Supporting Information

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Cytotoxic Constituents from the Rhizomes of *Monstera deliciosa*

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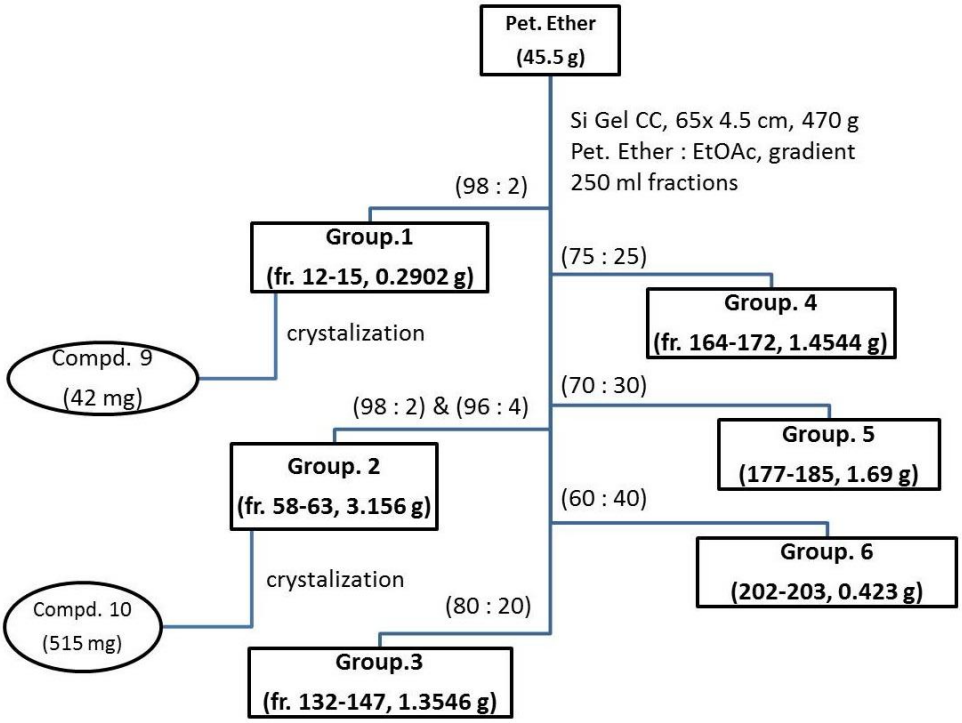

Figure S1: Scheme for chromatographic fractionation of the pet. ether extract & separation of **9** (β-sitostertyl palmitate) and **10** (β-sitosterol).

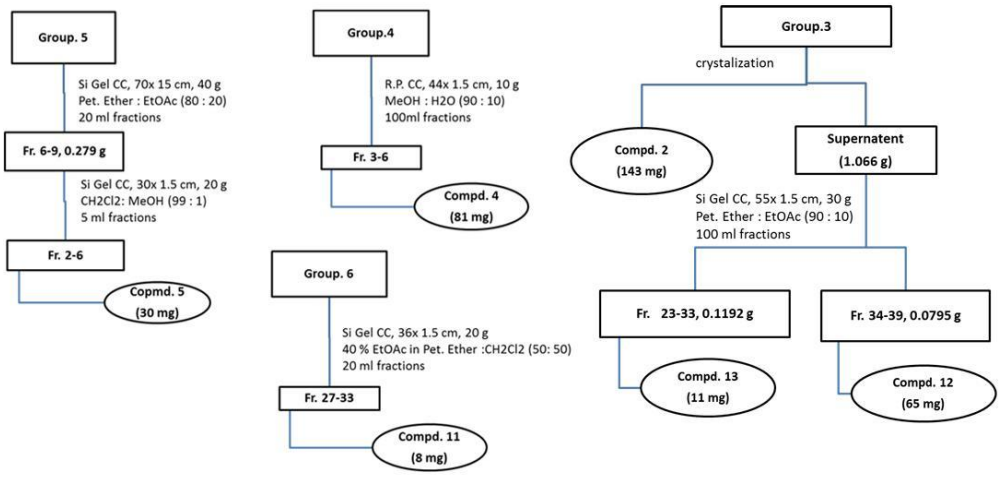

Figure S2: Scheme for chromatographic separation of **2** (propiosyringone), **4** (sesartemin), **5** (yangambin), **11** (7-oxo- β-sitosterol-3-O-β-D-glucopyranoside)-6'-palmitate), **12** (5α, 8α-epi-dioxyergosta-6, 22-dien-3β-ol), and **13** (oleanolic acid).

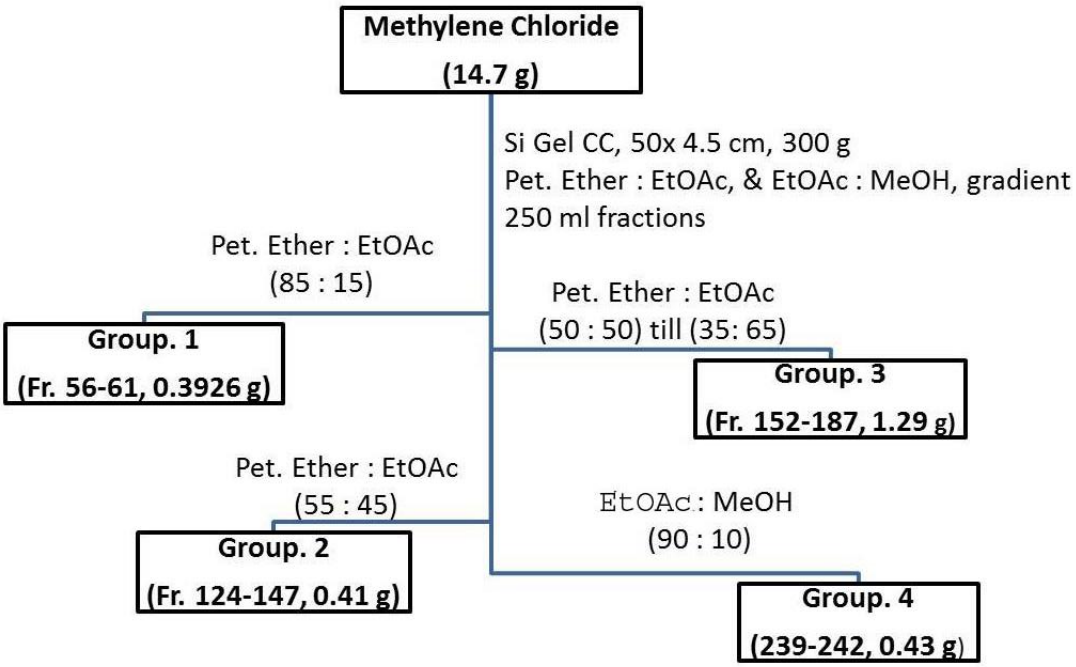

Figure S3: Scheme for chromatographic fractionation of the methylene chloride extract

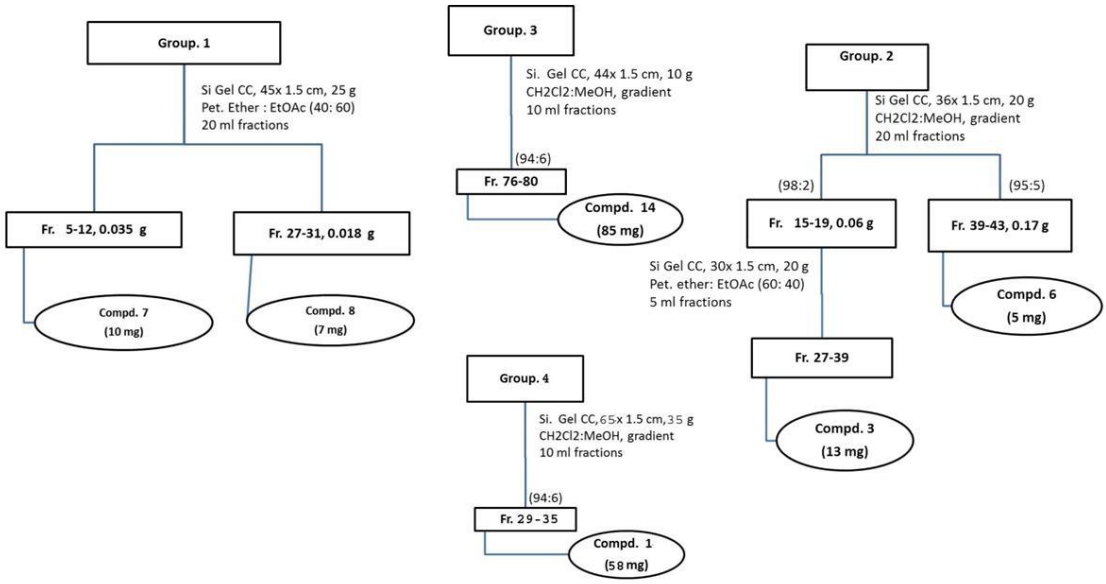

Figure S4: Scheme for chromatographic separation of compounds **1**(propiosyringone-β-D-glucopyranoside), **3** (ceplignan), **6** (syringaresinol), **7** (protocatechuic aldehyde), **8** (3-methyl thio-indole) and **14** (9, 12, 13-trihydroxy-10-octadecenoic acid).

