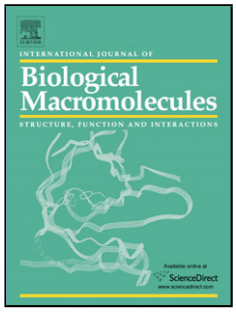

Title: Isolation and characterisation of a novel alpha-amylase from the extreme haloarchaeon *Haloterrigena turkmenica*

Author: Marco Santorelli Luisa Maurelli Gabriella Pocsfalvi Immacolata Fiume Giuseppe Squillaci Francesco La Cara Giovanni del Monaco Alessandra Morana

PII: S0141-8130(16)30701-2
DOI: http://dx.doi.org/doi:10.1016/j.ijbiomac.2016.07.001
Reference: BIOMAC 6275

To appear in: *International Journal of Biological Macromolecules*

Received date: 12-5-2016
Revised date: 30-6-2016
Accepted date: 1-7-2016

Please cite this article as: Marco Santorelli, Luisa Maurelli, Gabriella Pocsfalvi, Immacolata Fiume, Giuseppe Squillaci, Francesco La Cara, Giovanni del Monaco, Alessandra Morana, Isolation and characterisation of a novel alpha-amylase from the extreme haloarchaeon Haloterrigena turkmenica, International Journal of Biological Macromolecules http://dx.doi.org/10.1016/j.ijbiomac.2016.07.001

Isolation and characterisation of a novel alpha-amylase from the extreme haloarchaeon *Haloterrigena turkmenica*

Marco Santorelli[a], Luisa Maurelli[b], Gabriella Pocsfalvi[b], Immacolata Fiume[b], Giuseppe Squillaci[c], Francesco La Cara[c], Giovanni del Monaco[b], Alessandra Morana[c*]

[a]*Department of Chemical, Materials and Production Engineering, University of Naples "Federico II", P.le Tecchio 80, 80125 Napoli, Italy;*
[b]*Institute of Biosciences and Bioresources, National Research Council of Italy, Via Pietro Castellino 111, 80131 Naples, Italy*;
[c]*Institute of Agro-environmental and Forest Biology, National Research Council of Italy, Via Pietro Castellino 111, 80131 Naples, Italy*.

***Corresponding author:**
Alessandra Morana
Institute of Agro-environmental and Forest Biology, National Research Council of Italy, Via Pietro Castellino 111, 80131 Naples, Italy.
Tel.: +39 081 6132286
Fax: +39 081 6132701
E-mail address: alessandra.morana@ibaf.cnr.it

Abstract

An extracellular halophilic alpha-amylase (AmyA) was produced by the haloarchaeon *Haloterrigena turkmenica* grown in medium enriched with 0.2% (w/v) starch. Sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) and size exclusion chromatography (SEC) analyses showed a major band at 66 kDa and a peak of 54 KDa, respectively. Analysis of tryptic fragments of the protein present in the major SDS-PAGE band by nano-LC-ESI-MS/MS led to identification of the alpha-amylase catalytic region, encoded by the *htur2110* gene, as the protein possessing the described activity. Optimal values for activity were 55 °C, pH 8.5 and 2 M NaCl, and high thermostability was showed at 55 °C and 3 M NaCl. AmyA activity was enhanced by Triton X-100 and was not influenced by *n*-hexane and chloroform. Starch hydrolysis produced different oligomers with maltose as the smallest end-product. The efficiency of AmyA in degrading starch contained in agronomic residues was tested in grape cane chosen as model substrate . Preliminary results showed that starch was degraded making the enzyme a potential candidate for utilization of agro-industrial waste in fuel and chemicals production. AmyA is one of the few investigated amylases produced by haloarchaea, and the first alpha-amylase described among microorganisms belonging to the genus *Haloterrigena*.

Keywords: Alpha-amylase, Archaeon, Halophile, *Haloterrigena turkmenica*