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Areca Bark Pulp for Hygienic Food Packing

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Abstract: ***The growing demand for increased fresh food shelf life as well as the need of protection against food borne disease urged the development of antimicrobial food packaging. Food is one of the basic needs of the human being. It is required for the normal functioning of the body parts and for a healthy growth. Consumer interest in ready-to-eat (RTE) snack and ready-to-serve (RTS) food is growing due to their convenience, value, attractive appearance, taste and texture. Most of the foods packed in plastic material. But longer use of plastic coated material is slow poison for human health. So the aim of this project to highlights the migration of chemicals from plastic material to food and its side effects on human health. The project is to prepare packing materials for hygienic food by using areca bark. Areca bark, Turmeric powder, Aloe Vera gel and Gum Arabic are used to prepare the packing material for primary foods. This package is used as a primary packaging for foods.***

I. INTRODUCTION

To pack the fragile material plastics, corrugated board and recycled paper pulp is being used extensively. This results into environmental degradation as if finds its way into landfills. Especially the plastics based materials as they are not biodegradable results into a big environmental hazards.

Therefore in the present work the naturally occurring biodegradable areca bark pulp has been prepared with suitable binders and fungicides. This pulp is proposed to be used to make casts for fragile products. Recently these forms of packaging were the only viable, cost effective solutions when the goods are out that are prone to damage during transit including glass bottles, toner cartridges and electronic items.

Unfortunately the most effective and commonly used packaging materials of polystyrene, pulp and polyethylene all have their drawbacks, especially as we move to a more environmentally conscious world with increased transportation and storage costs.

Thankfully the introduction of 100% recyclable inflatable packaging from Air Pack Systems not only overcomes all of the problems associated with these traditional packaging materials, but at the same time offers real and significant benefits that will not only reduce your breakages and returns but could also reduce the storage and shipping costs.

II. OBJECTIVES

The main objective of this project are first objective is to reduce the plastics materials. Second objective is to save the ozone layer. Third objective is to prevent from the fungi and bacteria formation. The last but not least is to use the 100% of natural barks for packaging materials without wastages

III. PREPARATION OF ARECA BARK PULP

Original areca bark is directly picked up from natural areca tree without any chemical or natural additive, using physical and mechanical method. The present study deals in using areca bark pulp for packing fragile products.

A. Base Pulp Preparation

Areca bark were collected from areca palm tree in garden. It is drenched for 12 hours. After draining the water it is shredded into small pieces. Then it is ground in grinding machine for 30 minutes. Now areca bark pulp is ready. The pulp is poured into pattern for required shape and is dried.

The formation of fungi was observed in the base pulp. It also resulted in very low water absorption thereby making it difficult to form the cast. To overcome this problem suitable naturally occurring antifungal agents and binders had to be incorporated. To enable this literatures were reviewed to select the following binding materials and antifungal agents.

1) Areca bark pulp with OrmocarpumSennoides and Acacia Resin.
2) Areca bark with Fenugreek and Turmeric.
3) Areca bark pulp with Aloe Vera.

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B. Composition of Components

Concentration	Method 1	Method 2	Method 3
Base pulp	200g	200g	200g
Binders	Gum Arabic (20g)	Fenugreek (10g)	Gum Arabic (20g)
Antifungal agent	Ormocarpumsennoides (40g)	-	Aloe Vera (100g)

1) Method1: Areca Bark with Ormocarpum Sennoides and Acacia Resin

Ormocarpum sennoides leaves are collected from the herbal plant in forest. The natural leaves are ground for 5 minutes in the grinding machines. Now the ormocarpumsennoides paste is ready.

Acacia resin have been collected from acacia trees. The collected acacia is drenched into water for 12 hours. After completion of 12 hours, the resin gel is ready.

The prepared areca pulp, acacia resin gel and ormocarpumsennoide spaste are to be taken in the ratio of 5:1:0.5. Then they are mixed well with the help of the grinding machine.

