

VALORISATION OF NON-COMMERCIAL BY-PRODUCTS FROM MEDITERRANEAN MUSSEL *Mytilus galloprovincialis* FOR THE OBTENTION OF ANTIMICROBIAL EXTRACTS WITH AQUACULTURE APPLICATIONS



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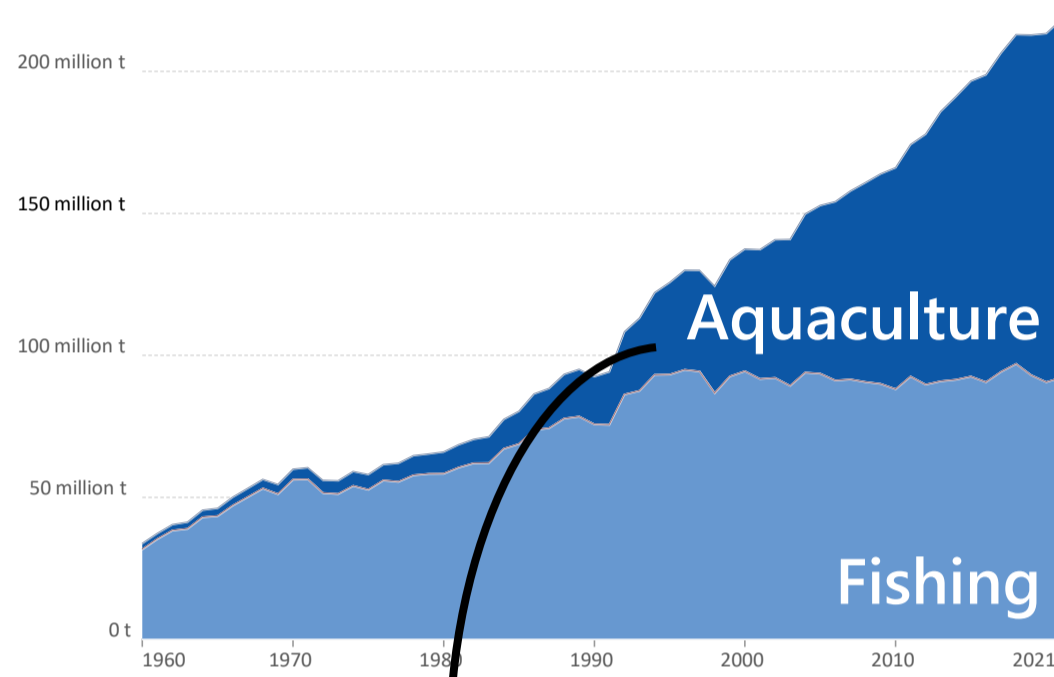
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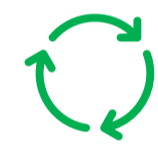
INTRODUCTION

Aquaculture is crucial to global food security, providing an alternative to over-exploitation of marine resources, but faces sustainability challenges such as bacterial diseases and discard management.

