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Production of Cost-Effective Biodegradable Straw

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Abstract: ***Every year 15,342 tons of plastic waste have been produced. Among these plastic wastes, the big junk of the waste is plastic straws which are used for just a few minutes and thrown away. To prevent the plastic pollution, we need to create proper awareness. In order to avoid the pollution by plastic straws, we planned to produce a Biodegradable straw which is chemical free and an eco-friendly product. The plastic straws are harmful to human health. Our Present study focuses to produce a Biodegradable straw using eco-friendly ingredients like banana peel, cinnamon, corn starch, honey, thyme leaves and vinegar. To replace these plastic straws the bioplastic film was naturally prepared from banana peel with some chemical free ingredients. According to the study of bioplastic, banana peel has the ability to produce bioplastic film which is best alternative of plastic use. Also, vinegar can degrade the starch. And study about cinnamon shows that cinnamon can prolong the shelf life of the bioplastic film and it banishes the smell of vinegar. The flexibility of the bioplastic film can be attained by the thyme leaves in addition it also has an antifungal property. Honey acts as a plasticizer to make the material softer and more flexible and also it has antimicrobial activity. An application of heat brings polymerization from these mixtures. Thus, the bio plastic replaces the petroleum-based plastic with something made from food waste or agricultural by-products.***

Keywords: Biodegradable, Biostraw, Bioplastic, Antifungal

I. INTRODUCTION

Humans are facing environmental pollution in their day-to-day life. Many factors are involved in this, among this plastic plays a major role. Due to its cheap price, durability and easy handling plastic production has been increasing. These plastics will breakdown into micro particles and release harmful chemicals into the landfill, and water source that are unfavorable to their eco system. Some of these plastics often end up into the ocean, which are even considered as food by marine animals and ingested. The toxins released from the plastics have the chance to enter into the food chain and affects human health. To overcome this, bioplastics are prepared from renewable resources such as agricultural byproducts, vegetable fats and oils, corn starch, straw, food waste etc. Bioplastics are classified into three types. 1. Cellulose based bioplastic, 2. Starch based bioplastic and 3.Protein based bioplastic. Bioplastics are degradable that makes them easily decomposed by the microorganisms present in the landfills or where ever they are disposed. The bioplastic which are composed of natural ingredients can act as fertilizer and helps in the growth of plants. Bioplastics does not need high energy manufacturing process as compared to the petroleum-based plastic. So this type of bioplastic shows as a better choice to minimize the environmental pollution and to replace the plastics. They are chemical free that makes them nontoxic, even if they are accidently consumed by the animals. Thus the bioplastic has a booming and emerging advantage in the future era.

II. FIELD SURVEY

S.NO	NAME	AGE	PLACE	OCCUPATION
1.	K.B.Anitha lakshmi	25	Avaniyapuram	Home maker
2.	K.R.Karthick	28	Avaniyapuram	Marketing
3.	S.Dharsiya	18	Avaniyapuram	Student
4.	R.Nawinall	30	Avaniyapuram	Registrar
5.	K.O. Dinesh	32	Avaniyapuram	Weaver
6.	Balachandar G.K	40	Avaniyapuram	Real estate
7.	Aruna.G	38	Avaniyapuram	Home maker
8.	Sandra sabu.S	45	Avaniyapuram	Weaver
9.	Madasamy.D	56	Avaniyapuram	Farmer
10.	Palani velammal.c	43	Avaniyapuram	Teacher

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III. MATERIAL AND METHODS

Banana peel, Thyme leaves, Cinnamon, Honey, cornstarch and Vinegar were collected. A paste was made by blending the banana peels and mixing other ingredients. This mixture was squeezed to form bio plastic film which makes the bio straw.

S.No	Materials	Amount
1.	Banana peel	2-3
2.	Water	250ml
3.	Cinnamon	1g
4.	Honey	5ml
5.	Thyme	1 g
6.	Vinegar	10ml
7.	Corn starch	5g

IV. METHODS

A. Preparation Of Banana Peel Paste

Take 2-3 Banana peels and cut the banana peels into small pieces. Put the banana peel and 250 ml water together in the mixy jar and blend. Boil the obtained paste after blending. Filter it and remove the excess water from the paste.



Fig 1: Blending of banana peel and water.



Fig 2: After boiling of banana peel and water



Fig 3: Filtered and dry residue of banana peel paste

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B. Preparation of Bioplastic Film

Place it in a bowl add cinnamon, Thyme, Honey and vinegar into the paste and mix it well. Squeeze the mixture between the baking parchment paper.



Fig 4: cinnamon and Thyme leaves

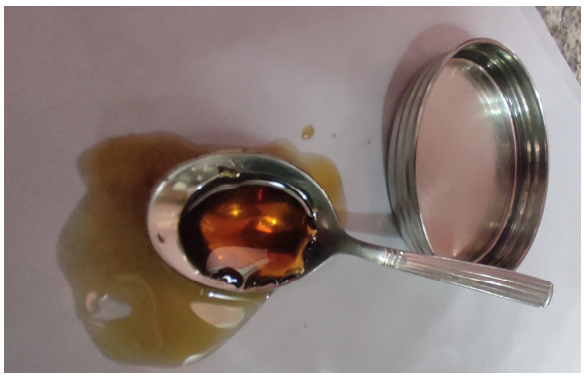


Fig 5: Honey and Vinegar



Fig 6: Mixture squeezed between baking paper

C. Preparation Of Cornstarch Glue

Mix corn starch and water in a pan . Heat and stir gently upto the formation of sticky consistency.

