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# Introduction to Sorghum Paper Production

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# Introduction to Sorghum Paper Production

Zachary Christman

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## Abstract

Sorghum is a tall grass used for many commercial products such as fodder and syrup. The 10 to 15 feet stalk of the plant has lower lignin than wood and provides a fiber length of 2.31 mm in the outer covering and 1.38 mm for the leaf. Sorghum fiber makes a high quality, strong paper suitable for printing, packaging and paperboard.

## Overview

Sweet sorghum grows to 10 to 15 feet tall in temperate and tropical climates. The stem contains a high level of sugar, the plant is used for fodder, syrup, sugar and small scale ethanol. The waste fiber material is usually thrown away or burned for heating. However, this fiber material can be turned into a second commercial product by converting it into paper. The properties of natural fibers are largely dependent on processing method. The most common practice is pulping with alkali and elevated temperature.<sup>3</sup>

A tree is ready for harvest at different time periods dependent on the species. Trees used for commercial manufacturing are typically between 5 to 10 years old. There would be a significant economic advantage to fiber companies who can reduce the time needed to grow the necessary raw material. *Sorghum bicolor x S. bicolor var. sudanense* grows to full size within one year and can produce high levels of biomass in comparison with other sugar producing crops. The dry grass efficiency of sorghum was found to be between 1.4 to 1.54 tons per decare (1 daa = 1,000 square meters) as determined by a Turkish study. The fiber length of sorghum's outer covering (2.31 mm) and leaf (1.38 mm) makes them a viable non-wood alternative for pulp production.<sup>1</sup>



**Figure 1.** Sorghum straw<sup>2</sup>



**Figure 2.** Unbleached pulp<sup>2</sup>



**Figure 3.** Bleached pulp<sup>2</sup>

The advantage of using agricultural residue for paper production include: abundance, low cost, and short production time. Due to the lower lignin content compared to wood, agricultural residues require 30% less chemicals and less energy is required during the pulping process (Figures 1 through 3). Sorghum straw based paper has shown good mechanical strength. This material has the characteristics needed for printing, packaging and paperboard applications.<sup>2</sup>

## **Conclusion**

Sorghum is a good candidate for further research in paper product manufacturing. The long fiber lengths give sorghum properties similar to softwood trees. Since sorghum can be processed with alkali similar to wood, there would be little difficulty for currently operating paper mills to accept this fiber for industrial use.

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