ENGINEERING *Saccharomyces cerevisiae* FOR CELLULOSE DEGRADATION

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Current production of biofuels from lignocellulose requires the addition of enzymes for conversion of the lignocellulosic substrate to monomeric sugars; these enzymes are estimated to constitute at least 25% of the total production cost. For cellulosic biofuels to compete with conventional transportation fuels, the enzyme costs must be reduced. Producing the required enzymes during the fermentation offers the possibility of reducing the amount of enzyme that needs to be loaded from an externally produced source and increasing the overall rate and yield of the conversion process.

Two significant barriers to achieve this Consolidated Bioprocessing (CBP) using the ethanologen *Saccharomyces cerevisiae* are high level production and secretion of active cellobiohydrolases (CBHs), and the creation of a robust xylose-utilizing strain. Mascoma Corporation has generated a robust xylose-utilizing platform strain through a combination of targeted genetic engineering and strain evolution. High activity CBH enzymes capable of being secreted at high levels (up to 10% of total cell protein) have been developed and engineered into Mascoma's platform strain in addition to several other cellulase system components. The CBP strains are capable of direct fermentation of cellulosic substrates to ethanol, as well as dramatically reducing the requirements for purchased enzyme.