

LIGHT AND TEMPERATURE EFFECTS ON THE ACCUMULATION OF β -CAROTENE IN *RHODOTORULA* YEASTS

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INTRODUCTION & AIM

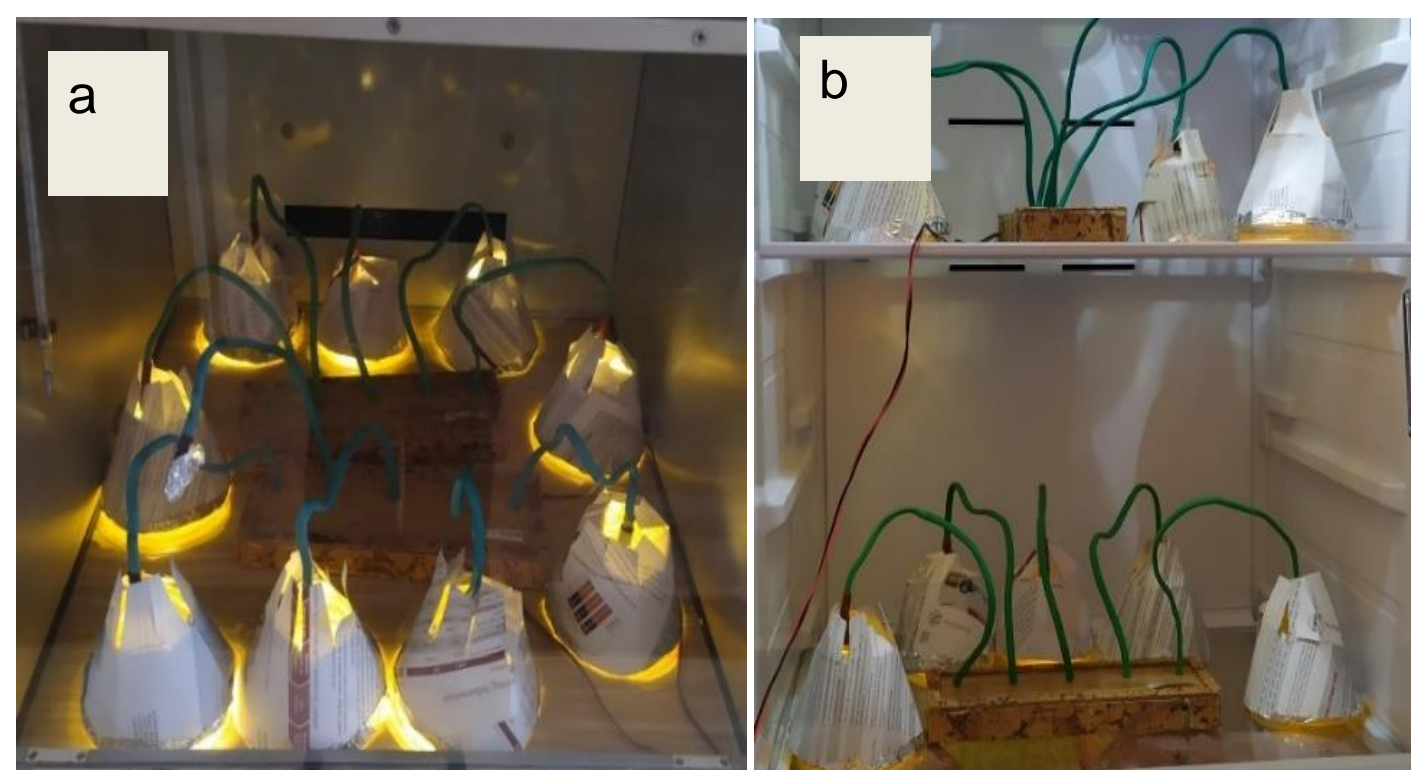
Yeasts of the genus *Rhodotorula* have pink, orange, and red colors, indicating their ability to synthesize carotenoids. Due to their biological properties, carotenoids are bioactive molecules and widely used in the phytomedicine, chemical, pharmaceutical, cosmetic, food, and feed industries. One of the most important carotenoids is β -carotene, which has attractive biological activity, such as antioxidant, anticancer, and antimicrobial.

