

MWP – Young Researcher Abstract 2023

Project title: Barking Up: Enzyme Exploration for Bark Residue Valorization	
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Abstract: Bark is a major by-product of forestry industries. Its major constituents are cellulose, hemicellulose, lignin, suberin and phenolic compounds (tannins), all of which have unique properties and diverse industrial applications. Since the primary biological function of bark is to provide strength and rigidity to the plant cell wall, these components are interconnected by extensive hydrogen bonds, covalent bonds, and other physical interactions, making their extraction a challenging task. Due to this, bark remains an underutilized resource, and is still primarily used for low-value applications such as mulching or fuel. Enzymatic extraction methods offer multiple advantages over chemical processes, such as high specificity and lower energy consumption. Currently, we are studying bark degradation using acidophilic fungal hydrolases (cellulases, esterases) from niche ecosystems. Our research focusses both on the biochemical and functional characterization of these enzymes, and on bioprocess development for enzymatically depolymerizing bark into sugars and fatty acids. The acidophilic nature of these enzymes is advantageous for resisting the inhibitory conditions created by the release of phenolics from bark during hydrolysis. The outcomes of this study hold significant appeal in terms of implementing more sustainable and resource-efficient approaches for the utilization of residual bark, thus benefitting both industry and the environment.	
Key words: Bark, biorefinery, cellulase, esterase, fatty acids	