EuroSciCon

EuroSciCon conference on

Protein, Proteomics and Computational Biology

December 06-07, 2018
Amsterdam, Netherlands

Biochem Mol biol J Volume:4
DOI: 10.21767/2471-8084-C5-021

SYNERGISTIC ACTION OF *ASPERGILLUS FUMIGATUS* CELLULASES AND ITS APPLICATION IN ANIMAL FEEDING

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Aspergillus fumigatus, saprophytic filamentous fungi, is well known for producing potential and stable enzymes and one of the major sources of cellulases. The bottleneck of this research is to identify, quantify and compare the secretome of *A. fumigatus* that uses corn, wheat or soybean cell wall cellulose as the sole carbon source, to investigate the transcriptional modulation, proteomic expression and to find the possible enzyme combination for efficient degradation. The activity of enzyme produced by *A. fumigatus* has better pH and thermo-stability showing dependency on carbon source used and the incubation time. This result suggests that *A. fumigatus* acts on different carbon source to produce different cellulolytic enzymes depending upon pH and temperature condition which somehow can relate with the enzyme produced by this strain that acts according to the gastrointestinal pH and temperature. Similarly, ~550 extracellular proteins (~85 proteins involved in cellulolysis) were iTRAQ-quantified in presence of all three carbon sources and mRNA expression results suggested that the expressions and regulations of cellulolytic proteins were dependent on both nature and complexity of cellulose, thus suggesting that different enzyme system and combination is required for degrading different carbon source used as forage for efficient cellulose degradation. Furthermore, strong synergism of endoglucanase, xylanase, pectolyase and β-glucosidase was observed for corn, wheat and soybean seed. The overall study revealed the potential of *A. fumigatus* to induce substrate specific cellulases and the mechanism on how they modulate their cellulolytic properties. The study has built up a system for improving hydrolytic performance of animal feed by reflecting combination of enzymes. In addition, this study has provided a better understanding on how *A. fumigatus* modulate its expression level to utilize various complex carbon sources to release glycosidases, cellulase, hemicellulase, mannosidase and so on.

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