TITLE: SOLID-STATE FERMENTATION FOR LOW-COST PRODUCTION OF PRODIGIOSIN BY *Serratia marcescens* UCP 1549.

AUTHORS: SANTOS, R. A.; SILVA, L. A. R.; FERREIRA, I. N. S.; NOVAES, C. F.; DOS SANTOS, P. N.; FRANÇA, E. S.; SOBRAL, D. M.; MONTERO-RODRÍGUEZ, D.; CAMPOS-TAKAKI, G. M.; LIMA, M. A. B.

INSTITUTION: UNIVERSIDADE CATÓLICA DE PERNAMBUCO, RECIFE, PE (RUA DO PRÍNCIPE, 526 - BOA VISTA, CEP 50050-900, RECIFE-PE, BRASIL)

ABSTRACT:

Worldwide interest for natural dyes have increased because of their better biodegradability and compatibility with the environment, as well as lower toxicity and allergic reaction, when compared with the synthetic ones. Microbial pigments stand out as the most potential choice for obtain natural colorants due to their short production cycle, independence from weather conditions and high productivity. In this context, prodigiosin is a red pigment synthetized mainly by the bacterium *Serratia marcescens*, which possess several biological properties and have gained increasing relevance in industrial markets such as drugs, cosmetics and textile dyeing. However, limitations like high cost production and low yield make unprofitable its large-scale production. Then, this study aimed to the production of prodigiosin by *S. marcescens* UCP 1549 using solid-state fermentation (SSF) as low-cost technology. Fermentation was carried out during 120 h using wheat bran as inexpensive substrate and a 2^3 full-factorial design (FFD) was performed in order to evaluate the effect of temperature, inoculum size and concentration of waste soybean oil (WSO) on the production process. The red pigment was extracted using chloroform: methanol from lyophilized biomass obtained after incubation with distilled water, filtration and centrifugation, and identified by UV-Vis spectrophotometry. The results demonstrated that the bacterium was able to grow in all conditions tested, but the highest production of biomass (354.0 g/kg of wheat bran) occurred in assay 7 of FFD, at 21ºC, 7 % of inoculum size and 7 % of WSO in impregnating solution. However, the highest yield of red pigment (122.36 g/kg of wheat bran) was obtained in condition of central point, at 28ºC, 5 % of inoculum size and 5 % of WSO in impregnating solution. The pigment was identified as prodigiosin by preliminary test and confirmed by the maximum peak of UV absorbance at 535 nm. The yield of prodigiosin obtained here was higher than others previously related in the literature using SSF and agro-industrial substrates. Therefore, this work demonstrated SSF as a suitable strategy for getting inexpensive prodigiosin and expediting its large-scale production.

Keywords: *Serratia marcescens*, pigment, static fermentation, wheat bran, waste soybean oil.

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