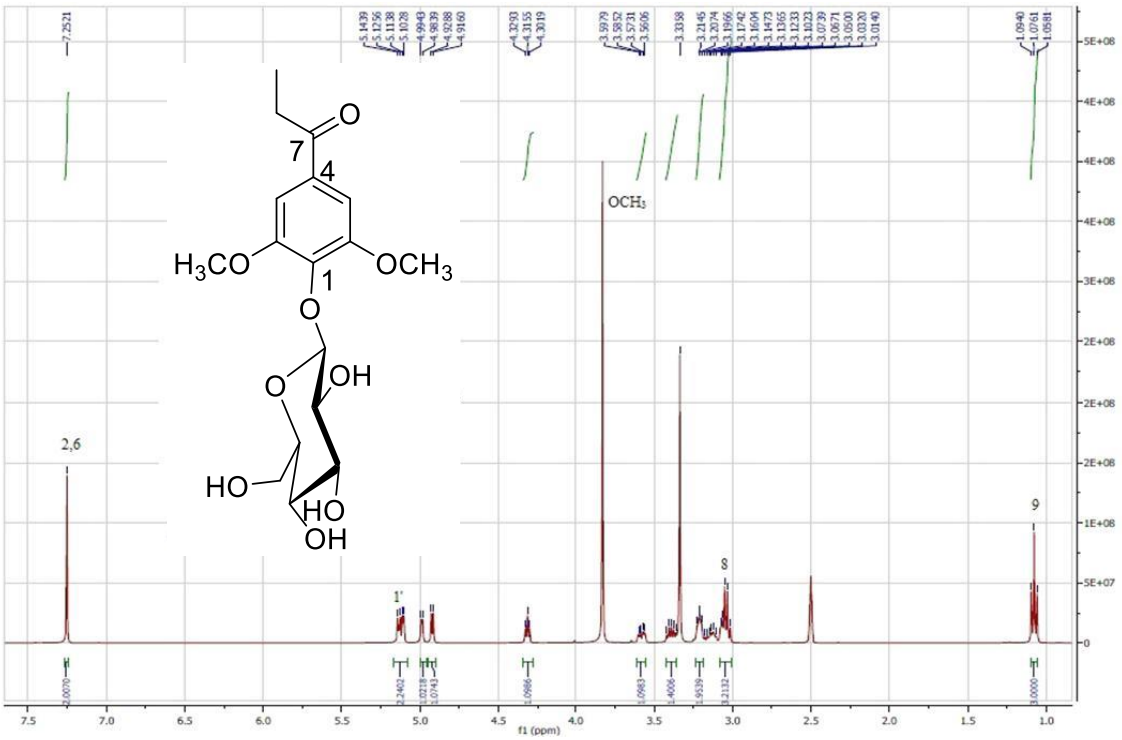

Figure S5: ^{1}H-NMR (400 MHz, DMSO-d_6) spectrum of **1** (propiosyringone-β-D-glucopyranoside)

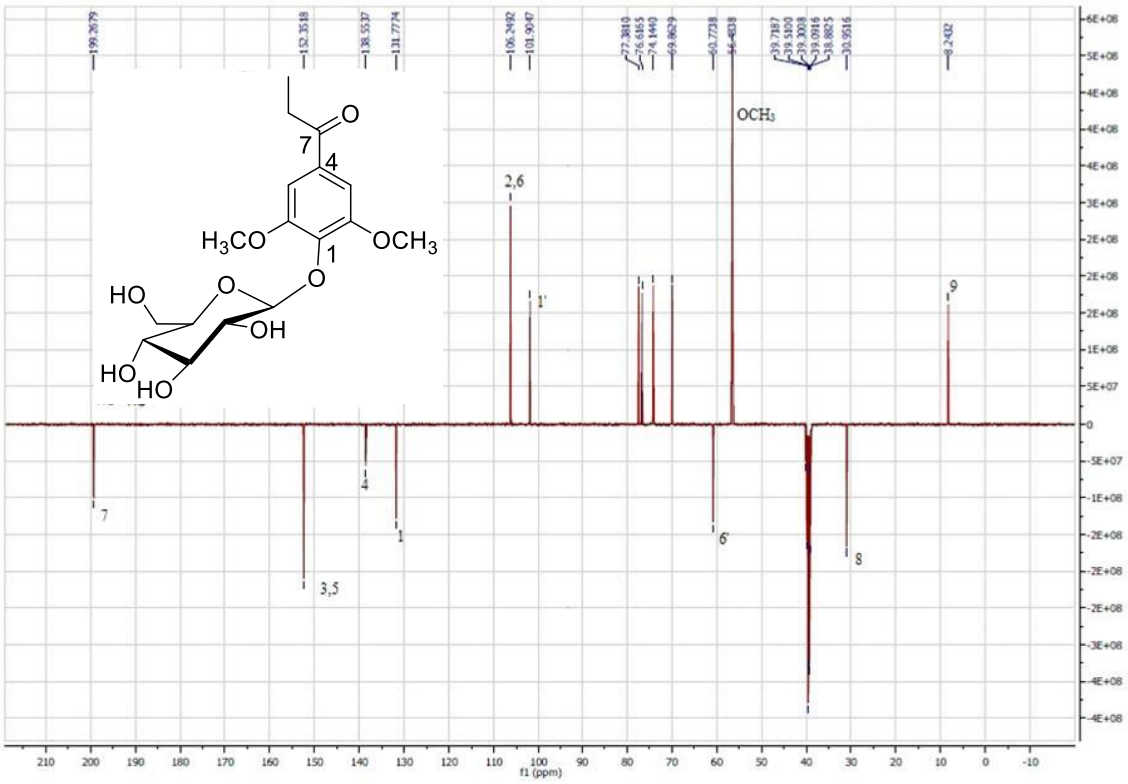

Figure S6: APT (100 MHz, DMSO-d_6) spectrum of **1** (propiosyringone-β-D-glucopyranoside)

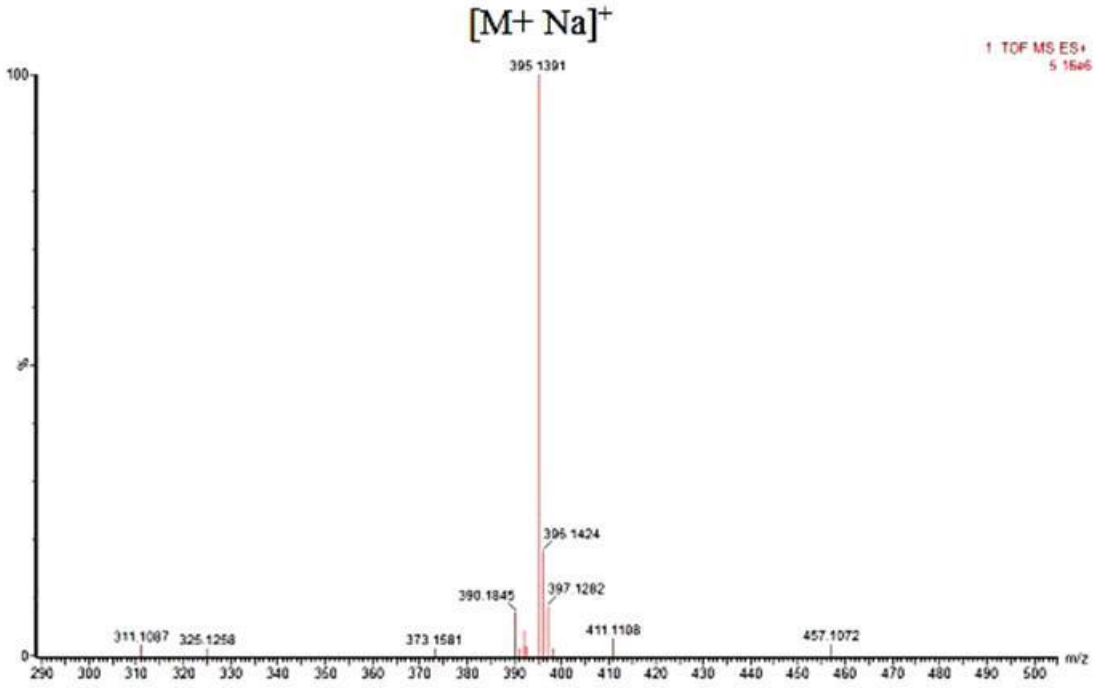

Figure S7: Positive ESI/TOF-MS spectrum of **1** (propiosyringone-β-D-glucopyranoside)

