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Valorization of Charry Pit Waste: Efficient Oil Extraction for Biodiesel Production

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Making chemicals and biofuels from biomass is one of the most promising approaches. Growing concerns over land and water use, deforestation and food security have challenged the sustainability of traditional biodiesel feedstocks. Waste from stone fruit, such as cherry seeds, offers a promising, low-cost, and low-acid feedstock for biodiesel production due to its high-oil content (above 50% of seed mass), and the large amounts of waste generated by the food industry, posing significant environmental challenges. This study presents preliminary results of oil extraction from cherry pits of the *Oblačinska* variety (*Prunus cerasus L.*), as a potential step toward their valorization in second-generation biodiesel synthesis.

In order to achieve optimal yield and oil quality, solvent extraction was performed on both finely milled whole kernels (shall + seed) and separated seeds, using several non-polar solvents, with or without the use of a Soxhlet apparatus. The effect of extraction time on oil yield was initially tested. Interestingly, the results revealed no significant increase in oil yield beyond 5 min, ranging from 26,9±1,1% to 28,4±0,42% for seeds, while similar trends were observed in previous extractions from whole cherry pits. These findings suggest that nearly complete oil extraction can be achieved within five minutes, highlighting the efficiency of the process for potential upscaling. The short extraction time is attributed to the high oil accessibility in cherry seeds, fine particle size, and the use of petroleum ether as an effective non-polar solvent.Detailed analysis of the extracted oils included acylglycerols, phospholipids, hydrocarbons, and pigments, using GC-MS, GPC, HPLC, HPLC-MS, and Raman spectroscopy. Fatty acid profiling was conducted by GC–MS/FID after derivatization.

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