Paper Trails: Using the Opuntia ficus-Indica to Make Paper Production More Sustainable

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With the effects of climate change, deserts continue to lose their desert crust, which increases the number and intensity of sand storms and creates other detrimental effects on the environment. Deforestation also contributes to climate change, and the paper industry harvests between 4 billion to 8 billion trees each year for paper production alone. This experiment identifies an alternative solution for paper production, specifically using the Opuntia ficus-indica cacti for paper production. It was hypothesized that by using cactus, we can reduce the number of resources that are required to make paper regarding water and chemicals used. Lignin is a natural polymer that keeps the structure of a plant stable and must be removed for paper production. To test the efficiency of paper production, pulp from sawdust and Opuntia ficus-indica cacti were tested. The Kraft Pulping System was replicated as closely as possible to determine the efficiency of cacti compared to wood. The average percent yield average for Opuntia ficus-indica pulp was 8% while the percent yield average for the sawdust pulp was 88%. Water extraction tests were then conducted to determine water quantity and to test how much water content could be extracted from cacti. Concluding, while the cactus is more energy efficient concerning the resources needed to grow and remove lignin, it had a smaller percent yield than wood. On the contrary, the wood uses lots of resources to grow and remove the lignin, but it had a significantly high percent yield compared to the cactus. In regards to the hypothesis, this particular experiment was unsupported concerning acquiring the same amount of cactus pulp as the wood pulp under the same conditions.

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