Differential response to isoproturon by two strains of *Saccharomyces cerevisiae*

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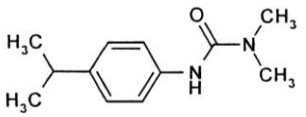
The isoproturon (IPU), 3-(4-isopropylphenyl)-1,1-dimethylurea, represented by the structure:



is a phenylurea widely used as herbicide which blocks photosynthesis, inhibiting chloroplasts electron chain at level of photosystem II. Therefore, the presence of isoproturon in the living cells can generate ROS and consequently oxidative stress. Because it exhibits low water solubility and chemical/biological degradation, accumulates in soils as waste and therefore persists in biological systems for long periods, being listed by European Union among 33 special substances that threaten the earth surface. In addition, the literature indicates that exposure to this phenylurea can change human blood parameters, and trigger cancer. So it is urgent to determine their mechanisms of toxicity in eukaryotes. The aim of this study was to compare the response of two strains of *S. cerevisiae*, wild-type UE-ME_3 deposited in the collection of enology laboratory of University of Évora, Portugal and IGC-4072, deposited in the Portuguese Yeast Culture Collection of New University of Lisbon, Portugal, that has been used as biological model in toxicity approaches because show high survival capacity to pesticides.

S. cerevisiae UE-ME_3 and IGC-4072, at mid-exponential phase were inoculated in mineral medium (MB) or MB with 100 μM isoproturon and incubated in a water bath with orbital shake at 28 ºC during 72 h. Samples from each treatment were used to obtain growth curves and to prepare post-12000 *g* supernatant, used for determination of protein [1] and antioxidant capacity by the 2,2-diphenyl-1-picryl-hidrazil (DPPH) method [2], and glutathione [3] contents, as well as glutathione reductase (GR) [4], glutathione peroxidase (GPx) [5], glucose-6-phosphate dehydrogenase (G6PD) [6] and catalase T (CAT T) [7] enzymes activities.

S. cerevisiae UE-ME_3 grown in MB medium in the absence and presence of IPU show a similar growth profile and a stabilization of the biomass, non-protein thiols content, cell viability (cfu) and cell redox status estimated by GSH/GSSG ratio. This response seems depend on GR and G6PD activities increase, which probably activates the glutathione cycle, signs of adaptive response to phenylurea. However, *S. cerevisiae* IGC-4072 strain showed signs of cell death in the presence of IPU, exhibiting a more slowly growth profile, a decrease of dry weight and cell viability, as well as a significant increase of free radicals scavenger (DPPH) in presence of phenylurea, without significant changes of the GSH/GSSG ratio. As the value of the GSH/GSSG ratio is significant lower in IGC-4072 cells and GR activity undergoes a marked decrease in the presence of the IPU it is suspected that the worst IPU adaptive capacity displayed by this strain depends on a poor antioxidant power mediated by the glutathione.

Keywords: *S. cerevisiae*; isoproturon; antioxidant capacity.

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