Engineering of Lycopene Production in *Escherichia coli*

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Abstract

Synthetic operons were engineered for recombinant production of lycopene in *Escherichia coli* DH5α. The constructed operons were composed of *crt* genes (*crtE, crtI,* and *crtB*), which originated from *Erwinia uredovora,* and were controlled under the regulation of the araBAD promoter. These constructs were integrated into high-copy or low-copy cloning vectors. In the case of high-copy vectors (pTB-EIB and pTB-EI4B), plasmid stability and lycopene production were affected by culture conditions. In particular, transformants with high-copy vectors produced lycopene without any arabinose induction. In addition, lycopene biosynthesis was also found to be reduced rather than increased by arabinose induction. All of the deleterious problems that were associated to the use of high copy vectors for recombinant lycopene production were overcome by using low-copy vectors (pTB-EIBrop and pTB-EI4Brop). In contrast to results obtained by using high-copy vectors, the amounts of lycopene biosynthesis were much higher and the plasmid stability was superior. In present study, the pTB-EI4Brop vector proved to be the most ideal for the production of lycopene in *Escherichia coli.* Cells harboring this vector produced up to 60 mg l^{-1} with 7 mg g^{-1} dry cell weight of lycopene content through fed-batch cultivation.

References

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