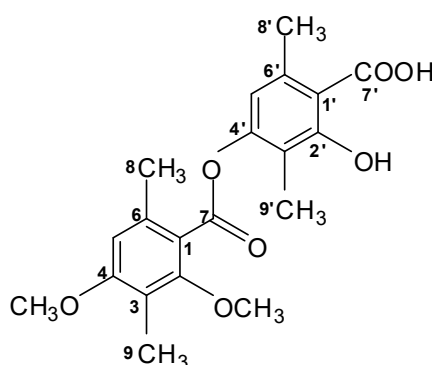


SUPPLEMENTARY MATERIAL

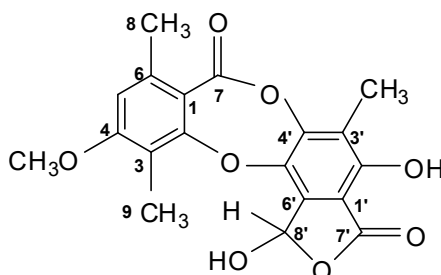
Herbicidal and plant-growth stimulating effects of phenolic compounds isolated from lichens

Marize Terezinha Lopes Pereira Peres^a, Ana Maria Mapeli^b, Odival Faccenda^c, Neli K.

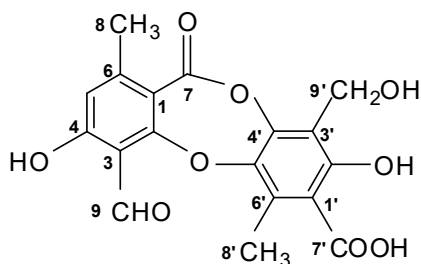
Honda^{d*}



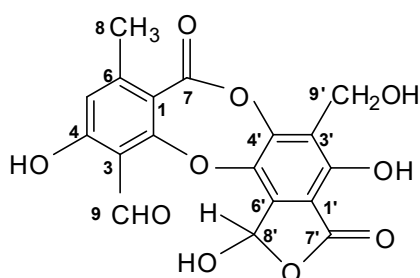
Diffractaic acid (1): ¹H NMR (DMSO-*d*₆, 300 MHz) δ: 2.13 (6H, s, CH₃-8, CH₃-8'), 2.44 (3H, s, CH₃-9), 2.61 (3H, s, CH₃-9'), 3.83 (3H, s, OCH₃-2), 3.89 (3H, s, -OCH₃-4), 6.67 (1H, s, H-5), 6.74 (1H, s, H-5'). ¹³C NMR (DMSO-*d*₆, 75 MHz) δ: 8.7 (C-9'), 8.9 (C-9), 19.5 (C-8), 22.8 (C-8'), 55.8 (OCH₃-4), 61.7 (OCH₃-2), 107.5 (C-5), 113.4 (C-3'), 115.7 (C-5'), 116.0 (C-1'), 116.1 (C-3), 119.4 (C-1), 134.8 (C-6), 139.1 (C-6'), 152.4 (C-4'), 157.0 (C-4), 159.5 (C-2), 161.3 (C-2'), 167.5 (C-7), 173.1 (C-7') [12].



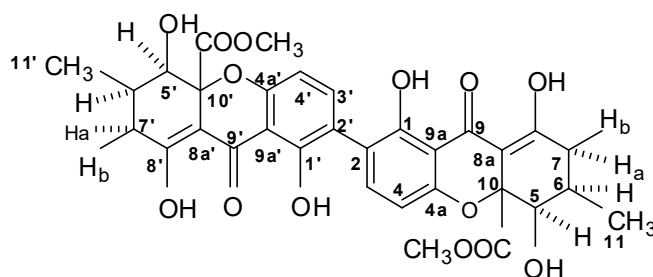
Hypostictic acid (2): ¹H NMR (DMSO-*d*₆, 300 MHz) δ: 2.18 (3H, s, CH₃-8), 2.26 (3H, s, CH₃-9'), 2.42 (3H, s, CH₃-9), 3.87 (3H, OCH₃), 6.68 (1H, *d*, *J* = 8.0 Hz, H-5), 6.89 (1H, lactol), 8.34 (1H, OH lactol, *d*, *J* = 8.0 Hz). ¹³C NMR (DMSO-*d*₆, 75 MHz) δ: 8.6 (C-9), 9.5 (C-9'), 20.8 (C-8), 56.2 (OCH₃), 95.6 (C-8'), 109.2 (C-1'), 110.9 (C-3), 112.6 (C-1), 114.6 (C-5), 120.4 (C-3'), 135.5 (C-6'), 138.0 (C-5'), 141.9 (C-6), 148.3 (C-4'), 151.3 (C-2'), 161.1 (C-7), 161.5 (C-7'), 166.5 (C-4), 167.1 (C-2) [13].



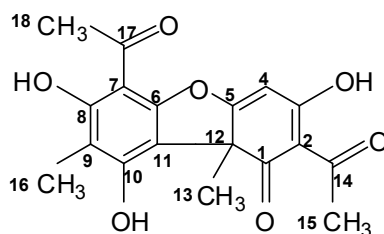
Protocetraric acid (**3**): ^1H NMR (DMSO- d_6 , 300 MHz) δ : 2.38 (s, 3H, CH_3 -8'), 2.40 (s, 3H, CH_3 -8), 4.61 (s, 2H, ArCH_2OH -9'), 6.83 (s, 1H, H-5), 10.57 (s, 1H, CHO), 11.94 (sl, 1H, OH-4). ^{13}C NMR (DMSO- d_6 , 75 MHz) δ : 14.5 (C-8'), 21.5 (C-8), 54.3 (C-9'), 111.9 (C-3), 112.4 (C-1), 116.6 (C-1'), 117.1 (C-5), 118.7 (C-3'), 129.5 (C-6'), 141.4 (C-5'), 144.7 (C-4'), 152.1 (C-6), 154.6 (C-2'), 161.3 (C-7), 163.8 (C-2), 163.9 (C-4), 170.3 (C-7'), 191.8 (C-9) [14, 15].



