

Supporting Information for

Cytotoxic Withanolide Constituents from *Physalis longifolia*

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S18(b) ^{13}C APT spectrum of viscosalactone B (**18**) (125 MHz)

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S18(d) HSQC spectrum of viscosalactone B (**18**)

S18(e) HMBC spectrum of viscosalactone B (**18**)

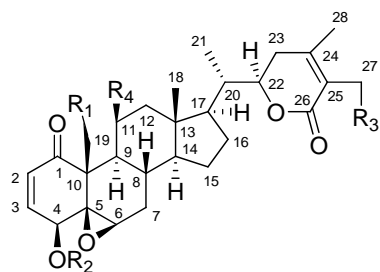
S18(f) NOESY spectrum of viscosalactone B (**18**)

S19(a) ^1H NMR spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (**19**) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)

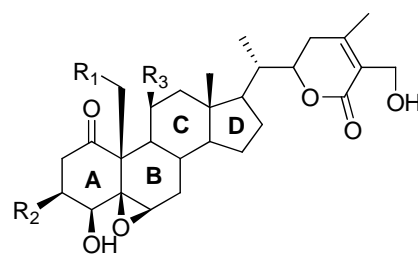
S19(b) ^{13}C APT spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (**19**) (125 MHz)

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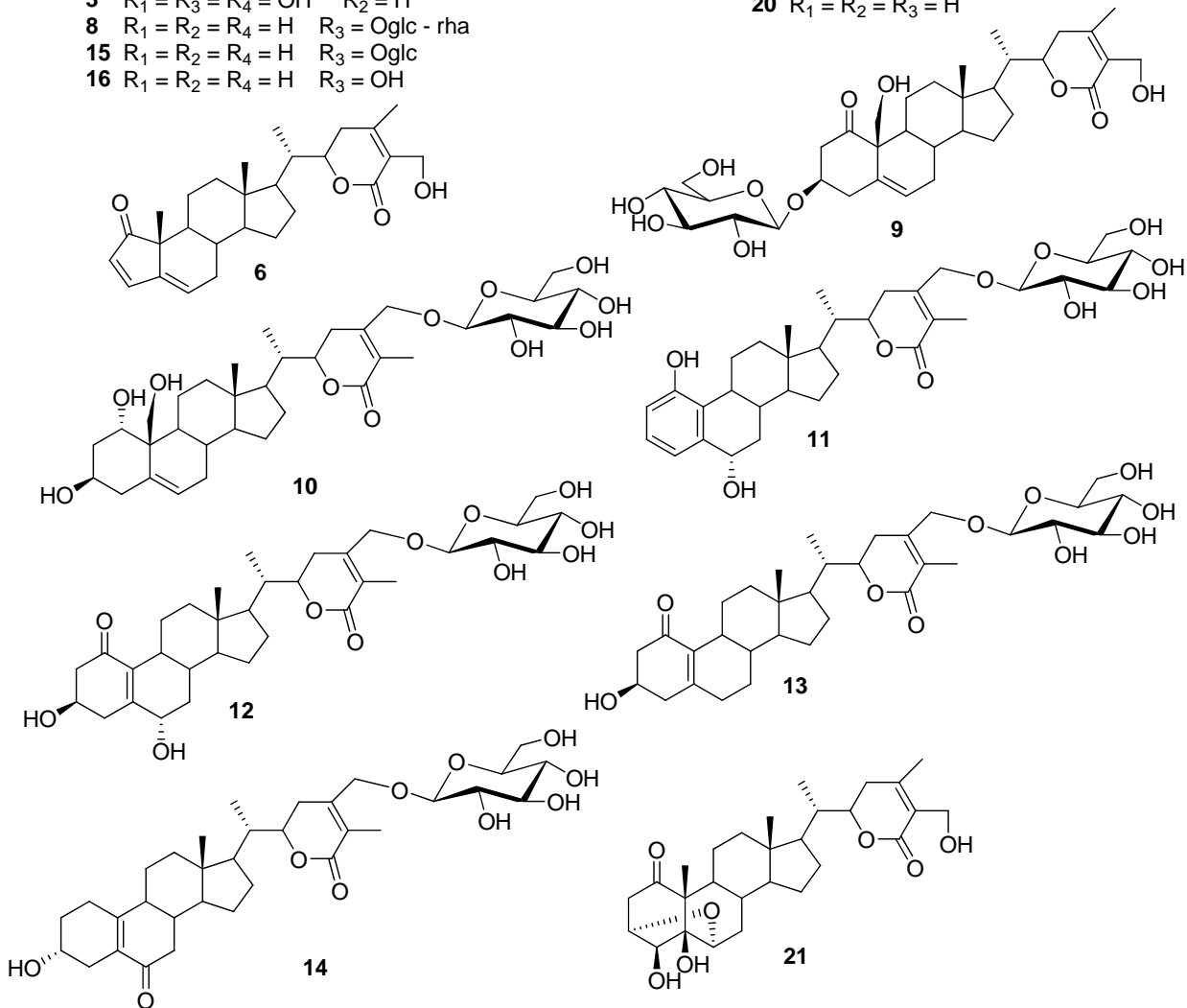
S0 Withanolides **1-21** isolated from *Physalis longifolia*



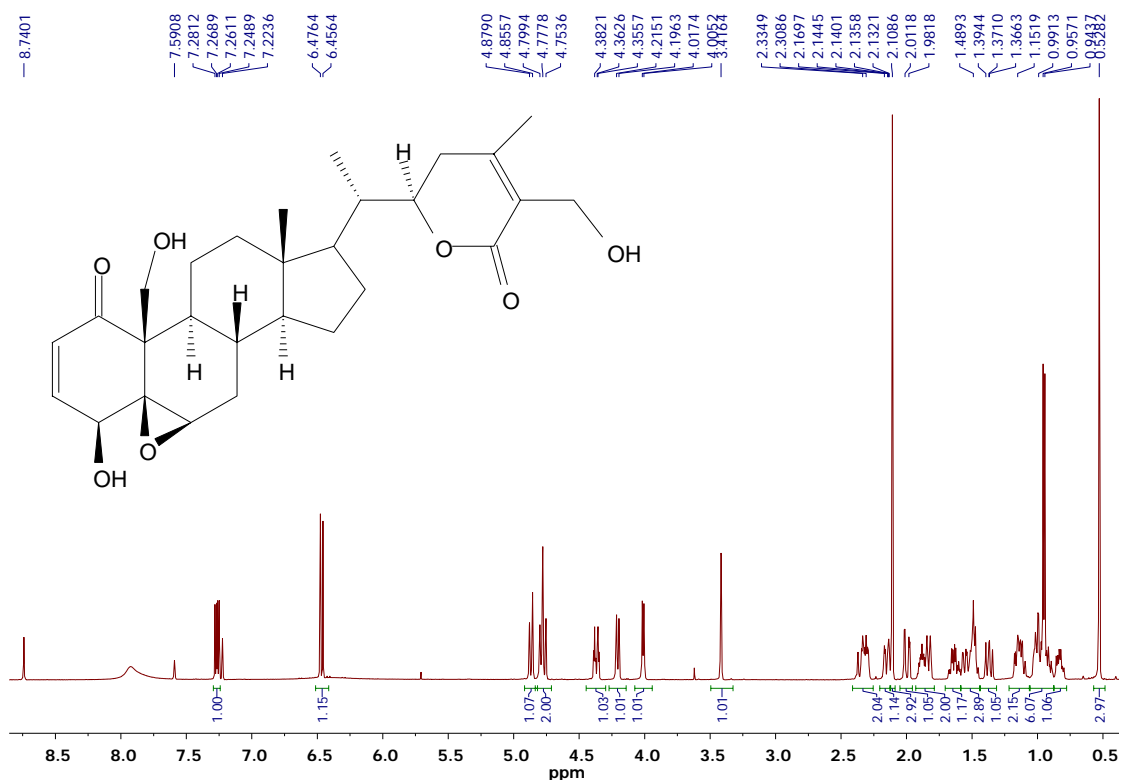
- 1** R₁ = R₃ = OH R₂ = R₄ = H
1a R₁ = OH R₂ = Ac R₃ = OAc R₄ = H
1b R₁ = R₃ = OAc R₂ = Ac R₄ = H
2 R₁ = OH R₂ = R₃ = R₄ = H
2a R₁ = OAc R₂ = R₃ = R₄ = H
2b R₁ = OAc R₂ = Ac R₃ = R₄ = H
3 R₁ = R₃ = R₄ = OH R₂ = H
8 R₁ = R₂ = R₄ = H R₃ = Oglc - rha
15 R₁ = R₂ = R₄ = H R₃ = Oglc
16 R₁ = R₂ = R₄ = H R₃ = OH



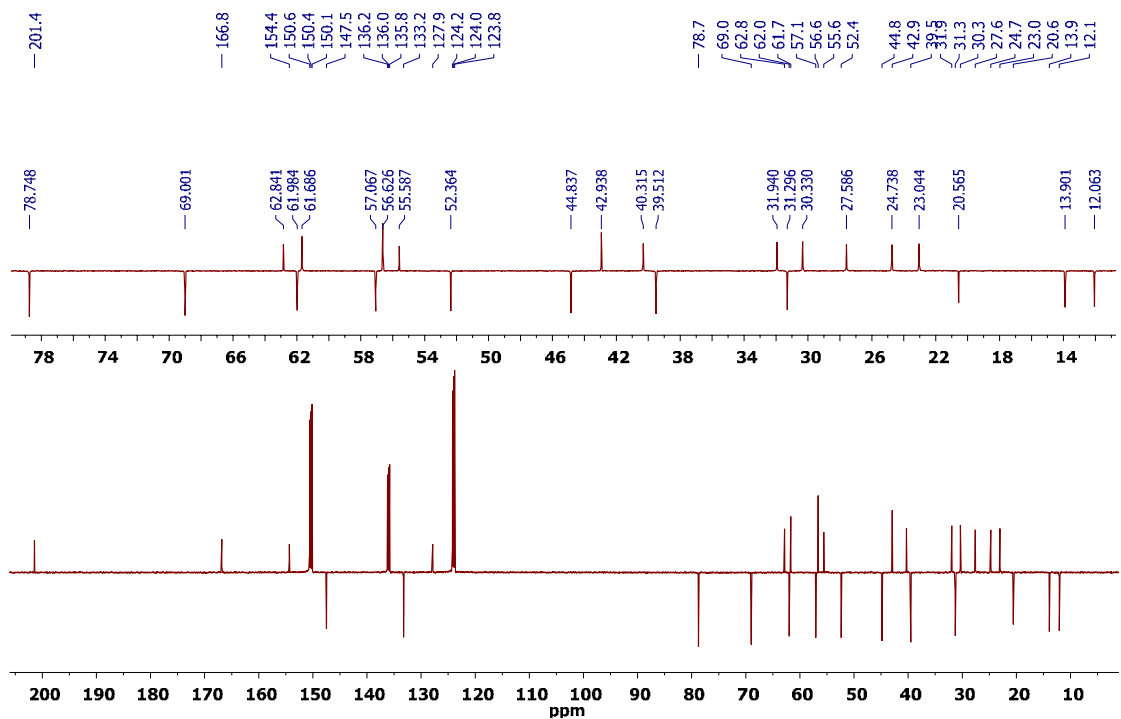
- 4** R₁ = OH R₂ = OCH₃ R₃ = H
5 R₁ = H R₂ = OCH₃ R₃ = OH
7 R₁ = OH R₂ = OSO₃H R₃ = H
17 R₁ = R₃ = H R₂ = OCH₃
18 R₁ = R₃ = H R₂ = OH
19 R₁ = R₃ = H R₂ = OSO₃H
20 R₁ = R₂ = R₃ = H



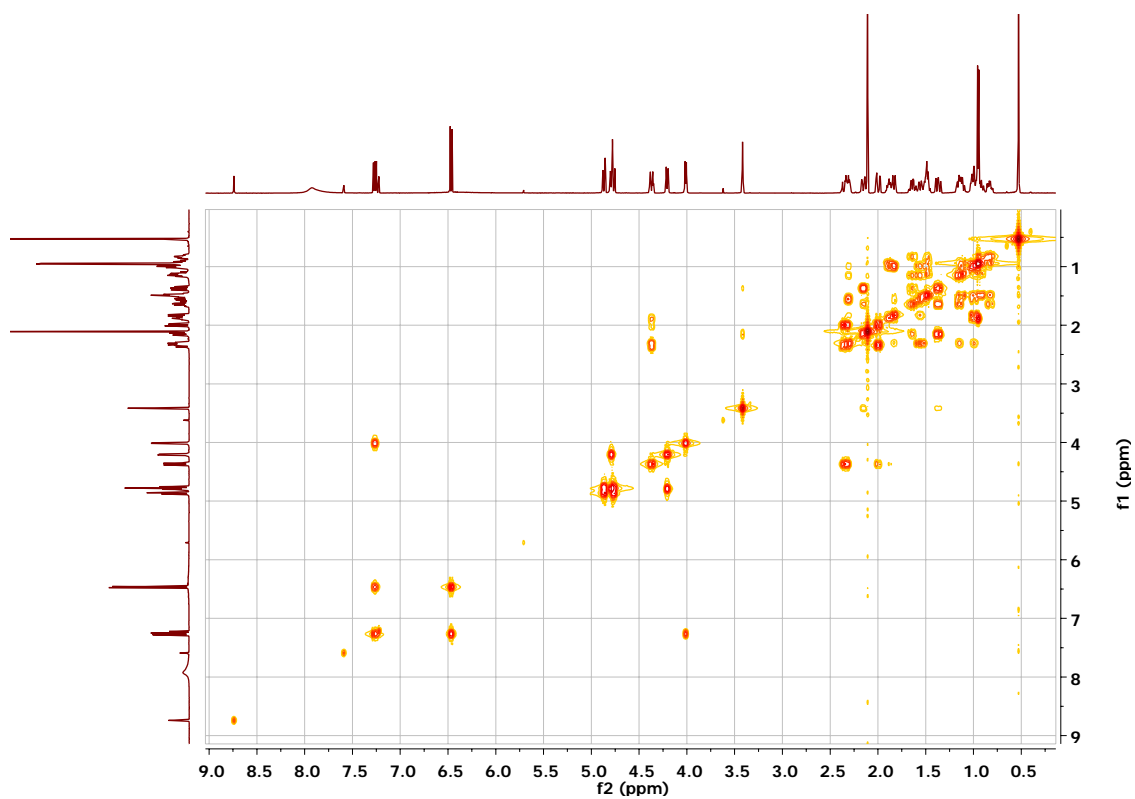
S1(a) ^1H NMR spectrum of withalongolide A (**1**) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



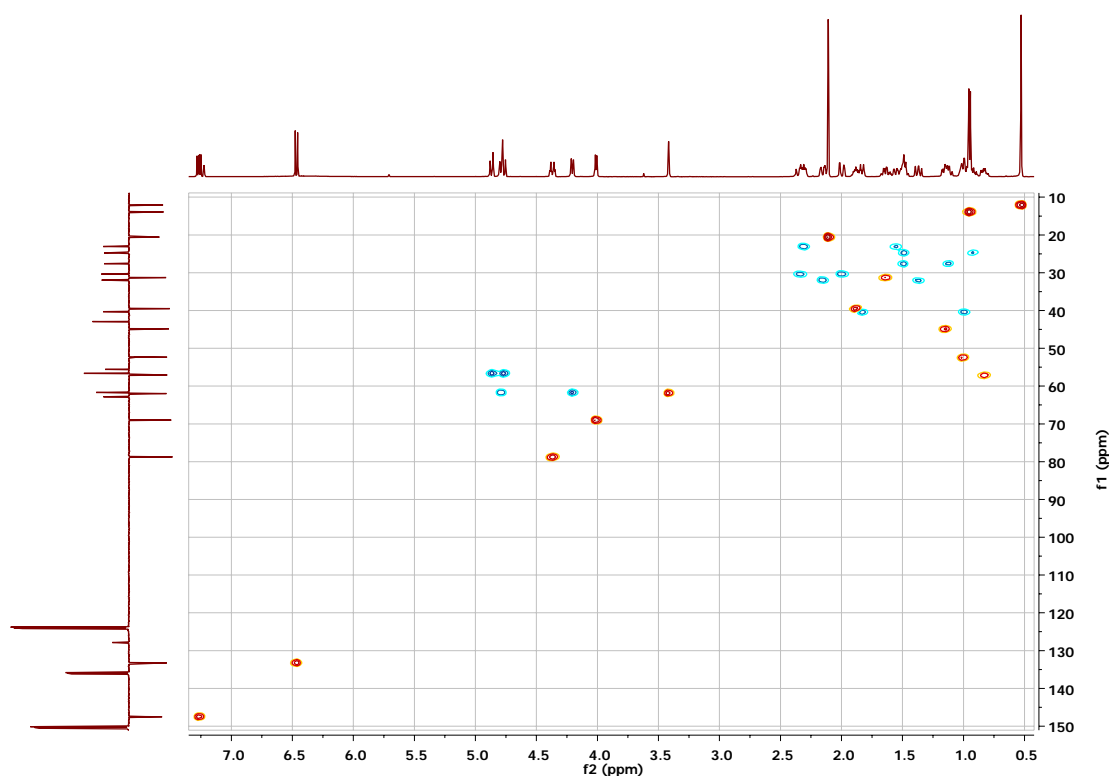
S1(b) ^{13}C APT spectrum of withalongolide A (**1**) (125 MHz)



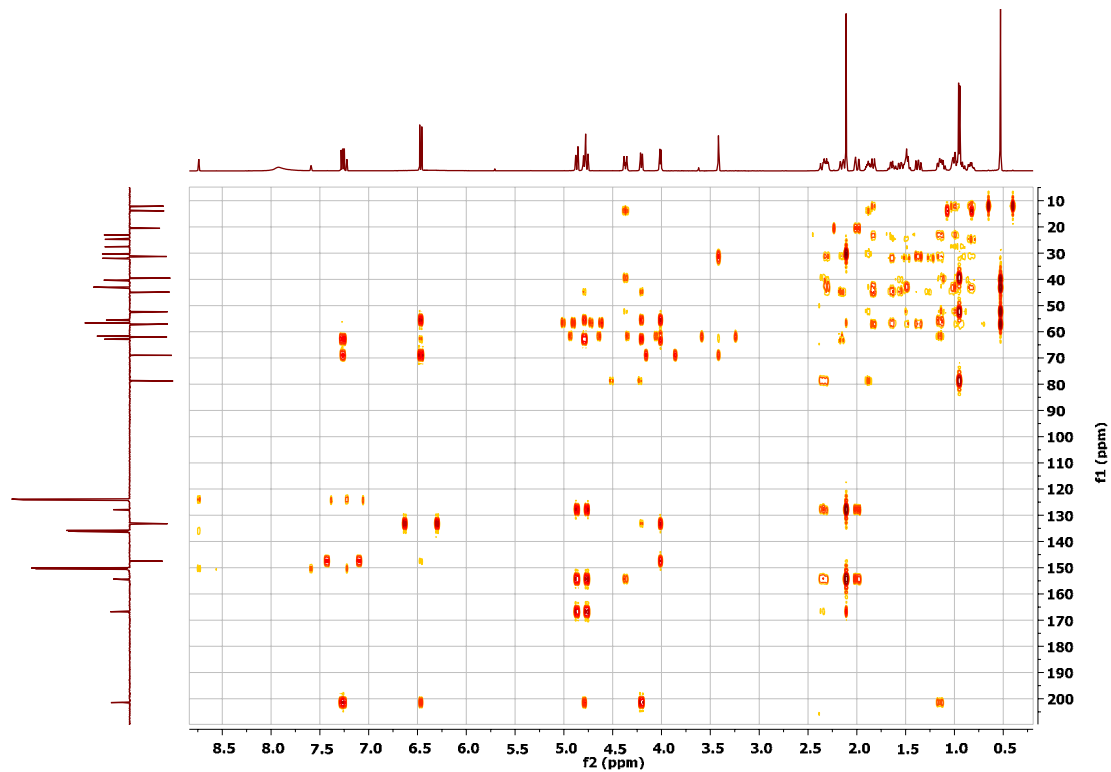
S1(c) ^1H - ^1H COSY spectrum of withalongolide A (1)



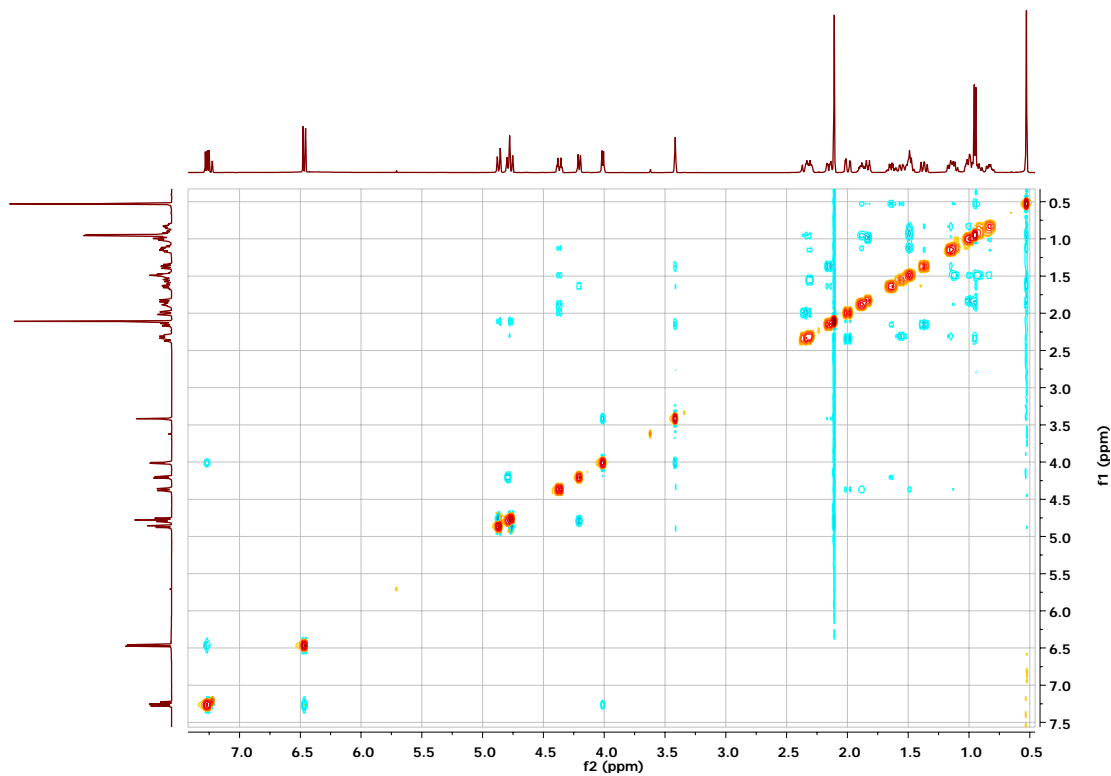
S1(d) HSQC spectrum of withalongolide A (1)



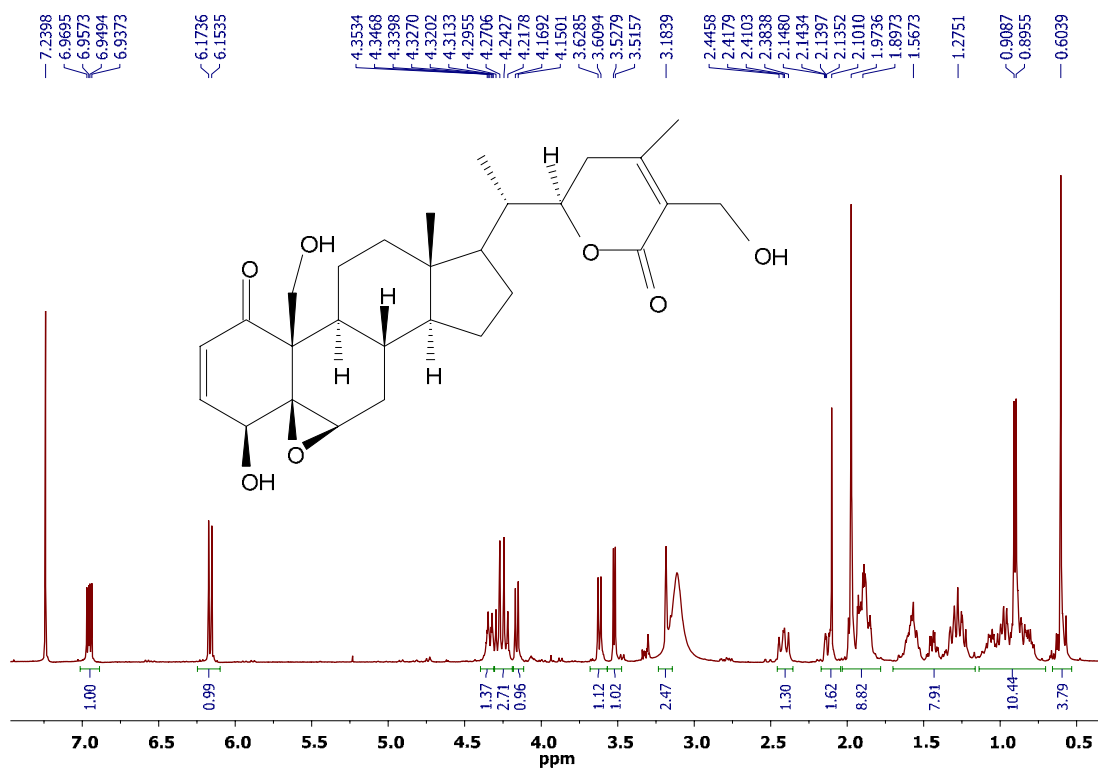
S1(e) HMBC spectrum of withalongolide A (1)



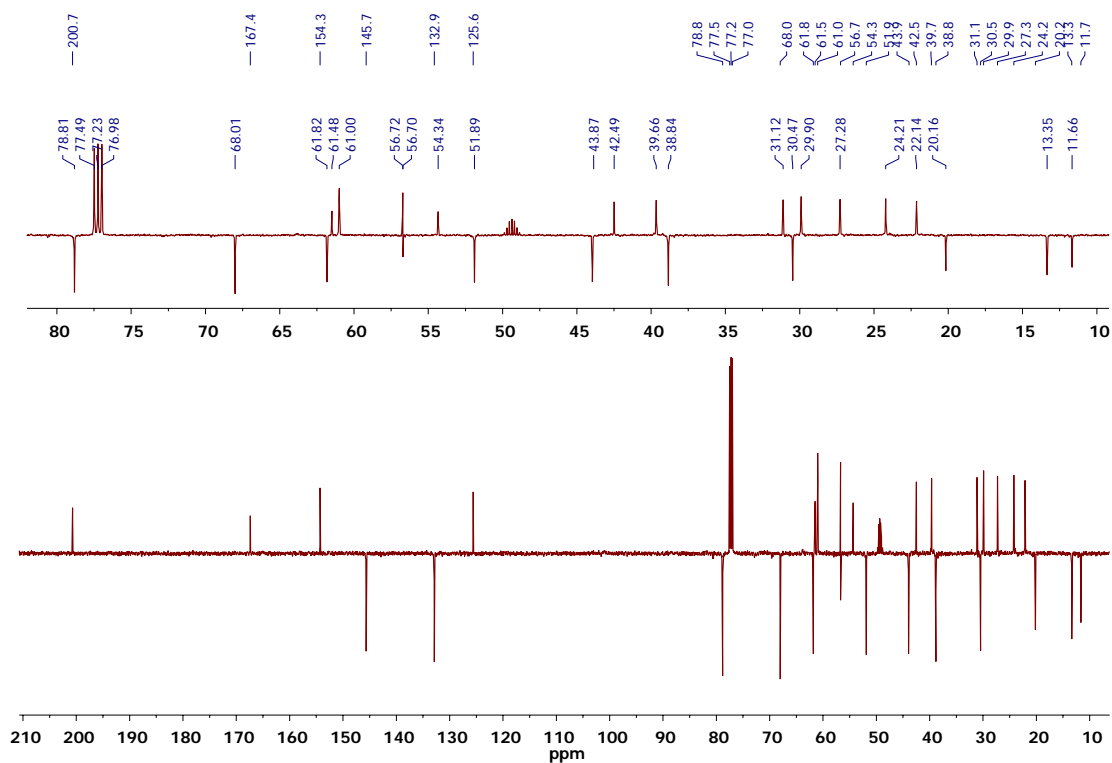
S1(f) ROESY spectrum of withalongolide A (1)



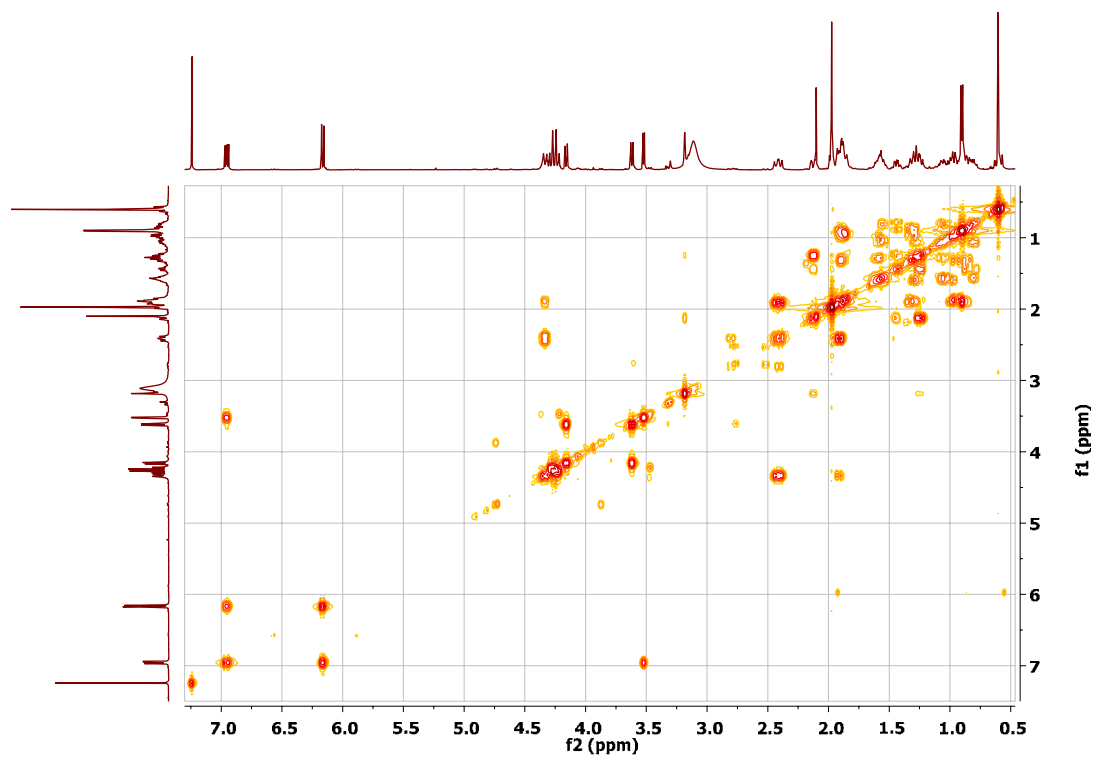
S1(g) ^1H NMR spectrum of withalongolide A (**1**) in CDCl_3 and CD_3OD (500 MHz)



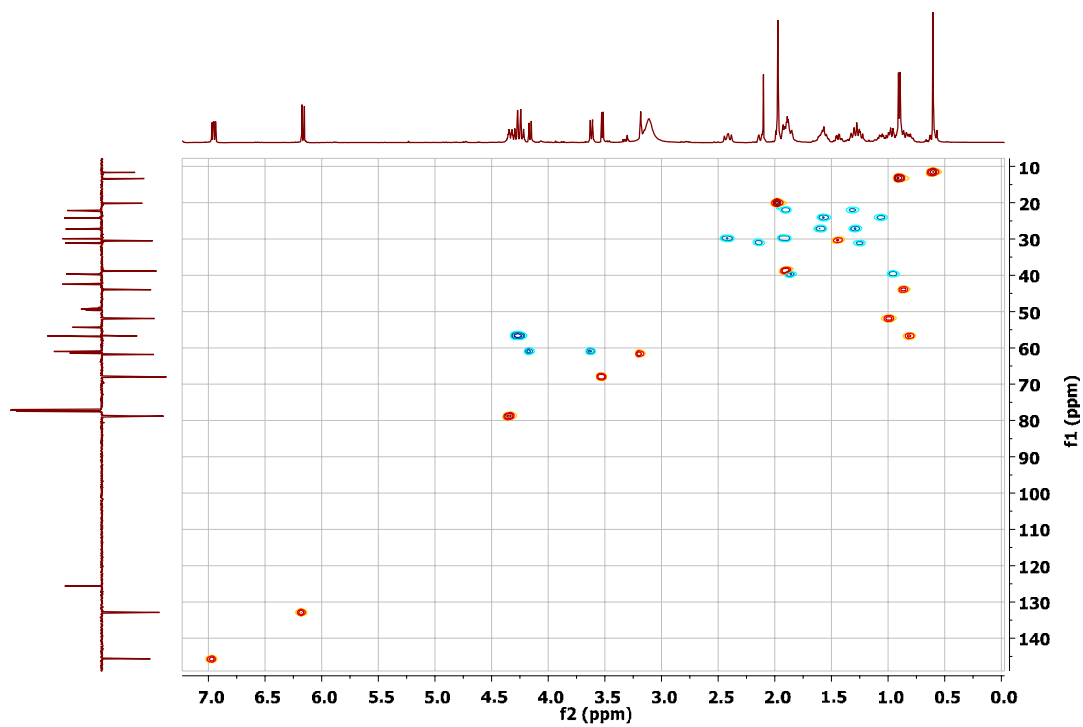
S1(h) ^{13}C APT spectrum of withalongolide A (**1**) (125 MHz)



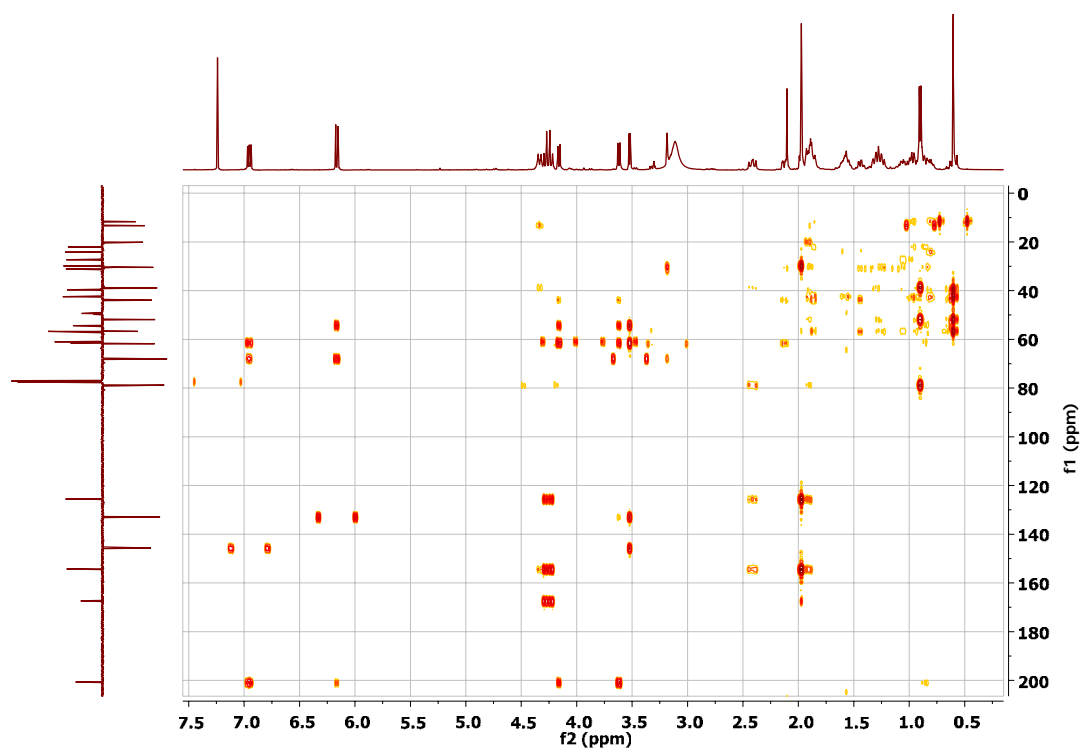
S1(i) ^1H - ^1H COSY spectrum of withalongolide A (1)



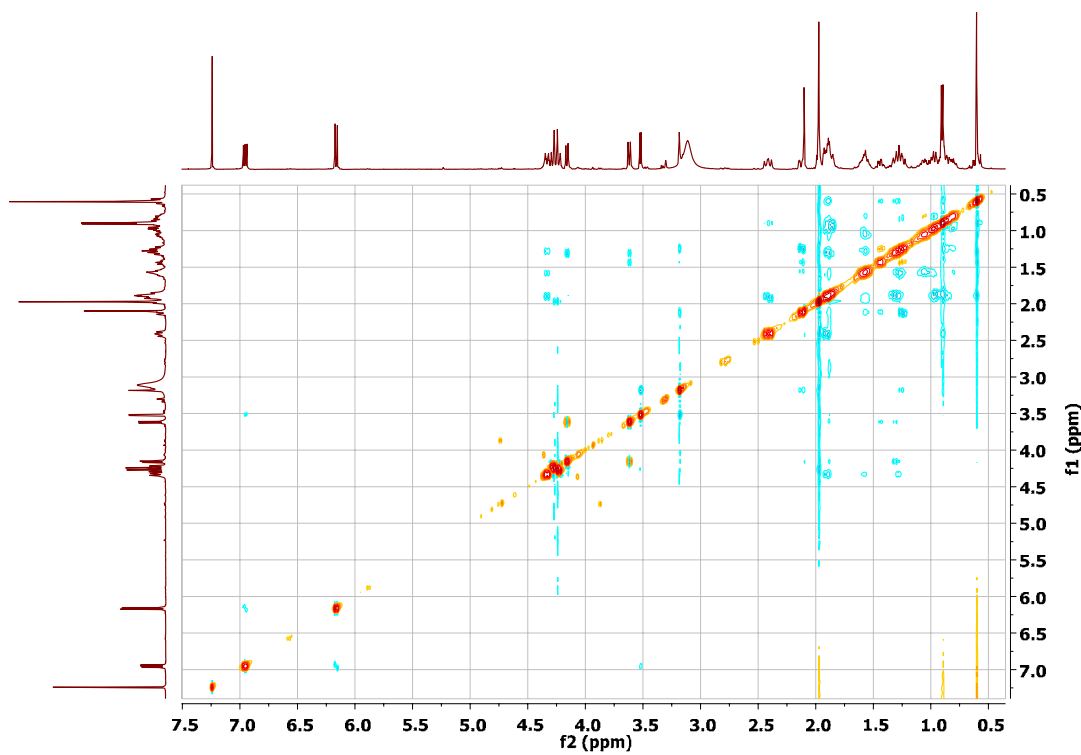
S1(j) HSQC spectrum of withalongolide A (1)



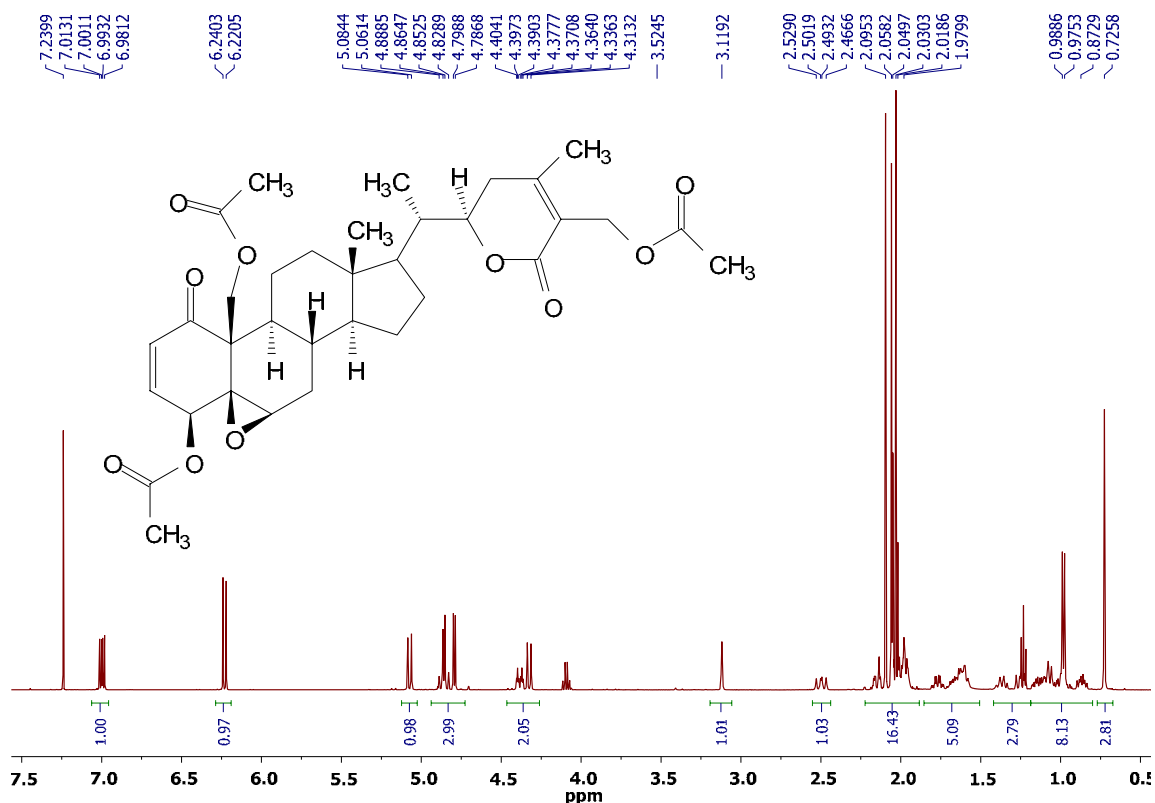
S1(k) HMBC spectrum of withalongolide A (1)



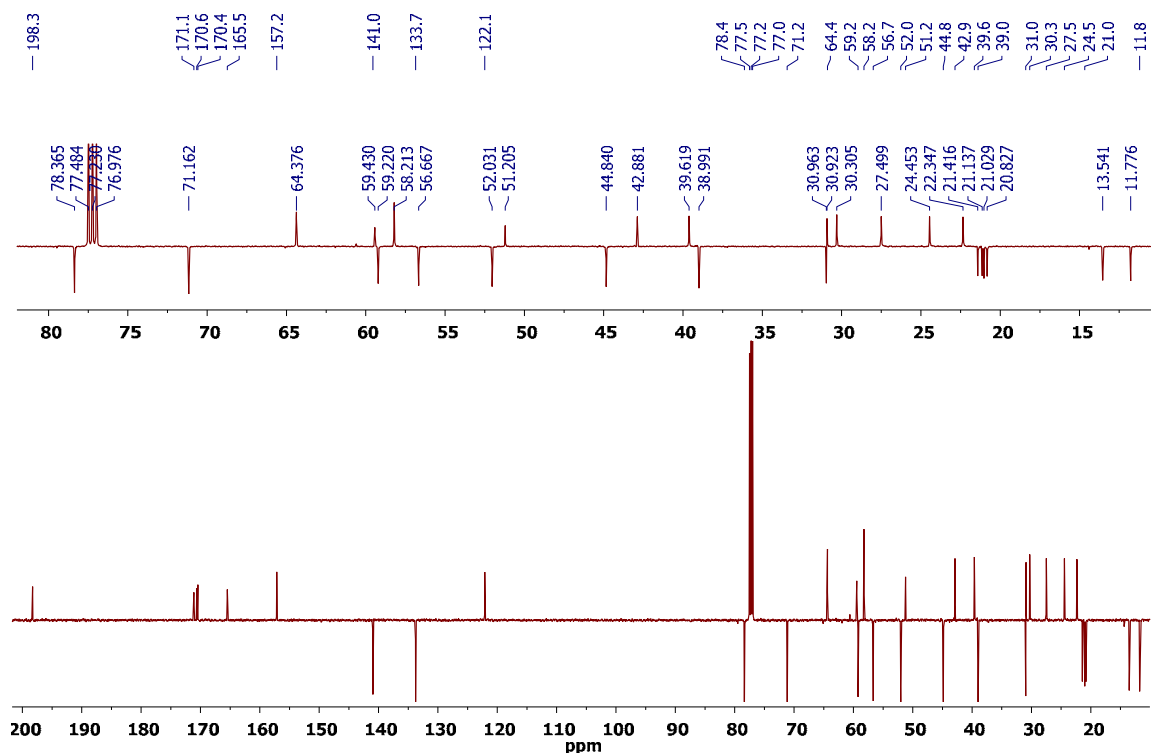
S1(l) ROESY spectrum of withalongolide A (1)



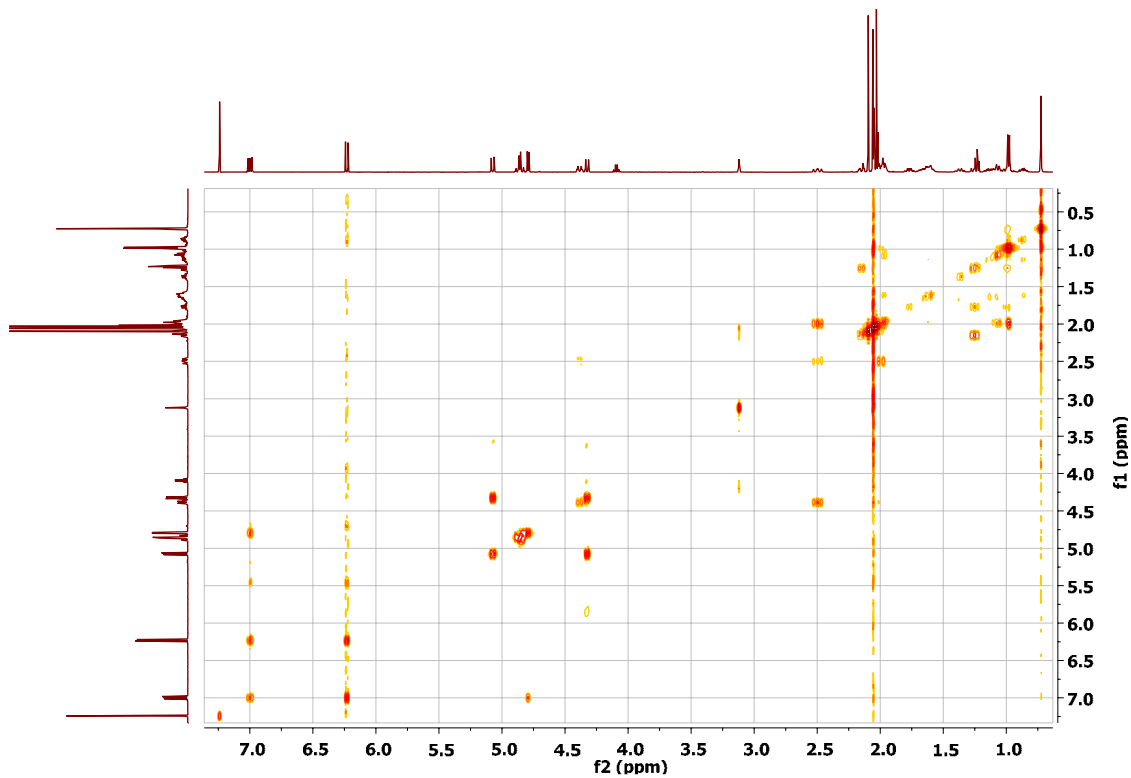
S1a(a) ^1H NMR spectrum of withalongolide A 4, 19,27-triacetae (**1a**) in CDCl_3 (500 MHz)



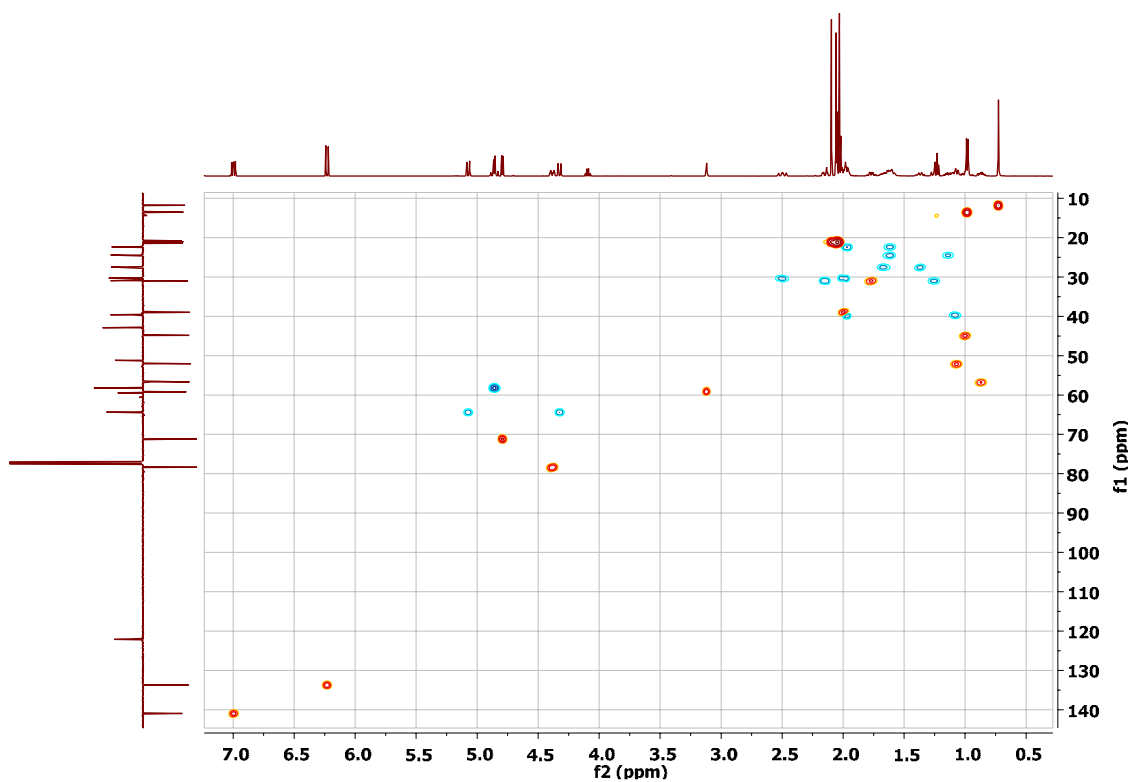
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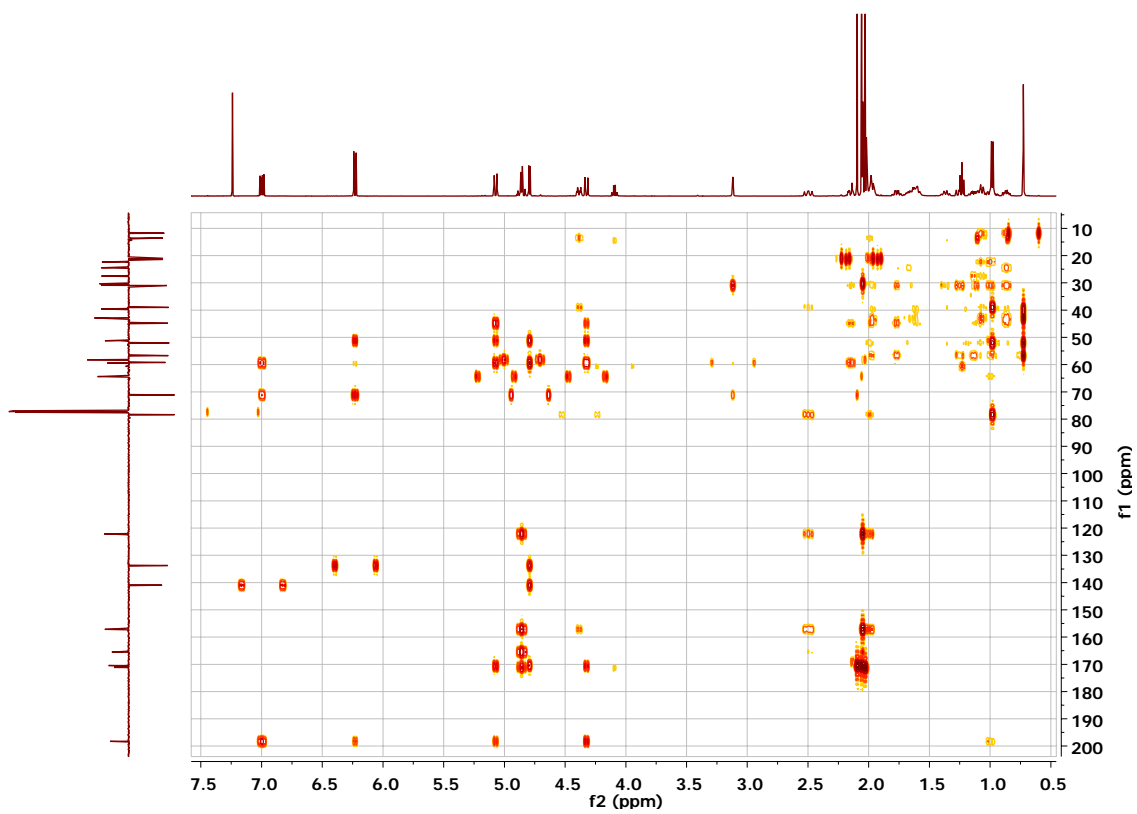
S1a(c) ^1H - ^1H COSY spectrum of withalongolide A 4, 19,27-triacetae (**1a**)



