

Supplementary Materials

Protective Effects of Hippophae rhamnoides L. Phenylpropanoids on Doxorubicin-Induced Cardiotoxicity in Zebrafish

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Figure S1. ^1H NMR Spectrum (400 MHz) of p-coumaric acid (P1) (in $\text{DMSO-}d_6$)

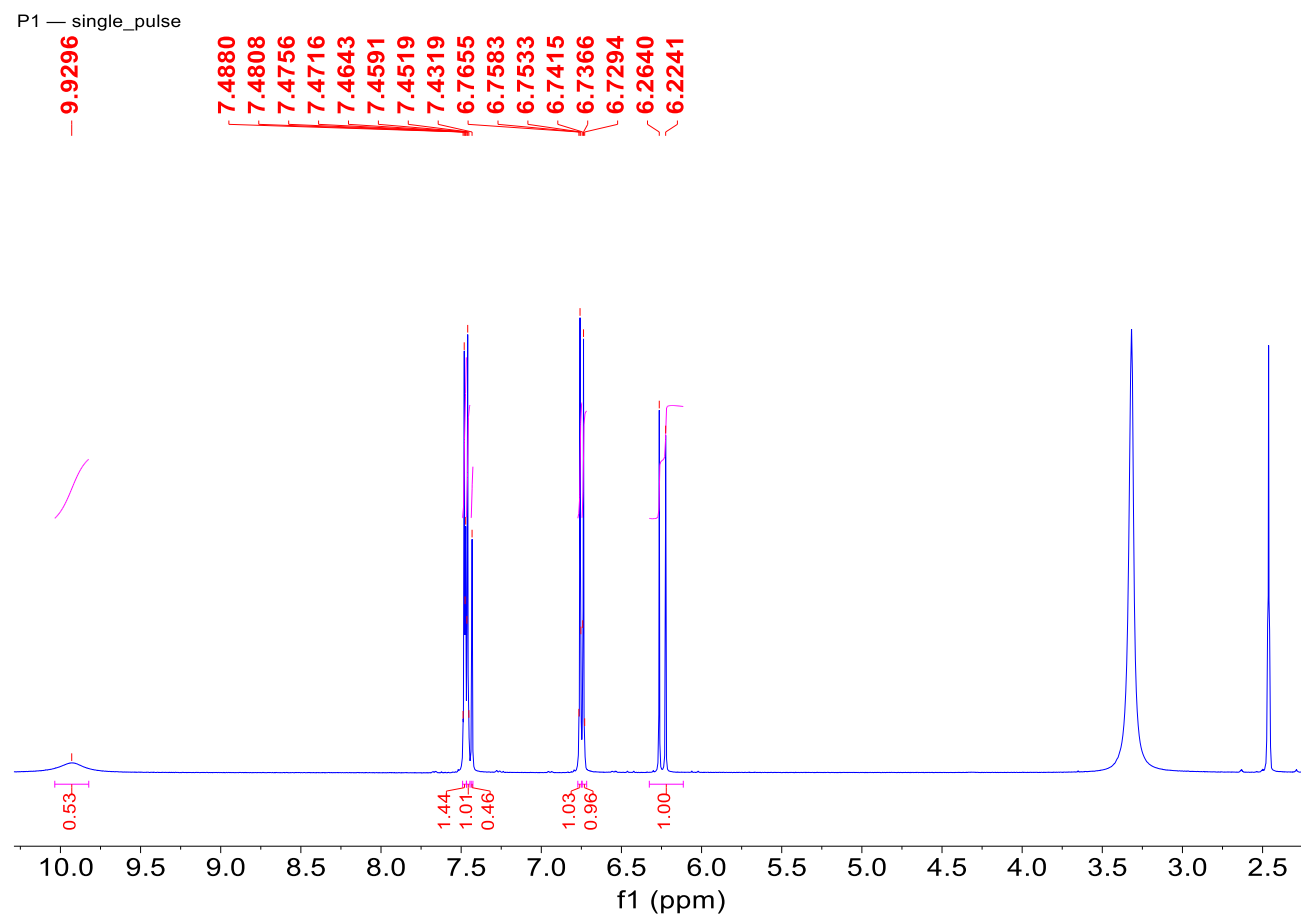


Figure S2. ^{13}C NMR Spectrum (100 MHz) of p-coumaric acid (P1) (in $\text{DMSO-}d_6$)

