ABSTRACT:

Cellulases are enzymes of the family Glycosil hydrolases (GHs) that are involved in the deconstruction of cellulose, being widely used in different industrial applications, contributing to the generation of value-added products. In this study we selected metagenomic sequences of *Syntermes wheeleri* gut, an endemic termite from the Brazilian Cerrado, for selection, production, purification and characterization of a cellulase. Among the sequences selected and produced in *Escherichia coli* BL21 (DE3), only one was chosen for the work, a β-glucosidase GH3 (β-G 72-26). This one was purified by size exclusion chromatography, having approximate size of 89.7 KDa on 12% SDS-PAGE gel. The enzyme was characterized in terms of pH and optimum temperature, when two ranges of optimum pH, pH 7.0 and 10.0, and an optimum temperature of 40 °C were observed. By means of the kinetic parameters were observe better enzymatic activity at basic pH, but better affinity ($K_m$) for the pNPG substrate at neutral pH. Furthermore, at neutral pH the β-G 72-26 showed better catalytic efficiency ($K_{cat} / K_m$). The results of circular dichroism showed that the secondary structure of the enzyme is pH-dependent, with different percentages of alpha helix structures and beta sheets, being more structured at pH 10.0. In the results of thermostability were detected the denaturation of β-G 72-26 in both pHs, less in acid pH (4.0). As a structural analysis, the β-glucosidase in the study was aligned with structured sequences of PDB (Protein Data Bank) for analyzes of conserved domains and catalytic sites, when the presence of 3 domains was verified: (1) (α / β) 8-barrel (TIM barrel), (2) (α / β) 6 sheet (β-sandwich) and (3) Fibronectin III, with function not yet known. The conserved catalytic sites were Asp233 and Glu417. By means of the results obtained β-G 72-26 is a candidate for industrial applications, besides contributing to the characterization of a new β-Glucosidase GH3, which belongs to an endemic termite in the Brazilian Cerrado.

**Keywords:** β-glucosidase, metagenome, termite, *Syntermes wheeleri*

**Development Agency:** Fundação de Apoio a Pesquisa do Distrito Federal (FAPDF)