FLAVONOIDS OF THE AERIAL PART OF *Tamarix hispida*

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Plants of the *Tamarix* genus (Tamaricaceae) are interesting not only for the variety of chemical compounds in them but also for their biological activity [1].

In continuation of research on Kazakh species of *Tamarix* [2], we isolated six pure phenolic compounds from the aerial part of *T. hispida* Willd. (bristle-haired tamarisk) by extraction and adsorption-distribution chromatography (silica gel, polyamide). The compounds were identified by physicochemical constants, spectra (UV, PMR, mass), and comparison with literature data. Compounds **1-3** have been previously described in certain *Tamarix* species [3-6] and are isolated from *T. hispida* for the first time. Compounds **4-6** are isolated for the first time from plants of the *Tamarix* genus. Furthermore, *T. hispida* contains the 4-sulfate of coniferylic alcohol, which we isolated previously from *T. ramosissima*.

Various fractions of polyphenols with antioxidant, antimicrobial, and fungicidal activity were obtained.

3,5,7,4′-Tetrahydroxy-3-methoxyflavone (isorhamnetin) (1), mp 304-306°C; PMR (500 MHz, C_5D_5N, δ, ppm, J/Hz): 8.53 (1H, d, J = 2, H-2′), 8.13 (1H, dd, J_1 = 2, J_2 = 8, H-6′), 7.12 (1H, d, J = 8, H-5′), 6.78 (1H, d, J = 2, H-8), 6.73 (1H, d, J = 2, H-6), 3.90 (3H, s, OCH_3). Mass spectrum (EI, 70 eV), *m*/*z*: 316 $[M]^+$, $C_{16}H_{12}O_7$ [3].

3,5-Dihydroxy-4′,7-dimethoxyflavone (2), mp 180-182°C, PMR (500 MHz, C_5D_5N, δ, ppm, J/Hz): 8.52 (2H, d, J = 9, H-2′, H-6′), 7.16 (2H, d, J = 9.0, H-3′, H-5′), 6.70 (1H, d, J = 2, H-8), 6.58 (1H, d, J = 2, H-6), 3.76, 3.74 (6H, s, OCH_3). Mass spectrum (EI, 70 eV), *m*/*z*: 314 $[M]^+$, $C_{17}H_{14}O_6$ [4].

3,5,4′-Trihydroxy-7-methoxyflavone (rhamnocitrin) (3), mp 223-225°C, UV spectrum (MeOH, λ_{max}, nm): 267, 364; +NaOMe: dec.; +$AlCl_3$: 270, 423; +$AlCl_3$/HCl: 270, 423; +CH_3COONa: 267, 364; +CH_3COONa+H_3BO_3: 268, 363. PMR (500 MHz, C_5D_5N, δ, ppm, J/Hz): 8.05 (2H, d, J = 10, H-2′, H-6′), 6.92 (2H, d, J = 10, H-3′, H-5′), 6.31 (1H, d, J = 2, H-8), 6.15 (1H, d, J = 2, H-6), 3.76 (3H, s, OCH_3). Mass spectrum (EI, 70 eV), *m*/*z*: 300 $[M]^+$, $C_{16}H_{12}O_6$ [5].

5,7,4′-Trihydroxyflavone 3-O-α-L-rhamnopyranoside (afzelin) (4), mp 168-170°C, UV spectrum (MeOH, λ_{max}, nm): 265, 340; +NaOMe: 272, 390; +$AlCl_3$: 273, 347 sh, 389; +$AlCl_3$/HCl: 274, 347 sh, 389; +CH_3COONa: 265, 344; +CH_3COONa+H_3BO_3: 265, 340. PMR (500 MHZ, CD_3OD, δ, ppm, J/Hz): 7.79 (2H, d, J = 8.8, H-2′, H-6′), 6.95 (2H, d, J = 8.8, H-3′, H-5′), 6.38 (1H, d, J = 2, H-8), 6.21 (1H, d, J = 2, H-6), 5.37 (1H, d, J = 2.0, H-1″), 0.92 (3H, d, J = 6, CH_3). Mass spectrum (EI, 70 eV), *m*/*z*: 431 $[M - H]^+$, $C_{21}H_{20}O_{10}$ [7].

5,3′-Dihydroxy-7,4′-dimethoxyflavone 3-O-β-D-glucopyranoside (5), mp 160-162°C, UV spectrum (MeOH, λ_{max}, nm): 269, 348; +NaOMe: 269, 343; +$AlCl_3$: 295, 307, 360; +$AlCl_3$/HCl: 360, 302, 292; +CH_3COONa: 271, 348; +CH_3COONa+H_3BO_3: 268, 344. PMR (400 MHz, CD_3OD, δ, ppm, J/Hz): 7.97 (1H, d, J = 2, H-2′), 7.76 (1H, dd, J_1 = 2, J_2 = 8, H-6′), 7.05 (1H, d, J = 8, H-5′), 6.35 (1H, d, J = 2, H-8), 6.20 (1H, d, J = 2, H-6), 5.40 (1H, d, J = 7, H-1″), 3.90, 3.95 (6H, s, OCH_3), $C_{23}H_{24}O_{12}$ [8].

4-Hydroxy-3,5-O-dimethylbenzoic acid (syringic acid) (6), mp 208-210°C, PMR (500 MHz, CD_3OD, δ, ppm, J/Hz): 7.01 (2H, s, H-2, H-6), 3.84, 3.82 (6H, s, OCH_3). Mass spectrum (EI, 70 eV), *m*/*z*: 198 $[M]^+$, $C_9H_{10}O_5$ [9].

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