Seafood Production



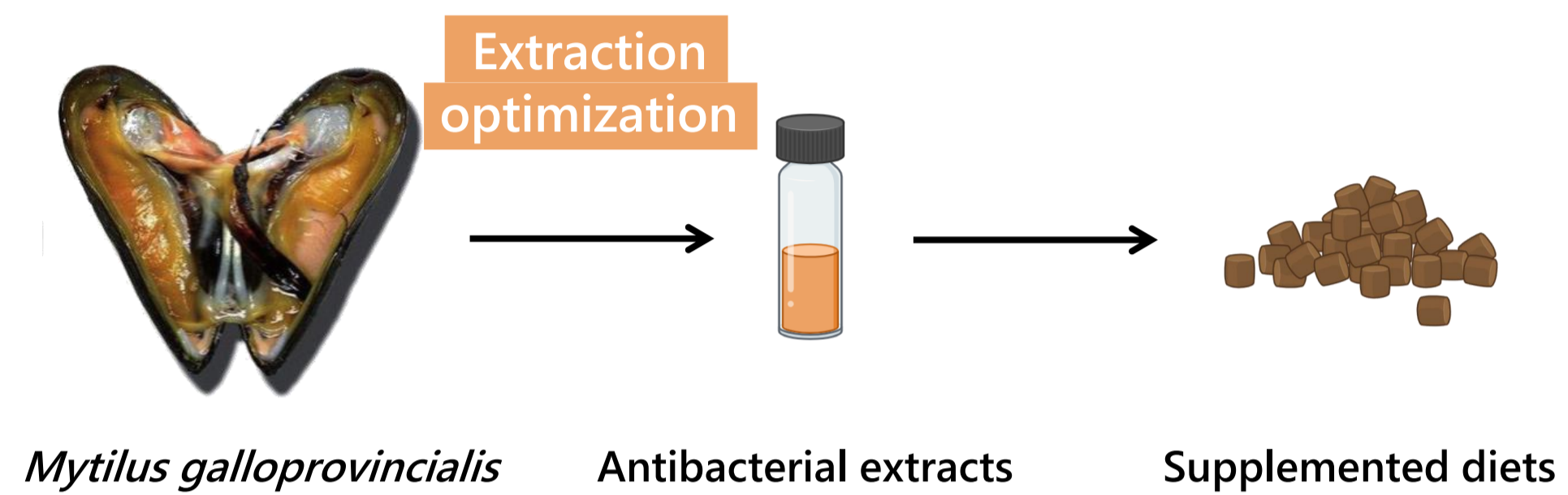
Aquaculture challenges



Seafood discards

Bacterial diseases

AIM OF THE STUDY

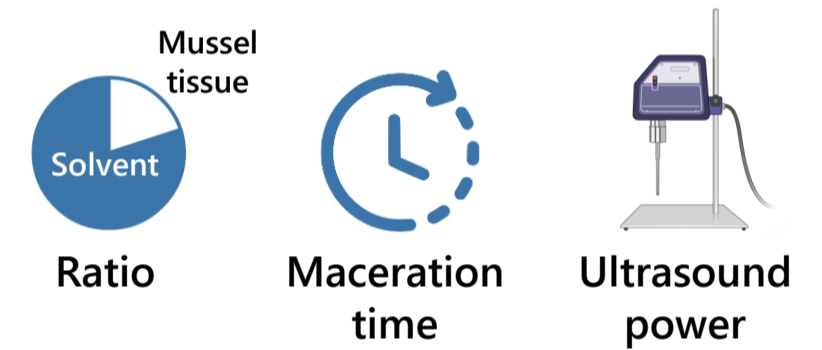


METHODOLOGY

Box-Behnken Statistical Model

Extract	Ratio (g/ml)	Time (h)	Ultrasound power (J/ml)
1	-1 (1/10)	-1 (2)	0 (100)
2	1 (1/40)	-1 (2)	0 (100)
3	-1 (1/10)	1 (24)	0 (100)
4	1 (1/40)	1 (24)	0 (100)
5	-1 (1/10)	0 (8)	-1 (50)
6	1 (1/40)	0 (8)	-1 (50)
7	-1 (1/10)	0 (8)	1 (150)
8	1 (1/40)	0 (8)	1 (150)
9	0 (1/25)	-1 (2)	-1 (50)
10	0 (1/25)	1 (24)	-1 (50)
11	0 (1/25)	-1 (2)	1 (150)
12	0 (1/25)	1 (24)	1 (150)
13	0 (1/25)	0 (8)	0 (100)
14	0 (1/25)	0 (8)	0 (100)
15	0 (1/25)	0 (8)	0 (100)

