

Spectroscopic data for compound 2-7:

Compound **2**: Mp 151-154 °C; IR (cm⁻¹, KBr): ν 1741 ($\nu_{C=O}$), 1561, 1433 ($\nu_{N=O}$); ¹H NMR (400 MHz, acetone-d₆) δ 3.09, 3.60 (d, each 1H, J = 18.0 Hz, CH₂COOCH₃), 3.44 (s, 3H, OCH₃), 3.65 (s, 3H, COOCH₃), 4.03 (dt, 1H, J_1 = 4.8 Hz, J_2 = 10.0 Hz, H-5), 4.15 (t, 1H, J = 10 Hz, H-6a); 4.36 (dd, 1H, J_1 = 4.8 Hz, J_2 = 10.0 Hz, H-6b), 4.88, 5.00 (d, each 1H, J = 13.6 Hz, CH₂NO₂), 5.07 (s, 1H, H-1), 5.14 (d, 1H, J = 10.0 Hz, H-4), 5.74 (s, 1H, PhCHO₂), 7.37-7.39 (m, 3H, ArH), 7.47-7.49 (m, 2H, ArH); ¹³C NMR (100 MHz, acetone-d₆): δ 37.1 (CH₂COOCH₃), 52.3 (COOCH₃), 56.0 (OCH₃), 56.5 (C-2), 68.2 (C-5), 69.2 (C-6), 74.9 (CH₂NO₂), 80.2 (C-4), 102.0 (PhCHO₂), 104.7 (C-1), 127.1, 128.7, 129.7, 138.2 (Ph), 170.6 (COOCH₃), 197.1 (C-3); HRMS (FAB): 396.1351 (M⁺+1); Anal. Calcd. for C₁₈H₂₁NO₉: C, 54.68; H, 5.35; N, 3.54. Found: C, 54.64; H, 5.33; N, 3.53.

Compound **3**: Mp 240-242 °C; IR (cm⁻¹, KBr): ν 1802, 1632; ¹H NMR (400 MHz, CDCl₃) δ 2.35 (s, 3H, CH₃(O)C=C<), 2.38 (s, 3H, COCH₃), 2.86, 3.32 (d, each 1H, J = 17.6 Hz, CH₂COO), 3.26 (s, 3H, OCH₃), 3.79 (t, 1H, J = 9.6 Hz, H-6a), 3.89-3.94 (m, 2H, H-4, H-5), 4.38 (dd, 1H, J_1 = 4.4 Hz, J_2 = 9.6 Hz, H-6b), 4.86 (s, 1H, H-1), 5.65 (s, 1H, PhCHO₂), 7.37-7.39 (m, 3H, ArH), 7.52-7.54 (m, 2H, ArH); ¹³C NMR (100 MHz, CDCl₃) δ 15.6 (COCH₃), 29.6 (CH₃(O)C=C<), 36.9 (CH₂COO), 55.7 (OCH₃), 58.2 (C-5), 60.0 (C-2), 68.8 (C-6), 79.4 (C-4), 99.5 (C-1), 102.5 (PhCHO₂), 108.8 (C-3), 118.5 (CH₃(O)C=C<), 126.3, 128.3, 129.3, 136.4 (Ar), 166.0 (CH₃(O)C=C<), 171.3 (CH₂COO), 192.8 (COCH₃); HRMS (FAB): 403.1451 (M⁺+1); Anal. Calcd. for C₂₁H₂₂O₈: C, 62.28; H, 5.51. Found: C, 62.29; H, 5.50.

Compound **4**: Mp 253-254 °C; IR (cm⁻¹, KBr): ν 1808, 1707, 1654; ¹H NMR (400 MHz, CDCl₃): δ 1.31 (t, 3H, J = 6.8 Hz, OCH₂CH₃), 2.34 (s, 3H, CH₃(O)C=C<), 2.87, 3.35 (d, each 1H, J = 17.6 Hz, CH₂COO), 3.31 (s, 3H, OCH₃), 3.79 (t, 1H, J = 10.0 Hz, H-6a), 3.90-3.96 (m, 2H, H-4, H-5), 4.22 (q, 2H, J = 6.8 Hz, OCH₂CH₃), 4.39 (dd, 1H, J_1 = 4.8 Hz, J_2 = 10.0 Hz, H-6b), 4.80 (s, 1H, H-1), 5.64 (s, 1H, PhCHO₂), 7.37-7.38 (m, 3H, ArH), 7.52-7.54 (m, 2H, ArH); ¹³C NMR (100 MHz, CDCl₃) δ 14.4 (OCH₂CH₃), 29.7 (CH₃(O)C=C<), 37.3 (CH₂COO), 55.6 (OCH₃), 58.2 (C-5), 59.0 (OCH₂CH₃), 60.2 (C-2), 68.8 (C-6), 79.4 (C-4), 99.7 (C-1), 102.4 (PhCHO₂), 107.6 (C-3), 109.5 (CH₃(O)C=C<), 126.3, 128.3, 129.3, 136.4 (Ar), 163.8 (CH₃(O)C=C<), 167.8 (COOCH₂CH₃), 171.1 (CH₂COO); HRMS (FAB): 433.1512 (M⁺+1); Anal. Calcd. for C₂₂H₂₄O₉: C, 61.11; H, 5.59. Found: C, 61.08; H, 5.57.

