Università degli Studi di Napoli Federico II

PhD in Biotechnology - 39th cycle

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Discovery and characterization of carbohydrate-active enzymes from hyper(thermophilic) microorganism for biotransformations

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The climate on Earth has been changing; one of the causes is global warming inflicted by greenhouse gases emissions that are strictly connected to fossil energy production and utilization (1). For this reason, it is important to focus on reducing the impact on natural resources by promoting the use of renewable resources for energy and product development. Among the feedstocks, the lignocellulose biomass (LCB) is the most widely used. Monomeric sugars obtained from LCB can lead to the achievement of high value-added products and fuels, etc. Due to the recalcitrant nature of this biomass, to obtain monosaccharides three major steps are needed: pretreatment, saccharification, and fermentation. The key point is the saccharification: this process takes place to break down the feedstocks into fermentable sugars (2). The current approach is the employ of enzymes with different activities in suitable enzyme cocktails; these cocktails are formed by various enzymes that we can find in the carbohydrate active enzymes database (CAZy). The largest and best-studied class of carbohydrate active enzymes are Glycoside Hydrolases; this one is the 50% of the entire database but only the 0.50% it's been characterized (3). To make the bioconversion of LCB more feasible, it is necessary to develop enzymes with higher catalytic efficiencies, thermal stability, and lower end-product inhibition. For those reasons, enzyme from extremophilic organisms could be the best alternatives (4). The specific target of my PhD project is to discover new extremophilic GHs for the degradation of agro wastes.

References

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