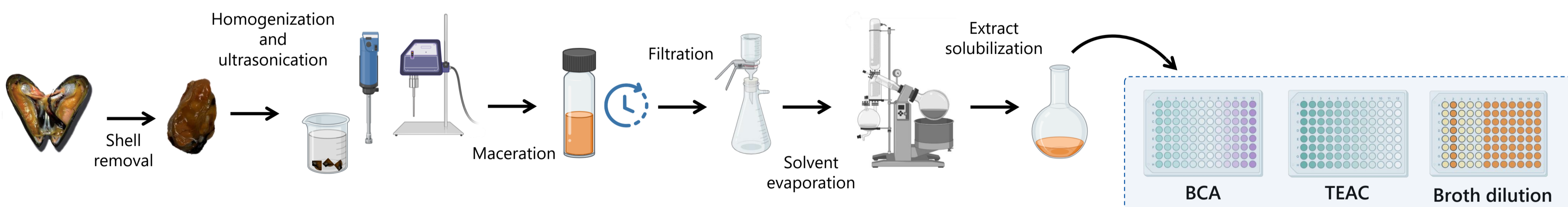
Optimization Factors



Responses for Optimization



Extraction process



RESULTS

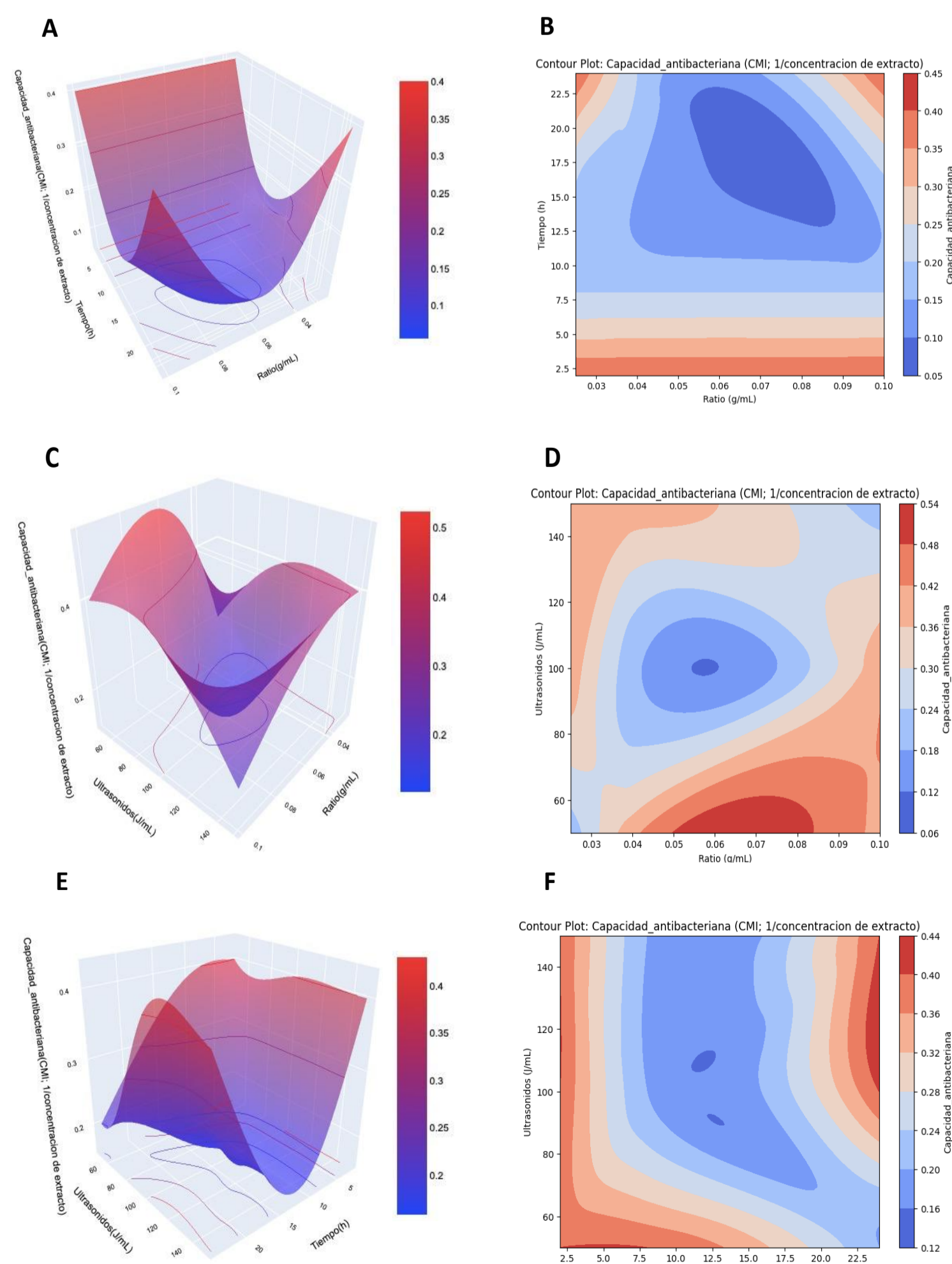
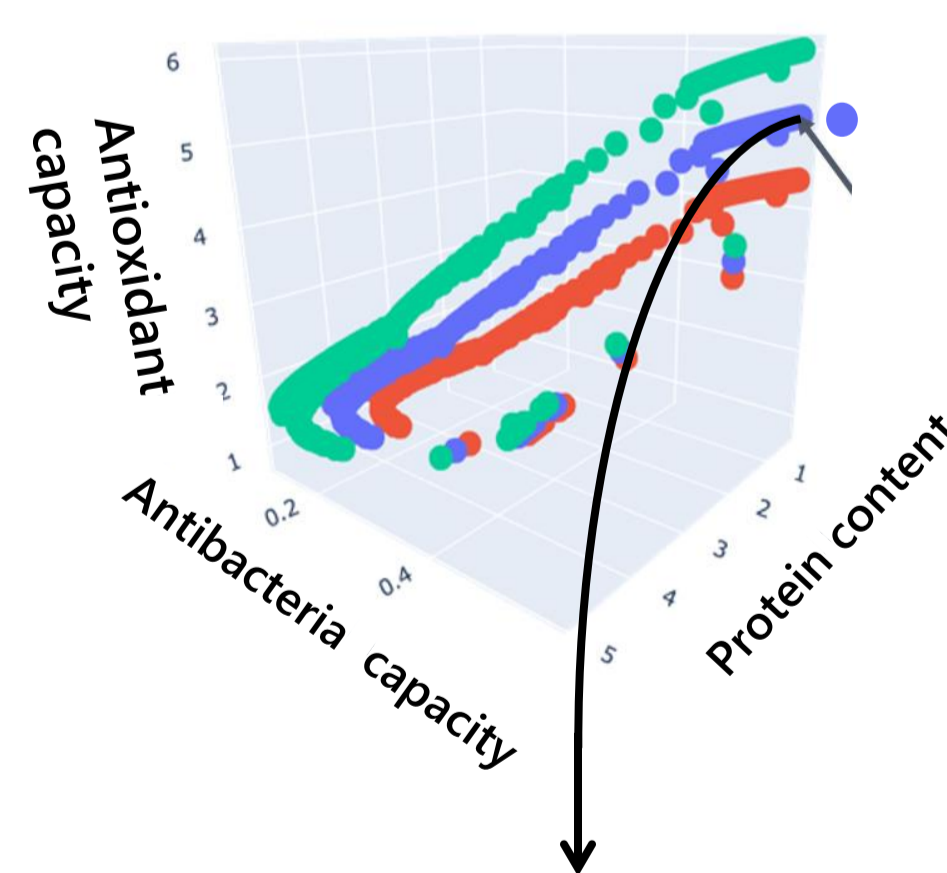


