



BIOPLASTIC – ENVIRONMENTAL SUSTAINABLE AND ECO-FRIENDLY ALTERNATIVE.

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ABSTRACT:

The improper disposal of the plastics ends up in our environment resulting in the death of animals annually and reduction of fertility in soil. Day by day reduce and deteriorated environmental quality. It's not only affect on animals but also many problems face by human beings. Due to mess of plastic on earth, plastic is not decomposed by microorganisms. They are present in nature as it is and increased solid waste, choking sewage drainage, decrease soil fertility and also affect on rain water leaching, percolation to the ground due to this ground water table also affected increase plastic pollution. So, Bioplastic manufacture and its application and use have become essential part of our today's life .Each and every work we used plastic and its products so it is persistent in nature and increase environmental nuisance. Bioplastic is an need of hour and it is also sustainable way.

The biosplastic manufacture by using biodegradable materials they are totally decomposed and dissolved. This is an essential for reducing today's pollution because around 275 million tons of plastic waste is generated each year around the world (from the top five countries). Therefore, it is necessary to use bioplastic and manufactured on large scale. The bioplastics innovation would be a long term solution for plastic pollution.

Key words: - *Bioplastic, Starch, Vinegar, Glacial acetic acid, Patchment paper.*

INTRODUCTION:

Application and use of plastic in various ways in the society around 275 million tonnes of plastic waste is generated each year around the world from top five countries, due to this global plastic pollution is increased day by day. Today's conventional plastic are produced from the petrochemical such as polyethylene, polyvinyl Chloride and polystyrene, and the production of such plastics consume more fuel and release more greenhouse gases. The production and disposal of these plastic is a major problem. Conventional plastic are made from non-renewable resources such as fossil fuels (petroleum based polymer). Petroleum products, which is increase cost and highly expensive and more scarce on the earth. It also so Toxic and carcinogenic chemicals are used in their production. Hence, there is a basic need to

manufacture bioplastic because it is made from organic biomass sources i.e. materials which are used from plants and animals.

Some Government Initiatives to Ban Plastics:

- The Union Government in a bid to free India of single-use plastics by year 2022, has laid out a multi ministerial plan to discourage the use of single use plastics across the country.
- With the aim of reducing Single-Use Plastic, DRDO Launches Biodegradable Packaging products. The Bags would be Biologically Degraded in three Months without any harm to Environment.
- The International Plastic Bag Free Day is annually observed across the globe on 3rdJuly to create awareness about the issues of plastic pollution and to highlight the effects of plastic pollution

on the natural environment ranging from land to marine.

- The days also promote the use of paper bags and cloth bags and eliminate the use of single-use plastic.
- NATIONAL HIGHWAY AUTHORITY OF INDIA (NHAI) will ensure that the plastic waste is collected and transported responsibly along National Highways. The collected plastic waste will be used for ROAD CONSTRUCTION.
- THE MINISTRY OF RAILWAYS will organize massive shamans (voluntary work) on October 2 for the collection of plastic waste at railway stations and along the rail tracks.
- MINISTRY OF TOURISM is set to ensure and create awareness on single-use plastic at iconic tourist spots.
- Concerns are growing worldwide about increasing plastic pollution, with a particular focus on the oceans, where nearly 50% of single-use plastic products end up killing marine life and entering the human food chain.

MATERIALS AND METHODS

Making of bioplastic:

Bioplastics are made by a number of different processes. Some methods use a microorganism to process as base materials, such as vegetable oils, cellulose and even alcohols. The biodegradable plastics are defined as material, whose physical and chemical properties undergo deterioration and completely degrade when exposed to microorganisms. Therefore bioplastic produced by biological system i.e., plants, animals or chemically synthesized from biological material like starch, cellulose and lactic acid. The large scale production and utilisation of bioplastic would preserve the non-renewable resources and

reduced plastic pollution, Andreas Detzel, C. D. G., Kauertz, K. (2015).

The bioplastics are a group of products each varied with its properties, and the applications also varied with the raw materials and manufacturing process as involved in the bioplastic products. Currently the bioplastics are coming from under the following categories:

- 1) Starch Based Bioplastics.
- 2) Cellulose Based Bioplastics.
- 3) Polylactic Acid Based Bioplastics.
- 4) Polyhydroxyalkanoates Based Bioplastics.
- 5) Fossil Fuel Based Bioplastics.

