Manipal Alumni Science and Health Journal 2025; 10(2): Special Edition
5th International Conference on Bioengineering for Health and Environment

OSP-30

Microwave-Assisted Extraction of Pectin from Decayed Citrus Waste: Evaluating the Effects of Decay

Raghul Rajah S.[1], Shreeja P.[1], Durga Gomathi Arumuganainar[1], Deepa Lakshmi Ramesh[1], Prakash Pandurangan[1*], Swetha Sunkar [2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India.
[2]Department of Bioinformatics, Sathyabama Institute of Science and Technology, Chennai, India.

The extraction and utilization of pectin from food industry waste present a sustainable solution to meet the growing industrial demand for this valuable polysaccharide. This study investigates the optimal timing for pectin extraction from citrus waste to maximize both yield and quality, addressing a critical gap in large-scale implementation pf waste to pectin conversion. Three citrus fruits were analyzed over a four-day period to assess the impact of decay on the pectin's characteristics. The research employed microwave- assisted extraction, selected for its efficiency and simplicity compared to traditional methods. The extracted pectin underwent comprehensive characterization through multiple analytical methods, including titrimetric analysis, FTIR, FESEM, TGA, and NMR. Additionally, the study evaluated the cytotoxic effects of the extracted pectin on human colorectal cancer cells using the MTT assay. This research addresses several key challenges in pectin production from food waste, particularly focusing on the temporal aspect of waste utilization. By determining the optimal window for pectin extraction, the study aims to establish parameters for an industrial scale-implementation. The results contribute to the broader goal of creating a sustainable pectin production from food industry waste, potentially reducing waste while meeting the growing demand for pectin in pharmaceutical, nutraceutical, and food applications. Finally, the optimum time for the utilization of citrus waste to obtain the best quality pectin with the highest yield was determined.

Keywords: Cytotoxicity, Colorectal Cancer, Extraction, Esterification, MTT assay

***Correspondence**: Prakash Pandurangan
prakash.biotech@sathyabama.ac.in