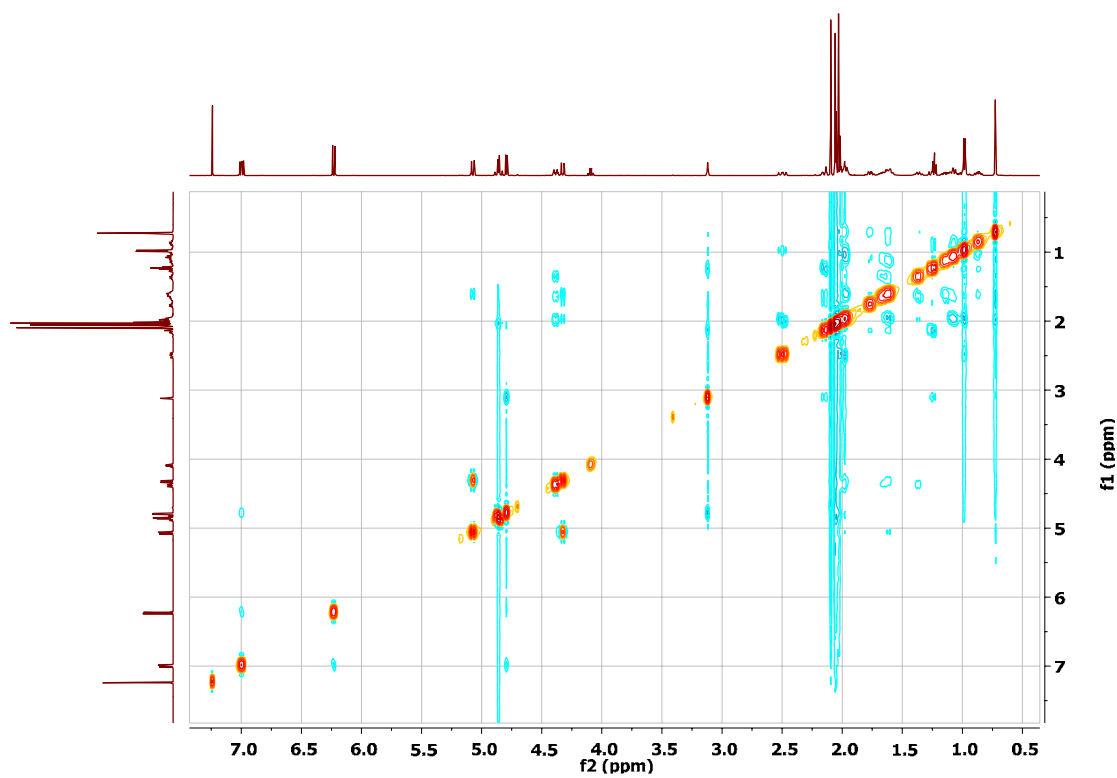
S1a(d) HSQC spectrum of withalongolide A 4, 19,27-triacetae (**1a**)



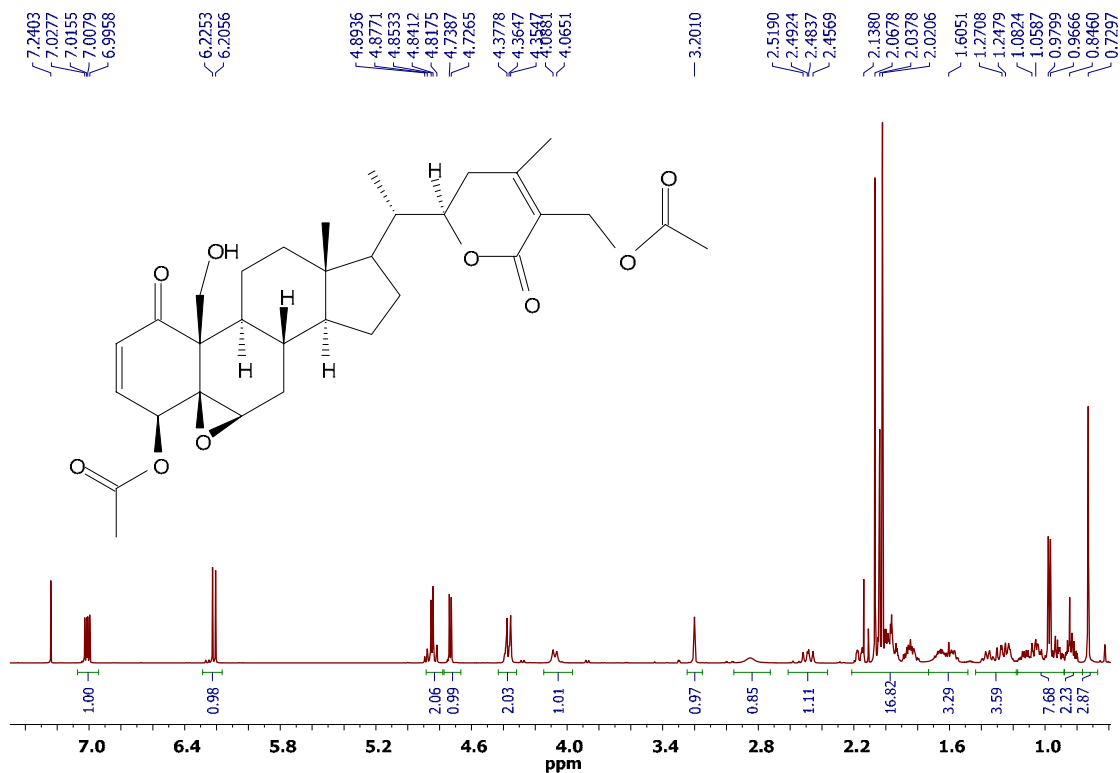
S1a(e) HMBC spectrum of withalongolide A 4, 19,27-triacetae (**1a**)



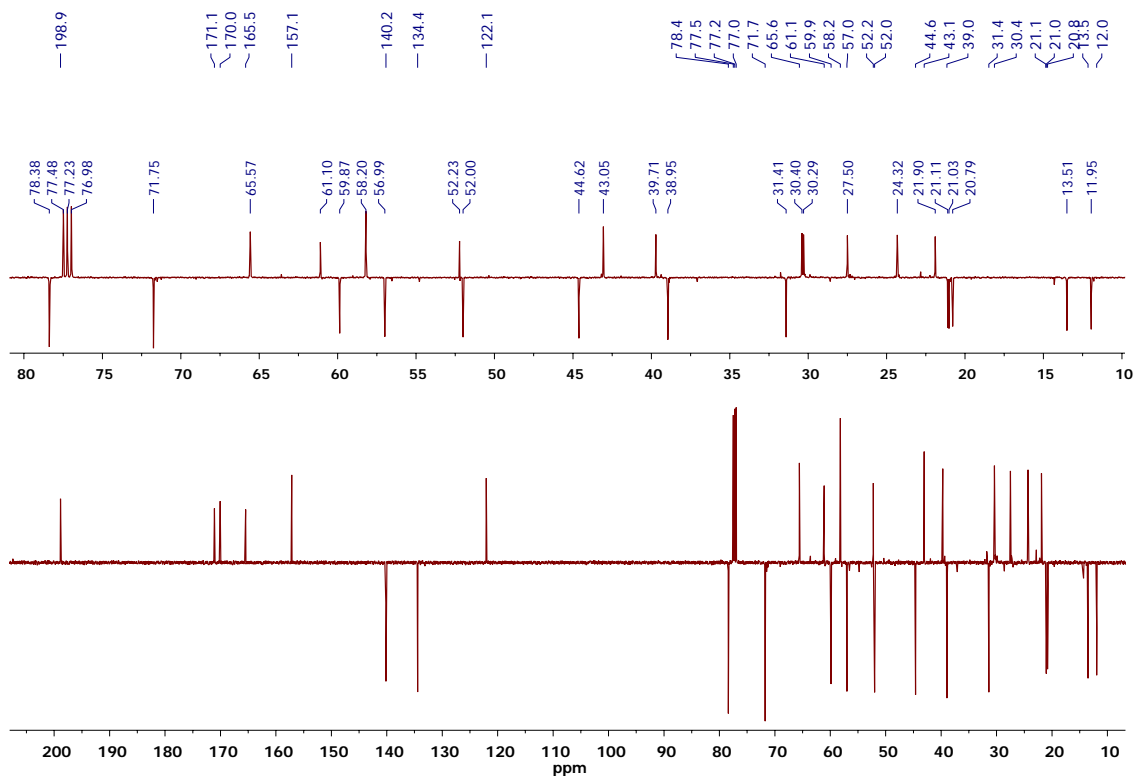
S1a(f) ROESY spectrum of withalongolide A 4, 19,27-triacetae (**1a**)



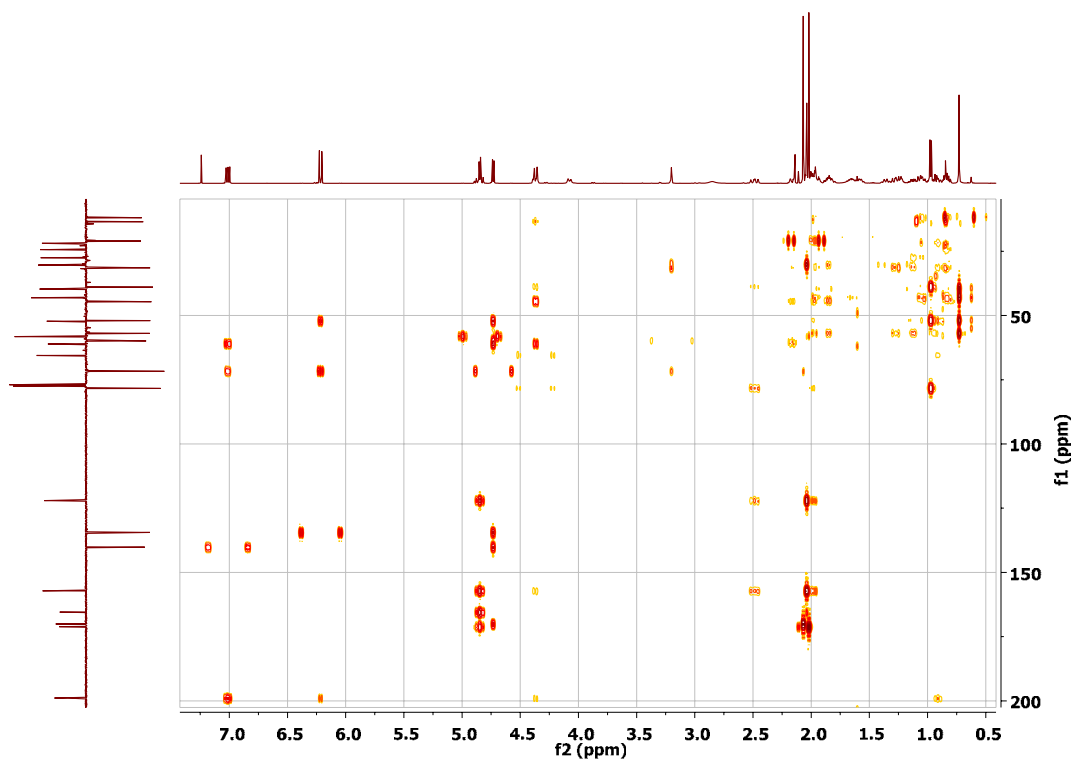
S1b(a) ^1H NMR spectrum of withalongolide A 4,27-diacetae (**1b**) in CDCl_3 (500 MHz)



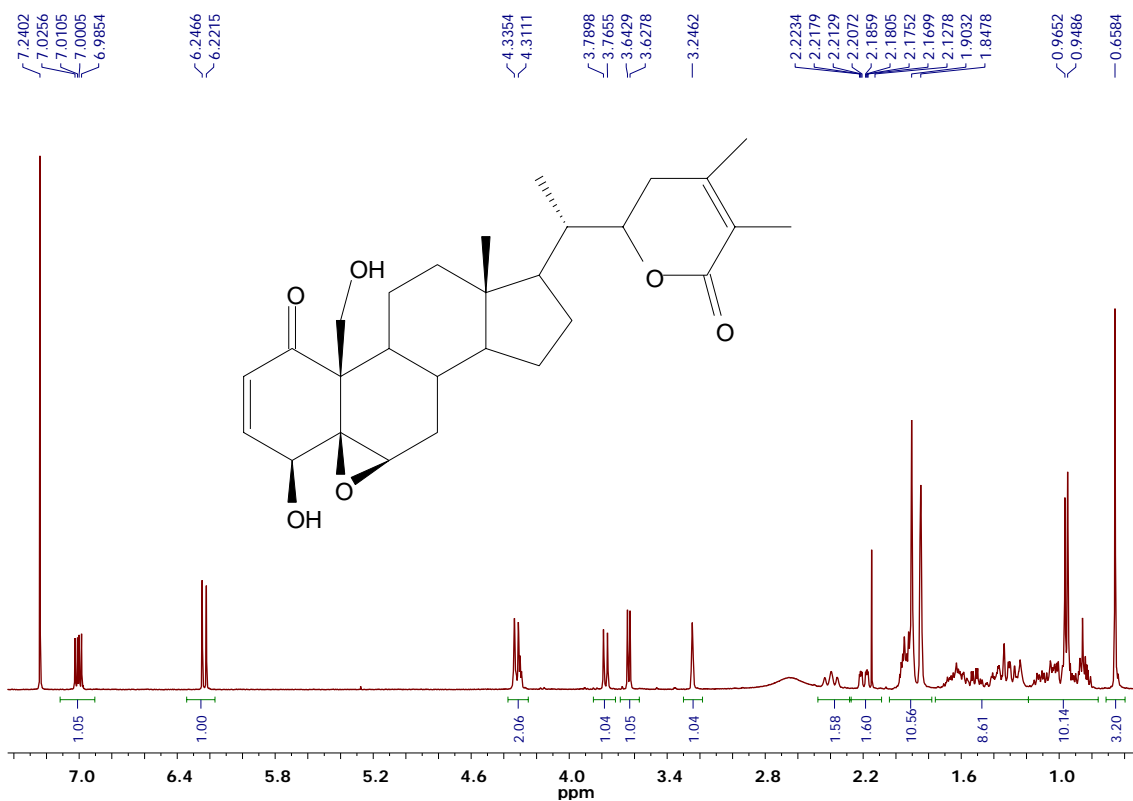
S1b(b) ^{13}C APT spectrum of withalongolide A 4,27-diacetae (**1b**) (125 MHz)



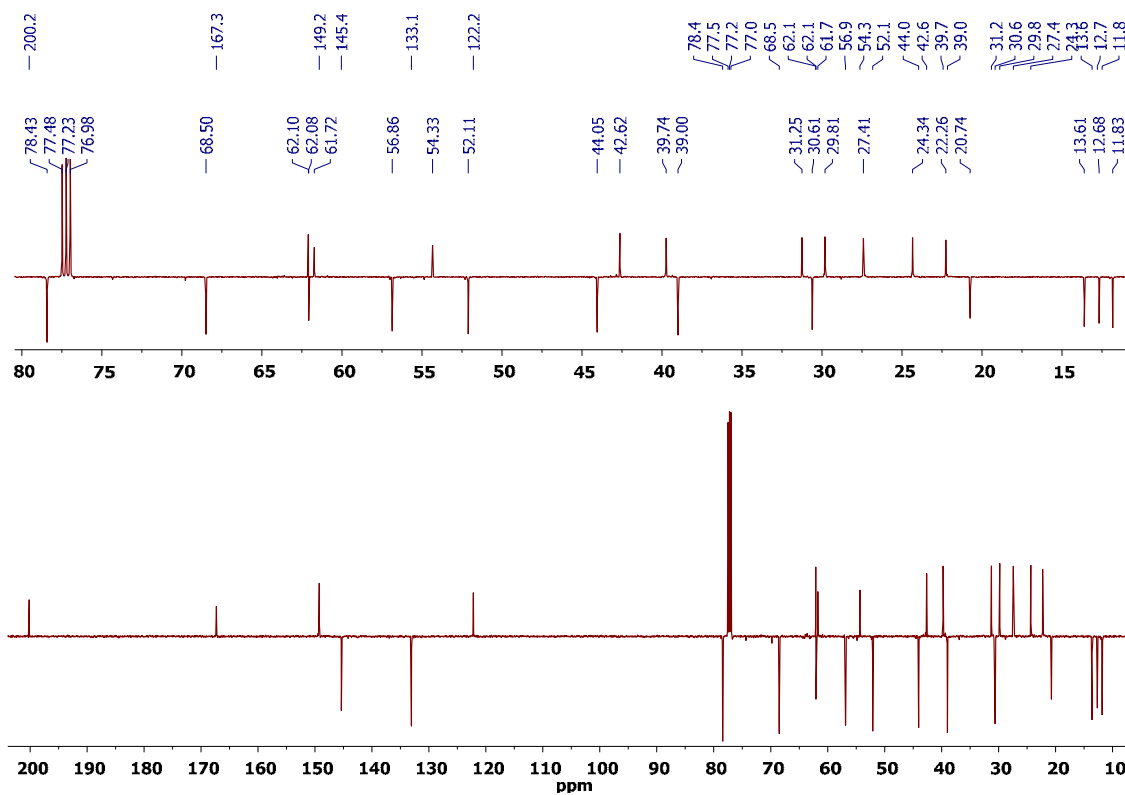
S1b(e) HMBC spectrum of withalongolide A 4,27-diacetate (**1b**)



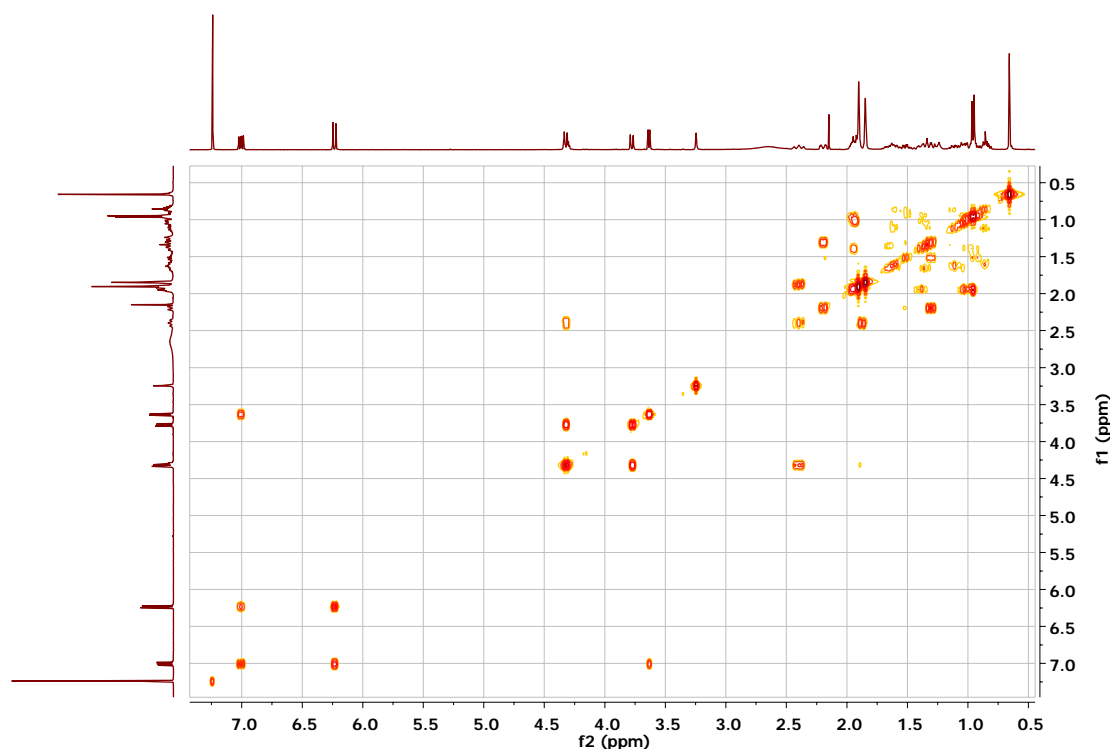
S2(a) ¹H NMR spectrum of withalongolide B (**2**) in CHCl₃ (400 MHz)



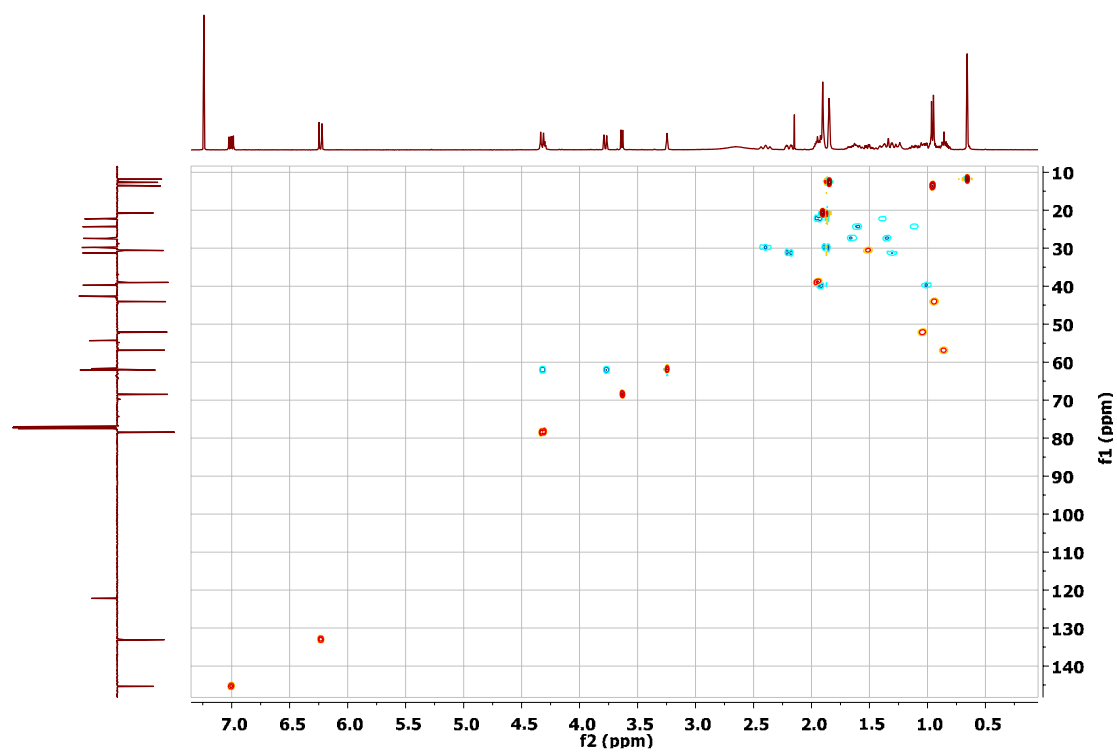
S2(b) ^{13}C APT spectrum of withalongolide B (2) (125 MHz)



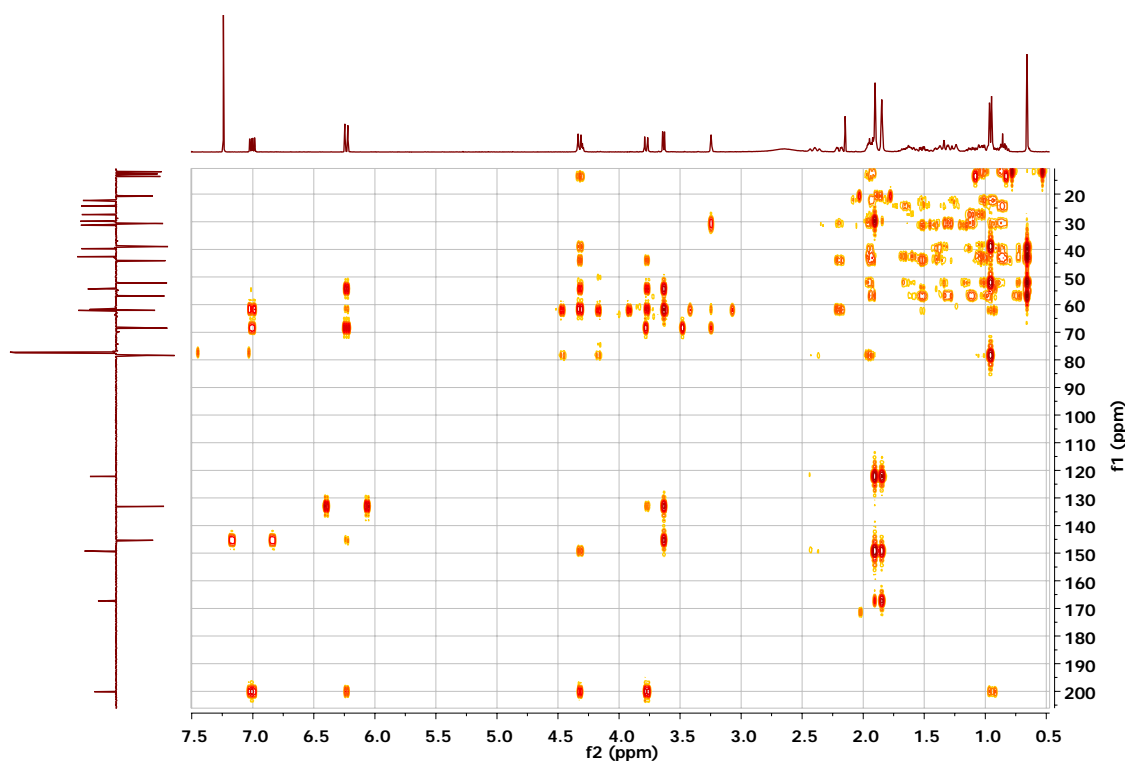
S2(c) ^1H - ^1H COSY spectrum of withalongolide B (2)



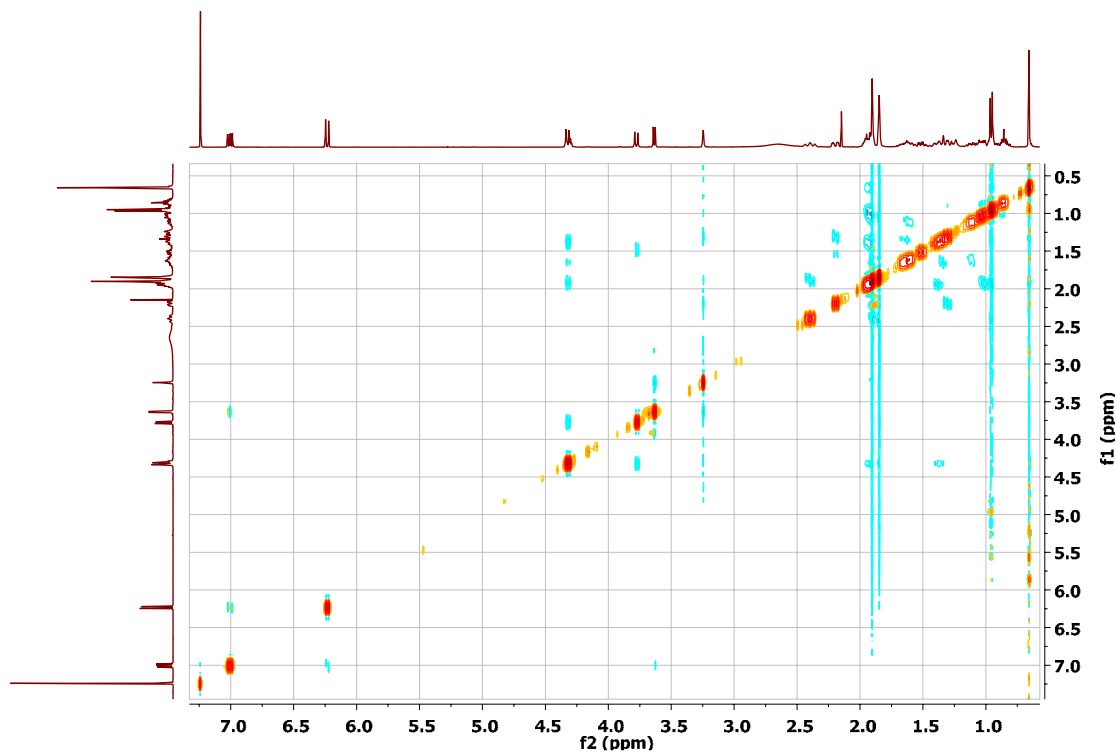
S2(d) HSQC spectrum of withalongolide B (2)



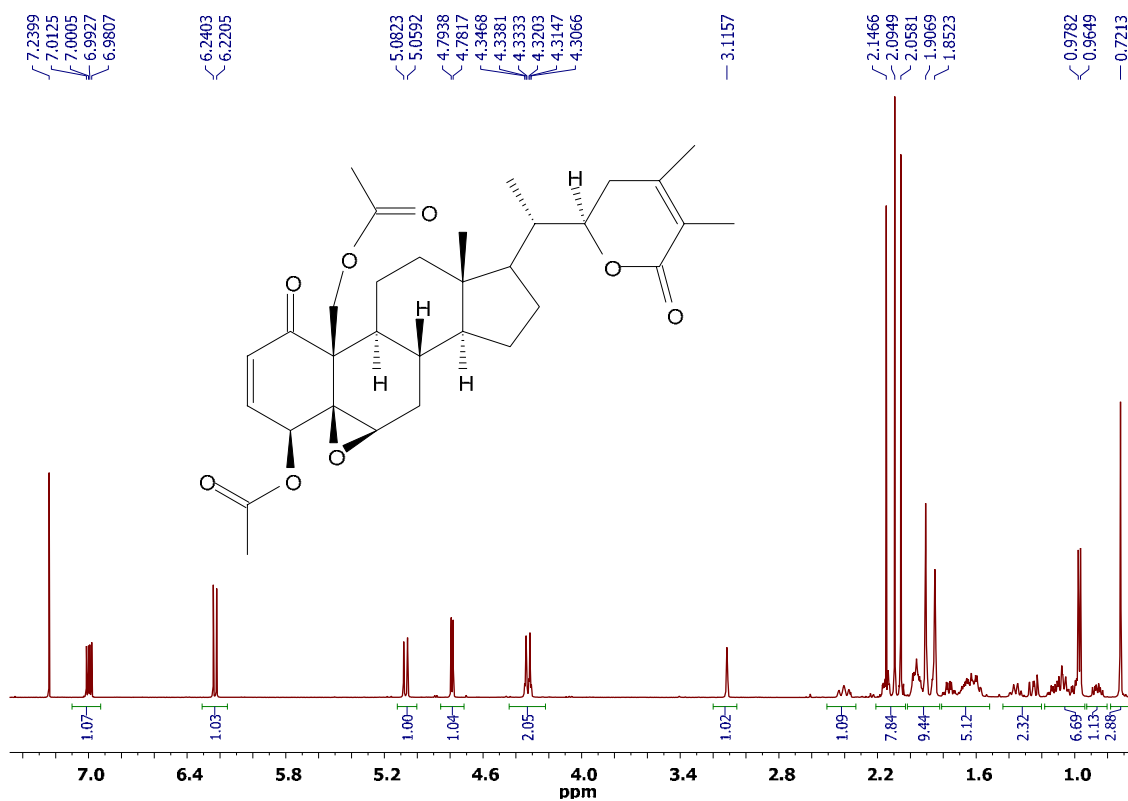
S2(e) HMBC spectrum of withalongolide B (2)



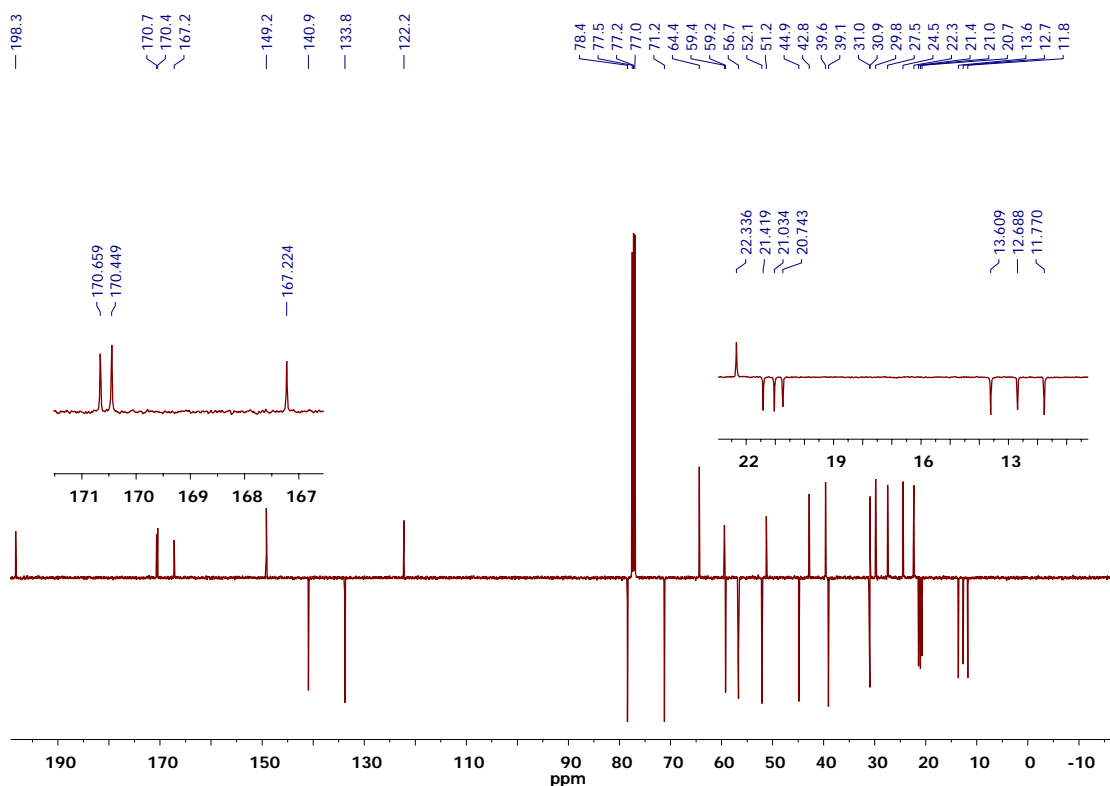
S2(f) ROESY spectrum of withalongolide B (2)



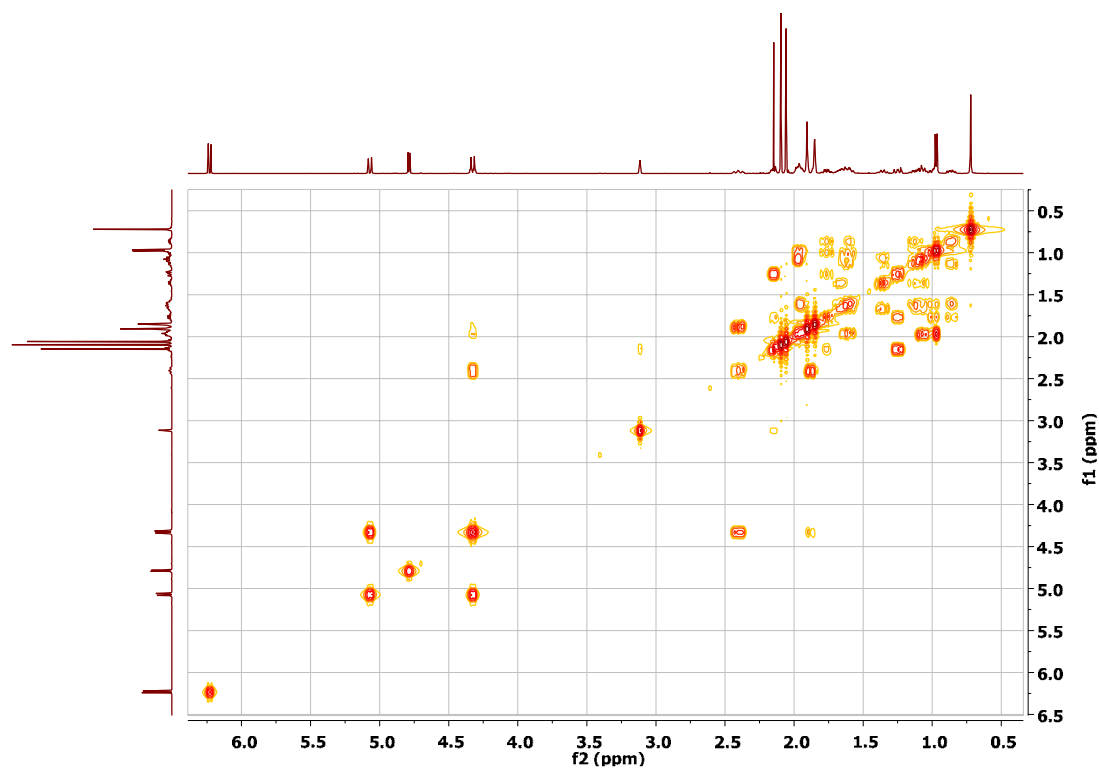
S2a(a) ¹H NMR spectrum of withalongolide B 4,19-diacetate (2a) in CDCl₃ (500 MHz)



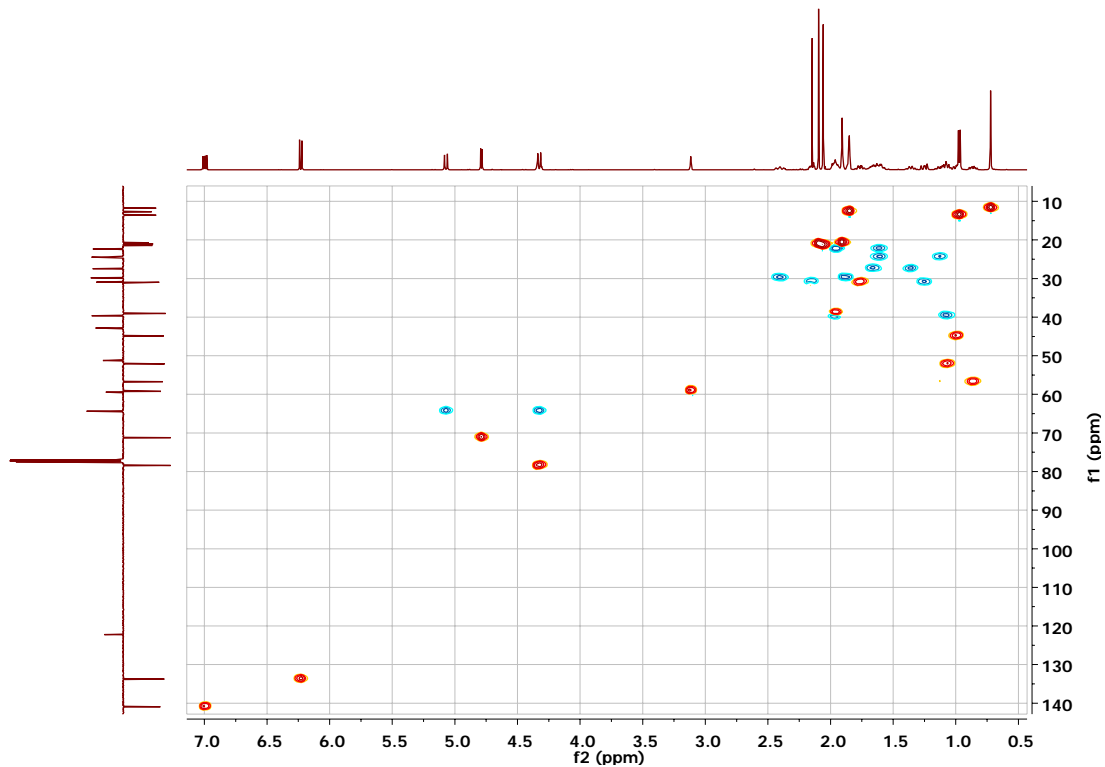
S2a(b) ^{13}C APT spectrum of withalongolide B 4,19-diacetate(2a) (125 MHz)



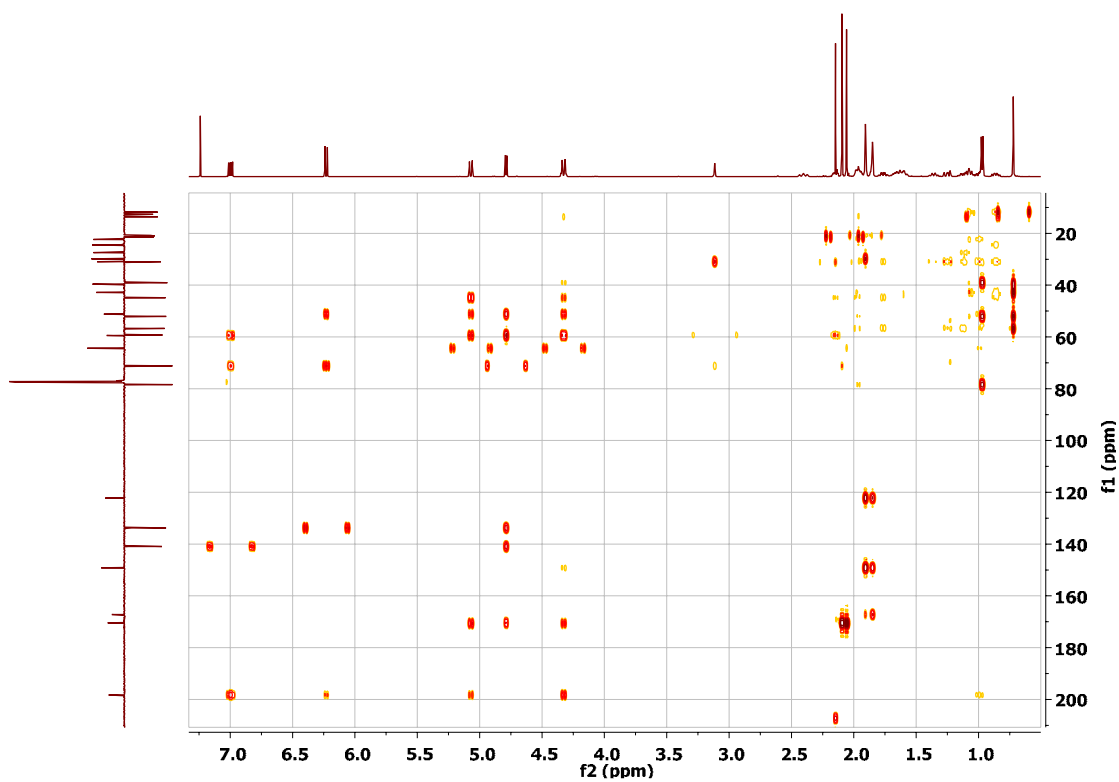
S2a(c) ^1H - ^1H COSY spectrum of withalongolide B 4,19-diacetate(2a)



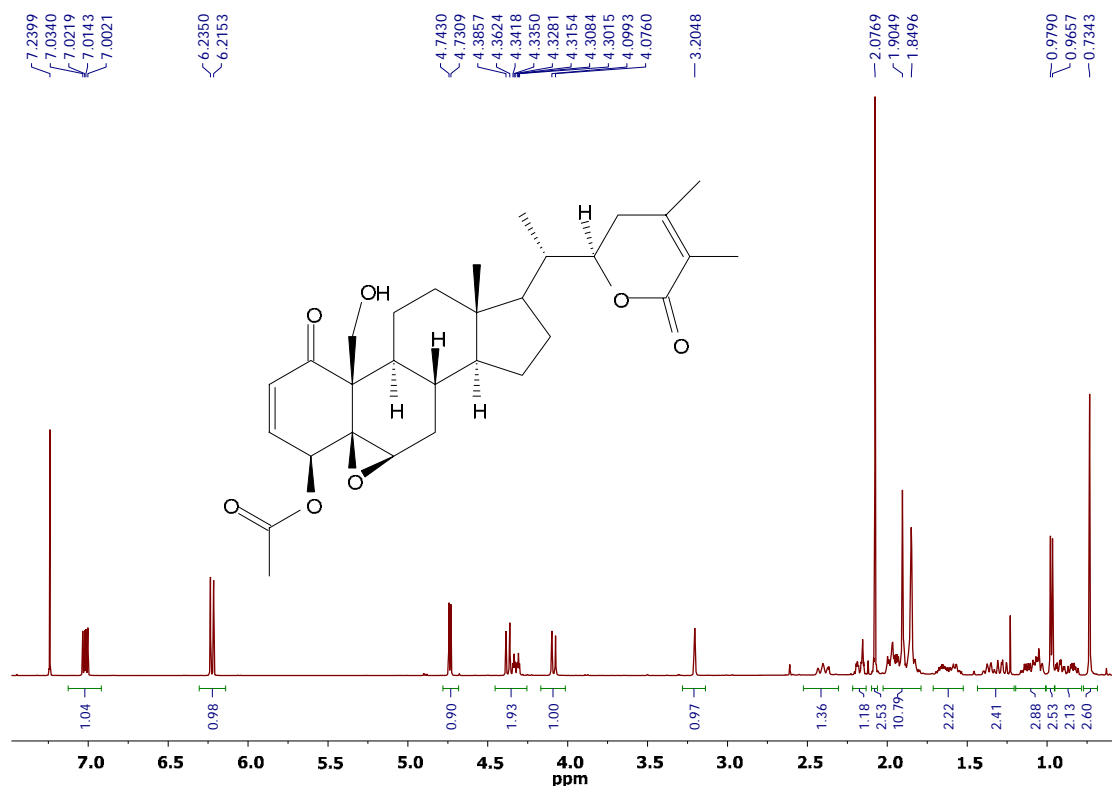
S2a(d) HSQC spectrum of withalongolide B 4,19-diacetate(2a)



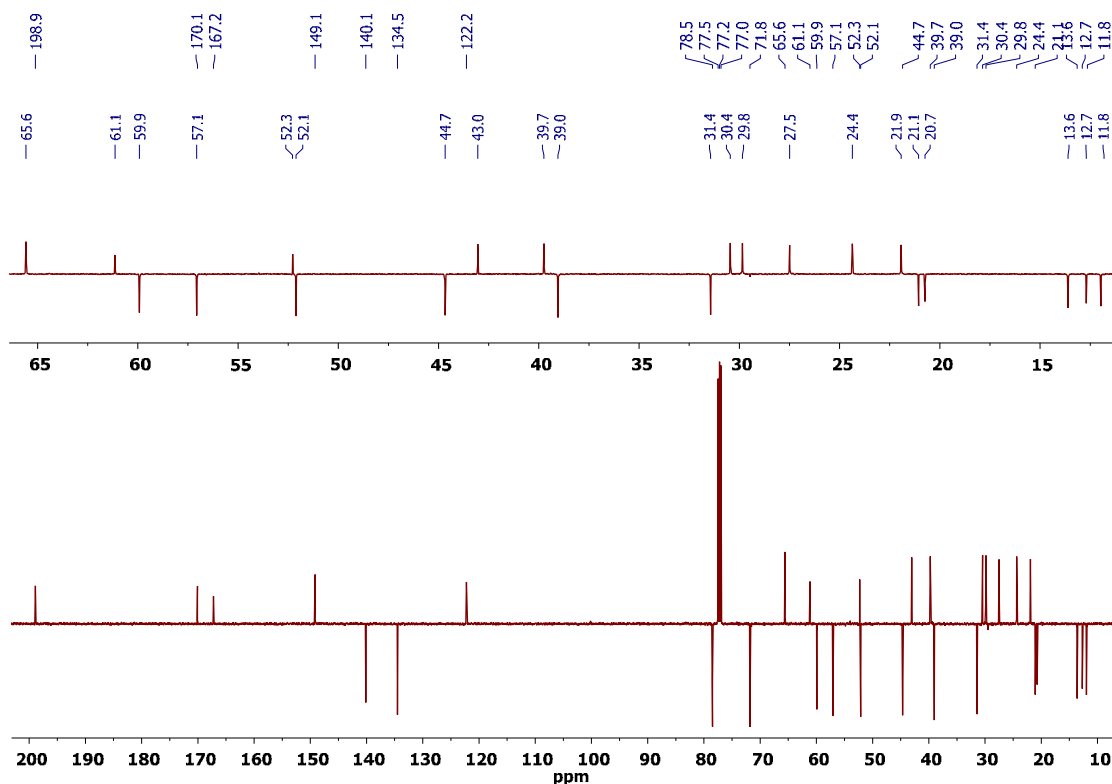
S2a(e) HMBC spectrum of withalongolide B 4,19-diacetate(2a)



