



BIOMOLECULES CONTAINED POLYETHYLENE TO DEGRADATION BY MICRO-ORGANISMS

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ABSTRACT

The mechanisms of degradation of polyethylene films are various ways such in soil containing microbes. The culture micro-organisms with suitable media such as SDA and YEMA contained some biochemical such as Starch, Cellulose and Plant Extract for both fungi and agro-bacteria. The biochemical substrate has increased the degradation efficiency. In this investigation highest degradation of polythene at 59.69% by micro-organisms in which contained MPE compared to other.

Keywords:

Polyethylene, SDA, YEMA, Micro-Organisms, MPE.

INTRODUCTION

The procedure of biodegradation has been defined as change in the properties of materials by micro-organisms (H. J. Hueck, *et al* 1974). The mechanisms of degradation of polyethylene films are describe parameters at various ways such in soil containing microbes (P.A.Dilara, *et al* 2000). The microbes are able to slow in degradability in natural environments. In this view consider, the develop methods for highly degradation of synthetic polymer biodegradation using microorganisms (S. Boonchan, *et al.* 2000). The pre-treated of polyethylene with bio molecules such as starch, reducing sugar and plants extract molecules is very important for its biodegradation by Microbial degradation of a solid polymer like polyethylene to enable the microbes to consume the non-soluble substrate by enzymatic activities (J.C. Gilman, *et al* 1957). The integration of small amount of biochemical can some change in polyethylene properties and lead to its microbial degradation (H. Kazmarek, *et al.* 2007). The study focuses on the micro-organisms are capable to the surface of oxidized polyethylene and perhaps biodegrading. The Low-Density Polyethylene (LDPE) is a thermoplastic widely used for packaging and other applications. The synthetic Polyethylene are generally not degradable, until these are convert into low molecular mass (M.A.Koutnya, *et al.* 2009).

MATERIALS AND METHODOLOGY

Collection of polyethylene was purchased from local market of Betul, District of Madhya Pradesh. Isolation of microorganisms was isolated from the soil samples collected at depth of 5cm, in a sterile petriplate and dry it at RT and after this sample stored for further studies. Taken 1gm of soil sample was transferred into a conical flask containing with 99ml of sterile distilled water. This

content was shaken to homogeneous dilution. The microorganisms isolated by pour plate method in aseptic condition was adopted using, SDA for fungi and YEMA for agro-bacteria. The plates were incubated at $28\pm 2^{\circ}\text{C}$ to 7 days for microbial growth. The developed colonies were isolated and sub cultured it to obtain pure colonies and stored for further use, (A. Kumar, *et al.* 2013).

Pre-treatment of polyethylene with prepared of 0.01% solution was starch, cellulose and plants extract biochemical for given treatment to, Polyethylene size cut into small pieces two by two and incubated at RT for 24 hours and knows weight of small pieces Polyethylene.

Pre-treated polyethylene sample was individually inoculated at the surface of medium in Petri plates. The Petri plates divided into two groups A with fungi, B with Bacteria. All Petriplates incubated at $28\pm 2^{\circ}\text{C}$ temperature for 15 days. The dry weights of recovered polyethylene from the culture media, weight determination, removed polyethylene and washed with 70% alcohol and distilled water and dry it at room temperature for accounting the rate of biodegradation final results taken in weight (V. Singh, *et al.* 2012).

RESULTS AND DISCUSSION

The presence study by observed that isolation of micro-organisms on two types of media such as SDA for fungi and YEMA for Agrobacterium. It was total 35.07% degraded to polyethylene slowdown with pure media in which 23.69% fungi much effective compared to bacteria, while the contained the biochemical substrate have increased the degradation efficiency in order $\text{PM} < \text{MS} < \text{MC} < \text{MPE}$. In this investigation highest total 59.69% in which 35.07% by fungi and 24.61% by agro-bacterial degradation of polyethylene contained MPE compared to other. That way plants extracted substrate play a major role to degradation of polyethylene.

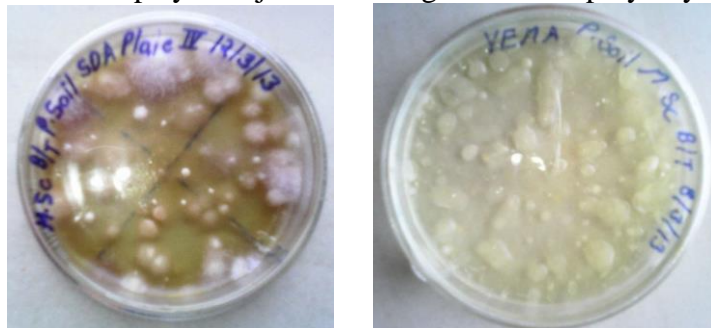
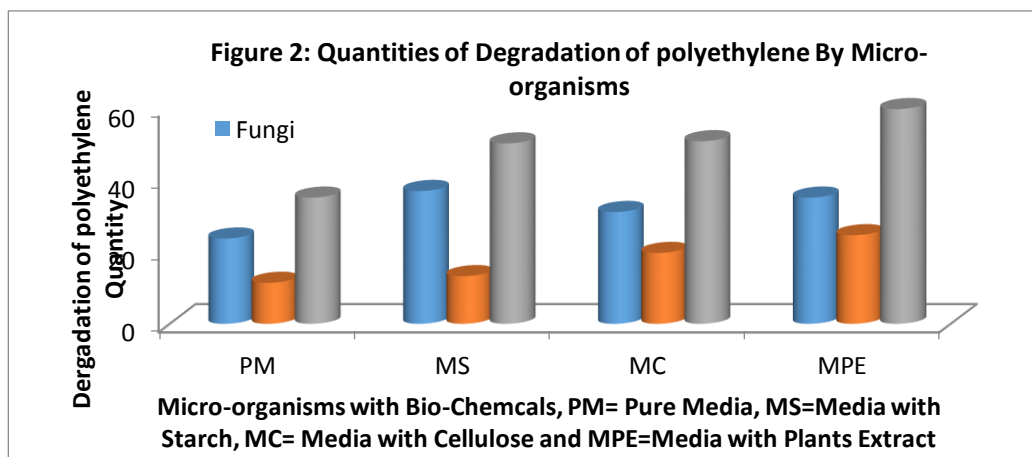


Figure 1: Degradation of polyethylene by Micro-organisms at culture medium A=Fungi, B=Agro-bacteria



CONCLUSIONS

The presence study by observed data was focusing the degradation of polyethylenemuch with fungi and slowdown with pure media bacteria. That way plants extracted substrate play a major role to degradation of polythene with fungi.

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