Los hongos como fuente de colorantes alimentarios

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Introduction

The color of food influences how we perceive and choose to consume it. The food industry is looking for natural alternatives to synthetic colorants, such as mushroom pigments. These pigments, which are safe for human consumption, offer a wide range of colors and have attracted interest in food research due to the growing demand for natural ingredients and concerns about the safety of artificial dyes.

Objectives

- To introduce the basics on the use of fungi as a natural food colorant:
- To study the safety of fungal dyes in the food industry, focusing on their toxicity and potential adverse health effects.
- To evaluate fungal pigments as a source of food dyes can become an alternative to traditional synthetic dyes.

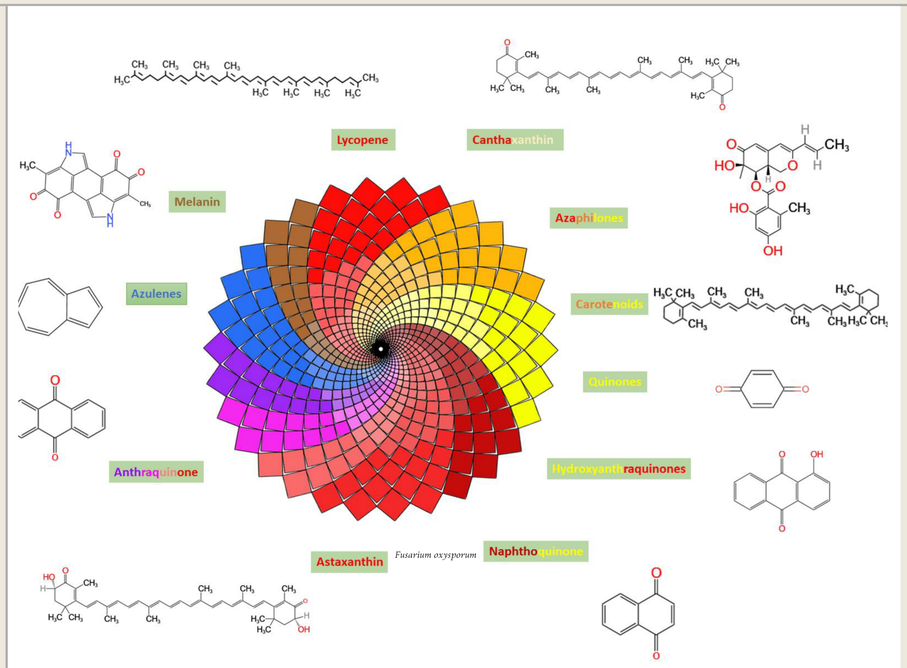

Figure 1. Fungal pigments (carotenoids and polyketides) exhibiting their color and their typical structure skeletons. [1]

Fungal pigments

Fungi are known to produce a wide range of pigments including metabolites of various classes such as melanins, anthraquinones, hydroxyanthraquinones, azaphylones, carotenoids, oxopolyenes, quinones and naphthoquinones.

Major producers

We have evidence that ascomycetous fungi produce a wide variety of dyes; the most important producers are the genera Monascus, Penicillium, Aspergillus, Paecilomyces, Neurospora, Eurotium, Drechslera and Trichoderma.

Conclusion

- Fungal pigments require a proper safety evaluation, maneging and conditions to be qualified to their industrial use
- Colorants of fungal origin are usually more advantageous than synthetic ones where in many of these, we are told that fungi can be a great source of colorants as well as beneficial to health.

References

Afroz Toma, M., Rahman, M. H., Rahman, M. S., Arif, M., Nazir, K. H. M. N. H., & Dufossé, L. (2023). Fungal Pigments: Carotenoids, Riboflavin, and Polyketides with Diverse Applications. Journal of Fungi (Basel, Switzerland), 9(4). [1]

Valenzuela-Gloria, M. S., Balagurusamy, N., Chávez-González, M. L., Aguilar, O., Hernández-Almanza, A., & Aguilar, C. N. (2021). Molecular characterization of fungal pigments. Journal of Fungi, 7(5). [2]

Poorniammal, R., Prabhu, S., Dufossé, L., & Kannan, J. (2021). Safety Evaluation of Fungal Pigments for Food Applications. Journal of Fungi, 7(9). [3]

Extraction and production

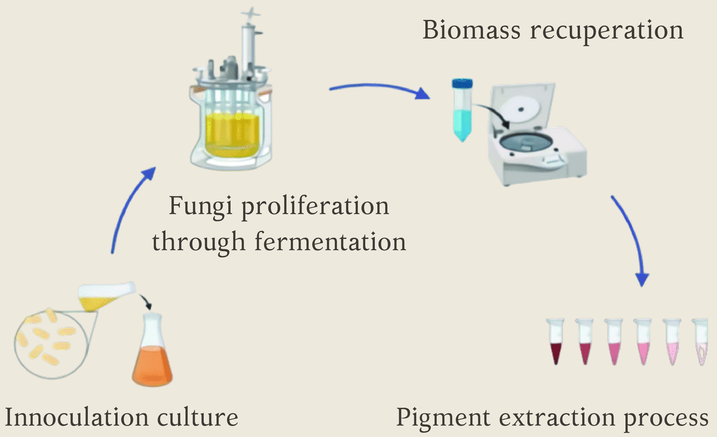

Figure 2. A general scheme for the production of fungal pigments under established controlled conditions. [2]

Safety and potential toxicity

Species	Pigment	Color	Mycotoxin	Safety evaluation
Aspergillus carbonarius	Melanins	Yellow	Not described/not found up to now	Subacute toxicity study
Blackeslea trispora	ß-carotene	Red-orange	Aflatoxin, Mycotoxine	Genotoxicity and subacute toxicity study
Fusarium graminearum	Rubrofusarin	Red	Fumonisins	Cytotoxic in colon cells
Monascus ruber	Monascorubrin and rubropunctatin	Orange-red	No coproduction of toxin	Oral toxicity
Penicillium europium	Benzoquinone	Pinkish red	Nontoxic	Subacute toxicity study

Table 1. Own table. Important fungal pigments and their safety evaluation. Own table. Content extracted from article [3].