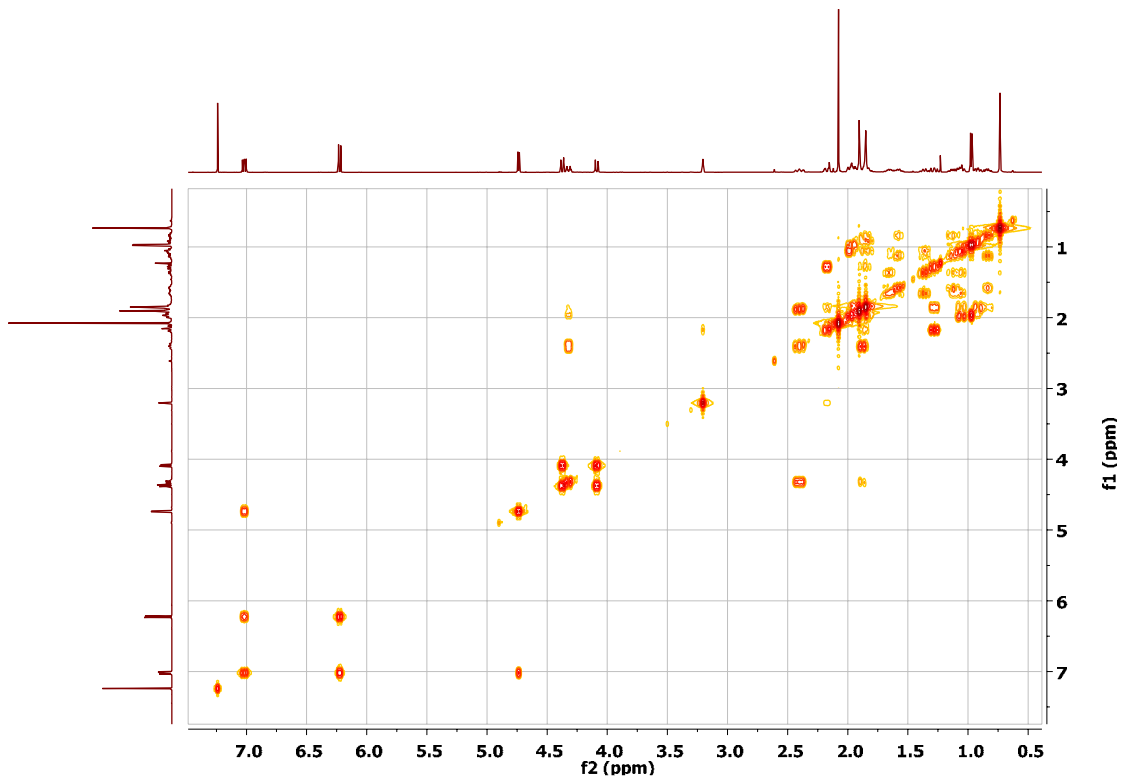
S2b(a) ^1H NMR spectrum of withalongolide B 4-acetate (**2b**) in CDCl_3 (500 MHz)



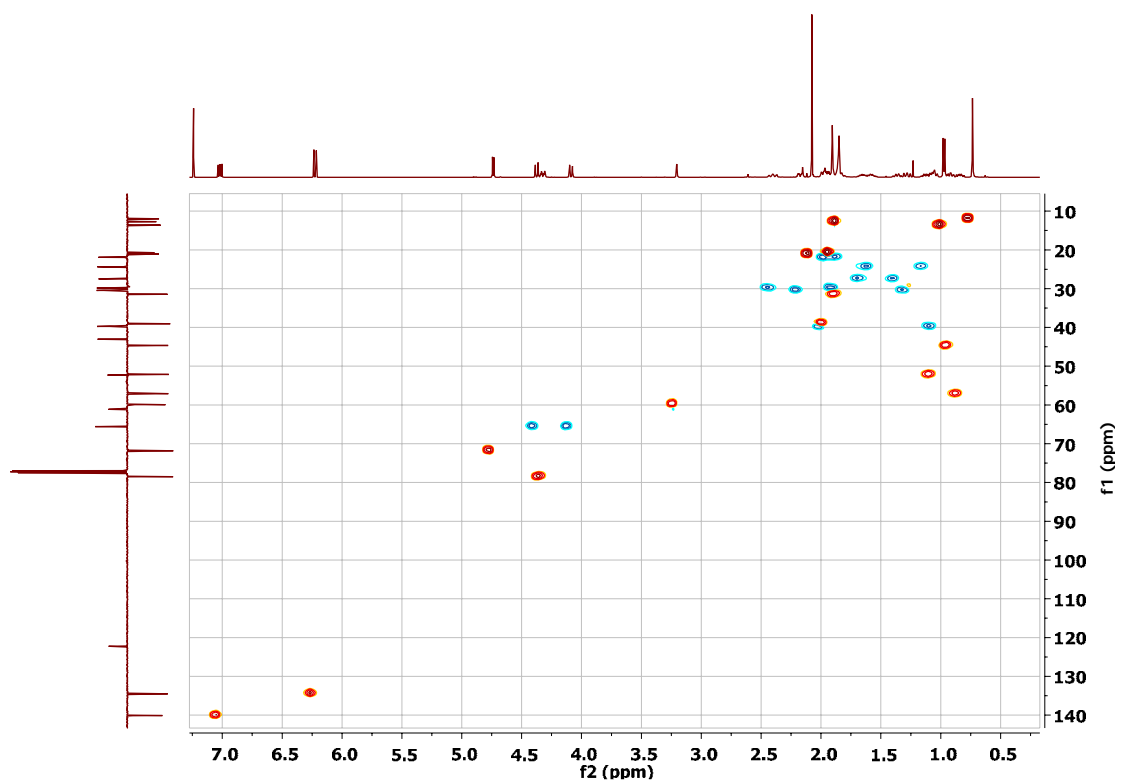
S2b(b) ^{13}C APT spectrum of withalongolide B 4-acetate (**2b**) (125 MHz)



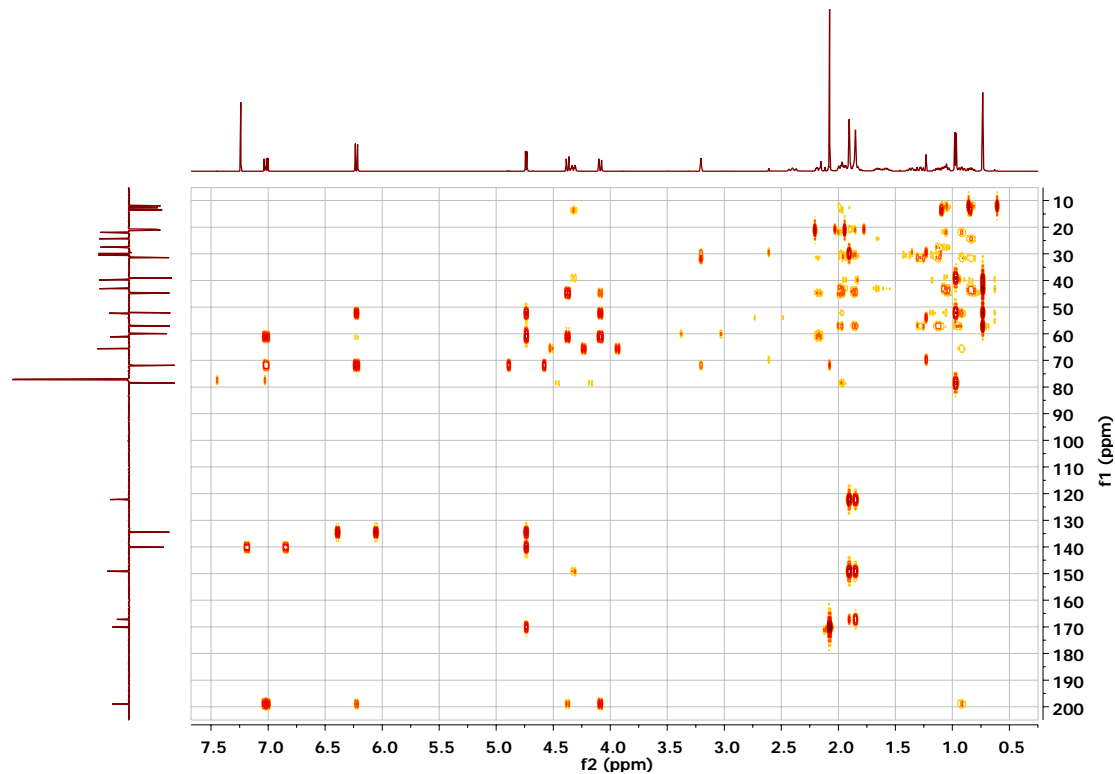
S2b(c) ^1H - ^1H COSY spectrum of withalongolide B 4-acetate (**2b**)



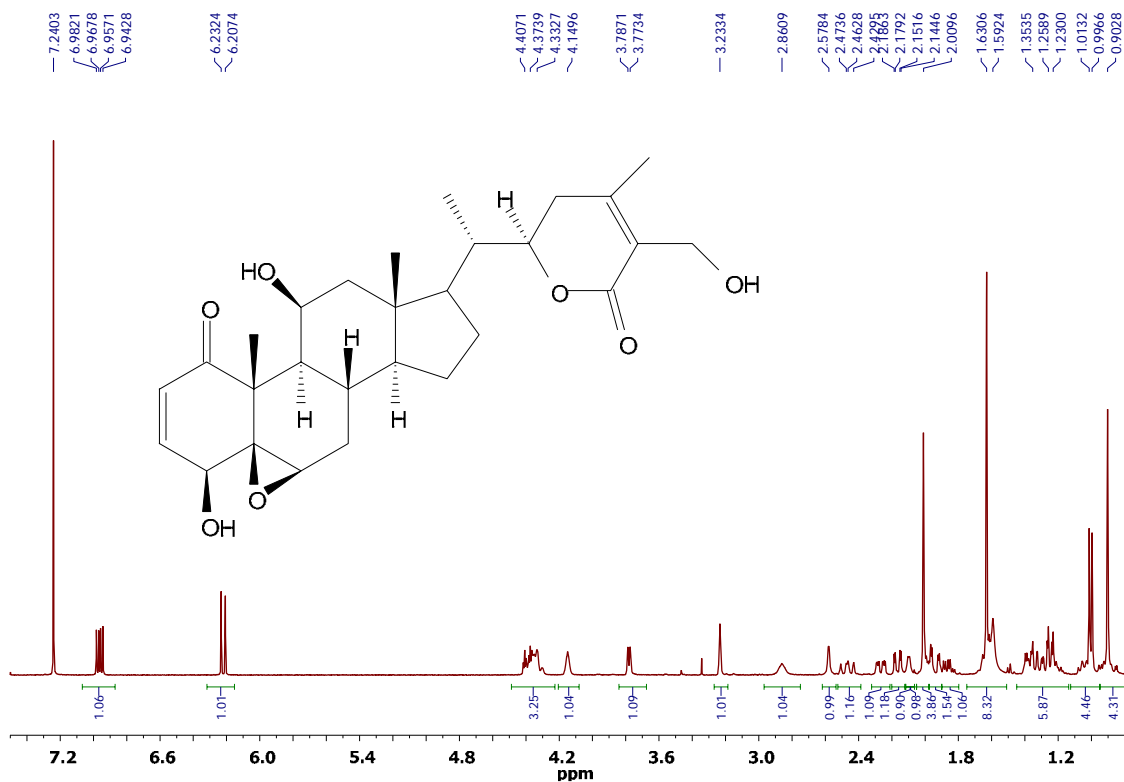
S2b(d) HSQC spectrum of withalongolide B 4-acetate (**2b**)



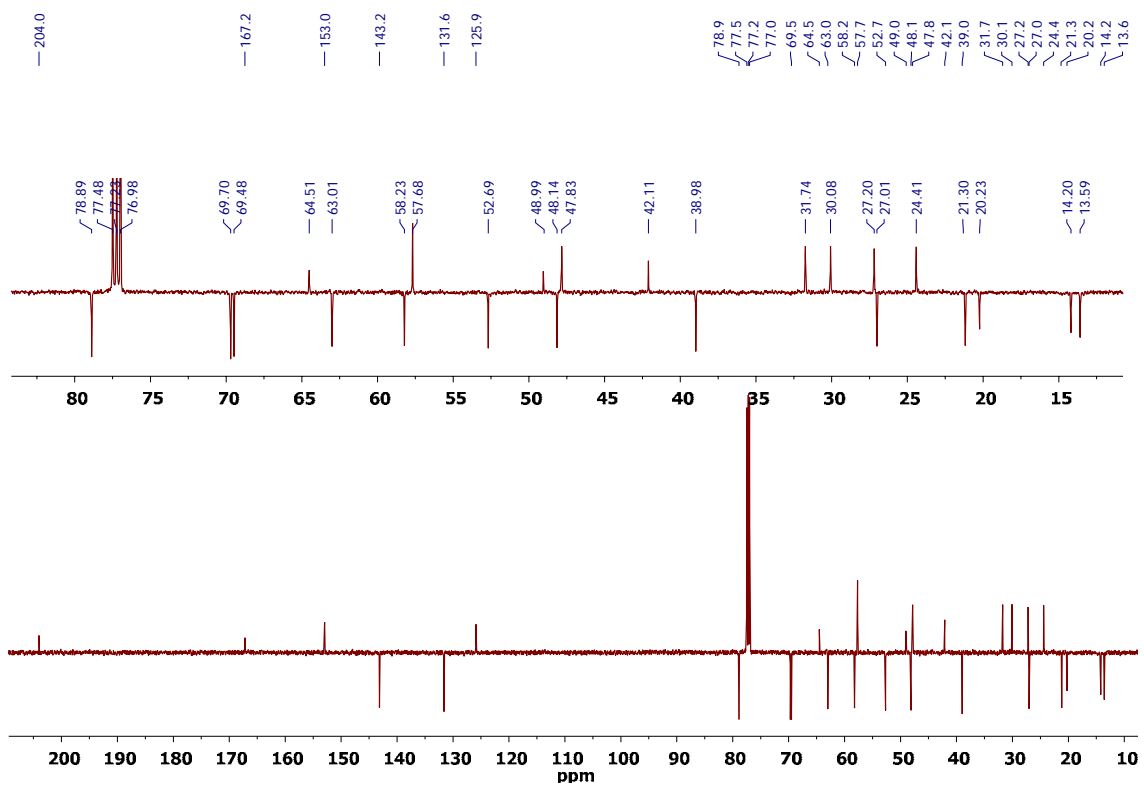
S2b(e) HMBC spectrum of withalongolide B 4-acetate (2b)



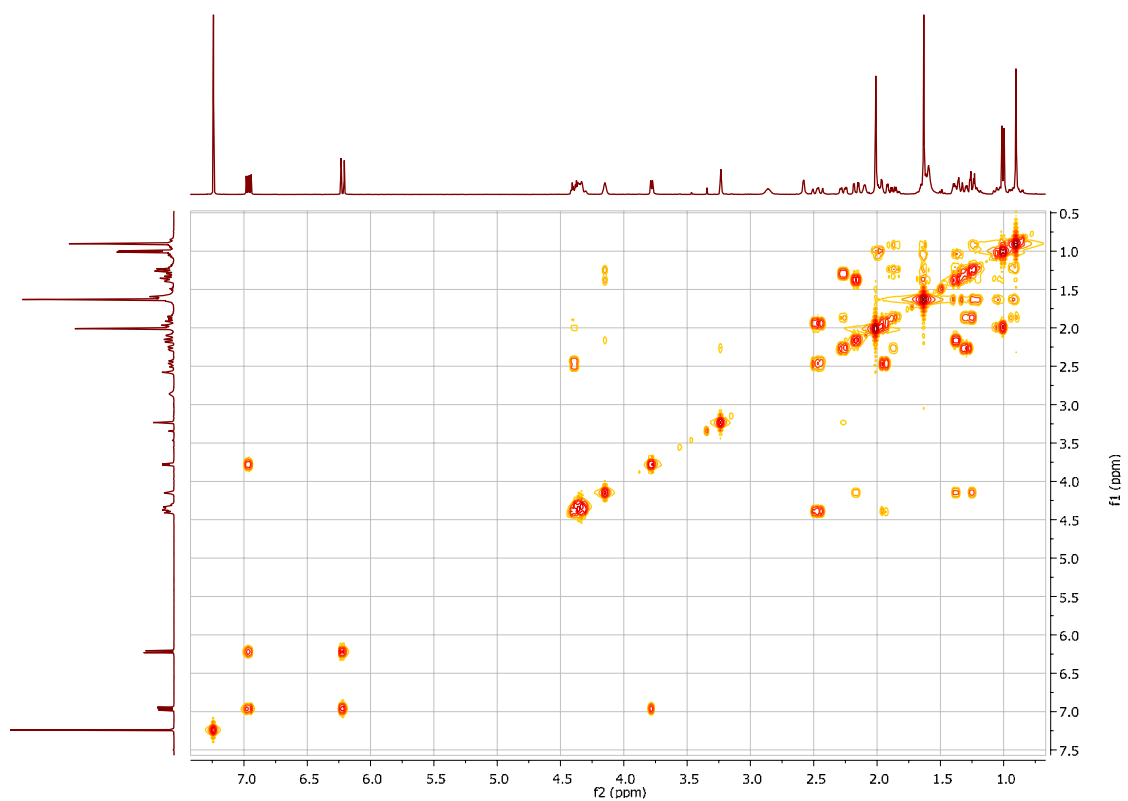
S3(a) ¹H NMR spectrum of withalongolide C (3) in CDCl₃ (400 MHz)



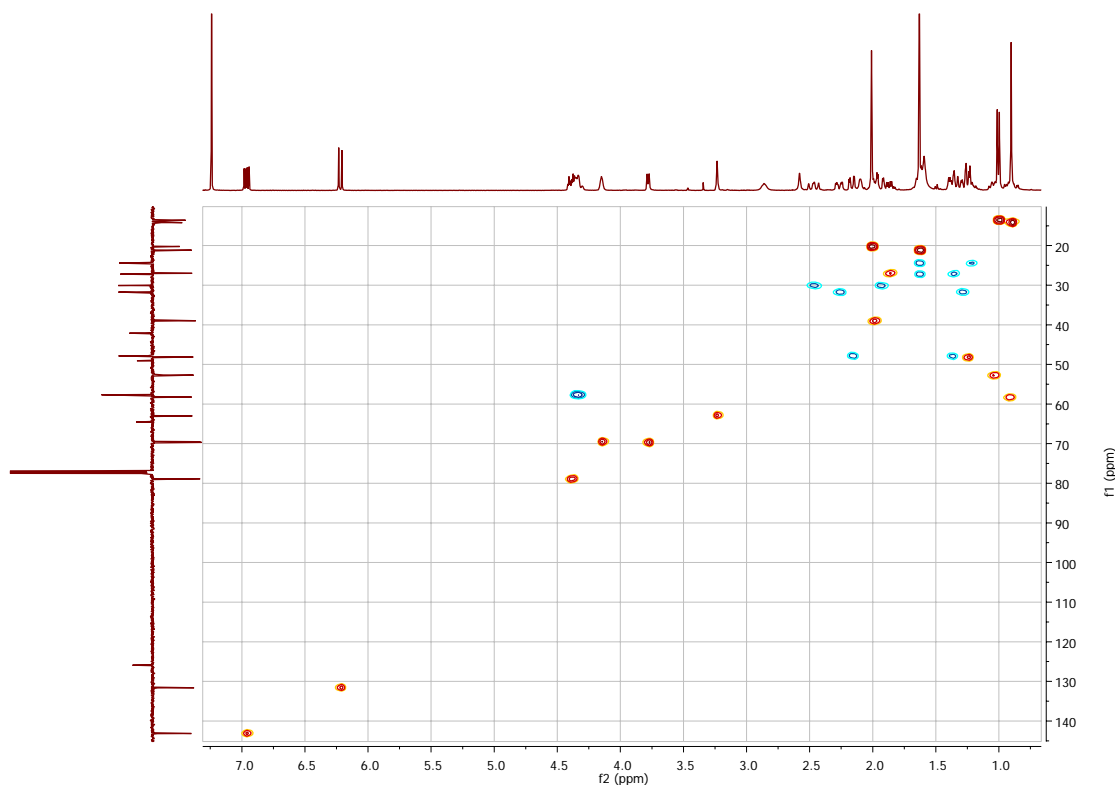
S3(b) ^{13}C APT spectrum of withalongolide C (**3**) (125 MHz)



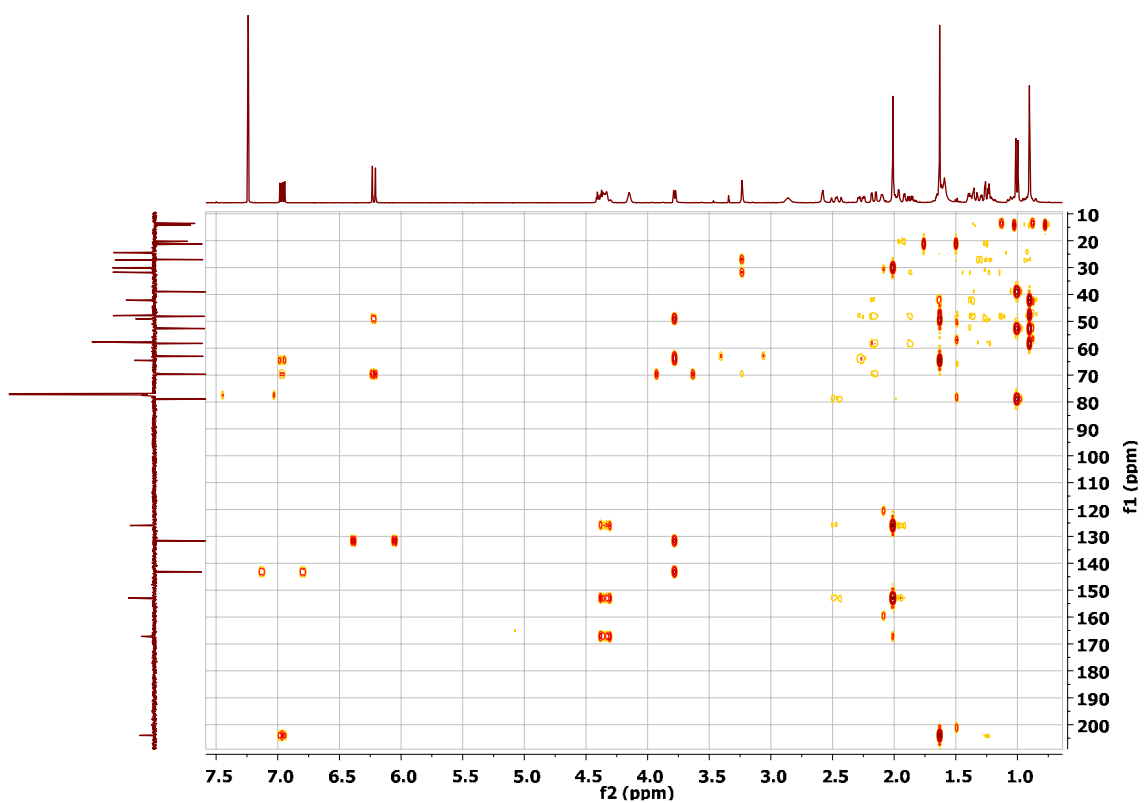
S3(c) ^1H - ^1H COSY spectrum of withalongolide C (**3**)



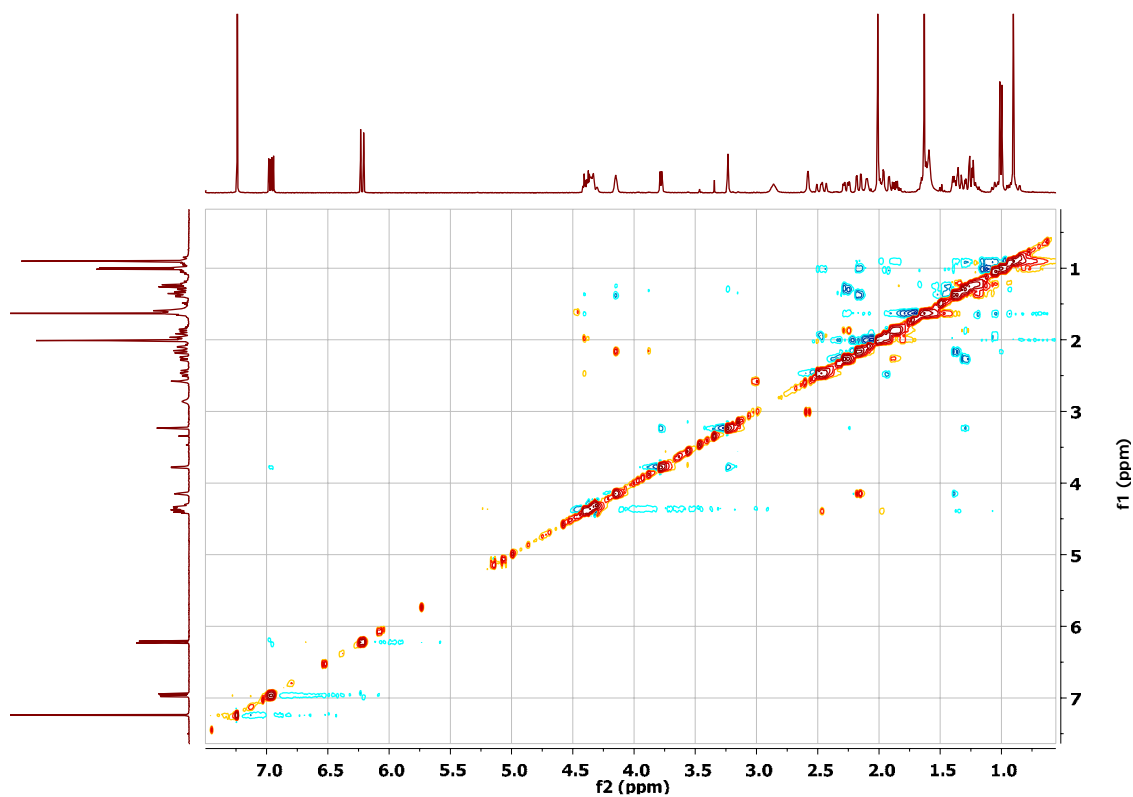
S3(d) HSQC spectrum of withalongolide C (3)



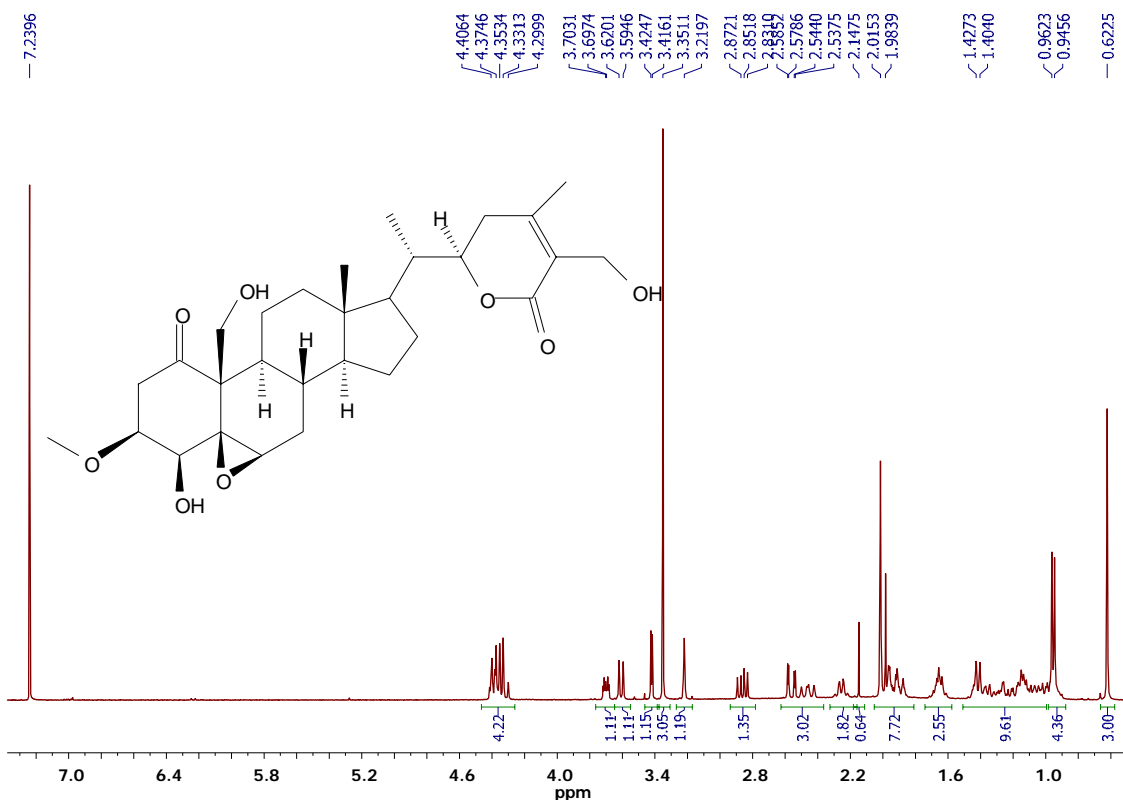
S3(e) HMBC spectrum of withalongolide C (3)



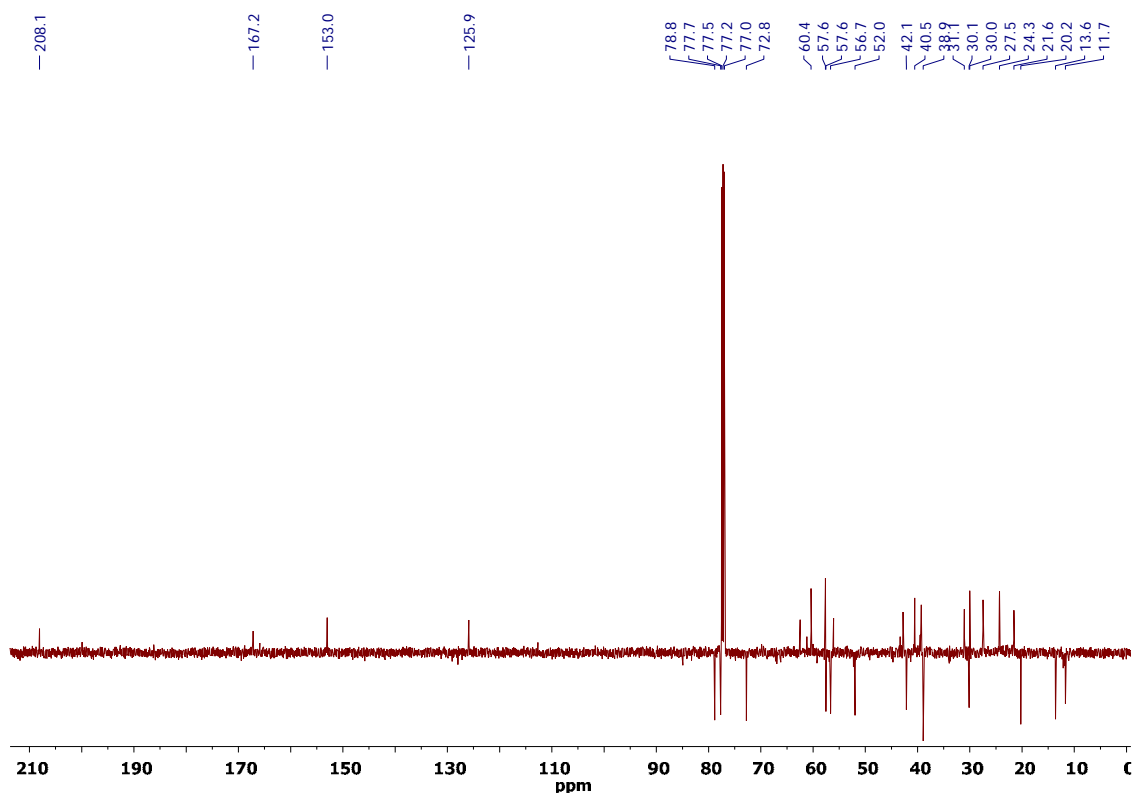
S3(f) NOESY spectrum of withalongolide C (3)



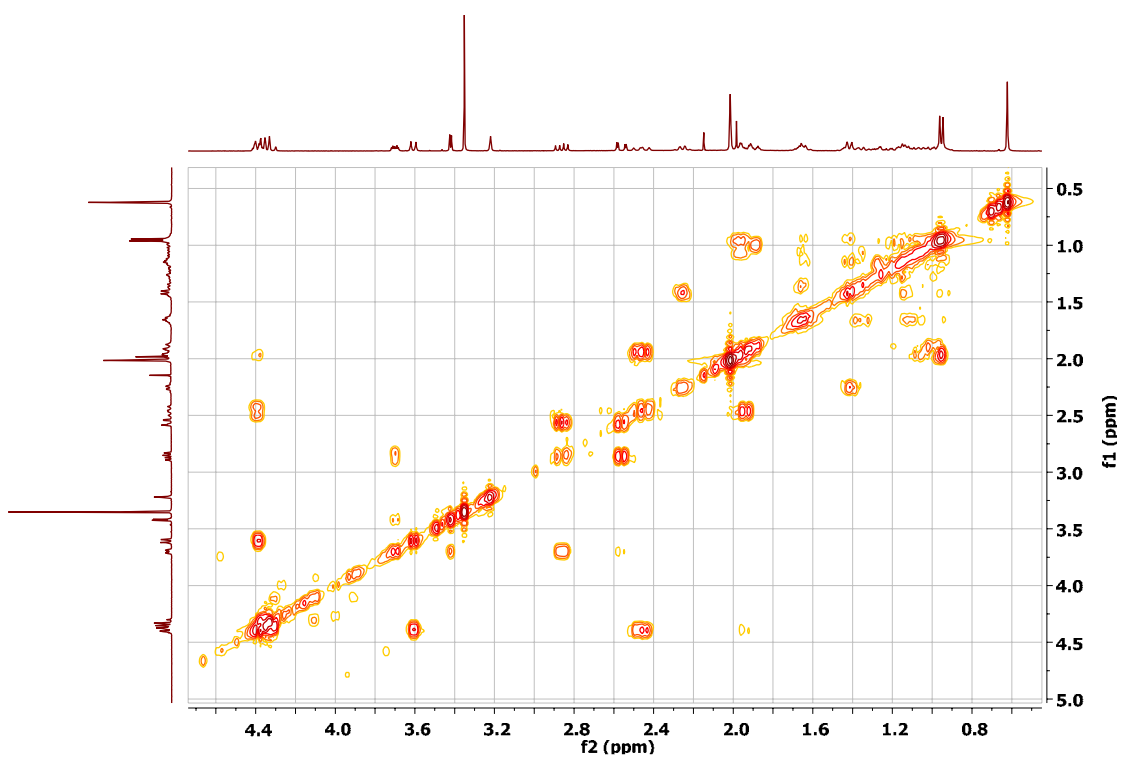
S4(a) ¹H NMR spectrum of withalongolide D (4) in CDCl₃ (400 MHz)



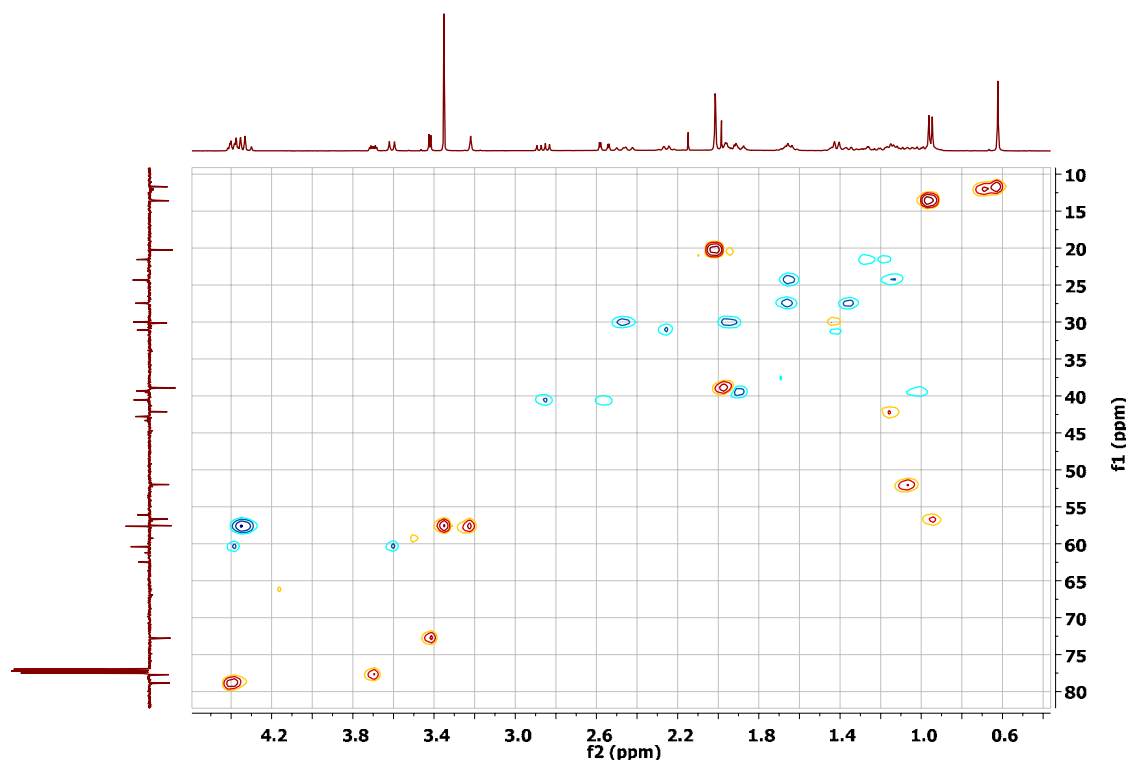
S4(b) ^{13}C APT spectrum of withalongolide D (**4**) (125 MHz)



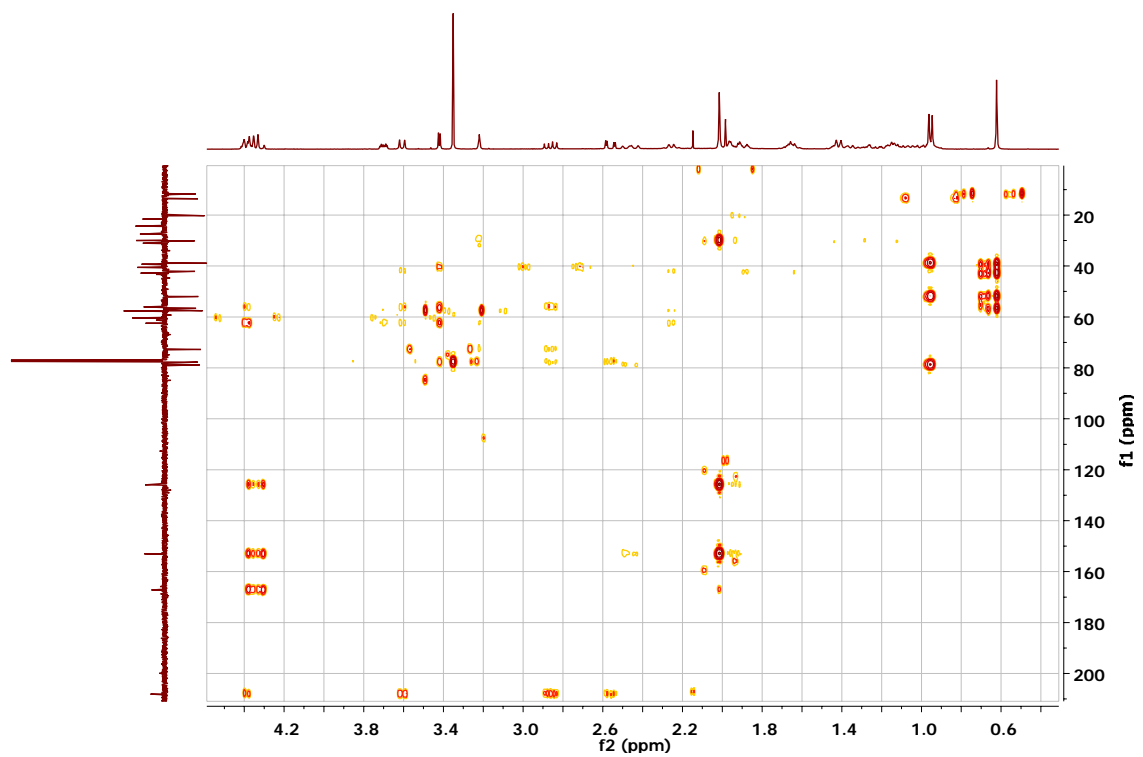
S4(c) ^1H - ^1H COSY spectrum of withalongolide D (**4**)



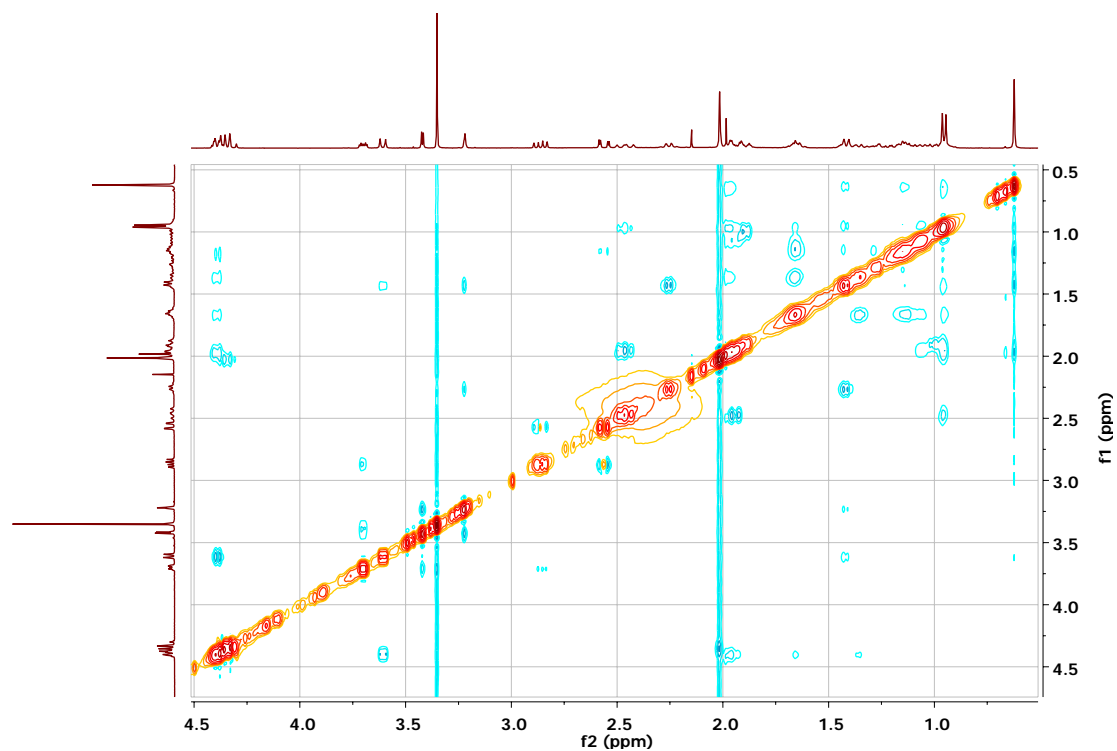
S4(d) HSQC spectrum of withalongolide D (4)



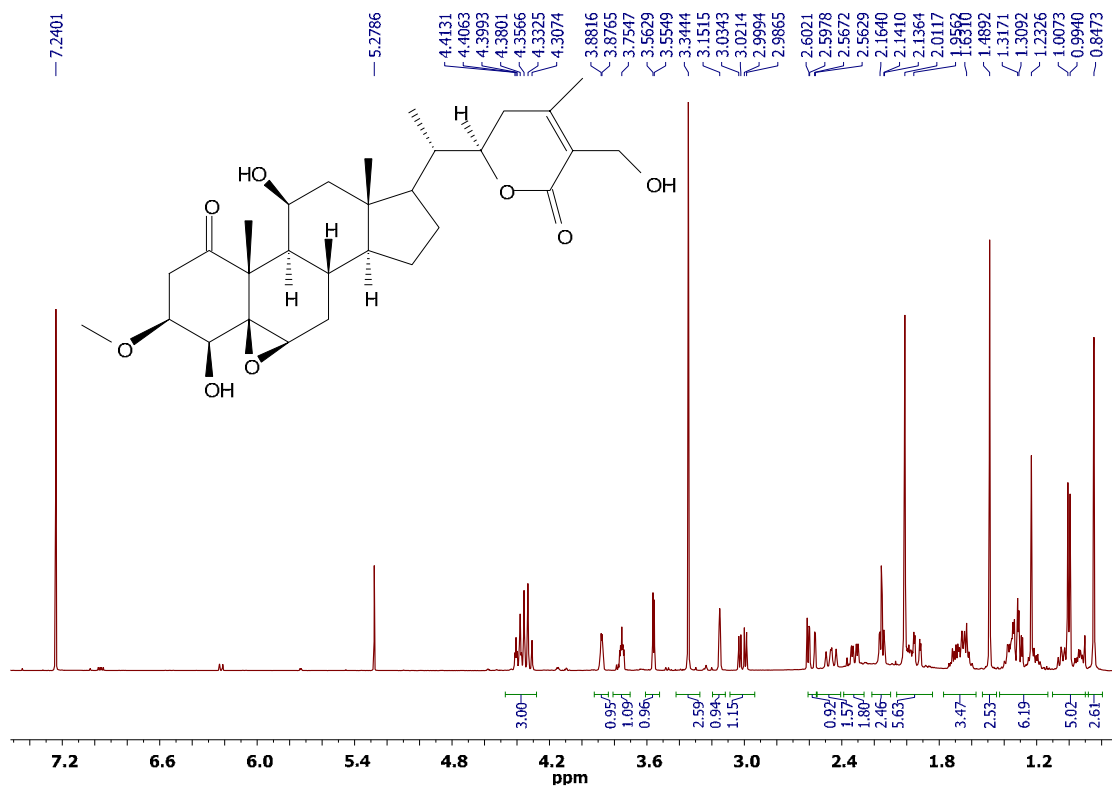
S4(e) HMBC spectrum of withalongolide D (4)



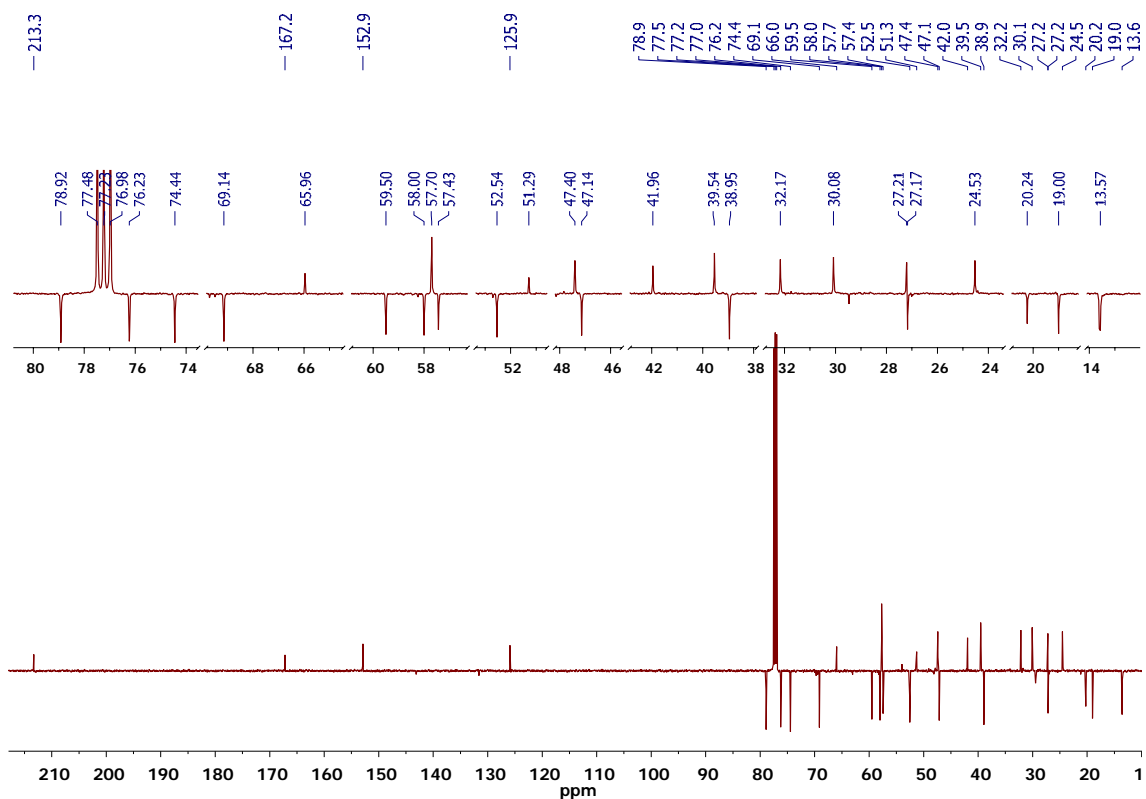
S4(f) NOESY spectrum of withalongolide D (**4**)



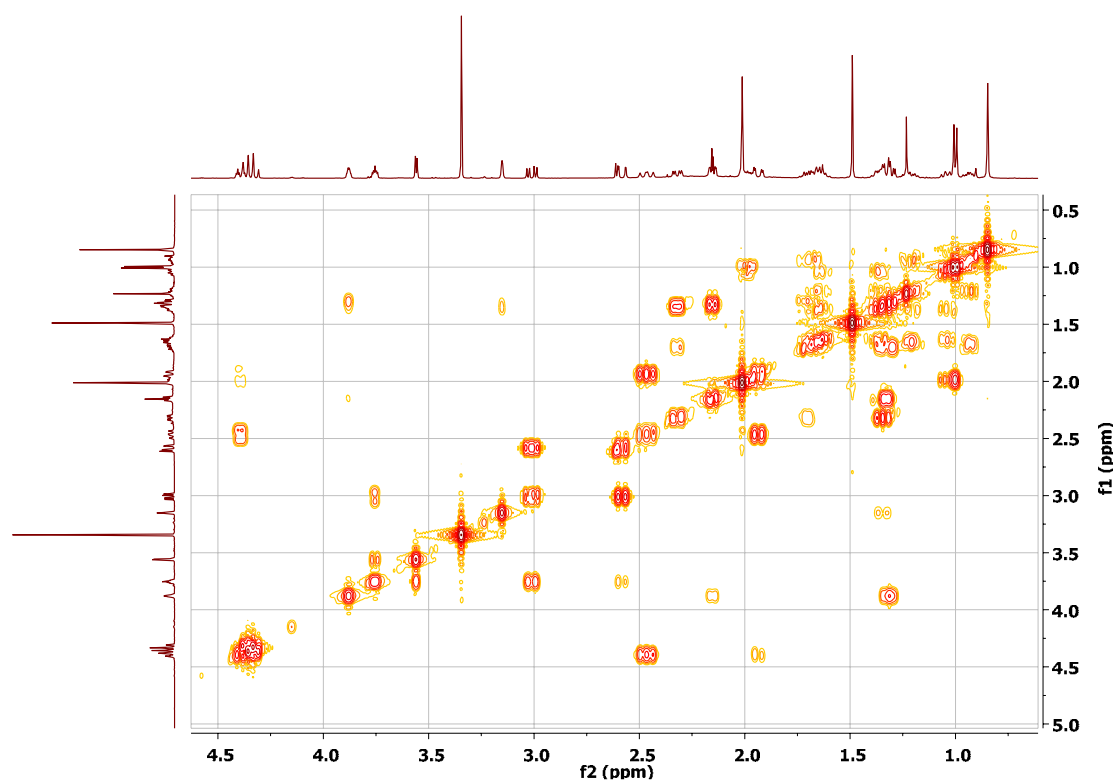
S5(a) ^1H NMR spectrum of withalongolide E (**5**) in CDCl_3 (500 MHz)