Figure 1. 2D contour and 3D response surface plots for antibacterial capacity.

(A, B) Effect of ratio and time on the antibacterial capacity of mussel extracts. (C, D) Effect of ratio and ultrasound on the antibacterial capacity of mussel extracts. (E, F) Effect of ultrasound and time on the antibacterial capacity of mussel extracts.



Predicted optimal conditions: Ratio = 1/10 g/ml Time = 2 h US = 50 J/ml

Figure 2. 3D scatter plot of the relationship between protein content, antibacterial capacity and antioxidant capacity in the mussel extraction process.

Each of the points shown corresponds to an extraction condition. In the tables are shown the predicted results for the optimal predicted conditions maximizing the antibacterial capacity (Table 1) and the experimental verification (Table 2).

Table 1. Model prediction

Protein quantity	0.45 µg/ml
Antibacterial capacity	1.78 mg/ml
Antioxidant capacity	5,21 mmol trolox/100 g dry extract

Table 2. Experimental verification

Protein quantity	0.56 µg/ml
Antibacterial capacity	1.25 mg/ml
Antioxidant capacity	4.77 mmol trolox/100 g dry extract

CONCLUSIONS

The Box-Behnken statistical model predicted that extracts showing **high antibacterial capacity** showed **reduced protein content** and **high antioxidant capacity**.

The predictive results obtained with the Box-Behnken statistical model showed a **remarkable similarity with the experimental results**.

REFERENCES

Balseiro, P., Falcó, A., Romero, A., Dios, S., Martínez-López, A., Figueras, A., Estepa, A., & Novoa, B. (2011). *Mytilus galloprovincialis* myticin C: A chemotactic molecule with antiviral activity and immunoregulatory properties. *PLoS One*, 6(8), e23140. <https://doi.org/10.1371/journal.pone.0023140>