Response Surface Optimization of the Culture Medium for Production of Elastin-Like Polymers by *E. coli*

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Introduction

Elastin-Like Polymers (ELP`s) are a family of proteins based on repetitive pentapeptide sequences having smart and extremely biocompatible behavior. The Response Surface Methodology (RSM) was employed in order to improve the production of both, biomass and ELP`s, in an auto induction medium previously designed by us and named BEPS Medium (Bacterial Elastomeric Polymer Synthesis). The nutrients yeast extract, lactose and glycerol were the factors subjected to this statistical treatment.

Objective

Optimization of the culture medium, in batch fermentation, for the production of GAG_{220} by *E. coli*.

Results

Table I – Experimental range levels of the three independent variables used in central composite design in coded factors.

Run	Factors A:Glycerol (g L^{-1})	B.Lactose (g L^{-1})	C:Yeast Extract (g L^{-1})
1	-1	1	1
2	0	0	-1.68
3	1	-1	-1
4	-1	-1	-1
5	0	0	0
6	0	0	0
7	0	0	1.68
8	0	0	0
9	1	-1	1
10	1	1	-1
11	0	-1.68	0
12	1	1	1
13	0	1.68	0
14	-1.68	0	0
15	-1	-1	1
16	-1	1	-1
17	1.68	0	0

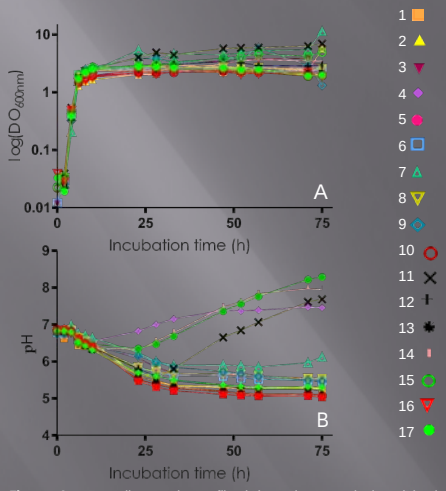


Figure 1 – *E. coli* growth profile (A) and pH variation (B) along time in central composite design assays, in shaken flasks, at 37 ºC and 200 rpm.

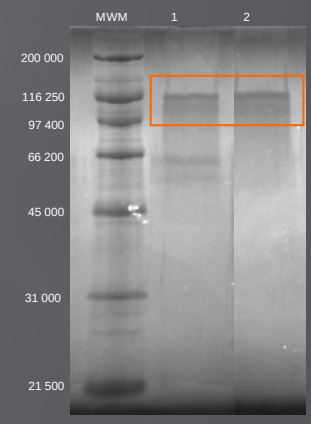
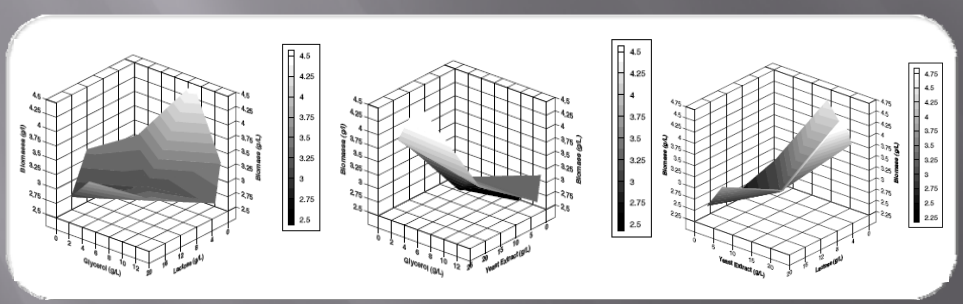


Figure 2 – SDS-PAGE electrophoresis of the polymer GAG_{220}. MWM – Molecular Wheight Marker, Lane 1 – Sample of CCD 10; Lane 2 – Sample of CCD 11.

Biomass



Polymer

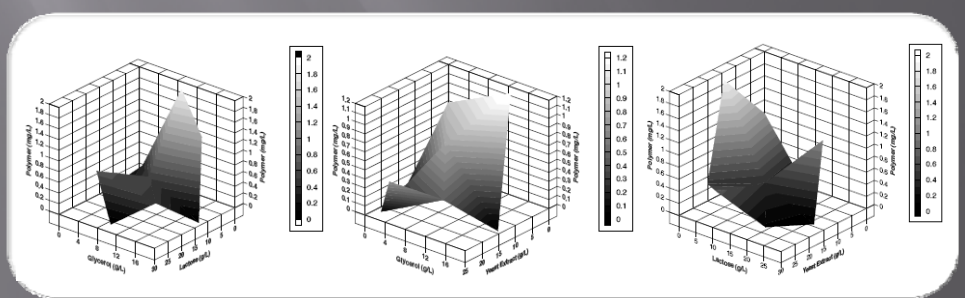


Figure 3 - Response surface curves of biomass and polymer production (g L^{-1}) showing interaction between lactose, glycerol and yeast extract.

Conclusions

A model for the response biomass was achieved:

Biomass = 3.38 + 0.056 *A* - 0.17 *B* + 0.63 *C*

Lactose has negative effects on biomass and GAG_{220} production but glycerol and yeast extract are essencial nutrients for this propose.

Acknowledgements

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