Metro Nashville Public Schools Food Waste Collection and Analysis for Downstream Bioconversion

Americans waste approximately 92 billion pounds of food waste a year. This contributes to greenhouse gas emissions, a billion-dollar loss in revenue, and a 30-40% loss in supply. Only a small amount of food waste goes through composting and is repurposed as animal feed. Microbial fermentation is a valuable way to convert food waste to value added products. However, before food waste can be utilized as a feed stock for fermentation the food waste must be analyzed. Insight to the composition of sustainable food waste can help streamline recycling of organic wastes. The food waste samples in this study was collected from Metro-Nashville Public Schools (MNPS) and measured for: moisture content, sugars, starch, fiber (cellulose, hemicellulose, and lignin), protein, fat, and mineral contents using standard AOAC methods. For industrial fermentation and conversion of waste, free sugars (glucose, fructose, sucrose, maltose, and mannose) are the most important in metabolic pathways. Free sugars enter glycolysis and are directly link with the downstream yield of bioproducts like 2,3-Butanediol, lactic acid, and bioethanol. Our initial findings indicated that most of the food waste had on average, 18.8% protein, 19.1% sucrose, 25.4% glucose, and 34.6% fructose. Starch, fiber and fat content are currently being analyzed but the average moisture content for food waste (prior to adding water for blending) was 37.5%. By determining the composition food waste can be properly evaluated for its potential in value-added production of bioproducts through non-sterile fermentation.