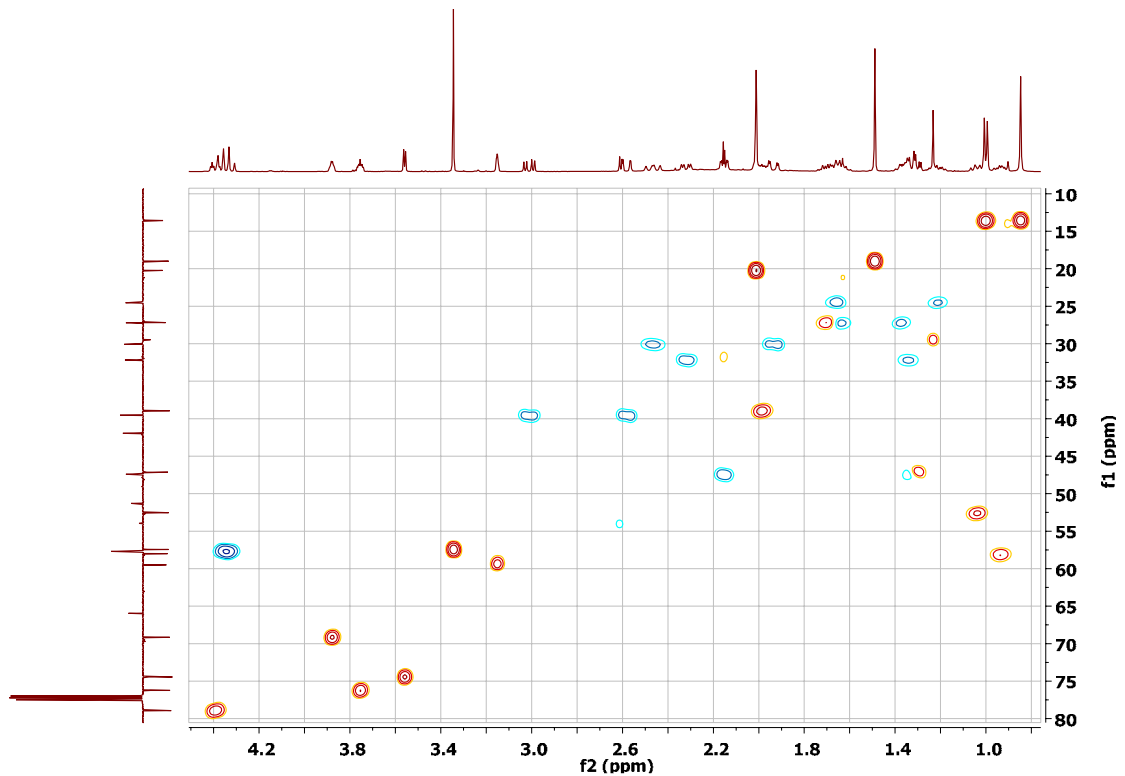
S5(b) ^{13}C APT spectrum of withalongolide E (**5**) (125 MHz)



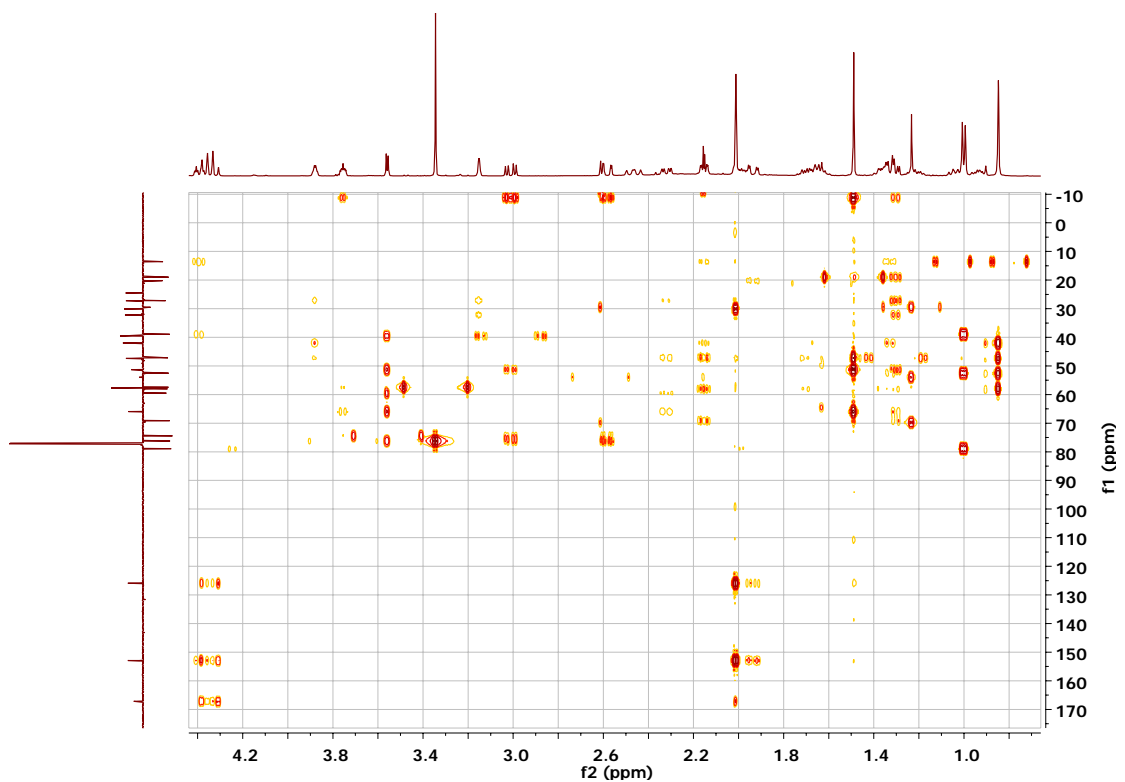
S5(c) ^1H - ^1H COSY spectrum of withalongolide E (**5**)



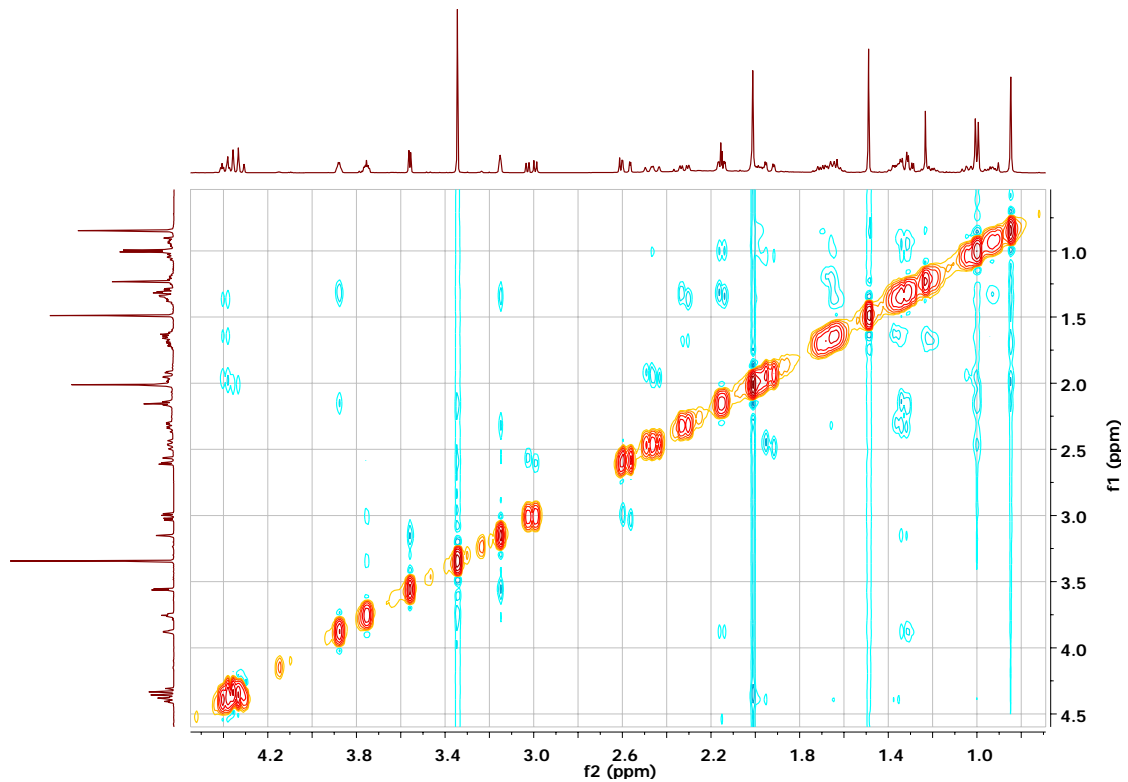
S5(d) HSQC spectrum of withalongolide E (5)



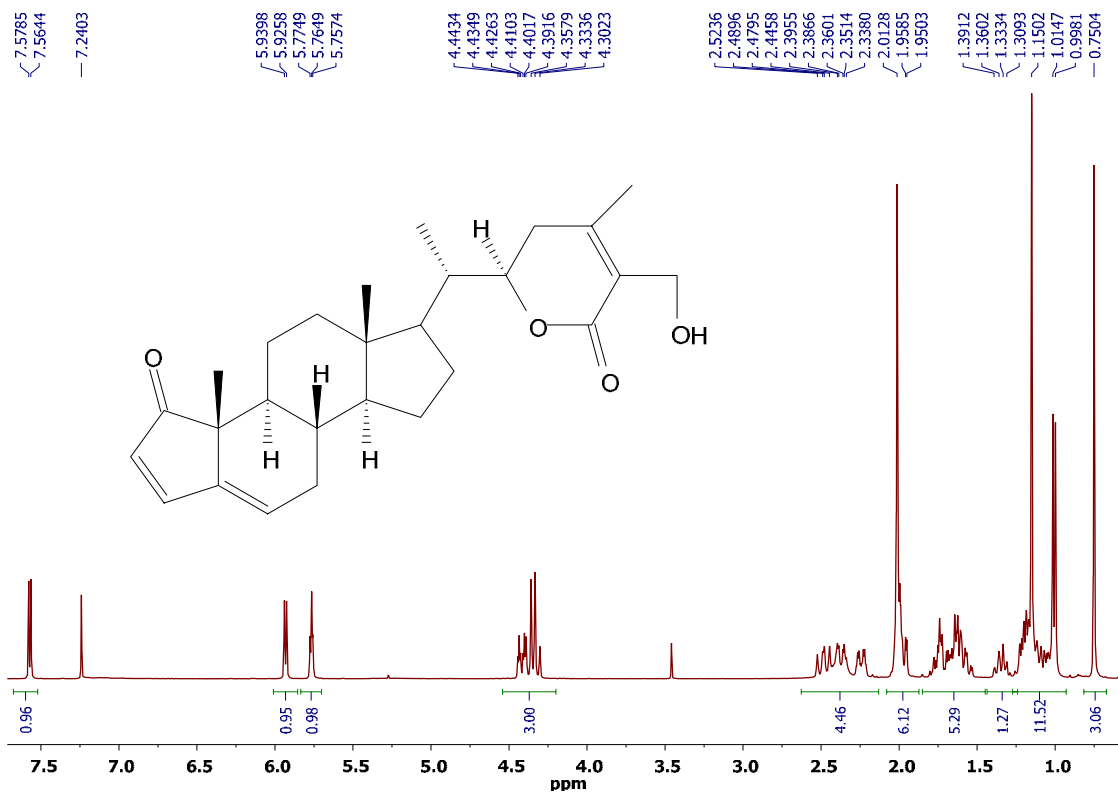
S5(e) HMBC spectrum of withalongolide E (5)



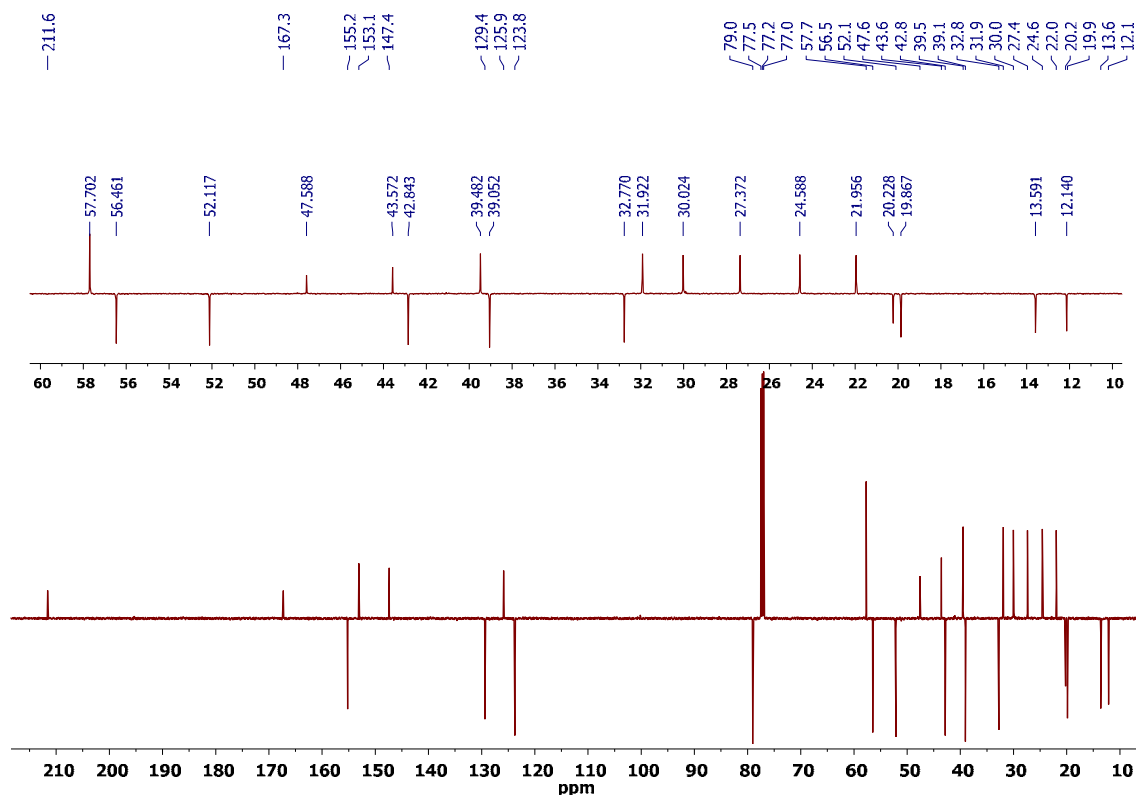
S5(f) NOESY spectrum of withalongolide E (5)



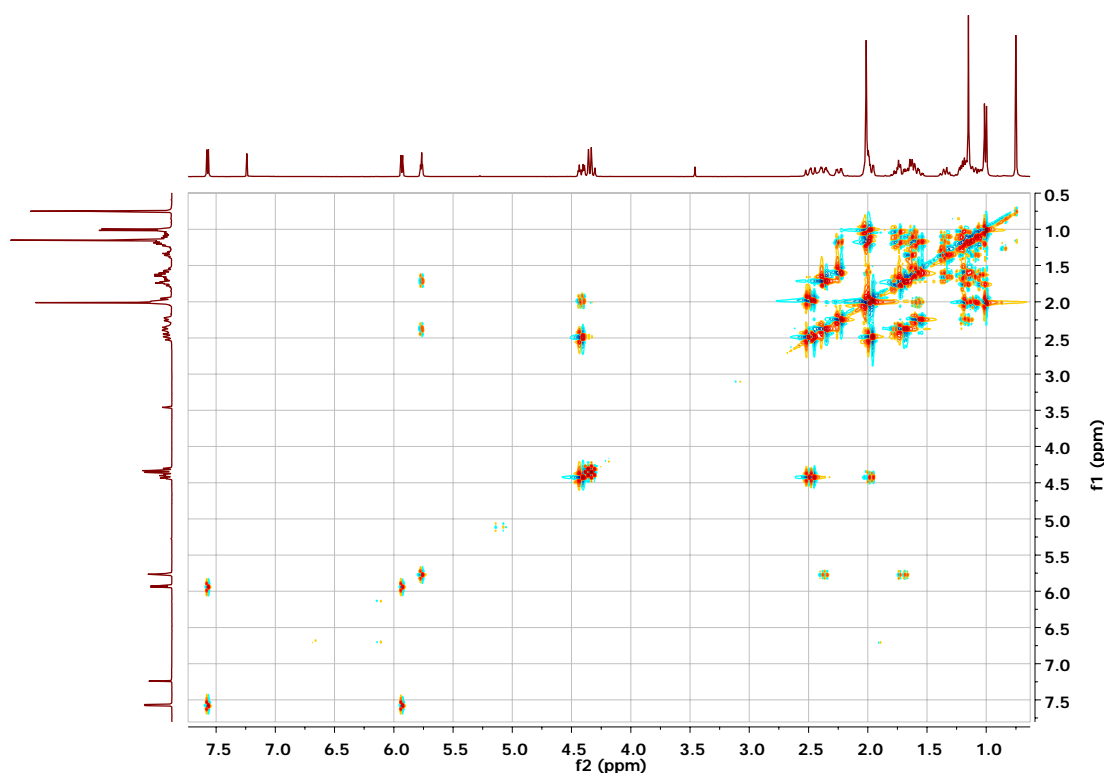
S6(a) ¹H NMR spectrum of withalongolide F (6) in CDCl₃ (400 MHz)



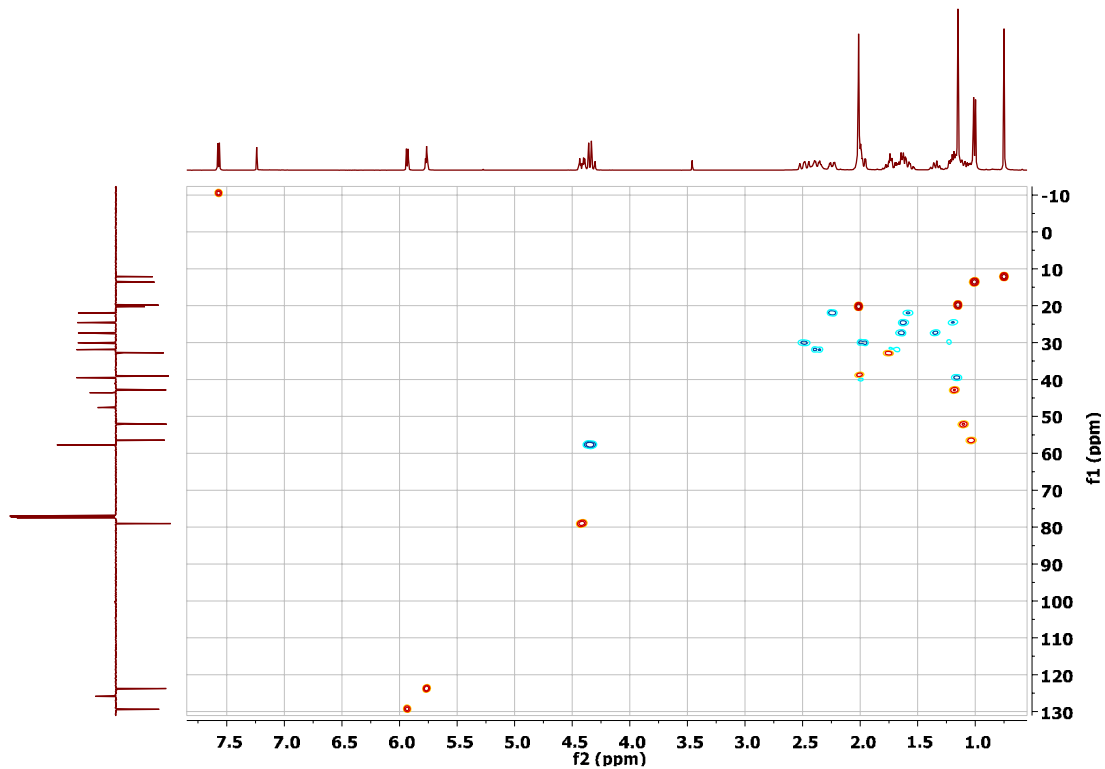
S6(b) ^{13}C APT spectrum of withalongolide F(6) (125 MHz)



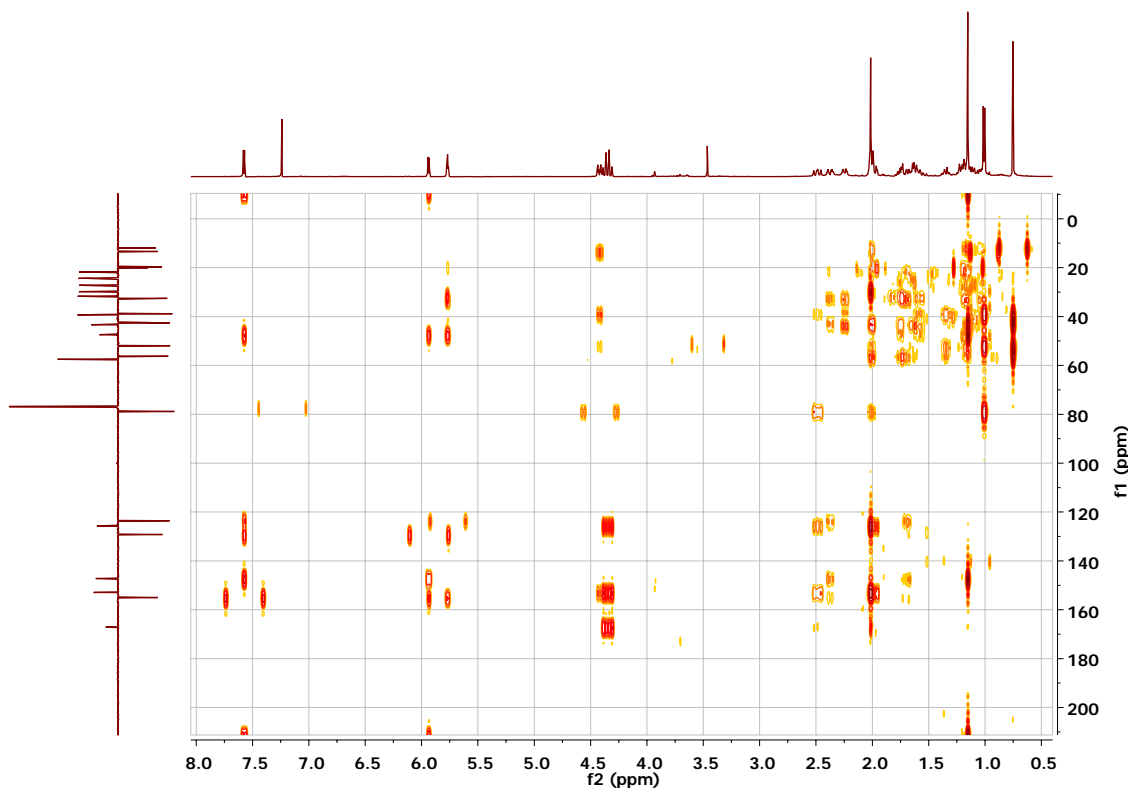
S6(c) DQF-COSY spectrum of withalongolide F (6)



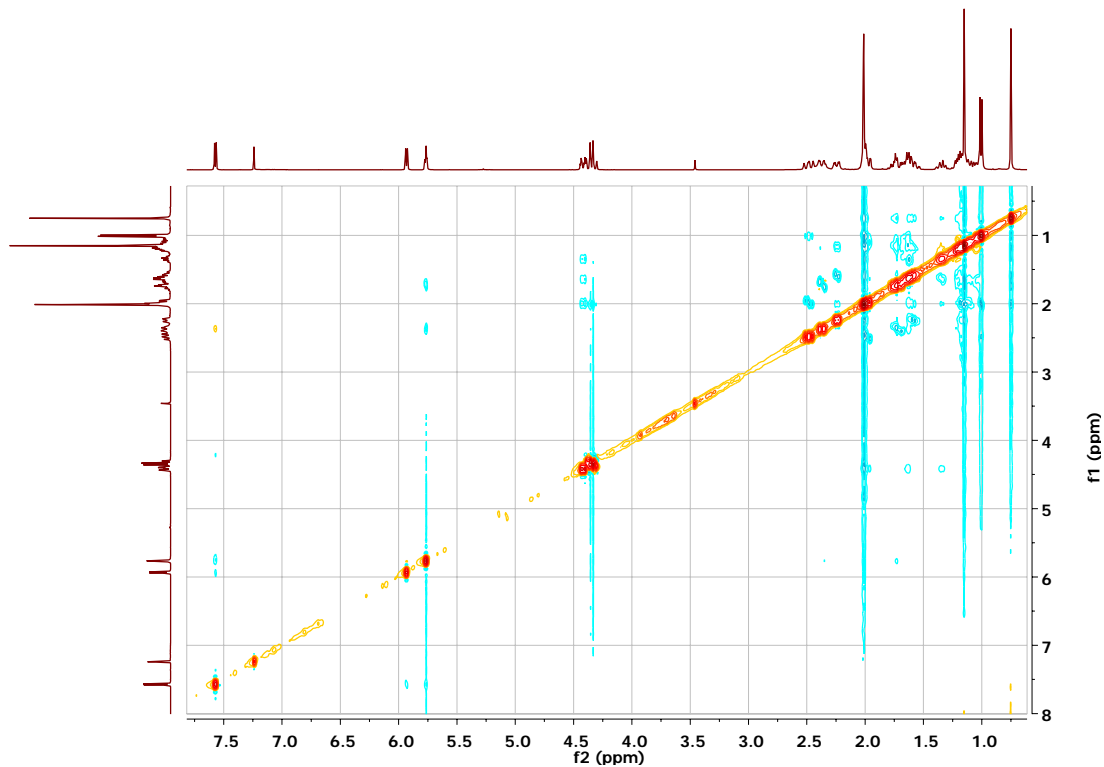
S6(d) HSQC spectrum of withalongolide F (6)



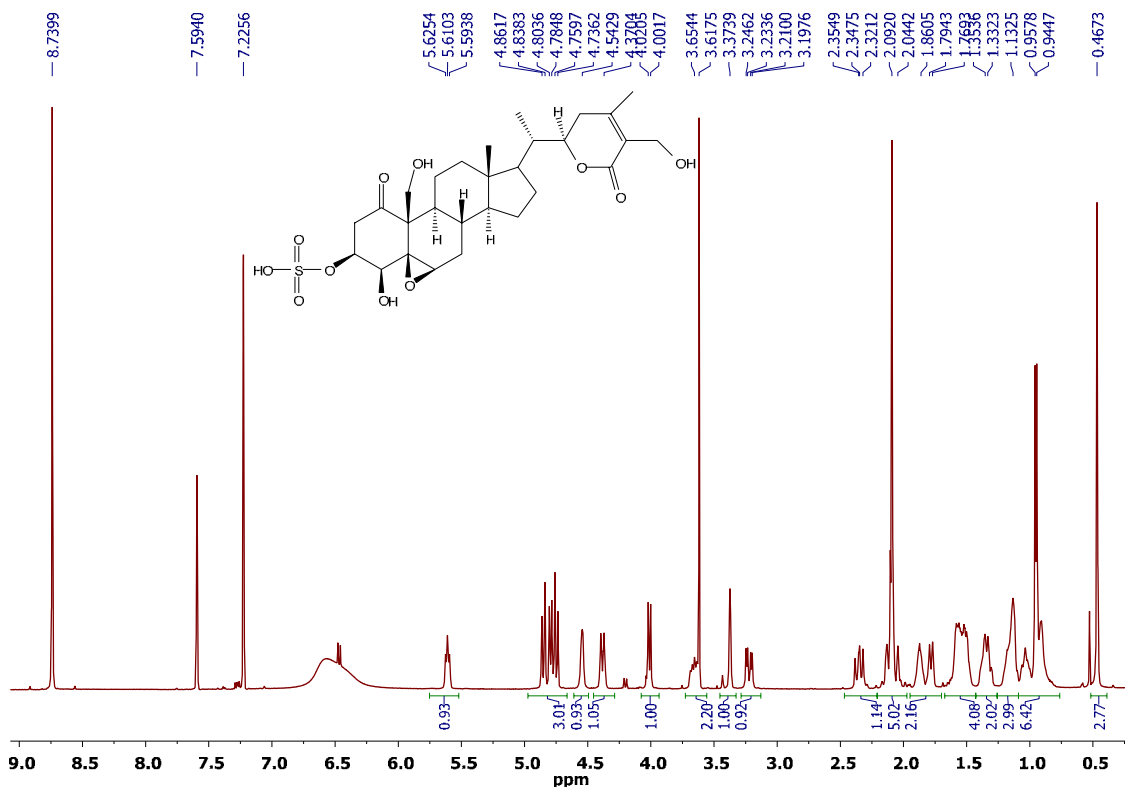
S6(e) HMBC spectrum of withalongolide F (6)



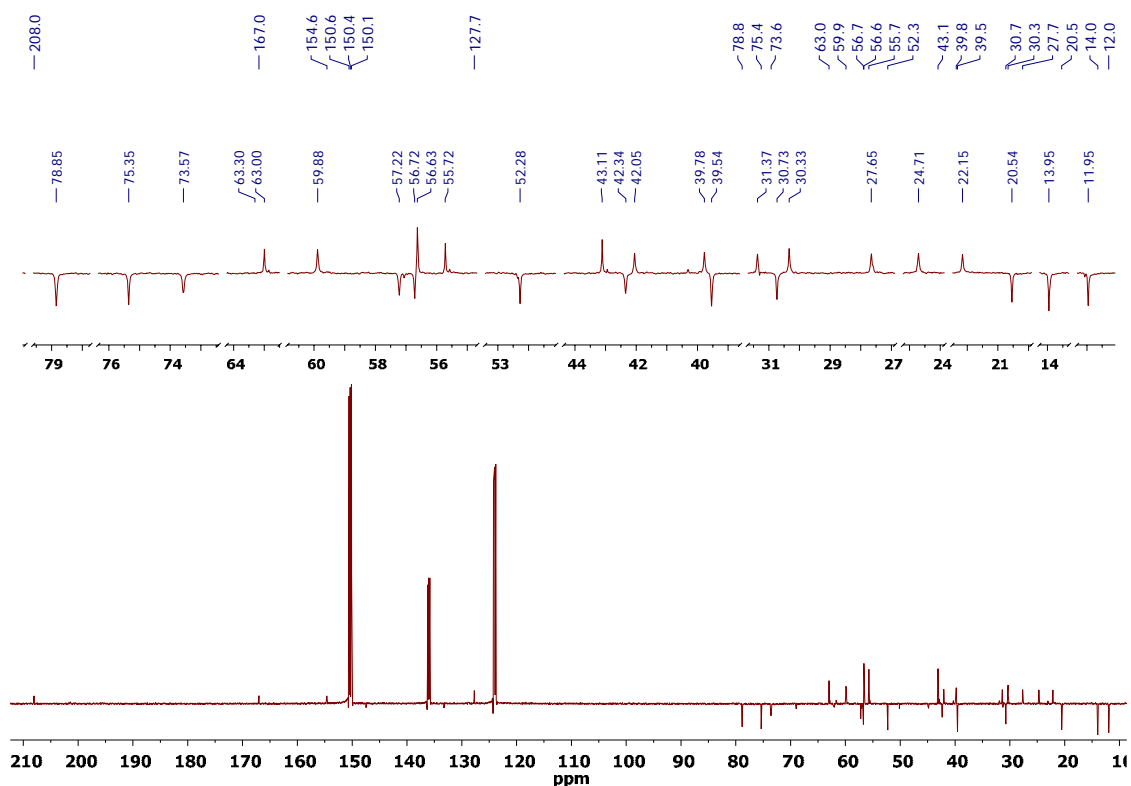
S6(f) NOESY spectrum of withalongolide F (6)



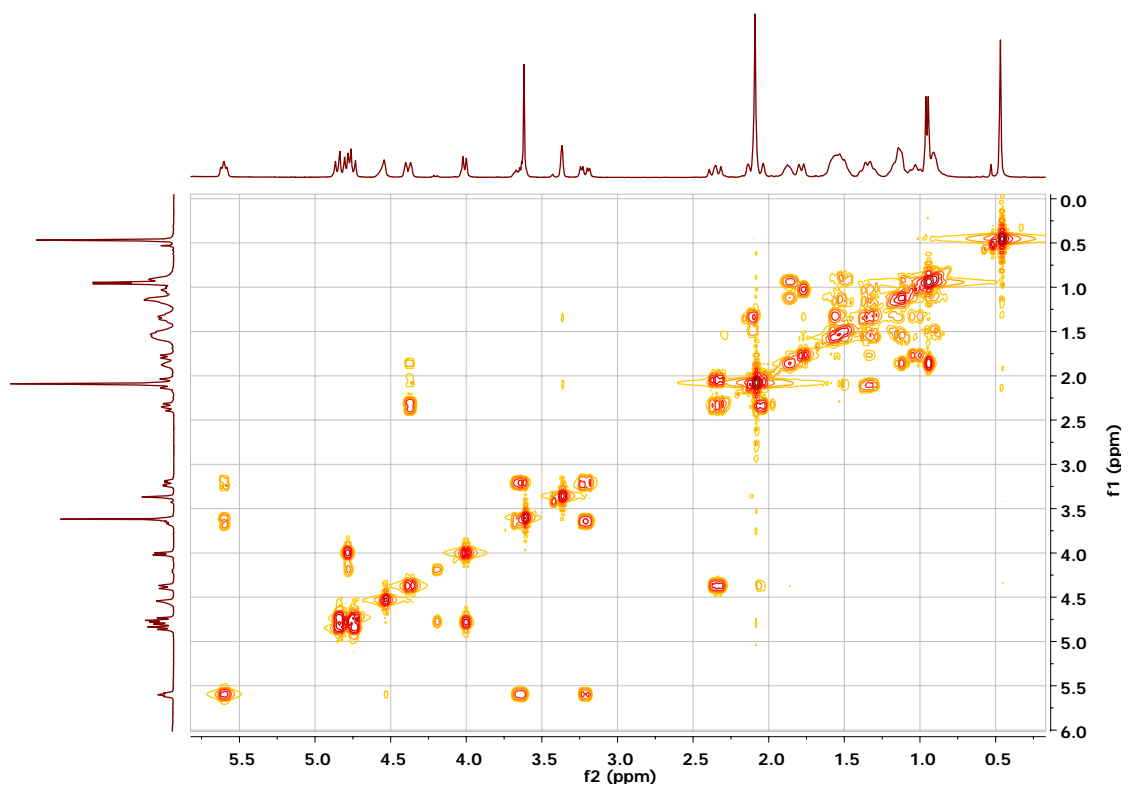
S7(a) ^1H NMR spectrum of withalongolide G (7) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



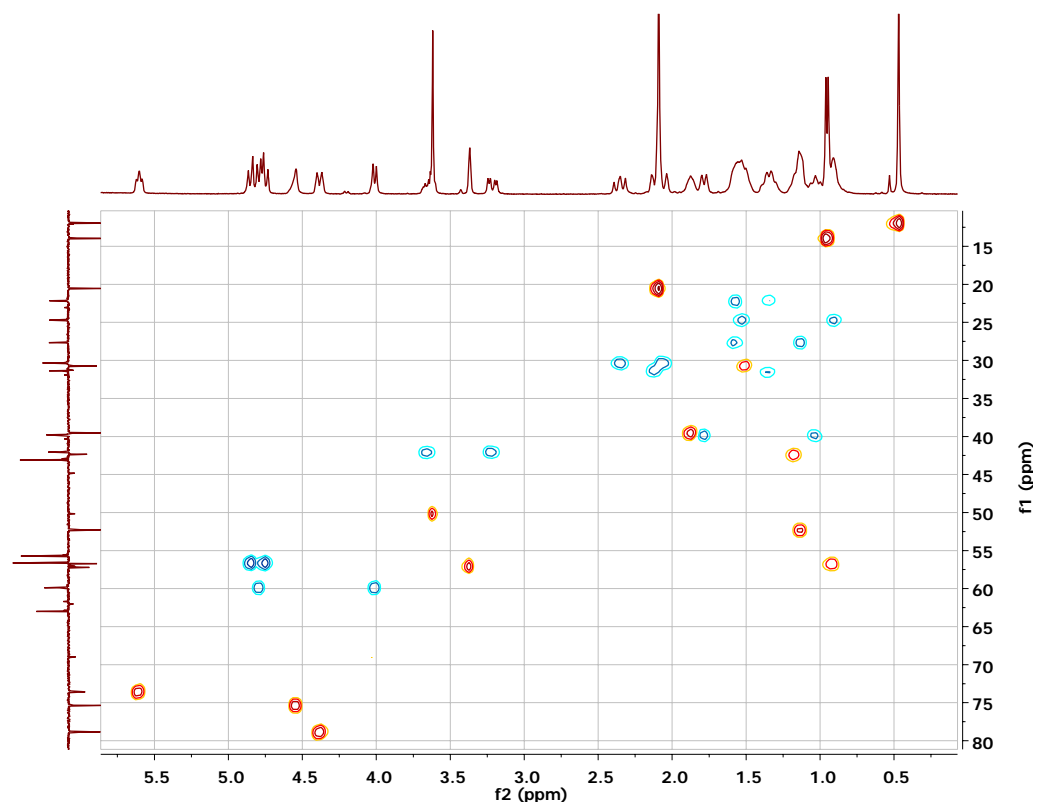
S7(b) ^{13}C APT spectrum of withalongolide G (7) (125 MHz)



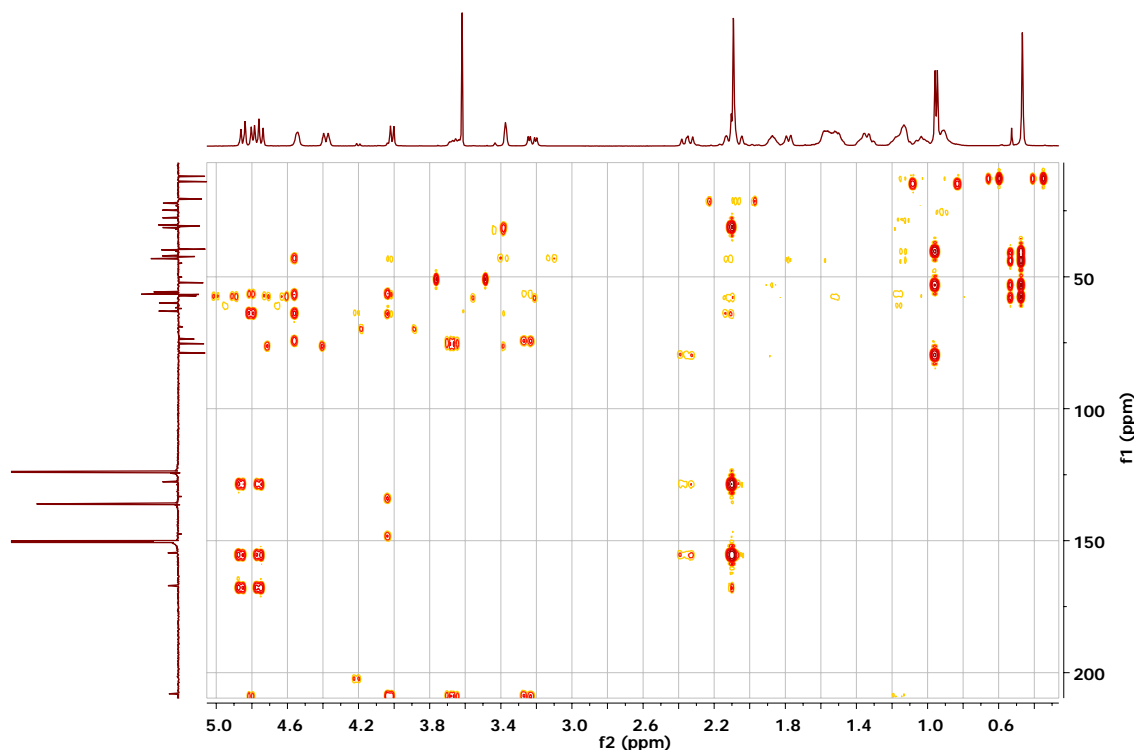
S7(c) ^1H - ^1H COSY spectrum of withalongolide G (7)



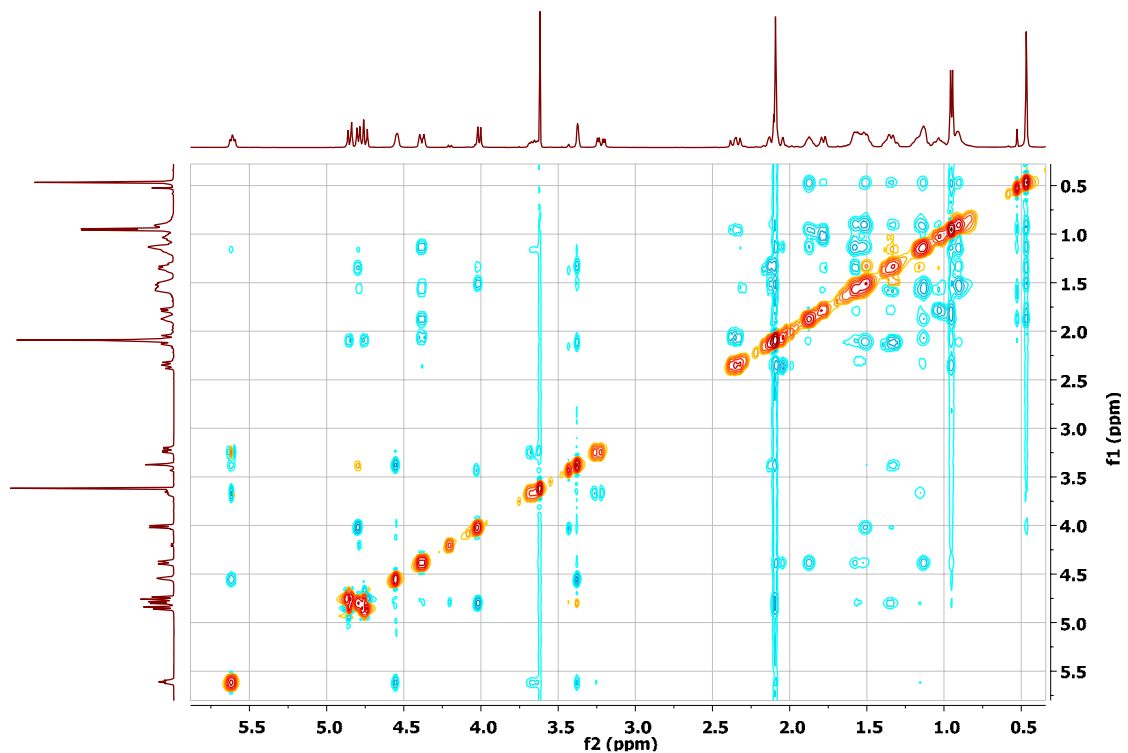
S7(d) HSQC spectrum of withalongolide G (7)



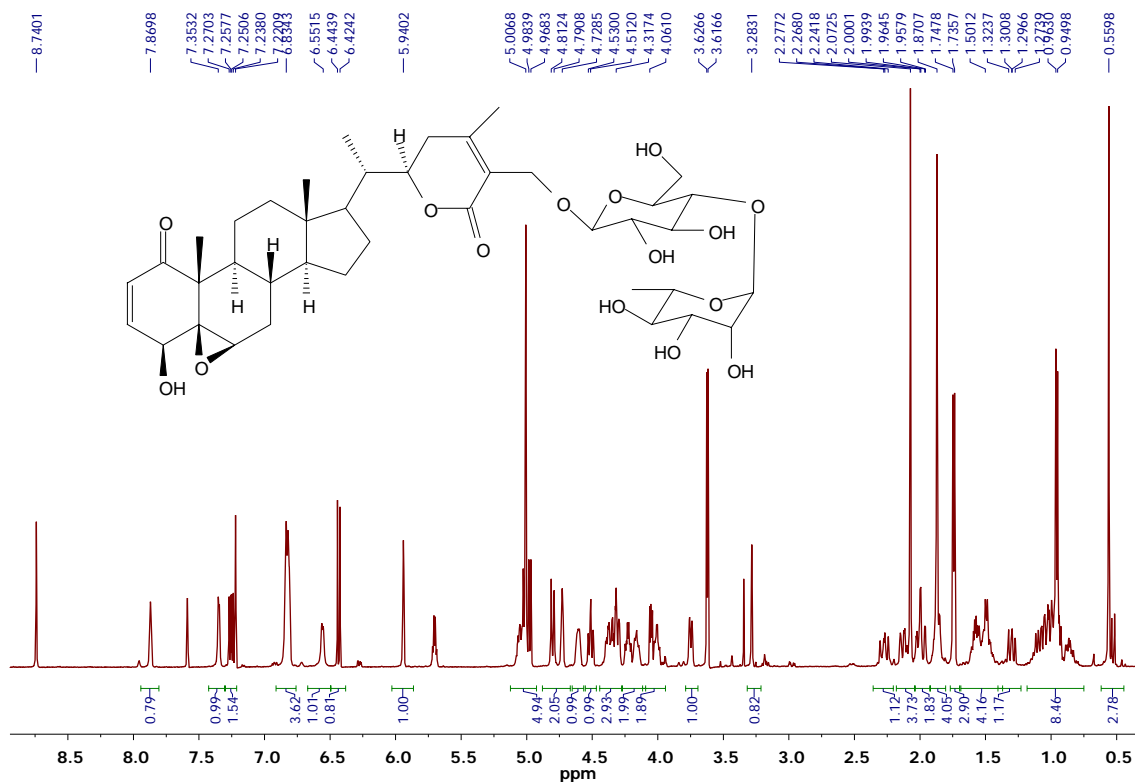
S7(e) HMBC spectrum of withalongolide G (7)



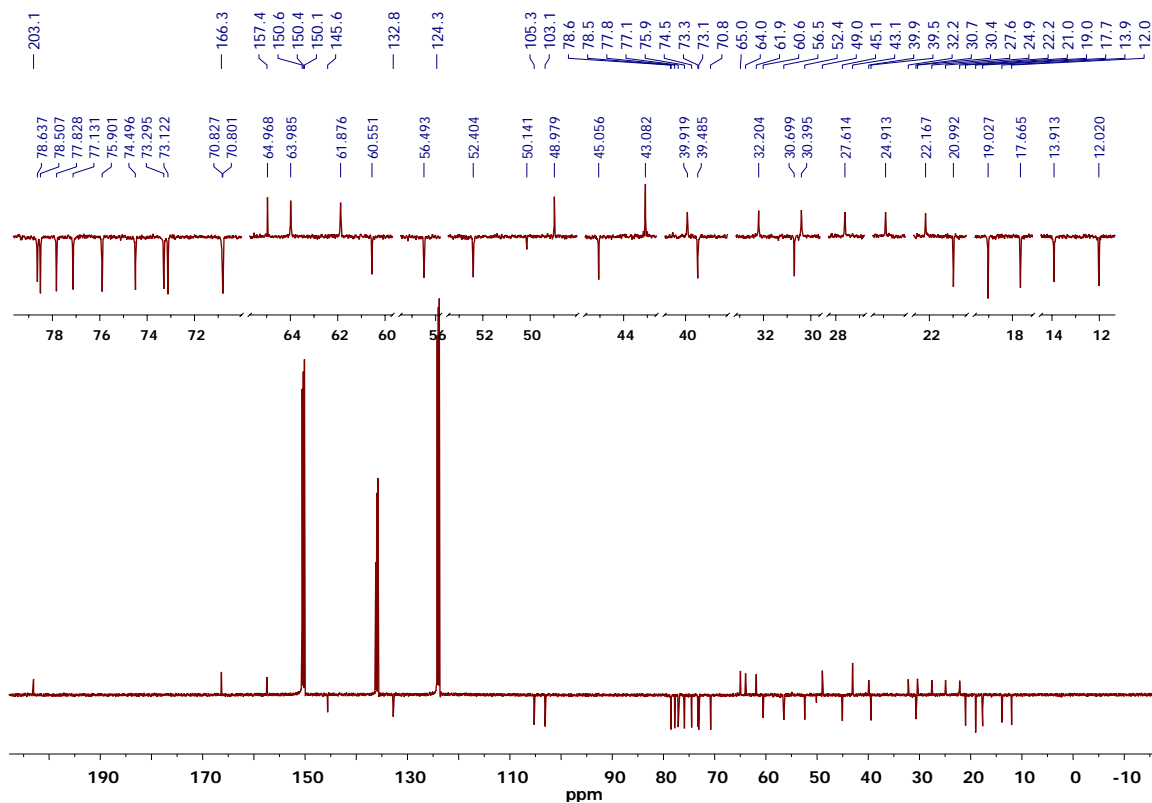
S7(f) NOESY spectrum of withalongolide G (7)



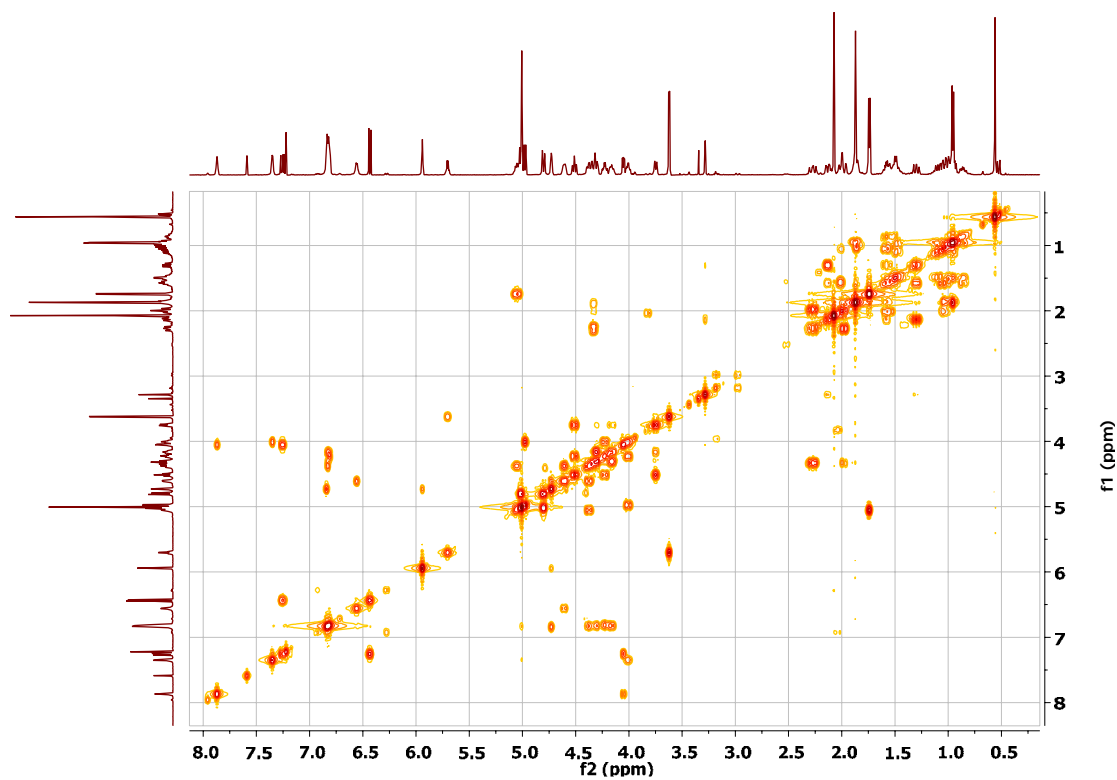
S8(a) ^1H NMR spectrum of withalongolide H (8) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