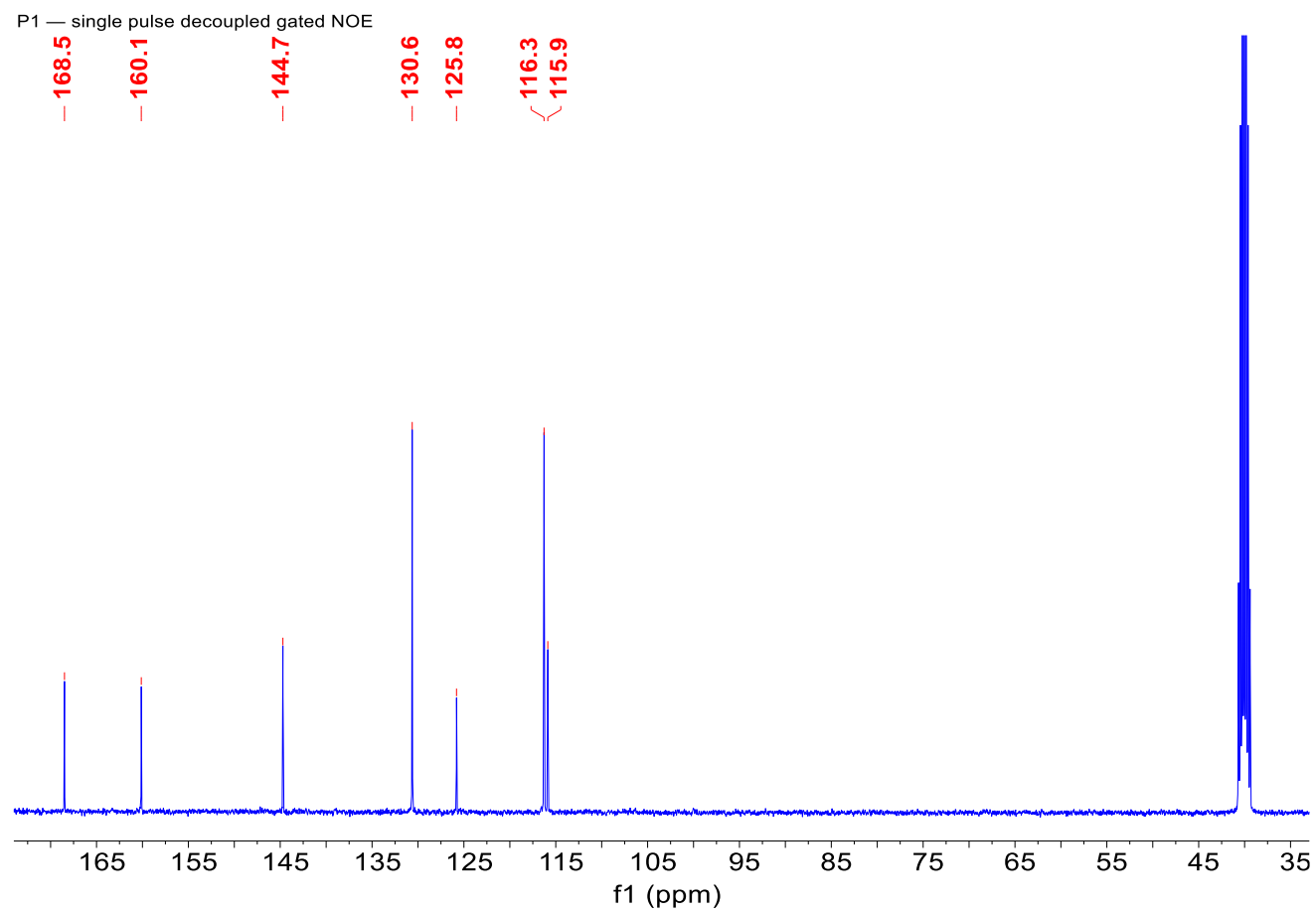
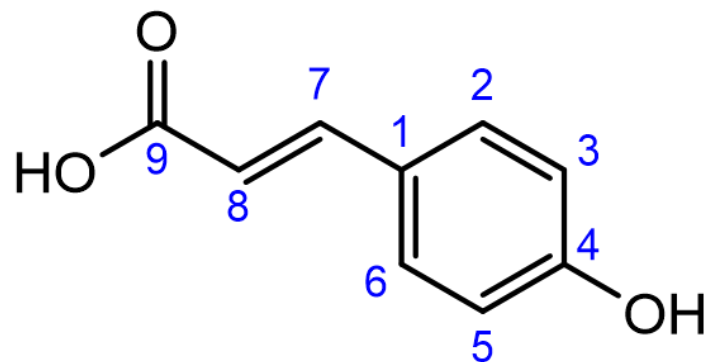


Figure S3. Structure of p-coumaric acid (P1).



$^1\text{H-NMR}$ (400 MHz, $\text{DMSO-}d_6$) δ : 9.93 (1H, s, H-4-OH), 7.48 (1H, dd, $J = 3.7$ Hz, H-2), 7.46 (1H, dd, $J = 3.7$ Hz, H-6), 7.43 (1H, ddd, $J = 15.9$, 3.7, 3.7 Hz, H-7), 6.76 (d, $J = 2.0$ Hz, 1H, H-3), 6.74 (d, $J = 2.0$ Hz, 1H, H-5), 6.24 (1H, d, $J = 15.9$ Hz, H-8); $^{13}\text{C-NMR}$ (100 MHz, $\text{DMSO-}d_6$) δ : 168.5 (C-9), 160.1 (C-4), 144.7 (C-7), 130.6 (C-2, 6), 125.8 (C-1), 116.3 (C-8), 115.9 (C-3, 5). The data correspond to p-coumaric acid.

