

# Optimization of enzymatic production in tamarillo (*Solanum betaceum* Cav.) cell suspension cultures using chemical elicitation

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Plant cell suspensions (PCS) are sustainable and efficient systems for producing high-quality molecules characterized by rapid growth and protein consistency within controlled bioreactors and contained environments. Integrating Molecular Farming platforms, these systems address contamination issues associated with viral or bacterial toxins. Nonetheless, challenges persist, including scalability for mass production in specific systems and a limited diversity of PCS cultures, which hinders the exploration of novel compounds with biological interest.

Histone acetylation is closely linked to heightened transcription levels. Consequently, the application of histone deacetylase inhibitors, such as suberoylanilide hydroxamic acid (SAHA), is anticipated to elevate mRNA and protein levels. In a previous study (doi: 10.3390/plants12010190), we successfully established tamarillo-induced callus lines (ICL) PCS cultures. Using various biotic elicitors, we induced the production of hydrolytic biocatalysts and low molecular weight peptides (>20 kDa), specifically glycosidases, alkaline phosphatases, and proteases, in tamarillo ICL PCS cultures.

In the present work, we aimed to optimize the previously employed elicitation strategy, specifically testing the effect of the histone deacetylase inhibitor SAHA to further enhance the production of hydrolytic biocatalysts. The results demonstrated a significant enhancement in specific biocatalyst production in SAHA-elicited tamarillo PCS cultures, complementing the effects of previously used elicitors.

This study reports, for the first time, the use of a histone deacetylase inhibitor as an elicitor for hydrolytic biocatalyst production in ICL PCS, optimizing the elicitation strategy and contributing to overcoming the typical low-yield biocatalyst production of PCS. This advancement is a crucial step forward in the potential scale-up of these systems to bioreactor production.

**Keywords:** Cell suspension cultures, molecular farming, deacetylase inhibitors; scale-up production; hydrolytic biocatalyst production; *Solanum betaceum*

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