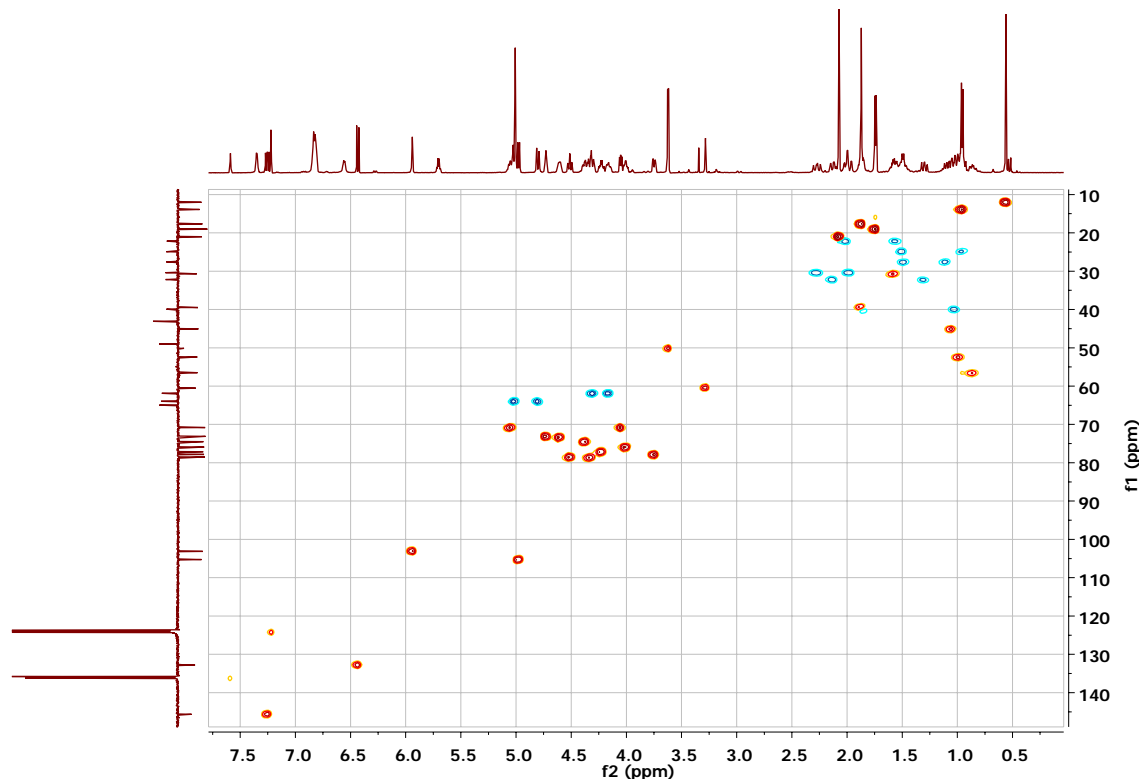
S8(b) ^{13}C APT spectrum of withalongolide H (**8**) (125 MHz)



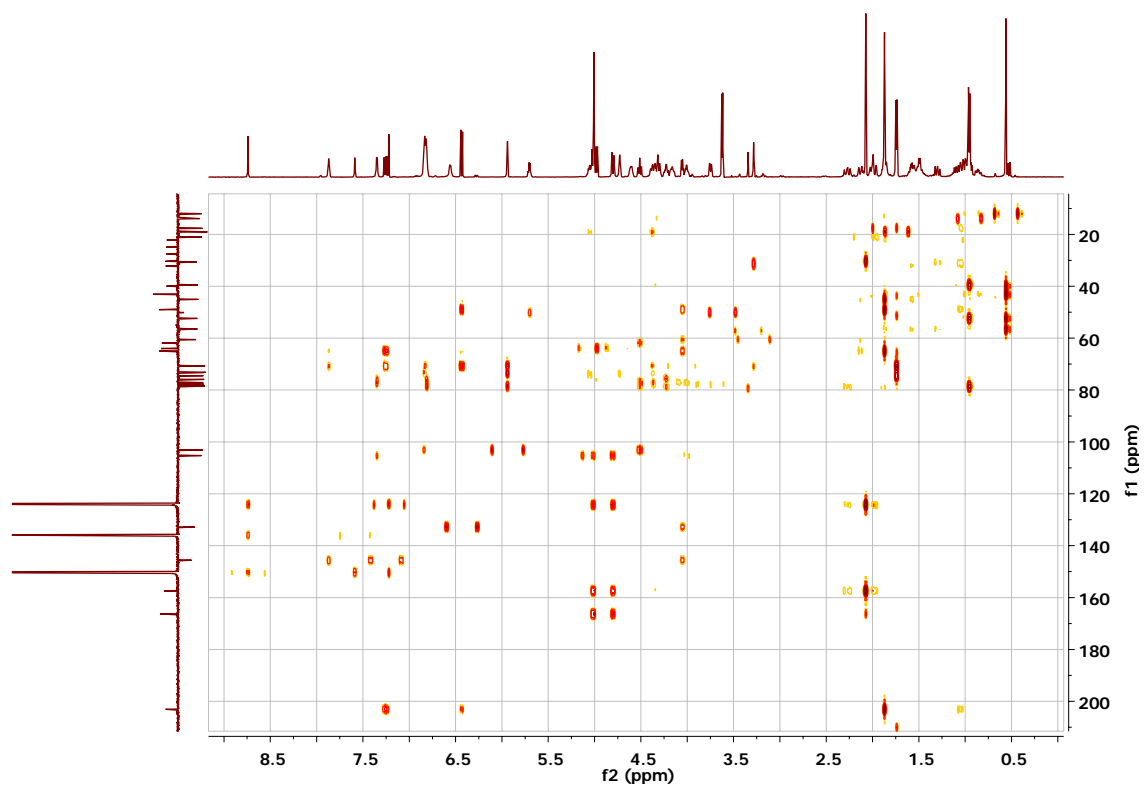
S8(c) ^1H - ^1H COSY spectrum of withalongolide H (**8**)



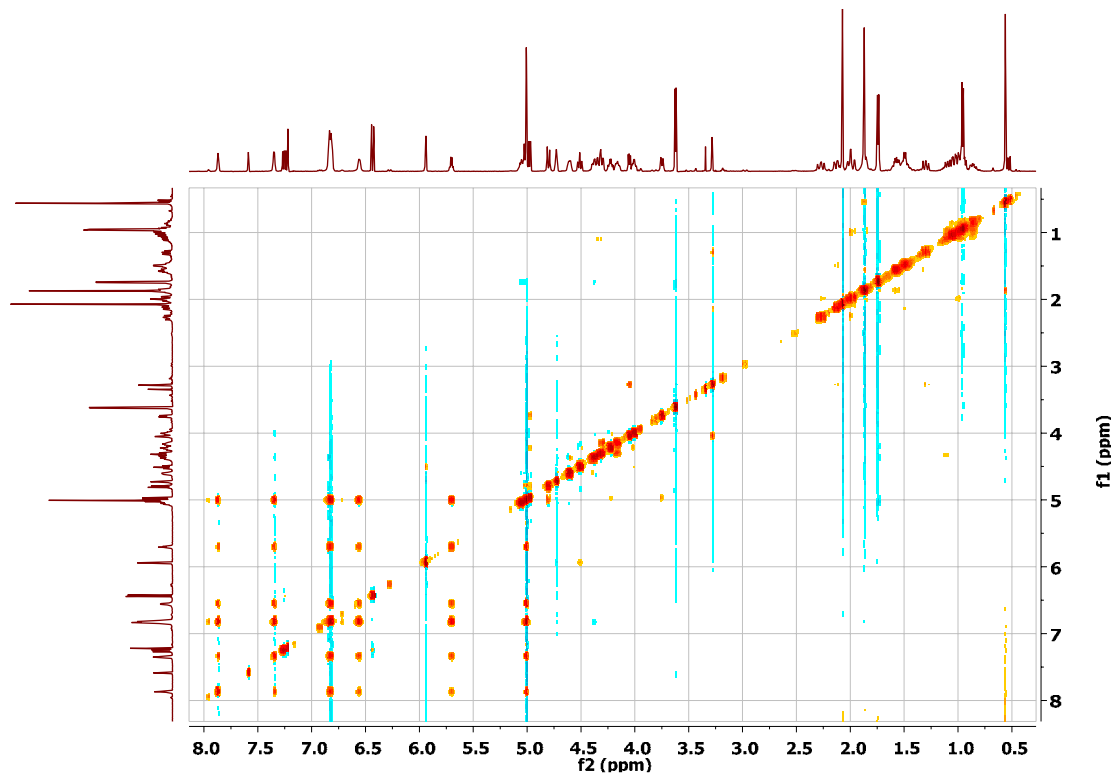
S8(d) HSQC spectrum of withalongolide H (8)



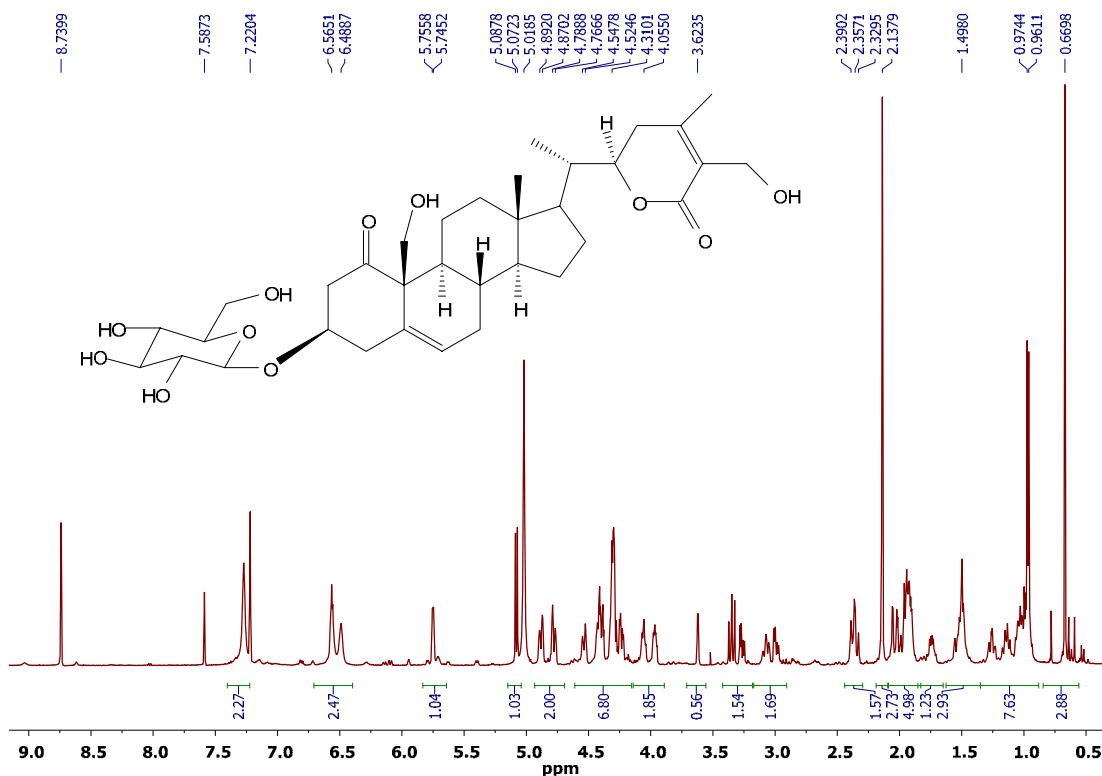
S8(e) HMBC spectrum of withalongolide H (8)



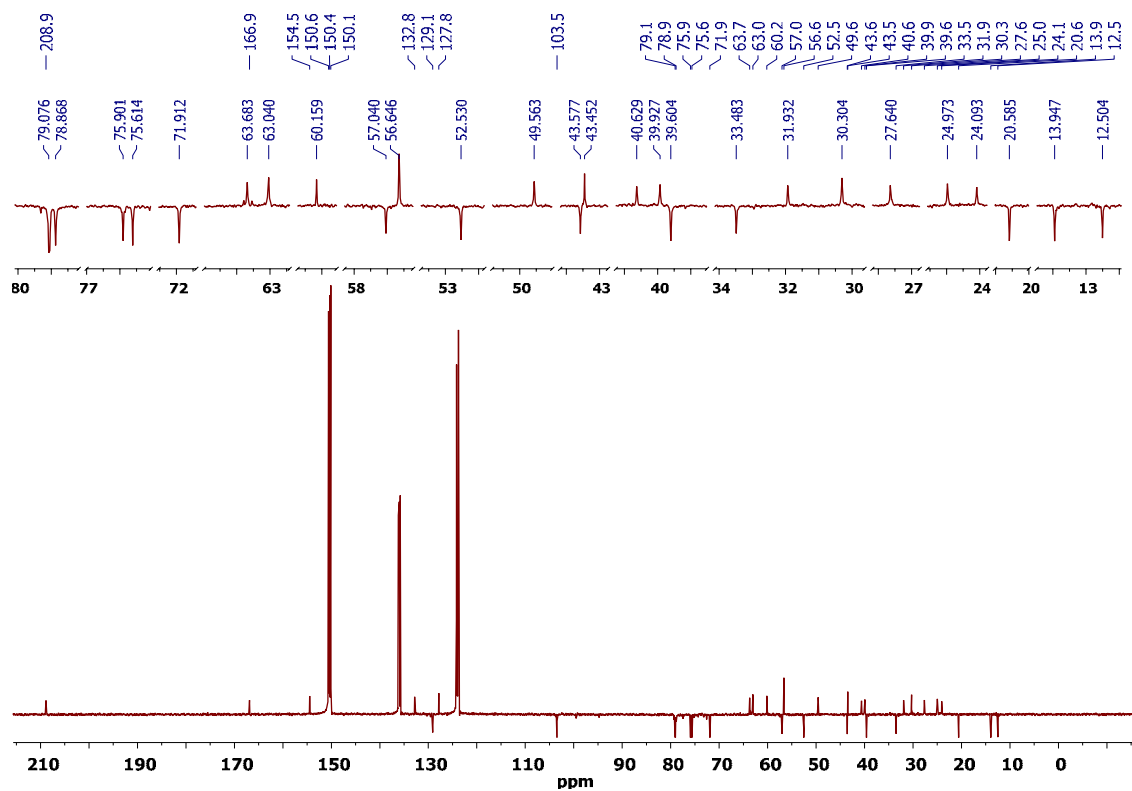
S8(f) NOESY spectrum of withalongolide H (8)



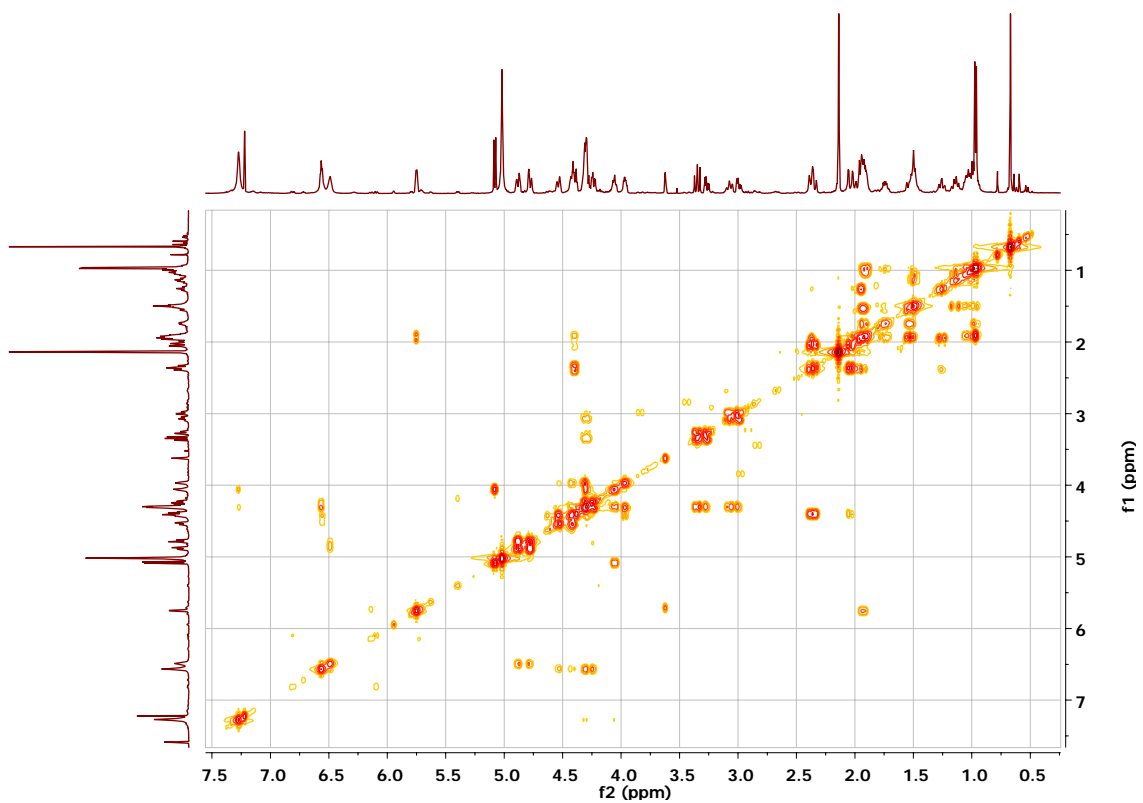
S9(a) ¹H NMR spectrum of withalongolide I (9) in C₅D₅N (500 MHz)



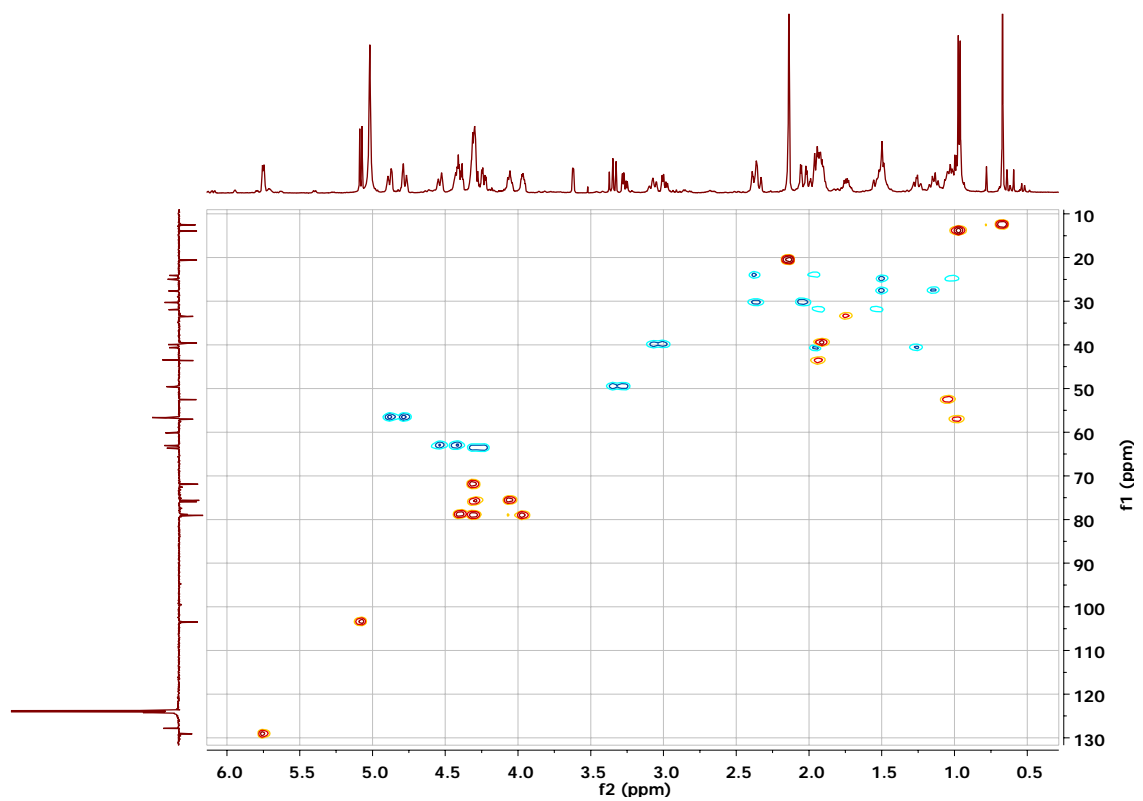
S9(b) ^{13}C APT spectrum of withalongolide I (9) (125 MHz)



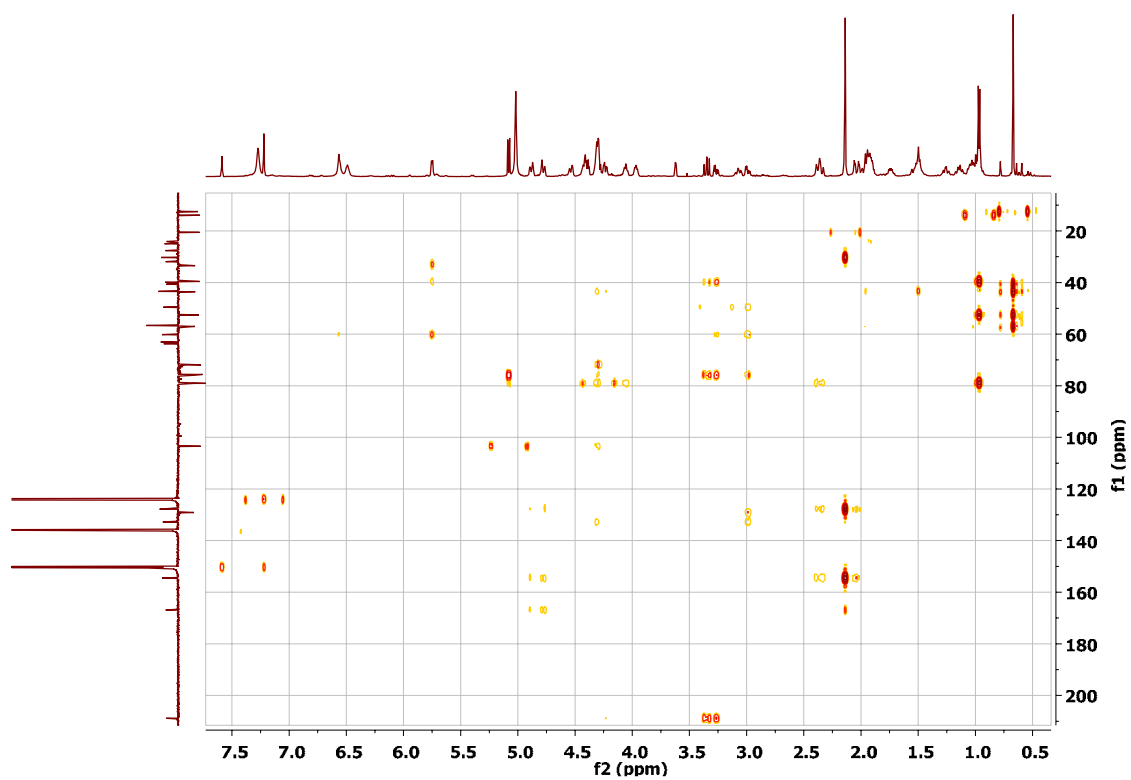
S9(c) ^1H - ^1H COSY spectrum of withalongolide I (9)



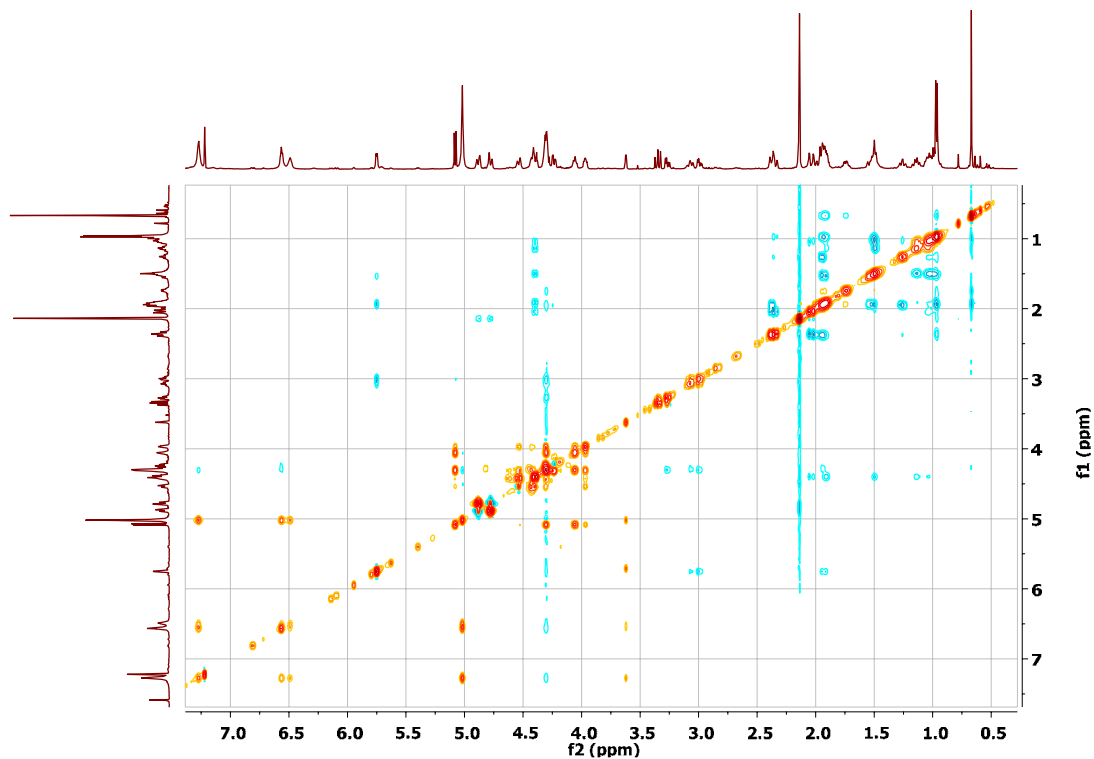
S9(d) HSQC spectrum of withalongolide I (9)



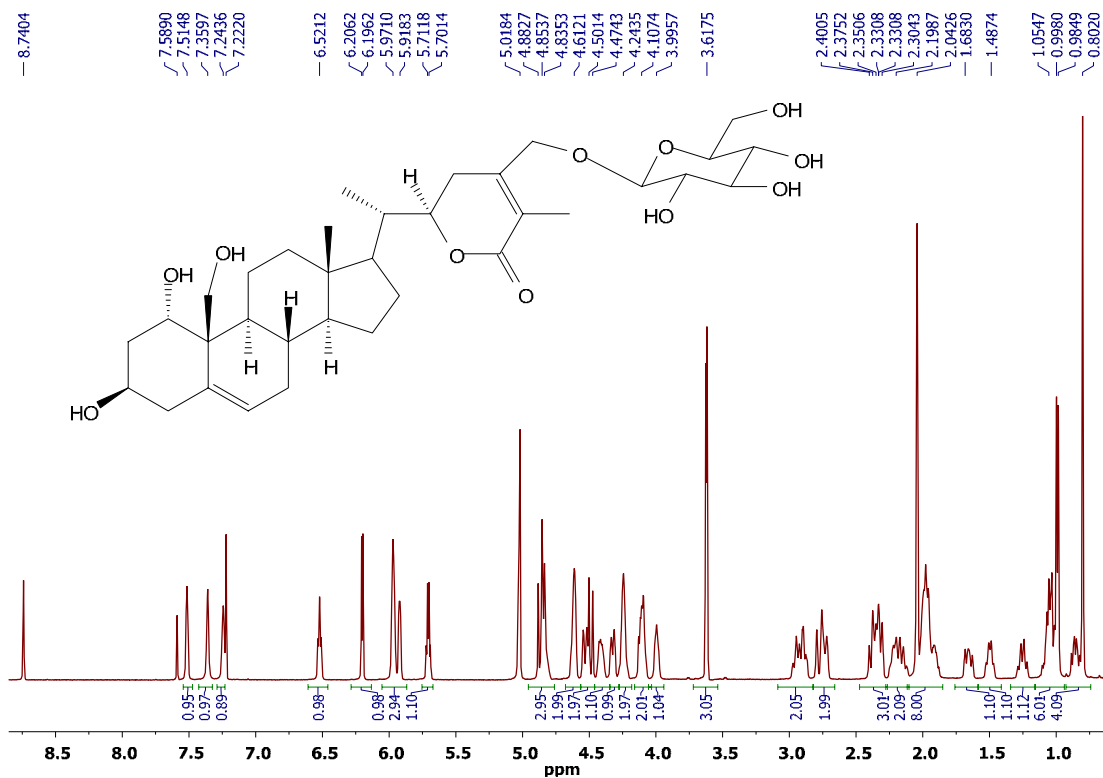
S9(e) HMBC spectrum of withalongolide I (9)



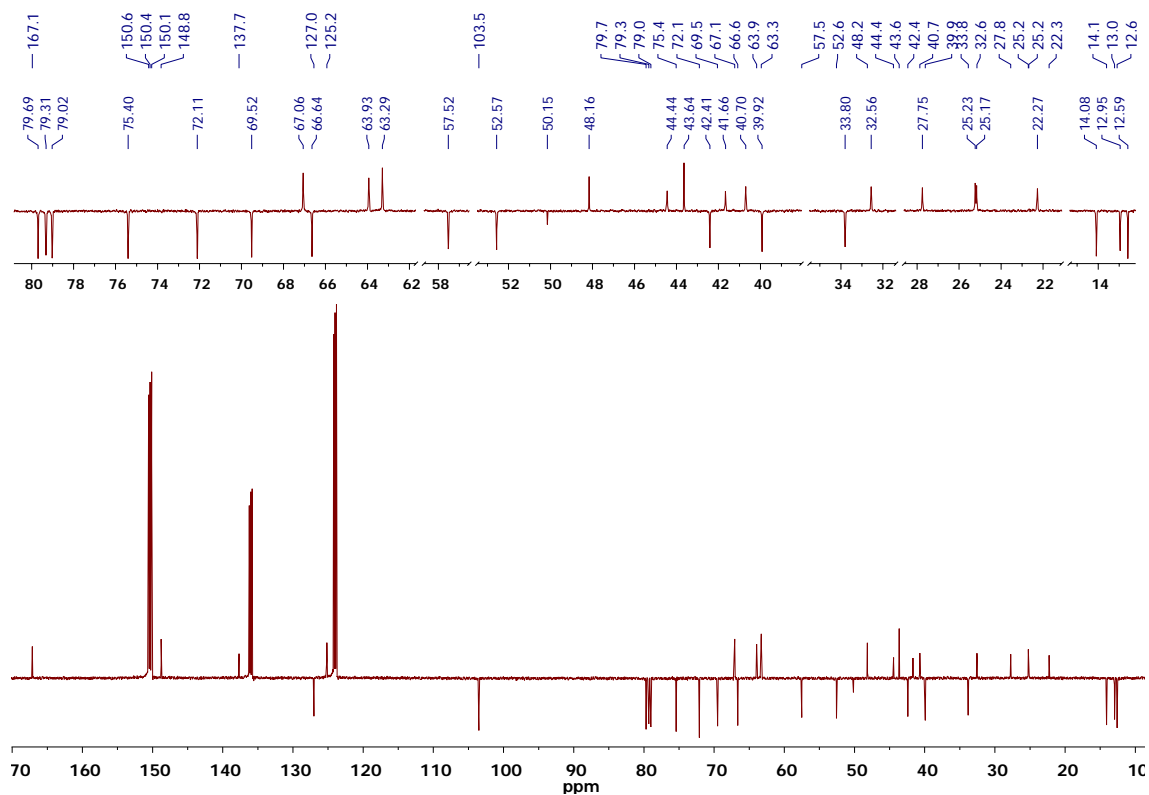
S9(f) NOESY spectrum of withalongolide I (**9**)



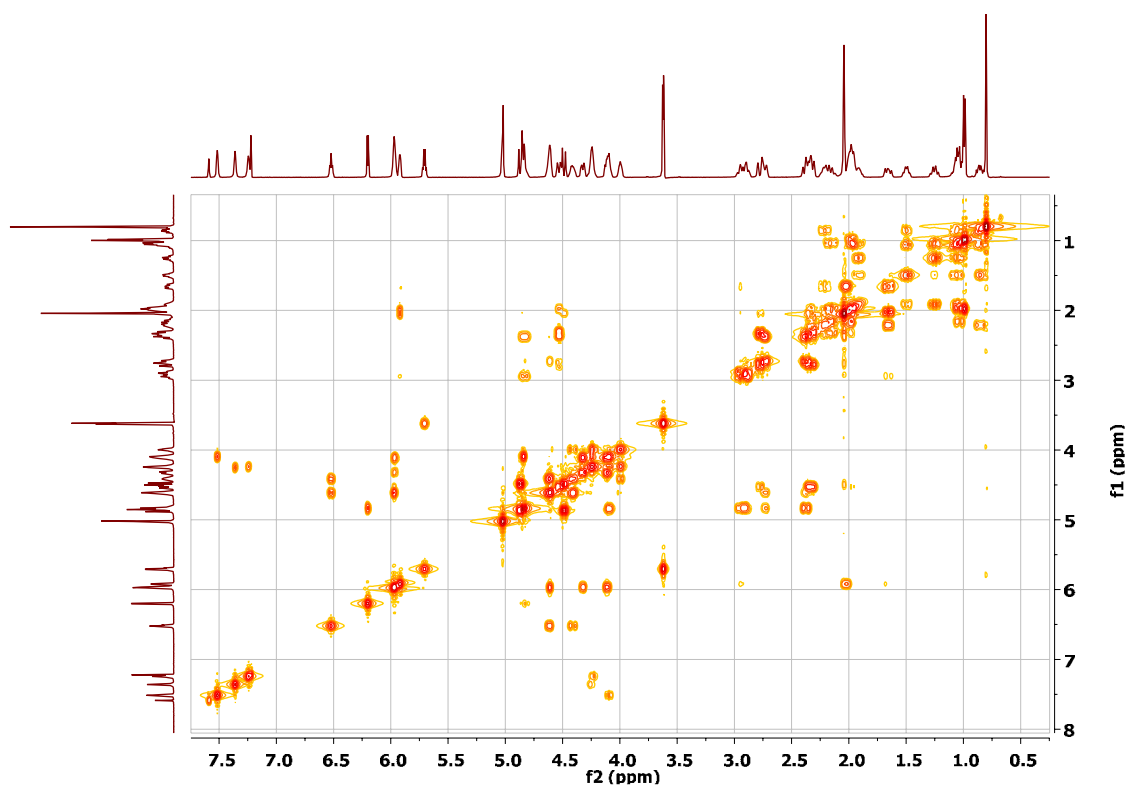
S10(a) ^1H NMR spectrum of withalongolide J (**10**) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



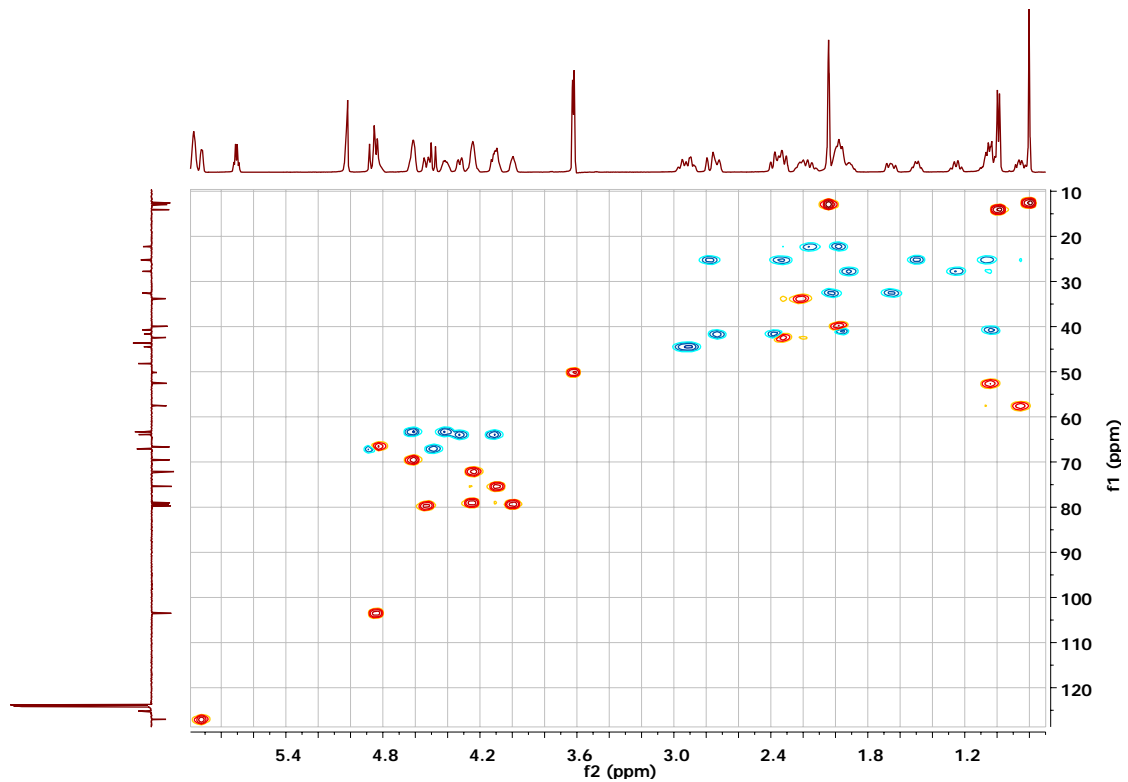
S10(b) ^{13}C APT spectrum of withalongolide J (**10**) (125 MHz)



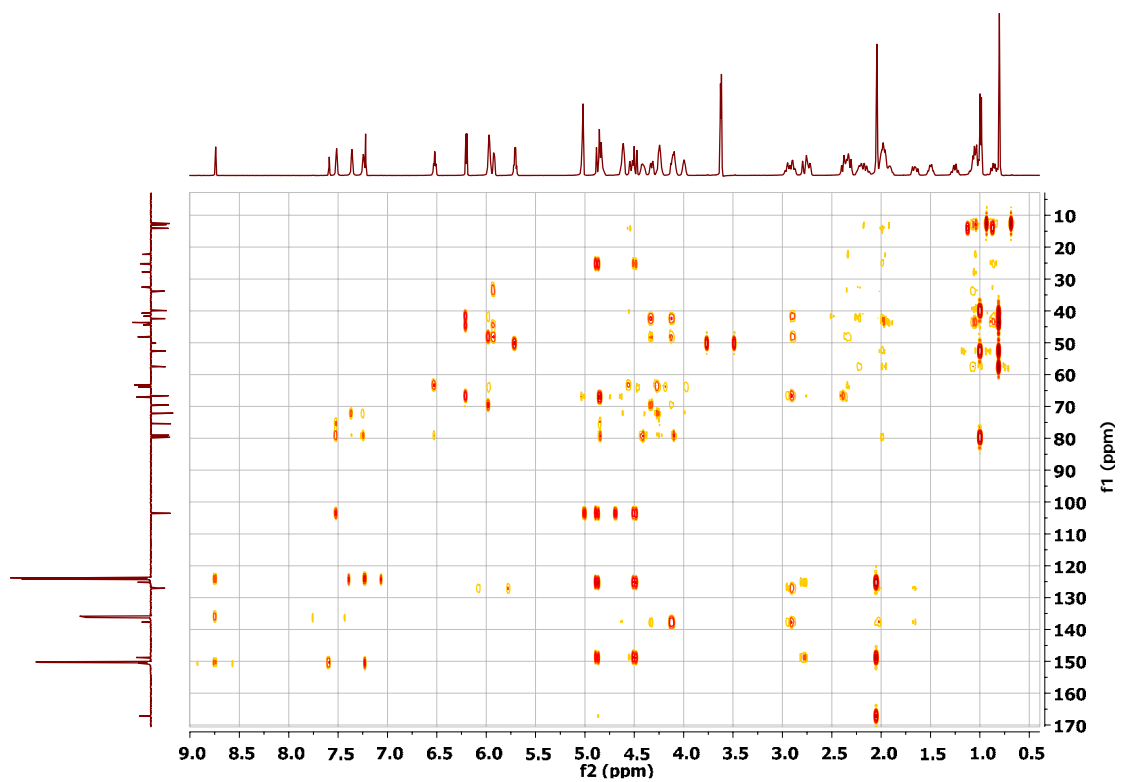
S10(c) ^1H - ^1H COSY spectrum of withalongolide J (**10**)



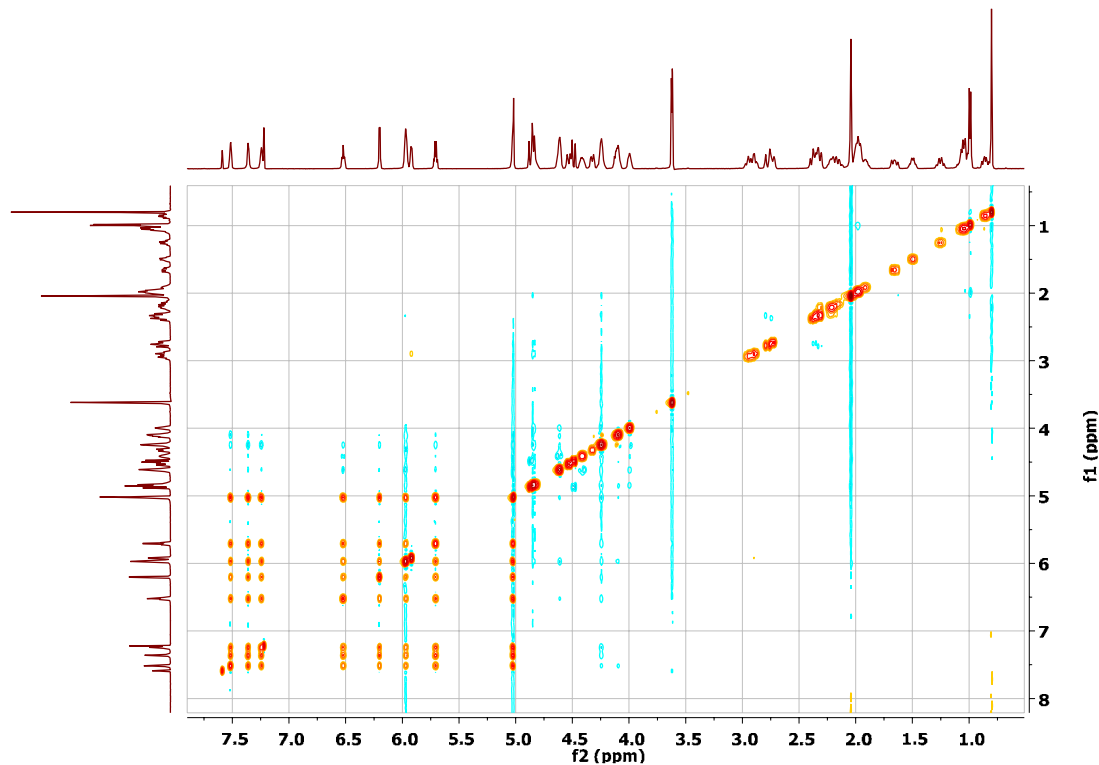
S10(d) HSQC spectrum of withalongolide J (10)



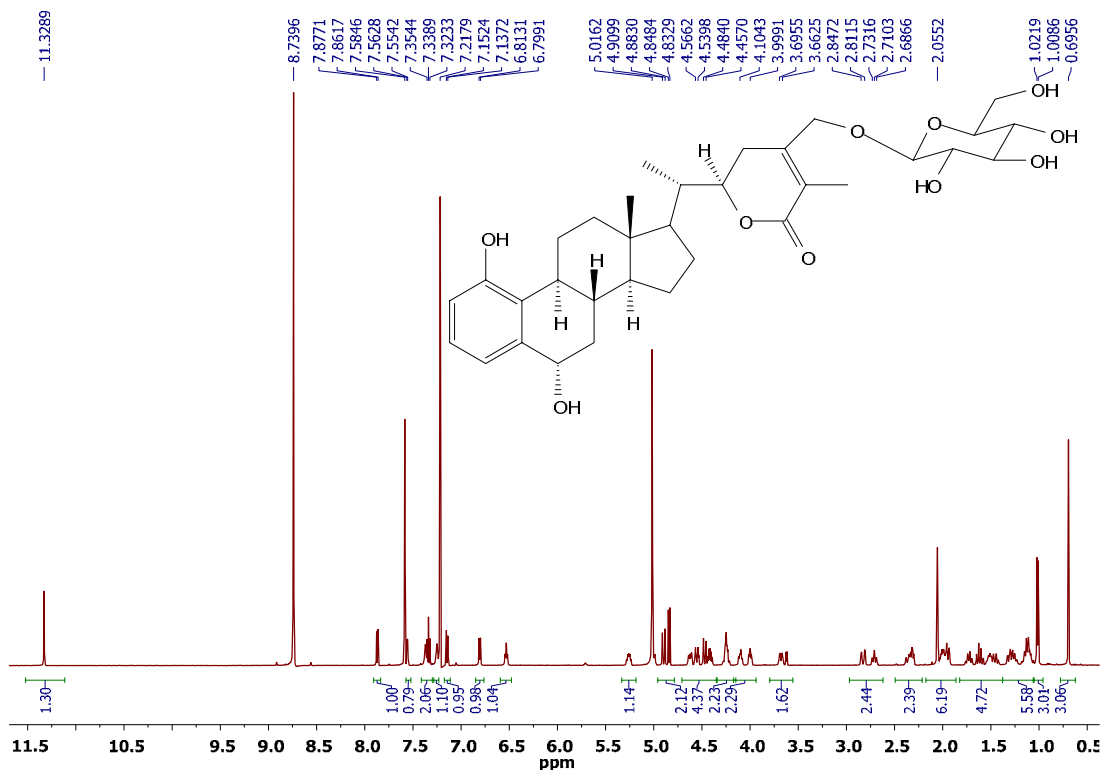
S10(e) HMBC spectrum of withalongolide J (10)



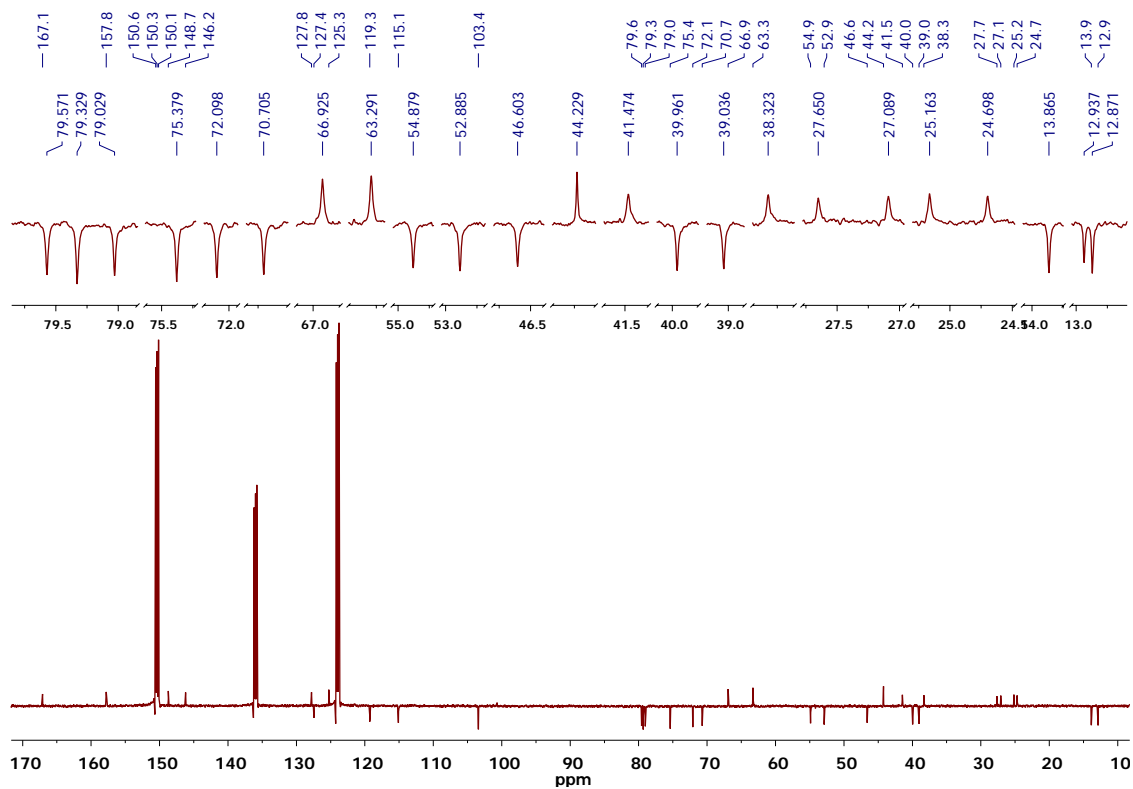
S10(f) NOESY spectrum of withalongolide J (10)



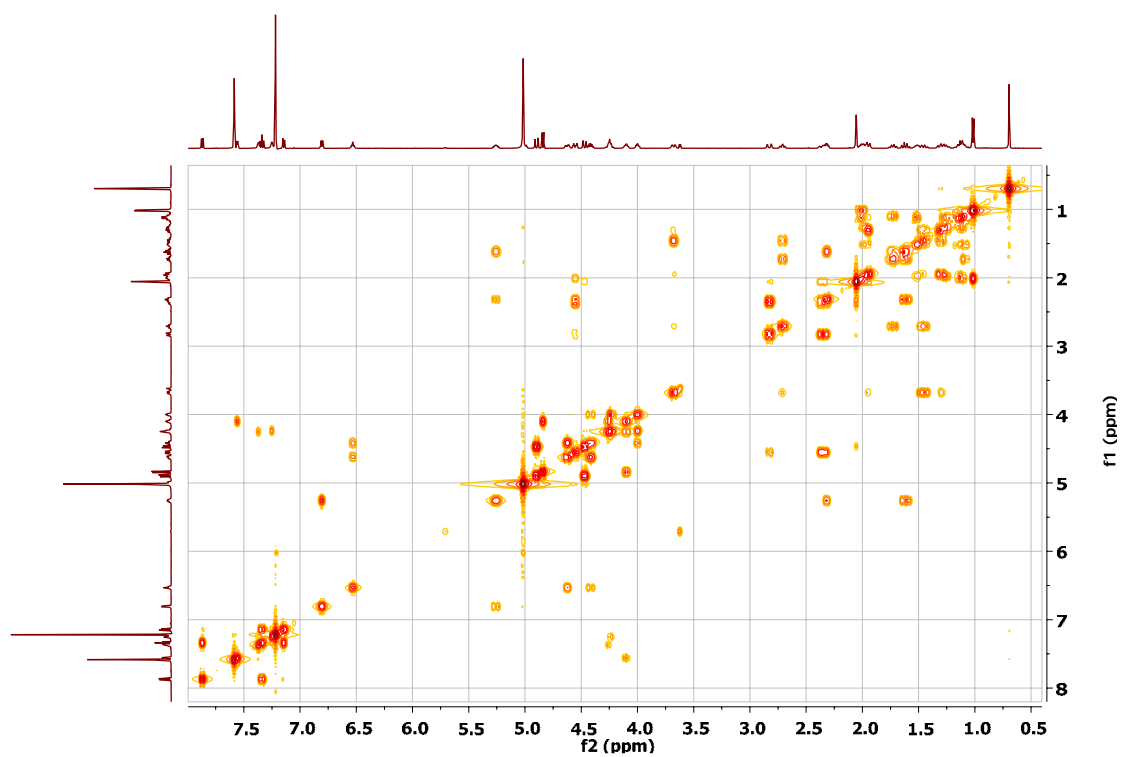
S11(a) ¹H NMR spectrum of withalongolide K (11) in C₅D₅N (500 MHz)



