

# To Develop a Sustainable Technology for Medium Chain Length Polyhydroxy Alkanoates Production Using *Pseudomonas Putida*

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**Abstract** The worldwide plastic production rose to 280 million tonnes in 2011 and is expected to grow at an average of 4% per annum. The impact on the environment has been detrimental, creating hurdles in the disposing of plastic wastes, thus necessitating a shift to bioplastics.

Polyhydroxy Alkanoates(PHA) have gained attention on account of their biodegradability and physical properties being analogous to conventional plastics. Yet, higher production costs have hampered their commercial production, the carbon substrate itself amounting to around 50%. To overcome this, we require efficient PHA producer organisms, renewable carbon substrates and economical fermentation and recovery processes. Recent surveys hold India as the second largest oil producer in the Asia-Pacific region and rank it 23<sup>rd</sup> in terms of global oil production, making it one of the major oil producers. Therefore, various oils can be considered as potential carbon substrates.

*Pseudomonas putida* is known to be one of the best producer's of MCL PHA. It is a GRAS organism and is versatile in that it can metabolize various substrates ranging from plant oils to simple sugars. We aim to design a sustainable approach for maximizing the MCL PHA production through medium optimization. Literature determines that the MCL PHA yield from fatty acids is higher than sugars and other carbon sources. We thus carried out shake flask and batch experiments with glycerol and different saturated, mono and polyunsaturated fatty acids. Higher PHA production was noted with linoleic acid, thus cultivation on plant oils such as sunflower oil with high linoleic acid content(80%) could result in improved PHA yield. Accordingly, we plan to extend our analysis to plant oils. Our main goal is to adopt an economical and sustainable approach to PHA production by using renewable carbon substrates like glycerol, a byproduct of a biodiesel plant in combination with plant oils.

**Keywords:** Polyhydroxy alkanoates, *Pseudomonas putida*, sustainable resources