TEKNOFEST

AEROSPACE AND TECHNOLOGY FESTIVAL

TECHNOLOGY FOR HUMANITY COMPETITION

PROJECT DETAIL REPORT

PROJECT NAME:REMOULDING OF CHAFF TO BIOPLASTIC

TEAM NAME: TWEAK TITANS

CATEGORY: SOCIAL INNOVATION

TEAM ID:

TEAM LEVEL: PRIMARY SCHOOL

TEAM MEMBERS: ZAINAB ADNAN

BASHA BUSHRA

ADVISOR NAME: Ms. Mehak Khalid

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Project Detail Report

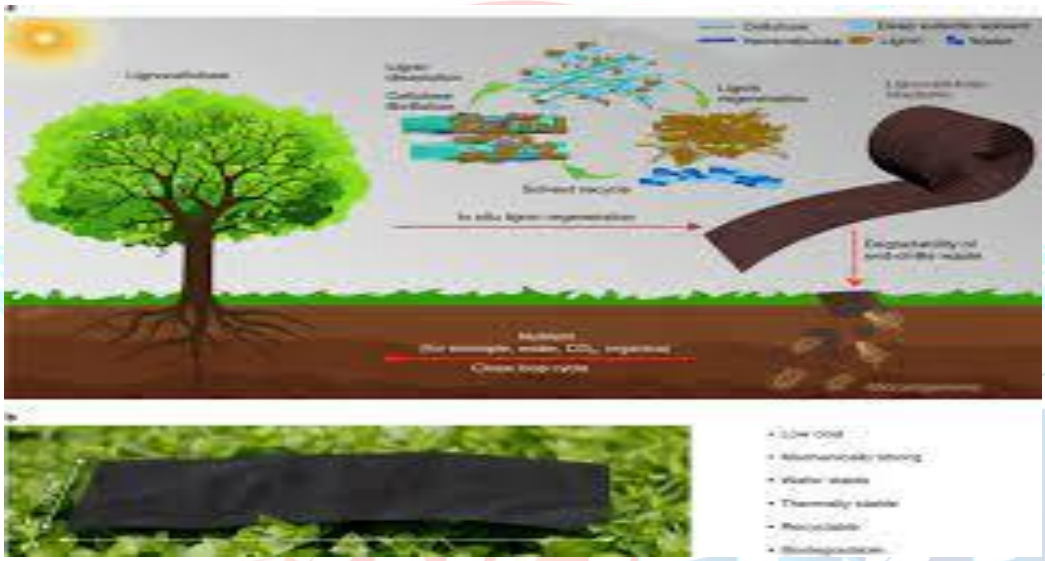
1.Project Summary:

The automaker will be taking food waste from the fast food giant, diverting it from a landfill to its laboratory, where it will be engineered into bio-plastic. In addition to reducing food waste, the effort will make car parts lighter, use less petroleum, and lower CO2 emissions. The present invention relates to a bioplastics using the coffee by-products for producing bio plastics by mixing coffee by-products with a synthetic resin, and to a method of manufacturing the same. A primary raw material extrusion step of mixing and extruding an inorganic material, titanium dioxide, a dispersant, and a wax into water to obtain a primary raw material extrudate, and the primary raw material extrudate with polypropylene (PP), polyethylene (PE) or a mixture thereof It provides a method of producing a bioplastic by mixing, heating and extruding, and a bioplastic produced by the production method, and has an effect of providing a bioplastic that is degradable and contributes to resource saving by recycling waste. The present invention relates to a bio plastic containing coffee waste and a method for manufacturing the same, wherein the bio plastic using the coffee by-product of the present invention has a tensile strength equivalent to that of a plastic made of 100% chemical synthetic resin and is disposable. Environmental pollution can be reduced by replacing various plastic products such as plastic cups and containers, food packaging films and bags, injection sheets and release extrusion.

