

Growth of transformed *Stevia rebaudiana* in in vitro systems and the stimulation of steviol glycoside production with soy protein hydrolysates

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Abstract

In this study, morphological characteristics and secondary metabolite production were explored in *Agrobacterium rhizogenes*-transformed plantlets of *Stevia rebaudiana* growing in semi-solid (SS) and liquid media (LM) in flasks or a twin-bottle temporary immersion system (TIS). The effect of adding 0.75 and 1.5 mL/L of soy protein hydrolysates (SPH) in LM was also evaluated. In plantlet growing without SPH, more shoots and leaves were obtained in SS media. Shoots grown in TIS were longer than those grown in flasks and SS media. Biomass accumulation was greater in TIS than in the other growth systems. Total phenolic content (TPC) and steviol glycosides production were higher in plants grown in the SS media than in those grown in LM. SPH improved the morphological characteristics of *S. rebaudiana* plantlets. Plants growing in flasks with 0.75 mL/L SPH had increased shoots, total chlorophyll, and leaf area compared with the control. Plants grown in TIS with 1.5 mL/L SPH exhibited improved foliar biomass, leaf area, and chlorophyll content. The addition of SPH to liquid culture media, in both flasks and TIS, enhanced stevioside (Ste) and rebaudioside A (Reb A) content in seedlings in comparison to the controls. Incorporating 0.75 mL/L SPH increased the Reb A: Ste ratio to 1.44. TPC only increased in flasks with 1.5 mL/L SPH. The highest Ste, Reb A, and TPC yields were obtained from seedlings grown in the TIS. SPH and TIS improved the yield and quality of *S. rebaudiana* plantlets.

Key message

Temporary immersion systems and soy protein hydrolysates synergistically enhance biomass, chlorophyll, and steviol glycoside production in transformed *Stevia rebaudiana*. This improves yield, metabolite quality, and the Reb A: Ste ratio.

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