Figure S4. ^1H NMR Spectrum (400 MHz) of chlorogenic acid (P2) (in $\text{DMSO-}d_6$)

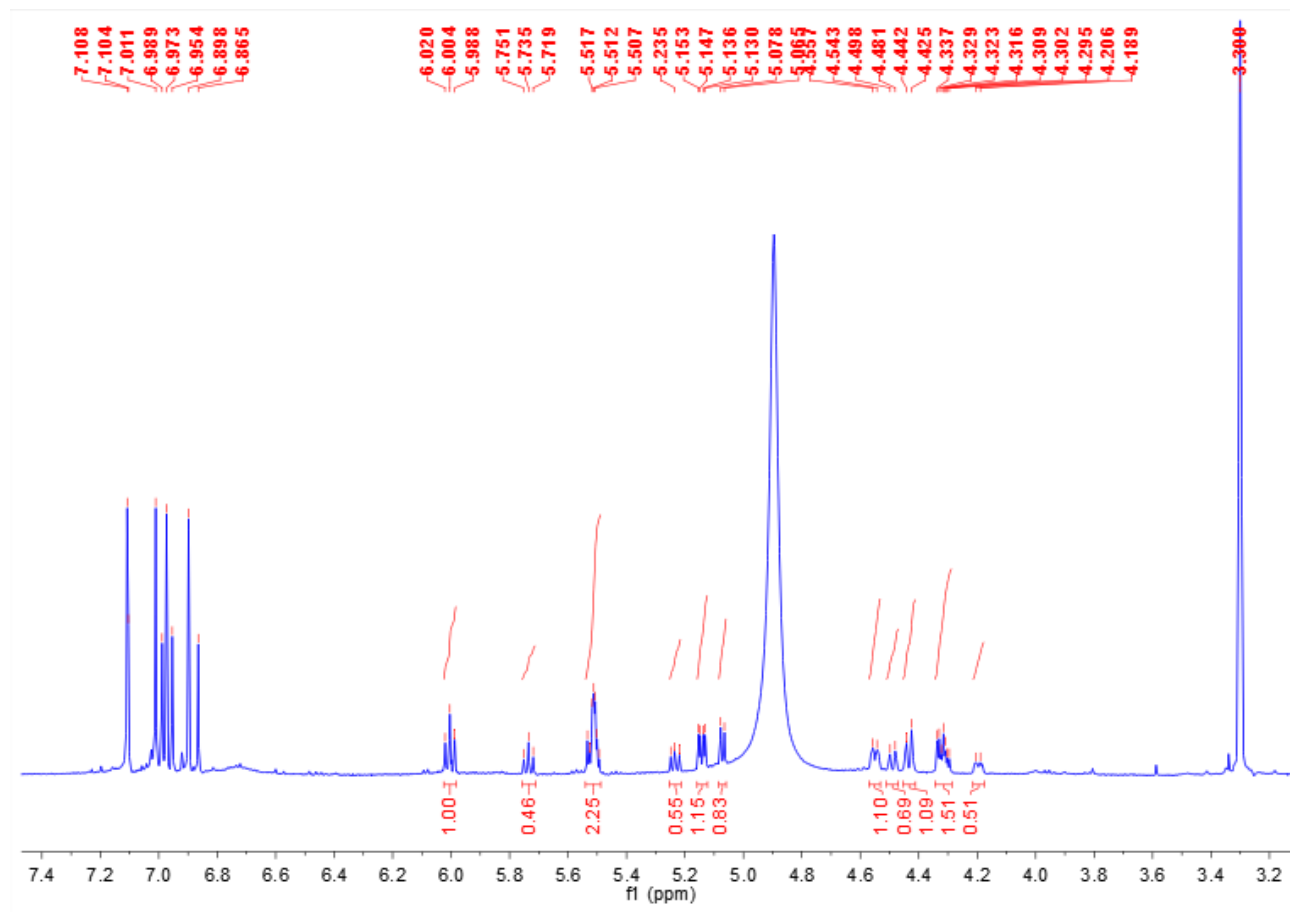


Figure S5. ^{13}C NMR Spectrum (100 MHz) of chlorogenic acid (P2) (in $\text{DMSO-}d_6$)

