Bioconversion of plant wastes to \(\beta\)-carotene by Rhodotorula glutinis KU550702

Magdy Mohamed Khalil Bagy, Mohamed Hemida Abd-Alla, Nivien Allam Nafady, Fatthy Mohamed Morsy, Ghada Abd-Elmonsef Mahmoud

Abstract:

Microbial synthesis of \(\beta\)-carotene has gained more interest as an alternative to synthetic \(\beta\)-carotene due to easy extraction and high yield. The vitamin microbial production is mainly dependent on culture conditions and the medium compositions. In this study, the \(\beta\)-carotene production by the Rhodotorula glutinis ASU6 (KU550702) was evaluated under different growth conditions and nutrient composition. Different agro-renewable wastes were tested as carbon source for R. glutinis to obtain maximum amount of \(\beta\)-carotene. Meanwhile, it is clear that R. glutinis could grow well on acid extract of onion peels and produced large amount of \(\beta\)-carotene. Initial statistical screening using a Plackett-Burman design showed temperature, incubation time, fermentation type, non-treated onion waste, KH2PO4 and L-asparagine as significantly, influencing \(\beta\)-carotene production. Response surface methodology was applied to determine the mutual interactions between these parameters and optimal levels for \(\beta\)-carotene production. The maximum value of \(\beta\)-carotene production was 204.29 mg/l (7.5-fold) of value observed as central point of the central composite design. All the experimental data are in good agreement with predicted ones, confirming the responsibility of the proposed empirical model in describing \(\beta\)-carotene production by R. glutinis. In the whole, the outcomes of this study support the exploitation of onion peels through microbial fermentation for \(\beta\)-carotene production.

Keywords:

\(\beta\)-carotene; Agro waste; RSM; Rhodotorula glutinis.

Published In:

European Journal of Biological Research , 6 , 226-241