EXPLOITABLE FOREGROUND

Novel hemicellulases derived from *Myceliophthora thermophila* C1 for the degradation and modification of plant materials

Explanation and Purpose

Five novel hemicellulases have been found and produced in *Myceliophthora thermophila* C1. These hemicellulases include two different xylanases, one arabinofuranosidase and two acetyl xylan esterases, which are involved in the degradation of the hemicellulosic structure (arabino)xylan. Xylans are found in all plant materials and occur in high amounts in crops that are in use for the production of biofuels (up to 25%). These enzymes degrade the hemicellulose and therewith improve the complete enzymatic hydrolysis of feedstocks. Besides the production of biofuels, such enzymes are also used in other industries, such as the food/feed or the pulp & paper industry.

Exploitation Strategy

DNL has produced the enzymes so far in a low cellulase background strain of C1, which allows their direct use as a monocomponent. This will be mainly interesting for food/feed or pulp & paper applications. For the use in biofuels applications, the enzymes are needed in combination with cellulases. The monocomponent enzymes have been used as a tool to develop improved enzyme cocktails by spiking cellulase mixtures with them which allows selection of the most promising ones (Figure). DNL has planned to produce these monocomponent enzymes in a dedicated strain that produces a biofuels enzyme mixture.

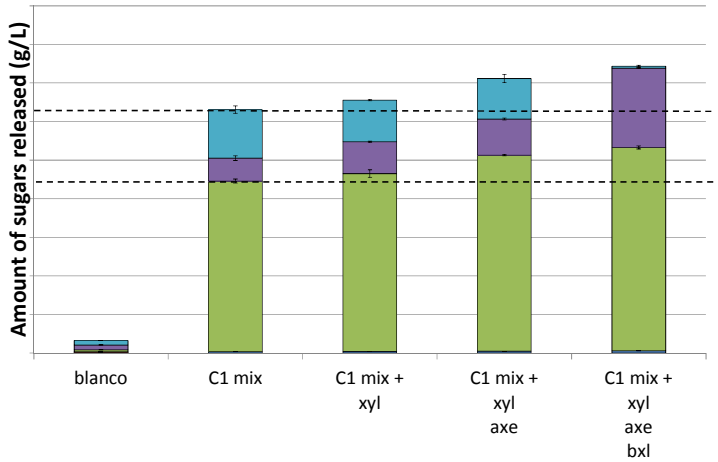

Figure: Mono- and oligosaccharides released from pretreated *Arundo donax* with a C1 cellulase mixture (C1 mix) combined with monocomponent xylanase (xyl), acetyl xylan esterase (axe) and β-xylosidase (bxl). Green bar = glucose, purple bar = xylose and blue bar = xylobiose.

Further Research

These and other enzymes will be characterized first and tested for their performance in biofuels applications. They will be tested alone or in combination with existing biofuels enzyme mixtures. In particular other C1 xylanases and/or accessory enzymes (like arabinofuranosidases) have our interest. Based on these tests a decision will be made which of the xylanases or accessory enzymes from the total pool of C1 enzymes will be selected in our strain improvement program.

Novel Microbes and Enzymes for 2nd Generation Bioethanol Production

NEMO for bioethanol

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SEVENTH FRAMEWORK PROGRAMME

NEMO is co-funded by the European Commission in the 7th Framework Programme (Project No. FP7-222699)