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Short title: Effect of initial pH of medium on composition of *R. glutinis* yeast biomass

Effect of initial pH of medium with potato wastewater and glycerol on protein, lipid and carotenoid biosynthesis by *Rhodotorula glutinis* yeast

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Abstract

Background: *Rhodotorula glutinis* yeast is capable of the synthesis of numerous valuable metabolites with extensive potential industrial usage. This paper reports the study on determination of the effect of initial culture medium pH on growth and protein, lipid and carotenoid biosynthesis by *R. glutinis* yeast.

Results: The highest biomass yield was obtained in media at pH 4.0–7.0, and the value after 72 h was 17.2–19.4 g_{d.w.}/L. An initial pH of the medium in the range 4.0–7.0 have no significant effect on the protein (38.5–41.3 g/100 g_{d.w.}), lipid (10.2–12.7 g/100 g_{d.w.}), or carotenoid (191.7–202.9 µg/g_{d.w.}) content in the biomass, or on the profile of synthesized fatty acids and carotenoids. The whole pool of fatty acids was dominated by oleic (48.1–53.4%), linoleic (21.4–25.1%) and palmitic acids (13.0–15.8%). In these conditions, the yeast mainly synthesized torulene (43.5–47.7%) and β-carotene (34.7–38.6%), whereas the torularhodin contribution was only 12.1–16.8%. Cultivation in medium at initial pH of 3.0 resulted in a growth reduction (13.0 g_{d.w.}/L) and total carotenoid (115.8 µg/g_{d.w.}), linoleic acid (11.5%) and torularhodin (4.5%) biosynthesis.

Conclusion: The different values of initial pH of the culture medium with glycerol and deproteinized potato wastewater had a significant effect on the growth and on protein, lipid and carotenoid biosynthesis by *R. glutinis* yeast.

Keywords: biomass yield; Carotenoids; fatty acids; linoleic acid; lipid content; Metabolites; oleic acid; palmitic acid; SCO; SCP; Wastes;

1. Introduction

Microorganisms are capable of the biosynthesis of many valuable metabolites, such as lipids (SCO–Single Cell Oil), microbial proteins (SCP–Single Cell Protein) and carotenoids. The ability to synthesize these cellular compounds is characteristic of

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