

Screening of oleaginous yeast *Trichosporon coremiiforme* EXF-8679 in commercial sugars and treatment of olive mill wastewaters

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Abstract *Trichosporon* is a genus of yeasts that belongs in the family of *Trichosporonaceae*. They typically can be found in soil, but several species are in the natural part of the skin microbiota of humans and other animals. *Trichosporon coremiiforme* is considered as an oleaginous yeast.

Keywords: *Trichosporon coremiiforme*, oleaginous yeasts

1. Introduction

Olive oil wastewaters are the principal waste stream that derives from the olive fruit processing by mechanical means, for olive oil production. They are characterized by high toxicity due to their high content of polyphenols. Annually, 8.0 million tons of OMW are generated and they are considered highly aesthetically degraded due to their strong odor, dark color, and high organic content, which have a direct impact on the environment.

2. State of the art

This study is aiming to determine the ability of *T. coremiiforme* strain EXF-8679 to grow on commercial sugar-based and OMW-based substrates as also to reduce the color and phenolic content of the effluent. In the first part of this study, a screening trial was performed using commercial sugars (glucose, fructose, lactose, glycerol) as substrate, to identify in which sugar- C/N (60 vs 120) the microorganism shows the ability to produce more % (w/w) intracellular microbial oil. Knowing the optimum conditions, a second set of analyses was performed to treat OMW with *T. coremiiforme* strain EXF-8679 in different C/N (120, 200,300, 400). Finally, having all screened and selected culture conditions stable, OMW was used as substrate increasing the total phenolic concentration from 2.4 g/L to 3.1 g/L.

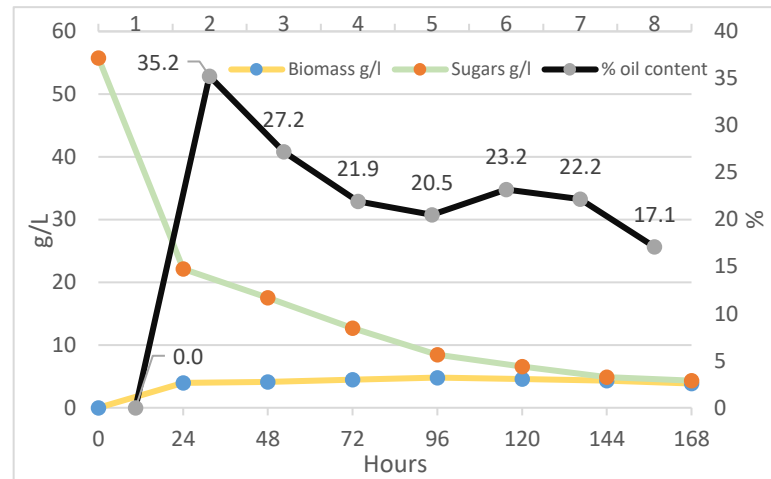
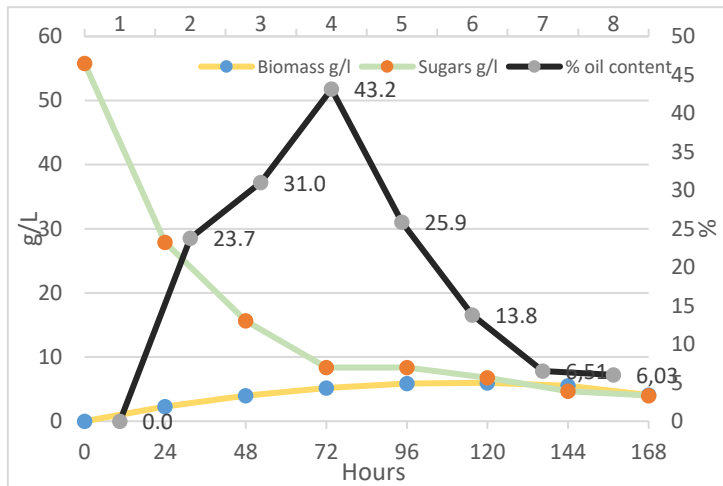
3. Results

Results showed that during the first stage of experimentation, the strain presented maximum lipid yield (% w/w) when fructose was used as substrate (35.3% w/w, 120 hours) producing 7.0 g/L biomass. Moreover, the strain did not present satisfactory values of biomass when grown on glycerol and lactose. In the second set of trials, *T. coremiiforme* strain EXF-8679 resulted in 2.9 g/L biomass production and 49.5% w/w oil content after 24 hours at C/N=400. At the third OMW-based fermentation, the strain resulted in 2.8 g/L biomass production and 45.2% w/w oil content after 48 hours at (C/N=200). The highest decolorization value of 44.3% and the maximum phenol compounds reduction of 45.0% w/w were observed at the trial having C/N=200 and an initial phenolic compounds concentration of 2.4 g/L. To conclude, this research showed that maximum % w/w intracellular lipid production was achieved when the microorganism was grown on fructose media and presented a high performance in reducing phenolic content and color. Finally, *T. coremiiforme* strain EXF-8679 presented a high yield in % lipid production when cultivated into OMW-based media, under certain conditions.

4. Conclusion

The results of this study showed that *T. coremiiforme* EXF-8679 had quite high values of % microbial oil production, phenol removal, and decolorization. Based on that, a conclusion can be made: this oleaginous yeast shows the potential to be used in order to produce microbial oil but also towards the valorization (phenol/color removal) of OMW.

Figure 1: T.C. EXF- 8679 to OMW C/N=200F, Ph0=2.4 g/L **Figure 2:** T.C. EXF- 8679 to OMW C/N=200F, Ph0=3.1g/L



Total decolorization (as a process): 44.3%

Total phenol reduction (as a process): 45.0%

Figure 3: T.C. EXF- 8679 to OMW C/N=200F, Ph0=2.4 g/L phenol reduction/ decolorization

Acknowledgments

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