

# Bioprospecting of Environmental Yeast *Rhodotorula* Isolated from Indian Ocean for the Production of Beta Carotene/Pre-Vitamin A

Misbah M. Yaseen\*, Naheed Afshan

Department of Microbiology, Jinnah University for Women, Karachi, Pakistan

\*E-mail: misbahyaseen94@gmail.com

## ABSTRACT

Diversity of marine environment always allure researchers for the hunting of bioactive molecules which can be useful for various purposes especially for bioprospecting in order to meet the consumer demand in natural ways therefore, the focus is more shifted to marine environment. Beta carotene or pre vitamin A is one of the examples of bioactive molecule which is equally important in nutraceuticals and cosmetics but the production by natural terrestrial means is not enough to meet consumers demand. So, researchers are exploring more unique ways to overcome this situation. Carotene is usually extracted from plants by phytochemical means or from other microorganisms. In this research carotene producing yeast *Rhodotorula* was isolated from oceanic dead zone of Arabian sea, Indian ocean and fermentation was performed in YM medium, the beta carotene was extracted by mean of chemical disruption method using DMSO. Salkowski test was performed as confirmatory test and spectrophotometry was done to calculate the amount of  $\beta$ - carotene is produced which is 3062.5ug/g of total yeast biomass. In future we should utilize oceans and marine ecosystem as a source for the extraction of products which are valuable to human health and have positive impact on economy.

**Keywords:** Beta carotene, Bioprospecting, Marine yeast, Oceanic dead zone, *Rhodotorula*.

## INTRODUCTION

*Rhodotorula* is single cell yeast present in ubiquitous environment. It gives appealing color when grown on SDA and famous for producing orange – red pigment [1]. Initially considered as saprophytic responsible for rotting of fruits and vegetables but according to recent researches it can be useful to obtain valuable products like oils, bioactive compounds and can play important role in bioremediation. One of the products to extract from *Rhodotorula* is beta carotene. Beta carotene belongs to the large family of pigment carotenoids. Rather than just pigment they plays an important role in economy and especially human health [2].

## OBJECTIVE

The main aim of the study is to utilize oceans and marine ecosystem as a source for the extraction of products which are valuable to human health and have positive impact on economy.

## IMPORTANCE OF BETA CAROTENE

Beta carotene is an antioxidant. An antioxidant is a substance that inhibits the oxidation of other molecules; it protects the body from free radicals. Free radicals damage cells through oxidation. Eventually, the damage caused by free radicals can cause several chronic illnesses. It is the main safe dietary source of vitamin A, essential for normal growth and development, immune system function, healthy skin and epithelia and vision. Carotenes especially beta carotene have great impact on health. They are the precursor of vitamin A (Retinol).

Human body cannot synthesis carotene or vitamin A hence must be taken in diet. It is very good for vision. Keep eyes moist and improve night vision it makes your eye adjust to light changes [3].

## **METHODOLOGY**

### **Sample collection**

Sample was collected from surface water of Arabian sea and presence of yeast was confirmed by performing microscopy

### **Isolation and pure culture**

0.1 mL of sample was streaked on SDA and incubated at 25°C for 72 hours after that pale orange colonies were isolated and incubated under pervious conditions

### **Cell suspension and inoculum preparation**

Colonies from SDA were suspended in 0.1% of 1mL peptone water and mixed with 9 mL of YM medium and incubated at incubated at 25°C for 2 days.

### **Fermentation of culture**

10 mL inoculum was mixed with 90 mL of YM medium and again incubated for 6 days at 25°C and exposed to shaking for 6-7 days at 150 rpm.

### **Collection of biomass and cell disruption**

Fermented medium was centrifuged sediments was collected washed dried and mixed with DMSO and heated vigorously with intervals of 15 mins for 1 hour.

### **Confirmation, spectrophotometry**

For the confirmation of carotene Salkowski test was performed and absorptivity of resultant product was checked under 490 nm light.

## **RESULTS**

By performing the bioprospecting of marine yeast *Rhodotorula* end product of 3062.5ug/g of total concentration of carotene obtained which is high as compared to any other method which may be because purity checking was not performed.

## **CONCLUSION**

Marine yeast like *Rhodotorula* can potentially be used for the bioproduction of beta carotene to meet the consumers demand in more natural way and by optimizing the cultural condition, incubation time or by increasing the amount of DMSO for chemical disruption we can actually obtain more amount of product as compared to other methods like extraction from plants by phytochemical means or from other bacteria which gives relatively a small number of carotenes. There is a high demand of carotene derived from natural resources as compared to synthetic one due to increase in pharmaceuticals, cosmeceutical and nutraceutical industries. Hence the oceans and marine ecosystem can be explored in search of many valuable products like beta carotene which have positive impact on economy and human health without exploiting resources available on land.

## REFERENCES

1. Wirth, Fernanda, and Luciano Z. Goldani. "Epidemiology of Rhodotorula: an emerging pathogen." *Interdisciplinary perspectives on infectious diseases 2012* (2012).
2. Kot, Anna M., *et al.* "Rhodotorula glutinis—potential source of lipids, carotenoids, and enzymes for use in industries." *Applied microbiology and biotechnology* 100.14 (2016): 6103-6117.
3. Cogdell, Richard John. "Carotenoids in photosynthesis." *Philosophical Transactions of the Royal Society of London. B, Biological Sciences* 284.1002 (1978): 569-579.
4. Lapointe, Brian E., Mark M. Littler, and Diane S. Littler. "Nutrient availability to marine macroalgae in siliciclastic versus carbonate-rich coastal waters." *Estuaries* 15.1 (1992): 75-82.