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CHEMICAL CONSTITUENTS OF MYCELIUM FROM ENDOPHYTIC FUNGUS HJ-3 STRAIN OF *Tamarix chinensis*

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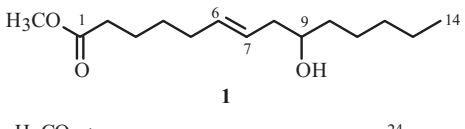
Plant endophytes are microorganisms that live in healthy plant tissues in part or all of their life history without causing obvious symptoms of infection in the host plants [1]. The tender stems and leaves of *Tamarix chinensis*, called xiheliu in traditional Chinese medicine, have been used to clear heat and toxic material, dispel mild wind and relieve exterior syndrome, promote eruption, and relieve coughs [2]. Pharmacological studies have confirmed that it has the effect of protecting liver and has anti-inflammatory, antipyretic, and analgesic properties [3]. In this paper, we described the isolation and identification of four compounds (**1–4**) from the mycelium of endophytic fungus HJ-3 strain (identifiend as *Aspergillus* sp. FJ844610.1) of *Tamarix chinensis*.

The fungal strain (HJ-3) was isolated from the stems of *Tamarix chinensis* and identified as *Aspergillus* sp. FJ844610.1 based on DNA sequences of the 18s rDNA gene region. A GenBank search for DNA sequence similarity revealed that 18s rDNA of HJ-3 was 99% homologous to that of *Aspergillus* sp. FJ844610.1 reference strains (GenBank No. JX092088.1). After the endophytic fungus HJ-3 strain of *Tamarix chinensis* was activated, a large-scale cultivation (50 L) was carried out at 28°C for 22 days. When the strain was mature, the mycelium was filtered under reduced pressure and dried under room temperature. The dried mycelium of HJ-3 (454.3 g) was extracted with methanol to obtain 52 g of a total extract. The extract was separated by a series of chromatographic techniques such as D101 macroporous adsorptive resins, silica gel (200–300 mesh), and Sephadex LH-20. A total of four compounds was isolated and identified based on MS and NMR spectra.

To the best of our knowledge, this is the first report on the isolation of penicilloitin A (**1**), lignoceric acid methyl ester (**2**), alternariol (**3**), and alternariol 4-methyl ether (**4**) from *Aspergillus* genus.

Penicilloitin A (1), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, δ, ppm, J/Hz): 0.88 (3H, t, J = 6.4, H-14), 1.26 (2H, m, H-4), 1.27 (2H, m, H-12), 1.29 (2H, m, H-13), 1.30 (2H, m, H-11), 1.36 (2H, m, H-10), 1.58 (2H, m, H-3), 2.04 (2H, br.q, J = 6.6, H-5), 2.21 (2H, t, J = 6.8, H-8), 2.3 (2H, t, J = 8.0, H-2), 3.66 (1H, m, H-9), 3.67 (3H, s, H-15), 5.31 (1H, dt, J = 15.6, 6.4, H-7), 5.44 (1H, dt J = 15.6, 6.4, H-6). ^{13}C NMR (100 MHz, $CDCl_3$, δ, ppm): 174.3 (C-1), 32.9 (C-2), 24.9 (C-3), 29.6 (C-4), 27.3 (C-5), 134.5 (C-6), 126.0 (C-7), 36.0 (C-8), 71.8 (C-9), 36.8 (C-10), 29.7 (C-11), 31.9 (C-12), 22.6 (C-13), 14.1 (C-14), 51.4 (C-15) [4].



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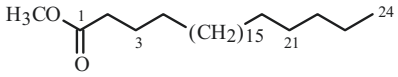

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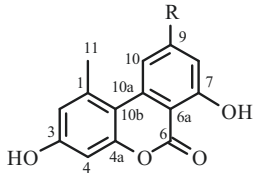

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3: R = OH; **4:** R = OCH_3

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Lignoceric acid methyl ester (2), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$, δ, ppm, J/Hz): 0.88 (3H, t, J = 6.4, H-24), 1.10 (1H, m, H-3a), 1.28 (1H, m, H-3b), 2.30 (1H, t, H-2), 3.67 (3H, s, OCH_3). ^{13}C NMR (100 MHz, $CDCl_3$, δ, ppm): 174.3 (C-1), 51.4 (C-2), 34.1 (C-3), 31.9 (C-4), 29.5 (multi CH_2, C-5–21), 24.9 (C-22), 22.7 (C-23), 14.1 (C-24) [5].

Alternariol (3), yellow powder. ^{1}H NMR (400 MHz, DMSO-d_6, δ, ppm, J/Hz): 2.66 (3H, s, H-11), 6.34 (1H, d, J = 1.6, H-8), 6.61 (1H, d, J = 2.4, H-4), 6.69 (1H, d, = 2.4, H-2), 7.21 (1H, d, J = 1.6, H-10). ^{13}C NMR (100 MHz, DMSO-d_6, δ, ppm): 139.8 (C-1), 118.9 (C-2), 160.08 (C-3), 102.8 (C-4), 154.92 (C-4a), 166.72 (C-6), 101.0 (C-6a), 165.2 (C-7), 102.0 (C-8), 165.80 (C-9), 105.2 (C-10), 140.4 (C-10a), 109.5 (C-10b), 25.82 (C-11) [6].

Alternariol 9-methyl ether (4), white crystals, mp 277–279°C. ^{1}H NMR (400 MHz, $CDCl_3$, δ, ppm, J/Hz): 6.72 (1H, d, J = 2.4, H-2), 6.64 (1H, d, J = 2.4, H-4), 6.62 (1H, d, J = 2.4, H-8), 7.22 (1H, d, J = 2.4, H-10), 2.74 (3H, s, H-11), 3.91 (3H, s, H-12), 10.37 (1H, s, OH), 11.83 (1H, s, OH). ^{13}C NMR (100 MHz, $CDCl_3$, δ, ppm): 138.27 (C-1), 118.08 (C-2), 159.06 (C-3), 102.10 (C-4), 153.11 (C-4a), 166.5 (C-6), 98.95 (C-6α), 164.60 (C-7), 99.66 (C-8), 165.16 (C-9), 103.88 (C-10), 137.91 (C-10a), 109.29 (C-10b), 25.48 (C-11), 56.31(C-12) [6, 7].

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