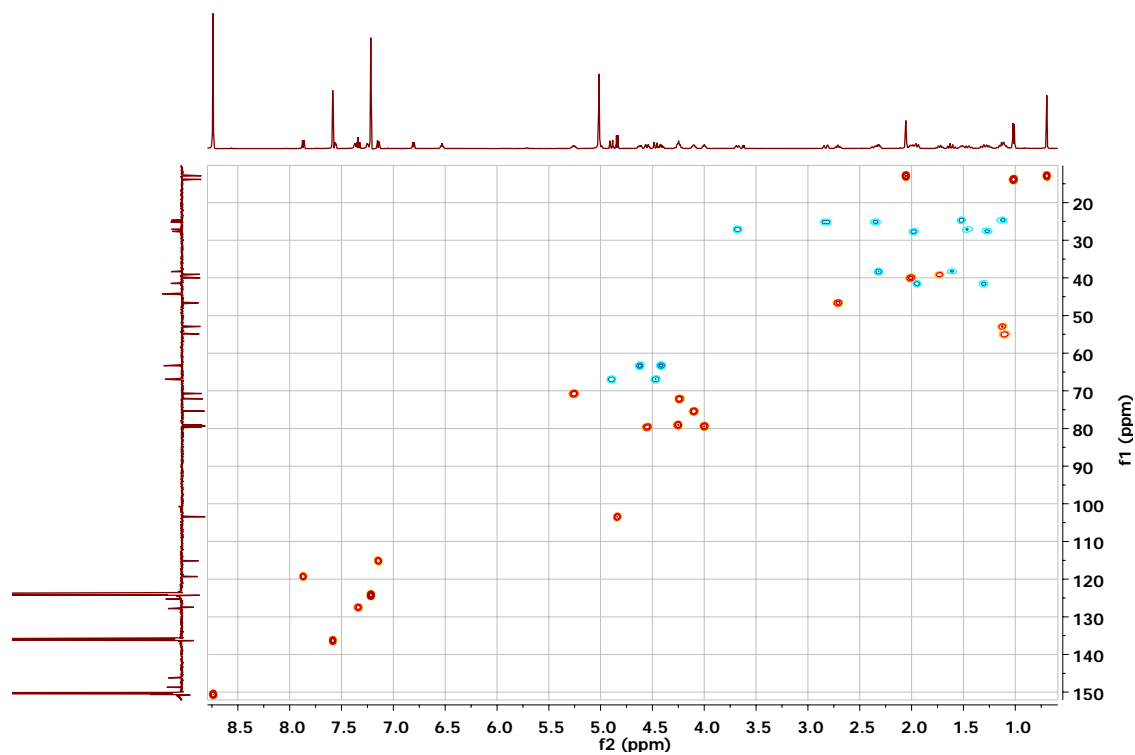
S11(b) ^{13}C APT spectrum of withalongolide K (**11**) (125 MHz)



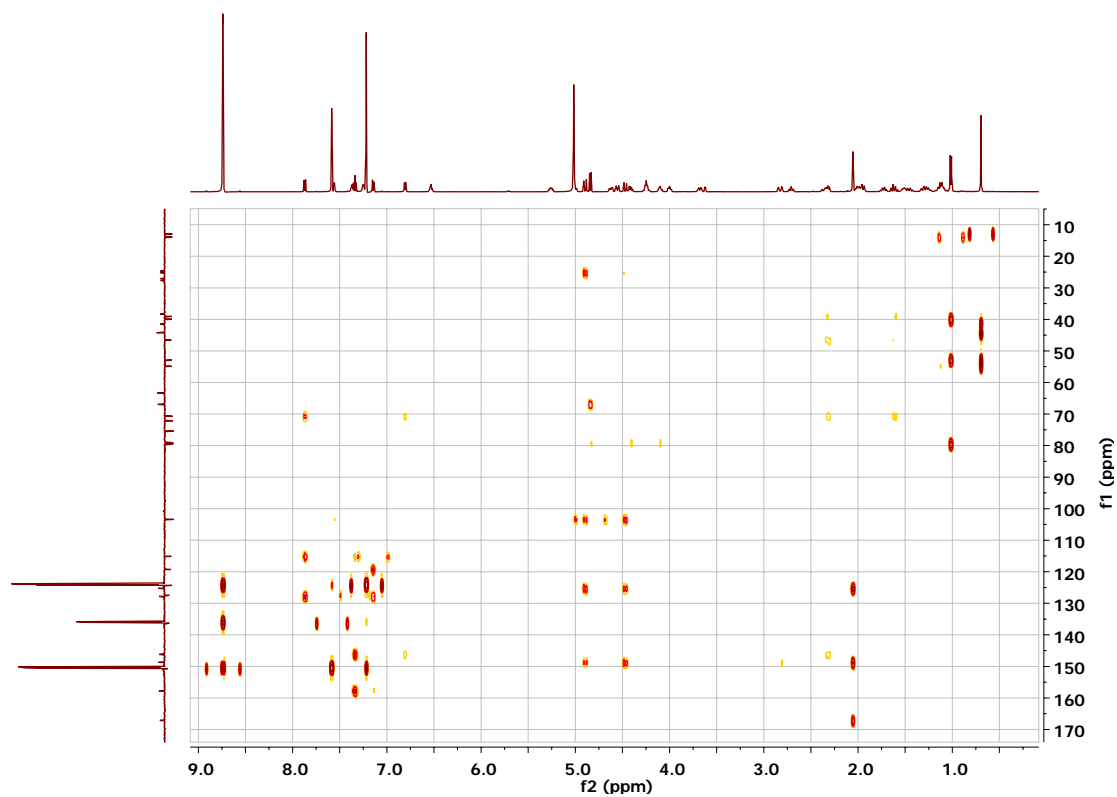
S11(c) ^1H - ^1H COSY spectrum of withalongolide K (**11**)



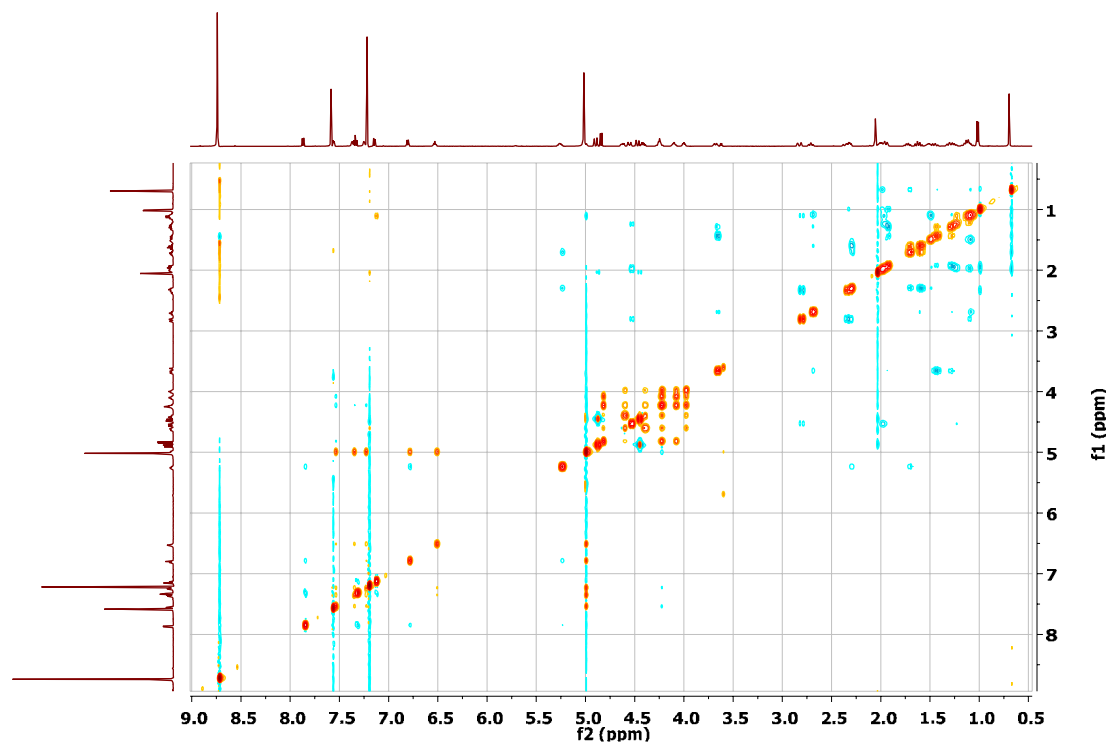
S11(d) HSQC spectrum of withalongolide K (11)



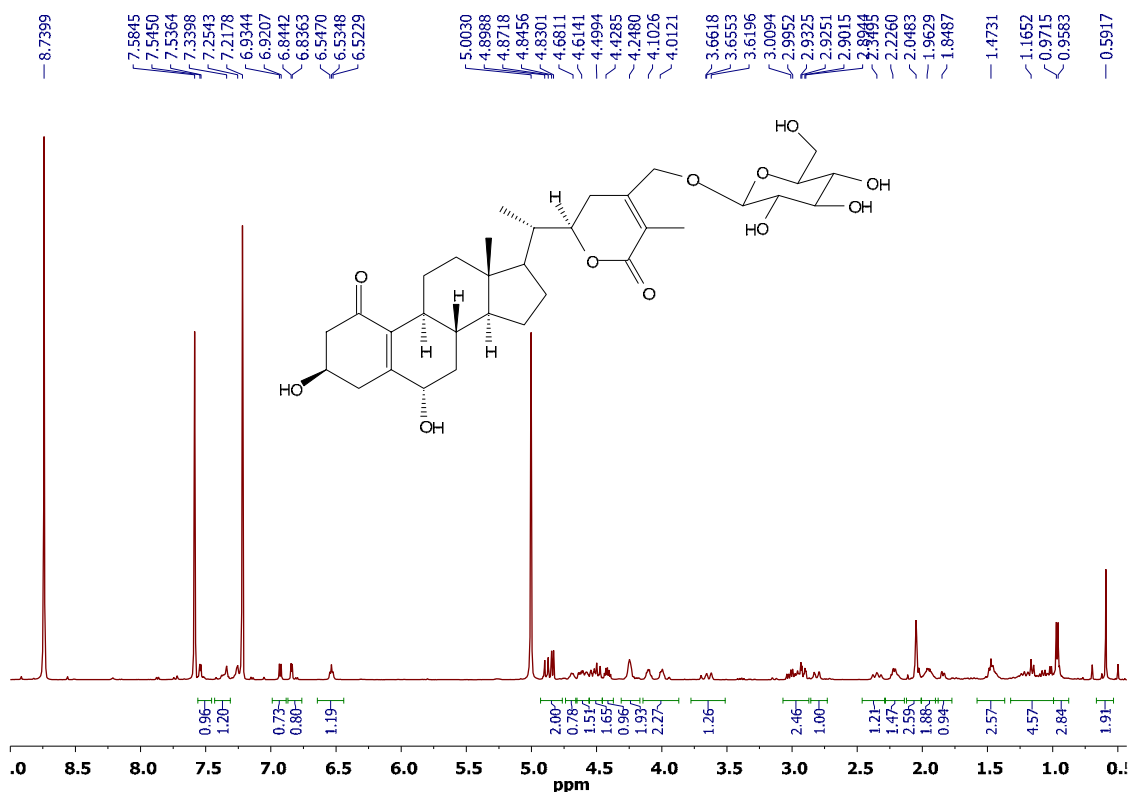
S11(e) HMBC spectrum of withalongolide K (11)



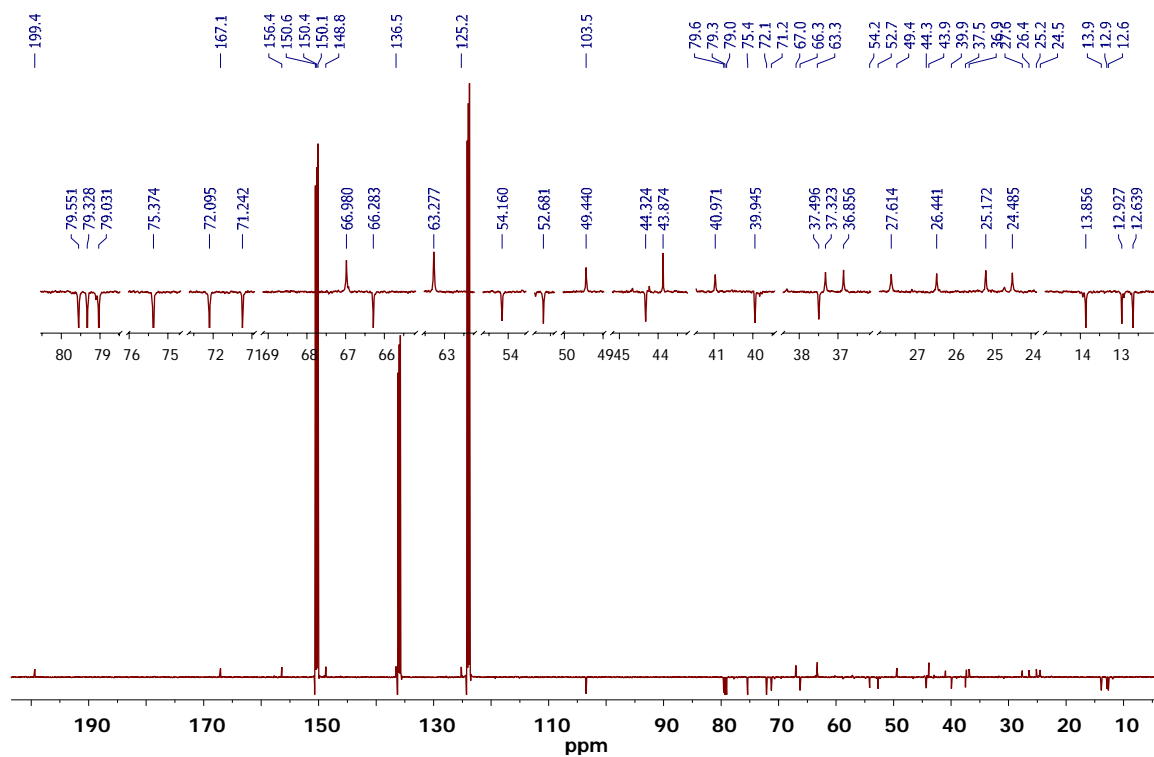
S11(f) NOESY spectrum of withalongolide K (11)



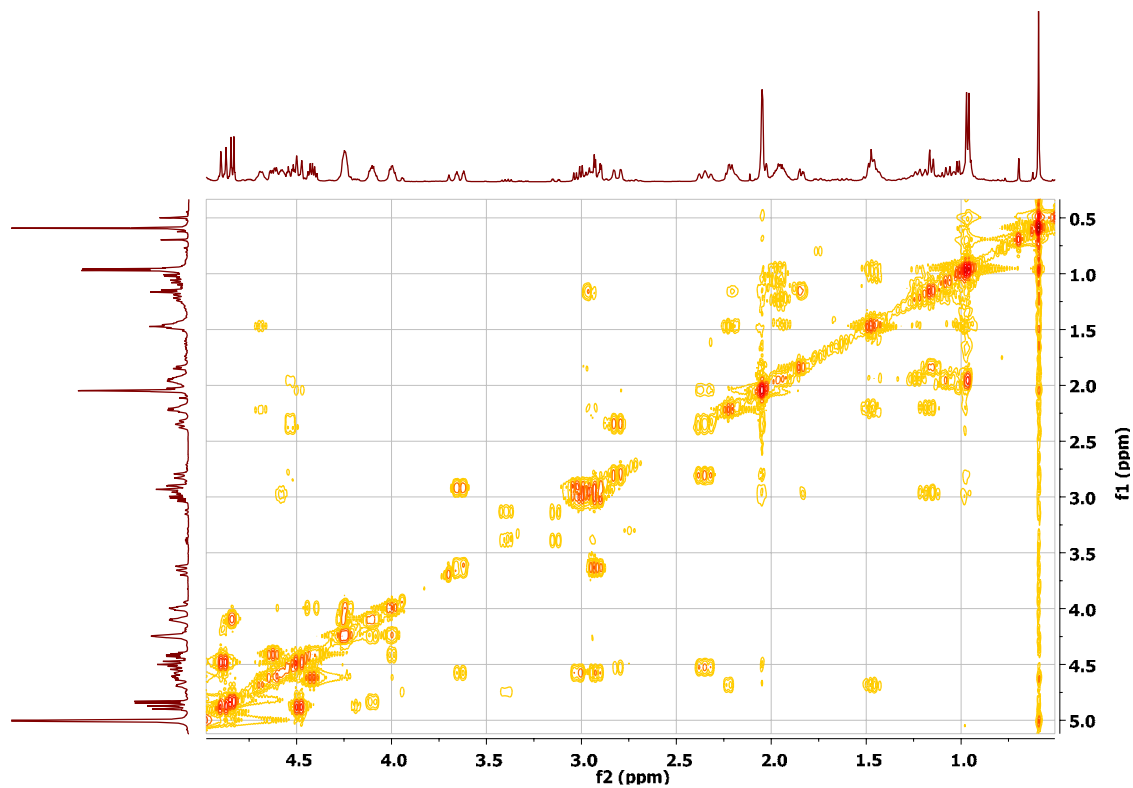
S12(a) ¹H NMR spectrum of withalongolide L (12) in C₅D₅N (500 MHz)



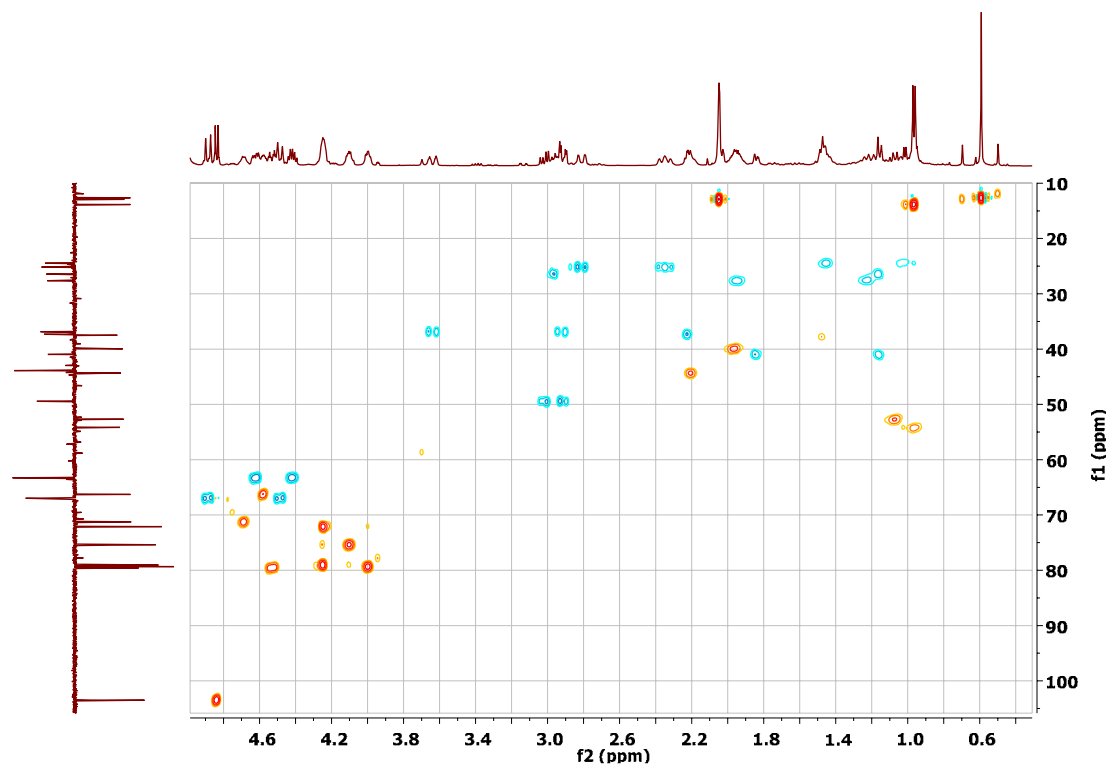
S12(b) ^{13}C APT spectrum of withalongolide L (**12**) (125 MHz)



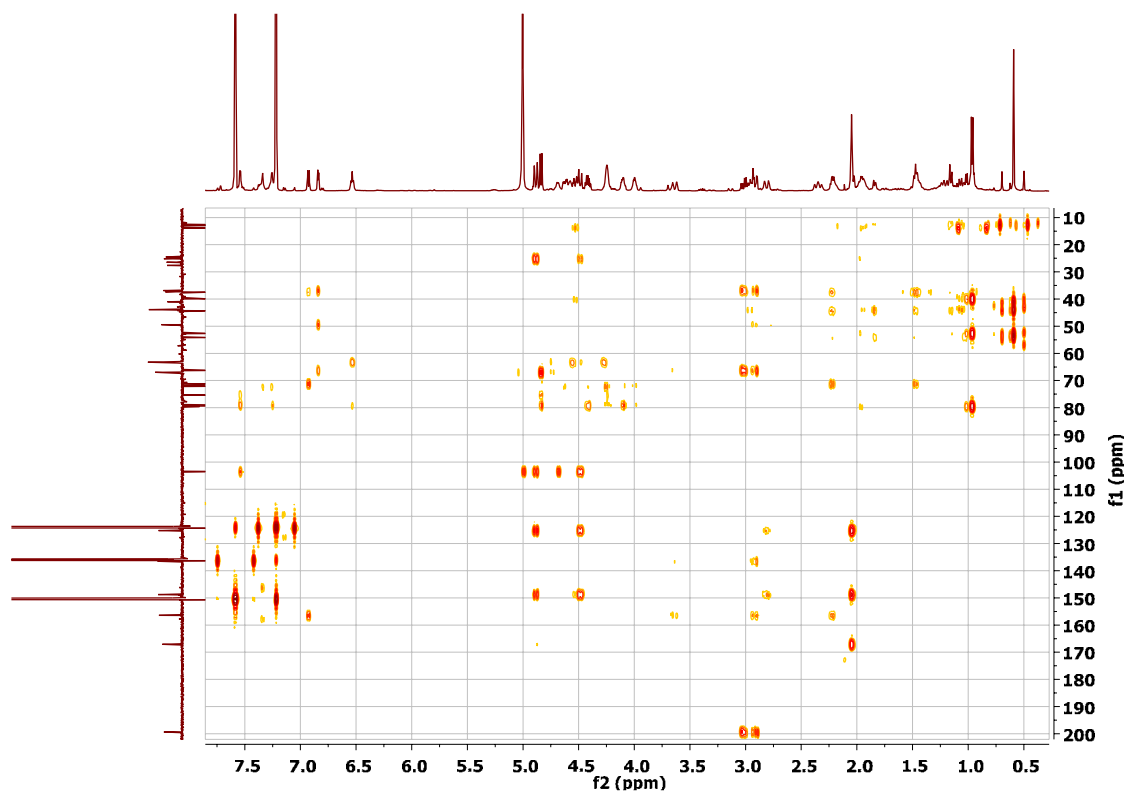
S12(c) ^1H - ^1H COSY spectrum of withalongolide L (**12**)



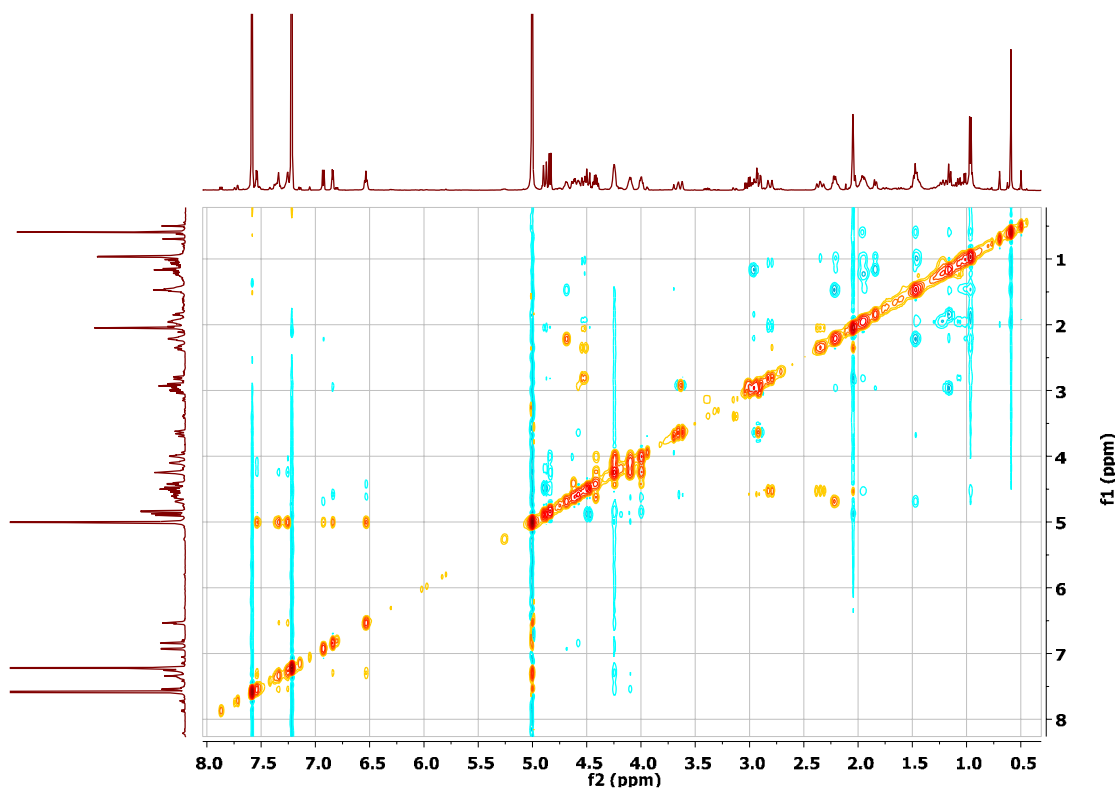
S12(d) HSQC spectrum of withalongolide L (12)



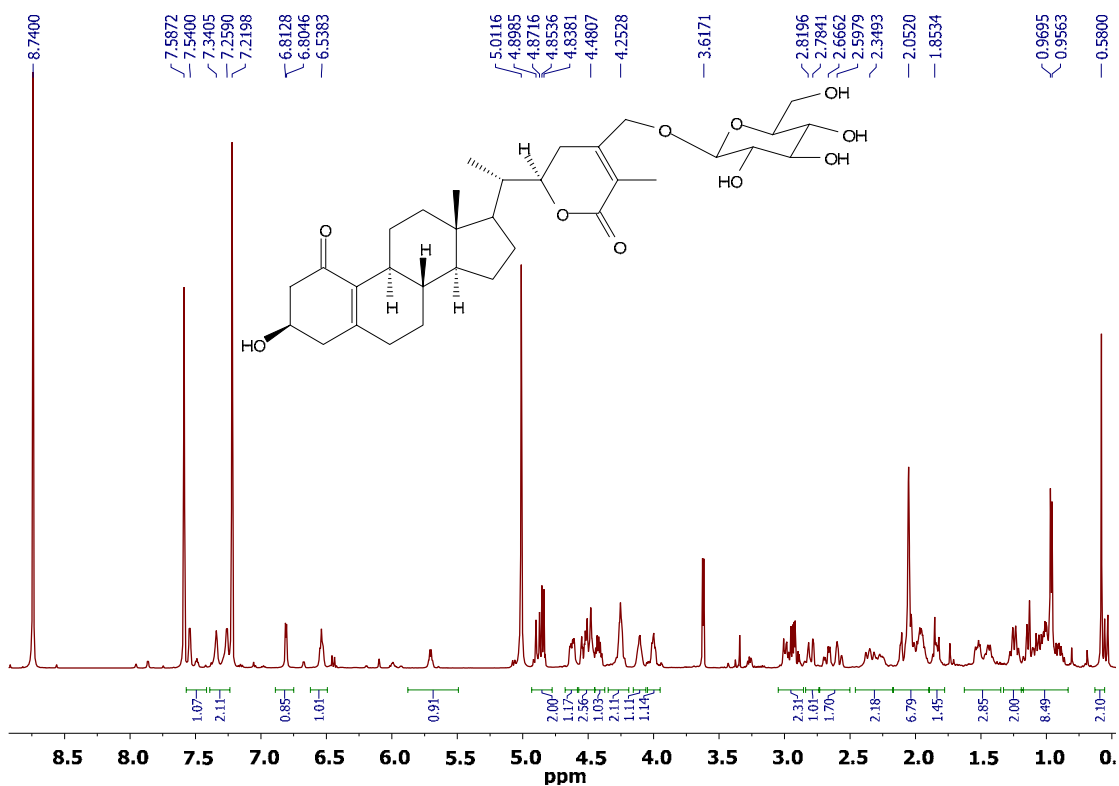
S12(e) HMBC spectrum of withalongolide L (12)



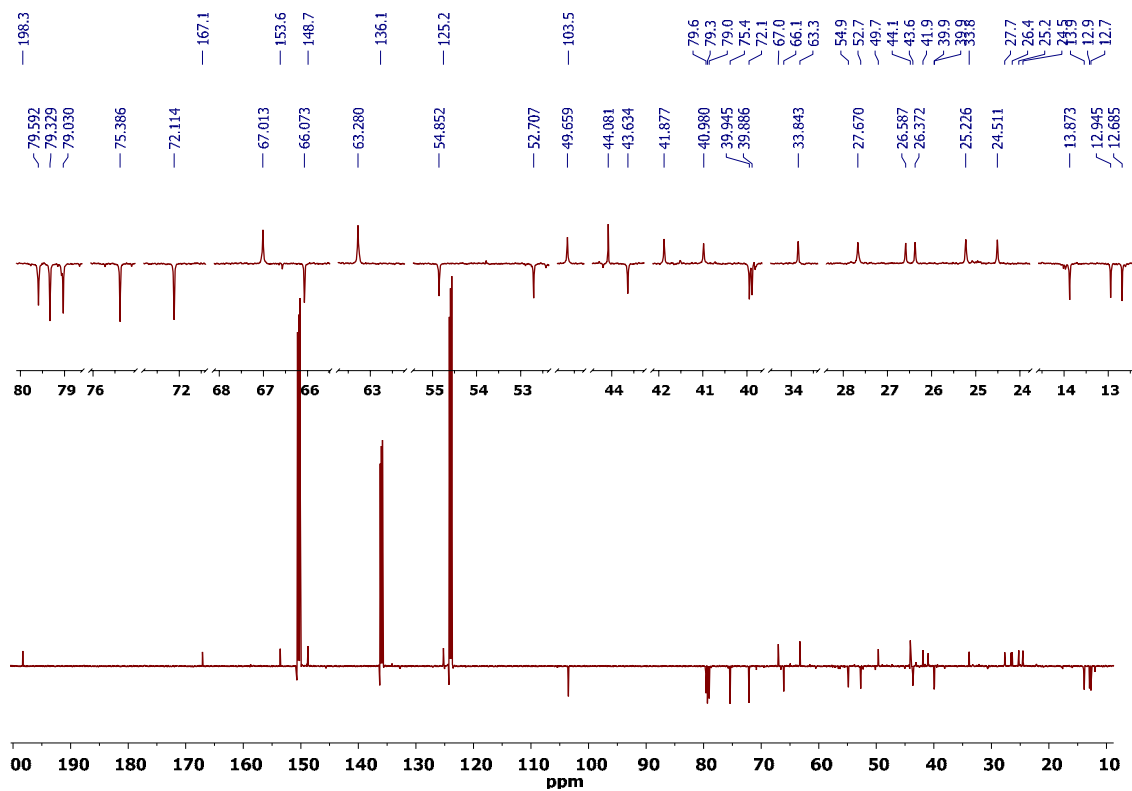
S12(f) NOESY spectrum of withalongolide L (12)



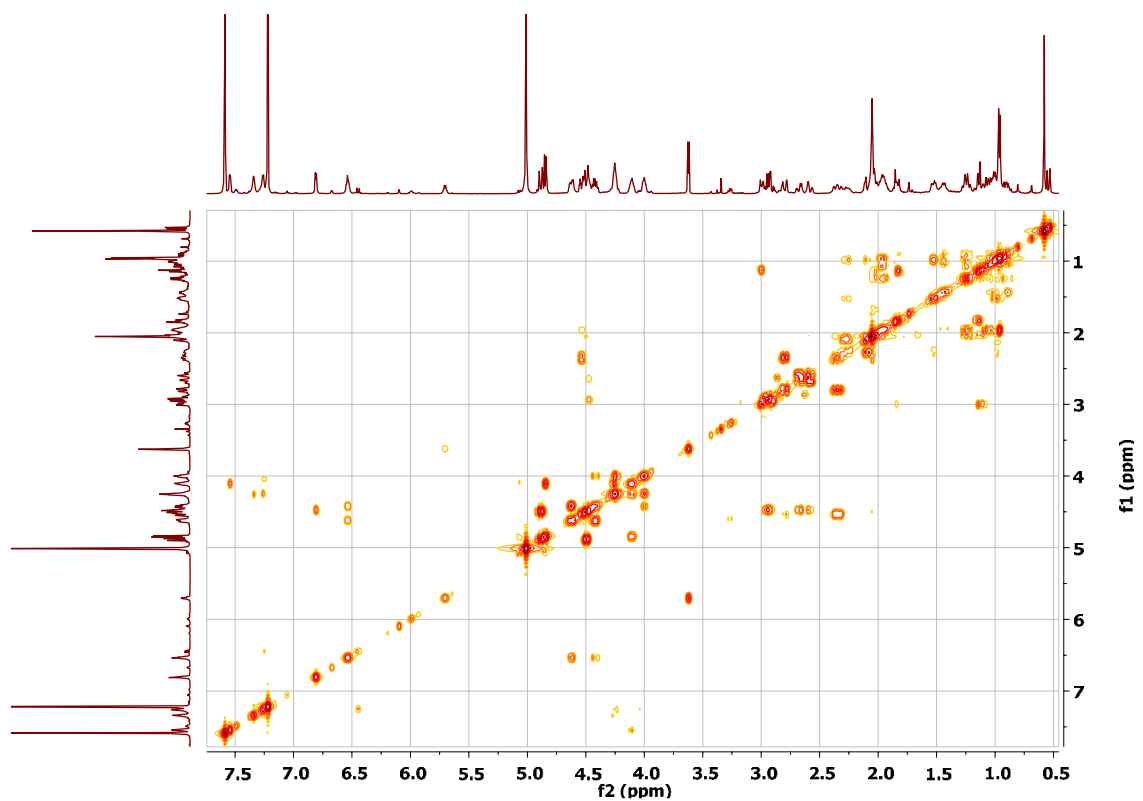
S13(a) ^1H NMR spectrum of withalongolide M (13) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



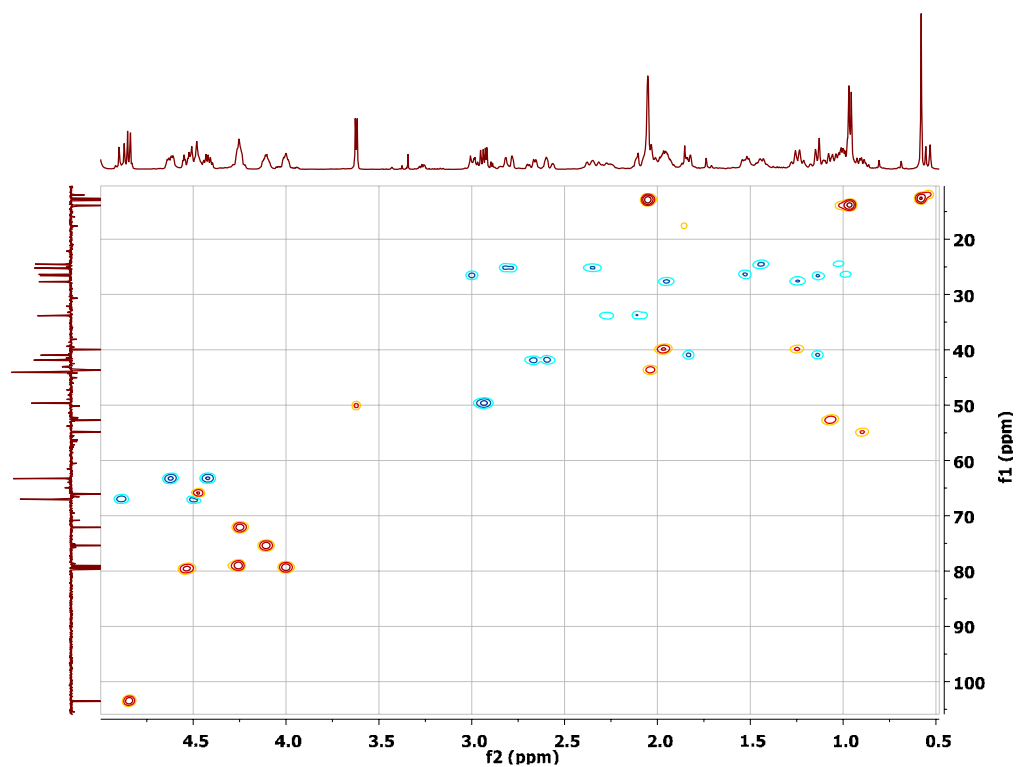
S13(b) ^{13}C APT spectrum of withalongolide M (**13**) (125 MHz)



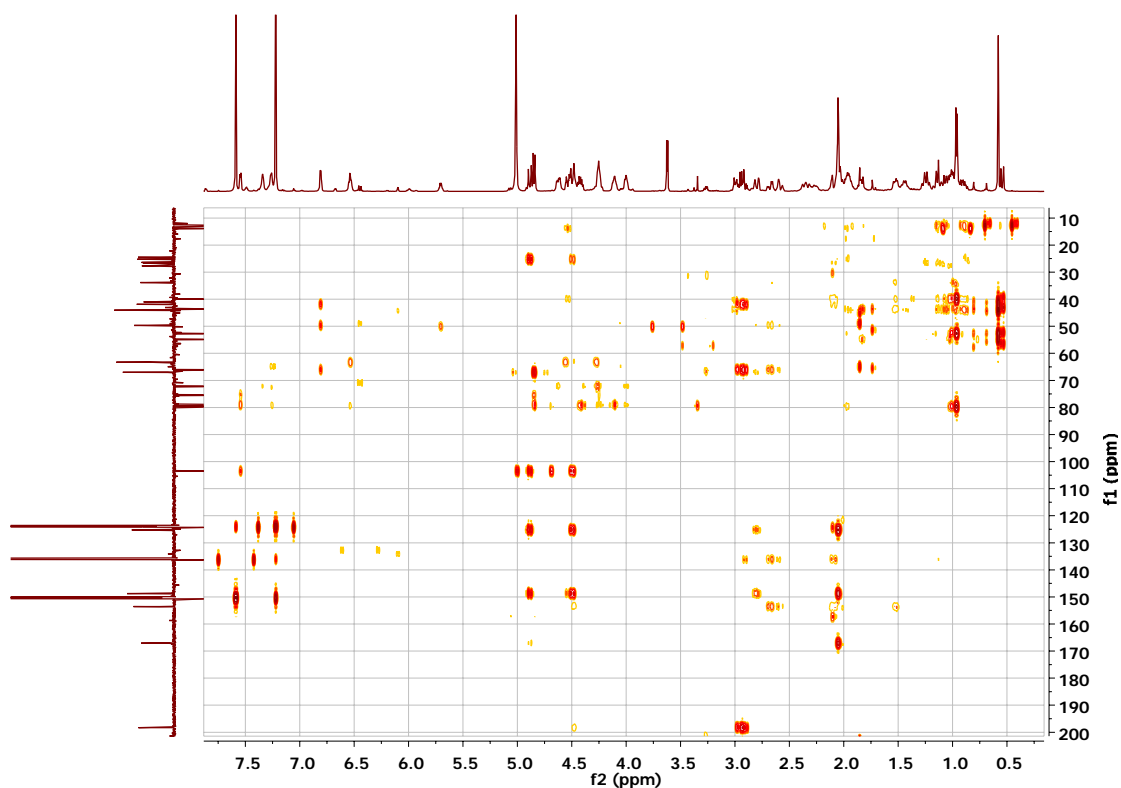
S13(c) ^1H - ^1H COSY spectrum of withalongolide M (**13**)



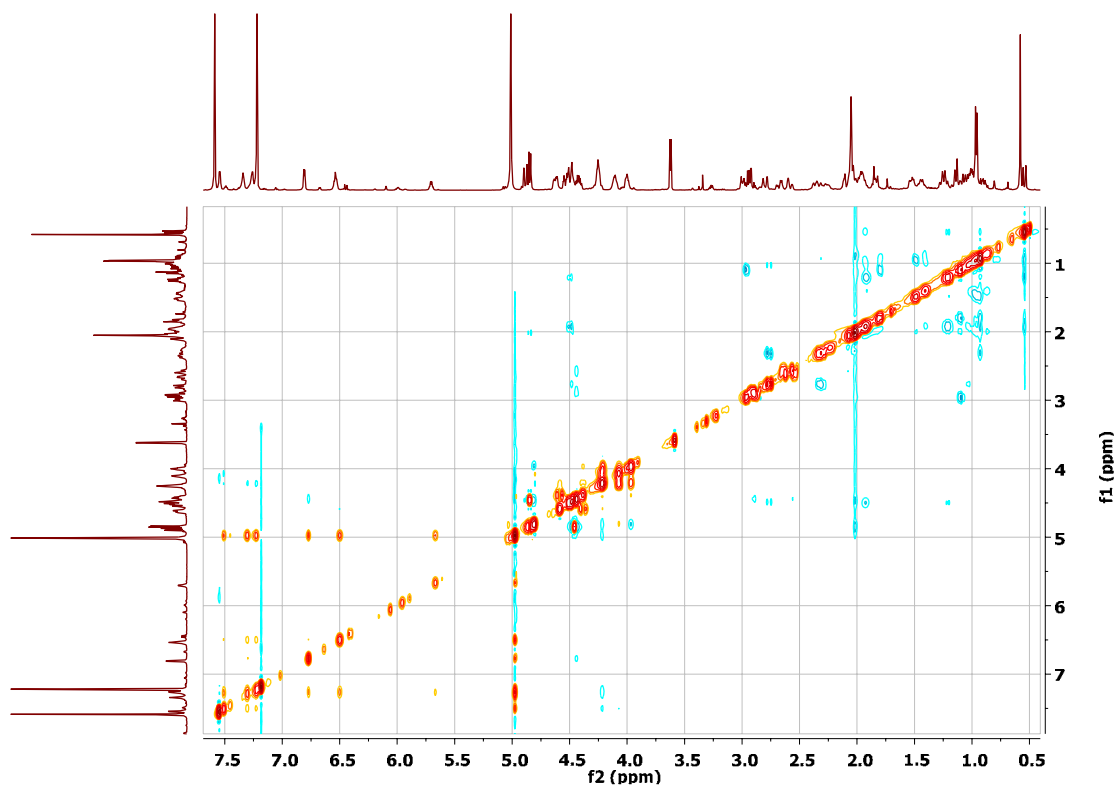
S13(d) HSQC spectrum of withalongolide M (13)



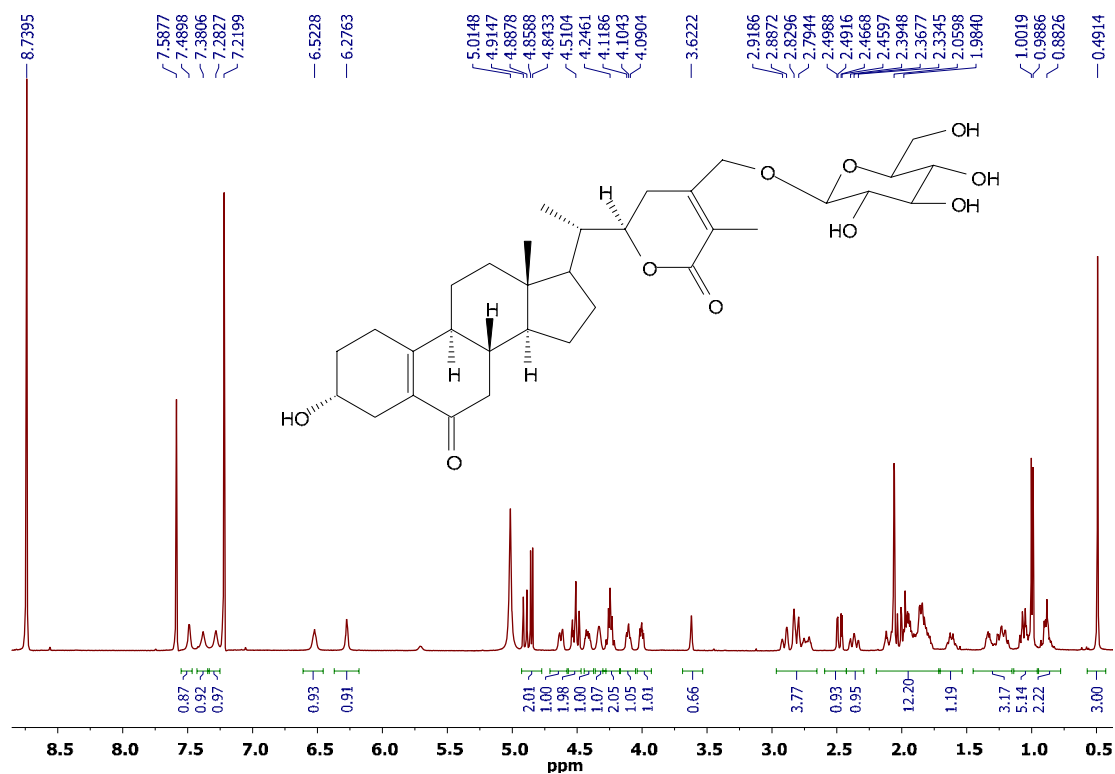
S13(e) HMBC spectrum of withalongolide M (13)



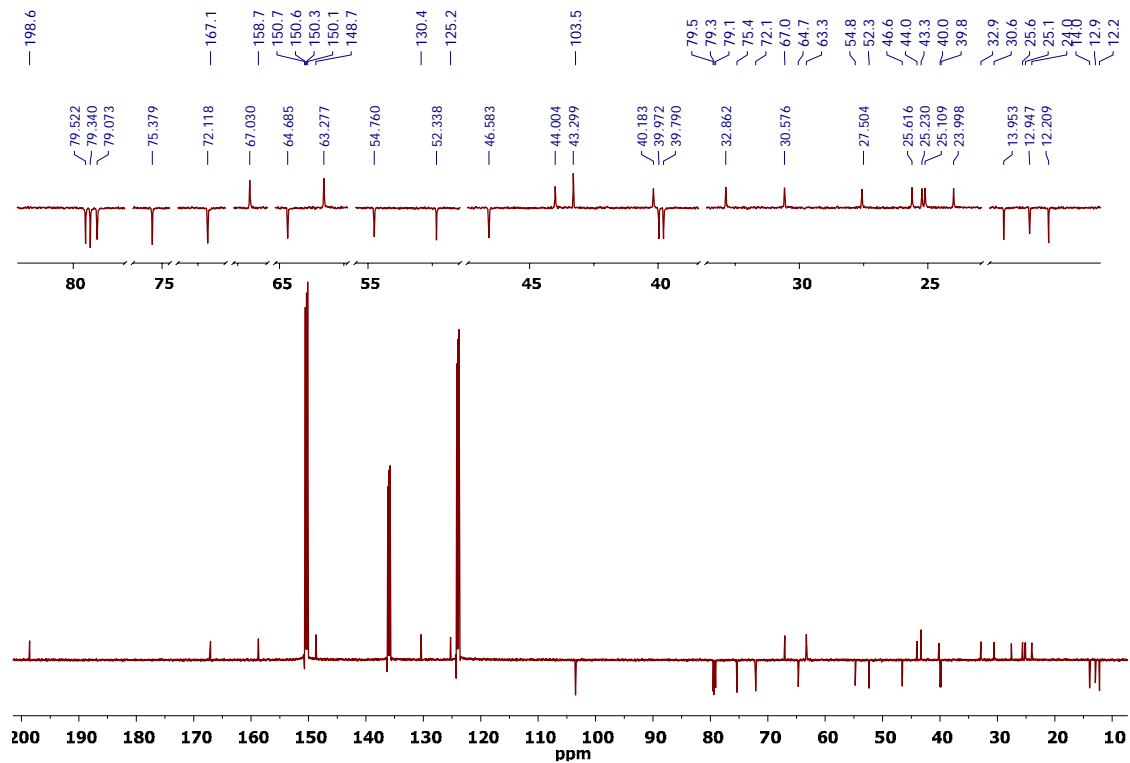
S13(f) NOESY spectrum of withalongolide M (13)



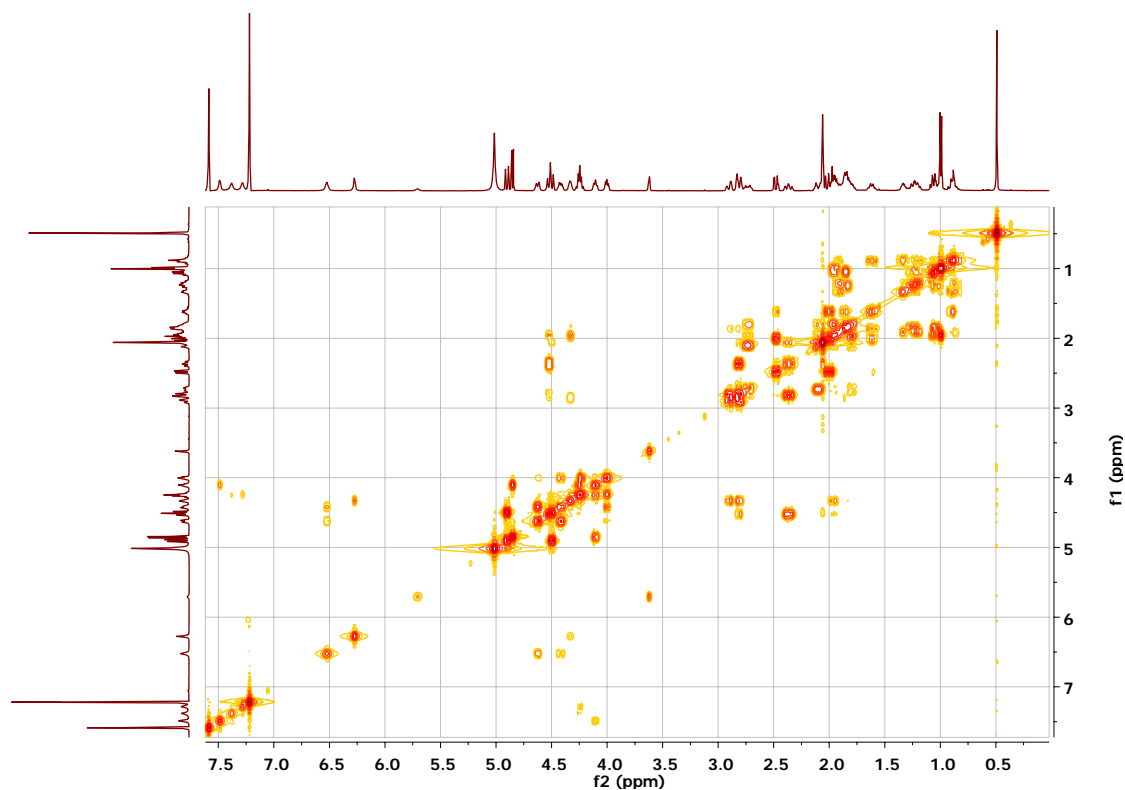
S14(a) ^1H NMR spectrum of withalongolide N (14) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