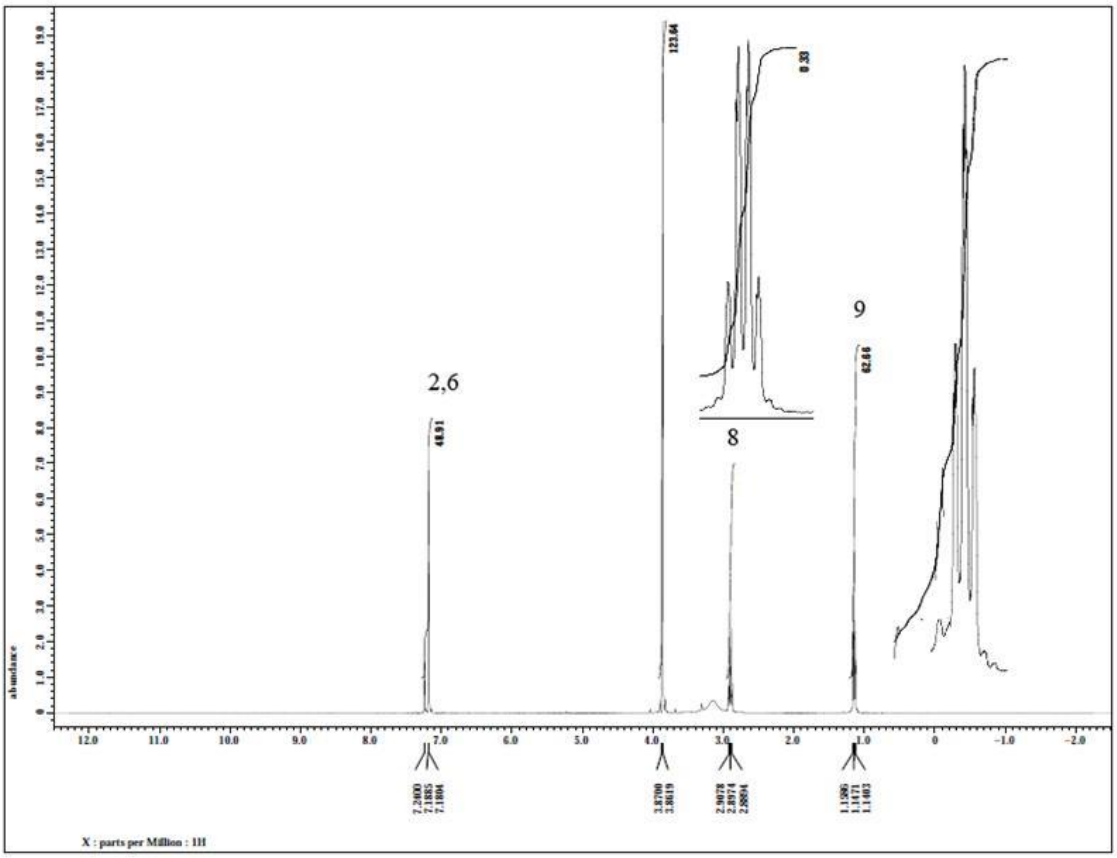

Figure S8: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **2** (propiosyringone)

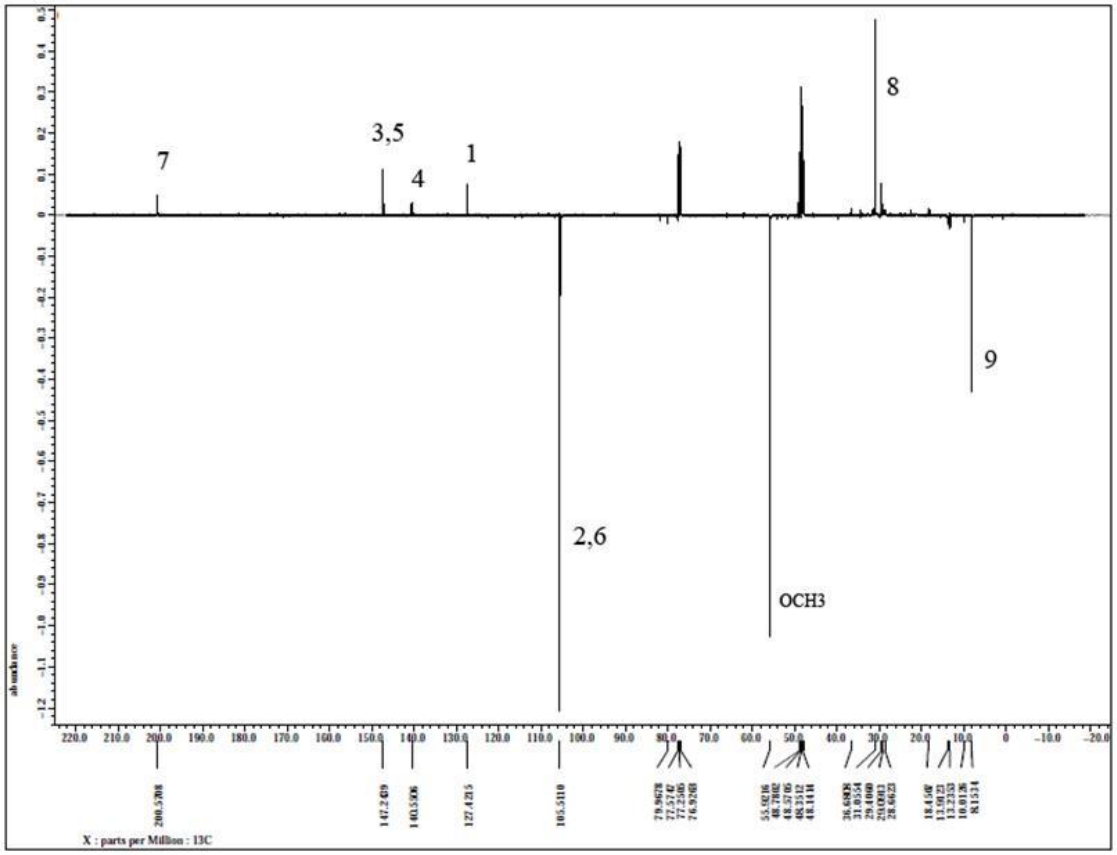

Figure S9: APT (100 MHz, $CDCl_3$) spectrum of **2** (propiosyringone)

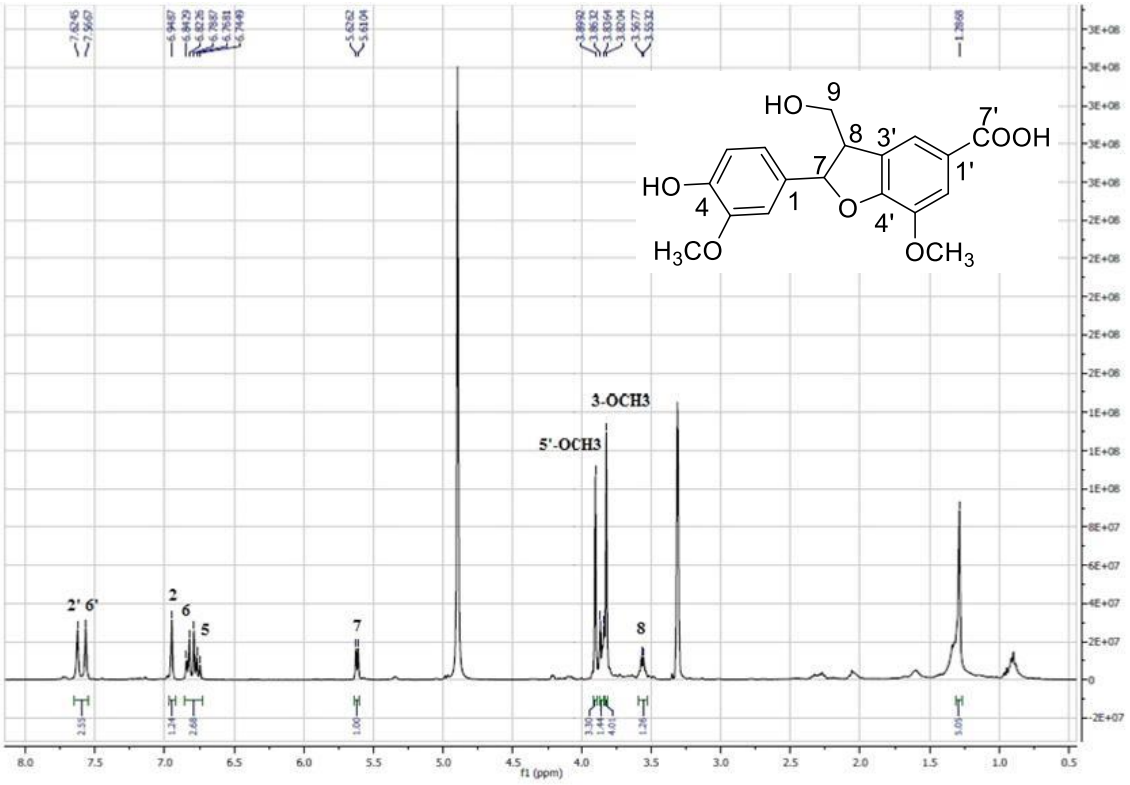

Figure S10: ^{1}H-NMR (400 MHz, CD_3OD) spectrum of **3** (ceplignan)

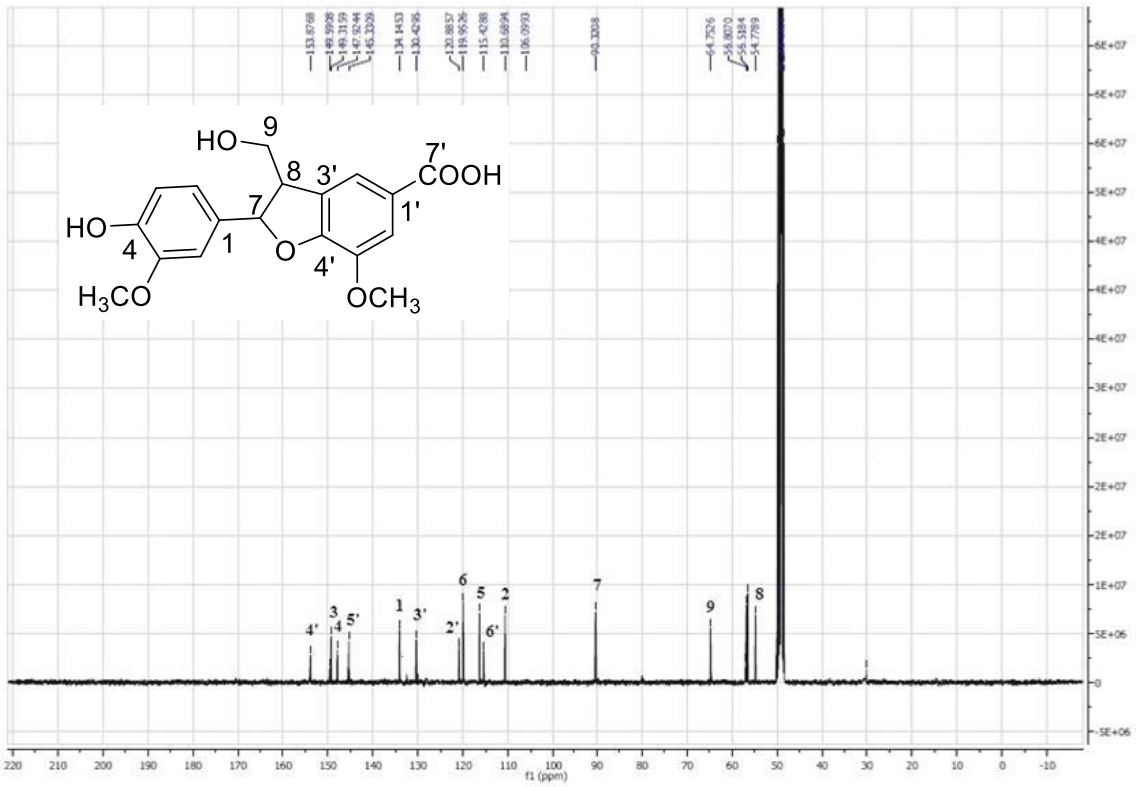

Figure S11: ^{13}C-NMR (100 MHz, CD_3OD) spectrum of **3** (ceplignan)

