



Why Polyhydroxybutyrate is not commercialized in India?

Rahul Vikram Singh*

Department of Biotechnology, Graphic Era University, Dehradun, Uttarakhand, India

***Corresponding Author:** Rahul Vikram Singh, Department of Biotechnology, Graphic Era University, Dehradun, Uttarakhand, India.

Published: June 07, 2017

Abstract

Polyhydroxybutyrates (PHBs) are a potential alternative to the environment polluting non degradable plastics. These compounds are non-toxic, biodegradable, highly crystalline, optically active, isotactic and insoluble polymers. PHBs are storage compounds produced by variety of micro organisms under nutrient stress conditions. About 75 genera of gram positive and gram negative bacteria are known to produce PHBs when grown in carbon and nitrogen limited media. Some important examples of PHB producing bacteria are *Ralstonia eutropha*, *Alcaligenes eutrophus*, *Pseudomonas pseudomallei*, *E. coli*, *Halomonas campisalis* etc. Although PHB production technology has established itself as a technology with great potential in other countries but it is not commercialized in India. This indicate that the technology transfer is not complete and that is requires coordinated efforts for scientists, and engineers to overcome these limitations in order to translate this 'high potential' technology to 'high performing' technology.

Keywords: Polyhydroxybutyrates; *Ralstonia eutropha*; *Alcaligenes eutrophus*; *Pseudomonas pseudomallei*; *E. coli*; *Halomonas campisalis*

Today plastic materials are indispensable part of everyday life and are used for numerous consumer goods and other applications. The non-degradable natures of synthetic plastic accumulate in the environment where they create problems for human population as well as wildlife and their habitats. A steady increase in plastics production and their persistence in the environment for long when their excess use creates serious environmental issues. These non-degradable plastics accumulate at global level at the rate of 25 million tons each year, posing a serious challenge to solid waste management. To manage international plastic disposal issues several laws were recently enacted, as well as the Maritime Pollution accord (MARPOL) that, since 1994, prevents the disposal of plastics puzzled, and therefore the North American country Plastic and Pollution analysis and management control Act, 1994.

Human over population combined with the current lifestyle urges efficient and sustainable use of natural resources to produce environmentally friendly biodegradable plastic materials such as poly-hydroxyalkanoic acids (PHAs), poly-lactic acid (PLA). Polyhydroxybutyrate (PHB) is bacterial polymer that formed as naturally

occurring storage polyesters by a wide range of microorganisms usually under stress growth conditions [1]. Such as endogenous carbon source during unfavorable conditions and these polymers are biodegradable without forming any toxic compounds, hence they are environment-friendly. Now a day's petrochemical based plastic is very popular and commonly around the world. Petrochemical based plastic has good tensile property, water resistance property makes it popular, but recycling or degradation is a major problem. During the combustion of petrochemical based plastic they release toxic gases like SO_2 , NO_2 , which is directly responsible for acid rain. On the other hand water insoluble, resistant to hydrolytic degradation, good oxygen permeability, good ultra-violet resistance, high biocompatibility of PHB films and medical devices implanted in animal tissues has been demonstrated, high melting point, tensile strength, sinks in water and nontoxic property makes PHB alternative to petro-chemical based plastic [2,4].

Although thousands of research articles has been published on the polyhydroxybutyrate (PHB) and other co-polymers of the same class. More than 250 Gram positive and Gram negative bacteria

has been identified, which produced polyhydroxybutyrate (PHB). Re-searchers generally start the research work, published one or two papers on particular topics and stop or discontinue the work. This kind of attitude or mentality is very serious for upcoming time. Recently, researcher of the Central Tuber Crops Research Institute (CT-CRI), Thiruvanthapuram has developed an inexpensive method to developed biodegradable plastic by adding tapioca starch to it. Starch is made of tapioca, which is easily available in state Kerala and Tam Nadu; it can be degrade within six month. This technology has been transferred to several companies for commercialization [3].

Although polyhydroxybutyrate (PHB) has been commercialized in other countries but not yet in India. "My opinion is about polyhydroxybutyrate is that there are several reasons behind it. First no low marketable cost substrate for producing polyhydroxybutyrate is available, which makes production cost of PHB high and high cost makes less attractive for general Indian consumer. Next Indian people in general have less awareness of sensitivity regarding environmental issues and hazard caused by non-bio-degradable plastics".

Bibliography

1. LL Madison and Huisman GW. "Metabolic engineering of poly(3-hydroxyalkanoates): from DNA to plastic". *Microbiology and Molecular Biology Reviews* 63.1 (1999): 21-53.
2. GQ Chen and Wu Q. "The application of polyhydroxyalkanoates as tissue engineering materials". *Biomaterials* 26.33 (2005): 6565-6578.
3. www.earthsoulindia.com/biodegradable.html
4. Valentin HE and A Steinbuchel. "Application of enzymatically synthesized short chain-length hydroxy fatty acid coenzyme A thioesters for assay of polyhydroxyalkanoic acid synthases". *Applied Microbiology and Biotechnology* 40 (1994): 699-697.

Volume 1 Issue 1 June 2017

© All rights are reserved by Rahul Vikram Singh.