

Exploration of bioactive compounds and antioxidant properties of medicinal plants for sustainable applications in post-harvest shelf-life enhancement of *Solanum lycopersicum* var. *cerasiforme*

Sharon John and Manjesh M*

Department of Life Sciences, CHRIST (Deemed to be University), Hosur Road,
Bengaluru – 560029, Karnataka, India.

*Email: manjesh.m@christuniversity.in

Receipt: 24.10.2025 Revised: 09.01.2026 Acceptance: 12.01.2026

DOI: <https://doi.org/10.53552/ijmfmap.12.1.2026.61-72>

License: [CC BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/) (<https://creativecommons.org/licenses/by-nc/4.0/>)

Copyright: © The Author(s)

ABSTRACT

This study aims to assess the bioactive compounds of the medicinal plants viz., *Centella asiatica*, *Phyllanthus niruri*, and *Swertia chirata*. Both aqueous and ethanolic plant extracts were prepared, and total phenolic, flavonoid, chlorophyll, and carotenoid contents were analyzed. The highest yield extract was observed in *Phyllanthus niruri* ($18.43 \pm 0.60\%$). *Swertia chirata* contained the highest chlorophylls and carotenoid contents. Total phenolic and flavonoid contents were highest in *Swertia chirata* (66.31 ± 1.527 mg GAE/g and 103.108 ± 4.136 mg QE/g, respectively). FTIR analysis confirmed the presence of diverse functional groups, with *Phyllanthus niruri* showing a comparatively richer phytochemical profile. In the DPPH antioxidant assay, *Phyllanthus niruri* demonstrated the strongest antioxidant activity. The microbroth dilution method was used to evaluate antimicrobial activity, revealing that *Phyllanthus niruri* exhibited a significant antibacterial effect, specifically against *Bacillus* spp. (MIC = 3.125 mg/ml). Application of natural coating to *Solanum lycopersicum* var. *cerasiforme*, stored at both room temperature and 4°C, significantly delayed microbial spoilage and preserved quality. By Day 15, *Swertia chirata* coating showed the lowest weight loss at room temperature (40.09%), while *Centella asiatica* coating provided superior preservation under 4 °C storage, exhibiting the lowest visual decay index, demonstrating temperature-dependent effectiveness of the plant extracts.

Keywords: Bioactive compounds, medicinal plants, postharvest preservation, shelf-life enhancement,