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## STRATEGIES FOR THE MICROBIAL CAROTENOIDS PRODUCTION COMPETITIVENESS IMPROVEMENT

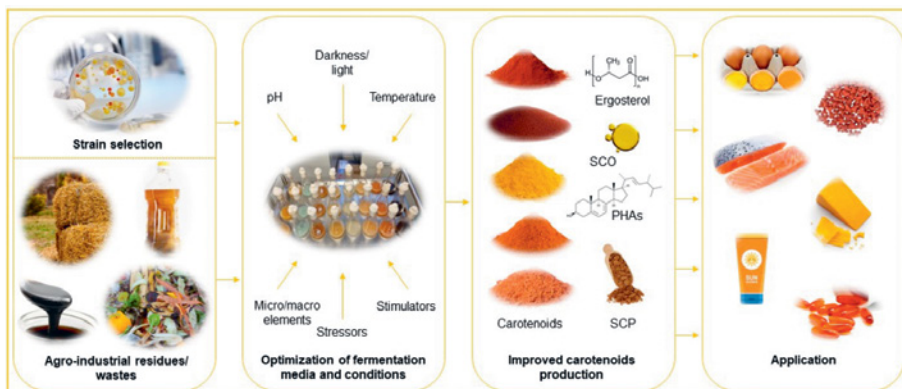
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**Abstract** – The research and development of carotenoids production have a long history, and interest in this group of pigments has not decreased to this day. Among all existing carotenoids, six are considered industrially important: astaxanthin,  $\beta$ -carotene, lutein, zeaxanthin, canthaxanthin, and lycopene. These carotenoids have a wide range of application and are used as additives in food and beverage, feed, nutraceuticals, pharmaceuticals, and cosmetics due to their bioactive and colour properties. An undisputed leader in the global pigment market is chemically synthesized carotenoids. To a lesser extent, carotenoids derived from natural sources as plants and microorganisms. Currently, the market of natural carotenoids is mainly represented by microalgae *Haematococcus pluvialis*, *Dunaliella salina*, *Botryococcus braunii*, fungus *Blakeslea trispora*, yeast *Phaffia rhodozyma* and bacteria *Paracoccus carotinifaciens*. These microorganisms afford the production of astaxanthin,  $\beta$ carotene, canthaxanthin, and lycopene. In turn, lutein is obtained by extracting marigold flowers *Tagetes erecta L.* and there is no other competitive source yet. Therefore, the potential of microorganisms to synthesize and accumulate lutein and other equally important carotenoids in their cells has been actively studied. Several yeast and bacteria species from Rhodosporidium, Rhodotorula, Sporobolomyces, Sphingomonas, Gordonia, and Sphingobacterium genus have a potential to replenish the diversity of sources of industrially important natural pigments, but available technologies still need improving. This paper reviews strategies for increasing of competitiveness of fungal and bacterial carotenoids production. Strategies such as selection of carotenogenic strain, use of low-cost substrates, simultaneous production of carotenoids and other value-added compounds, and optimization of fermentation medium and conditions are considered.

**Keywords** – Agro-industrial wastes; bacteria; by-products; ergosterol; pigment; polyhydroxyalkanoates; single-cell oil; single-cell protein; yeast



Strategies for improving microbial carotenoid production.