Squalene *vs* Ergosterol Formation by *Saccharomyces cerevisiae* under Different Culture Conditions

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The potential health-protecting effect of squalene has stimulated interest in its commercialization by the food industry. Taking into account the limited availability of the latter, the use of microorganisms for squalene production presents also a future industrial interest. In *Saccharomyces cerevisiae*, the mevalonate biosynthetic route to isoprenoid precursors leads mainly to the formation of ergosterol via squalene, but the latter is hardly detected in aerobic cultures (*1*). Sterol biosynthesis represents a crucial oxygen-dependent pathway since several enzymatic reactions of the post-squalene formation steps require molecular oxygen (*2*). The pre-squalene formation steps do not require oxygen and are responsible for the accumulation of the latter under anaerobic conditions.

In the present work, the effect of oxygen supply-oxygen limited versus non limited culture (semianaerobic versus aerobic culture) on the dynamics of two wild strains of S*. cerevisiae* (BY4741 and EGY48) was evaluated in terms of squalene yield and selectivity. In our study, the overall sterol formation pattern in distinct phases of the bioprocess under different aeration conditions was monitored by RP-HPLC of the unsaponified matter of *S. cerevisiae* lipids. Under microaerobic conditions, ergosterol was the main sterol in BY4741 throughout the monitoring period, whereas in EGY48, zymosterol and ergosterol dominated at all stages of the growth cycle. The results under semianaerobic conditions showed a general sterol deficiency in favor of squalene formation especially after 28h of the cultivation in both yeast cells. Maximum squalene content was 1240 ± 37 μg/g of dry biomass after 12h and 1155 ± 32 μg/g of dry biomass after 72h for BY4741 and EGY48, respectively. Our results are of practical importance in the development of commercial bioprocess for squalene production by *S. cerevisiae*.

References: 1) Maczek, J.; Junne, S.; Nowak, P.; Goetz, P., *Bioprocess Biosyst. Eng*. **2006,** *29*, 241-252; **2**) Rosenfeld, E.; Beauvoit, B., *Yeast* **2003**, *20*, 1115–1144.