Posidonia oceanica egagropili as renewable source for melanin production by Streptomyces nashvillensis

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Melanin is isolated from the ink sac of *Sepia officinalis* with expensive procedures that depends on the availability of the supplies. Biotechnological production processes of melanin are considered more environmentally friendly and easy to be scaled up. However, the possibility to biotechnologically produce melanin by Streptomycetes has been poorly investigated so far, as well as the employment of lignocellulose substrates for its biosynthesis. *Posidonia oceanica* egagropili are considered a new, possible, unexpensive biomass to valorize as it accumulates as waste along the Mediterranean Sea coasts as dry ball-shaped material. Therefore, their lignocellulose content might support bacterial growth and melanin production if used as substrate for *Streptomyces* strains. In this work the possibility to produce melanin by *S. nashvillensis* DSM 40314 was first investigated on a glucose, yeast extract, and malt extract-based medium, by testing the influence of different temperature (26, 28 and 30 °C) and pH (6.0 and 7.0) values on bacterial growth and melanin production. At 28 °C and pH 7.0, a maximum biomass of 8.4 ± 0.5 gcdw·L-1 and a melanin concentration of 0.74 ± 0.01 g·L-1 (with a yield on biomass of 0.09 ± 0.01 g·gcdw-1 and a productivity of 0.008 ± 0.001 g·L-1·h-1) were reached in 96 h. Then, different concentration of the egagropili (1.0, 2.5 and 5.0 g·L-1) were supplemented to the growth medium, and, a maximum biomass of 10.1 ± 0.1 gcdw·L-1 and a four-time higher melanin production, up 3.0 ± 0.2 g·L-1 (with a yield on biomass of 0.3 ± 0.05 g·gcdw-1 and a productivity of 0.031 ± 0.01 g·L-1·h-1) were obtained in 96 h by adding to the medium 5.0 g·L-1 of egagropili, just in the form of powder, without any pre-treatment. The pigment was purified by acidic precipitation and characterized by UV, FT-IR, mono e bi-dimensional NMR and elemental analyses.

References

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