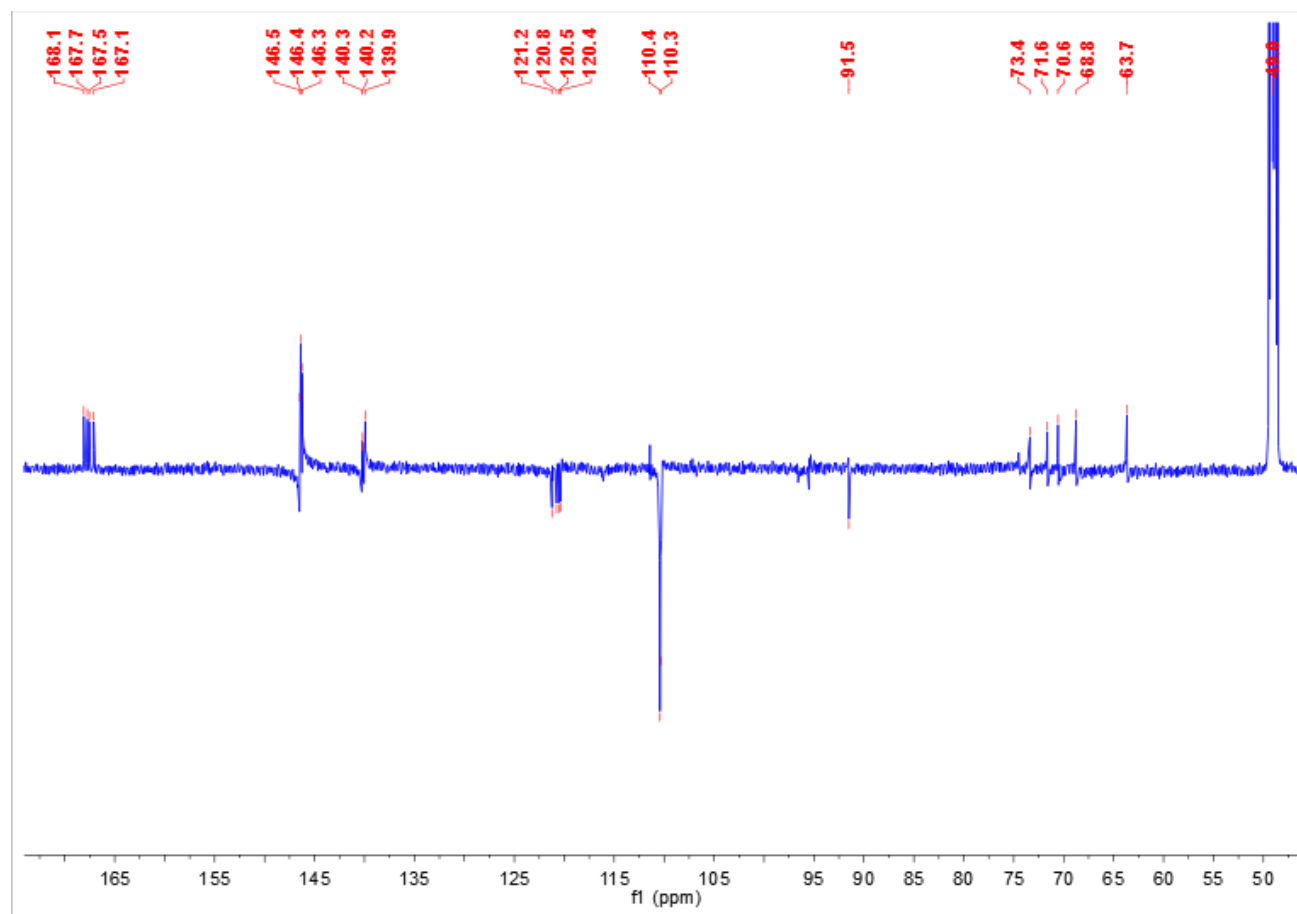
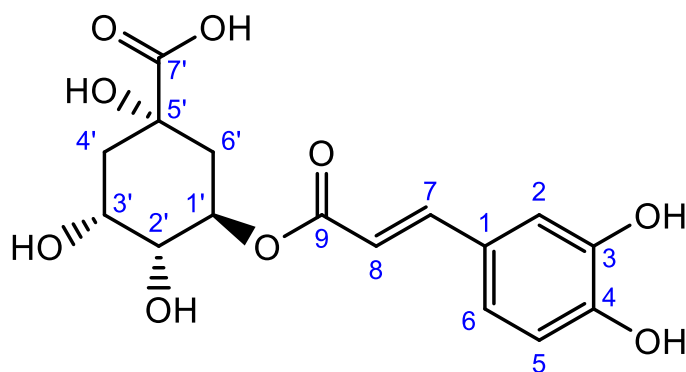


Figure S6. Structure of chlorogenic acid (P2).



$^1\text{H-NMR}$ (400 MHz, $\text{DMSO-}d_6$) δ : 7.43 (1H, d, $J = 16$ Hz, H-7), 7.06 (1H, d, $J = 1.6$ Hz, H-2), 6.96 (1H, dd, $J = 8.0, 1.6$ Hz, H-6), 6.75 (1H, d, $J = 8.0$ Hz, H-5), 6.22 (1H, d, $J = 16.0$ Hz, H-8), 5.15 (1H, dt, $J = 10.4, 4.8$ Hz, H-1'), 3.88 (1H, d, $J = 3.2$ Hz, H-2'), 3.46 (1H, dd, $J = 9.6, 2.4$ Hz, H-3'), 1.60~1.98 (4H, m, H-4', 6'); $^{13}\text{C-NMR}$ (100 MHz, $\text{DMSO-}d_6$) δ : 176.5 (C-7'), 166.4 (C-9), 148.5 (C-4), 145.8 (C-3), 144.8 (C-7), 125.5 (C-1), 121.3 (C-6), 115.9 (C-5), 114.8 (C-8), 114.6 (C-2), 75.2 (C-1'), 73.2 (C-2'), 71.6 (C-4'), 71.4 (C-6'), 39.5 (C-5'), 38.1 (C-3'). The data correspond to chlorogenic acid.

