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Original Article

Biodegradable plastic production from daily Household waste materials and Comparison the decomposing time with synthetic polyethylene plastic

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Abstract

Plastic products are very common in our modern life. According to approximate, every year we use1.6 million barrels of oil just for producing plastic water bottles. Plastic waste is one of the major concern now and many types of wastes that take too long to decompose. Normally, plastic products can take up to 1,000 years to decompose in landfills. Even According to estimates, every year we use approximately 1.6 million barrels of oil just for producing plastic water bottles. Plastic waste is one of many types of wastes that take too long to decompose. Normally, plastic items can take up to 1,000 years to decompose in landfills. Even plastic bags we use in our everyday life take anywhere from 10 to 1,000 years to decompose, and plastic bottles can take 450 years or more we use in our daily life take anywhere from 10 to 1,000 years to decompose, and plastic bottles can take 450 years or more. Therefore, plastic pollution became more hazardous nowadays. This research was successfully producing bioplastic sheet from our daily household waste materials as we throw away our household waste materials everyday. In future prospects, bioplastic from household waste materials can be developed as plastic bag, plastic bottles and food packaging and will reduce the plastic pollution.

Keywords: *Entomopathogenic nematodes, Biological control, Steinernema dharanaii, White grubs, Holotrichia rustica, Forest insect pests.*

Introduction

Plastic pollution in the world unabated raising serious threats to human and animal health. Environmentalists say that plastic can exist in soil and water for a long time as it is not biodegradable and it may turn into leachate and, through heat, get mixed with the food chain and enter human body causing diseases and, eventually, deaths (Le Guern 2018). Plastic production is swiftly increasing, with a doubling of production every 11 y since commercial production began in the 1950s (Plastics Europe, 2013). Plastic pollution afflict land, waterways and marine. It is estimated that 1.1 to 8.8 million tonnes of plastic waste goes to the ocean from coastal communities each year (Jambeck *et al.* 2015). Living organisms, particularly ocean animals, can be harmed either by mechanical effects, such as entanglement in plastic items, problems related to ingestion of plastic waste. As of 2018, about 380 million tonnes of plastic is produced worldwide in every year. From the 1950s up to 2018, an estimated 6.3 billion tonnes of plastic produced worldwide, of which

an approximately 9% has been recycled and another 12% has been incinerated (Economist 2018). This huge amount of plastic waste enters into the environment, with studies suggesting that the bodies of 90% of seabirds and fish contain plastic debris (Nomadic 2016, Mathieu *et al.* 204). In some areas there have been momentous efforts to reduce the feature of free range plastic pollution, through reducing plastic consumption, litter cleanup, and promoting plastic recycling procedure (Walker and Xanthos 2018, UNenvironment 2018). A 2019 study estimated the mismanaged plastic waste, in millions of metric tonnes (Mt) per year: 52 Mt – Asia,17 Mt – Africa,7.9 Mt – Latin America & Caribbean,3.3 Mt – Europe,0.3 Mt - US & Canada,0.1 Mt - Oceania (Australia, New Zealand, etc.) (Lebreton and Andrady 2019). Therefore, we have to find a way that would be able to protect us from this plastic waste. Biodegradable plastic production is one of the best way to combat this pollution. Everyday a large amount of household waste materials throw away each family. If we use this wastes to produce biodegradable plastic then plastic pollution will be greatly reduce. We can save our materials cost for producing plastic by using household wastes. In this research we successfully producing bioplastic sheet from our daily household waste materials as we throw away our household waste materials in our daily life. Then we compared the decomposing time of this produced biodegradable plastic and Polyethylene plastic.

Material and Methods

Total 100gm household wastes containing potato peel, brinjal part, tomato waste, bean, cauli waste, edible root part, banana peel ; water 500; vinegar 50ml; glycerin 50ml; lime juice 10ml; food dye were used.

