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Production of a Novel Short-Chain-Length-Long-Chain-Length Polyhydroxyalkanoate Co-Polymer by *Pseudomonas Aeruginosa* MTCC 7925 from Various Carbon Substrates

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ABSTRACT: A sludge-isolate, *Pseudomonas aeruginosa* MTCC 7925 emerging as an attention-grabbing organism owing to its ability to synthesize a novel short-chain-length-long-chain-length polyhydroxyalkanoate (SCL-LCL-PHA) co-polymer consisting of 3-hydroxybutyric acid (3HB), 3-hydroxyvaleric acid (3HV), 3-hydroxyhexadecanoic acid (3HHD) and 3-hydroxyoctadecanoic acid (3HOD) units as components. In the present study, *P. aeruginosa* MTCC 7925 was exploited for the production of P(3HB-co-3HV-co-3HHD-co-3HOD) co-polymer under supplementation of various carbon sources such as glucose, sodium acetate, maltose, fructose, ethanol, tri-sodium citrate, mannitol, sucrose and butyrate. Amongst different exogenous carbon supplementation, *P. aeruginosa* MTCC 7925 accumulated PHA co-polymer up to 48.8% of dry cell weight (dcw) in 2% ethanol followed by 2% glucose (43.1% dcw). Co-polymer production was further boosted maximum up to 68.7% (dcw) with a mol fraction of 93.1:1.4:2.4:3.1 of 3HB:3HV:3HHD:3HOD units in cultures supplemented with 2% (v/v) ethanol under N-deficiency. Co-polymer content of 63.9% (dcw) with a mol fraction of 92.8:1.5:1.6:4.1 of 3HB:3HV:3HHD:3HOD units was also recorded with glucose under N-deficiency. The co-polymer records higher elongation to break (%) value as compared to BIOPOL® and short-chain-length-medium-chain-length polyhydroxyalkanoate (SCL-MCL-PHA) co-polymers. Furthermore, this novel co-polymer exhibited material properties comparable to polypropylene and polyethylene, therefore opens up new possibilities for various industrial applications.

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