Morphological analysis of *Yarrowia lipolytica* under stress conditions through image processing

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Yarrowia lipolytica is an aerobic microrganism capable to produce important metabolites, has an intense secretory activity which drives efforts to be employed in industry (as a biocatalyst), in molecular biology and genetics studies. Dimorphism is refeered to fungi ability to growth in two distinct forms, usually as single oval cells os as a filament and to be reversible between each one. The cell shape is controlled by environmental factors and has been seeked by some authors [1,2,3].

Y. lipolytica has been considered an adequate model for dimorphism studies in yeasts since it has an efficient system for transformation and is easy to distinct between its morphological forms, on opposite to *S. cerevisiae* that do not produce true filaments and exhibits pseudo-hyphae growth under nitrogen limited conditions. *Y. lipolytica* has an hyphae diameter corresponding 60 to 100% of its single cell stage [4,5]. It is believed that *Y. lipolytica* dimorphism is related to defense mechanism from adverse conditions.

The aim of this work resides on investigate morphological changes in *Y. lipolytica* under thermal and oxidative stress conditions. *Yarrowia lipolytica* (IMUFRJ 50682) was cultivated in YPD medium (glucose 2%, peptone 0.64%, yeast extract 1%) at 29^{o}C and 160 rpm. Thermal stress experiments were carried employing a temperature shift (37^{o}C / 1 h.). For oxidative ones, an addition of H_2O_2 was used to reach final concentration of 10mM. Both stress conditions were applied at exponential growth phase. Morphology was observed in a optic microscope (Axiolab, Zeiss) and cell characteristics were determined employing image processing analysis (Matlab v. 6.1, The Mathworks Inc.) and comparisons were carried on to a control system.

A net increase around 22% on hyphae formation was detected as well as a significant increment in its length in relation to control system, when both thermal and oxidative stress was applied. The results herein obtained drives to consider a possible relationship between dimorphism and a cell response mechanism to stress conditions.

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