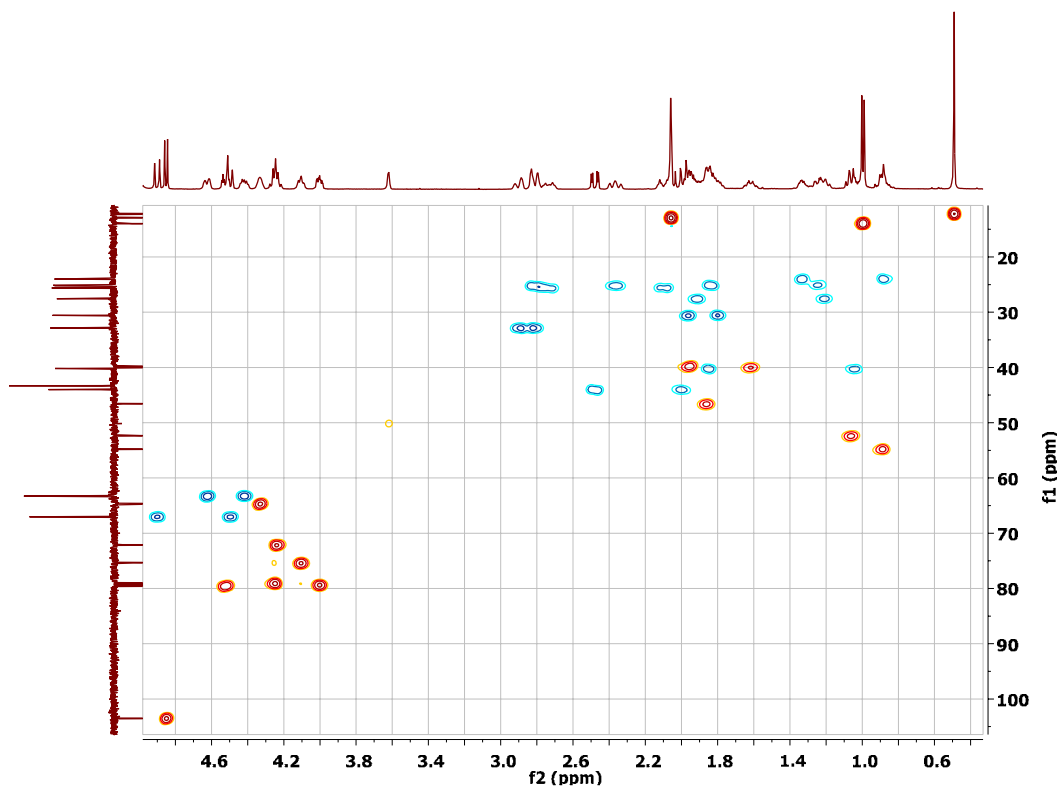
S14(b) ^{13}C APT spectrum of withalongolide N (**14**) (125 MHz)



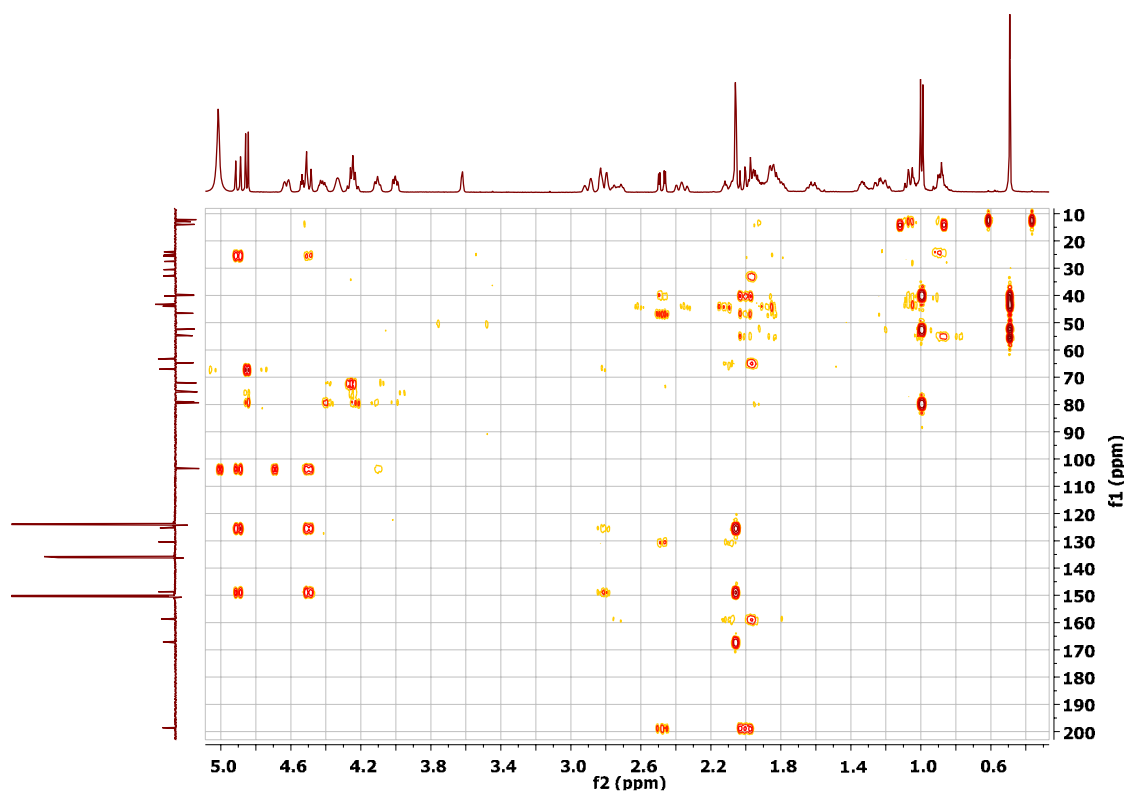
S14(c) ^1H - ^1H COSY spectrum of withalongolide N (**14**)



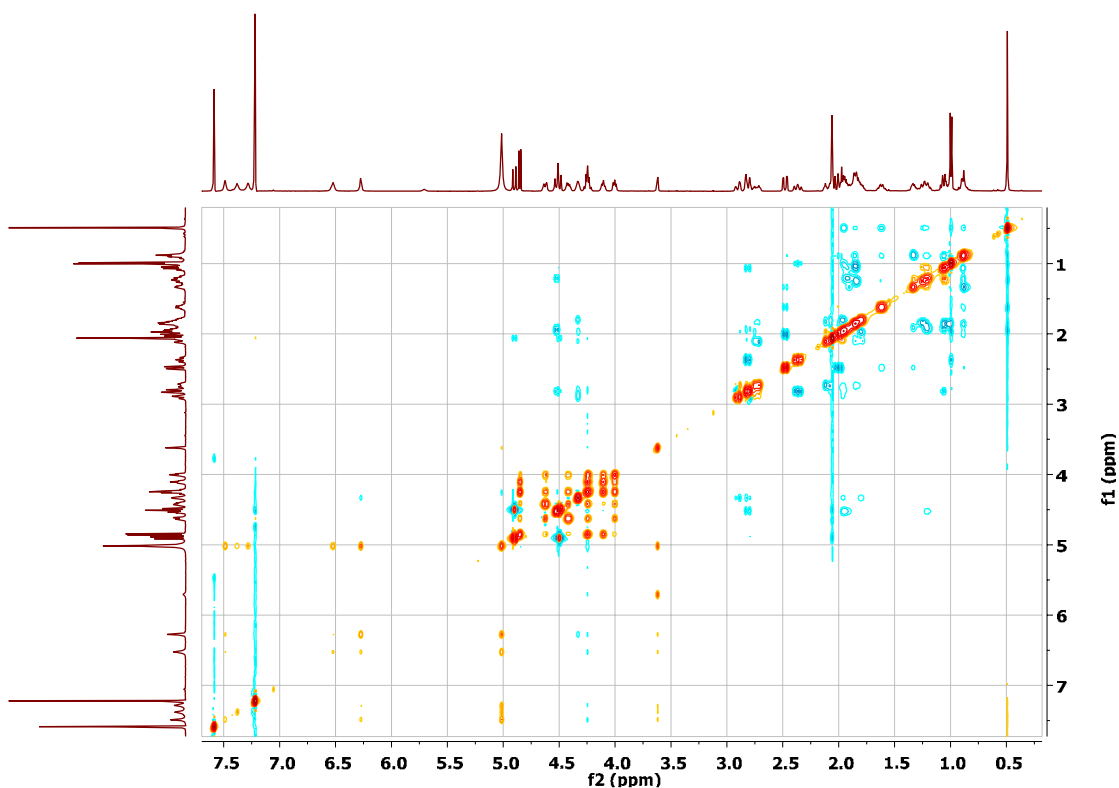
S14(d) HSQC spectrum of withalongolide N (14)



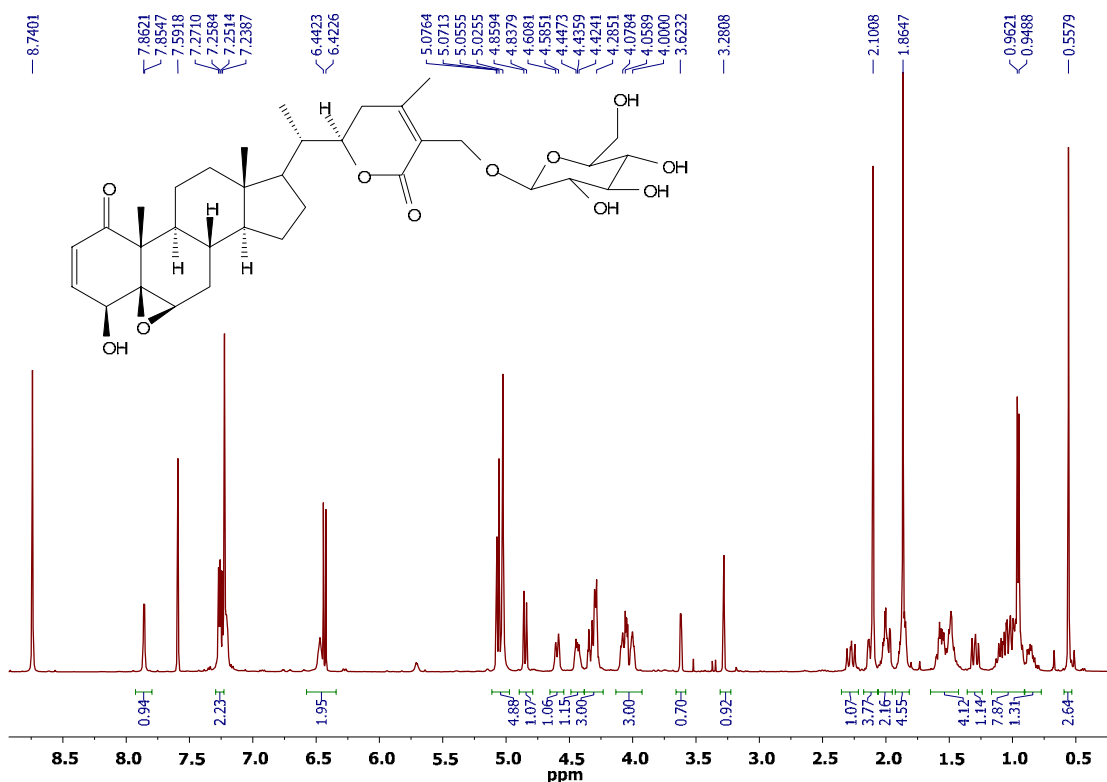
S14(e) HMBC spectrum of withalongolide N (14)



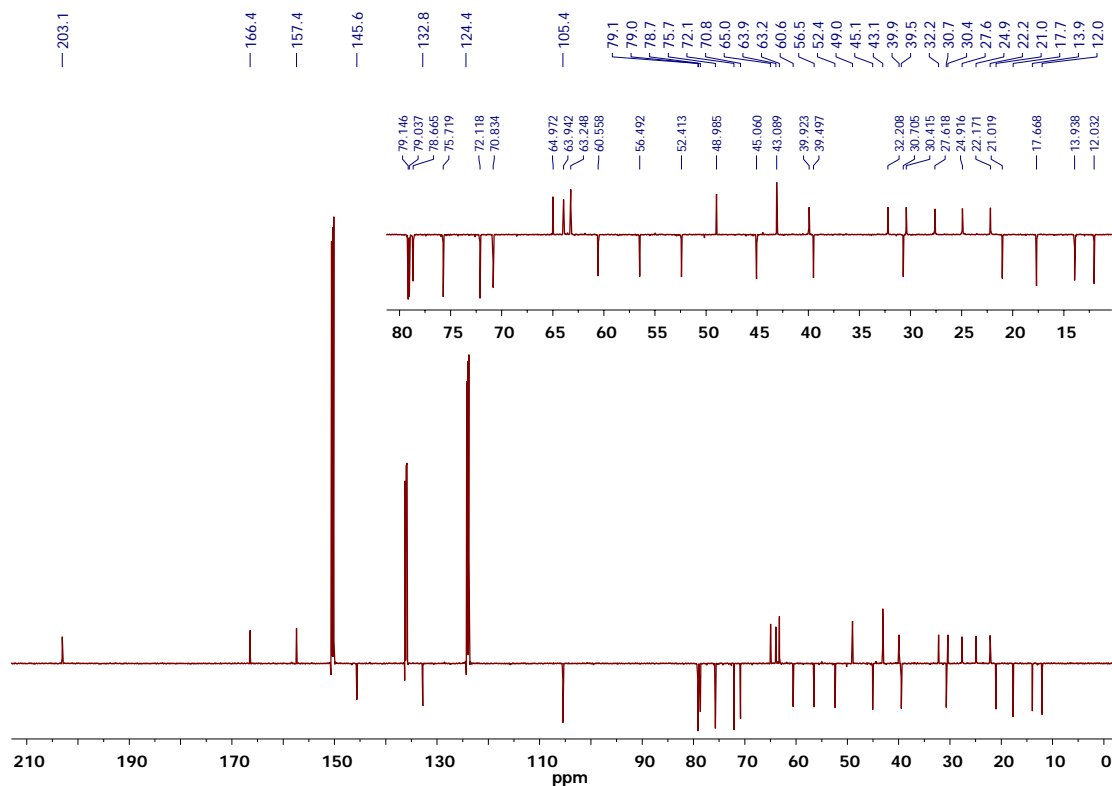
S14(f) NOESY spectrum of withalongolide N (14)



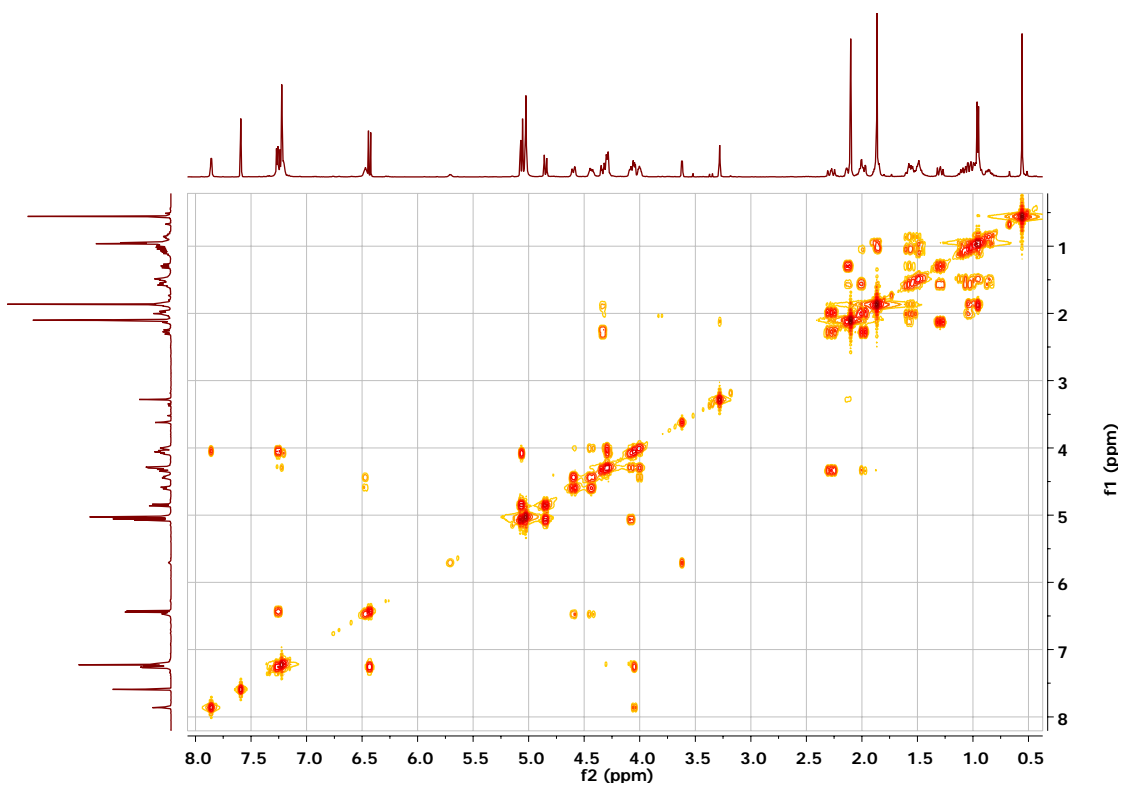
S15(a) ¹H NMR spectrum of sitoindoside IX (15) in C5D5N (500 MHz)



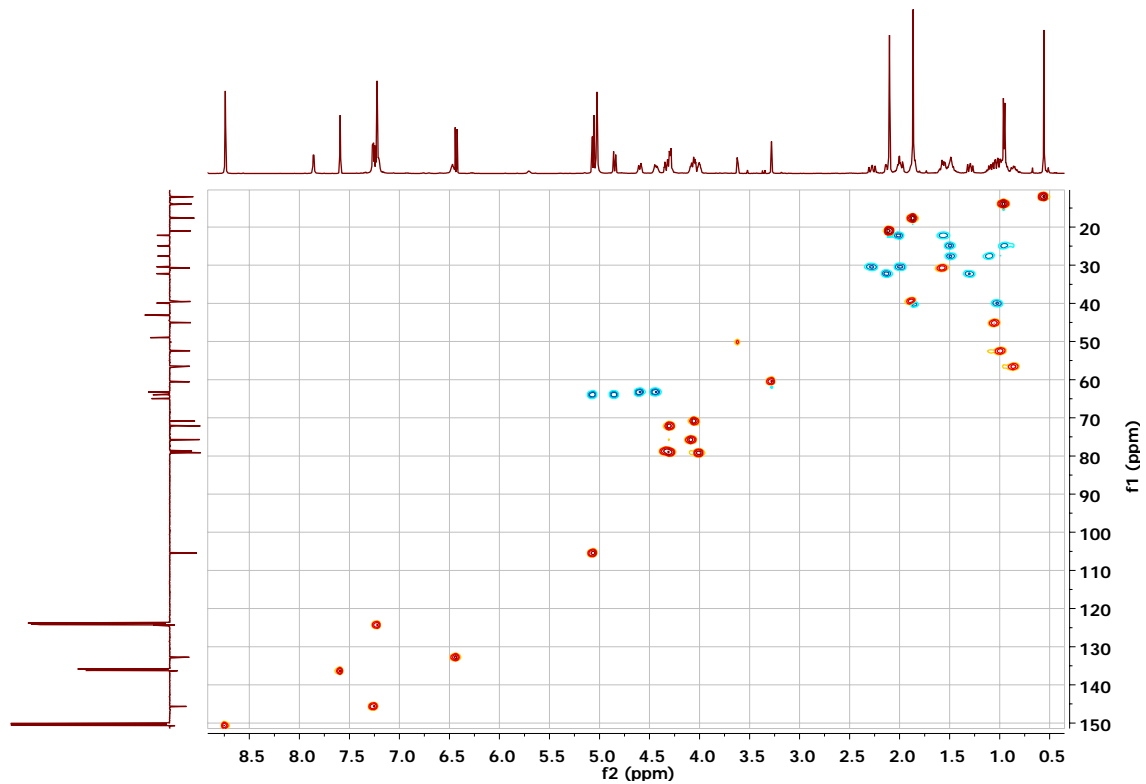
S15(b) ^{13}C APT spectrum of sitoindoside IX (**15**) (125 MHz)



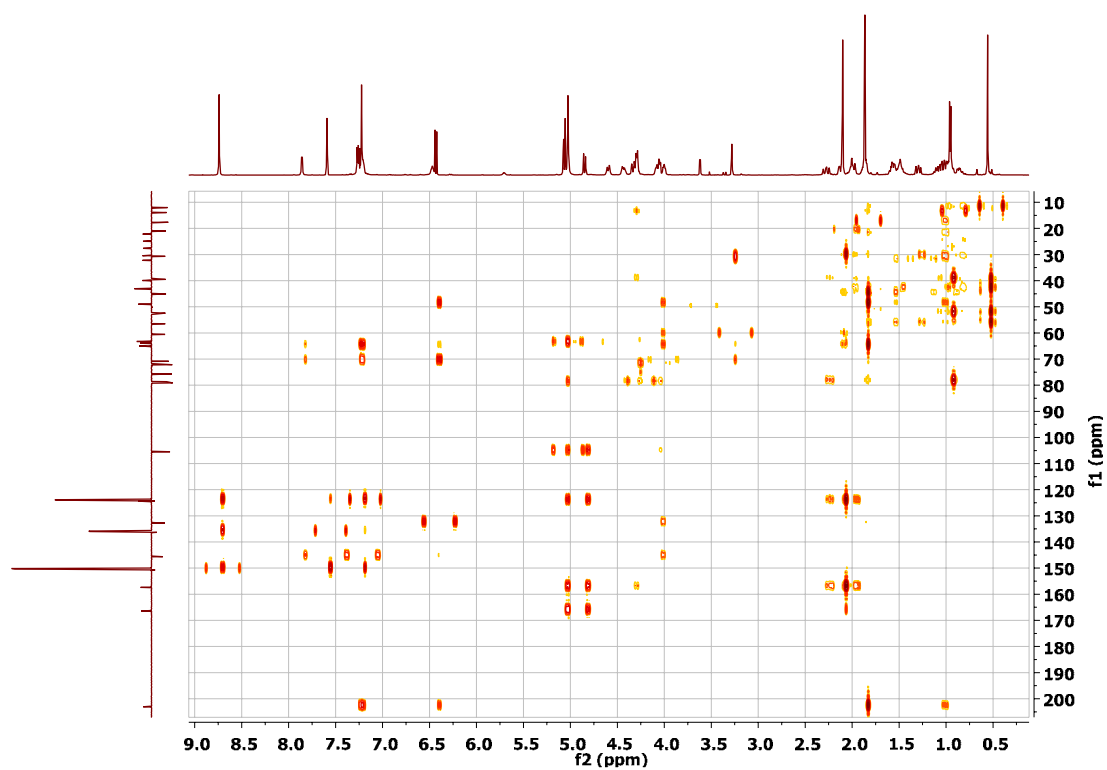
S15(c) ^1H - ^1H COSY spectrum of sitoindoside IX (**15**)



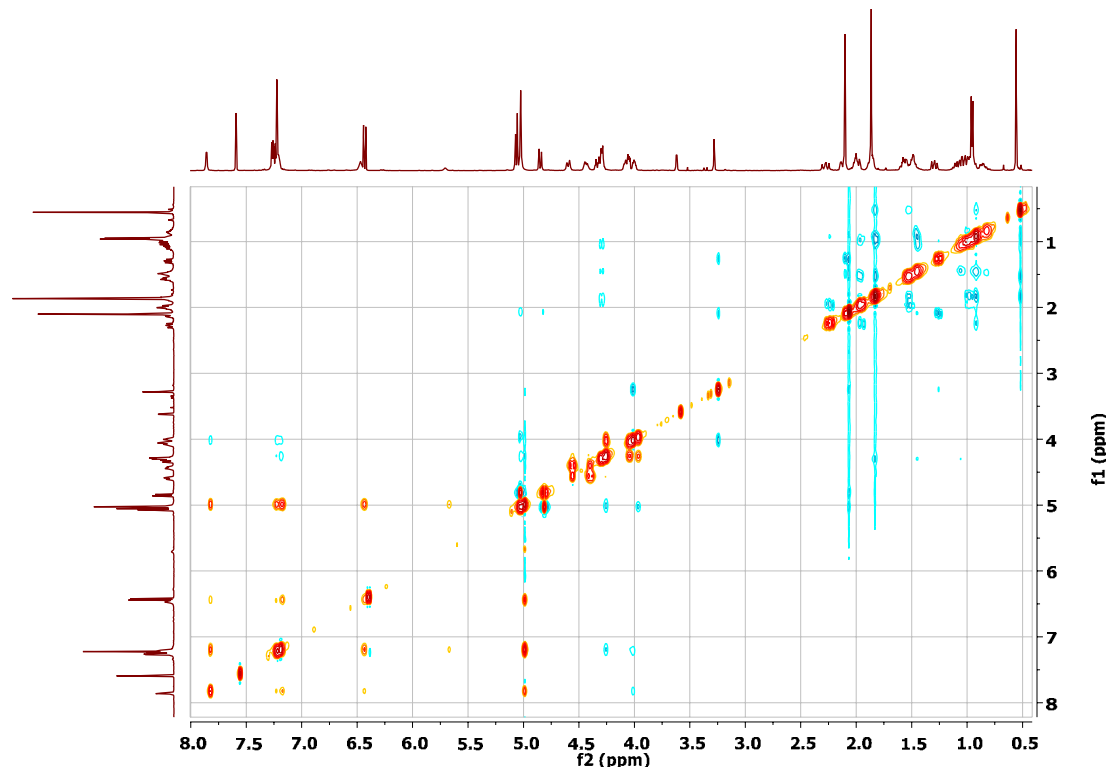
S15(d) HSQC spectrum of sitoindoside IX (15)



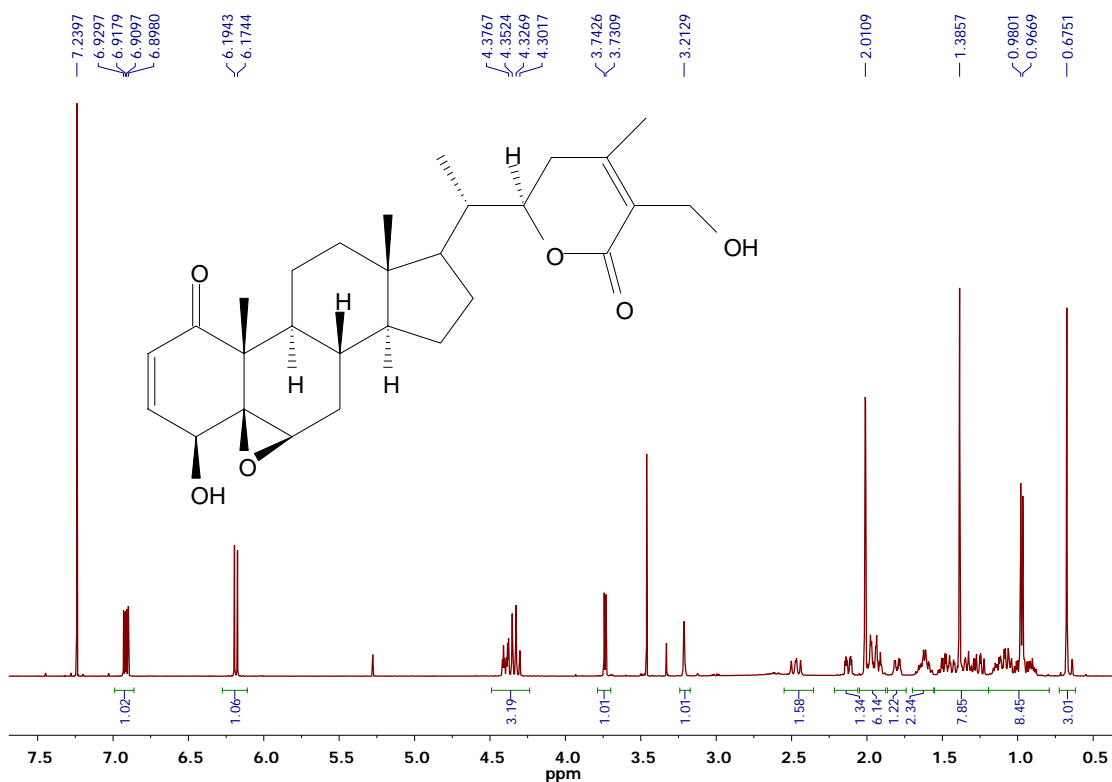
S15(e) HMBC spectrum of sitoindoside IX (15)



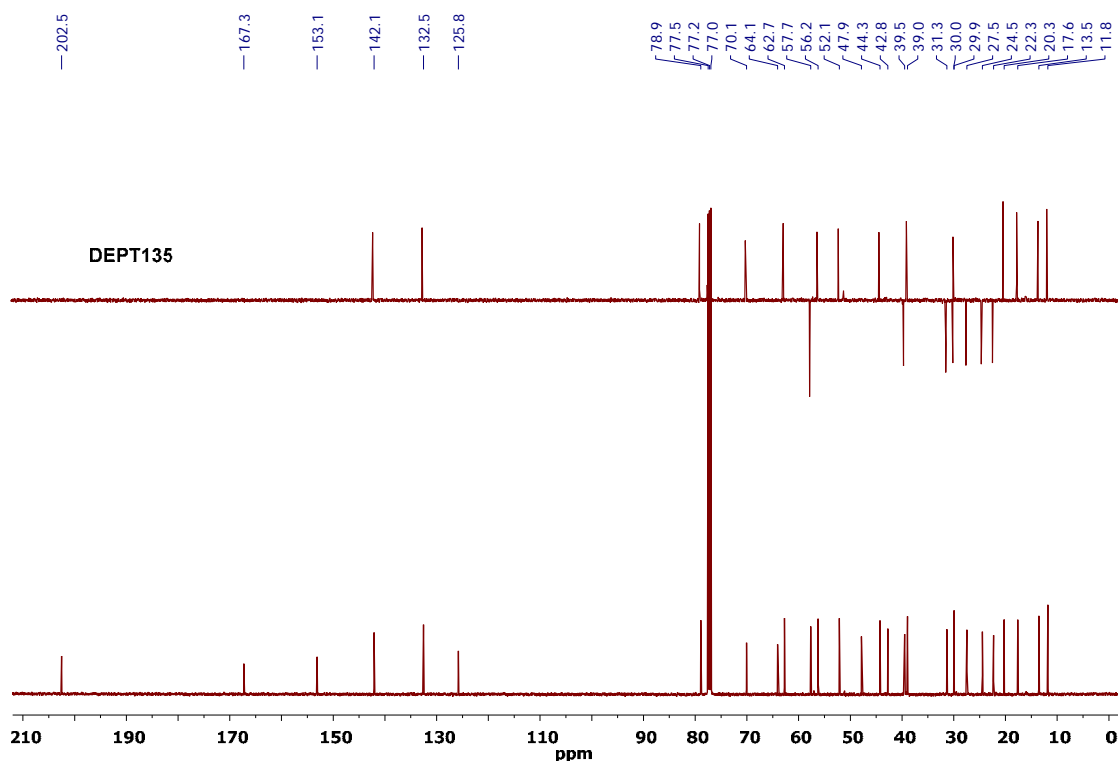
S15(f) NOESY spectrum of sitoindoside IX (15)



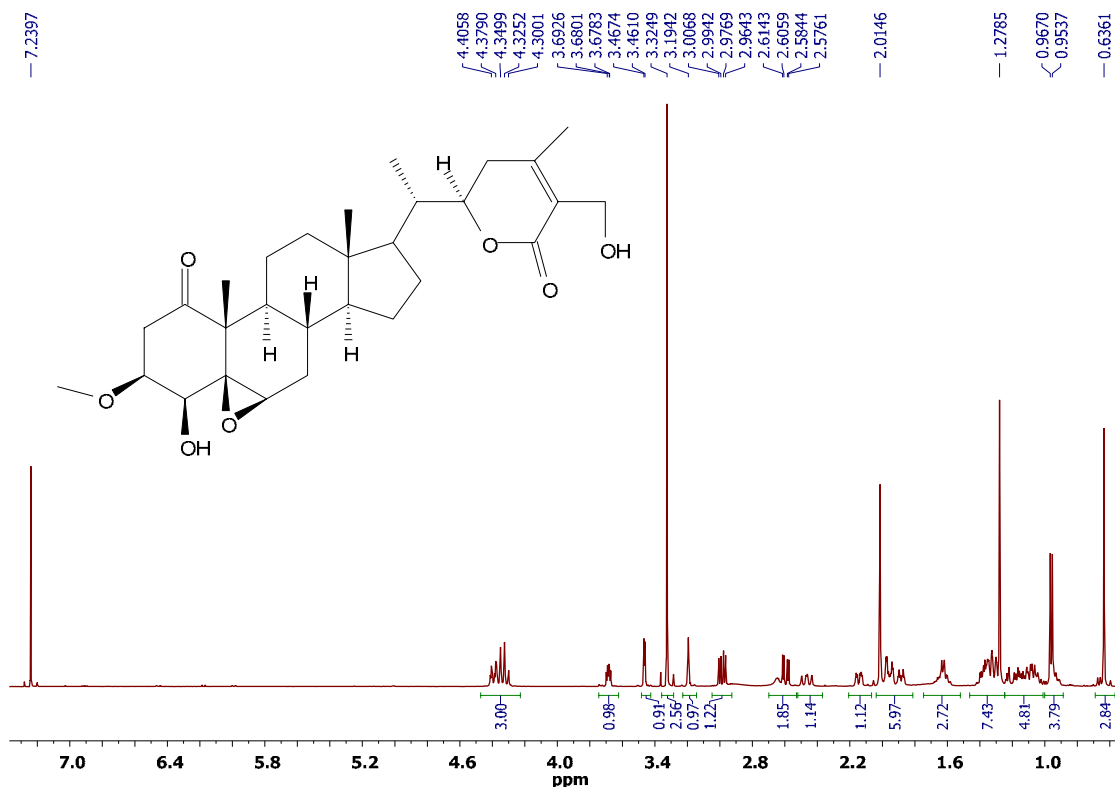
S16(a) ^1H NMR spectrum of withaferin A (16) in CDCl_3 (500 MHz)



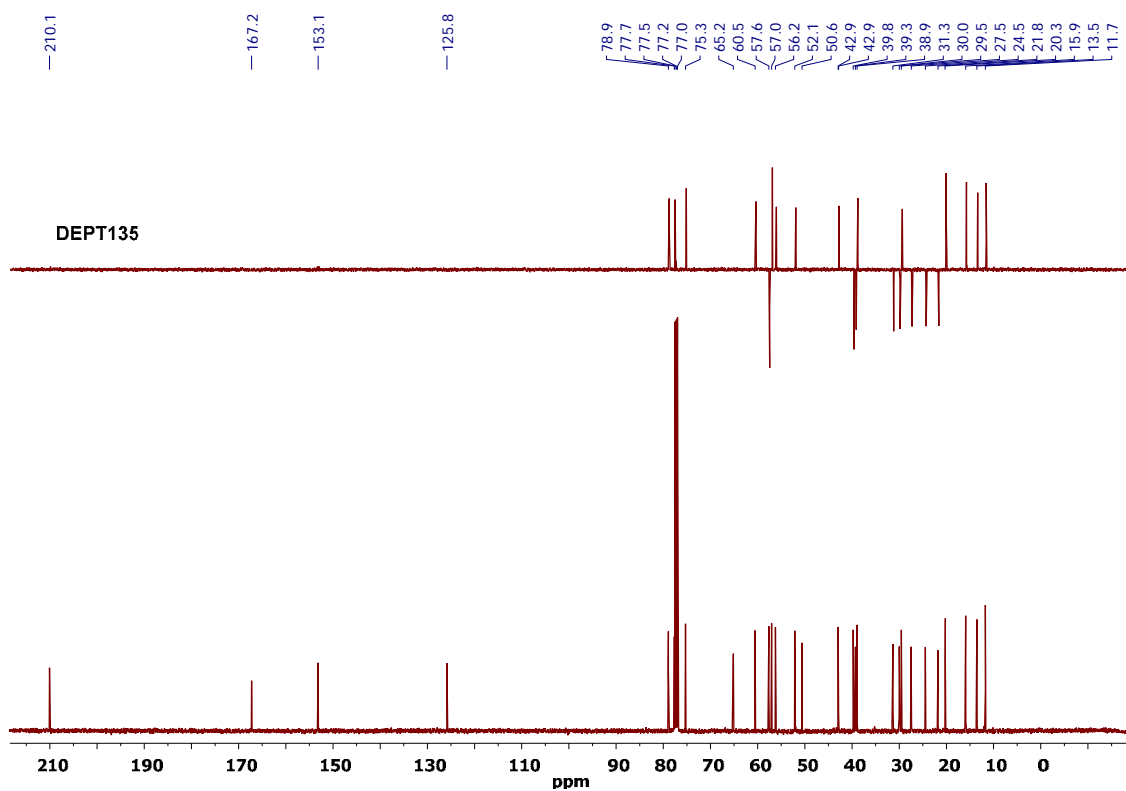
S16(b) ^{13}C and DEPT135 spectra of withaferin A (**16**) (125 MHz)



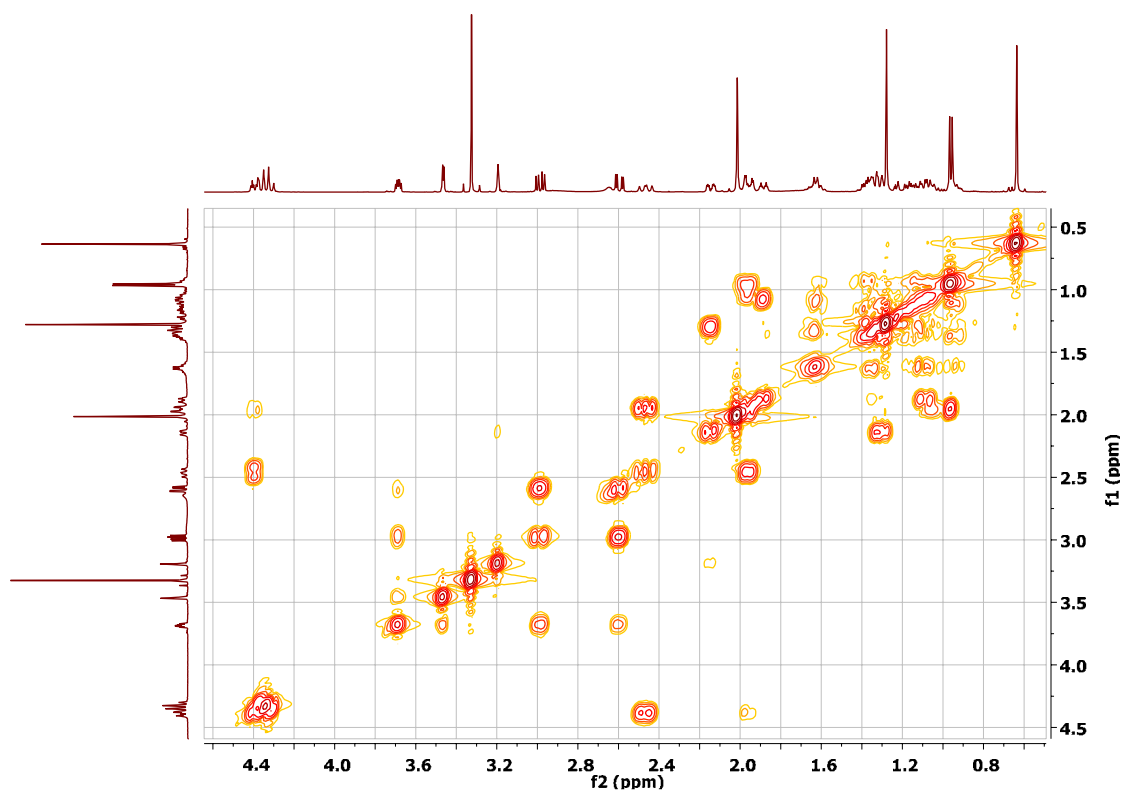
S17(a) ^1H NMR spectrum of 2,3-dihydro-3 β -methoxywithaferin A (**17**) in CDCl_3 (500 MHz)



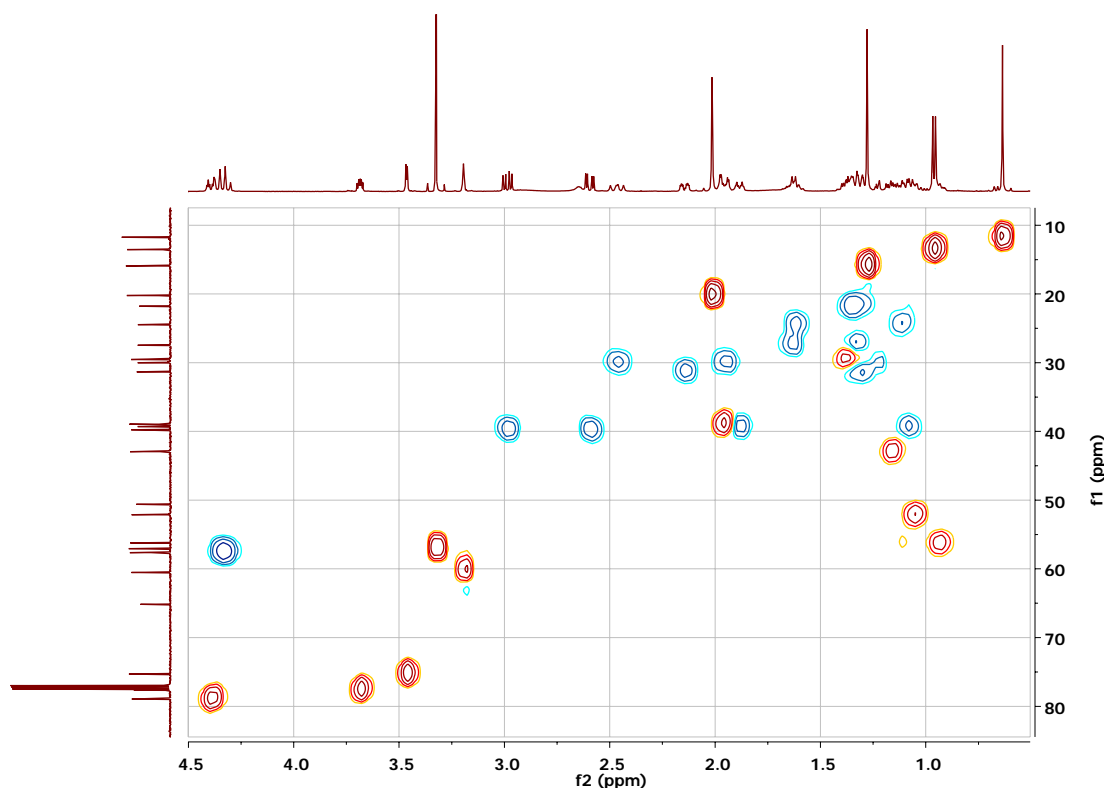
S17(b) ^{13}C and DEPT135 spectra of 2,3-dihydro-3 β -methoxywithaferin A (**17**) (125 MHz)



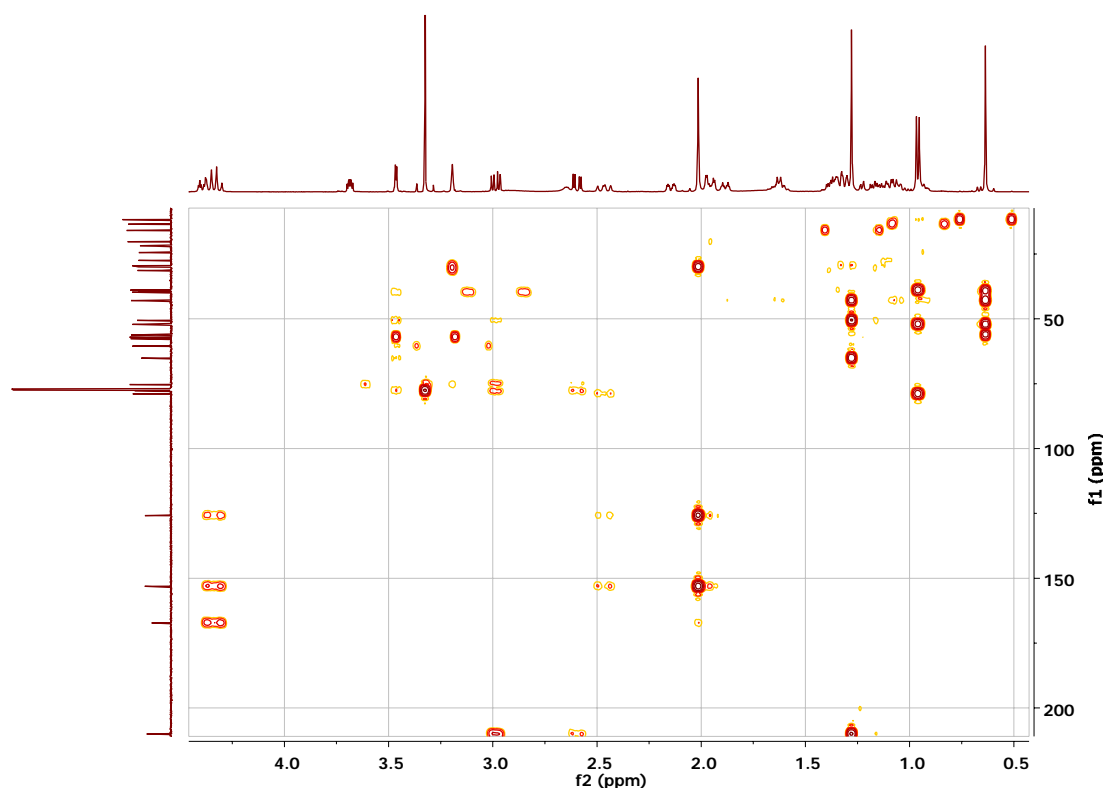
S17(c) ^1H - ^1H COSY spectrum of 2,3-dihydro-3 β -methoxywithaferin A (**17**)



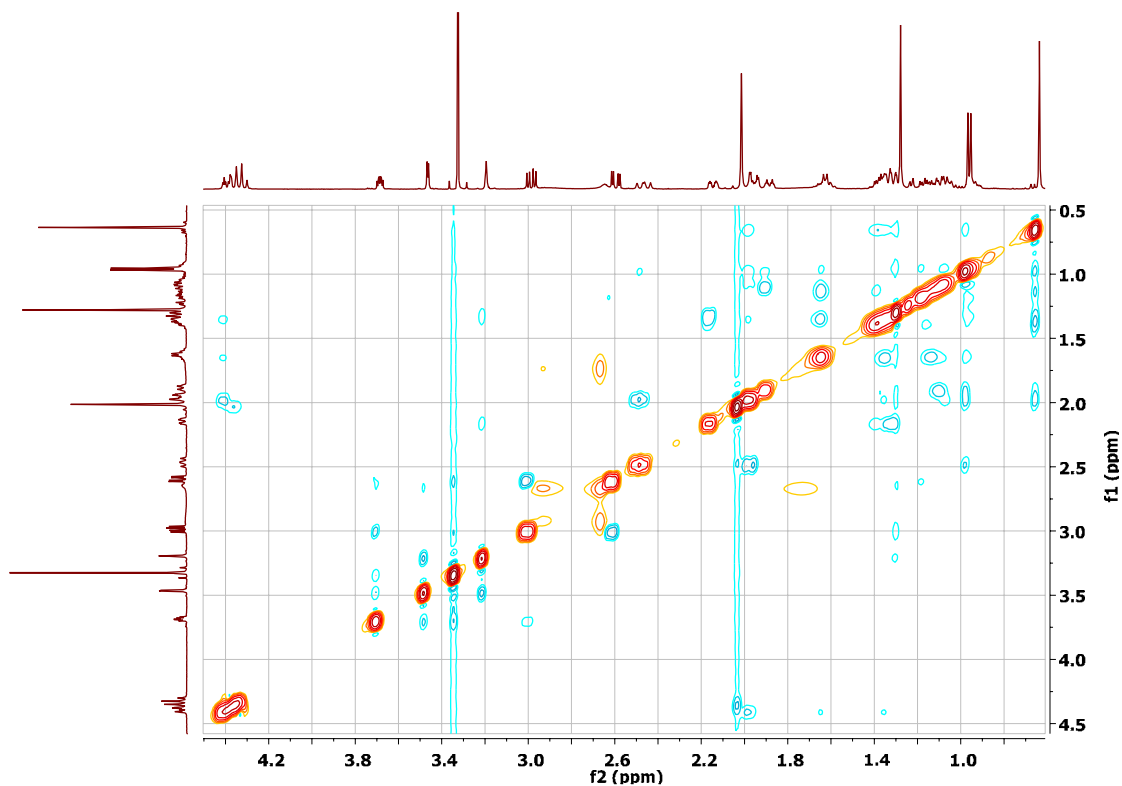
S17(d) HSQC spectrum of 2,3-dihydro-3 β -methoxywithaferin A (17)



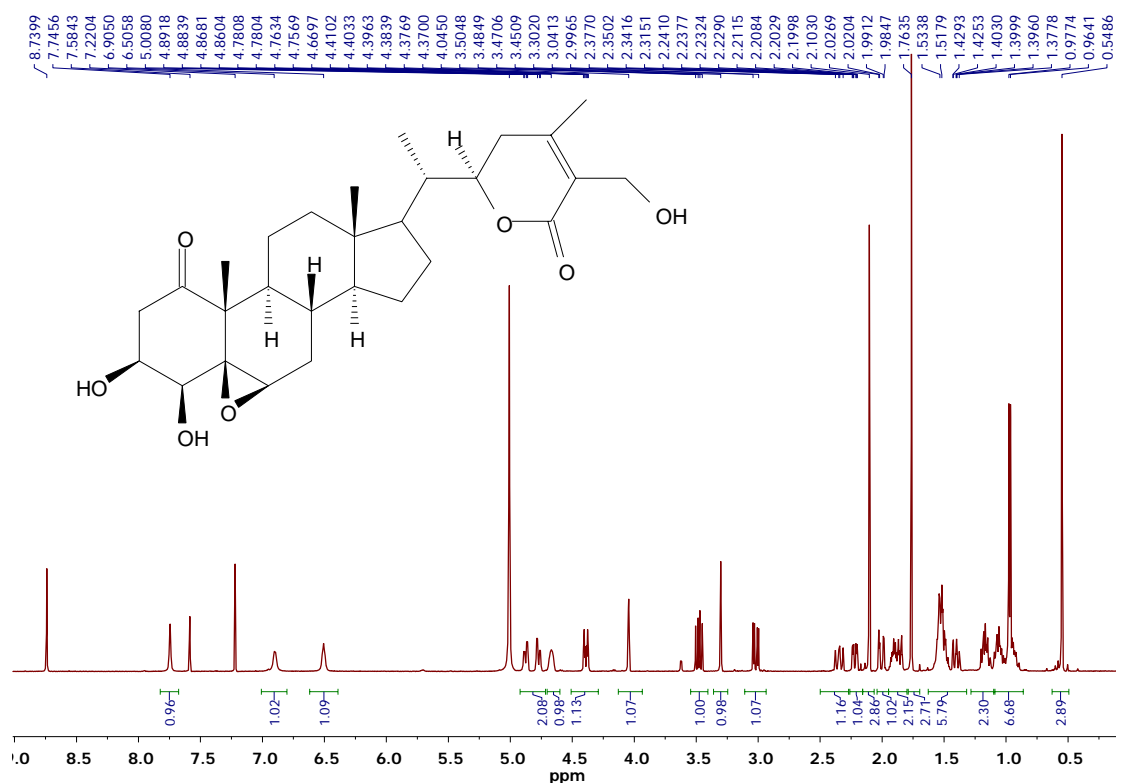
S17(e) HMBC spectrum of 2,3-dihydro-3 β -methoxywithaferin A (17)



