

Notice for the PhD Viva Voce Examination

Mr Yatheesharadhya B (Registration Number: 2071706), 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 Wednesday, 09 April 2025 at 10.00 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India

Title of the Thesis	:	Metabolomic Analysis and Biological Activities of Guava during its Different Ripening Stages
Discipline	:	Botany
External Examiner (Outside Karnataka)	:	Dr Biswajit Ghosh Plant Biotechnology Division Post Graduate Department of Botany Ramakrishna Mission Vivekananda Centenary College Rahara, Kolkata- 700118, West Bengal
External Examiner (Within Karnataka)	:	Dr Ramachandra Y L Senior Professor Department of Biotechnology and Bioinformatics, Kuvempu University Shivamogga - 577451, Karnataka
Supervisor	:	Dr Anish Nag Associate Professor Department of Life Sciences CHRIST (Deemed to be University) Bengaluru - 560029, Karnataka

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: 04 April 2025



Registrar (Academics)

ABSTRACT

The study optimized antioxidant phenolics and flavonoids from hydro-methanolic extracts of ripe guava fruits (*Psidium guajava* L.) of two cultivars, Arka Kiran (AK) and Arka Mridula (AM), using Response Surface Methodology (RSM). A comparative analysis of AK (pink-pulp) and AM (white-pulp) during ripening showed changes in morphology, anatomy, and biochemistry. Ripening led to a decrease in chlorophyll and an increase in carotenoids across four stages: pre-ripe, ripe, colour-turn, and over-ripe. At the over-ripe stage, both cultivars exhibited dried peel, senescence spots, and softening, with AM being softer. Anatomical changes included thinning exocarp and merging locules, while electron microscopy revealed dissolution of cell walls and enlarged intercellular spaces. Phenolics and flavonoids were present in extracts from the ripe stage. RSM identified optimal extraction conditions: 80% methanol, 3% solute-to-solvent ratio, extraction at 30-35°C, and a two-day incubation period. The optimized extracts showed high total phenolic content (TPC), total flavonoid content (TFC), and DPPH antioxidant activity, with AM having higher phenolic content. LC-MS and GC-MS analyses revealed the presence of phenolics, vitamins, amino acids, alkenes, and fatty acids in both fruit extracts (AK and AM).

Polyphenols constituted 26.90% and 32.40% of the AK and AM extracts, respectively, while alkanes were the predominant component, accounting for 76.92% in AK and 75.86% in AM. Key compounds included catechin, myricitrin, myricetin, quinic acid, ascorbic acid, chlorogenic acid, kaempferol-4-glucoside, kaempferol-3- α -L-arabinopyranoside, and coumarin. The over-ripe stage showed the highest antioxidant levels, correlating with TPC and TFC. Guava peel was richer in bioactive compounds than the pulp, suggesting enhanced health benefits from consuming both. *In silico* molecular docking studies showed catechin had the strongest binding affinity against SARS-CoV-2 spike proteins, indicating its potential as a drug candidate, further clinical and *in vivo* validation are warranted.

Keywords: *Antioxidant, Anti-SARS-CoV-2, Fruit ripening, Guava, Metabolic profiling, Molecular docking, RSM*

Publications:

1. **Yatheesharadhya. Bylappa** and Anish Nag, "Evaluation of phenolic and antioxidant profiles of pink Guava peel (*Psidium guajava* L. cv Arka kiran) during fruit ripening and its *in silico* Anti SARS-CoV-2 property," *Journal of Applied and Natural Science*, vol. 15, no. 4, pp. 1557–1562, 2023, <https://doi.org/10.31018/jans.v15i4.5089>.
2. **Yatheesharadhya. Bylappa** and Anish Nag, "Unravelling Post-harvest Ripening Metabolomics of a New White Variety Guava Fruit (Cv Arka Mridula) with Special Emphasis on Phenolics and Corresponding Antioxidants," *Applied Biochemistry and Biotechnology*, pp. 1–21, 2024, <https://doi.org/10.1007/s12010-024-04907-5>.
3. **Yatheesharadhya. Bylappa** and Anish Nag, "A statistical approach to study anatomical changes of pink guava cultivar (*Psidium guajava* L. cv Arka Kiran) during its ripening at the room temperature storage," *Kuwait Journal of Science*, vol. 52, no. 1, p. 100295, 2025, <https://doi.org/10.1016/j.kjs.2024.100295>.
4. **Yatheesharadhya Bylappa**, Balamuralikrishnan Balasubramanian, Sungkwon Park, Kadanthottu Sebastian Joseph, Anish Mathew Chacko, Wudali Narasimha Sudheer, Manikantan Pappuswamy, Arun Meyyazhagan, Wen-Chao Liu, Anish Nag, Parisa Mostashari, Amin Mousavi Khaneghah, "Three decades of advances in extraction and analytical techniques for guava (*Psidium guajava* L.): A review," *Results in Chemistry*, p. 101708, 2024, <https://doi.org/10.1016/j.rechem.2024.101708>.