Now the required pulp is ready.

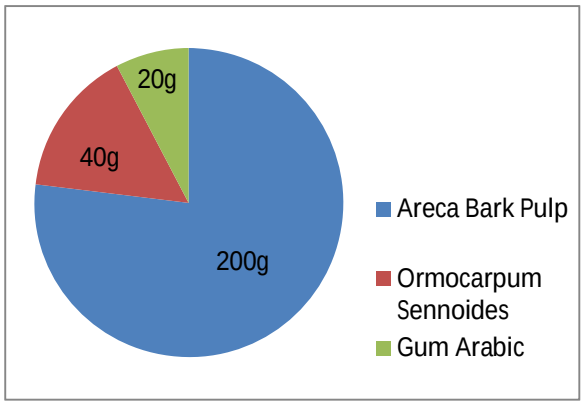
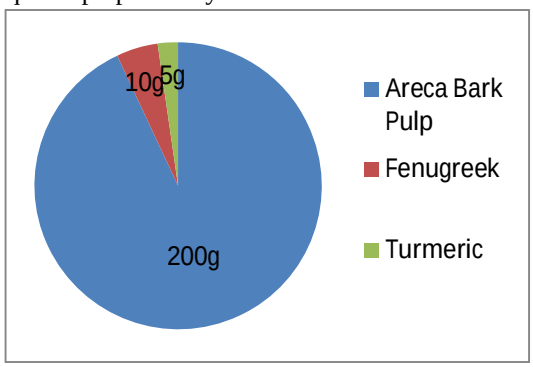


Chart : Combination of components (METHOD 1)

2) Method 2: Areca bark with fenugreek and turmeric

Fenugreek seeds are drenched for 1 hour. Then drenched fenugreek seeds are ground for 5 minutes by grinding machines. Now the fenugreek paste is ready.

The prepared base areca pulp, fenugreek seeds paste and turmeric powder are to be taken in the ratio of 7:2:0.5. They are mixed well through the grinding machine. Now the required pulp is ready.



Combination Of Components (Method 2)

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3) Method 3: Areca Bark with Aloe Vera

Aloe Vera leaves are collected from the garden. Clean the aloevera leaves. The leaves are covered with prickles on both sides. First that should be removed. After removing prickles from the aloevera leaves. The outer layer of aloe vera is to be removed from the bushy leaves.

We will get now, the fresh aloe vera gel. The required aloe vera gel grind for 5 minutes in the grinding machine.

Now the aloevera gel paste is ready.The prepared areca pulp, aloe veragel are to be taken in the ratio of 10:5. Then they are mixed well through the grinding machine.

Now the required pulp is ready.

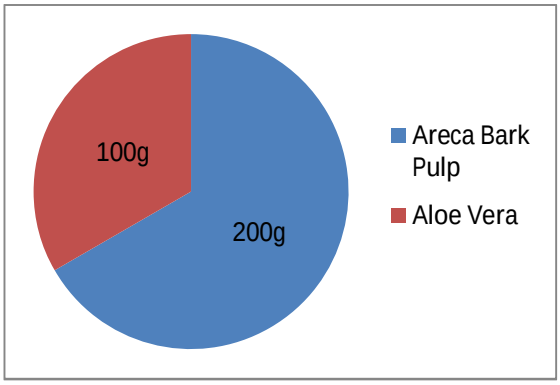


Chart : Combination of Components (Method 3)

