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## Research Article

# Carotene production from waste cooking oil by *Blakeslea trispora* in a bubble column reactor: The role of oxidative stress

The oxidative stress induced by hydroperoxides and reactive oxygen species (ROS) during carotene production from waste cooking oil (WCO) and corn steep liquor (CSL) by the fungus *Blakeslea trispora* in a bubble column reactor was investigated. The specific activities of the intracellular enzymes superoxide dismutase (SOD) and catalase (CAT) as well as the micromorphology of the fungus were measured in order to study the response of the fungus to oxidative stress. The changes of the morphology of microorganism led to pellets formation and documented using a computerized image analysis system. As a consequence of the mild oxidative stress induced by hydroperoxides of WCO and ROS a significant increase in carotene production was obtained. The highest carotene concentration (980.0 mg/l or 51.5 mg/g dry biomass) was achieved in a medium consisted of CSL (80.0 g/L) and WCO (50.0 g/L) at an aeration rate of 5 vvm after 6 days of fermentation. In this case the carotenes produced consisted of  $\beta$ -carotene (71%),  $\gamma$ -carotene (26%), and lycopene (3%). The strong oxidative stress in the fungus caused a significant increase of  $\gamma$ -carotene concentration. Bubble column reactor is a useful fermentation system for carotene production in industrial scale.

**Keywords:** *Blakeslea trispora* / Bubble column reactor / Carotenes / Oxidative stress / Waste cooking oil

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