# Evaluation of carotenoids and lipids production by two isolated *Rhodosporidium kratochvilovae* strains using galactose-based media

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## Abstract

In recent years, there has been a growing interest in agro-industrial by-products valorization, as low-cost carbon sources for the production of microbial metabolites. Many research studies showed particular attention in the valorization of cheese whey, which is an abundant and lactose-rich raw material. However, studies dealing with the production of carotenoids by yeasts, employing cheese whey as substrate, are scarcely found in the literature, primarily due to their inability to assimilate lactose. Red yeasts, belonging to the *Rhodosporidium* genus synthesize carotenoids like b-carotene, torulene and torularhodin, while several of them are able to accumulate intracellularly lipids as well.

In the present study two isolated *Rhodosporidium kratochvilovae* strains (FMCC Y-42 & Y-43) were evaluated for the production of carotenoids and lipids using glucose, galactose and lactose based substrates. Submerged fermentations results showed that these strains do not assimilate lactose; however they were able to consume glucose and galactose. An experimental set-up was conducted in microplate to evaluate the specific growth rate ($\mu$, $h^{-1}$) under different carbon/nitrogen (C/N) ratios. Subsequently, selected C/N ratios were employed in submerged fermentations to identify biomass, carotenoid and lipid production. Results showed a negative correlation between carotenoid and lipid production. More specifically, the highest carotenoid accumulation was observed at low C/N ratio, whereas lipid synthesis, reaching a maximum yield of 70% (w/w), was favored at high C/N ratio. Maximum biomass concentration (14.4 g/L) was also obtained at low C/N ratio. This study presented the capability of *Rhodosporidium kratochvilovae* to utilize glucose/galactose-based substrates towards the synthesis of high-added value products, namely carotenoids and lipids, indicating the perspective to utilize hydrolyzed cheese whey as an alternative substrate.

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