Studies of the Expansin and Glycosyl hydrolase domains of Cellulase from *Xanthomonas campestris*

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Global demand for energy has grown with the development of new industries what requires constant improvement and search for new sources of energy. Now a day, the growing awareness of the population about the need for renewable energy had opened an optimistic expectation for the use of biomass as energy source (Kumar, *et al*, 2008).

A variety of microorganisms like bacteria and fungi produce enzymes that can be used to depolymerization of cellulosic biomass into glucose monomers. It is known that microorganisms annually hydrolyze 10^{11} tonnes of biomass, especially the cell wall, which contains the energy equivalent of 640 billion barrels of oil (Geeertt Ragauskas, *et al*., 2006). The efficiency of recycling carbon by microbes reflects the complexity of the natural recycling system that has evolved to degrade cell walls of plants. The understanding of the molecular mechanisms that allow the biodegradation of lignocelluloses and the development of potential cellulolytic bioprocessing can be effectively increased through the use of molecular biology, biophysical and structural techniques such as: the recombinant DNA technology, circular dichroism of proteins, small angle X-ray scattering and protein crystallization (Kumar, *et al*, 2008).

Within this context, we study one cellulase (NP_638881.1) from *Xanthomonas campestris* organism. This protein is a natural hybrid with two domains (a glicosylhidrolase domain and an expansin domain) which seem to have complementary functions. It is believed that expansins help in the degradation of crystalline cellulose by participating in substrate binding, followed by formation of enzyme complexes or possibly attaching to cell surface.

Thus, our main objective in this study is to understand how these two domains act together in the process of recycling and degradation of the biomass, aiming

to apply this knowledge to create efficient enzymatic cocktails to be used in the process of depolymerization of lignocellulosic material.

[1] Geeertt Ragauskas AJ, Williams CK, Davison BH, Britovsek G, Cairney J, Eckert CA, Frederick WJ Jr, Hallett JP, Leak DJ, Liotta CL et al. The path forward for biofuels and biomaterials. Science 2006, 311: 484-489.

[2] Kumar, R., S. Singh, et al. (2008). "Bioconversion of lignocellulosic biomass: biochemical and molecular perspectives." J Ind Microbiol Biotechnol 35(5): 377-91.