IV. PATTERN PREPARATION

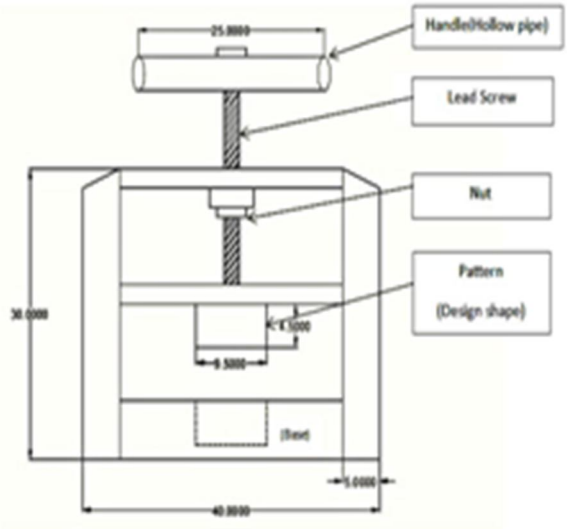
Prepare the pattern and pour the pulp to get the required shape. The pattern material is metal. The pattern is cup like structure. After pattern prepared, pour the pulp into pattern forecast.

The samples are test to be the following tests.

A. Compression test
B. Burst test
C. Drop test

According to ASTM standard, the samples are tested.

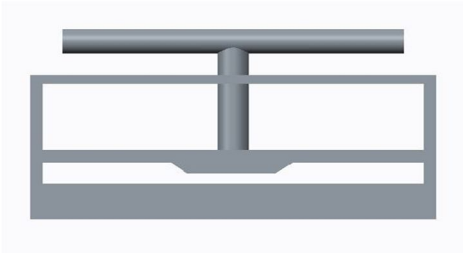
Design Diagram



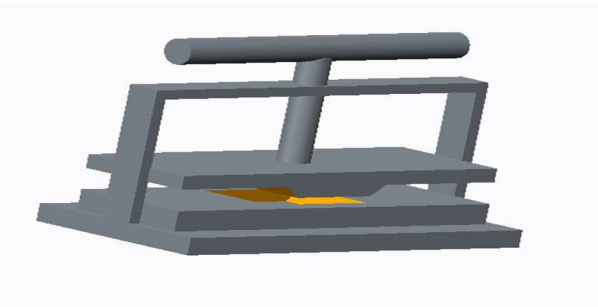
All dimension are in “cm”

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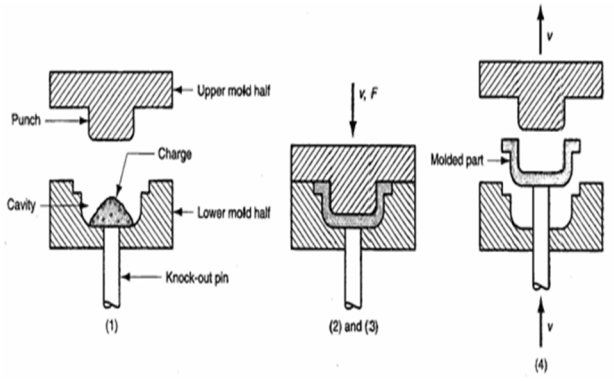
Front View of Compression Moulding



Side View of Compression Moulding

V. WORKING PRINCIPLE

Molding or moulding is the process of manufacturing by shaping liquid or pliable raw material using a rigid frame called a mold or matrix. This itself may have been made using a pattern or model of the final object. A mold or mould is a hollowed-out block that is filled with a liquid or pliable material such as plastic, glass, metal, or ceramic raw material. The liquid hardens or sets inside the mold, adopting its shape. A mold is the counterpart to a cast. The very common bi-valve molding process uses two molds, one for each half of the object. Articulated moulds have multiple pieces that come together to form the complete mold, and then disassemble to release the finished casting; they are expensive, but necessary when the casting shape has complex overhangs.Piece-molding uses a number of different molds, each creating a section of a complicated object. This is generally only used for larger and more valuable objects. A manufacturer who makes molds is called a mold maker. A release agent is typically used to make removal of the hardened/set substance from the mold easily. Typical uses for molded plastics include molded furniture, molded household goods, molded cases, and structural materials. Compression Moulding is a method of moulding in which the moulding material, generally preheated, is first placed in an open, heated mould cavity. The mould is closed with a top force or plug member, pressure is applied to force the material into contact with all mould areas, while heat and pressure are maintained until the moulding material has cured. The process employs thermosetting resins in a partially cured stage, either in the form of granules, putty-like masses, or preforms. Compression molding is a high-volume, high-pressure method suitable for molding complex, high-strength fiberglass reinforcements. Advanced composite thermoplastics can also be compression molded with unidirectional tapes, woven fabrics, randomly oriented fiber mat or chopped strand. The advantage of compression molding is its ability to mold large, fairly intricate parts. Also, it is one of the lowest cost molding methods compared with other methods such as transfer molding and injection molding; moreover it wastes relatively little material, giving it an advantage when working with expensive compounds.



