OPTIMIZATION OF PIGMENT EXTRACTION FROM QUINOA FLOUR FERMENTED BY *Monascus purpureus* SUPPLEMENTED WITH SODIUM CHLORIDE †

Foods 2022

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INTRODUCTION

Monascus pigments as natural food dyes have been widely used in food industries around the world, and are known to provide antimutagenic properties, anticarcinogenic and antimicrobial activities and possible anti-obesity activities. Sodium chloride may contribute to the production of these beneficial secondary metabolites. The objectives of this study were: To optimize the hydroethanol extraction of the pigments from quinoa flour fermented by *M. purpureus*; and To establish a relationship to predict extract concentration (g/ml) by spectrophotometry of the hydroethanol extracts.

METHODS

The samples came from a solid-state fermentation of quinoa grains with *M. purpureus* supplemented with 0.5% sodium chloride (w/w) harvested on the eighth day. A Box-Behnken design (BBD) with a response surface model (RSM) were used to optimize the pigment extraction conditions of these flours.

RESULTS

The extraction yield was 26.2±0.26 under the optimized conditions (ethanol graduation of 50º, extraction temperature of 55ºC and ethanol: sample ratio of 40:1 (v/w). In addition, the best equation to predict extract concentration was linear and was attained by adding up absorbances measured at 400, 470 and 500 nm at a dilution of 1:6 (R^2=0.964).

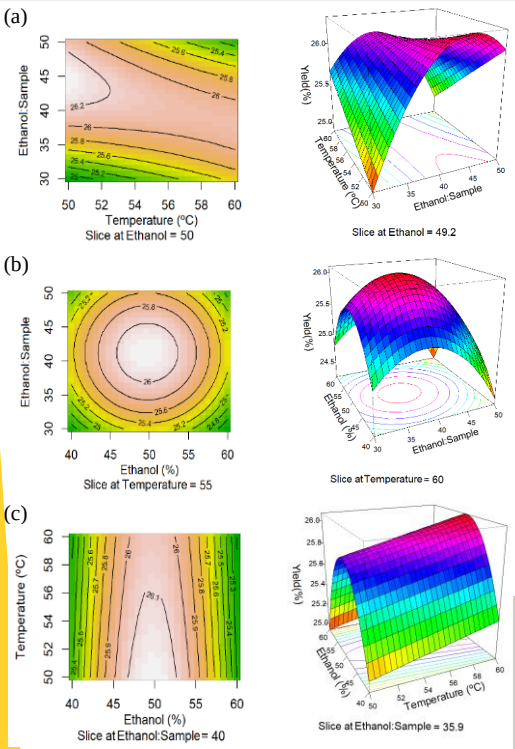

Figure1. Contour and response surface plots showing the effect of Ethanol (%), extraction temperature (°C) and ethanol:sample ratio (ml/g) on the extraction yield of pigments from quinoa flour fermented with sodium chloride.

Table 1. BBD experimental design for three factors: Ethanol (%), Temperature (°C), Ethanol:Sample ratio for the pigment extraction from quinoa flour fermented by *Monascus purpureus* supplemented with sodium chloride.

Run Order	Ethanol (%)	Temperature (°C)	Ethanol : Sample (ml/g)
1	60	50	40
2	50	55	40
3	40	50	40
4	40	55	50
5	40	60	40
6	50	55	40
7	60	55	50
8	50	50	50
9	60	55	30
10	40	55	30
11	50	60	50
12	50	50	30
13	60	60	40
14	50	60	30

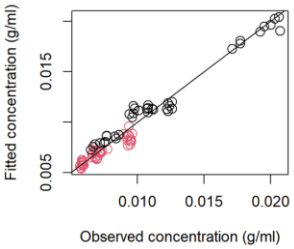

Figure 2. Linear regression model of salt fermentation sample..

CONCLUSION

This study has optimized the conditions for the hydroethanolic extraction of pigments from quinoa flour fermented by *M. purpureus* when supplemented with sodium chloride. Contrarily to what is commonly used in hydroethanolic extractions, a low ethanol graduation of 49% was found to maximise the yield. This implies that extraction of pigments from fermented quinoa flour can be economically feasible. This study also derived a very useful equation for future rapid estimations of extract concentrations.

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ACKNOWLEDGMENTS

This work was funded by CONCYTEC-PROCIENCIA under the Basic Research Project 2019-01 [contract 383-2019-FONDECYT]. We would also like to thank the Laboratorio de Microbiología de Alimentos UNALM, Laboratorio de Biotecnología Ambiental-Biorremediación UNALM and Centro de Investigação de Montanha (CIMO). U. Gonzales-Barron would like to thank the national funding by FCT, through the institutional scientific employment program-contract.

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