Isolation and Optimization of PHB (Poly- β -hydroxybutyrate) Based Biodegradable Plastics from *Chlorella vulgaris*

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Abstract

Poly-β-hydroxybutyrate (PHB) can be used as an effective thermoplastic and has many characteristics similar to those of standard commercial plastics like polypropylene. PHB based plastic substitutes are less flexible than traditional plastics; they are completely biodegradable and leave behind no residue. Algae are used for the production of PHB, for bioplastic production which offers an opportunity in economic efficiency by reduced costs. *Chlorella vulgaris* PB (1-6) was isolated from different freshwater sources and screened for PHB production using Sudan black B and Nile Blue Stain. The production of PHB was optimized using different media and under various parameters like Aeration; Effect of phosphate and Sodium acetate etc. PHB was extracted using hot chloroform and the amount of PHB produced was estimated by reading the absorbance at 235 nm.

Keywords: PHB; *Chlorella vulgaris* PB (1-6); Biopolymers; Nile blue; Biodegradation

Bioplastics or organic plastics are a form of plastics derived from renewable biomass sources such as vegetable oil, corn, starch, pea starch unlike fossil-fuel plastics derived from petroleum. Biodegradable form of plastic was first characterized in the mid 1920's by French researchers. This molecule is called Polyhydroxybutyrate (PHB). Many different types of bacteria and algae produce it as food storage material [1]. Biodegradable plastics can decompose into carbon-dioxide, methane, water, inorganic compounds or biomass via microbial assimilation. Algae serve as an excellent feedstock for plastic production owing to its many advantages such as high yield and the ability to grow in a range of environments [2].

In this paper, Algae are used for the production of PHB. Industrial utilization of Algae as PHB producers has the advantage of converting waste carbon-dioxide, greenhouse gases to environmentally friendly plastics with energy saving

cool white fuorescent lamps. Every day the cultures were mildly shaken by hand for 10 mins.

Media's used

- Cyanophycean medium
- Chu 10 Medium
- Fogg's Nitrogen free Medium
- BG 11 Medium
- Chu 10 Modifed Medium
- Algae culture Medium
- Modifed Allen's Medium
- Hughes and Gorham Medium
- Bold's Basal Medium (BBM).

Effect

Chlorella vulgaris PB (1-6) were inoculated into three diferent selected media. Based upon their growth and production of PHB these media's were selected. T ey include BBM; Modifed Allen's Medium and Chu 10 modifed medium. Air was supplied into the medium through the aerator. Afer two weeks, growth was m wsÎurÉ}mop. p-] mmc k ® die èd. f Medium f Medium % s M

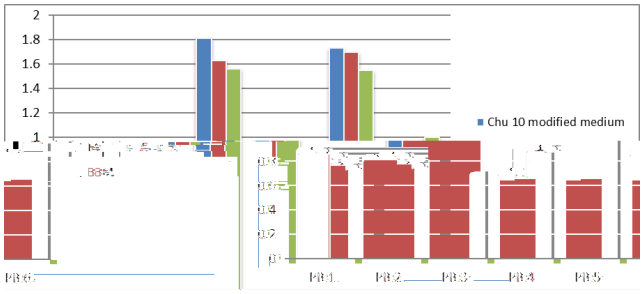

Figure 2: PB 1-6-*Chlorella vulgaris*.

Effect

After 2 weeks, growth was observed and PHB was extracted. The residual biomass and the amount of PHB accumulated were shown in the following graph (Figure 3).

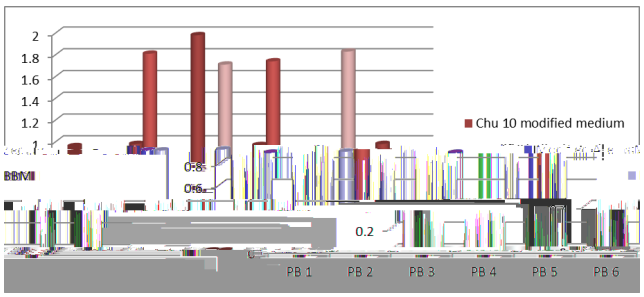

Figure 3: PB 1-6-*Chlorella vulgaris*.

At present, PHB production from photosynthetic microorganisms