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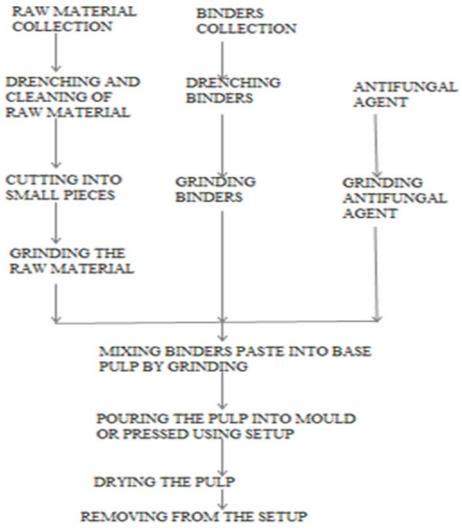
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The main goal of this project is to prepare the hygienic packing material using a natural source (areca bark).The areca bark is shredded, which gets soaked up in the water for a particular concerned time. The second areca bark further followed to the grinding process, which undergoes emulsion with the aloevera, arabic gum and turmeric powder. Then the obtained product is introduced into the setup. The desired shape pattern is choosen, and based on this structure the product can be obtained by manual pressing method. After this obtainment of pressure, the ejection is carried out and concerned pattern is under went for the drying process.

A. Components

1) *Lead Screw:* A lead screw is also known as a power screw or translation screw. It is a screw used as a linkage in a machine, to translate turning motion into linear motion. Because of the large area of sliding contact between their male and female members, screw threads have larger frictional energy losses compared to other linkages. A lead screw is sometimes used with a split nut also called half nut which allows the nut to be disengaged from the threads and moved axially, independently of the screw's rotation, when needed (such as in single-point threading on a manual lathe).
2) *L-Shape Channel:* Al Shape Channel is often a structural system that supports other components of a physical construction and/or L Shape channels that limits the construction's extent. A multi force member is defined as one with three or more forces acting on it, or one with two or more forces and one or more couples acting on it. L Shape channels are structures which are designed to support applied loads and are usually fixed in position.
3) *Nuts and Bolts:* A nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten multiple parts together. The two partners are kept together by a combination of their threads' friction (with slight elastic deformation), a slight stretching of the bolt, and compression of the parts to be held together. Bolt is a form of threaded fastener with an external male thread.
4) *Hollow Pipe (Handle):* A pipe is a tubular section or hollow cylinder, usually but not necessarily of circular cross-section, used mainly to convey substances which can flow liquids and gases (fluids), slurries, powders and masses of small solids.

VI. METHODOLOGY



VII. CONCLUSION

Food industry is one of the greatest packaging disposal producers and realizing bio gradable packages for food items is an important requirement of nowadays environmental problems.

Though the method is bio gradable, method comprising Areca Bark and Gum-Arabic has Tensile, Compression, Flexural and Burst Properties.

