CABBI
CENTER FOR ADVANCED BIOENERGY AND BIOPRODUCTS INNOVATION

Bioprocessing, Recovery, and Mass Balance of Vegetative Lipids from Metabolically Engineered 'Oilcane' Demonstrates Its Potential as an Alternative Feedstock for Drop-In Fuel Production

Background/Objective

Plant lipids like triacylglycerol (TAG) are increasingly in demand as renewable feedstocks for biodiesel and biochemicals. Oilseeds are currently the primary source. The vegetative tissues of plants express lipid metabolism pathways, but they do not hyper-accumulate lipids. Elevated synthesis, storage, and accumulation of lipids in vegetative tissue has been achieved by metabolic engineering of sugarcane to produce an "oilcane." This study evaluates the potential of oilcane as a renewable feedstock to produce lipids for biodiesel production.

Approach

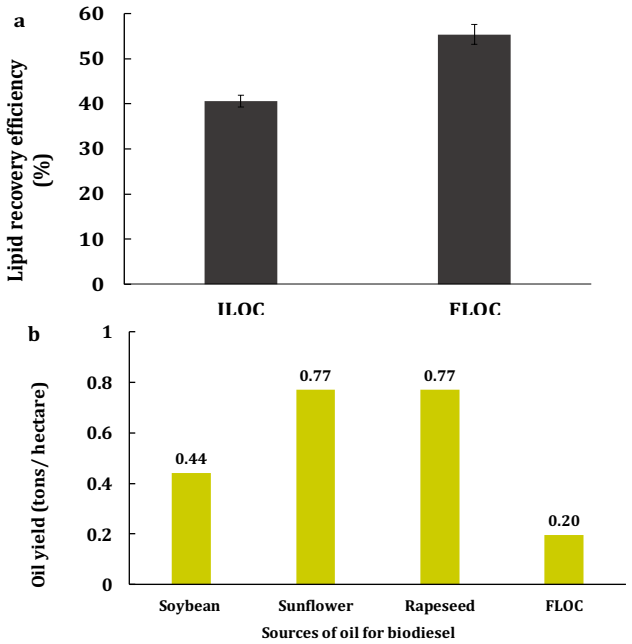
- Oilcane was grown under favorable climatic and field conditions in Florida (FLOC) and at an atypical growing region in Illinois (ILOC) in an abbreviated growing season.
- The oilcane bagasse and leaves underwent lab-scale chemical-free hydrothermal pretreatment.

Results

- Chemical-free hydrothermal pretreatment prevented the degeneration of lipids during bioprocessing, which greatly increased lipid recovery.
- Lipid recovery efficiencies were 40% and 55% for ILOC and FLOC, respectively, after bioprocessing.
- FLOC vegetative tissues yielded 0.20 tons/ha of lipids, equivalent to 80% of total soybean oil yields.

Significance/Impacts

Oilcane showed potential as an alternative renewable feedstock for biodiesel production.



a) The efficiency of vegetative lipid recovery from ILOC and FLOC plants; and b) actual oil recovered per hectare of land from FLOC and its comparison with other feedstocks for biodiesel production.

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