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Short communication

SHORT COMMUNICATION

Antifungal activity of davanone-type sesquiterpenes from *Artemisia lobelii* var. *conescens*[*]

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Abstract: Five tetrahydrofuran sesquiterpenes, so-called davanones, and coumarin umbelliferone isolated from *Artemisia lobelii* All. var. *canescens* (DC.) Briqu, were tested for antifungal activity. All the compounds inhibited the growth of the applied fungi. The overall activity of one of them, 2-hydroxy-2,6,10-trimethyl-7,10-epoxy-dodeca-3,11-dien-5-on, was comparable to that of the antibiotic bifonazole.

Keywords: *Artemisia lobelii* All. var. *conescens*, Asteraceae, davanones, umbelliferone, antifungal activity.

INTRODUCTION

The genus *Artemisia* is one of the largest and most widely distributed of *ca.* 60 genera in the tribe Anthemideae of Asteraceae (Compositae). This genus comprises about 400 species widely spread over all continents.[1] Most of the *Artemisia* species have been used in traditional medicine in different countries, *e.g.*, 45 species of the genus have medical uses in China for the treatment of different disorders (colds and cough, rheumatism, carbuncle, fractures, dermatitis, dysentery, pharyngitis, urethritis and cholecistitis).[2] Some of *Artemisia* species used in India (Westarn Himalayas, Kashmir, Kumaon, Nepal) show antimicrobial, antibacterial and antifungal activities.[3] Some aromatic plants of the genus, used as a source of aroma, and for their stomachic, cholagogue and anthelmintic properties,[4] are officially registered in numberous pharmacopoeias in many countries.[5]

Previous studies on the chemical constituents of the aerial parts of *Artemisia labelii* All. var. *conescens* comprised GC/MS analysis of the essential oil,[6] as well

* Dedicated to Professor Živorad Čeković on the occasion of his 70th birthday.

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as the isolation and identification of davanone-like terpenoids (**1**–**5**) and a coumarin umbelliferone (**6**).[7] Due to the aforementioned therapeutic effects of some *Artemisia* species, if was decided to investigate the potential pharmacological effects of their constituents. To that aim, tetrahydrofuran-type terpenoids **1**–**5** (davanones) and umbelliferone **6** (Fig. 1), previously isolated from the aerial part of *Artemisia lobelii* All. var. *conescens*, were tested for antifungal activity.

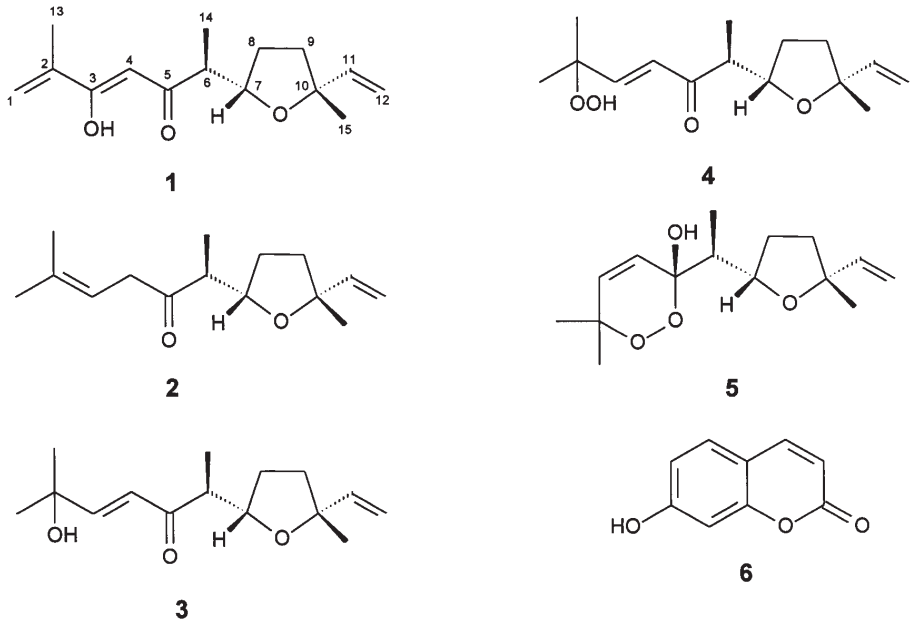

Fig. 1.

TABLE I.

