TITLE: PRODUCTION OF COLD-ADAPTED CELLULASE FROM ANTARCTIC FUNGI

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ABSTRACT:

Extracellular enzymes are required in a range of known reactions, such as cellulases applied in agroindustrial waste remediation processes and in food improvement. Little is known about the ability of Antarctic fungi to produce cellulases, and still less about those associated with lichens present in this environment. The objective of this study was to evaluate the potential of fungi isolated from Antarctic lichens in producing cellulases and to analyze the temperature limit for the production of this enzyme. The fungi were isolated from Antarctic lichens growing on solid YMA medium at 8.0 ± 2.0 °C and cryopreserved in 20% glycerol at -80 °C. Subsequently, were submitted to the enzymatic test being cultivated in YMA medium plus carboxymethylcellulose as inductive substrate for the production of cellulases and incubated for a period of 7 days and confirmation of enzyme activity was performed by addition of solution to the medium the congo red solution and saline solution and measured the enzymatic index (value of the ratio between the diameter of the halo and the colony). From the isolation, 400 fungi were obtained from the lichen samples, of which about 165 were tested for enzymatic screening and 65 (39.3%) of them were positive for the production of extracellular cellulases and were isolated mainly from lichens *Usnea aurantiacoter*, *Lecania brialmontii* and *Xanthoria candelaria*. The enzymatic index ranged from 1.07 (4.LF19) to 5.33 (with F.L11, G. L11, I. L11). Among those with larger halos were cultivated for five different temperatures ranging from 15 to 40 °C and it was observed that the enzyme 7.L4 produced from 15 to 35 °C with the averages of the hydrolysis halos varying from 2.4 (15°C) to 0.73 (35°C). Isolates 2.L3, F.L11 and I.L11 grew and produced cellulase at 15 to 25 °C, and isolates these *Usnea capilacea* showed significantly similar halos. From these data, it is inferred that the Antarctic lichens are excellent sources of fungi capable of producing cellulases at different growth temperatures, demonstrating a unique thermal plasticity that can be useful in industrial processes of interest.

Keywords: Yeasts, cold-adapted cellulose, biotechnology.

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