Continuous research and developmental activities towards bioplastic and growing awareness towards environmental conservation. Therefore in our study we are using renewable material such as starch based material to prepare bioplastics.

RESULT & DISCUSSION:

The starch based Polymers can be produced from potato, corn, wheat, etc. which are the cheapest sources and disposal of this type of waste is also degraded by microorganisms. Therefore, for reduce solid waste and eco-friendly product we are taking this as a consideration and prepared bioplastic by adopting simple and cheap method.

1) By using cornstarch and vinegar

Take 100ml distilled water 50 to 100 ml glycerol, 15 gm cornstarch, 10 ml of white vinegar and for strength add 6ml Glacial acetic acids if required then add food colour.

Combine all the ingredients and stir together for half an hour for proper mixing. Then transfer all ingredients to the sauce pan again Stir properly by using stirrer. Avoid the lumps. At this stage mixture will be milky white colour and quite watery. Then, place the saucepan on the gas stand and set the heat at low flame. Stir continuously as the mixture heats. Start and continue this process up to gentle boil. As the

mixture boil, it will become more translucent and begin to thicken. Remove the mixture from heat, when it becomes clear and thick. It will take maximum 20 minutes for the heating process (so again cheap because we reduce fuel). Lumps may begin to form if the mixture gets overheated.

Add 1-2 drops of food colour at this stage, if we would like to colour the plastic.

Pour the saucepan mixture onto foil or parchment paper. Spread the heated mixture onto a piece of foil or parchment paper and let it cool. If we would like to mould the plastic into different shape we can use various moulds, but it must be done when it is in hot condition.

Allow the plastic to dry for at least two days. It will take time to dry and harden the plastic. Thus, check the plastic after two days, it is fully hardened. In fig.1.

2) By using Agar Powder

We will use the method of making Bioplastic from agar. Materials such as glycerol, Gelatine or Agar, hot water and food colour are needed to prepare the bioplastic.

Take all the ingredients in a bowl. Stir together for 1 hour. Then transfer ingredients to the saucepan and heat it at medium flame. If we want to colour bioplastic, food colour must be added. Heat the mixture at 95°C by using thermometer or it begins to froth, before it removes the pan from gas stove. Continue stirring while it is heating up. Pour the content on smooth surface covered with foil or parchment paper. If froth is formed then remove it from mixture. It will take two days to form bioplastic. In this way, we use number of moulds also for giving the different shape of bioplastic because when it is disposed to any site or in warm water then no waste is generated. It dissolved totally and it is eco-friendly and durable because it does not increase the solid waste and pollution on nature. Apply and manufactured in various products Ahmad (2021). In fig. 2 and 3.

The future trend is to directly use this product for economically sustainable point of view.

CONCLUSION:

The major environmental problems arising tremendously due to improper disposal of the plastic waste and pollution effect. It would be solved through the using of alternative i.e. Bioplastics. This is eco-friendly and good alternative for health and safety of the society.

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Fig. 1 fully hardend bioplastic

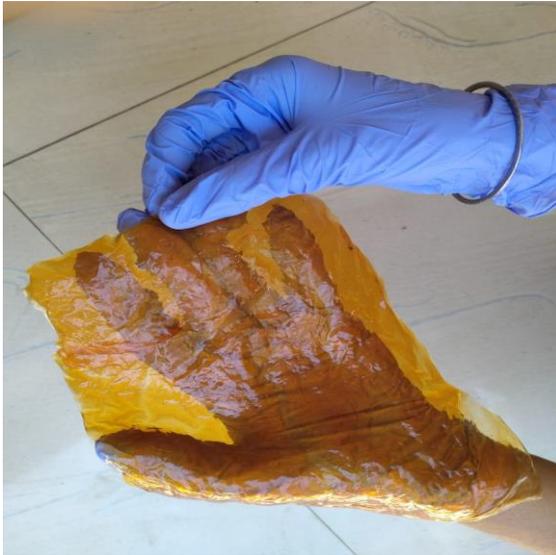


Fig.

2 Bioplastic from agar



Application →



Fig. 3