

Implementation of “Biodegradable Hydrophobic Plants” Container for Drinking Water to Reduce the Use of Single-use Plastic Cups and Plastic Bottles and Upon Waste Generation of Green Energy

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Abstract - To implement biodegradable hydrophobic plant materials to reduce us of plastic cups and bottles, important criteria such as rate of pollution, waste management process, green energy generation, and sustainability must be taken into account. Many recent developments regarding the use of hydrophobic plant materials were analyzed to establish the prospect of implementing biodegradable hydrophobic plant materials to reduce us of plastic products for drinking water. An analysis of this use of plants for drinking water was also done on the basis of geological location. In conclusion, it is hoped that this review will clarify its significance to the environment, particularly in terms of reducing the use of plastic products through the application of hydrophobic plant materials.

Key Words: Biodegradable, Hydrophobic, Plastic Pollution, Green Energy, Biogas Energy

1. INTRODUCTION

One of the biggest issues the world is currently dealing with is environmental degradation brought on by the usage of non-biodegradable materials, such as plastic bottles, containers, and bags. Plastic pollution results from plastic objects and particles in the environment that negatively impact human, animal, and aquatic life. Due to its low cost and durability, we are making more and more plastic every day. However, because of their chemical makeup, most plastics are sluggish to decay since they are resistant to a variety of natural processes. These two elements work together to allow the persistence of plastic in the ecosystem and the large-scale release of plastic into the environment as improperly disposed of waste. We are attempting to create a chemical using nanotechnology to stop this pollution. Though many activities and campaign have been initiated but still people, especially from developing and less developed country are not following these campaigns. As it is very difficult to change the mentality of people and Earth is getting more polluted each day, a very prospectus way to reduce this pollution can be of replacing the plastic by biodegradable materials in different applications.

2. LITERATURE REVIEW

Plastic pollution can afflict land, waterways and oceans. It is estimated that 1.1 to 8.8 million tonnes of plastic waste enters the ocean from coastal communities each year [1]. From the 1950s up to 2018, an estimated 6.3 billion tons of plastic has been produced worldwide, of which an estimated 9% has been recycled and another 12% has been incinerated [2]. This large amount of plastic waste enters the environment, with studies suggesting that the bodies of 90% of seabirds contain plastic debris [3]. As of 2020, the global mass of produced plastic exceeds the biomass of all land and marine animals combined [4]. Biodegradation of one PET bottle left in nature can last around 500 years [5].

3. FINDINGS AND RECCOMENDATIONS

In India, the leaves from a wide range of plants are used as food packaging, eating plates, coverings for food during steam cooking, and grilling and frying of various meals. The potential for biodegradable leaf plates on the global market is enormous; however, quality and design standards must be met. Here some of the trees and plants which are used as plates, cups and wraps for food packaging are briefly discussed.

3.1 Shorea Robusta

It is a native tree of the Indian subcontinent and is found there as well as in Bangladesh, Bhutan, Myanmar, Nepal, and India. The sun-dried leaves are stitched together using grass stem sticks or a sewing machine to create leaf plates (khali) and leaf bowls. The fresh leaves are used for serving tiny snacks like boiled lentils. During household and ceremonial gatherings, meals are served on leaf plates. As the sal forest of Odisha occupies around 30% of total sal forests in India, it is one of the revenue-generating activities for the landless, marginal, and forest-dependent tribal people [6]. Machine-pressed plates, the finished product, are exported to various regions of the nation.

3.2 Areca Catechu

Its English names include areca palm, areca nut palm, and beetle nut palm. It is an Aracaceae family member and a medium-sized, single-trunked, tropical palm with a slender, erect, unbranched solitary stem. China, India, Bangladesh, Sri Lanka, Malaysia, Thailand, Vietnam, the West Indies, and Indonesia are among the countries where it is widely cultivated. The palmate, long leaves have a length of 1.5 to 2 metres. The stem is surrounded by a protective layer made up of the leaf sheaths. The sheaths are rectangular in shape and range in size from 65 to 111 cm in length, 23 to 33 cm in breadth, and 2.5 to 5.25 mm in thickness. They are naturally biodegradable and compostable, leak proof, water resistant, odourless, freezer, microwave, and oven safe. They can be used with moist food once without compromising food safety, and they can be used repeatedly with dry food. Due to their strong shape and thermal resistance, leaf plates and cups can handle both hot and cold beverages [6].

