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CHEMICAL CONSTITUENTS OF *Lonicera etrusca*

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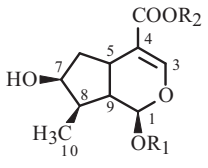
The genus *Lonicera* (Caprifoliaceae) is represented by 7 species in Turkish flora [1, 2]. Previous phytochemical studies on species of *Lonicera* reported that it contained iridoid glycosides [3], secoiridoid glycosides [3–13], *bis*-iridoid glycosides [13], triterpene saponins [9–11, 14, 15], phenolic acids [9, 14, 16, 17], flavonoids [9–11, 16, 18, 19], coumarin derivatives [18], anthocyanins [20], megastigmane glycosides [21], polyhydric alcohol glycosides [22], and monoterpene alkaloid glycosides [23]. Iridoid and secoiridoid glycosides have been reported to possess hypotensive, sedative, antipyretic, antitussive, and tonic activities [3].

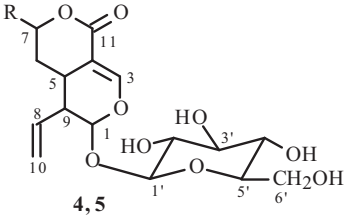
This paper describes the isolation and structural elucidation of seven known metabolites, loganetin, loganin, loganic acid, sweroside, 7-*O*-butylsecologanic acid, apigenin 7-*O*-*β*-glucopyranoside, and luteolin 7-*O*-*β*-glucopyranoside from the aerial parts of *Lonicera etrusca* Santi. 7-*O*-Butylsecologanic acid and apigenin 7-*O*-*β*-glucopyranoside were isolated from this plant for the first time.

Plant Material. *Lonicera etrusca* was collected from Davutlar-Kusadasi in June 2008. A voucher specimen has been deposited in the Herbarium of the Faculty of Pharmacy, Hacettepe University, Ankara, Turkey (HUEF 10069). The plant was air dried in the shade and ground to a fine powder.

Extraction and Isolation. Open air-dried and powdered aerial parts of the plant (263 g) were extracted with methanol at 40°C. After filtration, the combined extracts were evaporated under vacuum to dryness (73 g). The residue was suspended in H_2O, and the water-soluble portion was partitioned between *n*-hexane, $CHCl_3$, EtOAc, and *n*-BuOH. The organic phases were condensed to dryness *in vacuo*. The residues obtained were 12 g, 3 g, 10 g, and 25 g, respectively. The fractions of $CHCl_3$, EtOAc, and *n*-BuOH were purified by column chromatography with silica gel, RP-18, and Sephadex LH-20 to yield compounds **1–7**. TLC analyses were carried out on precoated Kieselgel 60 F_{254} aluminum sheets. The compounds were monitored by spraying 1% vanillin-H_2SO_4 reagent, followed by heating at 105°C for 1–2 min. The purified compounds were identified by EI-MS and NMR spectrum using a Finnigan MAT 95 spectrometer and a Varian Mercury plus spectrometer, 400 MHz for proton and 100 MHz for carbon. All compounds were identified as loganetin (**1**) [18, 24], loganin (**2**) [6, 25], loganic acid (**3**) [25], sweroside (**4**) [6], 7-*O*-butylsecologanic acid (**5**) [26], apigenin 7-*O*-*β*-glucopyranoside (**6**) [27], and luteolin 7-*O*-*β*-glucopyranoside (**7**) [28]. The spectral data of the isolated compounds are reported below.



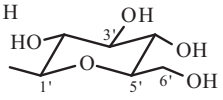
1 - 3



4, 5

1: R_1 = H

2, 3: R_1 =



1, 2: R_2 = Me

3: R_2 = H

4: R = $O^{1''}CH_2(CH_2)_2{}^{4''}CH_3$

5: R = H

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Loganetin (1). EI-MS *m/z* 228 $[M]^+$ (calcd for $C_{11}H_{16}O_5$).

Loganin (2). EI-MS *m/z* 228 $[M - 162]^+$ (calcd for $C_{17}H_{26}O_{10}$).

