Chemical Synthesis of Hemicellulose Fragments

Hemicelluloses constitute a significant part of plant biomass, yet so far it has been difficult to make use of this class of polysaccharides. A lack of access to this class of molecules prevents the use of enzymatic studies to increase our understanding of the biochemical processes relevant to the synthesis and degradation of hemicellulose. In this thesis the synthesis of arabinoxylans as well as glucuronoxylans is demonstrated. At first, a reliable strategy to efficiently synthesize a variety of xylan backbones was established. Two strategies were tried. The first strategy was an attempt to use an unprotected xylose acceptor in a tin-mediated glycosylation. Since the best results of the optimization of this reaction were not good enough a second strategy was pursued. This second strategy is based on the preactivation of thioglycosides to be glycosylated with thioglycoside acceptors which in turn can be preactivated again in a second step. Optimization of this strategy lead to a viable pathway towards a variety of protected xylan backbones. The use of protecting groups allows for the specific introduction of branching units to the backbone. Subsequently arabinose as well as glucuronic acid were attached to the xylan backbone.