2. Defining the Problem Situation:

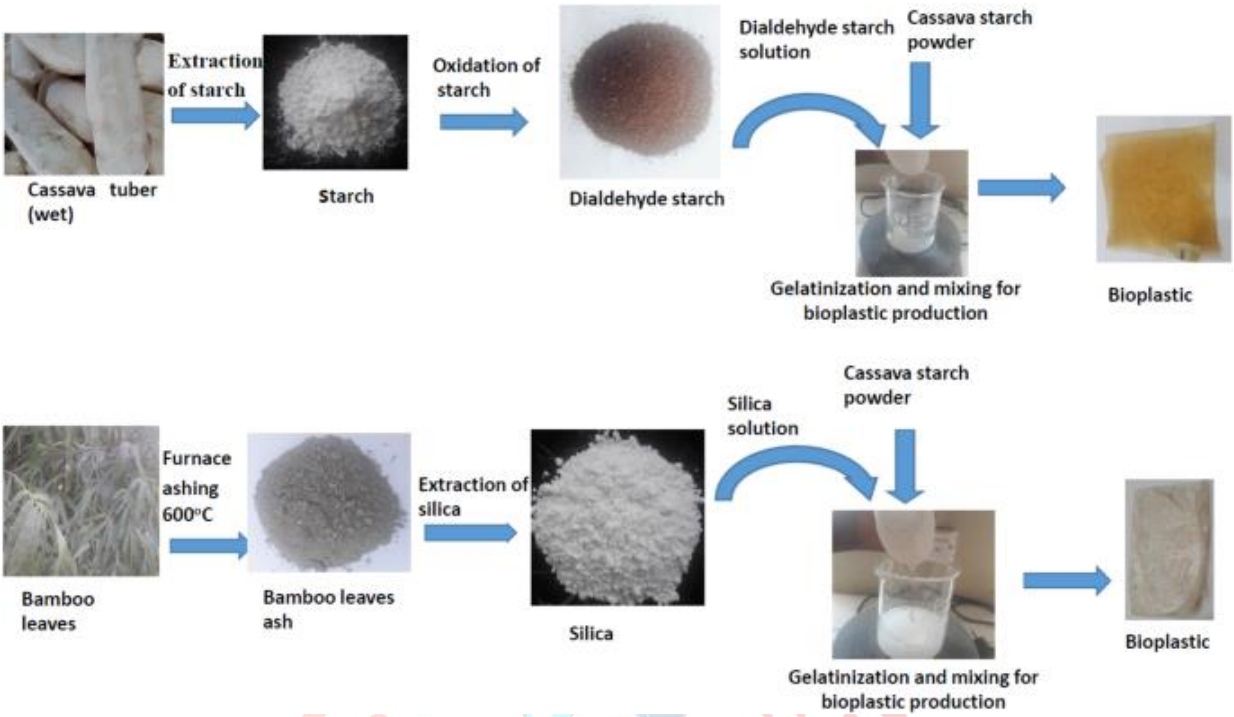
Each year, more than 330 million tons of plastic are produced worldwide. The main consumers of plastics are the packaging (40%), building (20%) and automotive (8%) industries, as well as for the manufacture of household appliances. The vast majority of industrial plastics are not biodegradable and, therefore, create environmental problems due to the increase in the amount of solid waste. Studies have been conducted to produce biodegradable materials such as bioplastics to overcome this environmental problem. Bioplastics are defined as materials that are bio-based, biodegradable, or both; they can provide excellent biodegradability and can be used to help alleviate environmental problems. Therefore, this article presents an overview of the introduction of bioplastic materials and classifications, and a comprehensive review of their drawbacks and areas of importance, including basic and applied research, as well as biopolymer mixtures and biocomposites developed in the last decade. At the same time, this article provides insights into the development of bioplastics research to meet the needs of many industries, especially in the packaging industry in Malaysia. This review paper also focuses generally on bioplastic packaging applications such as food and beverage. Plastics are a wide class of polymer composites that use polymers as a major ingredient. The class of synthetic polymers includes polyethylene (PE) (used in plastic bags), polystyrofoam (PS) (used in styrofoam cups), polypropylene (PP) (used in fiber and bottle), polyvinyl chloride (PVC), and

polytetrafluoroethylene or Teflon (PET) (used in food packages, bottles and drain pipes) [1]. Meanwhile, semi-synthetic polymers are obtained from natural polymers by subjecting them to a chemical process; this includes natural materials which have been modified and combined with other materials. An example of this is cellulose acetate, a reaction product between cellulose and acetic anhydride used to make films [2]. The plastics are made of carbon and hydrogen. In addition, the plastics can contain other elements, such as sulfur, silicon, chloride, fluorine and phosphorus. Plastic is manufactured in various forms and is a material that can be adapted for many different applications. In addition to the cheap production process, this suitability, combined with a variety of beneficial properties such as light, durability and flexibility has led to widespread use in today's society. As far as product packaging is concerned, packaging plays a role in product holdings and food safety for the food industry.



3. Solution:

Petroleum based plastics are facing a major problem in disposal and degradation and these are promoting destruction to the environment. The new field of bio-based plastics i.e. Starch based bioplastic is providing an alternative way to eradicate this problem. In recent years, many starch based bioplastic have been evolved but, till now no study related to wheat chaff has been recorded. This study entails the utilisation of easily available waste material i.e. Wheat chaff, for the production of biodegradable eco-friendly starch based bioplastic. For the fabrication of bioplastic, the initial step involves the extraction of starch that is done by treating wheat chaff with 25% ammonium hydroxide and this step follows the production of bioplastic by heating the starch in measured quantities of water, glacial acetic acid and plasticizers (Glycerol and Sorbitol) at 900 C for 45 minutes. On the basis of comparative analysis Glacial (4): Sorbitol (1) ratio was found best as plasticizer. 0.17g of starch and 1.45g of bioplastic per 1g of wheat chaff were generated. From this study, wheat chaff being easily accessible source of waste, can be used as a possible starch source for the fabrication of bioplastic.



