

Enhanced production of secondary metabolites by *in vitro* cell culture of *Adansonia digitata* (L.) using low-cost options

Ashwini Arvind Pujari & Aniroodha V Pethkar*

Department of Microbiology, Government Institute of Science,
Chhatrapati Sambhajnagar, Maharashtra 431004, India

Received 06 February 2025; revised 17 May 2025

Adansonia digitata (L.), also known as African baobab, is known for the diverse types of secondary metabolites present in the bark, fruits and leaves. The present study aimed to establish a cost-effective plant cell suspension culture method for the production of secondary metabolites. Cell culture of *A. digitata* (L.) was established by a float culture method using a dried fibrous mesocarp of *Luffa aegyptiaca* Mill. (Luffa sponge), to support the growing cells in a liquid medium, and the possibility of production and enhancement of secondary metabolites was tested. Murashige Skoog medium with 2,4-D (0.5 mg/L) & BAP (0.5 mg/L) and incubation in dark at temperature of $30 \pm 2^\circ\text{C}$ was found to be optimum for the induction and growth of the callus. To allow the redifferentiation of callus cells and to optimise the production of secondary metabolites, an organic nitrogen supplement in the form of soybean flour (0.02 g/100mL) and blue-red LED (1350 lux for 16 hours) was used as a light source. After 8 weeks of incubation, the redifferentiated callus cells were harvested and the presence of various phytochemicals in the cell extract was determined by qualitative analyses. The cultured cells were found to be capable of producing all the secondary metabolites produced by the leaves and bark of the tree. Quantitative estimation of alkaloids was carried out by HPLC with standard berberine. The alkaloid concentration in the cultured cells sample (with LED light and soy flour) was found to be 18.642 $\mu\text{g/g}$ on a dry weight basis compared to the crude bark extract which contained 4.02 $\mu\text{g/g}$. The use of Luffa sponge, soybean flour, refined edible table sugar and LED light resulted in an affordable method for the production of plant secondary metabolites, which resulted in the reduction of the cost of 1L medium from ₹ 2170.9/- to ₹154.95/-.

Keywords: *Adansonia digitata*, Alkaloids, Float culture, Luffa sponge, Phytochemical analyses, Plant tissue culture, Secondary metabolites