J.Serb.Chem.Soc. 68(3)235–237(2003)
JSCS – 3038

UDC 547.636.2:633.913.2
Note

NOTE

A stilbene from the heartwood of *Maclura pomifera*

NINA DJAPIĆ[1], ZOLTAN DJARMATI[2], SNEŽANA FILIP[2] and RATKO M. JANKOV[3,#]

[1]*Tehnical Faculty "Mihajlo Pupin", University of Novi Sad, Djure Djakovića b. b., 23000 Zrenjanin,* [2]*Bio-Ecological Centre, Petra Drapšina 15, 23000 Zrenjanin and* [3]*Chemical Faculty, University of Belgrade, Studentski trg 16, 11000 Belgrade, Serbia and Montenegro*

(Received 1 July, revised 3 December 2002)

Abstract: Dried heartwood powder of *Maclura pomifera*, Moraceae, was extracted with acetone. Silica gel column chromatography (CC) of the crude extract yielded 2',3',4',5'-tetrahydroxystilbene (oxyresveratrol).
Keywords: Maclura pomifera, Moraceae, heartwood, oxyresveratrol.

INTRODUCTION

Maclura pomifera, Moraceae, is a tree native to the southwestern region of North America. A great deal of literature exists on the chemical composition of *Maclura pomifera*. The types of compounds isolated from the various parts of the plant belong to different classes such as flavonoids,[1,2] xanthones,[3,4] triterpenes[5] and stilbenes.[6,7] Stilbenes are a class of biologically active components found in plants that have been shown to possess various medicinal properties. The antioxidant properties of stilbene analogues have also been investigated. The most potent of these compounds against oxidation of the human LDL is the constituent of red wine, piceatannol.[8] Many researches have been done on the identification of stilbenes in wines cultivated throughout the world.[9–11] However, the amount of stilbenes that occurs in wine is far less than the amount found in the heartwood of *Maclura pomifera*.

EXPERIMENTAL

Plant material. The *Maclura pomifera* tree was collected in the area of Zrenjanin, North Serbia, in October 2000.

Extaction and isolation procedure. Two successive acetone extractions of the dried heartwood powder (1 kg) yielded a heavy viscous brown–yellow product (79.5 g). The crude extract (20.0 g) was subjected to column-chromatography (CC) using silica gel and the fractions were screened on silica gel TLC plates. The elution was started with benzene followed with benzene – acetone, gradually increasing amount of acetone (99:1, 98:2, 97:3, 96:4, 95:5, 93:7 and 9:1). The fraction eluted with benzene – acetone (9:1) contained compound **1** (0.39 g) in form of a gelatine product, crystallizing from acetone–acetic acid, as well as methanol–acetic acid.

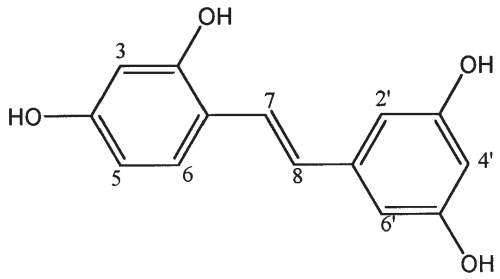
General procedures. ^{1}H, ^{13}C one and two dimensional NMR-spectra were measured on a Bruker DMX 600 in acetone-d_6. Low resolution mass spectra were recorded on Fissons Instruments, Manchester, England

Serbian Chemical Society active member.

with mass selective detector MD 1000; *m/z* 50 – 750 (EI) mass spectrometer. All solvents used for extraction and isolation were reagent grade.

RESULTS AND DISCUSSION

The isolated compound (M^+, *m/z* 244) was identified as 2', 3, 4', 5-tetrahydroxystilbene (oxyresveratrol) (**1**) by the similarity of its ^{1}H-NMR data (see Table I) to those previously reported for this compound.[7] The application of H,H-COSY revealed small long-range interproton couplings (#0.5 Hz), such as $^4J_{6',8}$, $^4J_{7.2(6)}$, $^8J_{3',2(6)}$ and $^8J_{5',2(6)}$, not detected before. The ^{13}C-NMR chemical shifts assigned by means of HMQC and HSQC are listed in Table I.