Figure S7. ^1H NMR Spectrum (400 MHz) of caffeic acid (P3) (in $\text{DMSO-}d_6$)

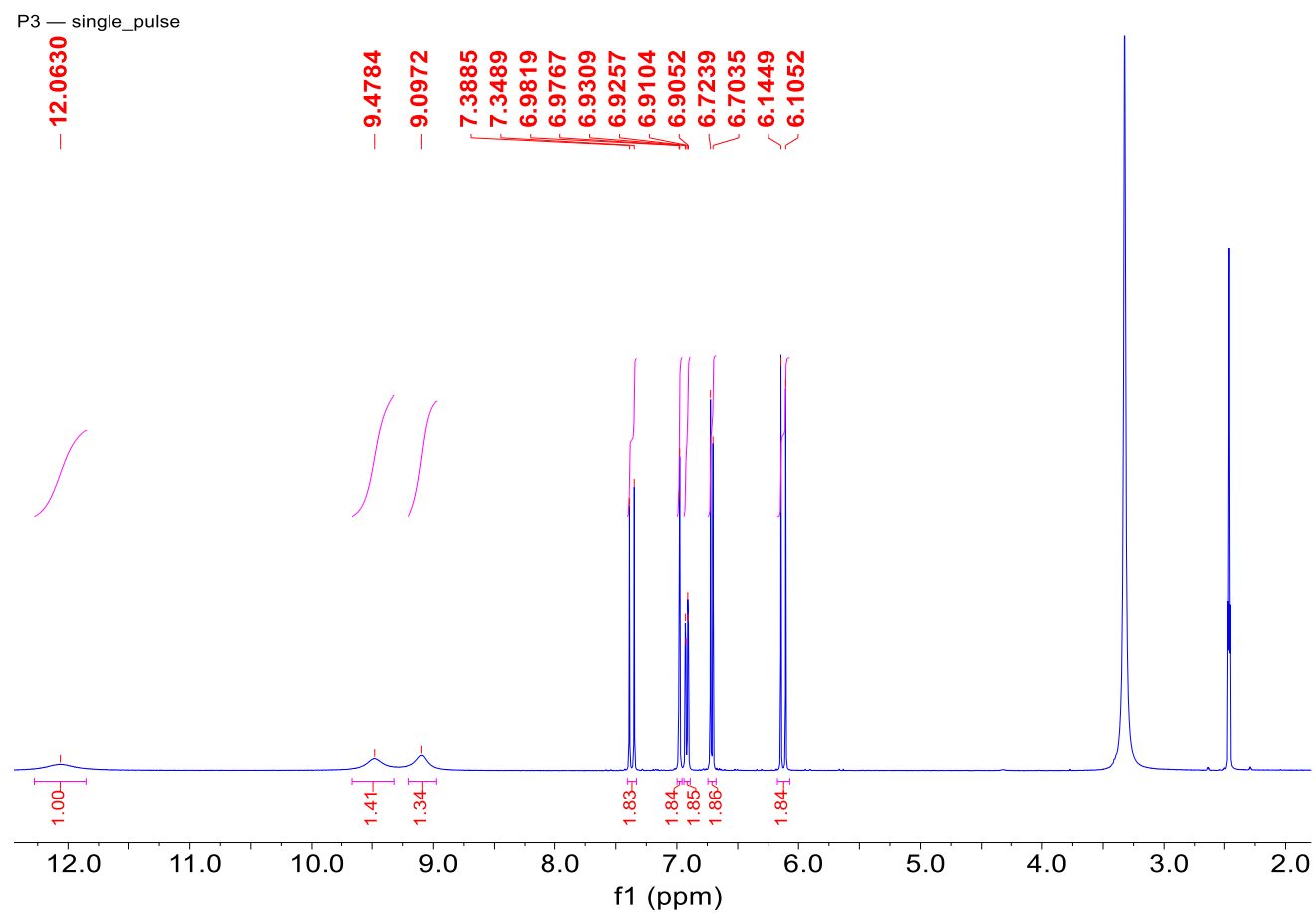


Figure S8. ^{13}C NMR Spectrum (100 MHz) of caffeic acid (P3) (in $\text{DMSO-}d_6$)

