OXIDATIVE STRESS INDUCES ALKALOID PRODUCTION IN *UNCARIA TOMENTOSA* ROOT AND CELL CULTURES IN BIOREACTORS.

ABSTRACT

The effect of oxidative stress on indole alkaloids accumulation by cell suspensions and root cultures of *Uncaria tomentosa* in bioreactors was investigated. Hydrogen peroxide (H_2O_2, 200 µM) added to *U. tomentosa* cell suspension cultures in shaken flasks induced the production of monoterpenoid oxindole alkaloids (MOA) up to 40.0 µg/L. In a stirred tank bioreactor, MOA were enhanced by exogenous H_2O_2 (200 µM) from no detection up to 59.3 µg/L. Root cultures grew linearly in shaken flasks with a μ=0.045 $days^{-1}$ and maximum biomass of 12.08±1.24 g DW/L (at day 30). Roots accumulated 3α-dihydrocadambine (DHC) 2354.3±244.8 µg/g DW (at day 40) and MOA 348.2±32.1 µg/g DW (at day 18). Exogenous addition of H_2O_2 had a differential effect on DHC and MOA production in shaken flasks. At 200 µM H_2O_2, MOA were enhanced by 56% and DHC by 30%; while addition of 800 and 1000 µM H_2O_2, reduced by 30–40% DHC accumulation without change in MOA. Root cultures in the airlift reactor produced extracellular H_2O_2 with a characteristic biphasic profile after changing aeration. Maximum MOA was 9.06 mg/L at day 60 while at this time roots reached ca. 1 mg/L of DHC. Intracellular H_2O_2 in root cultures growing in the bioreactor was 0.87 µmol/g DW compared to 0.26 µmol/g DW of shaken flasks cultures. These results were in agreement with a higher activity of the antioxidant enzymes superoxide dismutase and peroxidase by 6- and 2-times, respectively. *U. tomentosa* roots growing in the airlift bioreactor were exposed to an oxidative stress and their antioxidant system was active allowing them to produce oxindole alkaloids.

http://onlinelibrary.wiley.com/doi/10.1002/elsc.200800118/abstract

CEPROBI - IPN

Autores: Ariana A. Huerta-Heredia, Ricardo Marín-López, Teresa Ponce-Noyola, Carlos M. Cerda-García-Rojas, Gabriela Trejo-Tapia, Ana C. Ramos-Valdivia*

Revista: Engineering in Life Sciences. Volume 9, Issue 3, pages 211 – 216.