MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Creative Problem Solving Report

ON

"Manufacturing of paper from banana peels"

By

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Under the guidance of

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DECLARATION

We hereby declare the project report-"*Manufacturing of paper from banana peel*" which is being submitted for "CPS Report of 7th semester in MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE,GWALIOR(MP) is our genuine work done under the guidance of **Prof. Anish P. Jacob** , Dept. of Chemical engineering , "MITS", Gwalior.

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Date : 21/11/23.

Place: Gwalior

Certificate

This is to certify that the above declaration made by the candidate is correct to the best of my knowledge.
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PLAGIARISM CERTIFICATE

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Abstract :-

Paper made from banana peels, when compared to normal paper, this paper shows better tensile strength, stiff nature, and renewable nature. These characteristics result from the cellulose, hemicellulose, and lignin that make up the cellular makeup of banana fiber. The process of creating pulp involved alkalizing a 4% NaOH solution in the ratio 6:1 to the bulk peels. The process takes 1.5 hours at 1000 degree celcius. It is then filtered and cleansed using water which is distilled after cooking. The 10% H2O2 bleaching procedure. It was discovered that Banana peel paper is found to have conventional bamboo based paper. In accordance to the research, the parchments in banana peel paper allow for a higher fiber content. It is observed to be 300 times stronger than bamboo paper and contains higher cellulose and lesser lignin. Experiments revealed that the texture of the product was influenced by the quantity of Banana peel used, the amount of water used, and the length of time the peel was boiled and blended . The more banana peel used, the more banana paper was produced, and the longer the peel was boiled, the finer the banana paper. Despite it's ancient origins, paper is one of the most widely used materials in contempary society. Paper is employed in a variety of home, workplace, and industrial settings. Vegetable fibers and cellulosed pulp, which are used in it's production, have a long history of negative environmental effects. In order to make better use of natural available things and have a liitle less of an impact in the environment, this paper analyses the process of preparing paper from the peels. Additionally, Ecuador, a country in Latin America with a high production of Bananas, offers easily accessible and resistant natural fiber. The findings demonstrate that Banana fiber can be used to make paper, because Banana paper is less expensive to dispose of and less agro waste ends up in landslides and water bodies, it lessens pollution. Since, the bamboo paper industry is the major consumers of energy sector the production from Banana peels requires less energy than that of traditional paper.

Keywords- Paper, Banana peel, Pseudostem,circular economy.

Chapter-1: Introduction

Paper is manufactured when Peels from bananas are chopped , boiled , blended , the paper is shaped , and then dried during the production process. Peeling the Bananas was the first step in chopping the peels. It was sliced, then submerged in water and brought to a boil. It was boiled and then put through a blender to be crushed and blended. The outer shell, or peel, of a banana is it's fruit. It is a byproduct of processing bananas and domestic use . The need for paper has been rising annually due to advancements in science and education. The banana or Musa paradisiaca Linn, is a tropical fruit that grows widely in Indonesia. It is one of the helpful commodities that can be harvested all year round, grows quickly, and is simple to cultivate. The flesh of the banana fruit is the part that is most commonly used, the skin is only used as organic fertilizer and animal feed. It suggests that the waste from banana peels has not yet reached it's full potential. The lignin found in Banana peels needs to be hydrolized and separated via a delignification procedure in order to produce pulp. Banana peels or other fine materials with short fibers can be used to make pulp using the alkalization process. NaOH cooking solutions are widely used because they are cost effective . sodium hydroxide is the alkali that is strong . The purpose of adding NaOH solution during the paper making process is dissolve lignin during the pulping stage. Additionally , it expedites the extraction and separation of fibers.

Figure-1

Image Source- Banana Peels

1.1- Scope

The project's goal is to turn leftover banana peels into 100% environmentally friendly biodegradable paper. Bamboo Paper was once produced from the cellulose in, many centuries ago. Wood pulp can be used to make paper more easily than cellulose from cotton and linen, but the polymer chains in wood pulp are not as strong as those in plants. Cellulose can make up as much as 15% of Banana peels, because banana peels are more frequently found in household waste than normal fibers, found in peels to make bamboo paper will have a significant positive environmental impact. This is fundamental notion of "Musa Papyrus." The process is not too complicated and doesn't call for a lot of expensive equipment.

Observation

The desired paper color will determine how much the peel dries. Excessive drying and sun exposure cause a dark brown color. Next, chop the peel into pieces and boil it. The fiber's pores close after drying, making it resistant to swelling upon rewetting. The peel needs to be blended with water after boiling in order to form a mesh. The mesh needs to be evenly spread out to cloth to dry. Banana peels can be used to create cardboard-like sheets that are thicker than paper and are used for cover

1.3- Why Banana?