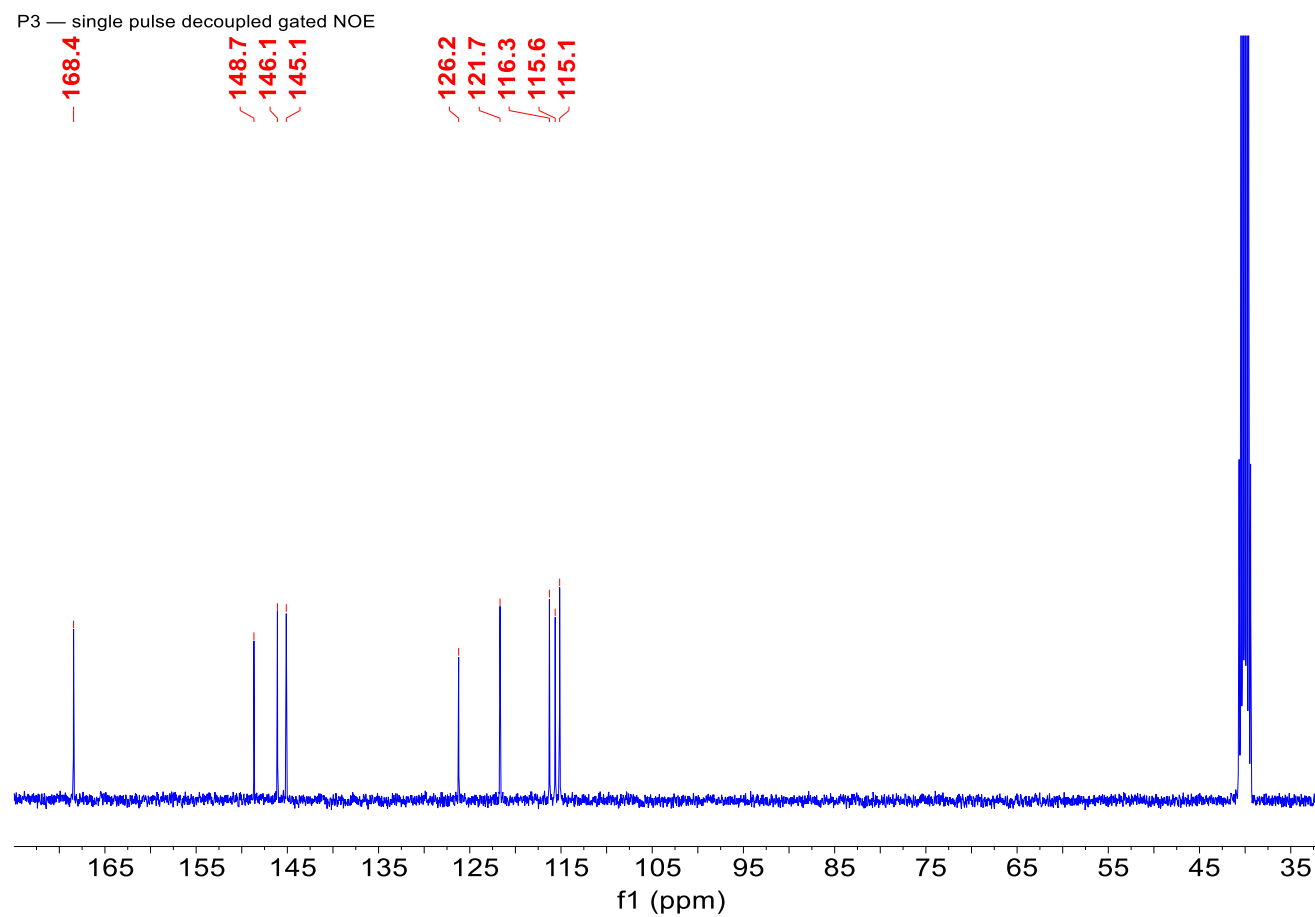
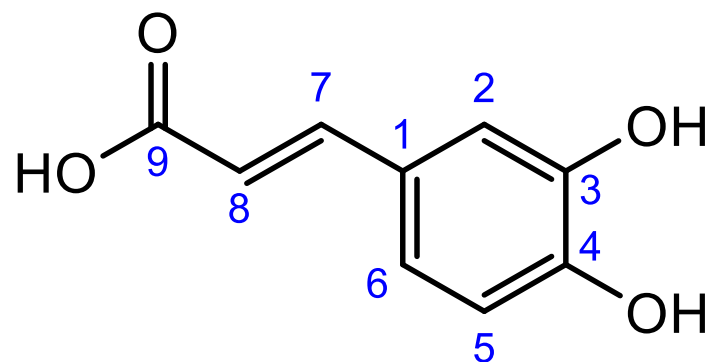


Figure S9. Structure of caffeic acid (P3)



$^1\text{H-NMR}$ (400 MHz, $\text{DMSO-}d_6$) δ : 12.05 (1H, s, H-9-OH), 9.48 (1H, s, H-3-OH), 9.10 (1H, s, H-4-OH), 7.37 (1H, d, $J = 15.9$ Hz, H-7), 6.98 (1H, d, $J = 2.1$ Hz, H-2), 6.92 (1H, dd, $J = 8.2, 2.1$ Hz, H-6), 6.71 (1H, d, $J = 8.2$ Hz, H-5), 6.13 (1H, d, $J = 15.9$ Hz, H-8); $^{13}\text{C-NMR}$ (100 MHz, $\text{DMSO-}d_6$) δ : 168.4 (C-9), 148.7 (C-7), 146.1 (C-4), 145.1 (C-3), 126.2 (C-1), 121.7 (C-6), 116.3 (C-5), 115.6 (C-8), 115.1 (C-2). The data correspond to caffeic acid.