Loganic Acid (3). EI-MS *m/z* 214 $[M - 162]^+$ (calcd for $C_{16}H_{24}O_{10}$). ^{1}H NMR (400 MHz, CD_3OD, δ, ppm, J/Hz): 7.38 (1H, d, J = 1.1, H-3), 5.27 (1H, d, J = 4.7, H-1), 4.65 (1H, d, J = 7.7, H-1′), 4.04 (1H, m, H-7), 3.89 (1H, dd, J = 11.9, 1.8, H-6′b), 3.66 (1H, dd, J = 11.9, 5.5, H-6′a), 3.40–3.17 (4H, m, H-2′, 3′, 4′, 5′), 3.09 (1H, m, H-5), 2.25 (1H, ddd, J = 14.1, 8.0, 1.5, H-6b), 2.03 (1H, br.dd, J = 4.7, 9.3, H-9), 1.87 (1H, m, H-8), 1.65 (1H, ddd, J = 13.7, 7.7, 5.1, H-6a), 1.09 (3H, d, J = 7.0, 3H-10). ^{13}C NMR (100 MHz, CD_3OD, δ): 169.9 (C-11), 150.8 (C-3), 113.1 (C-4), 98.8 (C-1′), 96.5 (C-1), 77.1 (C-5′), 76.8 (C-3′), 73.9 (C-7), 73.5 (C-2′), 70.4 (C-4′), 61.6 (C-6′), 45.4 (C-9), 41.5 (C-6), 40.9 (C-8), 30.9 (C-5), 12.2 (C-10).

7-*O*-Butylsecologanic Acid (4). EI-MS *m/z* 429 $[M]^+$ (calcd for $C_{20}H_{29}O_{10}$). ^{1}H NMR (400 MHz, CD_3OD, δ, ppm, J/Hz): 7.61 (1H, d, J = 2.4, H-3), 5.58 (1H, d, J = 1.7, H-1), 5.56 (1H, d, J = 1.76, H-8), 5.50 (1H, m, H-7), 5.49–5.28 (2H, m, H_2-10), 4.69 (1H, d, J = 7.9, H-1′), 3.92 (1H, m, H-1′′b), 3.91 (1H, dd, J = 11.9, 2.0, H-6′b), 3.67 (1H, dd, J = 11.9, 5.8, H-6′a), 3.60 (1H, m, H-1′′a), 3.53–3.17 (4H, m, H-2′, H-3′, H-4′, H-5′), 3.4 (1H, m, H-5), 2.71 (1H, ddd, J = 9.5, 5.5, 1.5, H-9), 2.01 (1H, m, H-2′′b), 1.62 (1H, m, H-6b), 1.52 (1H, m, H-2′′a), 1.45 (1H, m, H-6a), 1.42 (2H, m, 2H-3′′), 0.96 (3H, t, J = 7.4, 3H-4′′). ^{13}C NMR (100 MHz, CD_3OD, δ): 166.2 (C-11), 153.0 (C-3), 132.0 (C-8), 119.6 (C-10), 103.9 (C-4), 100.9 (C-7), 99.0 (C-1′), 97.3 (C-1), 77.0 (C-5′), 76.7 (C-3′), 73.2 (C-2′), 70.0 (C-4′), 69.0 (C-1′′), 61.2 (C-6′), 42.3 (C-9), 31.2 (C-6), 29.0 (C-2′′), 21.5 (C-5), 18.8 (C-3′′), 12.6 (C-4′′).

Sweroside (5). EI-MS *m/z* 358 $[M]^+$ (calcd for $C_{16}H_{22}O_9$). ^{1}H NMR (400 MHz, CD_3OD, δ, ppm, J/Hz): 7.38 (1H, d, J = 2.5, H-3), 5.55 (1H, d, J = 1.8, H-1), 5.56 (1H, m, H-8), 5.33 (1H, br.d, J = 2.5, H-10b), 5.27 (1H, br.d, J = 2.5, H-10a), 4.68 (1H, d, J = 8.0, H-1′), 4.45 (1H, m, H-7b), 4.36 (1H, m, H-7a), 3.85 (1H, dd, J = 12.1, 1.8, H-6′b), 3.65 (1H, dd, overlapped signal, H-6′a), 3.4–3.2 (4H, m, H-2′, 3′, 4′, 5′), 3.2 (1H, m, H-5), 2.7 (1H, ddd, J = 9.5, 5.5, 1.8, H-9), 1.83 (2H, m, 2H-6). ^{13}C NMR (100 MHz, CD_3OD, δ): 167.3 (C-11), 150.9 (C-3), 132.1 (C-8), 119.7 (C-10), 104.9 (C-4), 98.9 (C-1′), 96.8 (C-1), 77.1 (C-5′), 76.8 (C-3′), 73.8 (C-2′), 70.0 (C-4′), 68.5 (C-7), 61.5 (C-6′), 42.6 (C-9), 27.3 (C-5), 24.7 (C-6).

