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Second generation ethanol from orange bagasse via co-fermentations

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Second generation biofuels have come forth as a highly promising means of energy generated from non-food biomass. Orange bagasse is a low cost biomass having high levels of carbohydrates with enormous biotechnological value. Previously, we evaluated the potentials of this biomass for generating ethanol by optimizing hydrolyses (acidic and enzymatic) and subsequent submerged fermentation processes on bench scale. Our current investigation involves a new approach for the conversion of this biomass into sugar mixtures applying hydrolysis with enzymes coming from *Xanthomonas axonopodis pv. citri* (*'Xac'*) lysates, a potent pathogen that causes Citrus canker disease. Later, the obtained reducing sugars were converted into bioethanol by co-fermentation that involved three yeast strains: *Saccharomyces cerevisiae*, *Candida parapsilosis* IFM 48375 and NRRL Y-12969, the last two being isolated from bagasse. Results demonstrated successful hydrolyses by 'Xac' enzymes that released high levels of fermentable sugars. Also during co-fermentation processes involving any of the two yeast strains in a single process, we noticed that ethanol yield was improved from 50% to 62% w/w (calculated on the basis of total dry matter contents) and sugars were consumed faster than by a single-microorganism approach. Thus by employing co-fermentation strategy, apart from getting better bioethanol yields, fermentation time is also reduced that makes it a cost effective technique for bioethanol production using micro-organisms extracted from orange bagasse.

Biography

Almas Taj Awan is a Ph.D. student at the University of Campinas at Chemical Biology Laboratory, SP, Brazil. Her studies involve recycling of orange bagasse and exploring it as a valuable source for obtaining second-generation ethanol. This multidisciplinary project deals with classical biochemistry and green-chemistry approaches.

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