Assessment of drying conditions of a yeast-based solution for application on textile industrial wastewater treatment plants

Marta Mendes[1], Ana C. Cassoni[1], Patrícia Moreira[1, 2], Manuela Pintado[1] and Paula ML Castro[1]

[1]Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal

[2]Universidade Católica Portuguesa, CITAR - Centro de Investigação em Ciência e Tecnologia das Artes, Escola das Artes, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal

CATÓLICA ESCOLA SUPERIOR DE BIOTECNOLOGIA PORTO

MICROBIOTEC 19 — December 5th-7th, 2019 — University of Coimbra (Pólo II) — CONGRESS OF MICROBIOLOGY AND BIOTECHNOLOGY 2019

Abstract

The textile sector is a worldwide industry that produces high amounts of harmful effluents that are discharged to the environment. These dyed effluents are resistant to biodegradation and potentially damaging to the aquatic and other ecosystems [1]. Classic chemical treatment methods are very costly and generate large quantities of sludge that need to be treated [2]. Biological methods are generally considered more environmentally friendly and of major relevance [3]. Biological alternatives to aid the decolourisation of dyes in textile wastewaters need to be implemented.

The aim of this work was to investigate the viability and stability of the decolourisation capacity of a yeast strain preserved in a lyophilized form.

Methodology for production of freeze-dried yeast

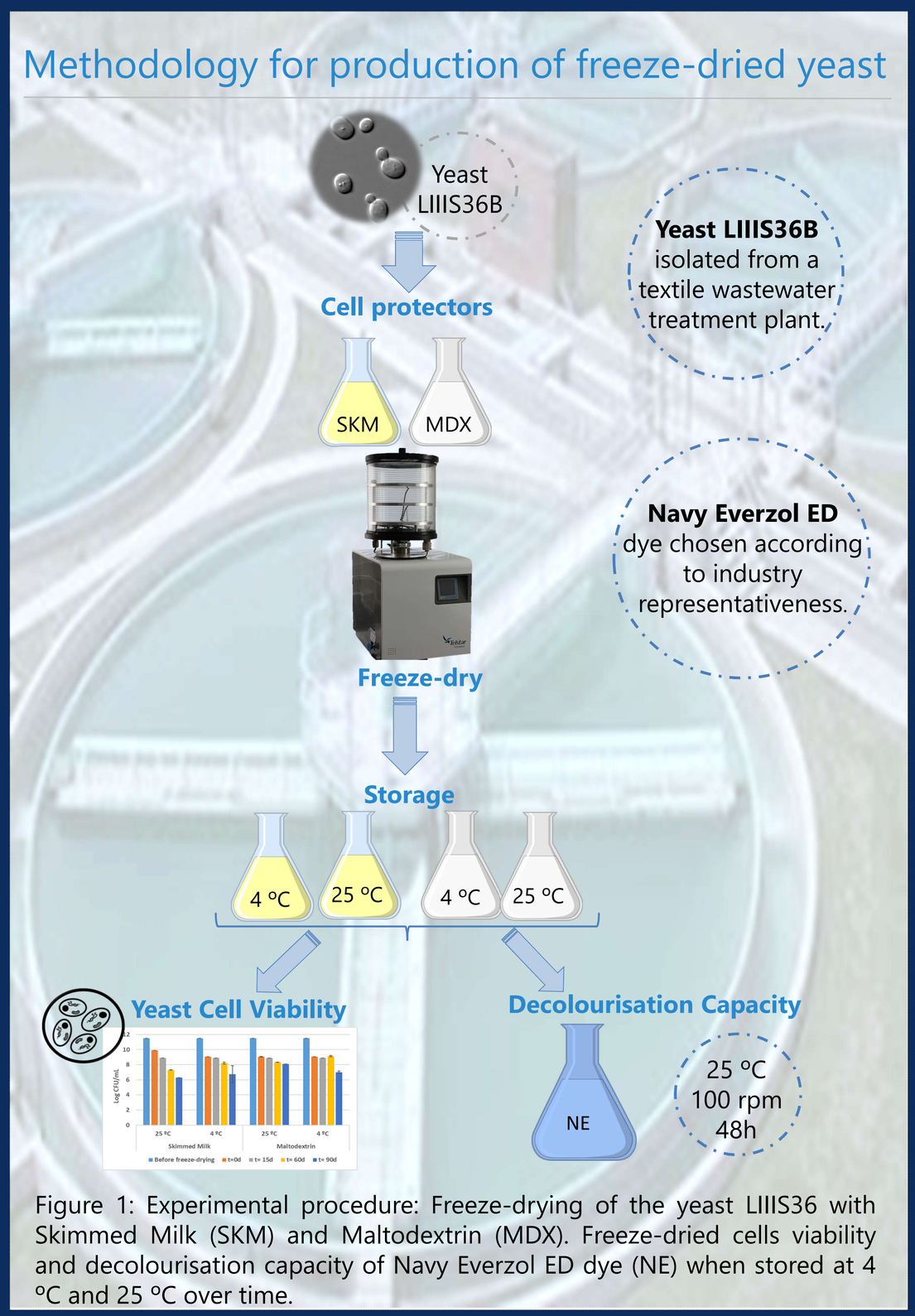

Figure 1: Experimental procedure: Freeze-drying of the yeast LIIIS36 with Skimmed Milk (SKM) and Maltodextrin (MDX). Freeze-dried cells viability and decolourisation capacity of Navy Everzol ED dye (NE) when stored at 4 ºC and 25 ºC over time.