METHOD

Rhodotorula yeasts were isolated from the natural environment and analyzed using morphological and molecular methods. Species were identified based on the restriction fragment length polymorphism analysis and sequencing of the rDNA internal transcribed spacer region (ITS). In this work, the β -carotene content of *Rhodotorula* yeasts was investigated when grown on solid YEPD medium at different temperatures (4 °C and 26 °C) using various intensities of light (8-10 $\mu\text{mol}/\text{m}^2\text{s}$). The biomass was collected, and carotenoids were extracted using dimethylformamide (DMF). The amount of β -carotene was calculated based on absorption at 440 nm.

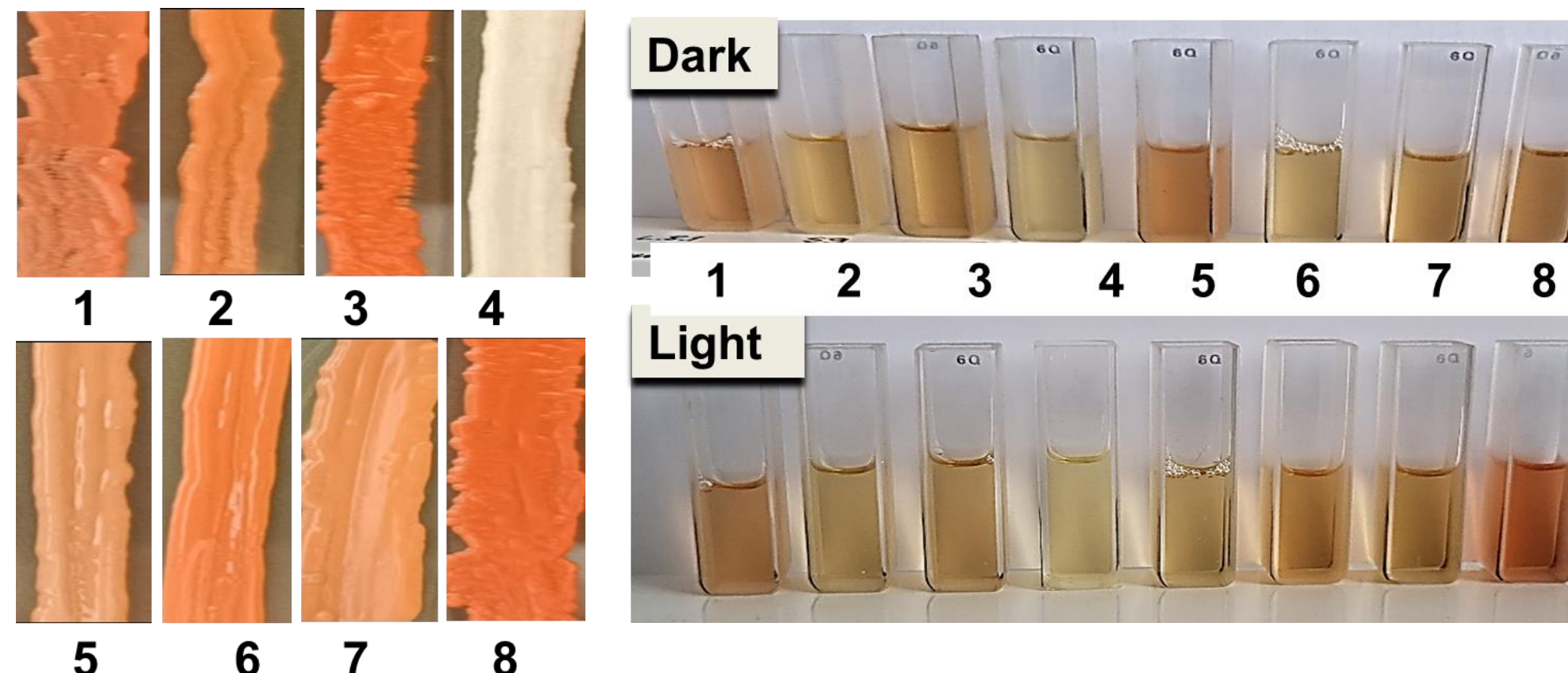
RESULTS & DISCUSSION

Lighting experiment design



Rhodotorula spp. yeast samples were cultured under white light at 26 °C (a) and 4 °C (b) using a self-generated lighting system.