Compound **5**: Mp 233 °C (dec); IR (cm⁻¹, KBr): ν 1812, 1742, 1648; ¹H NMR (400 MHz, CDCl₃) δ 1.38 (t, 3H, J = 6.8 Hz, CH₂CH₃), 2.97, 3.43 (d, each 1H, J = 18.0 Hz, CH₂COO), 3.39 (s, 3H, OCH₃), 3.82 (t, 1H, J = 10 Hz, H-6a), 3.98 (d, 1H, J = 10.0 Hz, H-4), 4.15 (dt, 1H, J_1 = 5.2 Hz, J_2 = 10.0 Hz, H-5), 4.33-4.43 (m, 3H, H-6b, OCH₂CH₃), 4.95 (s, 1H, H-1), 5.61 (s, 1H, PhCHO₂), 7.36-7.38 (m, 3H, ArH), 7.48-7.50 (m, 2H, ArH); ¹³C NMR (100 MHz, CDCl₃) δ 14.1 (OCH₂CH₃), 35.9 (CH₂COO), 55.9 (OCH₃), 58.7 (C-5), 60.9 (C-2), 62.8 (OCH₂CH₃), 68.4 (C-6), 78.9 (C-4), 98.8 (C-1), 102.3 (N⁺=C<), 102.7 (PhCHO₂), 108.6 (C-3), 126.3, 128.3, 129.5, 136.0 (Ar), 158.1 (COOCH₂CH₃), 169.0 (CH₂COO); HRMS (FAB): 436.1237 (M⁺+1); Anal. Calcd. for C₂₀H₂₁NO₁₀: C, 55.17; H, 4.86; N, 3.22. Found: C, 55.19; H, 4.84; N, 3.21.

Compound 6: Mp 198-199 °C; IR (cm⁻¹, KBr): ν 1806, 1665; ¹H NMR (400 MHz, CDCl₃) δ 1.93 (s, 3H, CH₃), 2.90, 2.96 (d, each 1H, J = 18 Hz, CH₂COO), 3.40 (s, 3H, OCH₃), 3.81 (t, 1H, J = 10.4 Hz, H-6a), 3.95 (d, 1H, J = 10.0 Hz, H-4), 4.06-4.14 (m, 1H, H-5), 4.40 (dd, 1H, J_1 = 5.2 Hz, J_2 = 10.4 Hz, H-6b), 4.81 (s, 1H, H-1), 5.60 (s, 1H, PhCHO₂), 7.36-7.38 (m, 3H, ArH), 7.49-7.51 (m, 2H, ArH); ¹³C NMR (100 MHz, CDCl₃) δ 10.2 (CH₃), 35.1 (CH₂COO), 55.4 (OCH₃), 58.7 (C-5), 62.1 (C-2), 68.3 (C-6), 78.9 (C-4), 98.5 (C-1), 102.6 (PhCHO₂), 102.8 (N⁺=C<), 111.8 (C-3), 126.3, 128.3, 129.4, 136.1 (Ar), 168.8 (CH₂COO); HRMS (FAB): 378.1219 (M⁺+1); Anal. Calcd. for C₁₈H₁₉NO₈: C, 57.29; H, 5.08; N, 3.71. Found: C, 57.28; H, 5.06; N, 3.72.

Compound 7: Mp 208-210 °C; IR (cm⁻¹, KBr): ν 3446, 1791, 1728; ¹H NMR (400 MHz, CDCl₃) δ 3.59 (s, 3H, OMe), 3.78-3.85 (m, 2H, H-4, H-6a), 3.94 (s, 3H, COOMe), 4.32 (dt, 1H, J_1 = 4.8 Hz, J_2 = 10.0 Hz, H-5), 4.44 (dd, 1H, J = 4.8 Hz, J_2 = 10.0 Hz, H-6b), 5.69 (s, 1H, PhCHO₂), 6.16 (s, 1H, H-1), 7.38-7.40 (m, 3H, ArH), 7.49-7.51 (m, 2H, ArH); ¹³C NMR (100 MHz, CDCl₃) δ 53.0 (COOMe), 56.6 (OMe), 61.5 (C-4), 68.5 (C-6), 82.9 (C-5), 95.2 (C-1), 99.4 (C-3), 101.7 (PhCHO₂), 121.6 (=C<), 126.2, 128.4, 129.4, 136.0 (Ar), 160.0 (COOMe), 160.8 (lactone C=O), 164.0 (C-2); HRMS (FAB): 379.1052 (M⁺+1); Anal. Calcd for C₁₈H₁₈O₈: C, 57.14; H, 4.80. Found: C, 57.16; H, 4.83.