



Notice for the PhD Viva-Voce Examination

Mr Nihal Ahmed K N (Registration Number: 1840095), PhD Scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore Central Campus will defend his PhD thesis at the public viva-voce examination on Monday, 07 April 2025 at 9.00 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis	:	In-Vitro Production of Andrographolide from Cell Suspension Cultures of <i>Andrographis paniculata</i> (Burm. F) Nees. and Transcriptomic Analysis of Elicited Cultures
Discipline	:	Botany
External Examiner - I	:	Dr E A Siril Professor and Head Department of Botany University of Kerala Trivandrum, Kerala - 695581
External Examiner - II	:	Dr S Anitha Professor Department of Biotechnology Sri Krishnadevaraya University Anantapur, Andhra Pradesh - 515003
Supervisor	:	Dr Praveen N Associate Professor Department of Life Sciences School of Sciences CHRIST (Deemed to be University) Bengaluru, Karnataka-560029

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Place: Bengaluru
Date: 02 April 2025


Registrar (Academics)

ABSTRACT

Andrographis paniculata (Burm. f.) Nees., an Acanthaceae member, is a medicinal plant with enormous pharmaceutical significance. It is an annual herb widespread in the Indian subcontinent and is the source of a broad range of phytoconstituents like andrographolide, neoandrographolide and isoandrographolide. Andrographolide is a major contributor to pharmacological activities among all the known phytochemicals of *A. paniculata*. Demand for andrographolide is being met by extracting it from wild varieties. Owing to its limited availability, conventional cultivation of this plant cannot be relied on for mass production of andrographolide. Therefore, plant tissue culture is the best alternative method for commercial propagation of medicinal plants and their metabolites.

Pharmacologically active metabolite production can also be enhanced by adopting approaches like media optimization, elicitation, cell line selection, etc. This study has established optimized *in vitro* culture conditions for maximum production of andrographolide. PIC (1 mg/L) + TDZ (1 mg/L) yielded the highest biomass and andrographolide content with a productivity of 1.78. Therefore, this combination was chosen for the rest of the optimization studies. Acidic conditions (pH 5), higher NO_3^- concentration (28.20 mM) and jasmonic acid (75 μM) serve as the best elicitors for maximizing andrographolide production. This study has presented the elaborate transcriptomic profile of cell suspension cultures upon the administration of elicitors for the first time. The metadata obtained from the study confirms the antagonistic effects of jasmonic acid and salicylic acid. The overall work adds to the knowledge on tissue culture studies in *A. paniculata*.

Keywords: *Andrographis paniculata*, andrographolide, tissue culture, transcriptome, elicitors, salicylic acid, jasmonic acid, heavy metals

Publications:

1. Ahmed, N., & Nagella, P. (2022). Effect of SA, JA and a combination of both on andrographolide production in cell suspension cultures of *A. paniculata* (Burm.f.) Nees. *Journal of Applied Biology and Biotechnology*. <https://doi.org/10.7324/jabb.2023.110220>
2. Ahmed, N., & Nagella, P. (2024). Effect of heavy metal elicitors on andrographolide content and other secondary metabolites in cell suspension cultures of *A. paniculata*. *Plant Science Today*.
3. Ahmed, N., & Nagella, P. (2024). Transcriptome analyses of salicylic acid and jasmonic acid treated cell suspension cultures of *Andrographis paniculata*- revisions submitted to *Journal of Applied Biology and Biotechnology*