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PHAFFIA RHODOZYMA- SOURCE OF ASTAXANTHIN**Nida Tabassum Khan***

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Abstract

Phaffia rhodozyma is a carotenoid producing fermentative deuteromycete yeast having astaxanthin as the fundamental pigment, it is the most encouraging and natural resource of astaxanthin with an extraordinary application in biotechnology such as use of biosynthetic astaxanthin in the preparation of feeds for aqua cultures

Keywords: Anamorph; Aquaculture; Feed; Carotenoid; Astaxanthin

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Introduction

Phaffia rhodozyma isolates were initially obtained from Russia, Chile, Finland, and the United States [1]. Two well-known species appear to exist including *anamorph Phaffia rhodozyma* and the lagomorph *Xanthophyllomyces dendrorhous* [2]. Because of *Phaffia rhodozyma* capacity to orchestrate the industrially significant carotenoid astaxanthin, there has been extensive business interest in the development of the yeast as a natural source of carotenoids [3,4]. *Phaffia rhodozyma* initially known as *Rhodozyma montanae* appeared orange-red because of the presence of carotenoid shades and which shifted in intensity relying upon the strain [5]. The yeast was perceived to be of basidiomycetous origin in light of its

morphology, cell wall formation, bud development, pigmentation, and metabolic properties [6,7]. In addition, it can ferment various sugars including glucose, maltose, sucrose, and raffinose [8]. *Phaffia rhodozyma* exhibits a dikaryotic mycelium and teleomorphic development, a sexual life cycle was not found [9].

Source of Astaxanthin

Since animals cannot produce carotenoids, Astaxanthin is an important well-known carotenoid utilized as a feed in aquaculture for salmonoid pigmentation [10]. Salmon cultivating is a multibillion-dollar industry that is developing and steadily supplanting the World's wild salmon fisheries [11,12]. The most expensive substance in their feed is astaxanthin, and the estimated market for

astaxanthin is >US \$10 million annually [13]. Thus, astaxanthin biosynthesis from *Phaffia rhodozyma* will surely enhance the development of further improved strains [14]. The red yeast *Phaffia rhodozyma* is considered as a useful source of astaxanthin which has numerous natural properties such as cell reinforcement, immunomodulatory, antioxidant, antitumor, stimulating erythrocyte synthesis, elevating ATP generation, increasing yolk /meat pigmentation etc [15,16].

The following characteristics of *Phaffia rhodozyma* for the synthesis of Astaxanthin

- *Phaffia rhodozyma* have most elevated level of astaxanthin in their biomass so by utilizing *Phaffia rhodozyma* astaxanthin, has the capacity to transform carbon from agro-industrial wastes added into bioproduct that have quick heterotrophic digestion may decreased cultivation time [17].
- Microbial synthesis of astaxanthin utilizing *Phaffia rhodozyma* requires ideal reaction conditions, like media, temperature, pH etc are key essentials to accomplish high astaxanthin yields [18]
- *Phaffia rhodozyma* can absorb different carbon sources, easy culture and inexpensiveness [19]
- *Phaffia rhodozyma* mediated astaxanthin synthesis function as an antioxidant and is generally utilized in the makeup industry [20]
- Utilizing inactivated yeast in poultry feeds enhances the development and is also a substitute to anti-microbial based drugs [21]
- The whole yeast or their cell wall components have been utilized to impact the morphology, physiology, and microflora of the digestive system of broiler chicken [22]

Conclusion

Phaffia rhodozyma is an anamorphic yeast, an abundant source of carotenoid astaxanthin utilized in the feed industry on large scale to promote growth and in development of poultry and aqua cultures.

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