The use of Ascomycota and Basidiomycota strains in the synthesis of natural pigments and flavors

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Currently, natural pigments in comparison to the synthetic colors have taken a lead in a rapidly changing industry. Considerable attention has been paid to exploring the biotechnological applications of several *Monascus* sp. for pigment production. An endophytic Ascomycota strain isolated from leaves of *Origanum majorana* was identified as *Monascus ruber* SRZ112 produced following pigments: rubropunctamine, monascin, ankaflavin, rubropunctatin, and monascorubrin. As a first step towards developing an efficient production platform of red pigments, the suitability of seven types of agro-industrial waste was evaluated. To increase yield of red pigments, favourable culture conditions including incubation temperature, incubation period, pH of moistening agent, inoculum concentration, substrate weight and moisture level were evaluated. Additionally, yield of red pigments was intensified after the exposure of *M. ruber* SRZ112 spores to 1.00 KGy gamma rays [1]. In our further studies, this mutant was employed in the immobilization technique using various entrapment carriers. Subsequently, we optimized the culture medium for maximal red pigment production using the Response Surface Methodology. Finally, these immobilized cultures were successfully utilized for red pigment production using a semi-continuous mode of fermentation. Importantly, this study marks the successful production of *Monascus* red pigments in a semi-continuous mode using gamma rays' mutant strain [2].

The second part of presented research is placed within the context of natural flavor biogeneration. More specifically, our work has been conceived to find a biotechnological solution to the current shortage of natural fragrant benzaldehydes. Indeed, during the last twenty years, the major food brands gradually eliminate artificial flavors from their commercial products. This general trend has created a problem to the worldwide supply of natural vanillin and piperonal, which prices have increased steadily. Herein, the microbiological alkene cleavage of propenylbenzenes, including isosafrole, anethole, isoeugenol [3] as well as reduction of benzoic acid derivatives, namely *p*-anisic, vanillic, veratric, piperonylic, and eudesmic acids [4], to produce the corresponding fragrant aldehydes will be discussed. We found that different Basidiomycota strains efficiently perform this transformation, with good chemical selectivity and tolerance to the toxicity of substrates and products.

References

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Acknowledgments

The presented research is part of the BioExplor project No. 2021/43/P/NZ9/02241 co-funded by the National Science Centre and the European Union Framework Programme for Research and Innovation Horizon 2020 under the Marie Skłodowska-Curie grant agreement no. 945339.