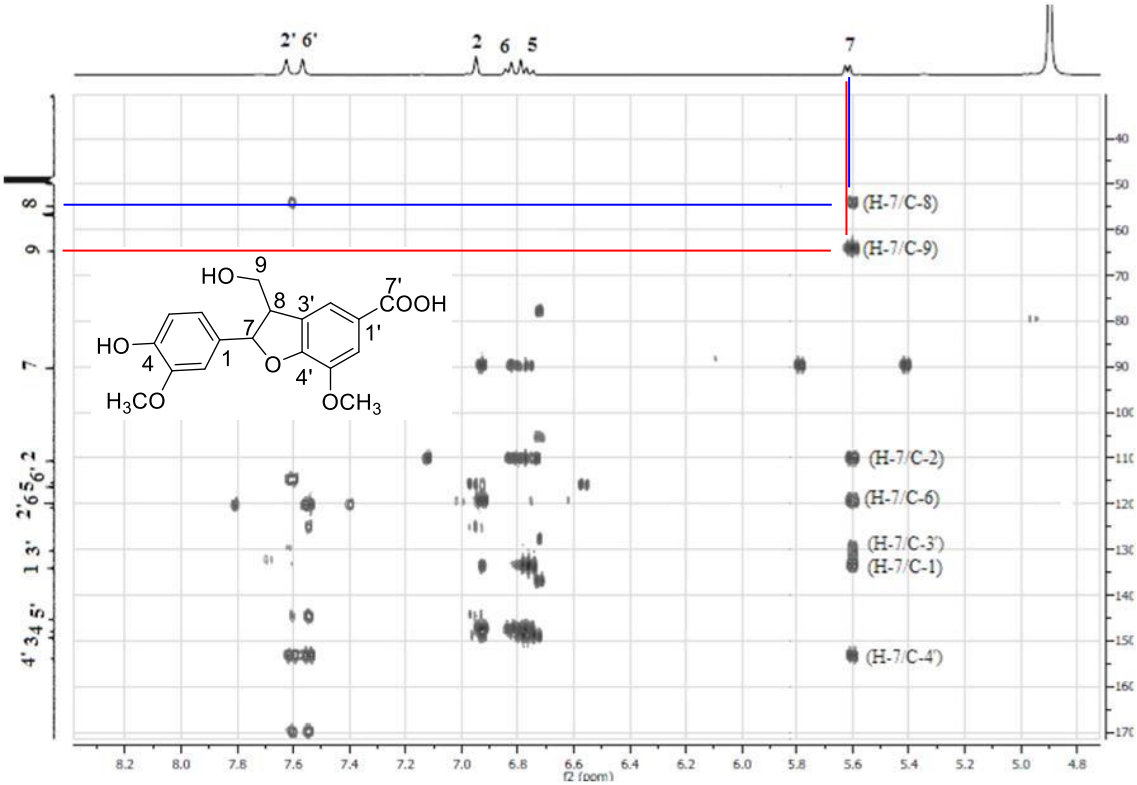

Figure S12: HMBC spectrum of **3** (ceplignan)

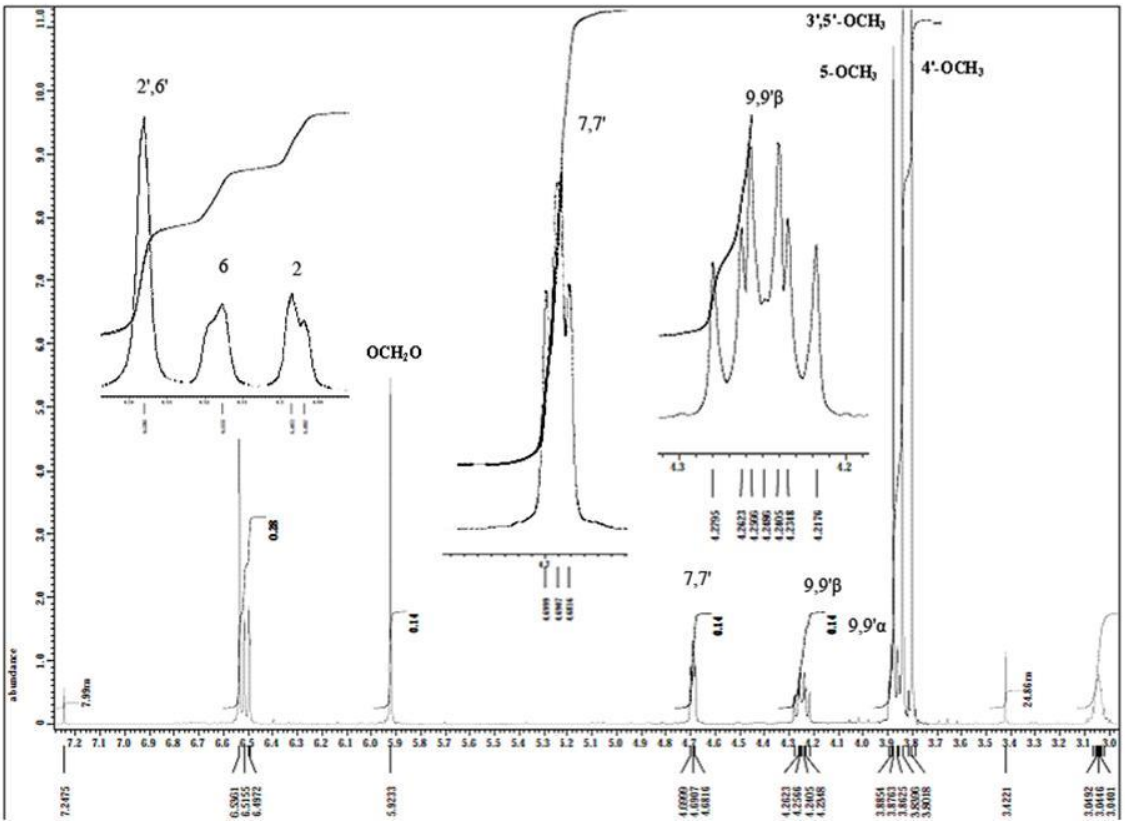

Figure S13: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **4** (sesartemin)

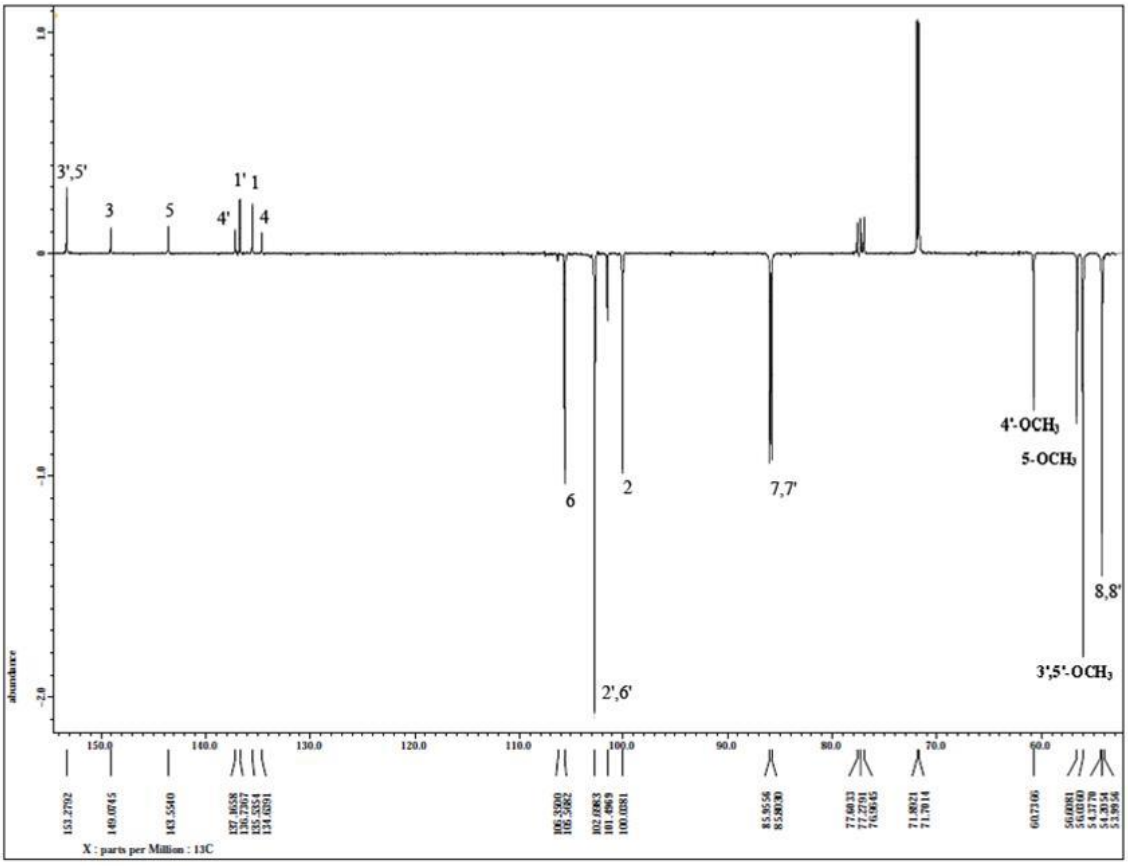

Figure S14: APT (100 MHz, $CDCl_3$) spectrum of **4** (sesartemin)