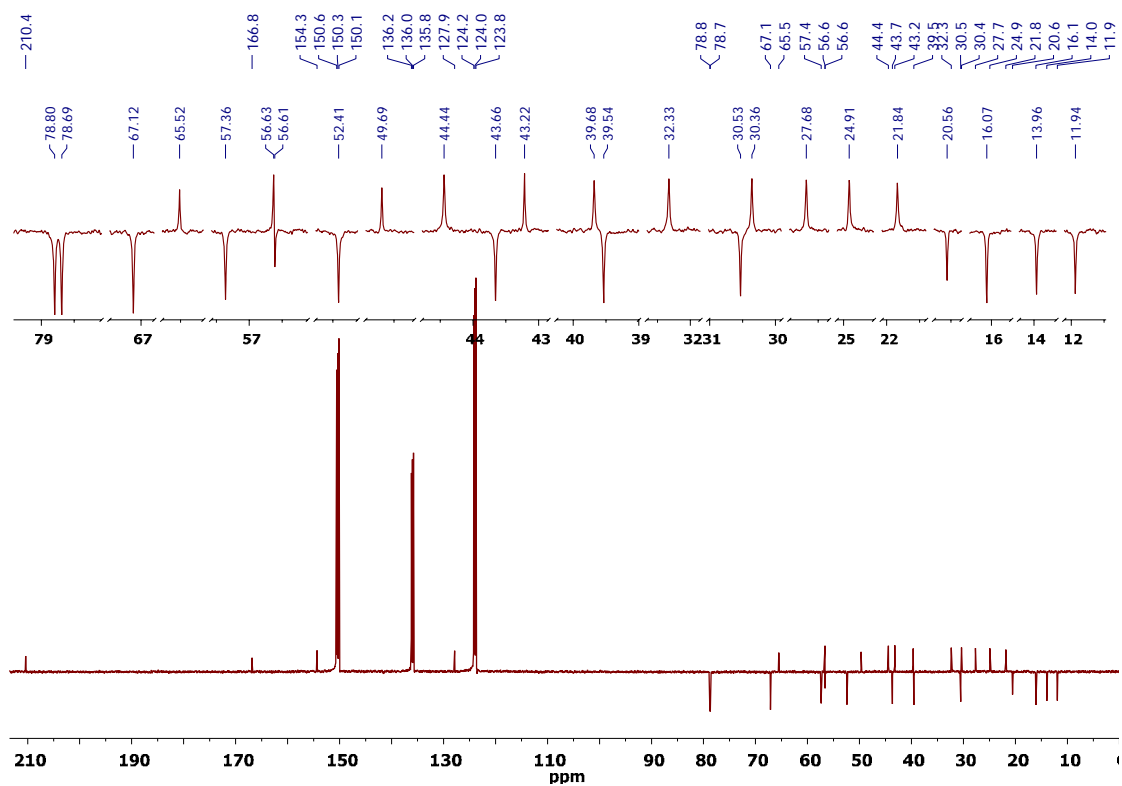
S17(f) NOESY spectrum of 2,3-dihydro-3 β -methoxywithaferin A (**17**)



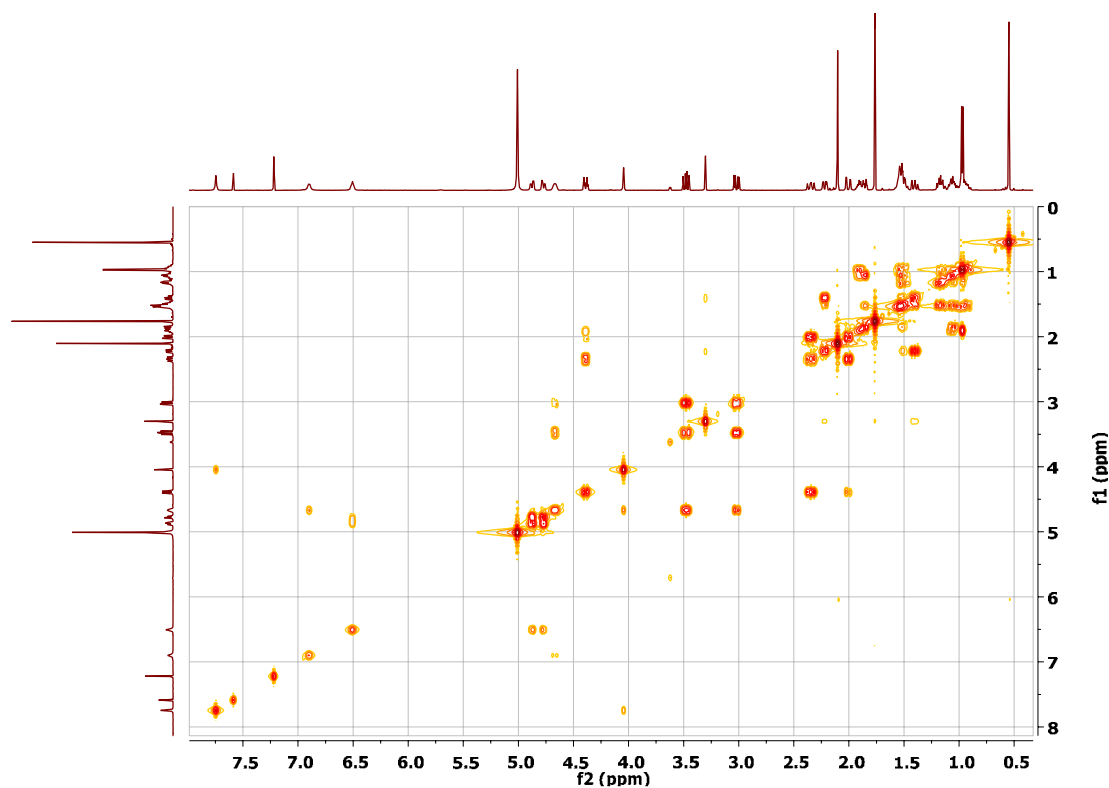
S18(a) ^1H NMR spectrum of viscosalactone B (**18**) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



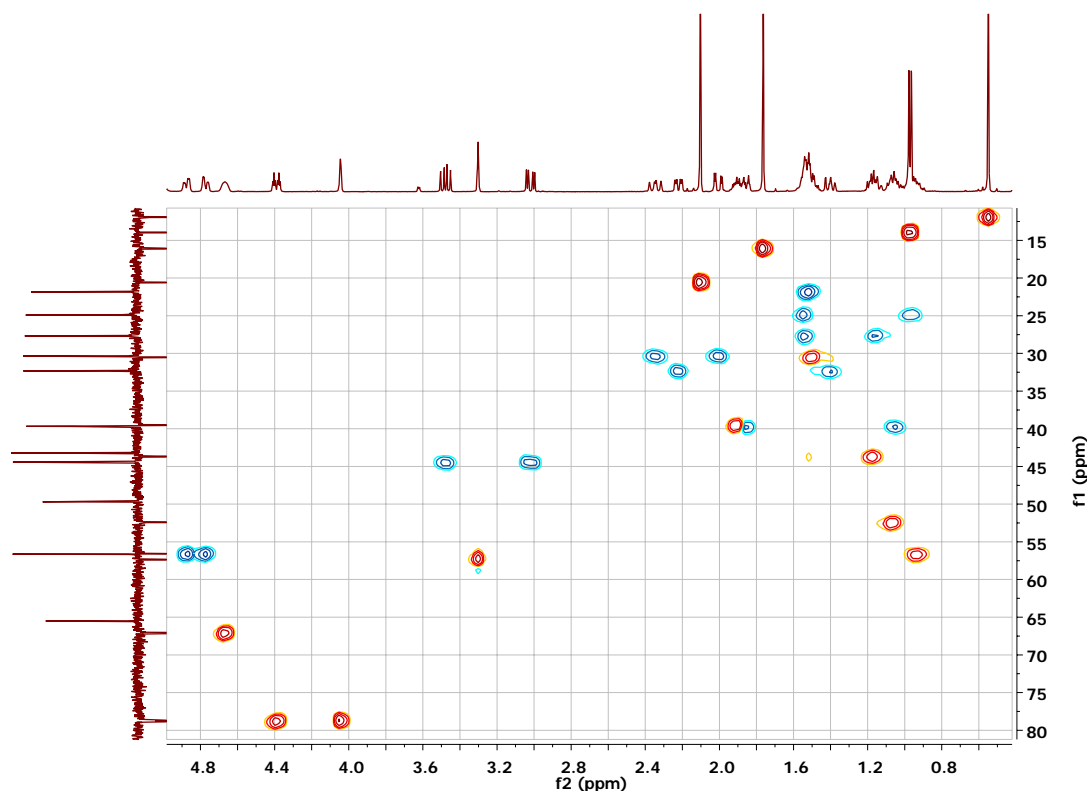
S18(b) ^{13}C APT spectrum of viscosalactone B (**18**) (125 MHz)



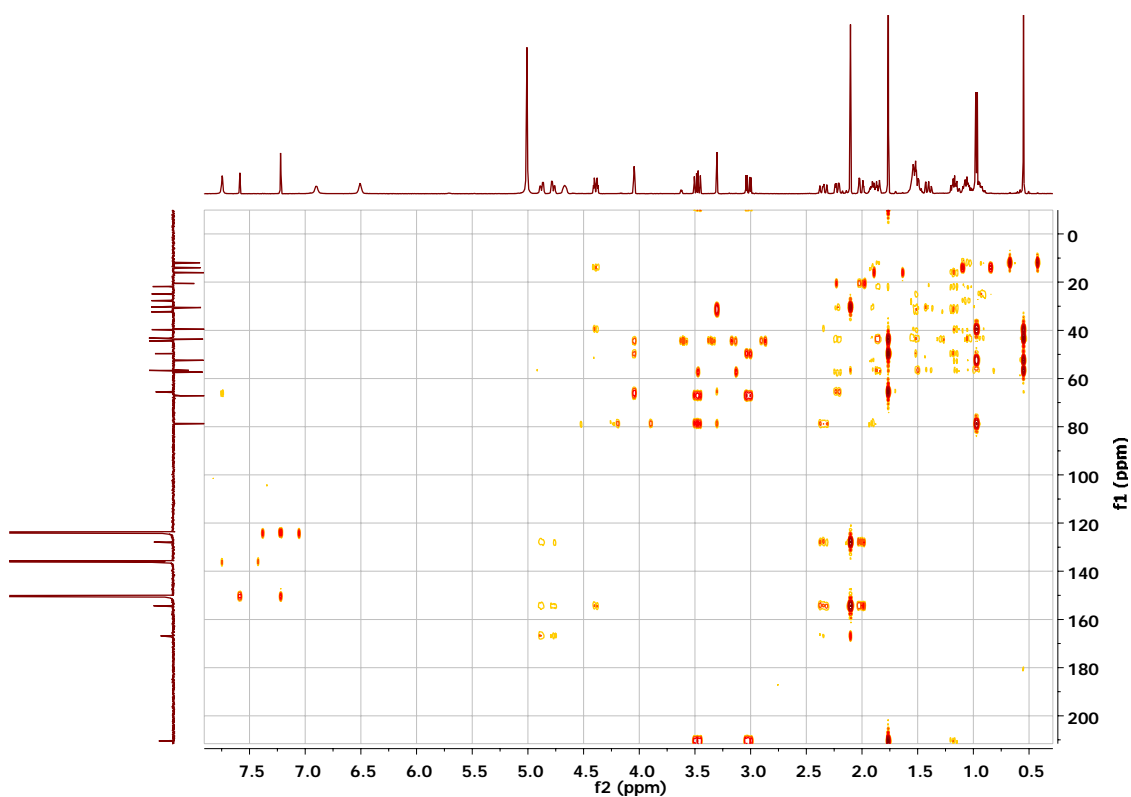
S18(c) ^1H - ^1H COSY spectrum of viscosalactone B (**18**)



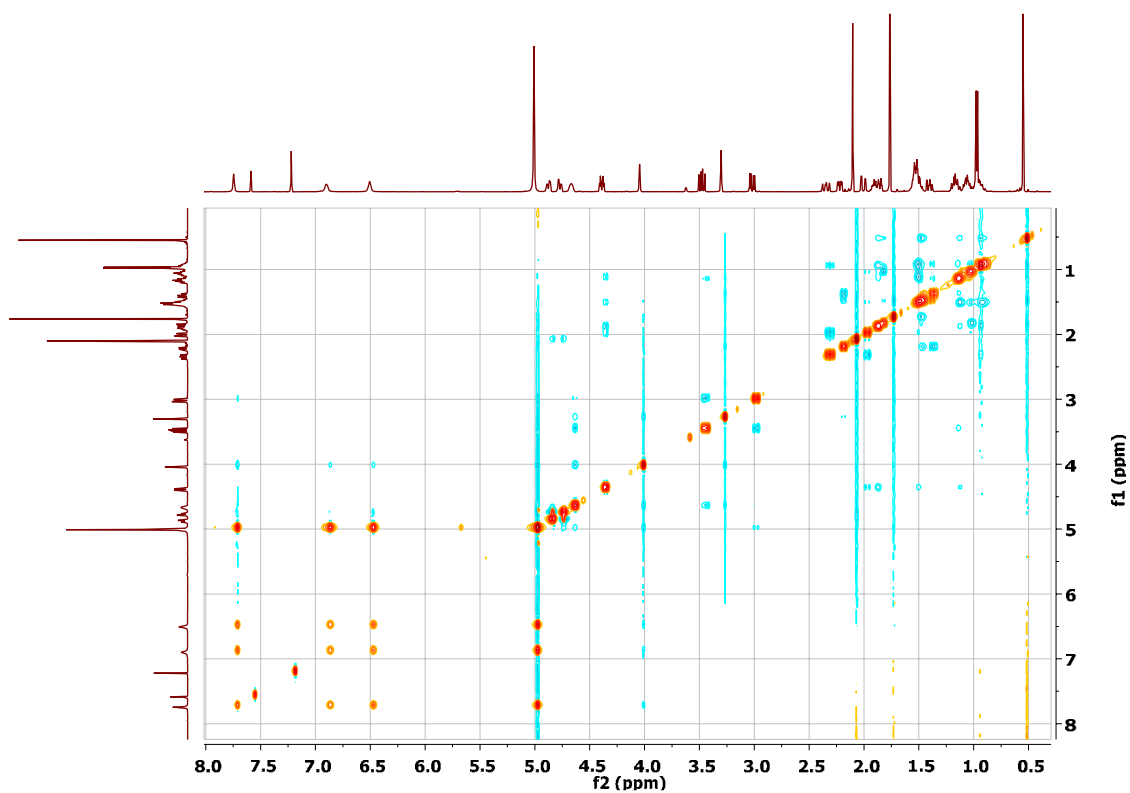
S18(d) HSQC spectrum of viscosalactone B (18)



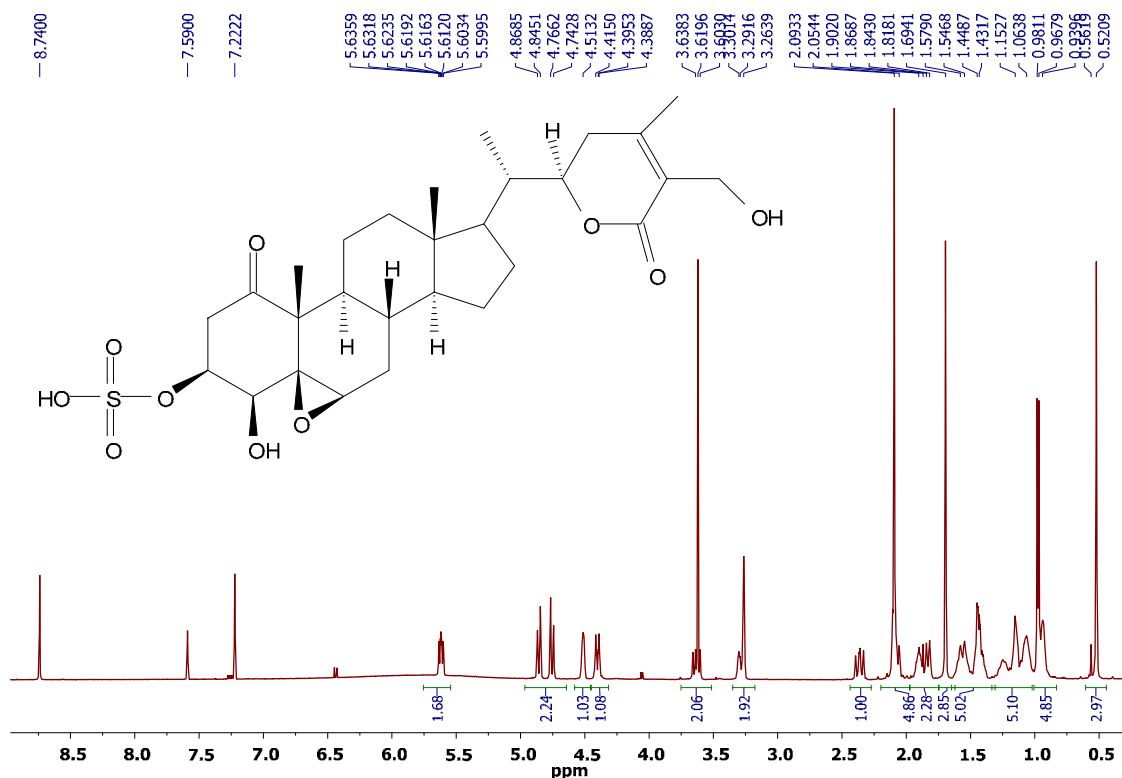
S18(e) HMBC spectrum of viscosalactone B (18)



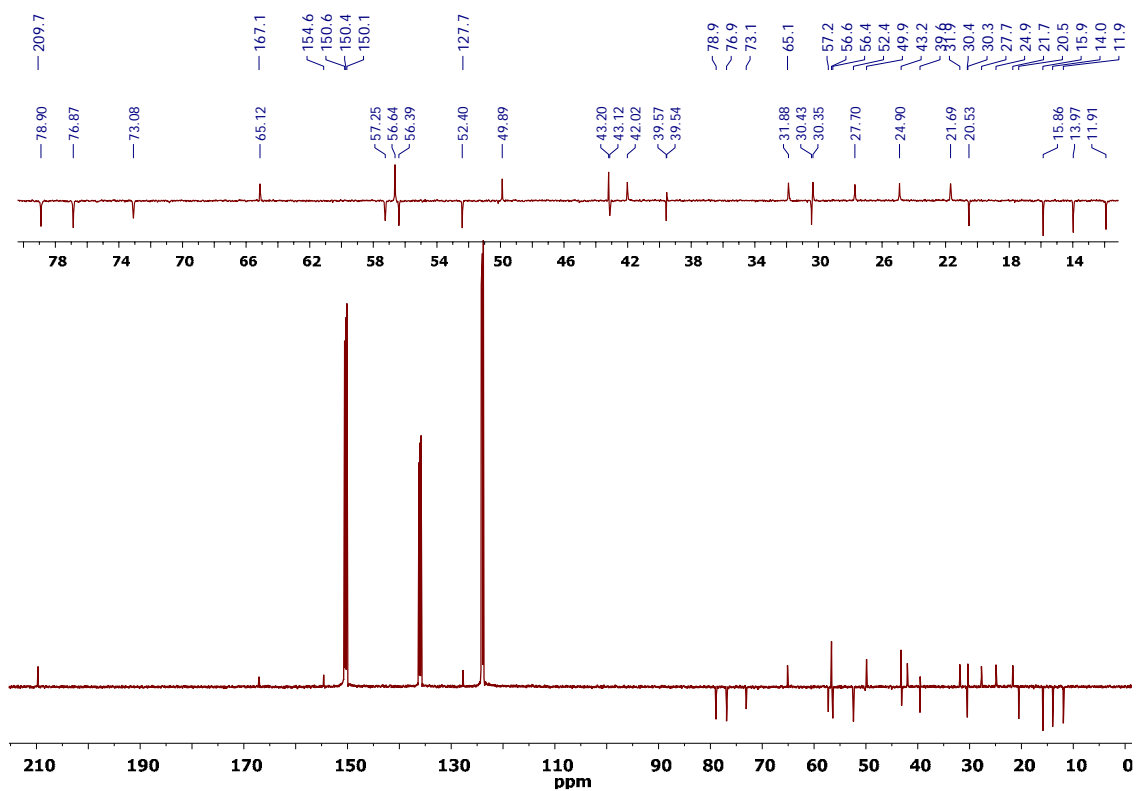
S18(f) NOESY spectrum of viscosalactone B (18)



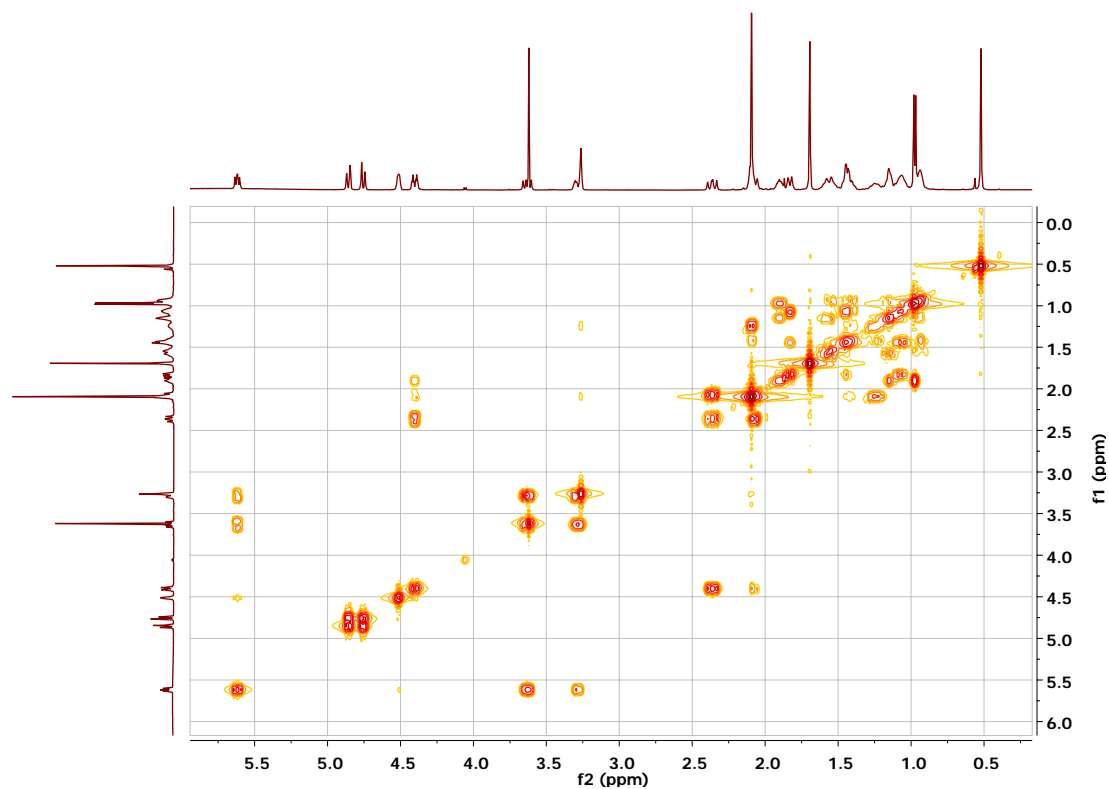
S19(a) ^1H NMR spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (19) in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



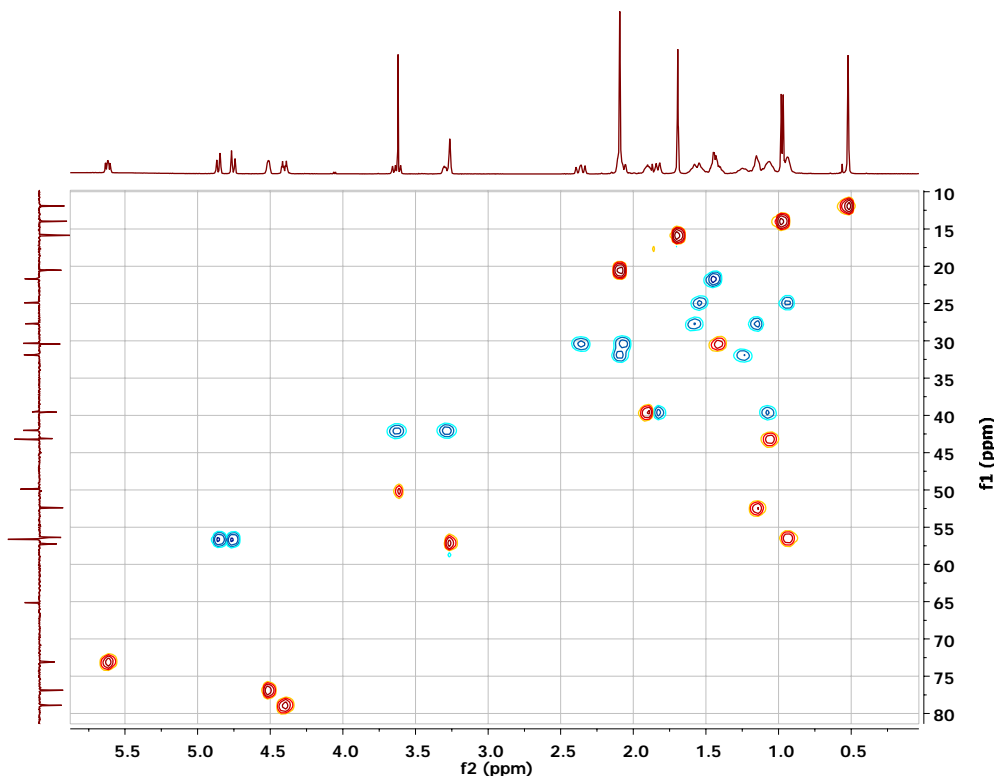
S19(b) ^{13}C APT spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (**19**) (125 MHz)



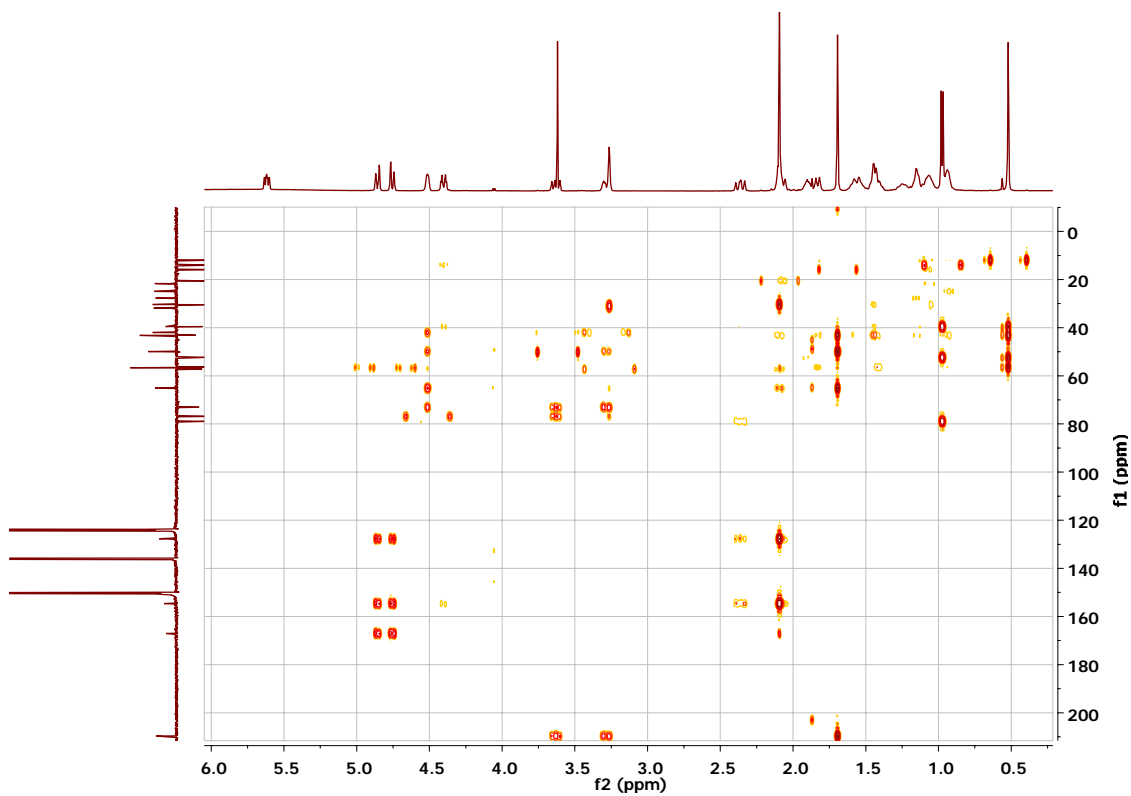
S19(c) ^1H - ^1H COSY spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (**19**)



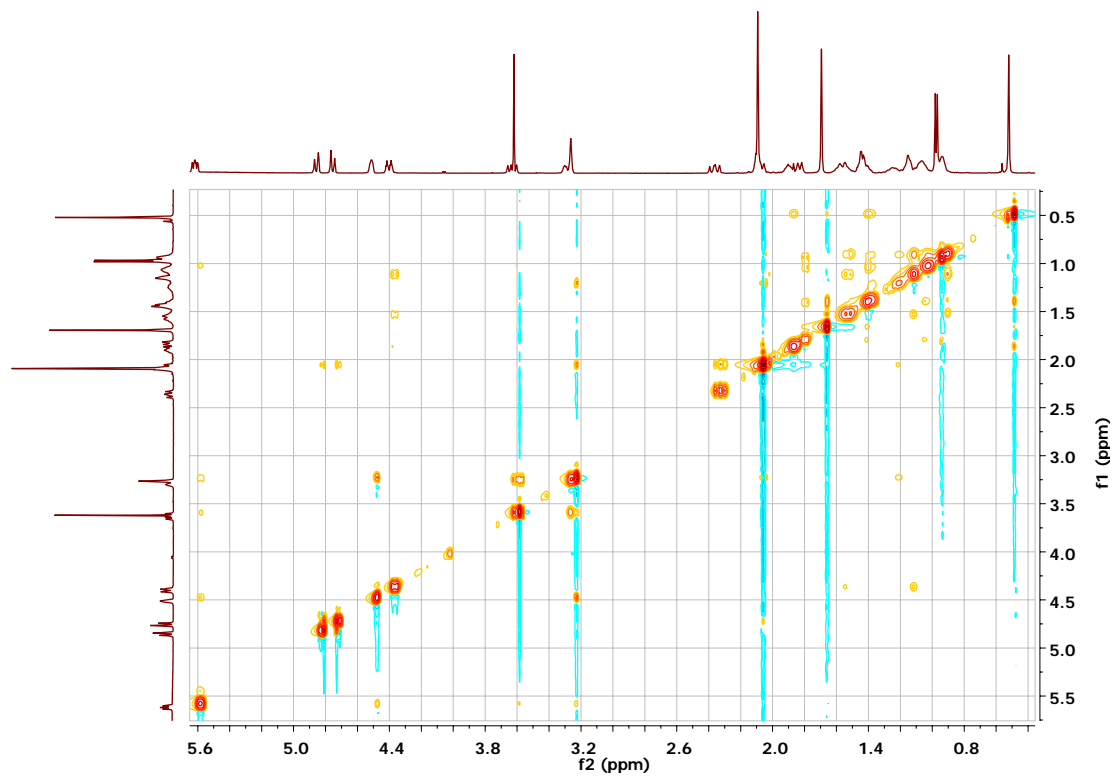
S19(d) HSQC spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (**19**)



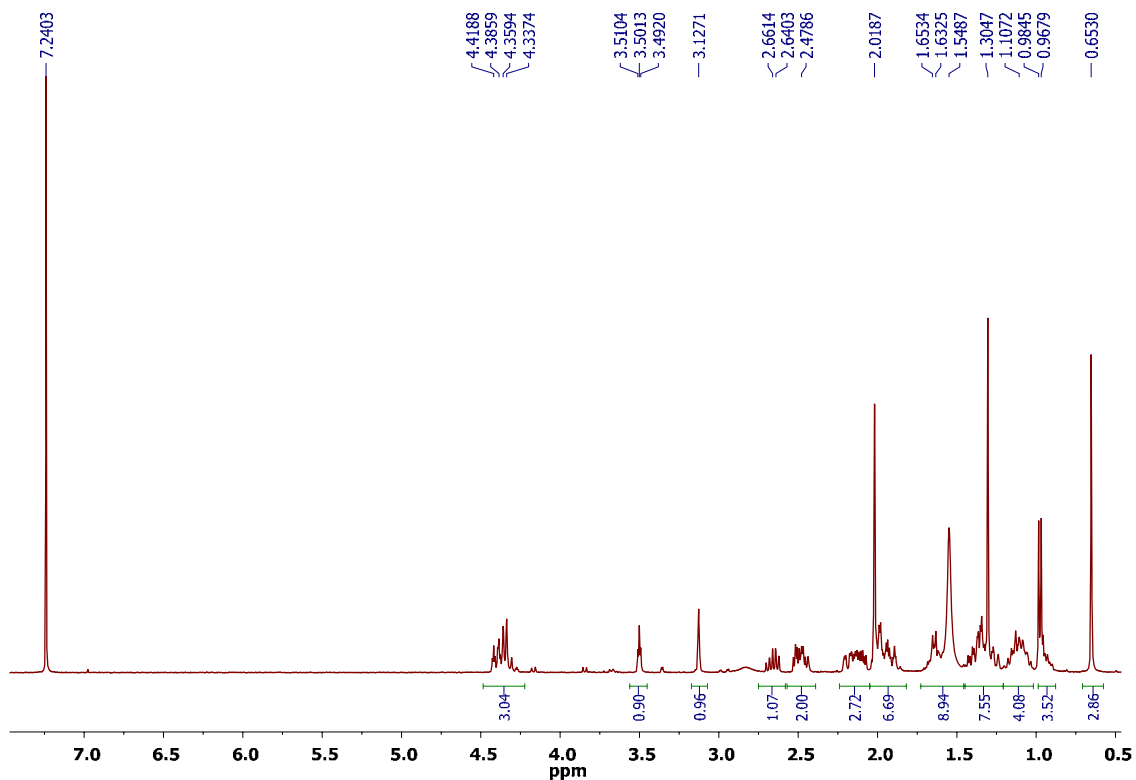
S19(e) HMBC spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (**19**)



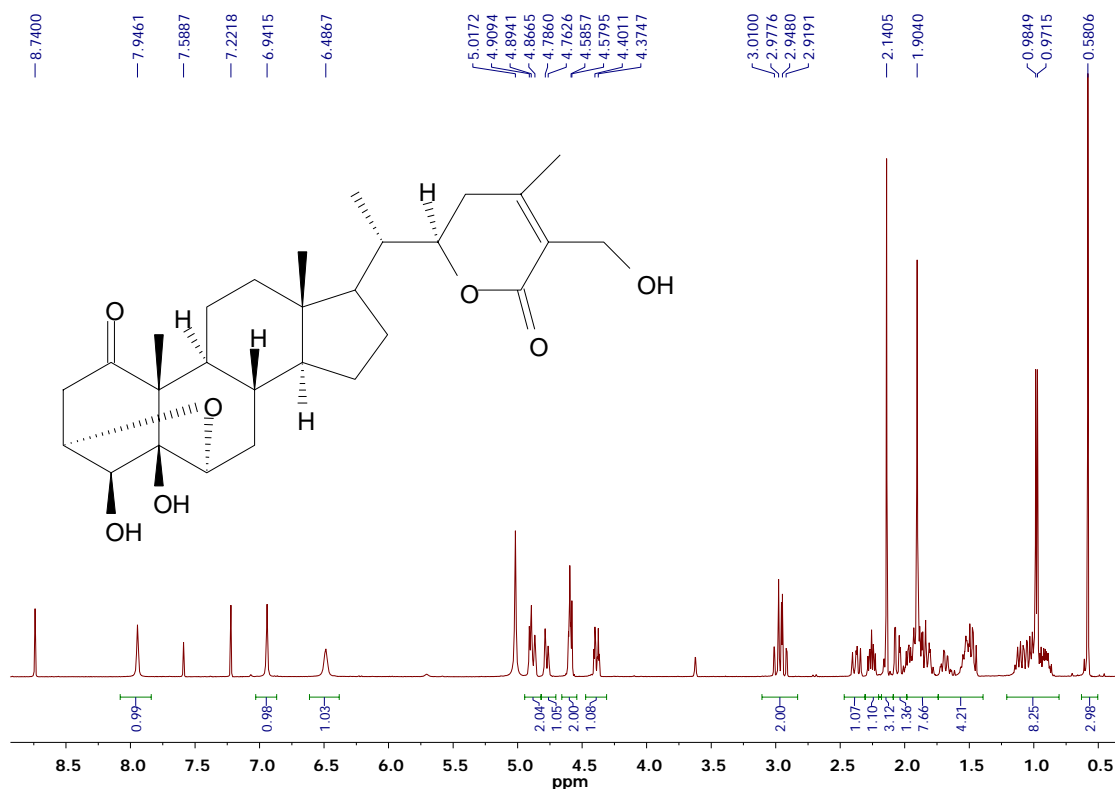
S19(f) NOESY spectrum of 2,3-dihydro-3 β -O-sulfate withaferin A (**19**)



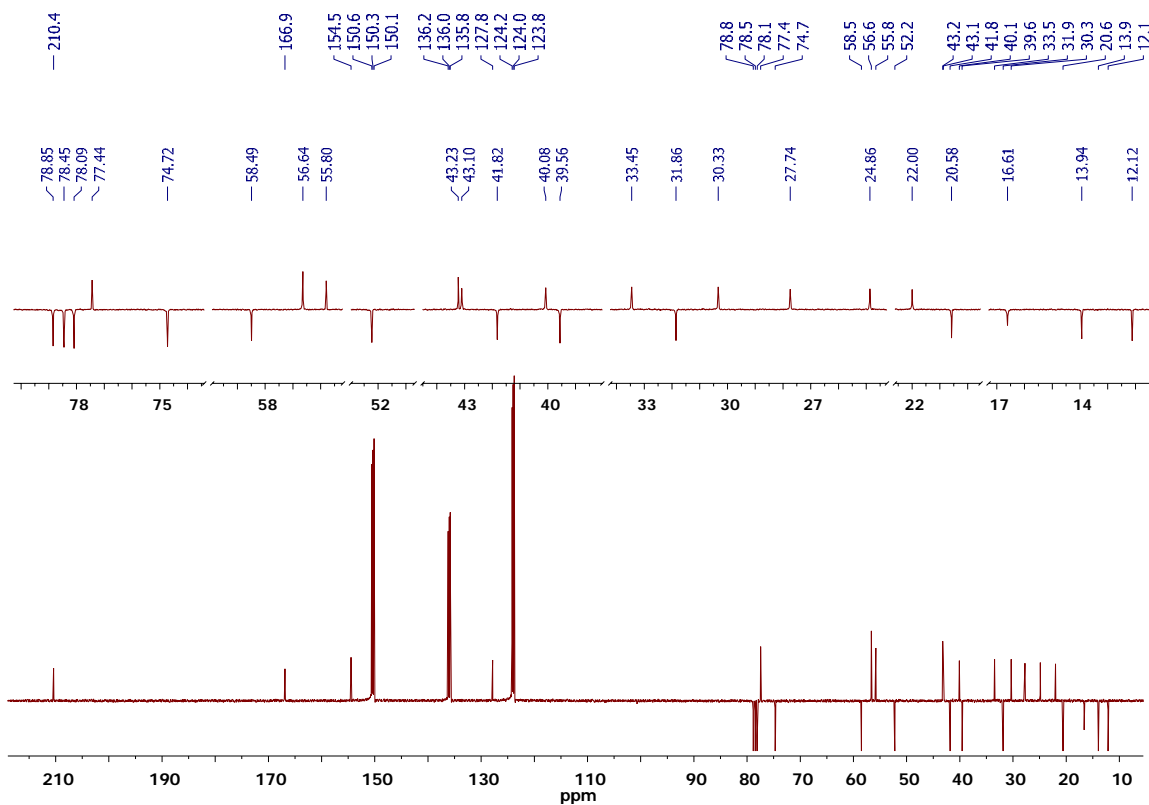
S20 ^1H NMR spectrum of 2,3-dihydrowithaferin A (**20**) in CDCl_3 (400 MHz)



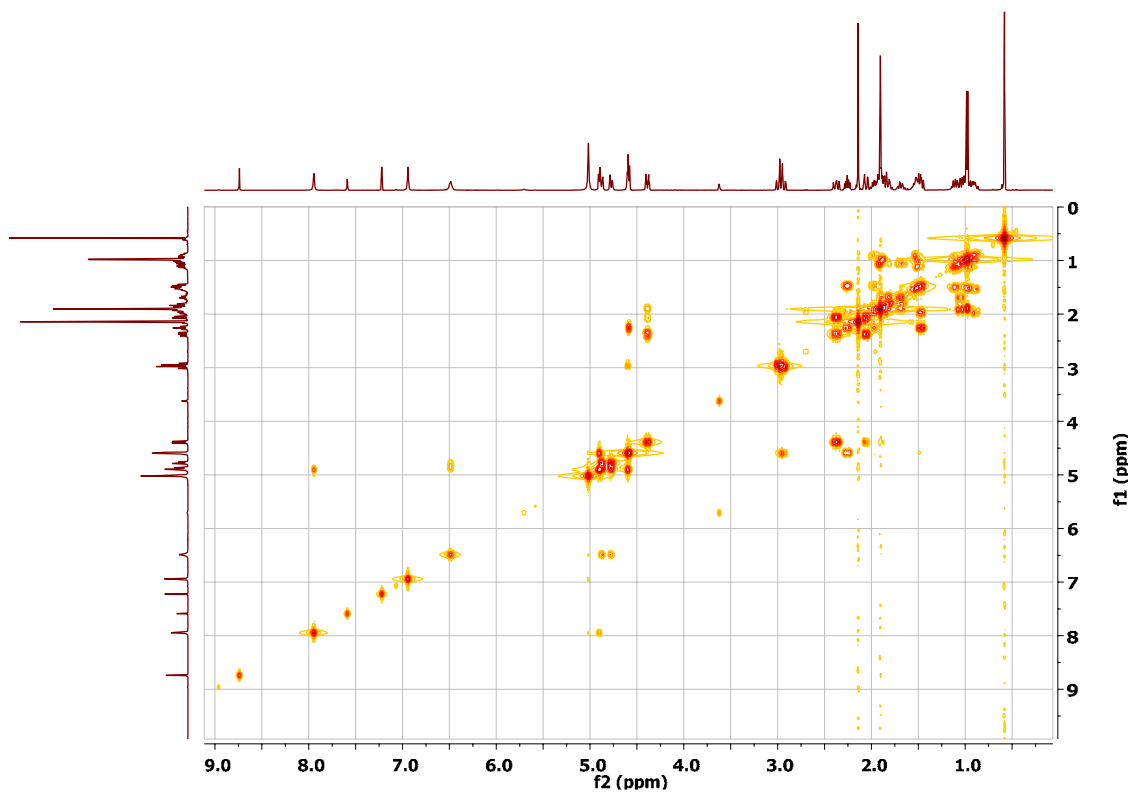
S21(a) ^1H NMR spectrum of **21** in $\text{C}_5\text{D}_5\text{N}$ (500 MHz)



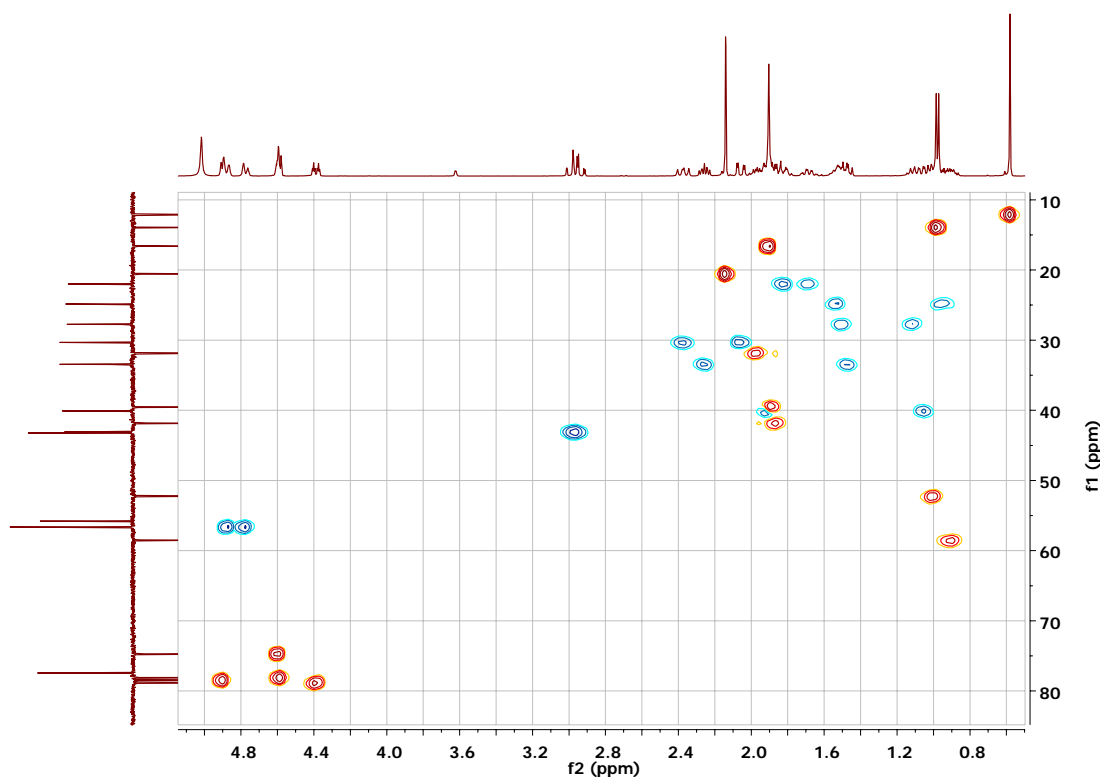
S21(b) ^{13}C APT spectrum of **21** (125 MHz)



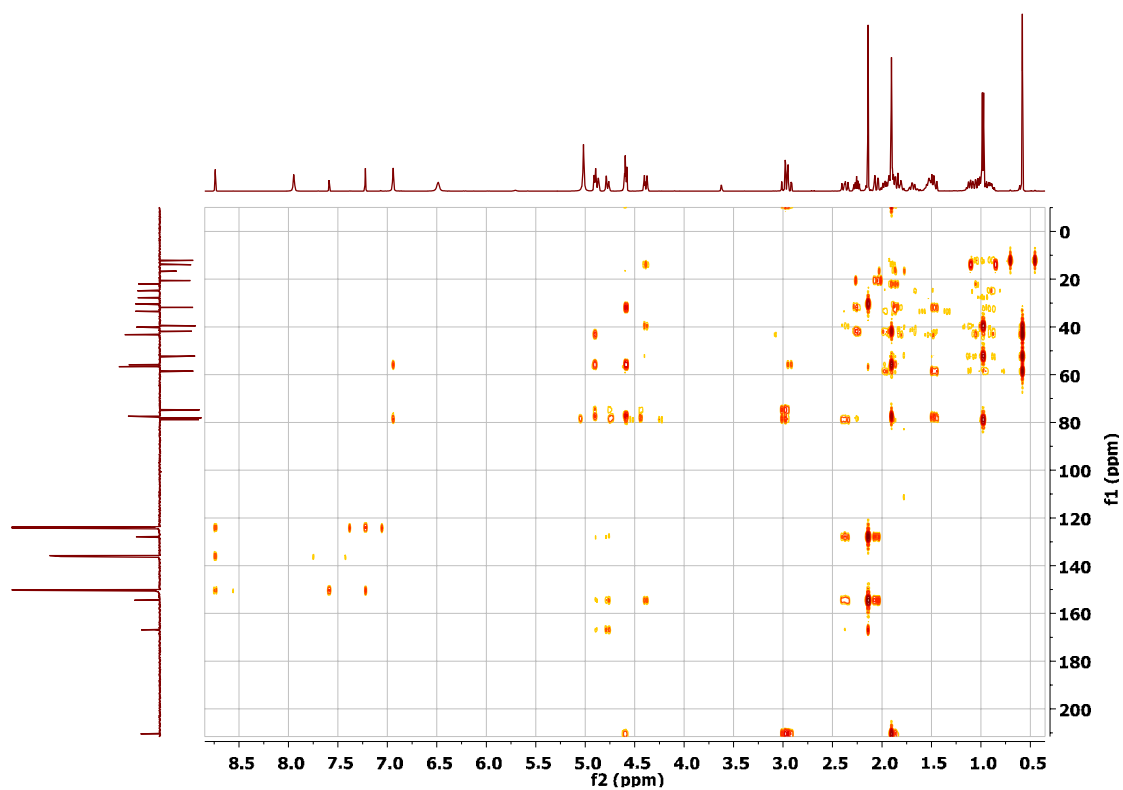
S21(c) ^1H - ^1H COSY spectrum of **21**



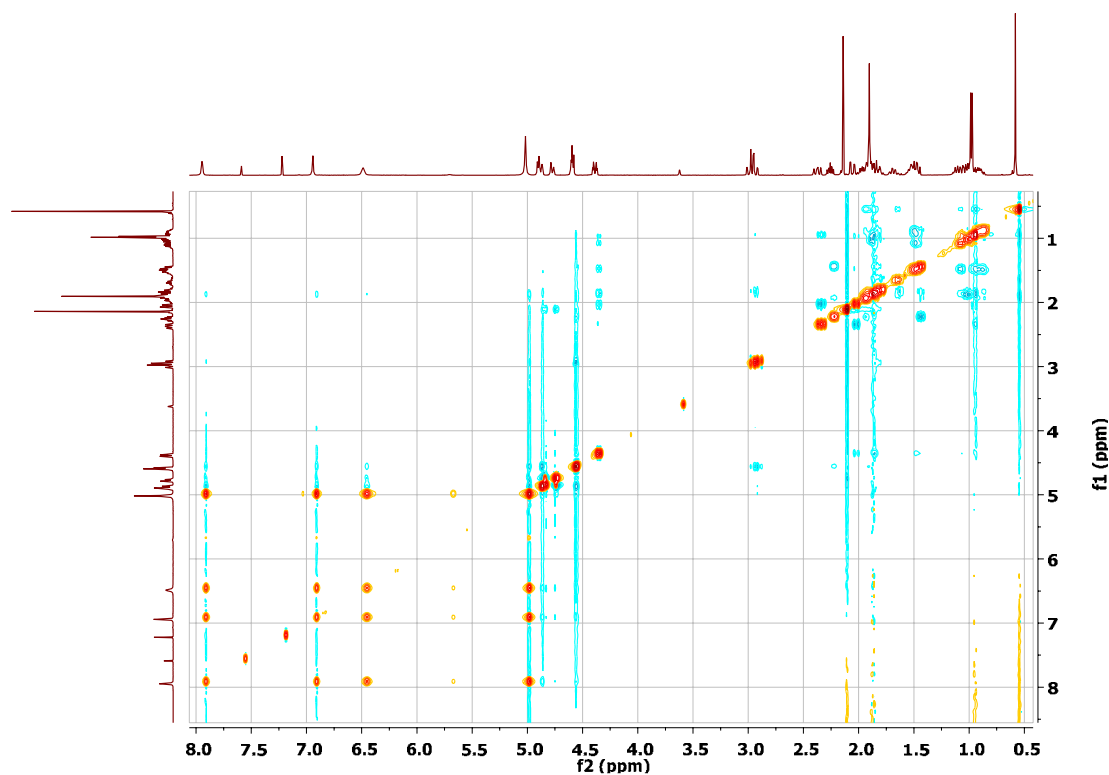
S21(d) HSQC spectrum of **21**



S21(e) HMBC spectrum of **21**



S21(f) NOESY spectrum of **21**



S22 Cytotoxicity IC₅₀ of Fractions ($\mu\text{g/mL}$) against Five Cell Lines ^a

Fractions	B16F10	SKMEL-28	JMAR	MDA-1986	MRC-5
CH ₂ Cl ₂ :MeOH (1:1) Extract	9.8	9.7	8.6	4.6	8.7
Hexane Fraction	46.6	43.6	49.7	9.9	28.6
EtOAc Fraction	1.6	1.7	1.5	0.7	1.0
<i>n</i> -BuOH Fraction	5.7	4.1	4.5	1.2	1.2

^a For cell lines used, see text.