1

TABLE I. ^{1}H (600 MHz) and ^{13}C (150 MHz) NMR data in $(CD_3)_2CO$ of **1**

H/C	δ_H, multiplicity (*J*/Hz)	δ_C, multiplicity	HMBC (H→C)
1		141.6 *s*	
2	6.53 *dd* (2.2; 0.5)	105.4 *d*	C-3; 4; 6; 7
3		159.5 *s*	
4	6.24 *t* (2.2)	102.3 *d*	C-2; 3; 5; 6
5		159.4 *s*	
6	6.53 *dd* (2.2; 0.5)	105.4 *d*	C-2; 4; 5; 7
7	7.34 *d* (16.4)	124.3 *d*	C-1; 2'; 6'; 1'*; 2*; 6*; 7*
8	6.89 *d* (16.4)	126.3 *d*	C-1; 1'; 2; 6; 8*; 2'*
1'		117.2 s	
2'		156.8 s	
3'	6.44 *d* (2.4)	103.6 *d*	C-1'; 2'; 4'; 5'; 8*
4'		159.1 *s*	
5'	6.38 *ddd* (8.5; 2.4; 0.5)	108.4 *d*	C-1'; 3'; 4'; 2'*
6'	7.41 *d* (8.5)	128.2 *d*	C-2'; 3'; 4'; 8
OH	8.50 *brs*; 1H; 8.32 *brs*; 1H; 8.11 *brs*; 2H		

*Cross-peaks of low intensity

The potential use of *Maclura pomifera* in the industry as a medicinal crop may be an advantage due to its growing throughout the region and its stilbene content of 1.96 % in the heartwood. According to some data, in the living organisms oxyveratrol is converted to its isomer with catohol structure.

ИЗВОД

ПОЛИФЕНОЛНО ЈЕДИЊЕЊЕ ИЗОЛОВАНО ИЗ ДРВЕТА *Maclurae pomifera*, Moraceae

НИНА ЂАПИЋ[1], ЗОЛТАН ЂАРМАТИ[2], СНЕЖАНА ФИЛИП[2] и РАТКО М. ЈАНКОВ[3]

[1]Технички факултет "Михајло Пупин", Универзитет у Новом Саду, Ђуре Ђаковића б. б., 23000 Зрењанин, [2]Био-технолошки центар, Петра Драпшина 15, 23000 Зрењанин и [3]Хемијски факултет, Универзитет у Београду, Студентски трг 16, 11000 Београд

Испитиван је хемијски састав дрвета *Maclura pomifera*, Moraceae. Екстракција је обављена ацетоном и ацетонска фракција је затим раздвојена колонском хроматографијом. Структура изолованог природног производа одређена је масеном спектрометријом, једно- и дво-димензионалним и хетеро- дво-димензионалним нуклеарно-магнетним резонанционим техникама. На основу снимљених спектара одређена је структура изолованог једињења и она је 2',3',4',5'-тетрахидроксистилбен (оксиресвератрол).

(Примљено 1. јула, ревидирано 3. децембра 2002)

REFERENCES

1. G. D. Monache, R. Scuria, A. Vitali, B. Botta, B. Monacelli, G. Pasqua, C. Palocci, E. Cernia, *Phytochemistry* **37** (1994) 893
2. S. J. Lee, A. R. Wood, G.–A. C. Maier, R. A. Dixon, T. J. Mabry, *Phytochemistry* **49** (1998) 2573
3. F. D. Monache, F. Ferreri, M. Pomponi, *Phytochemistry* **23** (1984) 1489
4. M. L. Wolfrom, E. E. Dickey, P. McWain, J. H. Looker, O. M. Windrath, F. Jr. Komitsky, *J. Org. Chem.* **29** (1964) 689
5. K. G. Lewis, *Aust. J. Chem. Soc.* (1959) 73
6. N. N. Gerber, *Phytochemistry* **25** (1986) 1697
7. T. P. Schultz, W. B. Harms, T. H. Fisher, K. D. McMurtrey, J. Minn, D. D. Nicholas, *Holzforschung* **49** (1995) 29
8. P. W. Teguo, B. Fauconeau, G. Deffieus, F. Huguet, J. Vercauteren, J. M. Merillon, *J. Nat. Prod.* **61** (1998) 655
9. D. M. Goldberg, A. Karumanchiri, E. P. Diamandis, G. J. Soleas, *Am. J. Enol. Vitic.* **47** (1996) 415
10. R. M. Lamuela-Raventos, A. I. Romero-Perez, A. L. Waterhouse, M. C. Torre-Boronat, *J. Agric. Food Chem.* **43** (1995) 281
11. M. Sato, Y. Suzuki, T. Okuda, K. Yokotsuka, *Biosci. Biotechnol. Biochem.* **61** (1997) 1800.