Apigenin 7-*O*-Glucopyranoside (6). EI-MS *m/z* 270 $[M - Glu]^+$ (calcd for $C_{21}H_{20}O_{10}$).

Luteolin 7-*O*-Glucopyranoside (7). EI-MS *m/z* 286 $[M - Glu]^+$ (calcd for $C_{21}H_{20}O_{11}$).

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REFERENCES

1. D. F. Chamberlain and D. Long, *Lonicera* L., in: *Flora of Turkey and the East Aegean Islands*, P. H. Davis (ed.), **4**, Edinburg University Press, Edinburgh, 1972, p. 544–550.
2. P. H. Davis, *Flora of Turkey and the East Aegean Islands*, **10**, Edinburg University Press, Edinburgh, 1988, p. 154–155.
3. A. Basaran, Z. Akdemir, A. Yuruker, and I. Calis, *Fitoterapia*, **LIX**, 389 (1988).
4. R. Kakuda, M. Imai, Y. Yaoita, K. Machida, and M. Kikuchi, *Phytochemistry*, **55**, 879 (2000).
5. S. Kumar, O. P. Sati, V. D. Semwal, M. Nautiyal, S. Sati, and Y. Takeda, *Phytochemistry*, **53**, 499 (2000).
6. D. Prasad, V. Juyal, R. Singh, V. Singh, G. Pant, and M. S. M. Rawat, *Fitoterapia*, **71**, 420, (2000).
7. H. J. Li, P. Li, and W. C. Ye, *J. Chromatogr. A*, **1008**, 167 (2003).
8. Y. Song, S. L. Li, M. H. Wu, H. J. Li, and P. Li, *Anal. Chim. Acta*, **564**, 211 (2006).
9. L. W. Qi, C. Y. Chen, and P. Li, *Rapid Commun. Mass Spectrom.*, **23**, 3227 (2009).
10. J. Chen, Y. Song, and P. Li, *J. Chromatogr. A*, **1157**, 217 (2007)
11. M. T. Ren, J. Chen, Y. Song, L. S. Sheng, P. Li, and L. W. Qi, *J. Pharm. Biomed. Anal.,* **48**, 1351 (2008).
12. I. Calis and O. Sticher, *Phytochemistry,* **23**, 2539 (1984).
13. K. Machida, J. Asano, and M. Kikuchi, *Phytochemistry*, **39**, 111 (1995).
14. L. M. Lin, X. G. Zhang, J. J. Zhu, H. M. Gao, Z. M. Wang, and W. H. Wang, *J. Asian Nat. Prod. Res.*, **10**, 925 (2008).
15. B. Domon and K. Hostettmann, *Helv. Chim. Acta*, **66**, 422 (1983).

16. E. J. Lee, J. S. Kim, H. P. Kim, J. H. Lee, and S. S. Kang, *Food Chem.*, **120**, 134 (2010).
17. L. Y. Peng, S. X. Mei, B. Jiang, H. Zhou, and H. D. Sun, *Fitoterapia*, **71**, 713 (2000).
18. S. I. Alqasoumi, A. J. Al-Rehaily, and M. S. Abdel-Kader, *Nat. Prod. Sci.*, **15**, 121 (2009),
19. M. Kikuchi and N. Matsuda, *J. Nat. Prod.*, **59**, 314 (1996).
20. M. Jordheim, N. H. Giske, and Q. M. Andersen, *Biochem. Syst. Ecol.*, **35**, 153 (2007).
21. N. Matsuda, K. Isawa, and M. Kikuchi, *Phytochemistry,* **45**, 777 (1997).
22. N. Matsuda and M. Kikuchi, *Chem. Pharm. Bull.*, **43**, 1049 (1995).
23. R. K. Chaudhuri and O. Sticher, *Tetrahedron Lett.*, **22**, 559 (1981).
24. C. A. Boros and F. R. Stermitz, *J. Nat. Prod.*, **53**, 1055 (1990).
25. L. J. El-Naggar and J. L. Beal, *J. Nat. Prod.*, **43**, 649 (1980).
26. L. Tomassini, M. F. Cometa, M. Serafini, and M. Nicoletti, *J. Nat. Prod.*, **58**, 1756 (1995).
27. T. Ersoz, U. S. Harput, I. Saracoglu, I. Calis, and Y. Ogihara, *Turk. J. Chem.*, **26**, 581 (2002).
28. K. R. Markham, B. Ternai, R. Stanley, H. Geiger, and T. J. Mabry, *Tetrahedron*, **34**, 1389 (1978).