**IDENTIFICATION OF HYDROXYLED COMPOUNDS FROM THE BIOCONVERSION OF NARINGENIN BY *Yarrowia lipolytica 2.2ab***

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**Highlights**

* We evaluated naringenin bioconversion by whole cells of *Yarrowia lipolytica 2.2ab*
* Some polyhydroxylated flavonoids are first reported by whole cells
* This study allowed selection and operation of the proper bioreactor.

**1. Introduction**

The flavonoids are plants secondary metabolites that exhibits important antivirals, anti-inflammatory, vasodilators and antioxidant biological activities [1]. Naringenin is classified on the subclass of flavonones and is naturally present in grapes, tomatoes and citric fruits. Due to its positive effects on health, their study has attracted the attention of several research groups [2, 3]. It has been reported that the increase in antioxidant activity in flavonoids is highly related to the degree of hydroxylation and/or methoxylation [4]. *Yarrowia lipolytica* may express the CYP450 enzyme system, which is indispensable to increase the hydroxylation of hydrophobic compounds such as naringenin [5]. Chang et al. [6] reported the bioconversion of naringenin to 8-hydroxynaringenin by *A. oryzae* cells. The hydroxylation of naringenin to eriodictiol by means of the cytochrome P450 monooxygenase enzyme expressed by *P. chrysosporium* was reported by Kasai et al. [7]. The objective of this study was the identification of the compounds obtained from the bioconversion of naringenin by the enzymatic system produced by *Y. lipolytica* 2.2ab (Yl2.2ab).

**2. Methods**

Bioconversion experiments were prepared in 250 mL Erlenmeyer flasks with 100 mL of Sabouraud culture broth inoculated with 1x106 cells mL-1 of Yl2.2ab and 100 mg L-1 of naringenin were added. Concentration and identification of residual naringenin and formed products was performed by HPLC, the use of external standard was required [8].

**3. Results and discussion**

Figure 1 shows the kinetic profile from the bioconversion of naringenin by Yl2.2ab to the polyhydroxylated compounds identified as apigenin, ampelopsin, myricetin, aromadendrin and luoteolin. All the molecules were produced simultaneously throughout the reaction time.

The obtained molecules exhibit higher antioxidant activity related to molecule used as precursor. It has been reported that the increase in antioxidant activity in flavonoids molecules is directly related to the degree of hydroxylation and/or methylation formed in the new formed molecule [4]. The compounds identified in here are of great interest for the pharmaceutic and food industries.

**Figure 1.** Profile of concentrations during the bioconversion.

**4. Conclusions**

Five compounds with high valued were obtained during the bioconversion naringenin by Yl2.2ab. The molecules obtained showed higher antioxidant activity than the initial precursor.

**References**

1. A. Madej, J. Poplonski, E. Huszcza, Applied Biochemistry and Biotechnology, 173 (2014) 67-73.
2. E. Álvarez, O. Cambeiro, Offarm, 22 (2003) 130-140.
3. T.O. Nagy,K. Ledolter, S. Solar, Radiation physics and chemistr,.77 (2008) 728 – 733.
4. E.N. Prasetyo,G.S. Nyanhongo Guebitz G.M. Process Biochemistry, 46 (2011) 1019-1024.
5. M.A.Z. Coelho, P.F. Amaral, I.Belo, Applied Microbiology and Microbial Biotechnology, (2010) 930-44.
6. T-S. Chang, M-Y. Lin, H-J Lin, J. Cosmet. Sci, 61, (2010) 205-210.
7. N. Kasai, S.I. Ikushiro, S. Hirosue, A. Arisawa, H. Ichinose, H. Wariishi, T. Sakaki, Biochemical and biophysical research communications, 387 (2009) 103-108.
8. C. Hernández-Guzmán, Master in biotechnology, UAM-I, México, 2015.