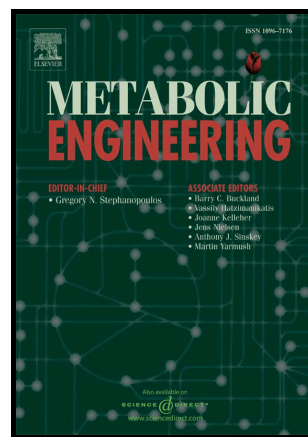


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Efficient phototrophic production of a high-value sesquiterpenoid from the eukaryotic microalga *Chlamydomonas reinhardtii*

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Abstract

The heterologous expression of terpene synthases in microbial hosts has opened numerous possibilities for bioproduction of desirable metabolites. Photosynthetic microbial hosts present a sustainable alternative to traditional fermentative systems, using freely available (sun)light and carbon dioxide as inputs for bio-production. Here, we report the expression of a patchoulol synthase from *Pogostemon cablin* Benth in the model green microalga *Chlamydomonas reinhardtii*. The sesquiterpenoid patchoulol was produced from the alga and was used as a marker of sesquiterpenoid production capacity. A novel strategy for gene loading was employed and patchoulol was produced up to $922 \pm 242 \mu\text{g g}^{-1}$ CDW in six days. We additionally investigated the effect of carbon source on sesquiterpenoid productivity from *C. reinhardtii* in scale-up batch cultivations. It was determined that up to 1.03 mg L^{-1} sesquiterpenoid products could be produced in completely photoautotrophic conditions and that the alga exhibited altered sesquiterpenoid production metabolism related to carbon source.

Keywords: Microalgae. *Chlamydomonas reinhardtii*. Terpenoids. Sesquiterpenoids. Patchoulol.

Abbreviations

PcPs – *Pogostemon cablin* Benth patchoulol synthase

TAP – Tris Acetate Phosphate medium

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