



Lipid and Carotenoid Production by a *Rhodospiridium toruloides* and *Tetradosmus obliquus* Mixed Culture Using Primary Brewery Wastewater Supplemented with Sugarcane Molasses and Urea

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Abstract

In this study, *Rhodospiridium toruloides* and *Tetradosmus obliquus* were used for lipid and carotenoid production in mixed cultures using primary brewery wastewater (PBWW) as a culture medium, supplemented with sugarcane molasses (SCM) as a carbon source and urea as a nitrogen source. To improve biomass, lipid, and carotenoid production by *R. toruloides* and *T. obliquus* mixed cultures, initial SCM concentrations ranging from 10 to 280 g L⁻¹ were tested. The medium that allowed higher lipid content (26.2% w/w dry cell weight (DCW)) and higher carotenoid productivity (10.47 µg L⁻¹ h⁻¹) was the PBWW medium supplemented with 100 g L⁻¹ of SCM and 2 g L⁻¹ of urea, which was further used in the fed-batch mixed cultivation performed in a 7-L bioreactor. A maximum biomass concentration of 58.6 g L⁻¹ and maximum lipid content of 31.2% w/w DCW were obtained in the fed-batch cultivation. PBWW supplemented with SCM was successfully used as a low-cost medium to produce lipids and carotenoids in a *R. toruloides* and *T. obliquus* mixed culture, with higher productivities than in pure cultures, which can significantly reduce the cost of the biofuels obtained.

Keywords Mixed cultures · Primary brewery wastewater · Lipids · Carotenoids · *Tetradosmus obliquus* · *Rhodospiridium toruloides*

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