Almost all Banana plants contains cellulose, which is utilized as the material for pulp production. Cellulose comes in the form of fiber and is the raw material used to make pulp. The banana is the plant with a high cellulose content. It is one of the helpful commodities that can be harvested all year round, grows quickly, and is simple to cultivate. The fruit's flesh is the portion of bananas that is most commonly used; the skin is only utilized for organic fertilizer and animal feed. It suggests that waste from banana peels has not yet been optimized. Paper has higher stiffness, higher disposability, higher renewability, and higher tensile strength in comparance to normal paper. In comparance to wood products with higher cellulose , hemicellulose , and lignin content, peel waste has a higher concentration of fine fibers, according to data from the institute for research and development of cellulose industries. On the other hand, the popular softwood used to produce the traditional raw material for paper only has a lignin (27.8%), hemicellulose (24%) and cellulose (41%). In order to lessen the reliance on wood as the raw material for wrapping paper, peels will be utilized as a raw material in producing paper.

Chapter-2: Procedure

1. Finely chop the Banana peels into tiny pieces.

2. Making Pulp a 4% NaOH solution was used in a ratio of 6:1 to the peel mass to create the pulp. For 1.5 hours, the cooking done at 1000 degree celcius. It must be filtered and washed with distilled water after cooking, the bleaching procedure with 3% of H2O2.

3. The peel needs to be blended with water to form a mesh after it has been boiled. The pulp then needs to be evenly distributed on fabric to dry.

Fig- 2

Fig- 3

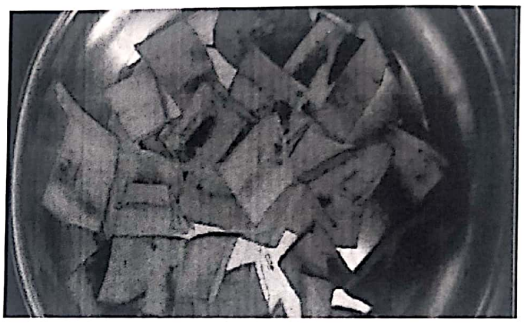


Fig- 4

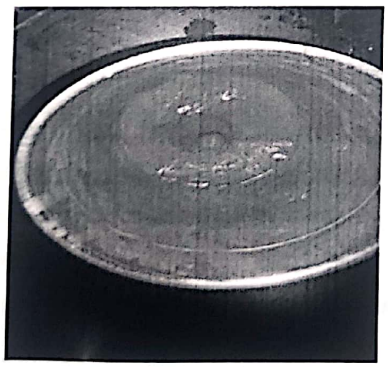
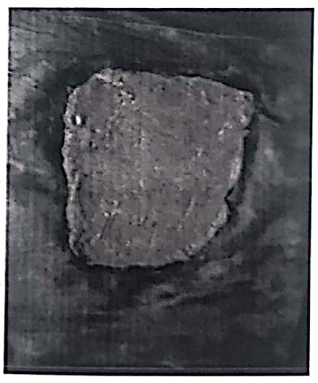


Fig- 5



2.1- Results & Discussions

Banana is cultivated in all over the india throughout the year, and it produces a lot of waste. Banana fruits and banana leaves are mostly used in all other parts of banana plants are treated as waste. These waste contains pseudo stem of banana which contains higher cellulose content. These products have a commercial value and there are not utilized yet. Wrapping paper, sanitary pads as well as fibre as raw material can be made from these waste. Farmers literally had to pay to dump these waste from their land. If they will set up these banana fibre industry, it will be a source of income for them. Due to higher cellulose content , water observing capacity is increased and it can be used for sanitary pads and pads made from banana fibres can be degraded from in 200 days. Paper made from banana peels is totally eco-friendly because it does not create any pollution and any harm to environment. The orthodox method of making paper uses processes such as craft process which use sodium sulphide which is a pollutant . Thus, it degrades the environment .

2.2- Conclusion

Being the world's top banana producer, India produces enormous amounts of biomass waste annually. However, by properly using, recycling, and managing the waste, it can be used in more ways. This could help small-scale businesses, innovators, farmers, and entrepreneurs by creating jobs and source of income through the production of commercial goods. Future prospects for soil and environmental health are also brightened by banana waste because it generates eco-friendly products (eco-papers, bags, fibers, ropes, etc.) that ultimately lessen pollution in the environment. The natural paper made from leftover banana peels and enhanced with essential oil satisfies requirements for basic paper for laminated plastic wrapping paper. Fruit can be eaten raw or cooked after the peel is removed, and the peel is usually thrown away. An enormous amount of organic waste is produced as a result of this banana peels.

Sometimes, on small land areas where bananas are produced, peels are fed to cattels and other animals. Concerns have been raised regarding how the peels' tannins may affect animals that eat them. Banana peels that have been dried have 20–30% fiber and 6-9% protein. Forty percent starch present in plantain peels gets converted into sugars during ripening process. peels have up to 30 percent free sugars, while peels have much less starch (about 15%) than green plantain peels. Banana peels also have a low lignin content (5–10%), which facilitates the cellulose separation process. In order to lessen the reliance on wood as the raw material for wrapping paper, peels will be utilized as a raw material in producing of paper.

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