Figure S10. ^1H NMR Spectrum (400 MHz) of ferulic acid (P4) (in $\text{DMSO-}d_6$)

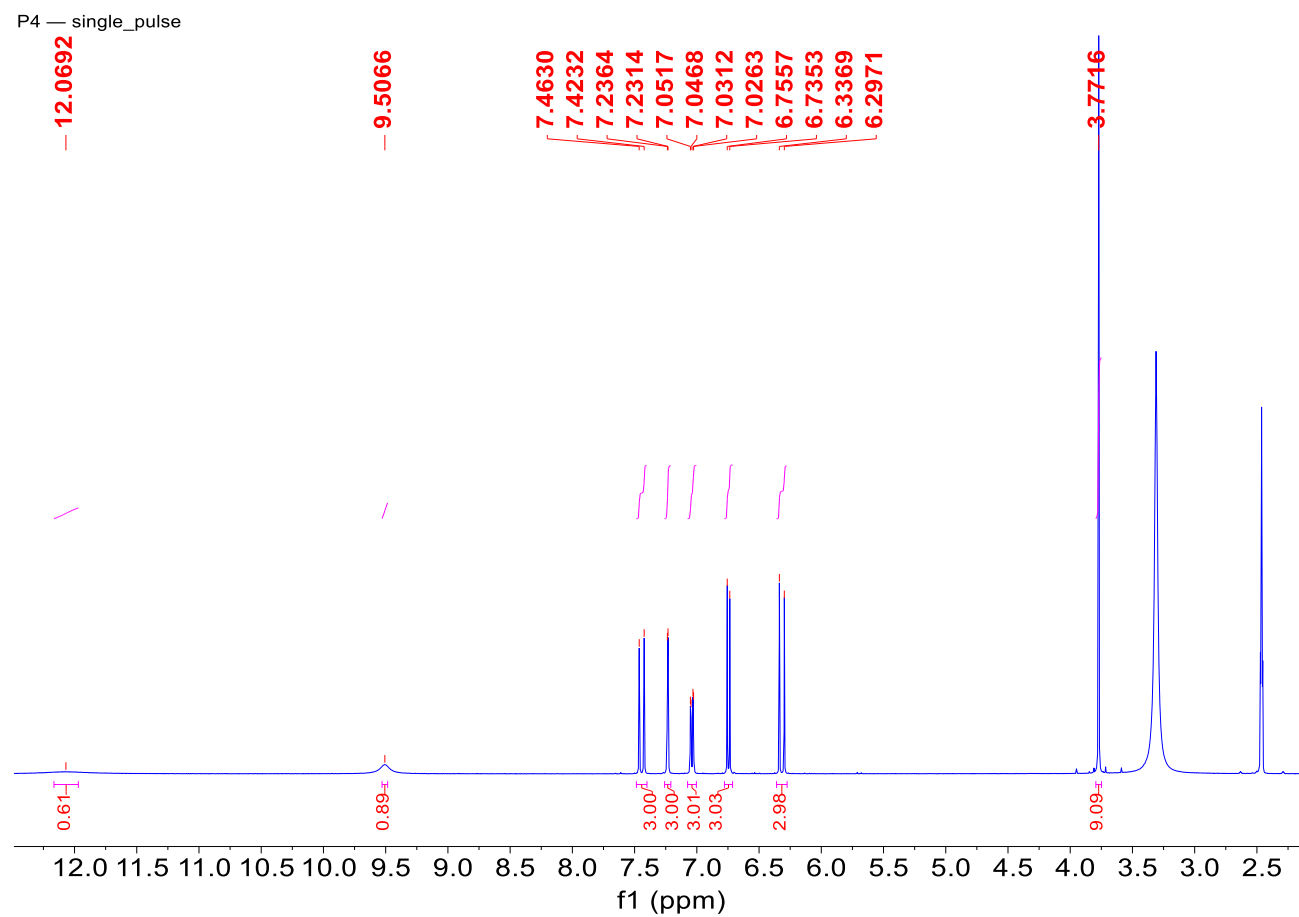


Figure S11. ^{13}C NMR Spectrum (100 MHz) of ferulic acid (P4) (in $\text{DMSO-}d_6$)