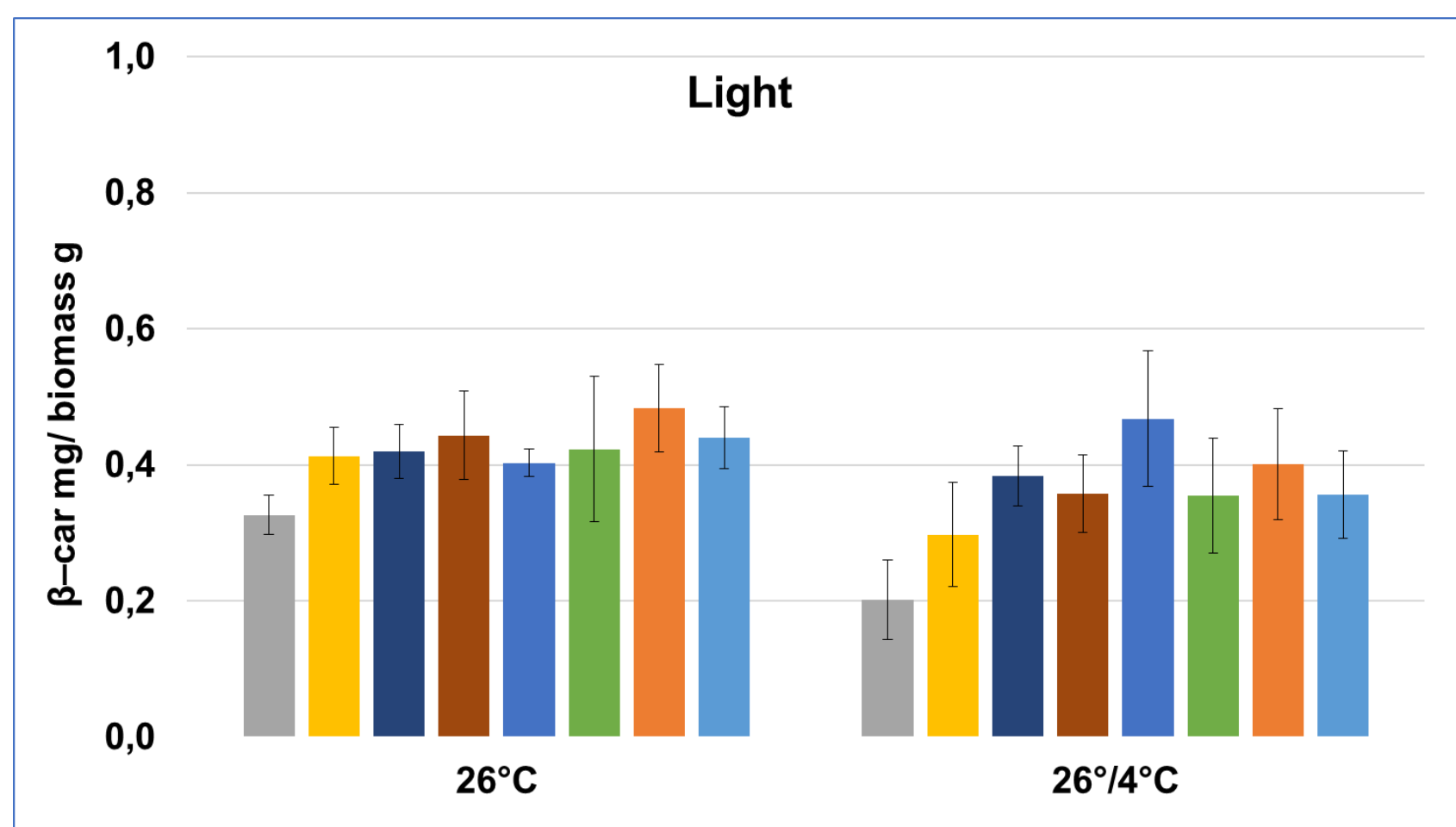
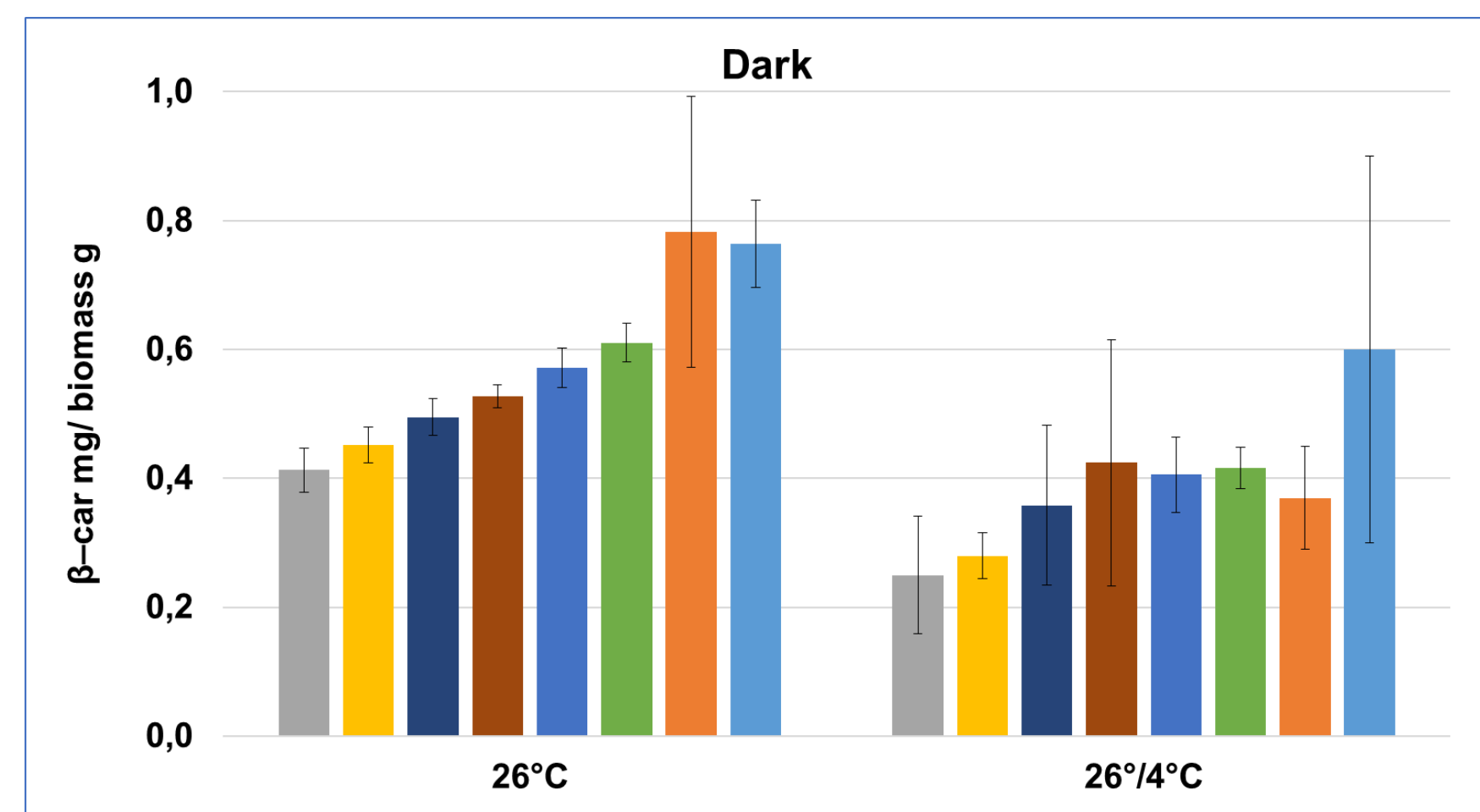
The color change of *Rhodotorula* spp. yeasts



