



Integration of paddy straw hydrolysate to molasses as a diluent for ethanol production using a robust *Saccharomyces cerevisiae* NGY10 strain

TECHNOLOGY AVAILABLE FOR TRANSFER

UNMET NEED AND OPPORTUNITY

Exhausting fossil fuels reserves, increasing fuel demand and greenhouse gas emissions together have mandated the search for alternative energy sources. Bioethanol is a preferred additive/replacement to gasoline due to its remarkable characteristics such as ability to reduce greenhouse gases emissions. Co-fermentation of molasses and biomass hydrolysate could be a potential strategy to boost ethanol yield and titre. Which not only dilutes the inhibitor concentration and increases sugar content, but also limits the use of water as diluent and reduces distillation time.

UNIQUE SELLING PROPOSITION

- *S. cerevisiae* NGY10 showed highest potential for ethanol production at 35°C during mixed molasses and PSH fermentation.
- Fermentation at 35 ° C by *S. cerevisiae* NGY10 will further reduce the cost of ethanol production.

TECHNOLOGY

Paddy straw is a potential feedstock for microbial ethanol production in India. Currently, it is burned after harvesting, leading to severe air pollution. Therefore, the goal of this study was to develop an integrated process for molasses and paddy straw hydrolysate fermentation using thermotolerant and inhibitor tolerant yeast strains. Mixing of molasses with PSH resulted into increased sugar concentration, diluted inhibitors generated during pre-treatment of paddy straw, production of higher ethanol.

Dilutions (% v/v)	Initial sugar (g/L)	Ethanol (g/L)	Ethanol (% v/v)	Yield (%)	Productivity (g/Lh)	Glycerol (g/L)	Acetic acid (g/L)
33.33 (1:2)	190.4 ± 3.97 ^a	85.74 ± 1.78	10.87	90.97	2.52 ± 0.06	9.87 ± 0.38	2.17 ± 0.04
35	198.58 ± 5.53	90.15 ± 2.74	11.43	92.65	2.5 ± 0.04	9.99 ± 0.36	2.15 ± 0.03
40	223.09 ± 6.31	97.11 ± 2.36	12.31	89.22	2.8 ± 0.05	10.67 ± 0.43	2.28 ± 0.04
45	247.6 ± 5.15	71.26 ± 2.43	9.03	67.93	1.48 ± 0.04	11.95 ± 0.47	2.31 ± 0.02

^a Mean ± standard deviation, for n = 3.

Table depicting Fermentation profile of *S. cerevisiae* NGY10 yeast strain in serum bottles using 35% v/v, 40% v/v and 45% v/v molasses diluted with PSH at 35°C after 48 h under optimized conditions

STAGE OF DEVELOPMENT

Technology is validated at laboratory scale and ready for scaled up as per the industry requirement.

LICENSING OPPORTUNITY

BCIL is looking for suitable industrial partner for commercialization of this technology

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