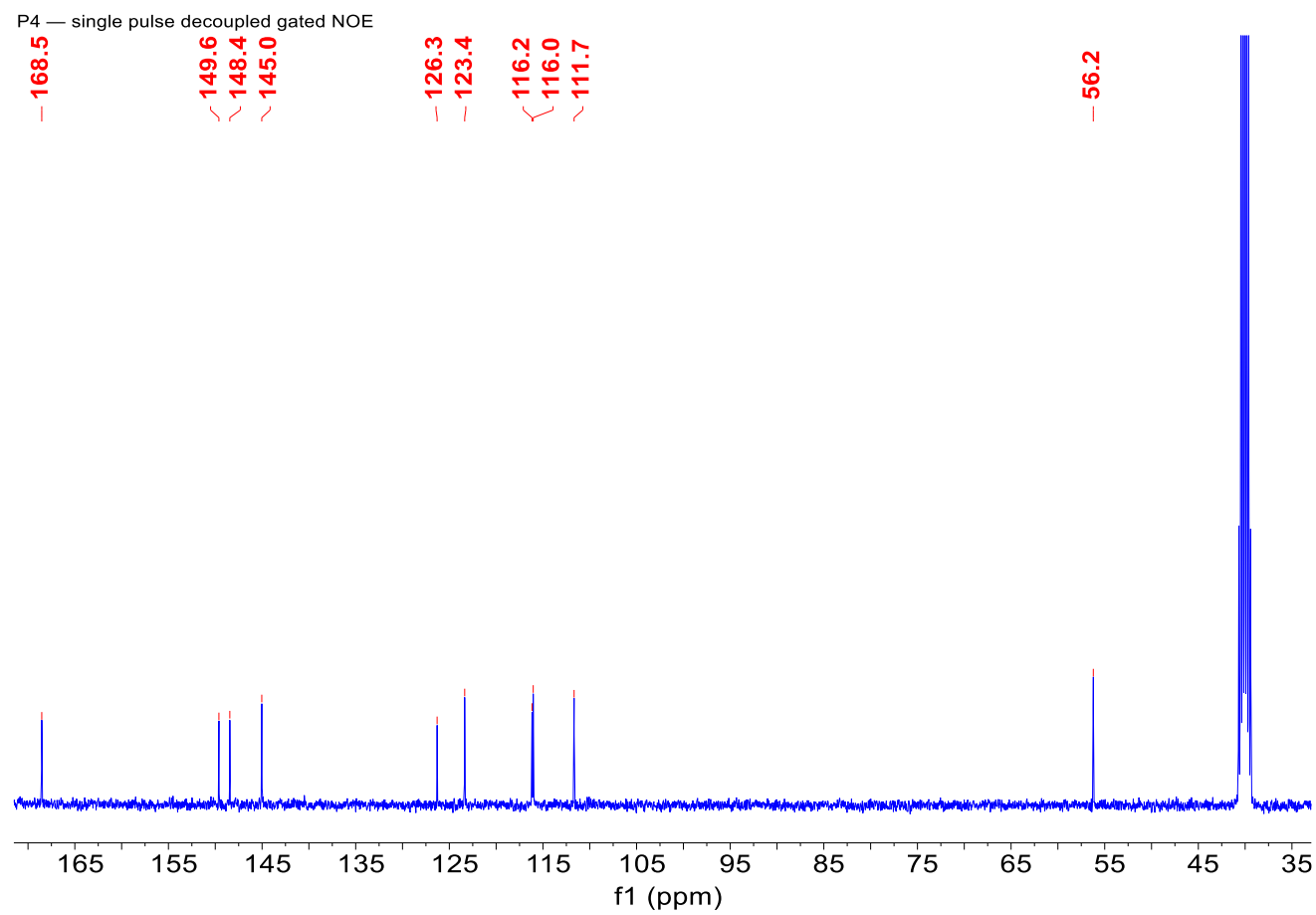
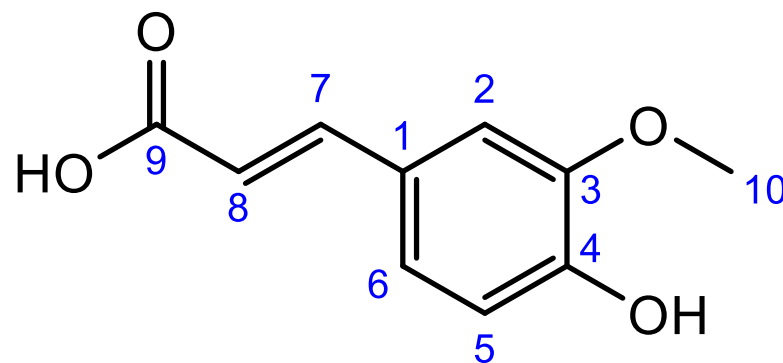


Figure S12. Structure of ferulic acid (P4)



$^1\text{H-NMR}$ (400 MHz, $\text{DMSO-}d_6$) δ : 12.07 (1H, s, H-9-OH), 9.51 (1H, s, H-4-OH), 7.44 (1H, d, $J = 15.9$ Hz, H-7), 7.23 (1H, d, $J = 2.0$ Hz, H-2), 7.04 (1H, dd, $J = 8.2, 2.0$ Hz, H-6), 6.75 (1H, d, $J = 8.1$ Hz, H-5), 6.32 (1H, d, $J = 15.9$ Hz, H-8), 3.77 (3H, s, H-10);

$^{13}\text{C-NMR}$ (100 MHz, $\text{DMSO-}d_6$) δ : 168.5 (C-9), 149.6 (C-3), 148.4 (C-4), 145.0 (C-7), 126.3 (C-1), 123.4 (C-6), 116.2 (C-5), 116.0 (C-8), 111.7 (C-2), 56.2 (C-10). The data correspond to ferulic acid.