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PAPER PRODUCTION TECHNOLOGY FROM CORN AND IT'S PROSPECTS AND BENEFITS

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Abstract
This article analyzes the technology for producing paper from corn (Zea mays L.), its environmental advantages, and economic prospects. Currently, the widespread use of wood in paper production is reducing forest resources and disrupting the ecological balance. Therefore, the use of fast-growing and regenerative plants as an alternative raw material has become a pressing issue.During the research, cellulose fibers were extracted from corn stalks through chemical treatment (using NaOH and H2O2) to produce high-quality, smooth, and environmentally friendly paper samples. The results showed that corn waste has great potential as a cheap, widespread, and renewable raw material. This technology serves to reduce tree felling, efficiently utilize waste, and ensure environmental sustainability. In the future, producing paper based on corn will be economically beneficial and environmentally friendly.

Keywords: Corn (Zea mays L.), cellulose, lignin, sodium hydroxide (NaOH), hydrogen peroxide (H2O2), renewable resources, biomass, waste.

Introduction

This article analyzes the technology for producing paper from corn (Zea mays L.), its environmental advantages, and economic prospects. Currently, the widespread use of wood in paper production is reducing forest resources and disrupting the ecological balance. Therefore, the use of fast-growing and regenerative plants as alternative raw materials has become a pressing issue.

During the research, cellulose fibers were extracted from corn stalks through chemical treatment (using NaOH and H2O2), resulting in high-quality, smooth, and environmentally friendly paper samples. The results showed that corn waste has great potential as a cheap, widespread, and renewable raw material. This technology serves to reduce tree felling, efficiently utilize waste, and ensure environmental sustainability. In the future, the production of paper based on corn can develop as an economically viable and environmentally friendly innovative direction.

Technology, prospects, and benefits of paper production from corn stalks. Technological process

The corn stalks are collected and cleaned of unnecessary debris. The cleaned and collected stems are crushed using a grinding machine. The grinding machine is set to the maximum level; the finer the product is in the form of a dough, the better the quality and smoothness of the paper.

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The crushed mass is sent to the boiler. NaOH (sodium hydroxide) is added to the dough for better crushing. This process primarily provides better fiber separation and dissolves lignin and hemicellulose. Then the fibers are washed and treated with hydrogen peroxide (H2O2) for bleaching. Sometimes starch, calcium carbonate, or other fillers are added to improve the strength and quality of the paper.

After chemical processing, the fibers are mixed with water to form a homogeneous mass (pulp). During the pulp cleaning process, small debris and non-melted parts are filtered out. That is, it is precisely at this time that the mass must be filtered. The mass that has passed through the filter must be placed in water. The finished mass is rolled out in a thin layer using special mesh machines. The bulk of the water is squeezed out, then the paper is pressed, dried, and brought to the desired thickness. After this process, white and thin paper will appear and be submitted for use.

Main materials used in the technology and their quantity

Corn stalks: 100 kg (70 kg remains after cleaning from debris)

Water: 1000–1500 liters (recycled in the process, using domestic water).

Sodium hydroxide (NaOH): 8–12 kg.

Hydrogen peroxide (H2O2): 6-8 liters.

Additives: 1–2 kg of starch, calcium citrate, dye, or strengthening agents.

Because it is a fast-growing, annual plant, it can be harvested every year, which prevents the tree from being cut down. This is considered very beneficial from an environmental perspective. That is, there is no need to wait for years to obtain raw materials, ready-made raw materials will be obtained in a year. Agricultural waste is used. This part of the corn cannot be used as livestock feed, so removing this part will help reduce waste. This is an environmentally friendly and renewable resource. Using such waste, it is possible not only to preserve the environment but also to use paper that rots completely in 180 days. That is, it leaves no trace in nature.The raw material is inexpensive and widespread. In addition to Uzbekistan, it will not be a problem to find it in other parts of the world. This plant is, of course, Zea mays. In terms of price, it is much cheaper than trees and semi-shrubs.

Obtaining in laboratory conditions; First, the corn is harvested, cleaned of trash, and crushed with ordinary kitchen scissors. The crushed mass is sent to a boiler and boiled for 4-5 hours. Before boiling, NaOH (from laboratory sodium hydroxide) is added.

The boiled product is passed through a special drain and placed in water. At the end of the work, the mass is passed through a special mesh. The product in the mesh is dehydrated and pressed into a press. After a few days, remove the paper from the press and it will be ready.

The more the product is crushed during the laboratory process, the higher quality paper is obtained. At the same time, paper made in laboratory conditions is relatively thicker, while in the industrial method, it has almost the same quality as ordinary paper.

Figure 1

Conclusion:

Based on my own research, I can say that: Corn is currently gaining great importance as an innovative resource due to its rapid growth process, environmental friendliness, and versatile use. This plant can be used in the paper, biofuel, textile, and many other industries. Its stem produces a high amount of cellulose, which makes it an effective raw material for paper production. Furthermore, corn is ecologically clean and is being studied as a renewable source. However, it has drawbacks, such as the need for land and chemicals, as well as the influence of climatic conditions on the quality of the harvest. At the same time, if the environmental aspects of corn cultivation and use are well controlled, it can become an important resource that contributes to economic and environmental sustainability.

The production of paper from corn stalks is one of the most promising directions from an environmental and economic point of view. This technology reduces the environmental problems caused by deforestation and provides additional benefits through the recycling of agricultural waste. The fact that thousands of sheets of paper can be obtained from 100 kg of corn stalks demonstrates its practical and economic utility. In the future, by improving this method, it will be possible to implement it at large production facilities.

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