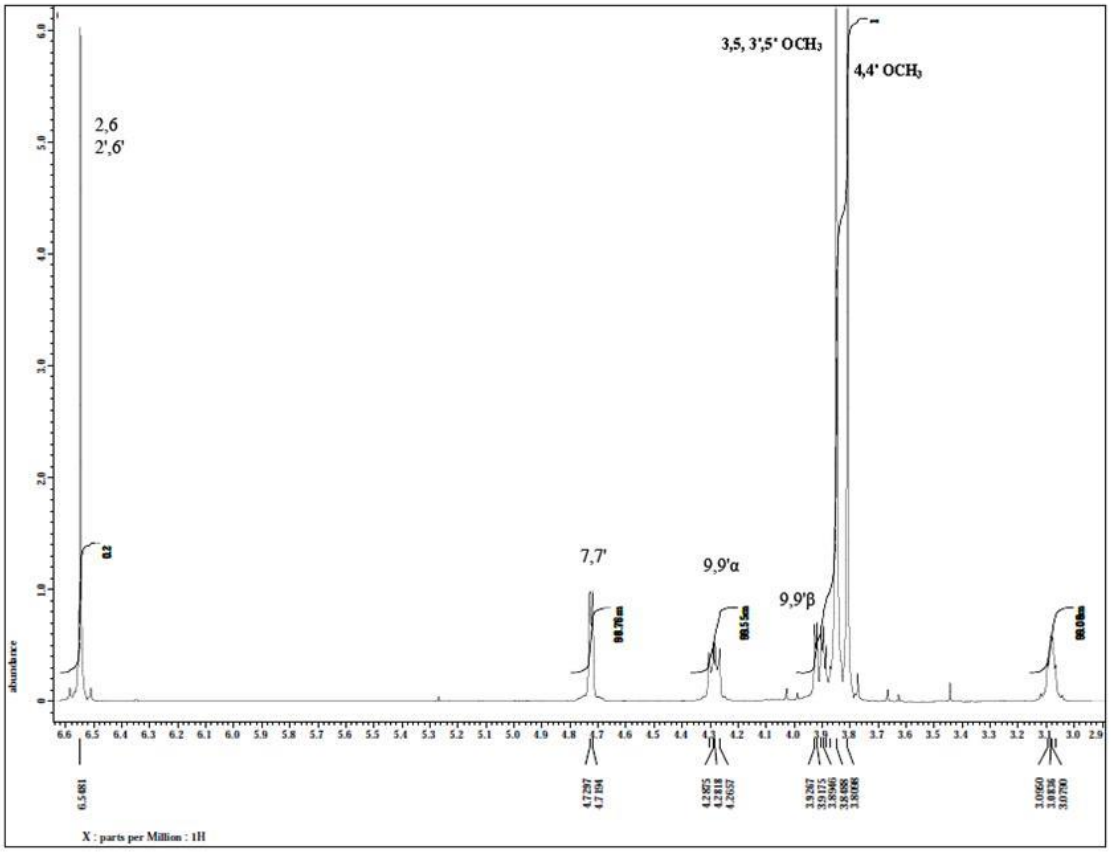

Figure S15: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **5** (yangambin)

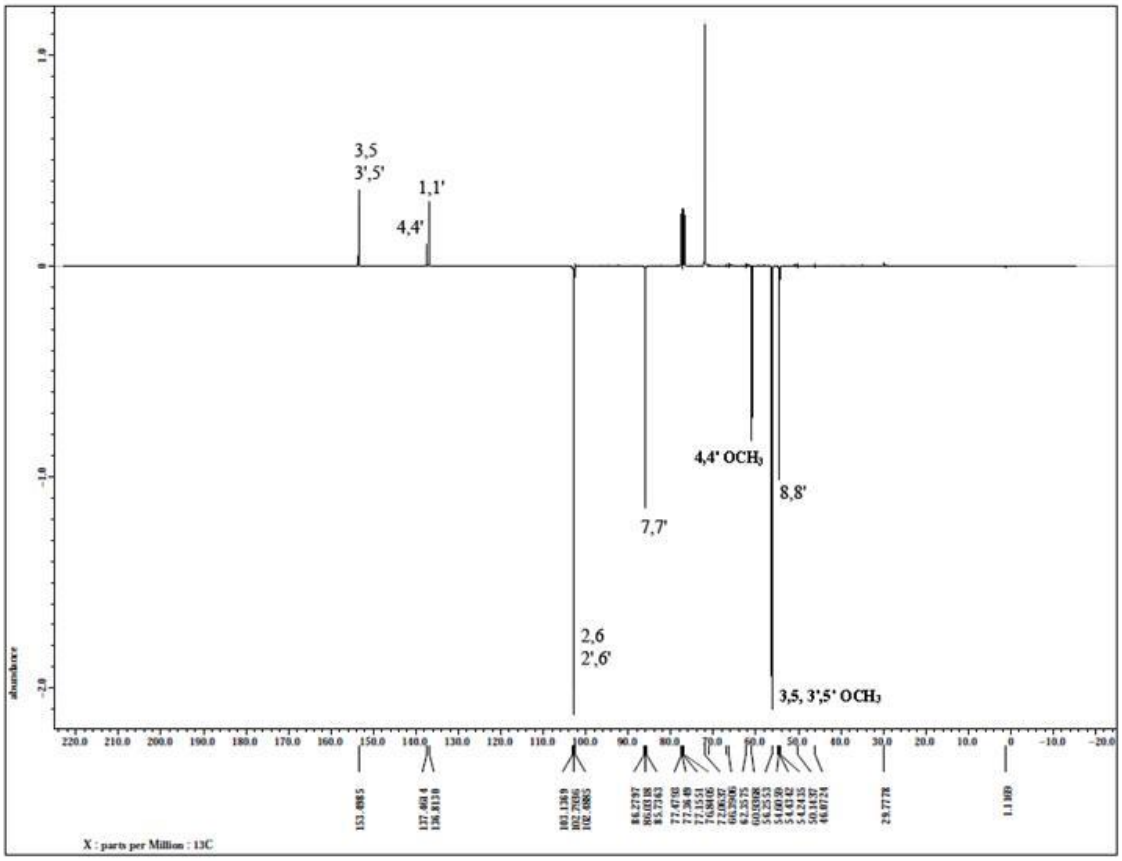

Figure S16: APT (100 MHz, $CDCl_3$) spectrum of **5** (yangambin)

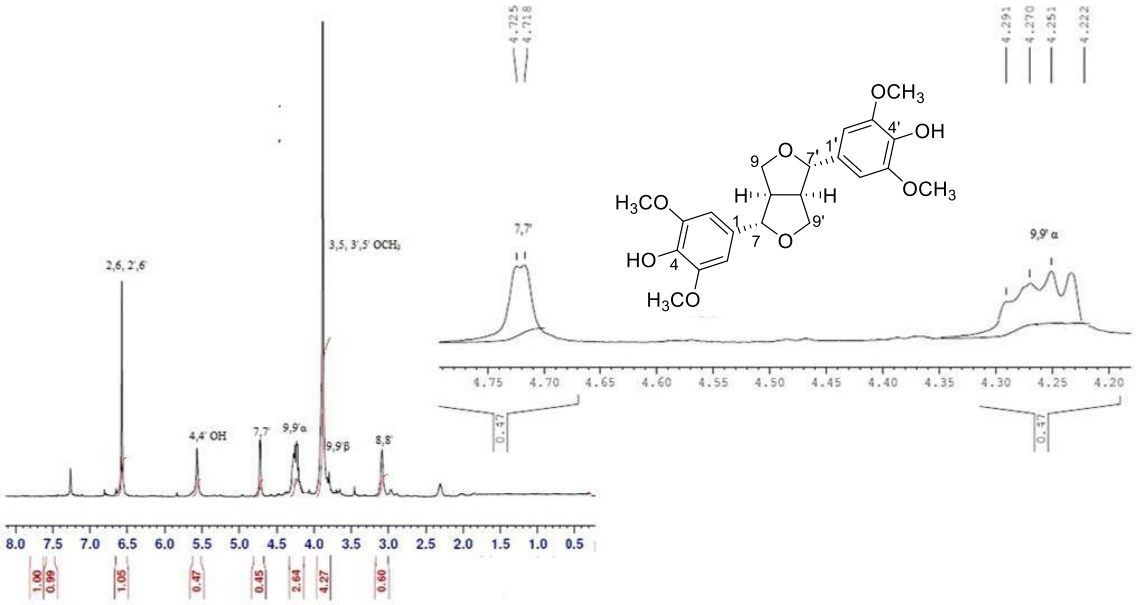

Figure S17: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **6** (syringaresinol)

