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Economic and Environmental Sustainability of Vegetative Oil Extraction Strategies at Integrated Oilcane and Oil-Sorghum Biorefineries

Background/Objective

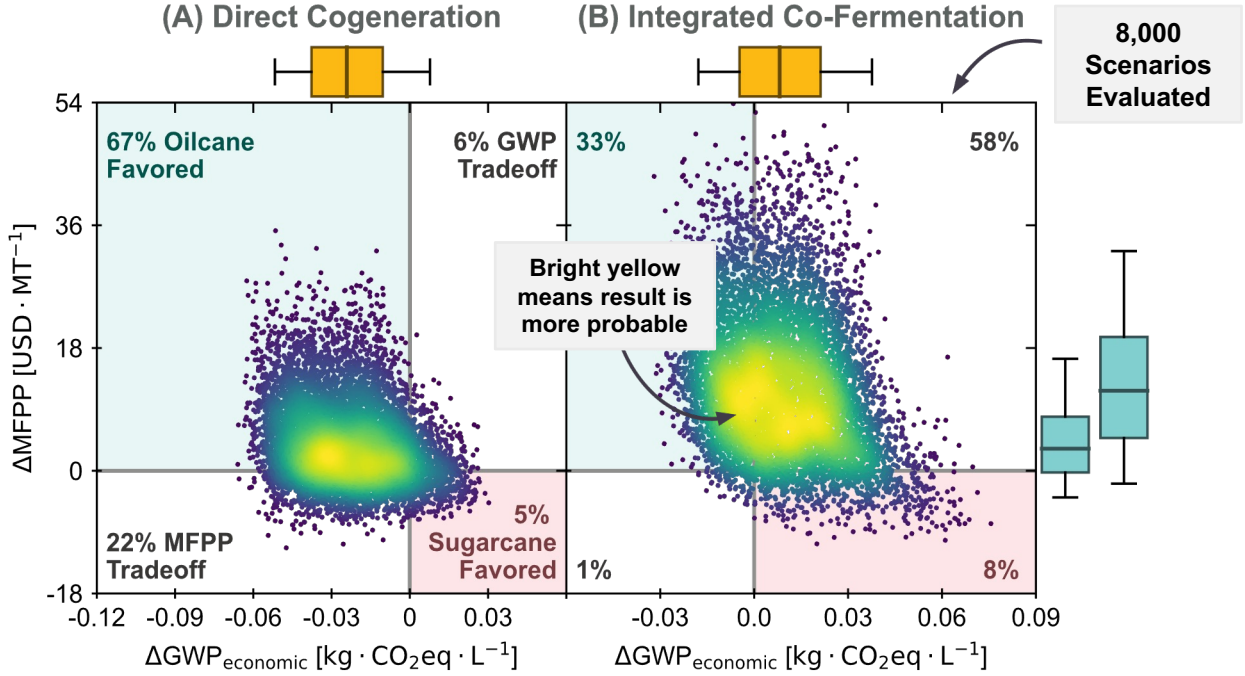
- Oilcane and oil-sorghum may yield greater oil per unit land area than conventional oilseed crops and could help meet expected demand for biofuels.
- This work sought to evaluate the potential economic and environmental sustainability of two oilcane and oil-sorghum biorefinery configurations producing biodiesel and ethanol.

Approach

Biorefineries were modeled in BioSTEAM. Economically allocated global warming potential (GWP100) and maximum feedstock purchase price (MFPP) were used as key sustainability indicators.

Results

For the evaluated biorefinery configurations, oilcane and oil-sorghum have economic value greater than and GWP impacts similar to non-engineered sugarcane and sweet-sorghum. The cellulosic configuration was shown to have the highest potential for sustainability due to greater ethanol and biodiesel production than the configuration that burns bagasse for heat and power cogeneration.



A kernel density scatter plot of the impact on the MFPP and ethanol GWP (using economic allocation) of opting to process oilcane over sugarcane shows that oilcane is more profitable for over 73 and 81% of all scenarios for the (A) Direct Cogeneration and (B) Integrated Co-Fermentation biorefinery configurations.

Significance/Impacts

As biofuel crops, oilcane and oil-sorghum present financial and environmental opportunities compared to traditional sugarcane and sweet sorghum.

Cortes-Peña et al. 2022. "Economic and Environmental Sustainability of Vegetative Oil Extraction Strategies at Integrated Oilcane and Oil-Sorghum Biorefineries." *ACS Sustainable Chemistry and Engineering*. DOI: 10.1021/acssuschemeng.2c04204