Influence of chitosan-xerogel ratio on rinderol production and biomass proliferation of *Rindera graeca* transgenic root cultures

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The plant secondary metabolites have vast potential for practical application in pharmaceutical, cosmetic, food, and agricultural industries. The low concentration of secondary metabolites in plant biomass harvested from natural resources limits their use in industrial production. However, modern techniques proposed by biotechnologists and bioengineers allow for the increased efficiency of secondary metabolites production. In the literature, much attention is paid to in situ techniques, which can be applied for bioproduct separation via the absorption of metabolites by additional solid-phase scaffolds incorporated into the culture system.

The study aimed to investigate the influence of chitosan concentration in TEOS-based xerogel (i.e., solid-phase extraction agent) on rinderol production and biomass proliferation of *Rindera graeca* transgenic roots. Cultures were maintained for 28 days in darkness. Biomass was cultured in six independent culture systems:

- (i) biomass without any xerogel (as reference),
- (ii-vi) biomass cultured with a disintegrated form of xerogels enriched by 0%, 5%, 10%, 20% and 40% of chitosan,

and the yield of rinderol production per dry biomass weight and the increase of the fresh biomass was determined quantitatively.

The results show the positive influence of chitosan enriching xerogel on both biomass proliferation and secondary metabolite production. The highest biomass proliferation was observed for the culture containing xerogel with 5% of chitosan. Unexpectedly, this level of concentration of chitosan also stopped the de novo production of rinderol, which was observed in other xerogel-containing culture systems. The highest yield of rinderol, i.e., 762 $\mu g/\mu g_{DW,}$ was noticed for the culture containing xerogel with 40% of chitosan.

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