3.3 Musa × paradisiaca

The herbaceous, cormed, pseudo-stemmed banana plant is a member of the Musaceae family. The leaves are about 2.7 0.6 m in size, big, flexible, and waterproof. Polyphenols, flavonoids, fibre, carbs, tannins, vitamin C, enzymes, and potassium are abundant in the leaves. The leaves exhibit antibacterial, antifungal, aphrodisiac, antioxidant, and anticancer properties. According to reports, the leaves purify the blood, strengthen the immune system, increase hunger, aid in food digestion, and prevent intestinal ulcers thanks to chlorophyll's soothing effects on the mucus lining. The concentration of polyphenols in banana leaves, which serve as antioxidants and aid in food digestion by releasing nutrients like vitamin C and potassium when food is served hot, is one of the reasons they are a choice for use as dining ware. The fact that the leaf's blade is so large allows for multi-course meals is most crucial. After serving the steamed meal, the endless leaves impart a distinct flavour and scent because they are water and leak-resistant, residue-free, and free of detergent [6].

3.4 Plant Leaves used in West Africa

Benin's government has prohibited the use of non-biodegradable plastic bags from 2018 due to the environmental issues caused by packaging material waste. Together with colleagues from Abomey Calavi University, close to Cotonou in Benin, scientists from the University of Bonn in Germany are currently working on developing sustainable packaging made of natural materials like banana leaves [7].

3.5 Paper Beer Bottle

Packaging made of plastic, metal, and glass heavily dominates the beverage business. Tetra-pak R and other environmentally friendly goods have become more popular as a result of the ongoing search for sustainable alternatives. The development of moulded paper products for carbonated beverages is, nevertheless, the subject of extensive research. The four main categories of moulded paper goods are thick wall, transfer moulded, thermoformed, and processed. Fruit trays, egg cartons, and electronic packaging are common uses for transfer-molded items. The Green Fiber Bottle is one of these products (GFB). The GFB is designed to be a more environmentally friendly beer bottle than the current glass and plastic options [8].

3.6 Green Energy in Lithuania

The biogas potential in Lithuania was 1700 GWh year⁻¹, which is 30 times more than the amount of biogas produced in the year 2009. The best possibilities of covering the county's heat demands were in Marijampole and Panevezys where 11% of the heat needed could have been covered with the heat from biogas CHP [9].

3.7 Physical Conversion

To turn the waste into fuel pellets or fuel derived from waste, physical waste treatment energy is applied (RDF). Plastics and other perishable garbage, as well as other organic materials, make up the majority of the fuel pellets. Glass, metals, and other non-flammable elements are removed from the waste during the initial processing stage. Viral and other possible pathogens are then killed by a powerful steam treatment. With this approach, waste can be cut by up to 60%. In comparison to directly incinerating MSW or other types of solid waste, the combustion of fuel pellets is more environmentally friendly and cost-effective, although the procedure is very expensive [10].

3.8 Biological Conversion

Anaerobic digestion and fermentation are two biochemical processes that generate clean energy in the forms of biogas and alcohol, respectively. It is a dependable method for the treatment of wet, organic waste since AD is a natural organic process that biochemically degrades the organic waste in a controlled, oxygen-free environment, producing biofuels. Currently, advanced steriliser systems may produce biogas with a pure methane series content above 95%. Yeast fermentation produces liquid alcohol from biomass waste [10].

3.9 Recommendation

Table -1: Recommendation Criteria

No.	Classification	Suggestion
1	Environment	Design a prototype of a hydrophobic plant container. Develop in such a way so that it can be degraded in such a way that will not pollute the environment, Make it a perfect replacement for plastic.
2	Energy	Develop a process by which maximum possible green energy can be achieved upon turning into waste. As this can be a good source of biomass energy, research can be conducted on how the efficiency of biomass can be increased.
3	Economy	Research can be conducted to make both the container and, later on generation of green energy more economical.

4. CONCLUSION

The advantages of using leaf plates and cups over plastic ones are their renewability, biodegradability, lack of toxicity, and availability of antioxidants. It is clear that leaf plate technology has a lot of room for growth in terms of raw material quality, design advancement, product variety, manufacturing techniques, and marketing. However, the goods must adhere to the strict quality requirements established by the governing organisations. The required regulations ought to be established by the government agencies in order to maintain the practise of utilising leaf plates in our daily lives and discourage the use of plastic plates. In addition to being ecologically benign, installing biogas plants and supporting green energy will lessen financial pressures and resolve waste treatment issues brought on by the rapid urban population growth.

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BIOGRAPHIES



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