Improved Carbon Dioxide Fixation and Organic Compounds Production by Inducible Expression of the Carbonic Anhydrase and Phosphoenolpyruvate Carboxylase in *Rhodobacter sphaeroides*

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Carbonic anhydarse (CA) is as zinc-containing metalloenzyme catalyzing the reversible hydration of CO_2 to HCO_3^-. Phosphoenolpyruvate (PEP) carboxylase (PEPC) is an enzyme involved in carbon metabolism that catalyzes the fixation of CO_2 to PEP in the presence of HCO_3^- to yield oxaloacetate and inorganic phosphate. Therefore, CA and PEPC is a key factor for the biological fixation of CO_2 and enhanced production of organic compounds. In this study, *Rhodobacter sphaeroides* was used as a recipient strain for transformation with the plasmid pBBR1mcse-2 to induce over-expression of CA and PEPC respectively. This result showed that cells used more CO_2 and enhanced the production of organic compounds under anaerobic light conditions. The function of CA and PEPC in *R. sphaeroides* would accelerate the biocarbonate-CO_2 conversion in the intracellular under photosynthetic conditions. Therefore, this study will prove useful in efforts to improve CO_2 fixation and photosynthetic ability in this species for a variety of biotechnological applications.