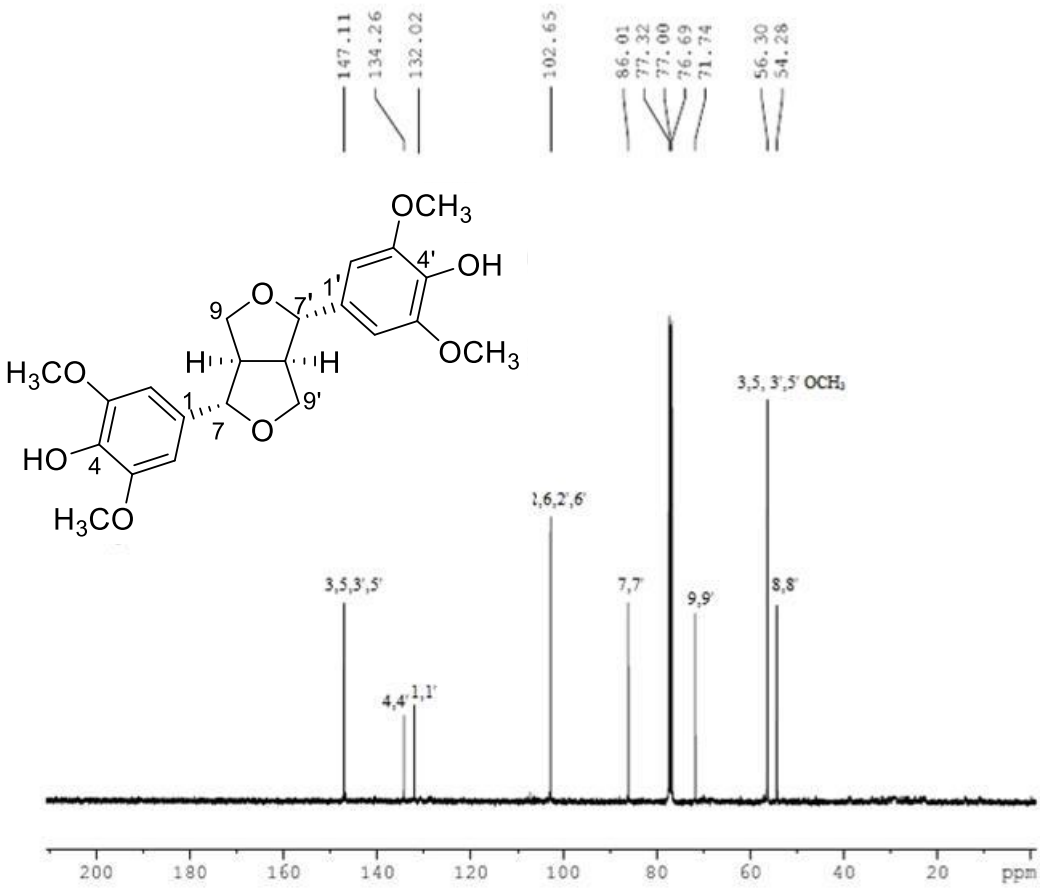

Figure S18: ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of **6** (syringaresinol)

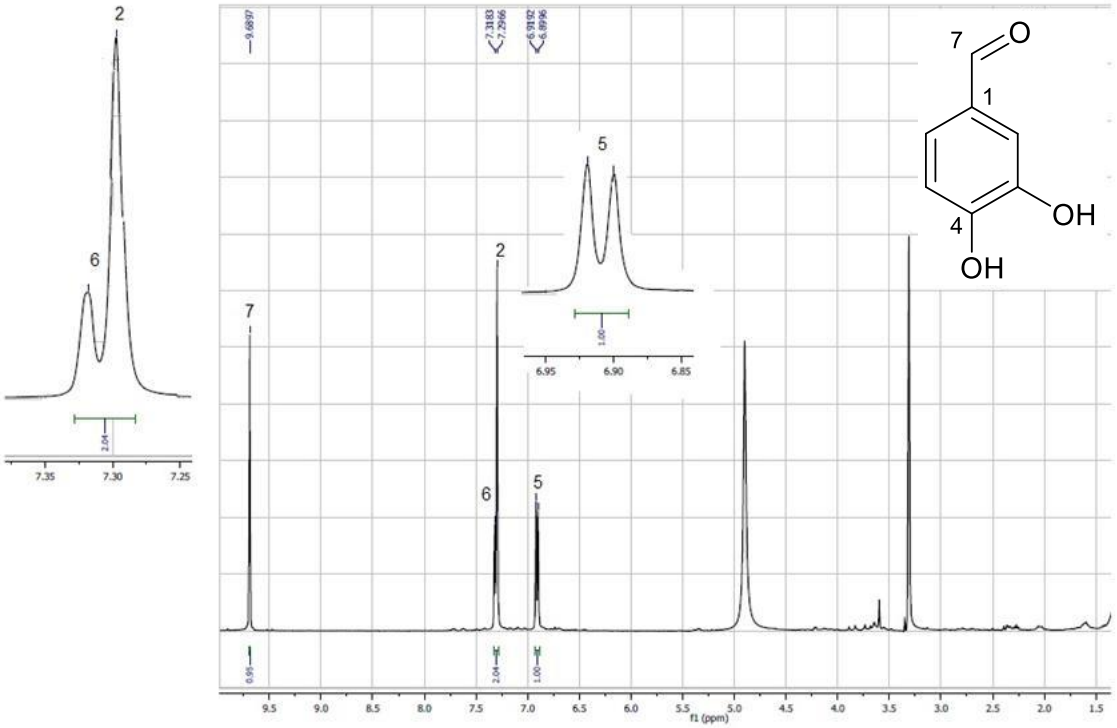

Figure S19: ^{1}H-NMR (400 MHz, CD_3OD) spectrum of **7** (protocatechuic aldehyde)

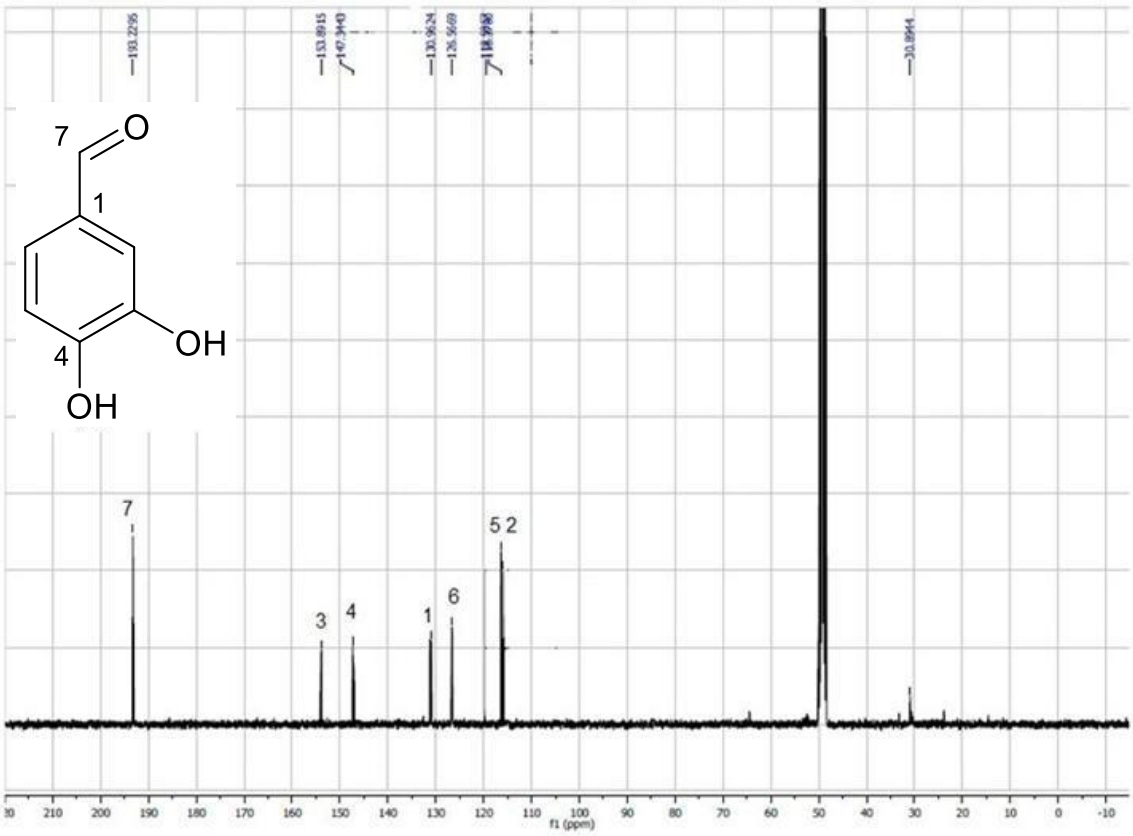

Figure S20:^{13}C-NMR (100 MHz, CD_3OD) spectrum of **7** (protocatechuic aldehyde)

