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Characterization of Lignocellulolytic Activities from a Moderate Halophile Strain of *Aspergillus caesiellus* Isolated from a Sugarcane Bagasse Fermentation.

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Palabras clave: celulasas, halotolerancia, bioetanol.

Introduction. The isolation and characterization of microorganisms in habitats with over 1 M NaCl is important for the identification of metabolites and/or robust proteins with potential industrial applications, and to understand the cellular physiology, molecular biology and biochemistry that support the survival of these organisms under extreme conditions

The goal of this work was to isolate microorganisms that could degrade lignocellulose in a sugar cane bagasse fermentation and characterize the lignocellulolytic activities that enable them to grow under such harsh conditions.

Methodology. All the methods described in this work are referred in Batista-García et al. 2014. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0105893

Results. A moderate halophile and thermotolerant fungal strain was isolated from a sugarcane bagasse fermentation in the presence of 2 M NaCl that was set in the laboratory. This strain was identified by polyphasic criteria as *Aspergillus caesiellus* (Fig.1). The fungus showed an optimal growth rate in media containing 1 M NaCl at 28ºC and could grow in media added with up to 2 M NaCl. This strain was able to grow at 37 and 42ºC, with or without NaCl (Table 1). *A. caesiellus* H1 produced cellulases, xylanases, manganese peroxidase (MnP) and esterases. No laccase activity was detected in the conditions we tested (Figure 2). The cellulase activity was thermostable, halostable, and no differential expression of cellulases was observed in media with different salt concentrations. However, differential band patterns for cellulase and xylanase activities were detected in zymograms when the fungus was grown in different lignocellulosic substrates such as wheat straw, maize stover, agave fibres, sugarcane bagasse and sawdust. Optimal temperature and pH were similar to other cellulases previously described. These results support the potential of this fungus to degrade lignocellulosic materials and its possible use in biotechnological applications.

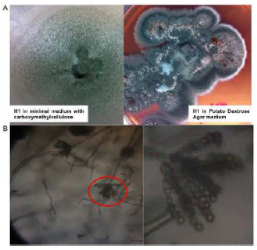

Fig. 1. (A) *A. caesiellus* grown in Vogel's medium supplemented with CMC (2%) with 0.5 M NaCl and PDA medium. (B) Microcultures of *A. caesiellus* in Saboraud Agar medium.

Table 1. Specific growth rate (mm/day) of the strain H1 at different temperatures and NaCl concentrations. Different letters indicate different statistical orders

NaCl (M)	Growth rate 28 ^{0}C	Growth rate 37 ^{0}C	Growth rate 42 ^{0}C
0	2.17 ± 0.03^d	2.17 ± 0.07^e	0.39 ± 0.03^d
0.5	5.12 ± 0.22^a	4.80 ± 0.02^b	0.62 ± 0.03^c
1.0	5.22 ± 0.02^a	5.40 ± 0.10^a	0.63 ± 0.07^c
1.5	4.18 ± 0.14^b	3.59 ± 0.07^c	1.62 ± 0.04^a
2.0	2.81 ± 0.05^c	2.28 ± 0.10^{de}	0.80 ± 0.01^b

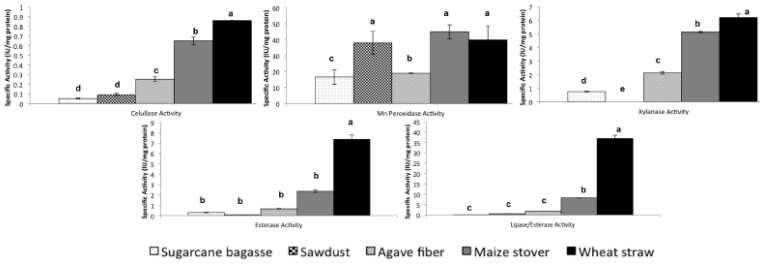

Fig. 2. Enzymatic activities from solid-state fermentation of H1 in different substrates. Different letters indicate different statistical orders.

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