Cloning of a GH5 endoglucanase from genus Penicillium and its binding to different lignins

The cel5C gene, coding for an endoglucanase (Cel5C) of Penicillium brasiliánum was cloned and heterologously expressed in Aspergillus oryzae. This is only the second GH5 EG from the genus penicillium reported in the CAZy database. The promoter region of the gene has putative binding sites for both the carbon catabolite repressor CreA and the activator XinR. The pH optimum of Cel5C was found to be 4.0 and the temperature optimum was 70°C. At a typical temperature for lignocellulose hydrolysis Cel5C retained full residual activity after 20 h of incubation at pH 5.0 and 6.0. Adsorption to Avicel and steam pretreated spruce was found to follow the Langmuir isotherm, and the maximum adsorption was similar for both substrates, 40 and 49 mg/g, respectively. The affinity for Avicel was 10 times higher than for steam pretreated spruce. 0.040 and 0.0035 L/mg, respectively. Non-productive binding of cellulolytic enzymes to lignin is an important obstacle to overcome for commercial biomass to ethanol production. Therefore, the adsorption on residual lignin produced from various biomass samples was investigated. Both Substrate and pretreatment conditions resulted in different adsorptions of Cel5C to the residual lignin.