TITLE: COLD-ADAPTED EXTRACELLULAR CHITINASE FROM THE ANTARCTIC BACTERIUM *Arthrobacter psychrochitiniphilus* STRAIN 492.

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ABSTRACT:

Chitin is the most abundant polymer in nature, distributed widely in marine and terrestrial environments. In Antarctica, this polymer is mainly associated to marine invertebrates. Chitinase acts in the hydrolysis of the bond ß 1-4 of N-acetyl-D-glucosamine and is used for differential biotechnological applications. The aim of this study was to evaluate the enzymatic activity of the cold-adapted extracellular chitinase from *Arthrobacter psychrochitiniphilus* strain 492 isolated from Antarctica. This isolate was recovered from marine sediment collected during the expedition OPERANTAR XXXII (summer 2013/2014) in King George Island after cultivation in R2A culture medium and incubation at 5°C. In previous assays, this bacterial strain showed chitinase activity in a screening performed in solid medium with colloidal chitin derived from shrimp shells as the carbon source and incubated at 15 °C. Further, extracellular cold-adapted chitinase production was performed in liquid medium and the growth evaluated by spectrophotometer and colony forming unit (CFU) count, in addition to the analyses of protein content (Bradford), enzymatic activity using blue chitin and the reducing sugars released with 3,5-dinitrosalicylic acid (DNS), monitored every 8 hours of incubation. Modeling of the bacterial growth curve was performed using OriginPro Ver 8. *A. psychrochitiniphilus* strain 492 showed an adaptation time (lag phase) and generation time (log) of 13 h and 12 h, respectively. The optimum of chitinase production and reducing sugars were at 80 hours of incubation, with 10.35 U/mL and 28.80 µg/mL, respectively. Optimization of chitinase production using experimental design is being carried out aiming future applications in industrial processes at low/moderate temperatures.

Keywords: Cold-Adapted Chitinase, psychrophilic bacteria, Bioprospecting, Low Temperature

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