OA3.3 - Engineering cyanobacteria for increased production of a monoterpene

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Cyanobacteria are emerging platforms for sustainable production of fuels and useful chemicals. However, the low productivity of terpenes from cyanobacteria is a challenge that requires to be addressed. In this study, we engineered cyanobacteria for enhanced production of a commercially valuable monoterpene, limonene (1). The model cyanobacterium *Synechocystis* sp. PCC 6803 was engineered for limonene production by expressing *limonene synthases* from *Mentha spicata* and *Citrus limon*. To increase the production titer, we applied a computational modeling approach to identify targets for genetic modification that benefits limonene synthesis. Such strategy leads to a 2.3-fold increase in productivity compared to the parental strain. Furthermore, we engineered the fast-growing cyanobacterium *Synechococcus elongatus* UTEX 2973 (2) to achieve higher productivity of limonene. By optimizing the limonene synthesis pathway, the achieved productivity was 8-fold higher than those from all previously reported cyanobacteria. Our study demonstrates the feasibility of increasing limonene production in cyanobacteria and can be applied to phototrophic production of other high-value terpenes.

References

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