water at the Bay Mills Indian Community

Expectations

We expect that restaurant waste will be needed to create the optimal ratio for production of biogas. The starches in restaurant waste will balance the nitrogen in high protein fish.

Future goals

- Conduct an experiment to show the effects of removing fish waste from the environment
- Construct a large scale digester
- Show local fishermen how to operate a digester to collect biogas

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