

DISSOLVING PULP FROM NON-WOOD FEEDSTOCKS: AN ALTERNATIVE PATHWAY TOWARD OBTAINING ENGINEERED SUSTAINABLE FIBERS FOR TEXTILE APPLICATIONS

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ABSTRACT

This study evaluates non-wood fibers such as wheat straw, switchgrass, and hemp hurd as potential alternatives for producing dissolving pulp using sulfur-ethanol-water (SEW) pulping. The SEW process was optimized for wheat straw, and the optimum pulping conditions were 130°C, 4h, and 10% SO₂ concentration, resulting in a viscose-grade pulp with 93% α-cellulose, 2.0% hemicellulose, <0.1% lignin, and 0.2% ash content. The best pulping conditions for wheat straw were applied to switchgrass and hemp hurd. The results showed that both wheat straw and switchgrass had similar pulp quality, while hemp hurd had a higher hemicellulose content and lower viscosity. Dissolving pulp was used to obtain engineered fibers via low chemical and non-solvent spinning processes. This work suggests that non-wood feedstocks such as wheat straw and switchgrass can be promising alternatives for dissolving pulp and spun fiber production, which can help reduce the pressure on the textile industry to increase the use of natural fibers and mitigate the environmental impact of non-biodegradable synthetic fibers.

Keywords: Alternative Fibers, SEW, Dissolving Pulp, Fiber Spinning, Textiles, Sustainability.