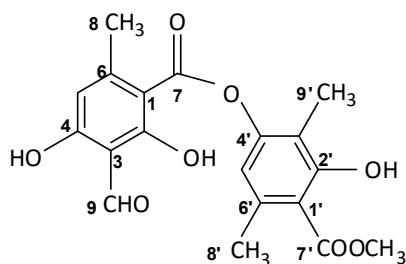
Salazinic acid (**4**): ^1H NMR (DMSO- d_6 , 300 MHz) δ : 2.41 (s, 3 H, CH_3 -8), 4.65 (s, 2H, CH_2OH), 6.80 (sl, 1H, H-5), 6.87 (s, 1H, lactol), 8.29 (sl, 1H, OH lactol), 10.44 (s, 1H, CHO), 12.04 (s, 1H, OH-4). ^{13}C NMR (DMSO- d_6 , 75 MHz) δ : 21.6 (C-8), 52.9 (C-8'), 95.3 (C-9'), 109.8 (C-1'), 110.7 (C-3), 112.0 (C-1), 117.4 (C-5), 123.4 (C-3'), 137.3 (C-6'), 138.1 (C-5'), 148.1 (C-4'), 152.3 (C-2'), 153.0 (C-6), 160.4 (C-7), 163.7 (C-7'), 164.2 (C-2), 166.0 (C-4), 192.9 (C-9) [16].



Secalonic acid (**5**): ^1H NMR (pyridine- d_5 , 300 MHz) δ : 1.25 (6H, $\underline{d}$ J = 6.0 Hz, $2 \times \text{CH}_3$), 2.4 (2 H, $\underline{dd}$ J = 11 and 12 Hz, H-7a, H-7'a), 2.72 (1 H, $\underline{d}$ J = 6.0 Hz, H-7'b), 2.78 (3 H sl, H-6, H-6', H-7b), 3.55 (6H, s, $2 \times \text{COOCH}_3$), 4.17 (2H, $\underline{d}$, J = 10.7 Hz, $2 \times \text{CHOH}$), 6.73 (2H, $\underline{d}$ J = 8.5 Hz, H-3, H-3'), 7.61 (2H, $\underline{d}$ J = 8.5 Hz, H-4, H-4'). ^{13}C NMR (pyridine- d_5 , 75 MHz) δ : 18.43 (C-11), 19.21 (C-11'), 30.56 (C-6, C-6'), 36.71 (C-7, C-7'), 52.75 (C-13, C-13'), 76.50 (C-5, C-5'), 86.24 (C-10, C-10'), 102.62 (C-9a, C-9'a), 107.5 (C-4), 107.84 (C-4'), 140.57 (C-3, C-3'), 159.95 (C-4a, C-4'a), 171.17 (C-12, C-12'), 178.5 (C-8, C-8'), 187.88 (C-9, C-9') [17,18].



Usnic acid (6): ^1H NMR (CDCl_3 , 300 MHz) δ : 1.73 (s, 3H, CH_3 -13), 2.08 (s, 3H, CH_3 -16), 2.65 (s, 6H, CH_3 -15, Ar CH_3 -18), 6.0 (s, 1H, H-4), 11.0 (s, 1H, OH-10), 13.29 (s, 1H, OH-8), 18.82 (s, 1H, OH-3). ^{13}C NMR (CDCl_3 , 75 MHz) δ : 8.2 (C-16), 28.6 (C-13), 32.0 (C-15), 32.8 (C-18), 59.7 (C-12), 99.0 (C-4', C-6), 101.6 (C-5), 104.0 (C-9), 105.7 (C-11), 110.0 (C-7), 155.8 (C-3), 158.1 (C-8), 163.8 (C-10), 180.0 (C-2), 198.7 (C-1), 201.0 (C-17), 202.5 (C-14). $[\alpha]_D + 495.5^\circ$ at 23°C (CHCl_3) [19].



Atranorin (7): ^1H NMR (CDCl_3 , 300 MHz) δ : 2.07 (s, 3H, CH_3 -8'), 2.52 (s, 3H, CH_3 -9'), 2.67 (s, 3H, CH_3 -8), 3.96 (s, 3H, COOCH_3), 6.38 (s, 1H, H-5), 6.49 (s, 1H, H-5'), 10.33 (s, 1H, CHO), 11.95 (s, 1H, OH-2'), 12.50 (s, 1H, OH-4), 12.55 (s, 1H, OH-2). ^{13}C NMR (75 MHz, CDCl_3) δ 9.34 (C-8'), 24.0 (C-9'), 25.5 (C-8), 52.3 (COOCH_3), 102.79 (C-1), 108.49 (C-3), 110.21 (C-1'), 112.8 (C-5), 116.0 (C-5'), 116.74 (C-3'), 139.85 (C-6'), 151.94 (C-4'), 152.42 (C-6), 162.84 (C-2'), 167.44 (C-4), 169.06 (C-2), 169.67 (C-7), 172.18 (C-7'), 193.82 (C-9) [19].