V. PROCEDURE

Allow it to dry for two days and the bioplastic is prepared. The bioplastic flim is removed from the parchement paper. Then the bioplastic flim is rolled to form biostraws with the help of chopstick using corn starch.

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VI. RESULTS AND DISCUSSION

We have produced the biodegradable straw and tested the straw against the different beverages. It is resistant to water when dipped in the beverages like fruit juice, shake, soda and water. This biodegradable straw doesn't make any harm to human health while drinking and this straw is made of natural ingredients and waste banana peel so it can be degraded easily after use.



Fig 7: Bio straw

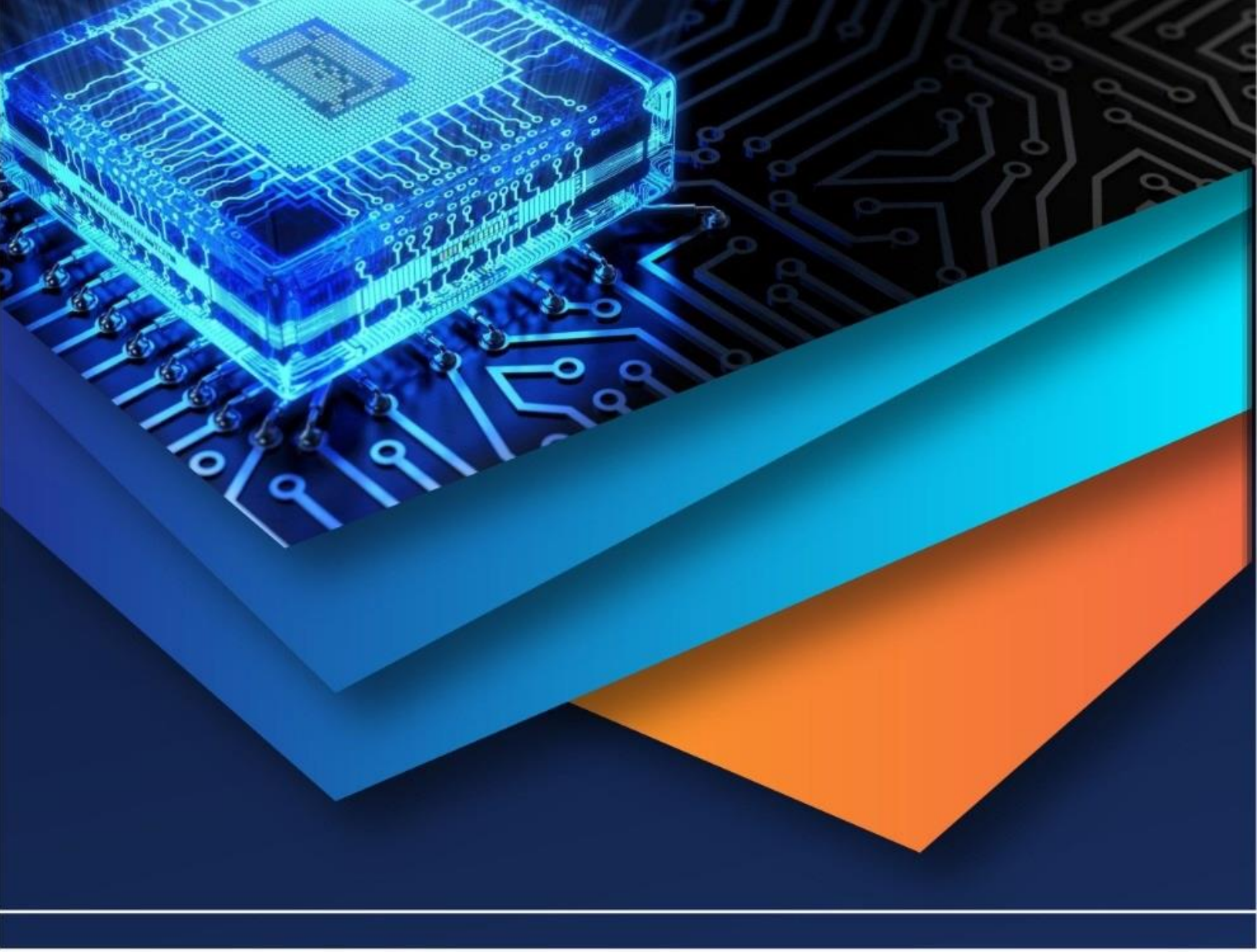


Fig 8: Juice served using bio straw

VII. CONCLUSION AND FUTURE WORK

A low-cost biodegradable straw was prepared to distribute to the local shops. The plastic straws are now used particularly ending up in the ocean and waterways. So, this biodegradable straw can reduce the ocean trash, microplastics at sea and on land. The biodegradable straw can be easily decomposed by the microorganisms present in the land and water. so we are planning to insist people to use biodegradable straw and thereby creating the awareness about the plastic pollution.

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