

Isopentenylacetophenones from the roots of *Anthemis cotula*

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Abstract:

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A new investigation of the roots of *A. cotula* (Asteraceae) showed that besides already isolated polyacetylenes and tree isopentenylacetophenone derivatives were present. They have not been previously isolated from any *Anthemis* species. It is possible that they act as phytoalexins in this plant.

Key words: Asteraceae, *Anthemis cotula*, isopentenylacetophenones, phytoalexins

Introduction

The large genus *Anthemis* with more than 130 species is widely distributed over the Mediterranean region. According to the literature this is one of the best phytochemically investigated genus of family Asteraceae (Compositae). Polyacetylenes, flavonoids and sesquiterpene lactones are the three main classes of secondary metabolites of the genus. *A. cotula* is one of nine *Anthemis* species that could be found in Serbia (Josifović, 1975). It grows on sandy terrains in eastern part of the country.

Material and methods

The plant material was collected during the time of flowering near Kladovo in July 2002. A voucher specimen (AC26052002) was deposited in the Herbarium of the Faculty of Biology, University of Belgrade.

Silica gel (0.063–0.200 mm) was used for column chromatography (CC) and silica gel GF-254 was used for analytical (0.25 mm) and preparative (0.75mm) thin layer chromatography (TLC). The NMR spectra were recorded using Variani Gemini 2000 (¹H 200 MHz). Mass spectra were obtained on a Finnigan MAT 8230 (EI, 70 eV and DCI, 150 eV, isobutane). IR spectra were measured on a Perkin Elmer FTIR Spectrometer 1725X.

The powdered roots (134 g) were extracted twice with petroleum ether–ether (2:1). The crude extract (600 mg) was subjected to CC on silica gel starting elution with petroleum ether and increasing polarity by adding Et₂O up to 50% to yield 50 fractions. Prep. TLC of fractions 28-29 (toluene-EtOAc 8:2) gave 3.4 mg of **1**. Prep. TLC of fractions 36-40 (petroleum ether–Et₂O 4:6) afforded **2** (2 mg) and **3** (3mg).

Results and discussion

In this paper a new investigation of the roots of *A. cotula* is described. Besides already isolated polyacetylenes (Bohlmann et al., 1965) and three isopentenyl-acetophenone derivatives (**1-3**) were present. Their structures were identified by comparison of their spectral data (¹H NMR, IR, MS) to those reported in the literature (Bohlmann, Rao, 1973, Bohlmann, Grenz, 1977, Bohlmann et al., 1977). These compounds, common in *Asteraceae*, have not been isolated from any *Anthemis* species so far.

Isopentenylacetophenones, especially benzopyrans (chromenes) and benzofurans, have a considerable chemotaxonomic and biological significance (Proksch, Rodriguez, 1983). They can act as anti-juvenile hormones and show

bacteriostatic, phototoxic or insecticidal activity. Additionally they can act as phytoalexins. The phytoalexins are low-molecular-weight antimicrobial compounds that accumulate in plants as a result of infection or stress (Kuć, 1995). It has been shown that 4'-hydroxy-3'-(3-methylbutanoyl)acetophenone (**1**) and two similar acetophenone derivatives are synthesized in tubers of *Polymnia sonchifolia* (*Asteraceae*) after inoculation with *Pseudomonas cichorii* (Takasugi, Masuda, 1996). Since previous investigations of the roots of *A. cotula* did not show presence of acetophenones, it is possible that in this case biosynthesis of **1-3** was induced by some external endangering factor, i.e. that they act as phytoalexins. Further investigation is required to prove this assumption.

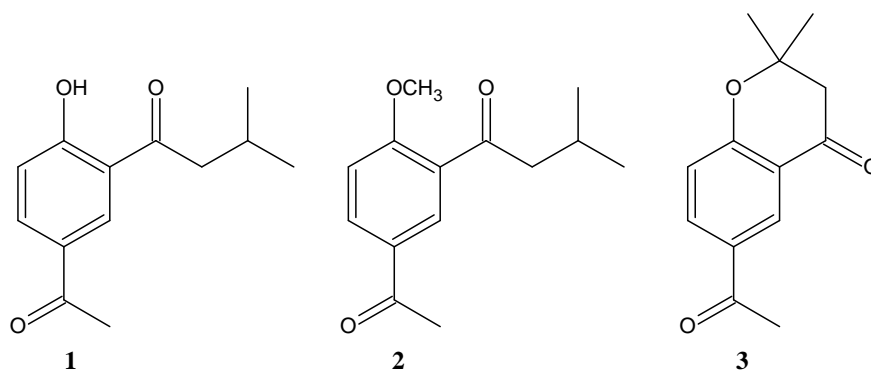


Fig. 1. Isopentenyl-acetophenone derivatives

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