

COMPONENTS OF *Fraxinus raibocarpa*

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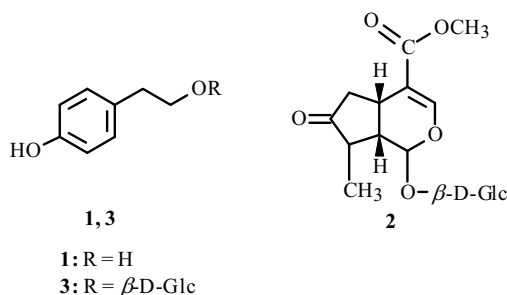
Fraxinus raibocarpa Rgl. (Oleaceae) is widely distributed in the flora of Central Asia [1]. The aerial part is used in folk medicine as a relaxant [2] and for cardiovascular diseases [3].

Carbohydrates and the flavonoids kaempferol, astragalin, isoquercitrin, and rutin, were isolated earlier from this plant [4].

We studied the aerial part of *F. raibocarpa* collected during flowering in Tashkent Oblast, Republic of Uzbekistan. Air-dried plant (740 g) was extracted with EtOH (70%). The extract was condensed and diluted with H₂O (1:1). The diluted solution was worked up successively with hydrocarbons, CHCl₃, EtOAc, and BuOH. Evaporation of the solvents afforded CHCl₃ (8 g), EtOAc (15 g), and BuOH (15 g) fractions.

TLC studies of the resulting fractions found that the CHCl₃ fraction contained mainly coumarins; EtOAc and BuOH, terpenoids and phenolic compounds.

Column chromatography of the BuOH fraction over silica gel using CHCl₃:MeOH (15:1, 9:1, 4:1) isolated five compounds: C₈H₁₀O₂ (1), mp 94–95°C; C₁₇H₂₄O₁₀ (2), mp 195°C; C₁₄H₂₀O₇ (3), mp 165°C; C₆H₁₄O₆ (4), mp 166°C; C₂₇H₃₀O₁₆ (5), mp 189–191°C.



UV, IR, PMR, ¹³C NMR, DEPT, HETCOR, COSY, and NOESY spectral data and comparisons with the literature were used to identify the isolated compounds as tyrosol (1) [4, 5], 7-ketologanin (2) [6], salidroside (3) [5, 7], mannitol (4), and rutin (5) [8].

Tyrosol (1), C₈H₁₀O₂, mp 94–95°C. UV spectrum (MeOH, λ_{max}, nm): 204.28, 222.89, 278.01. IR spectrum (KBr, ν_{max}, cm⁻¹): 3390, 3139, 2879, 1883, 1559, 1513, 1451, 1361, 1231, 1052, 817, 555. PMR spectrum (400 MHz, CD₃OD, δ, ppm, J/Hz): 2.65 (2H, t, J = 4.9, H-7), 3.61 and 3.98 (2H, t, J = 14.05, H-8), 6.64 (2H, d, J = 9.0, H-3,5), 6.97 (2H, d, J = 9.0, H-2,6). ¹³C NMR spectrum (100 MHz, CD₃OD, δ, ppm): 146.35 (C-1), 130.86 (C-2), 116.10 (C-3), 156.70 (C-4), 116.10 (C-5), 130.86 (C-6), 39.37 (C-7), 64.57 (C-8).

7-Ketologanin (2), C₁₇H₂₄O₁₀, mp 195°C. UV spectrum (MeOH, λ_{max}, nm): 231.17. IR spectrum (KBr, ν_{max}, cm⁻¹): 3374, 2921, 1749, 1683, 1644, 1446, 1299, 1075, 889, 845. PMR spectrum (400 MHz, DMSO-d₆, 0 = HMDS, δ, ppm, J/Hz): 1.01 (3H, d, J = 7.0, H-10), 1.89 (1H, m, H-8), 2.26 (1H, ddd, J = 10.5, 7.9, 2.9, H-9), 2.36 (1H, br.d, J = 18.9, H-6α), 2.56 (1H, dd, J = 18.9, 8.4, H-6β), 3.06 (1H, m, H-5), 3.58 (3H, s, OCH₃), 5.51 (1H, d, J = 2.9, H-1), 7.39 (1H, d, J = 1.4, H-3), 2.92 (1H, t, J = 8.0, H-2'), 2.98 (1H, t, J = 8.9, H-4'), 3.08 (2H, m, H-3',5'), 3.39 (1H, dd, J = 11.9, 6.2, H-6'α), 3.62 (1H, dd, J = 11.9, 1.6, H-6'β), 4.44 (1H, d, J = 7.8, H-1'). ¹³C NMR spectrum (100 MHz, δ, DMSO-d₆ = 39.5 ppm): 93.24 (C-1), 151.66 (C-3), 109.13 (C-4), 26.47 (C-5), 42.04 (C-6), 217.78 (C-7), 42.74 (C-8), 44.25 (C-9), 13.14 (C-10), 166.56 (C-11), 98.65 (C-1'), 73.07 (C-2'), 76.63 (C-3'), 70.04 (C-4'), 77.35 (C-5'), 61.13 (C-6'), 51.07 (OCH₃).

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Salidroside (3), C₁₄H₂₀O₇, mp 165°C. UV spectrum (MeOH, λ_{max}, nm): 223.40, 277.84. IR spectrum (KBr, ν_{max}, cm⁻¹): 3274, 2933, 1616, 1518, 1444, 1377, 1241, 1131, 1073, 1027, 900, 823, 775, 630, 503. PMR spectrum (400 MHz, CD₃OD, 0 = HMDS, δ, ppm, J/Hz): 2.78 (2H, t, J = 7.5, H-7), 3.62 (1H, dd, J = 15.0, 7.4, H-8α), 3.98 (1H, dd, J = 15.0, 7.4, H-8β), 6.64 (2H, d, J = 9.0, H-3,5), 7.00 (2H, d, J = 9.0, H-2,6), 3.12 (1H, d, J = 7.9, H-2'), 3.20–3.35 (3H, m, H-3',4',5'), 3.80 (2H, dd, J = 12.0, 2.0, H-6'), 4.22 (1H, d, J = 7.9, H-1'). ¹³C NMR spectrum (100 MHz, CD₃OD, δ, CD₃OD = 49.0 ppm): 130.90 (C-1), 130.68 (C-2), 116.10 (C-3), 156.70 (C-4), 116.10 (C-5), 130.68 (C-6), 36.30 (C-7), 71.54 (C-8), 104.30 (C-1'), 72.10 (C-2'), 77.84 (C-3'), 71.54 (C-4'), 78.00 (C-5'), 62.67 (C-6').

Mannitol (4), C₆H₁₄O₆, mp 166°C. IR spectrum (KBr, ν_{max}, cm⁻¹): 3271, 2935, 1462, 1377, 1090, 1023, 931, 889, 713, 623, 503. PMR spectrum (400 MHz, CD₃OD + D₂O, δ, ppm, J/Hz): 3.57–3.80 (8H, H-1,2,3,4,5,6). ¹³C NMR spectrum (100 MHz, CD₃OD + D₂O, δ, ppm): 64.78 (C-1,2), 70.83 (C-2,5), 72.49 (C-3,4).

Rutin (5), C₂₇H₃₀O₁₆, mp 189–191°C. The compound was identified by direct comparison with an authentic sample. Tyrosol, 7-ketoganin, salidroside, and mannitol were isolated for the first time from plants of the genus *Fraxinus*.

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