Bioactive Extracts of *Olea europaea* Waste Streams

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Abstract

The production of olive oil has seen an increase in recent years due to a broader understanding of the health benefits of the Mediterranean Aliment Culture. With this expanding industry we also see an increase in the waste products associated with olive oil production. Given the high polluting content of the waste streams and the economic costs associated with its removal and processing, waste remediation and disposal has become a significant point of interest for both producers and local bodies. In this project, wastes of the olive oil production industry are examined for their use as the raw material for a novel product used in the control of horticulturally important diseases, examining the effect of extraction protocols on the activity of the final product.

Active fractions of the olive oil wastes were identified from literature and protocols for their extraction and recovery developed; incorporating both standard solvent extraction and novel ultrasound-assisted extraction. Criteria for the analysis of extract quality were outlined and potential target applications identified.

The biophenolic compounds of olive wastes were identified as providing the majority of the active fraction, so protocols were developed for the recovery of these compounds. Standard solvent extraction and ultrasound-assisted extraction were examined for their effectiveness of biophenolic recovery and their effect on product quality. Certain horticulturally important diseases were identified as potential targets, and bioassays undertaken to determine the ability of a crude extract to inhibit and control these diseases.

It was found that the action of ultrasound during extraction provides a greater degree of recovery of biophenolic compounds, with minimal loss of product quality; as determined by bioassays and total biophenol determination. This increase in recovery is due primarily to the destruction of cellular material resulting in higher rates and absolute yields of recovery. This work provides evidence of the occurrence of some

interesting phenomenon in the recovery of biophenols from olive wastes that deserves further examination.

The crude olive leaf extract was shown to have an inhibitory effect on bacteria and effectively no inhibitory effect on fungal species in the total biophenol ranges tested. Erwinia amylovora and Staphylococcus aureus both showed a large susceptibility to the olive leaf extract. Results showed a higher degree of susceptibility of Gram positive bacteria and a potential resistance in soil microbes. For bacterial species, total biophenol concentrations of 0.15 to 3.50 mg GAE/ml provided inhibitory effects, while with the fungal species tested, no inhibitory effects were found at total biophenol concentrations of up to 2.50 mg GAE/ml.

Some evidence exists that there is an opportunity for the economic recovery of olive biophenols for use as a novel product, but more work is required to determine specific applications and/or targets of use, as well as optimisation of the extraction and purification protocol. A sample removed from interfering compounds will allow the examination of activity of particular compounds and hence a better understanding of the action of the olive waste extract.

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