Effects of Oxygen Supply on Growth and Carotenoids Accumulation by \textit{Xanthophyllomyces dendrorhous}

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The effects of oxygen supply on growth and carotenoids accumulation by \textit{Xanthophyllomyces dendrorhous} were studied. Initial volumetric oxygen transfer coefficients ($K_{La}$) within the range 21.5–148.5 h\textsuperscript{-1} had significant effects on growth and carotenoids accumulation, and an increase of the initial $K_{La}$ value led to higher carotenoids, astaxanthin and biomass yields by \textit{X. dendrorhous}. At an initial $K_{La}$ value of 148.5 h\textsuperscript{-1}, a maximal cell concentration of 19.37 g l\textsuperscript{-1} and optimal carotenoids and astaxanthin productions of 18.1 and 14.5 mg l\textsuperscript{-1} were obtained, as well as a maximal astaxanthin content of 0.8 mg g DCW\textsuperscript{-1}, respectively. A higher oxygen supply was advantageous to astaxanthin biosynthesis and the ratio of astaxanthin in the total carotenoids. An increasing initial $K_{La}$ value gave stronger fluorescence intensities by \textit{X. dendrorhous}, resulting in the maximal intensity of fluorescence at the $K_{La}$ value 148.5 h\textsuperscript{-1}. The cell growth of \textit{X. dendrorhous} was significantly inhibited when dissolved oxygen tension (DOT) was controlled at ~20% air saturation, which was due to the oxygen limitation in broth. The astaxanthin yield and content at ~50% DOT were higher than those at ~20% DOT.

\textbf{Key words:} Volumetric Oxygen Transfer Coefficient, Total Carotenoids, \textit{Xanthophyllomyces dendrorhous}