# Characterization of an extracellular thermoacidophilic xylanase from *Alicyclobacillus acidocaldarius*

Hemicellulose makes up 20-30% of lignocellulosic plant biomass and is the second most abundant polysaccharide in nature. As such hemicellulose represents a large potential renewable reservoir of sugars that could be converted into useful fuels and chemicals. Many pretreatment techniques have been developed that allow almost complete conversion of hemicellulose into its component sugars; however, the harsh conditions required by these techniques often cause the formation of harmful byproducts that inhibit subsequent biologically-based conversions to fuels and chemicals. There is potential for the application of extremophilic hemicellulose-degrading enzymes to reduce the severity of pretreatments and reduce or eliminate these limitations. Of particular value would be heat and acid stable hemicellulase enzymes. Since the primary component of hemicelluloses in hardwoods and agricultural residues is xylan, we began our initial screening activities by examining the ability of a number of thermoacidophilic microorganisms to utilize xylan. One organism tested, *Alicyclobacillus acidocaldarius*, showed an extraordinary ability to utilize both soluble and insoluble xylan as its primary carbon source. We have isolated a xylan degrading enzyme from the supernatant of an *Alicyclobacillus acidocaldarius* culture grown on a soluble xylan source. This enzyme has activity at a pH of 3.5 and a temperature of 60°C. Studies were done to assess the stability, and optimum temperature and pH of this enzyme. The kinetics of the enzyme were also examined.