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13C labeling gives insight into contribution of PHB precursors in *Synechocystis* sp. PCC 6803

Vaishali Dutt and Shireesh Srivastava

International Centre for Genetic Engineering and Biotechnology, India

The freshwater cyanobacterium *Synechocystis* sp. PCC 6803 is known to accumulate polyhydroxybutyrate when under nutrient stress. Many aspects of PHB accumulation have been studied in this cyanobacterium but there is no study to shed light on the contribution of PHB precursors. In nitrogen deprived cells, higher amount of PHB accumulates with acetate supplementation. However, the quantitative contribution of externally added acetate for PHB synthesis is not known. Similarly, the quantitative contribution of newly-fixed carbon for PHB synthesis is not clear, though a previous study has shown that the photosystem I (PS-I) shows detectable photosynthetic activity up to 350 h of nitrogen starvation and so the cells continue to produce ATP and the reducing equivalent NADPH. In this study, using labeled substrates, we have shown that: (1) Externally added acetate, while increasing the intracellular PHB levels to over two-fold, contributes about 50% to PHB synthesis in either photo-autotrophic or mixotrophic growth, (2) The newly-fixed C is also a big contributor to PHB synthesis and mixotrophic pre-growth significantly reduces the contributions of newly-fixed C to PHB. Indirectly, the labeling studies also show that intracellular C recycling is an important source of precursor for PHB synthesis, irrespective of the pre-growth mode. Thus, this study provides novel insights into PHB synthesis by cyanobacteria by identifying the quantitative contribution of precursors for PHB synthesis and the effect of pre-growth.

Biography

Vaishali Dutt has obtained her BS and MS degrees in Zoology from University of Delhi, India. She has qualified the CSIR-UGC National Eligibility Test and was awarded Fellowship to conduct research in the life sciences. Her research focuses on understanding the PHB accumulation in photosynthetic bacteria, strategies to enhance the accumulation of this polymer and engineering of cyanobacteria to synthesize biofuel candidates.

duttvaishali54@yahoo.com