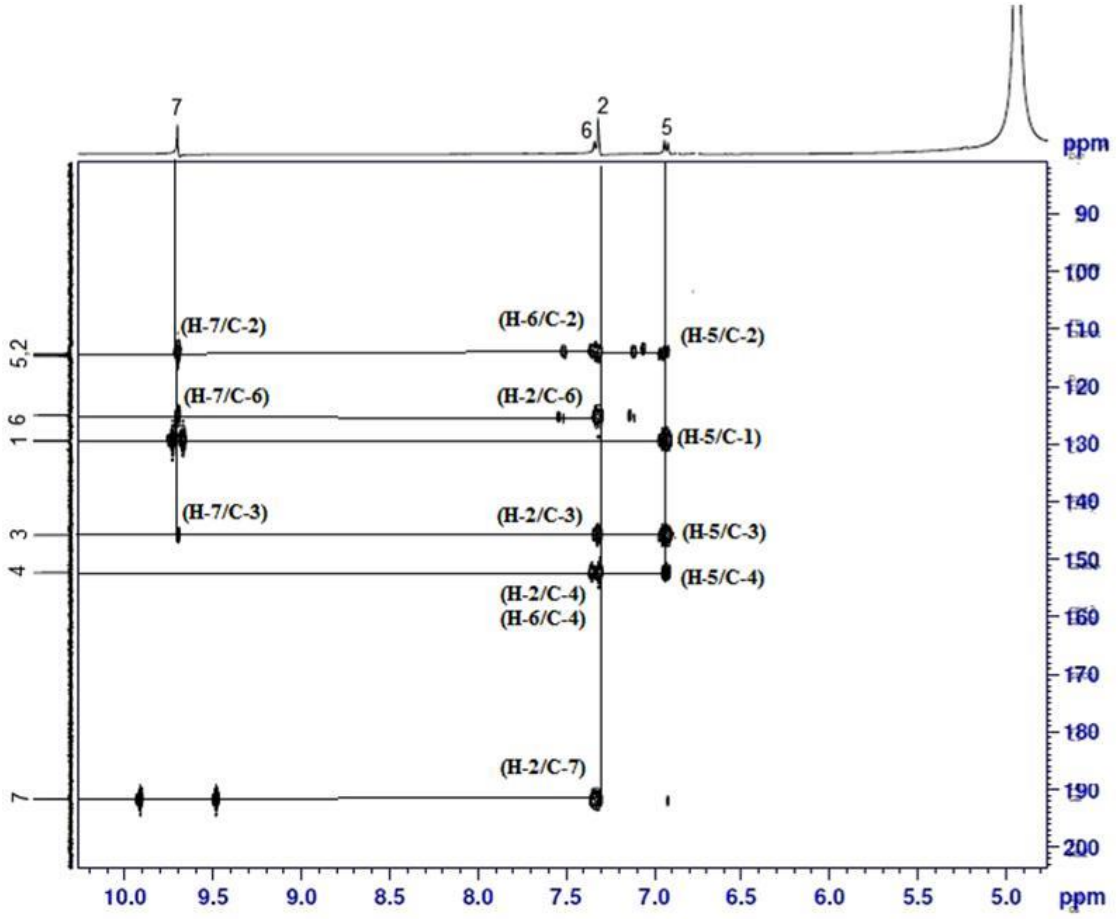

Figure S21: HMBC spectrum of **7** (protocatechuic aldehyde)

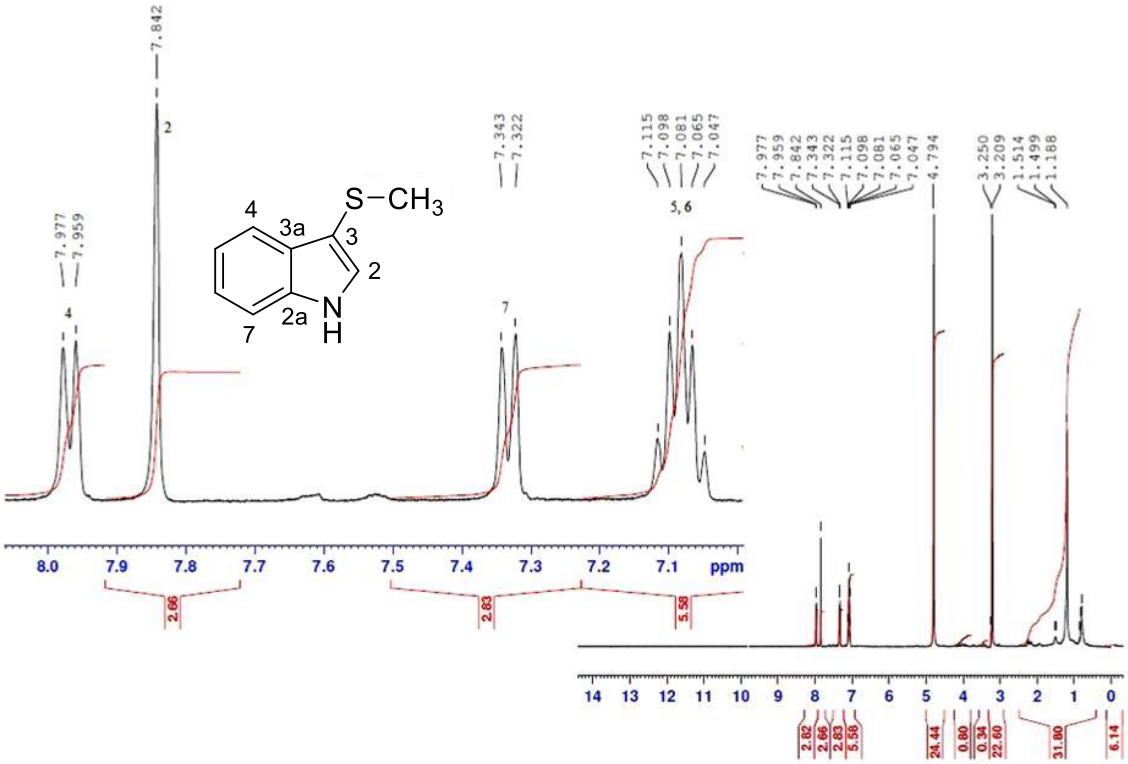

Figure S22: ^{1}H-NMR (400 MHz, CD_3OD) spectrum of **8** (3-methyl thio-indole)

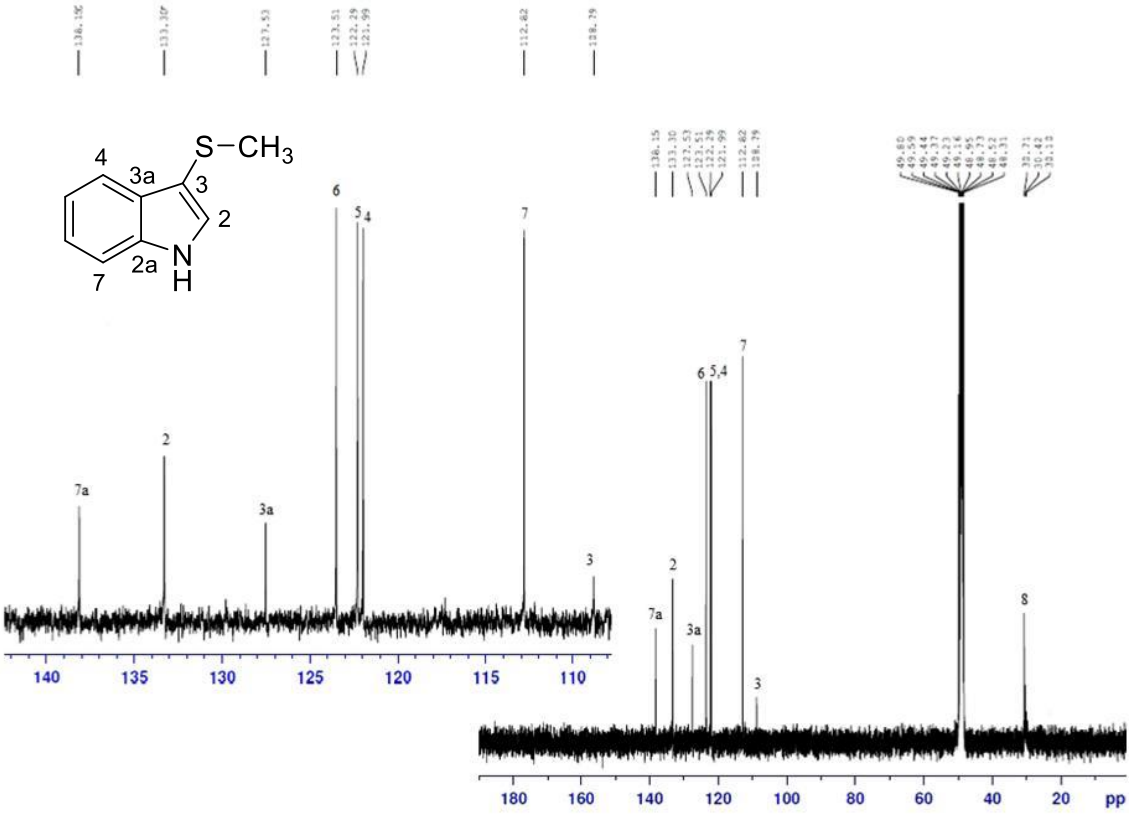

Figure S23: ^{13}C-NMR (100 MHz, CD_3OD) spectrum of **8** (3-methyl thio-indole)

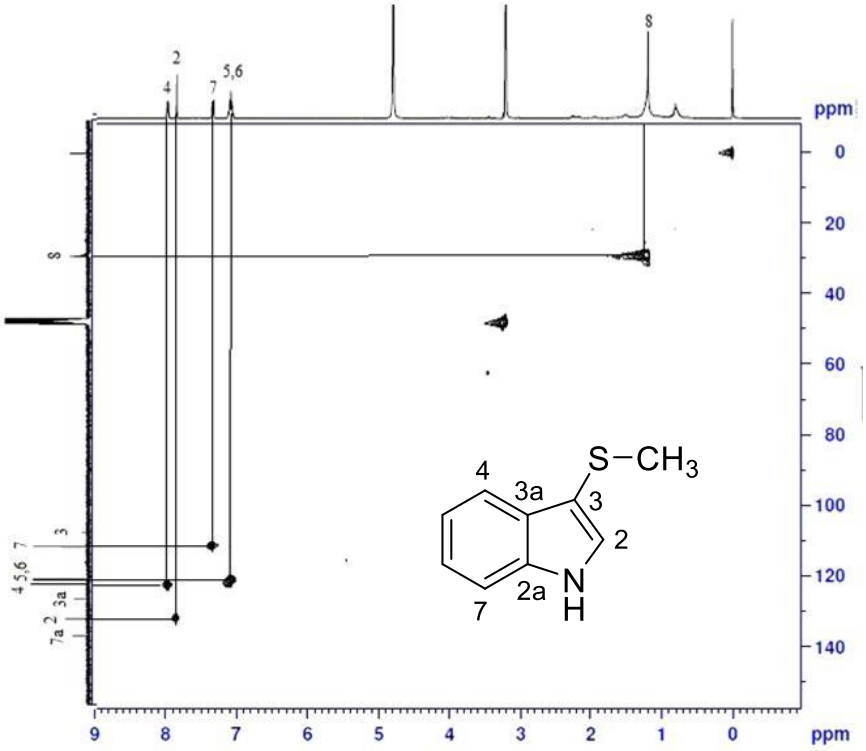

Figure S24: HSQC spectrum of **8** (3-methyl thio-indole)