500ml water poured into the beaker where containing 100gm household wastes paste. Stirring with a spoon to mix well. During stirring 50ml glycerin, 50ml vinegar, 10ml lime juice, a few drops of food dye added into the beaker. After two minute mixture warmed in the beaker gently by Bunsen burner. Stirred the mixture while heating. Mixture heated gently three minute on burner. After mixing well this mixture pour into the baking paper as well as put it aside with spread gently around on baking paper and let it to cool. This baking paper kept in room temperature for 5 days and produced biodegradable plastic. Then this desire biodegradable product and common Polyethylene plastic placed under the soil to measure the decomposing time.

Results and Discussion

From the household waste materials a fine biodegradable plastic produced Fig 1. and Fig 2.

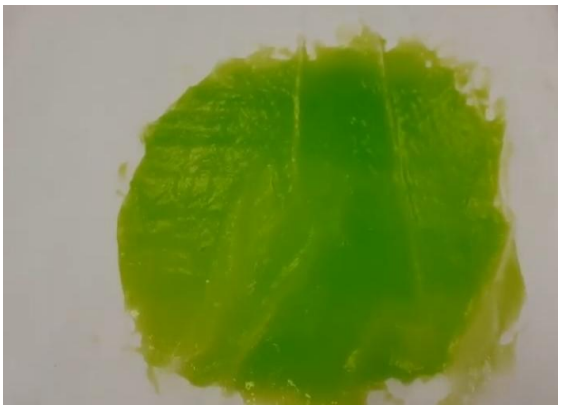

Fig 1: Spread bioplastic sheet on bake paper

Fig 2: Produced bioplastic part

Then we measured the decomposing time of this biodegradable plastic is thirteen days where synthetic polyethylene plastic remained unchanged. By using this process commercially can be developed biodegradable plastic bottle, bag, food packaging etc.

Bioplastics are plastics derived from renewable biomass sources. Synthetic

polyethylene plastics are non-renewable, often threaten the environment. Also have declining impacts on marine life and increases environmental pollution. It was assumed that global production of plastics is approximately 250 mt/yr. Their plenty has been found to transfer persistent organic pollutants, also known as POPs. These pollutants have been connected to an increased distribution of algae associated with red tides (Barnes *et al.* 2009). In 2019, the group Break Free From Plastic organized over 70,000 volunteers in 51 countries to collect and specify the plastic waste. These volunteers collected over "59,000 plastic bags, 53,000 sachets and 29,000 plastic bottles," as news by The Guardian. Almost half of the items were identifiable by food brands. The most common brands were Coca-Cola, Nestlé, and Pepsico (Chalabi M. 2019, GBAR 2019). A lot is unknown on how severely human being are physically affected by these synthetic plastic chemicals. Some of the chemical elements used in plastic production can cause dermatitis upon contact with skin (Brydson, J. A 1999). About 95% of adult person in the United States have had detectable levels of BPA in their urine test. Exposure to plastic chemicals such as BPA have been related with disruptions in fertility, reproduction, sexual maturation, and other health effects (North and Halden 2013).

Biodegradables are biopolymers that decompose in industrial composters. Biodegradables do not degrade as efficiently in usual composters, methane gas may be emitted (Thompson *et al.* 2009). If the world wishes to continue using light plastic films for storage, packaging or for carrying goods, then the only way we can avoid serious plastic pollution problems is to employ fully biodegradable compounds (Goodall C. 2011). As biodegradable plastic degraded within few days so the sustainability of synthetic plastic problem will be reduced. Human and marine animals will get rid of this severe plastic problem by using biodegradable plastic products. The development of bioplastics helps to solve many of the plastic pollution problems, offering the potential of renewability, biodegradation, and a path away from harmful additives and moreover a clean earth. This research study was successfully produced the biodegradable plastic which degraded within thirteen days..

Conclusion:

Plastics are a vital asset for humanity, often providing functionality that cannot be easily or economically replaced by other items. Most plastics are robust and last for hundreds of years. The need for bioplastics is now more than ever as the rate of plastic production and air pollution has increased at a rapid rate. Furthermore, plastics also cause many health risks because of its toxic nature. Therefore, bioplastics can be best suited as an alternative to improve healthy life and sustain a pollution-free clean planet.

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Conflicts of Interest:

The authors declare no conflict of interest. The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript.

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