4. **Method**

The plastic manufacturing method comprises the following steps of: placing the material in a high-speed mixer for mixing for 15-50 minutes at 90 DEG C to 150 DEG C, so that the surface of the starch is activated; placing the mixed material in a double-screw plastic extruder for extruding and pelletizing; and manufacturing the biodegradable material by using the chaff starch as the main material, wherein the technical indexes of the biological plastic reach the level of the existing common plastic, the degrading time can be controlled within 2-18 months and the degradation product are carbon dioxide and water without environment pollution. The chaff starch completely-biodegradable environmental protection material is successfully produced from a material mixer, a pelletizer to a film blowing machine, so that pelletizing and film blowing can be continuously and stably carried out; moreover, the formula, the equipment and the production process are mature, and therefore, the chaff starch completely-biodegradable environmental protection material has a popularization value.

Chaff starch completely-biodegrade environmental environmental protection material

Technical field. The present invention relates to plastic material manufactures field, specifically Chaff starch completely-biodegrade environmental environmental protection material.

Background technology:

The appearance of plastic material products, improves the quality of mankind's modern life, promotes the progress of civilization of human society. Modern My god, all closely bound up with people's lives the various aspects such as eat, wear, live, go, communicate and entertain, all have closely with plastic Association, plastics enrich people's life, bring more convenient and material benefit, become the indispensable part of daily life, all The place having crowd is with regard to visible plastic.

The significant contribution of plastic is below described only as a example the clothes that people are worn.

5. **Innovative Aspect:**

Five ways to improve bioplastics packaging with Capa™

1. Combining stability and biodegradability. Enabling biodegradable packaging to remain stable and durable during use.
2. Flexible in cold environments. ...
3. Food-friendly. ...
4. Compatible biopolymer enhancer. ...
5. Fast biodegradation and certified compostable.

6. **Applicability:**

Developing novel biodegradable polymers from renewable natural resources is gaining attention worldwide. This increased interest is primarily due to the adverse impact of non-degradable conventional plastics accumulating in the environment. The excessive and uncontrolled usage of conventional plastics and their environmental impact has necessitated the implementation of strategies for sustainable development. This can be achieved by switching to bio based plastics – plastics that is produced from renewable. resources and are susceptible for biodegradation. Bioplastics are either derived from natural polymers viz. protein, starch, lipid and cellulose or by using microbes. Although they are environmentally friendly, but the process of production is complex which reduces its economic feasibility. This problem can be resolved to a greater extent by using organic wastes of biological origin, as raw material for the production of bioplastics. Huge amounts of waste are annually generated from different industries which can be effectively utilized for this purpose. This strategy can also help in organic waste management. The bioplastic market is rapidly developing and as a result globally known brands are investing in this sector. Further growth is expected with extensive research which would mitigate the problems associated with the current technology of bio plastic production and completely remove our dependency from fossil based conventional

7. **Estimated Cost and Project Scheduling**

- Arduino
- LCD
- Wi-Fi module
- Dc fan
- Gas sensor
- Buzzer
- Regulator
- Crystal Oscillator
- Resistors
- Capacitors
- Transistors
- Cables and Connectors
- Diodes
- PCB and Breadboards
- LED
- Transformer/Adapter
- Push Buttons
- Switch
- IC
- IC Sockets

Software Specifications

- Arduino Compiler
- Programming Language: C

Plan B Hardware:

1. NodeMCU ESP8266 board
2. MQ2 gas sensor
3. Load cell with HX711 amplifier
4. Servo Motor
5. Piezoelectric Buzzer
6. Power supply 3.3-5 V

SOFTWARE:

1. Arduino IDE
2. Google Firebase
3. MIT App Inventor

- This project will take 1-2 months. The of the assemblage of the hardware and software shall occupy a month of our time. The final touches to the prototype shall be done in round about 30 days.

Project	Duration
Research Work	30 days
Sensors Collection	30 Day
Monitoring the project	45 Days
Estiamted Cost	30,000 PKR
Arduino BoardArduino UNO R3 Development Board1https://amzn.to/3bjpPDS	
2GSM ModuleSIM800/900 UART GSM Module1https://amzn.to/3cqDL06	
3LCD DisplayJHD162A 16x2 LCD Display1https://amzn.to/2YVEF0W	
4Potentiometer10K1https://amzn.to/35Qrn7f	
5GasSensorMQ-135/MQ7/MQ6/MQ5/MQ21https://amzn.to/2WLIPFL	
6Arduino Power Supply5V DC Adapter1https://amzn.to/3cnwUEI	
7GSM Power Supply12V DC Adapter1https://amzn.to/2yNfItP	
8Connecting WiresJumper Wires20https://amzn.to/2L8Xc1p	
9Breadboard-1https://amzn.to/2YM6YyS	

8. **Target Group of the Project Idea (Users):**

This project specifically for small industries. İt is also for those who are living without gas and they are using LPG cyclinders. Our project is mainly for low income people who are running their yhings on LPG.

9. **Risks:**

There are so many risk while remoulding of chaff

10. **Resources:**

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