Abstract

This research explored the production of bioethanol from food waste, with a focus on dates as a sustainable feedstock. Bioethanol, a renewable energy source, presents a viable alternative to fossil fuels due to its lower greenhouse gas emissions and biodegradability. The project aimed to exploreethanol production by investigating various fermentation processes using glucose and date substrates. Dates were pretreated, and the fermentation process was monitored by measuring sugar consumption and ethanol yield through distillation.

The fermentation of dates and glucose were carried out at 30 °C using instant dry commercially available baker's yeast (*Saccharomyces cerevisiae*). The results indicated that glucose fermentation was completed within 6 hours, while dates required slightly longer due to the complexity of their sugars. Despite the slower rate, dates produced approximately 91.3% of the ethanol yield achieved with glucose. Furthermore, increasing the substrate concentration from 100 g/L to 200 g/L significantly enhanced ethanol yield, increasing from 15.01% to 34.54%, demonstrating the impact of substrate concentration on ethanol production. pH monitoring revealed a steady acidification during fermentation, essential for efficient ethanol conversion.

The study demonstrated the potential of dates as an effective feedstock for bioethanol production.Future research could focus on optimizing fermentation through the use of different yeast strains,enzymatic treatments, and scaling the process for industrial applications, contributing to the advancement of sustainable biofuel production.