Red colourization of *Rhodotorula* spp. yeasts cells kept in the dark and light conditions for 14 days at 26 °C.

1. *R. glutinis*
2. *R. mucilaginosa*
3. *R. diobovata*
4. *R. ingeniosa*
5. *R. dairenensis*
6. *R. graminis*
7. *R. kratochvilovae*
8. *R. babjevae*

β -carotene accumulation in *Rhodotorula* spp. yeasts



- *R. ingeniosa*
- *R. dairenensis*
- *R. mucilaginosa*
- *R. diobovata*
- *R. kratochvilovae*
- *R. glutinis*
- *R. babjevae*

The highest β -carotene content was found in *R. babjevae* and *R. glutinis* after 14 days of incubation at 26 °C in the dark. The level of β -carotene was 30 to 55% lower, depending on yeast species, when the yeast culture after 2 days of cultivation at 26 °C was transferred to 4 °C and followed by 12 days of incubation in the dark. The lowest level of β -carotene was accumulated when yeasts were kept for two weeks in the light at 4 °C.

CONCLUSION

The ability of *Rhodotorula* yeasts to synthesize and accumulate β -carotene is temperature and lighting-dependent. Tested yeasts cultured in the dark at 26 °C accumulate β -carotene better than yeasts held under the same conditions in the light. The β -carotene content decreased at a low temperature. Our data suggest that *Rhodotorula* yeast species cultivated under appropriate conditions can be promising for carotenoid production.