

# Impact of Non-Irrigation on 1G and 2G Bioethanol Potential of Oilcane Feedstock: A Field to Fuel Pipeline Study

## Background/Objective

Oilcane (OC) line 1566 is a transgenic variety of sugarcane that can accumulate lipids along with sugars in their vegetative tissues for biodiesel and bioethanol applications. However, sugarcane is a water-intensive crop and vulnerable to drought conditions. This study evaluates the bioethanol potential of OC in response to irrigation (IR) and non-irrigation (NIR) during a seasonal drought prior to harvest.

## Approach

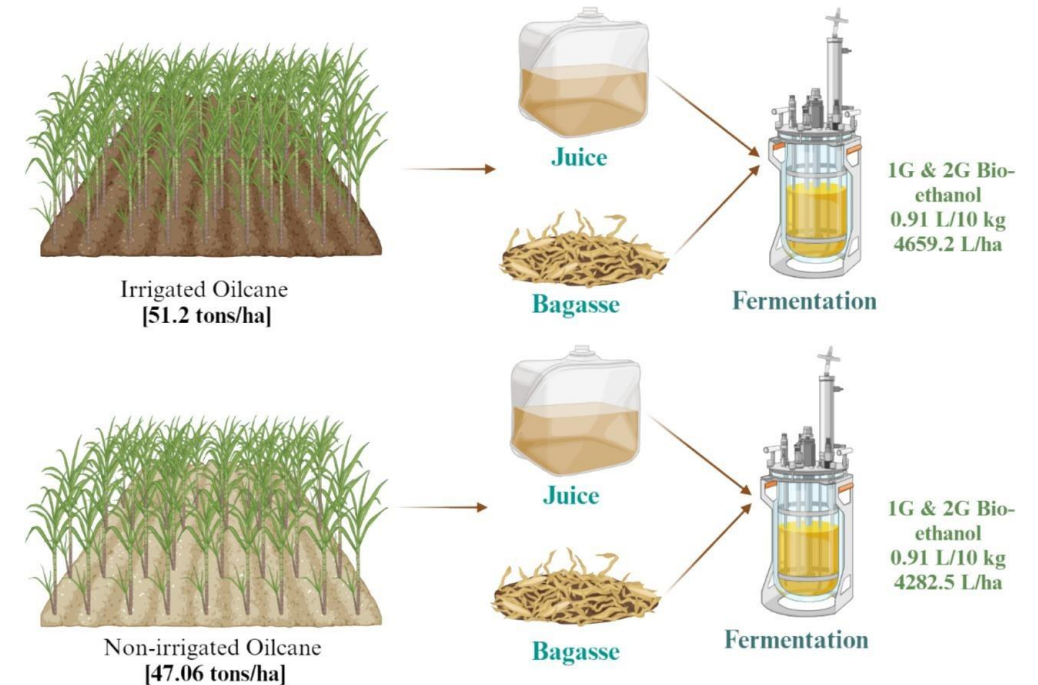
Oilcane was planted in IR and NIR plots during a seasonal drought until harvest. Juice was extracted from stems and fermented with Ethanol Red® yeast to produce first-generation (1G) bioethanol, while the bagasse underwent hydrothermal pretreatment and enzymatic hydrolysis to produce monomeric sugars that were further fermented by xylose-fermenting engineered yeast to produce second-generation (2G) bioethanol.

## Results

Oilcane under NIR conditions resulted in an 8% reduction in stem yield and a 14.4% reduction in juice sugar concentration ( $276.3 \pm 8.9$  g/L IR vs.  $236.5 \pm 2.2$  NIR), with no effect on bagasse yields or hydrolysis efficiencies. Industrial bioethanol titers of  $\geq 99$  g/L and  $\geq 75$  g/L were achieved for 1G and 2G production, and non-irrigation did not impact the 1G and 2G bioethanol conversion efficiency.

## Significance/Impacts

Oilcane crops grown in drier and more marginal areas may be possible for industrial bioethanol production.



Graphical abstract of the study.

Deshavath, et al. 2025. "Impact of Non-Irrigation on 1G and 2G Bioethanol Potential of Oilcane Feedstock: A Field to Fuel Pipeline Study." *Fuel*. DOI: 10.1016/j.fuel.2024.134254.