Results

Yeast Cell Viability

Yeast cell **viability** was maintained above 10^6 CFU/mL after 90 days (Fig 2).

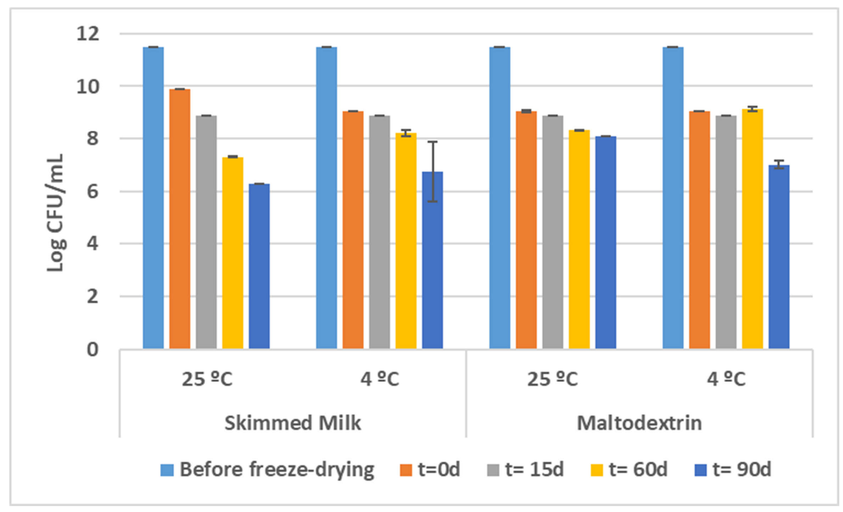

Figure 2: Viability of yeast LIIIS36B cells after freeze-drying: before freeze-drying, after freeze-drying (t=0, 15, 60 and 90 days), stored at 4 ºC and 25 ºC.

Decolourisation Capacity

Decolourisation was effective for all the conditions tested after 15, 60 and 90 days of storage (Fig 3).

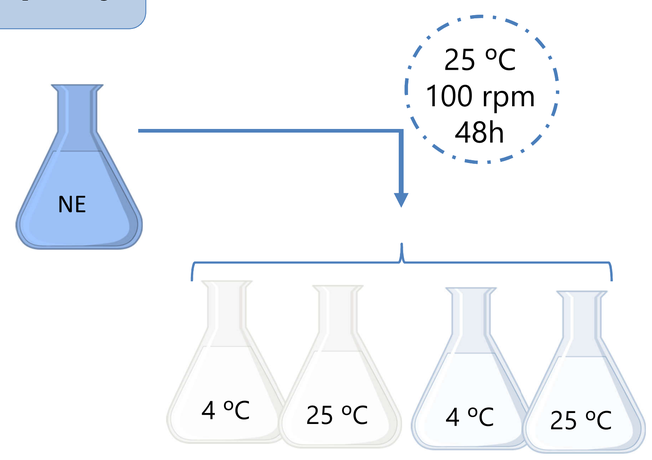

Figure 3: Capacity of freeze-dried yeast LIIIS36B cells to decolourise Navy Everzol ED dye with Skimmed Milk and Maltodextrin as cell protectors when stored at 4 ºC and 25 ºC over time.

References

[1] Dellamatrice *et al*. (2017). Brazilian Journal of Microbiology. 48, 25-31.
[2] Mahmoud, M.S. (2016). HBRC Journal. 12(1), 88-98.
[3] Ali, H. (2010). Water, Air, & Soil Pollution. 213(1-4), 251-273.

Conclusions

- ✓ Freeze-dried yeast cells LIIIS36B:
  - maintained viability above 10^6 CFU/mL after 90 days;
  - were able to decolourise the dye Navy Everzol ED even after 90 days of storage, at all conditions tested;
- ✓ Freeze-dried yeast LIIIS36B have potential as a starter culture for environmental biotechnology.

Acknowledgements

Support was provided by NORTE-01-0247-FEDER-017819 "EcoTex – Desenvolvimento de soluções mais sustentáveis para coloração têxtil", co-financed by Fundo Europeu de Desenvolvimento Regional (FEDER) through Programa Operacional Regional do Norte (PONorte). Author M. Mendes would like to acknowledge FCT for her doctoral grant (PhD grant SFRH/BD/129334/2017) financed by Ministério da Ciência, Tecnologia e Ensino Superior and Fundo Social Europeu through POCH – Programa Operacional Capital Humano. The authors would also like to thank the scientific collaboration under the FCT project UID/Multi/50016/2019.