Rapid Adaptation of *Papiliotrema laurentii* Strains for Lipid Production in Sugarcane Bagasse Hemicellulosic Hydrolysate

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The growing demand for renewable energy sources has boosted the use of lignocellulosic biomasses, such as sugarcane bagasse, as a potential source of lipids for biodiesel production using oleaginous yeasts. However, the pretreatment of these biomasses releases inhibitory compounds such as acetic acid. *Papiliotrema laurentii* ATSI displays tolerance to acetic acid and assimilates glucose and xxylose, the main sugars found in lignocellulosic biomasses. Herein, we explored the impact of inhibitors on yeast growth and assessed its short-term adaptation to non-detoxified sugarcane bagasse hemicellulose hydrolysate for lipid production. We treated the hydrolysate with sulfuric acid at 120 ºC/6 min, followed by filtration and centrifugation. Then, we characterized the liquid fraction regarding the content of reducing sugars, glucose, xylose, galactose, arabinose, hydroxymethylfurfural (HMF), furfural, formic acid, acetic acid, proteins, total ammoniacal nitrogen, and total phenolic compounds. To evaluate the effect of inhibitors on cell growth, we cultured the ATSI in media simulating the hemicellulose hydrolysate without and with inhibitors (formic acid, acetic acid, furfural, and HMF). The effects of phenolic compounds were studied using ferulic acid as a model. We monitored yeast growth (OD_{600}) and sugar consumption during all cultivations. Then, we evaluated the ATS I growth in different hydrolysate:modified SS2 medium concentrations: 50:50%; 75:25%; 100:0%; followed by consecutive short-term adaptations in medium containing 75% hydrolysate (1st adaptation - 66 h; 2nd adaptation - 21 h). Before and after the adaptations, we cultivated the ATSI in media with 100% hydrolysate under the same conditions (1st cultivation - 240 h, 2nd cultivation - 196 h, and 3rd cultivation - 149 h). Yeast growth in the medium with 100% hydrolysate, without prior adaptation, was slower and started later than in the medium with the mixture of inhibitors. Thus, the poor performance might also be related to inhibitors other than the mixture, such as phenolic compounds. A single short-term adaptation resulted in improved yeast performance, including a reduced lag phase, doubled lipid content, and improved sugar consumption of ATSI in sugarcane bagasse hemicellulose hydrolysate, with no statistically significant differences compared to yeasts with two adaptations. In conclusion, the short-term adaptation of *P. laurentii* ATSI improved yeast performance in hemicellulosic hydrolysate.

Keywords: Lignocellulosic biomass; Inhibitors; Oleaginous yeast.

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Adaptação rápida de Linhagens de *Papiliotrema laurentii* para a Produção de Lipídios em Hidrolisado Hemicelulósico de Bagaço de Cana-de-Açúcar

Biomassas lignocelulósicas, fontes renováveis de energia, reduzem impactos econômicos e ambientais. Leveduras oleaginosas usam o bagaço de cana para produzir biodiesel, mas os inibidores liberados em seu tratamento prejudicam o crescimento. A levedura *Papiliotrema laurentii* ATSI assimila bem glicose, xilose e acumula lipídios, mesmo com ácido acético. O estudo avaliou o impacto dos inibidores no crescimento e adaptação ao hidrolisado hemicelulósico de bagaço de cana. Adaptações a curto prazo melhoraram o desempenho, reduzindo a fase lag e aumentando o acúmulo de lipídios.

Palavras-chave: Biomassa lignocelulósica; Inibidores; Levedura oleaginosa.

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