P-033 - OPTIMIZATION OF Γ-DECALACTONE PRODUCTION BY CO-CULTURES OF YARROWIA LIPOLYTICA MUTANT STRAINS

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Background

"Natural" labeled aromatic compounds are very sought worldwide for their variety of industrial applications since they involve cheaper processes and create greater incomes when compared to synthetic equivalents [1]. Among natural fragrances and flavors, lactones are a well-known family at industrial and biotechnological level with a production of hundreds of tons per year. Midst this family, γ-decalactone, a peach-like aroma, is the most important flavor and is commonly used in cosmetics and perfumes [2].

Method

The performance of mutant strains derived from Yarrowia lipolytica wild-type W29, MTLY40-2P strain overexpressing POX2 gene and JMY3010 that overexpresses LIP2 gene, was evaluated under different conditions of operation: cellular and castor oil concentration, operation mode (batch or step-wise fed-batch) and bioreactor type (STR or Air-lift). For the first time, a co-culture of both strains was used in order to improve γ-decalactone production from castor oil.

Results & Conclusions

STR batch experiments (20 g L-1 of glucose and 60 g L-1 of castor oil) showed that higher γ-decalactone concentration (1844 ± 46 mg L-1a) and productivity (90 ± 7 mg L-1h-1) were obtained with a co-culture, when compared to pure cultures of each strain. The main reasons were the decrease of the lag phase of the aroma production (observed in MTLY40-2P pure cultures) and the minimization of γ-decalactone consumption (observed in JMY310 pure cultures). In this study, the addition of castor oil pulses resulted in similar γ-decalactone titers and productivities, which suggested that fed-batch approaches did not improve this bioprocess and increased the overall production costs. In air-lift co-cultures (with the same glucose and castor oils concentrations), similar maximum γ-decalactone concentration were attained, however productivity was severely decreased (75 %). This was probably due to process limitation by oxygen deficit.

References & Acknowledgments

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