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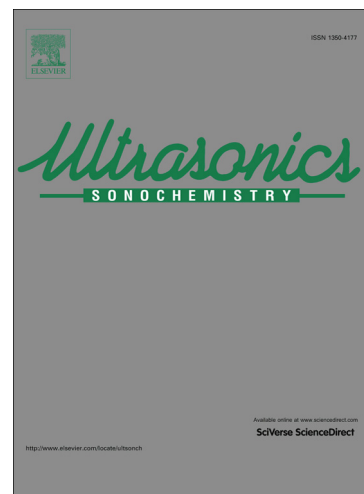
Ultrasound-assisted extraction of antimicrobial compounds from *Thymus daenensis* and *Silybum marianum*: Antimicrobial activity with and without the presence of natural silver nanoparticles

Mohammad Safarpour, Mehrorang Ghaedi, Arash Asfaram, Masoomeh Yousefi-Nejad, Hamedreza Javadian, Hossein Zare Khafri, Marzieh Bagherinasab

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Ultrasound-assisted extraction of antimicrobial compounds from *Thymus daenensis* and *Silybum marianum*: Antimicrobial activity with and without the presence of natural silver nanoparticles

Mohammad Safarpour ^a, Mehrorang Ghaedi ^{a,*}, Arash Asfaram ^b, Masoomeh Yousefi-Nejad ^c,

Hamedreza Javadian ^d, Hossein Zare Khafri ^a and Marzieh Bagherinasab ^e

^a Department of Chemistry, Yasouj University, Yasouj, 75918-74831, Iran

^b Medicinal plants research, Yasouj University of Medical Sciences, Yasouj, Iran.

^c Department of Biology, Yasouj University, Yasouj, 75918-74831, Iran.

^d Universitat Politècnica de Catalunya, Department of Chemical Engineering, ETSEIB, Diagonal 647, 08028 Barcelona, Spain.

^e Department of Animal Science, Kermanshah University, Kermanshah, 67156-85438, Iran.

Abstract

The present study is devoted to prepare a new antibacterial and antifungal agent based on in situ-synthesized silver nanoparticles at room temperature using *Rosmarinus officinalis* (*R. officinalis*) leaf extract. The Ag-NPs characterization by UV-visible, SEM, TEM and XRD revealed that the particles sizes were in the range of 10–33 nm. In this study, hydroalcoholic extracts were used with ultrasonic method. Ultrasonication has recently received attention as a novel bioprocessing tool for process intensification in many areas of downstream processing. The antimicrobial activities of *T. daenensis* and *S. marianum* extracts with and without the presence of Ag-NPs were investigated at concentrations from 12.5 to 50 mg/mL against *Staphylococcus aureus* (*S. aureus*, Gram-positive organism) and *Escherichia coli* (*E. coli*, Gram-negative organism), and fungal strains were *Aspergillus oryzae* (*A. oryzae*) and *Candida albicans* (*C. albicans*). Antimicrobial activity determined using agar disc diffusion method revealed that the activities of

*Corresponding authors: Tel/Fax: +98-741-2223048

E-mail address: m_ghaedi@yu.ac.ir (M. Ghaedi)

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