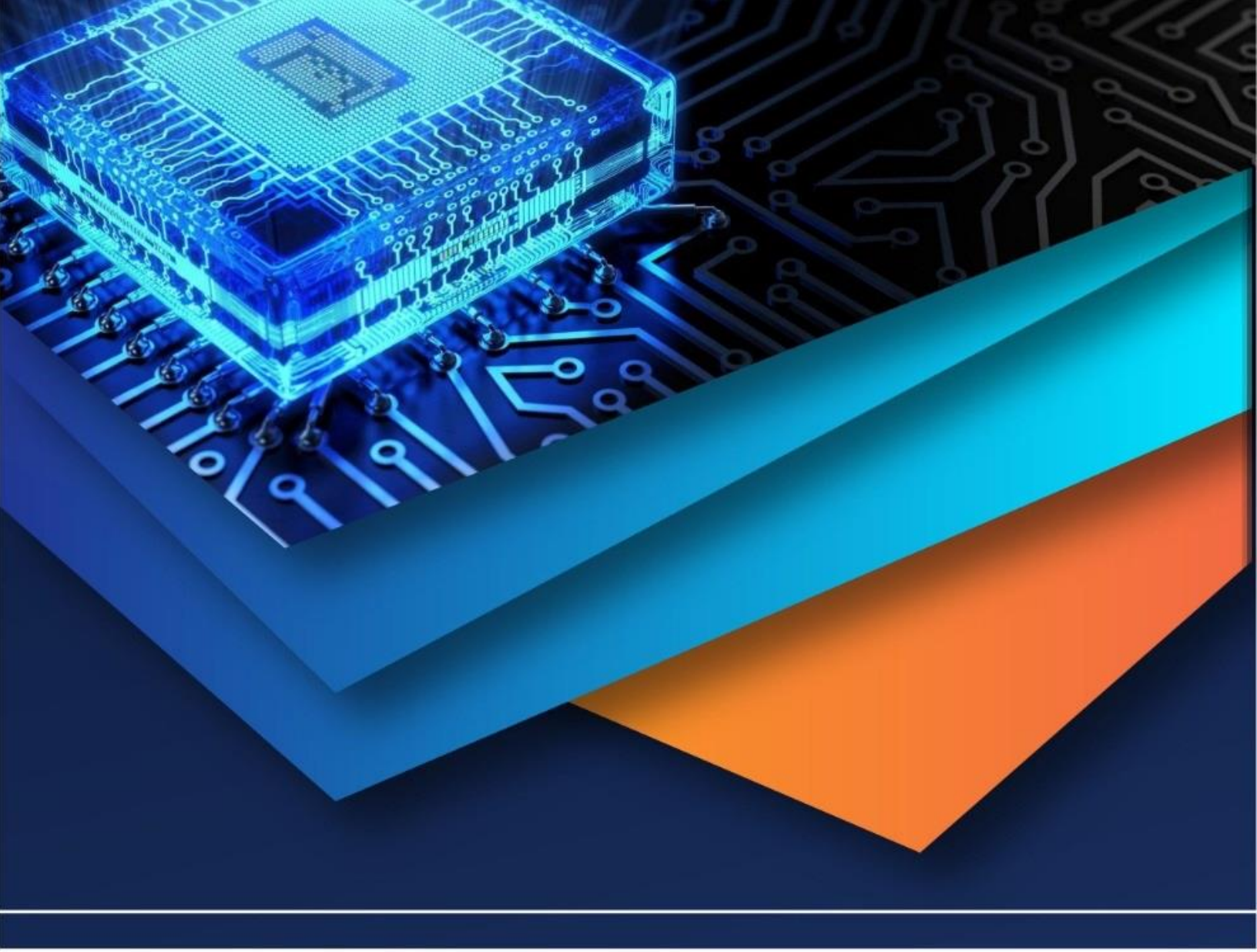
As these four mechanical properties are very important for packing materials, the Areca Bark Pulp of method could be used as one another material for packing of high value products. From original Areca bark converted into areca bark pulp by grinding. Then add ingredients with areca bark pulp and grind by grinding machine. Pour the pulp into mould for required shape. The sample is dried and ready for testing. The testing of the samples prepared are to be done. The tests are Tensile Test, Compression Test, Burst Test.

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