Micromycetes	**1**	**2**	**3**	**4**	**5**	**6**	Biofonazol
	[a]Mic	Mic	Mic	Mic	Mic	Mic	Mic
	[b]Mfc	Mfc	Mfc	Mfc	Mfc	Mfc	Mfc
Aspergillus niger	25	25	6.25	25	25	<12.5	10
	25–50	25	12.5	25	25–50	<12.5	10
Aspergillus ochraceus	25	25	6.25	25	25	25	10
	25–50	25	12.5	25	25–50	25	10
Aspergillus versicolor	25	25	<6.25	12.5	25	12.5	10
	25–50	25	6.25	25	25–50	25	10
Aspergillus flavus	25	25	<6.25	12.5	25	12.5	10
	25–50	25	6.25	25	25–50	25	15
Aspergillus terreus	50	25	6.25	25	50	25	10
	50	25	12.5–25	25	50	25	15
Penicillium ochrochloron	25	25	12.5	25	25	25	15
	50	25	25	25	50	25	20

TABLE I.Continued

Micromycetes	**1**	**2**	**3**	**4**	**5**	**6**	Biofonazol
	[a]Mic	Mic	Mic	Mic	Mic	Mic	Mic
	[b]Mfc	Mfc	Mfc	Mfc	Mfc	Mfc	Mfc
Penicillium funiculosum	25	25	12.5	25	25	25	15
	50	25	25	25	50	50	25
Trichoderma viride	25	25	<25	25	50	25	15
	50	50	<25	25	50	25	25
Cladosporium cladosporoides	25	25	<6.25	12.5	25	12.5	10
	25	25	<6.25	12.5	25	25	10
Alternaria alternata	25	25	<6.25	12.5	25	25	10
	25	25	6.25	12.5	25	25	10

[a] Minimal inhibition concentration (μg/ml); [b] Minimal fungicidal concentation (μg/ml)

MATERIAL AND METHODS

The aerial parts of *A. lobelii* All. var. *conescens* (DC.) Briqu. (Asteraceae) were collected in Montenegro during August 1999 from the slopes of the Morača mountains (Moračke planine). A voucher specimen, accession number AL0899-1, is deposited in the Herbarium, Faculty of Biology, University of Belgrade-Herbarium Code BEOU.

Tetrahydrofuran-type terpenoids **1**–**5** (davanones) and umbelliferone **6** (Fig. 1), previously isolated from the aerial parts of *A. lobelii* All. var. *canescens*,[7] were tested for antifungal activity.

The fungi used in this study were *Aspergillus niger* (ATCC 6275), *A. ochraceus* (ATCC 12066), *A. versicolor* (ATCC 11730), *A. flavus* (ATCC 9170, *A. terreus* (ATCC 16792), *Alternaria alternata* (ATCC 13963), *Penicillium ochrochloron* (ATCC 9112), *Penicillium funiculosum* (ATCC 10509), *Cladosporium cladosporioides* (ATCC 13276), *Trichoderma viride* (IAM 5061). The organisms were obtained from the Mycotheca of the Mycological Laboratory, Department of Plant Physiology, Institute for Biological Research "Dr. Siniša Stanković", Belgrade. The fungi were maintained on potato dextrose agar (PDA) and malt agar (MA). The cultures were stored at +4 ºC and subcultured once a month. In order to investigate the antifungal activity, a modified mycelial growth test with malt agar was used. The minimal inhibitory concentration (MIC) of the investigated components necessary for the complete inhibition of mycelial growth of the fungal strain was determined. Different concentrations of the tested compound were diluted in Petri dishes with malt agar (MA). All fungal species were tested in triplicate. Petri dishes with ethanol were used as a control. The compound was added into molten malt agar (MA) and poured into Petri dishes. The tested fungi were inoculated at the center of the plates.[8] The plates were incubated for three weeks at room temperature, after this period MIC and MFC were determined (Table I). Bifonazole, which was used as a positive control, is commercially available from "Srbolek", Belgrade.

CONCLUSIONS

All the compounds inhibited the growth of *Aspergillus niger*, *A. ochraceus*, *A. versicolor*, *A. flavus*, *A. terreus*, *Penicillium ochrochloron*, *P. funiculosum*, *Trichoderma viride*, *Cladosporium cladosporioides* and *Alternaria alternata*. Compound **3**, 2-hydroxy-2,6,10-trimethyl-7,10-epoxydodeca-3,11-dien-5-on, showed an effect comparable to that of the commercial agent, bifonazole, used as a positive control.

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ИЗВОД

АНТИФУНГАЛНА АКТИВНОСТ ТЕРПЕНОИДА ДАВАНОНСКОГ ТИПА ИЗОЛОВАНИХ ИЗ *Artemisia lobelii* var. *canescens*

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Пет тетрахидрофуранских терпеноида даванонског типа и кумарин умбелиферон, који су претходно изоловани из биљне врсте *Aretemisia lobelii* var. *conescens*, испитивани су на антифунгалну активност. Сва тестирана једињења инхибирају раст примењених култура гљива. Највећу активност, која се може мерити са активношћу комерцијалног антибиотика бифоназола, показује 2-хидрокси-2,6,10-триметил-7,10-епоксидодека-3,11-диен-5-он.

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