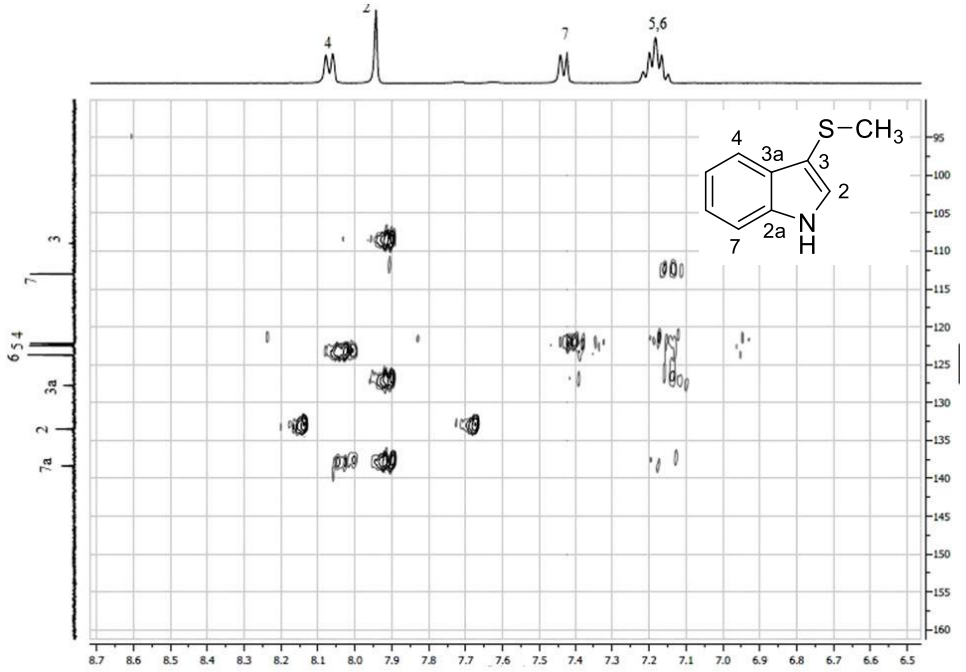

Figure S25: HMBC spectrum of **8** (3-methyl thio-indole)

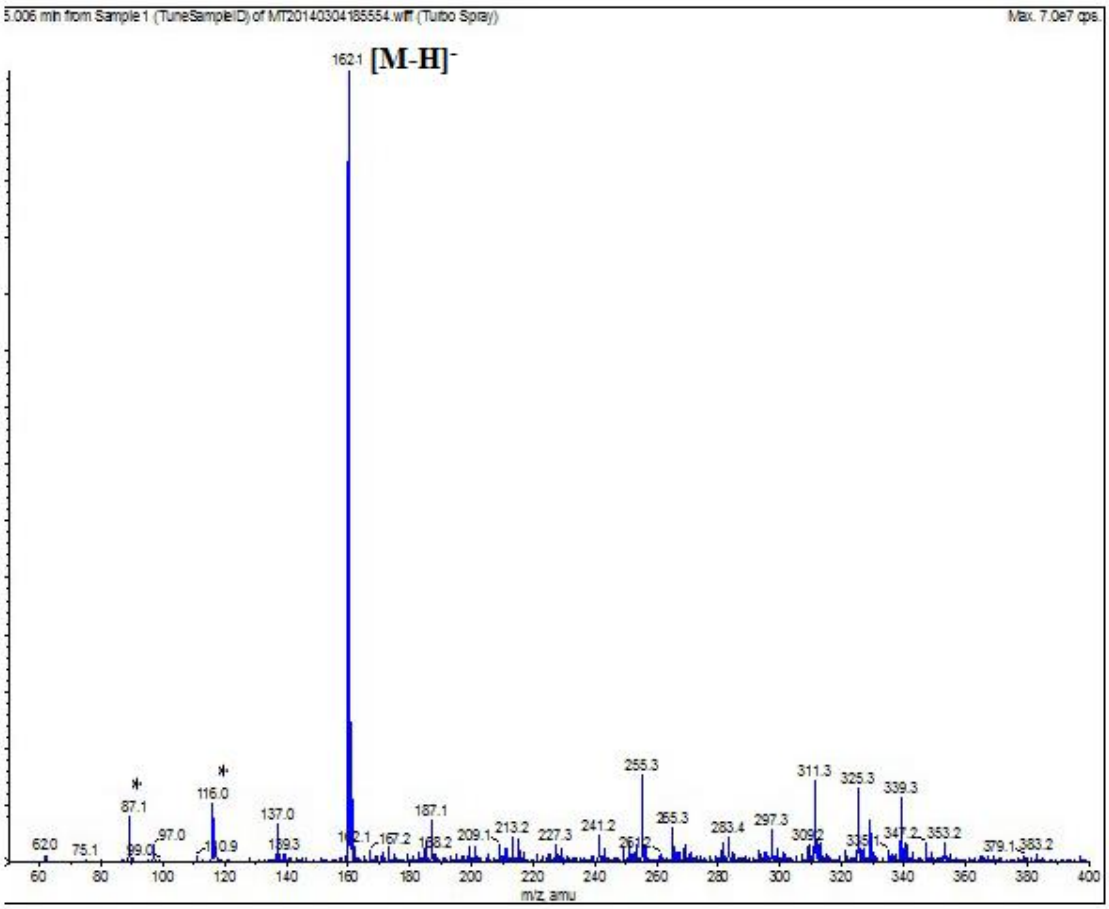

Figure S26: Negative ESI/EMS spectrum of **8** (3-methyl thio-indole)

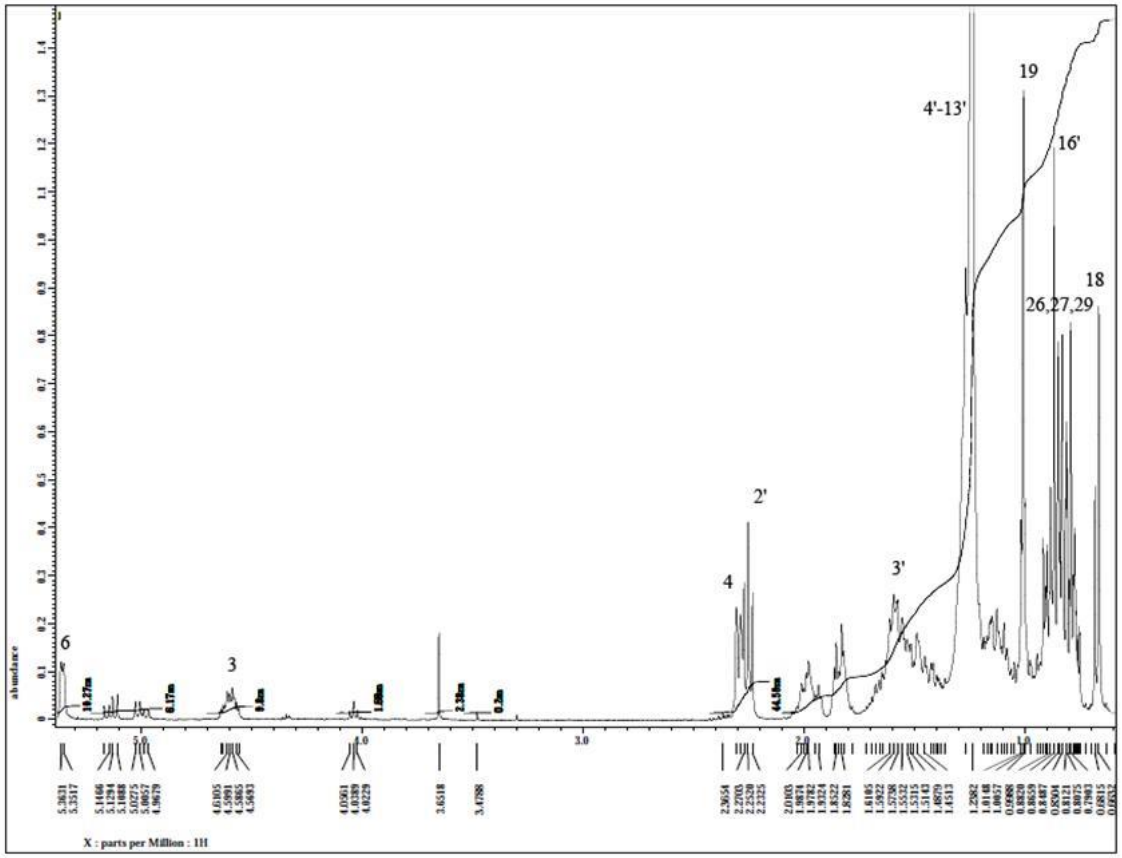

Figure S27: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **9** (β-sitostertyl palmitate)

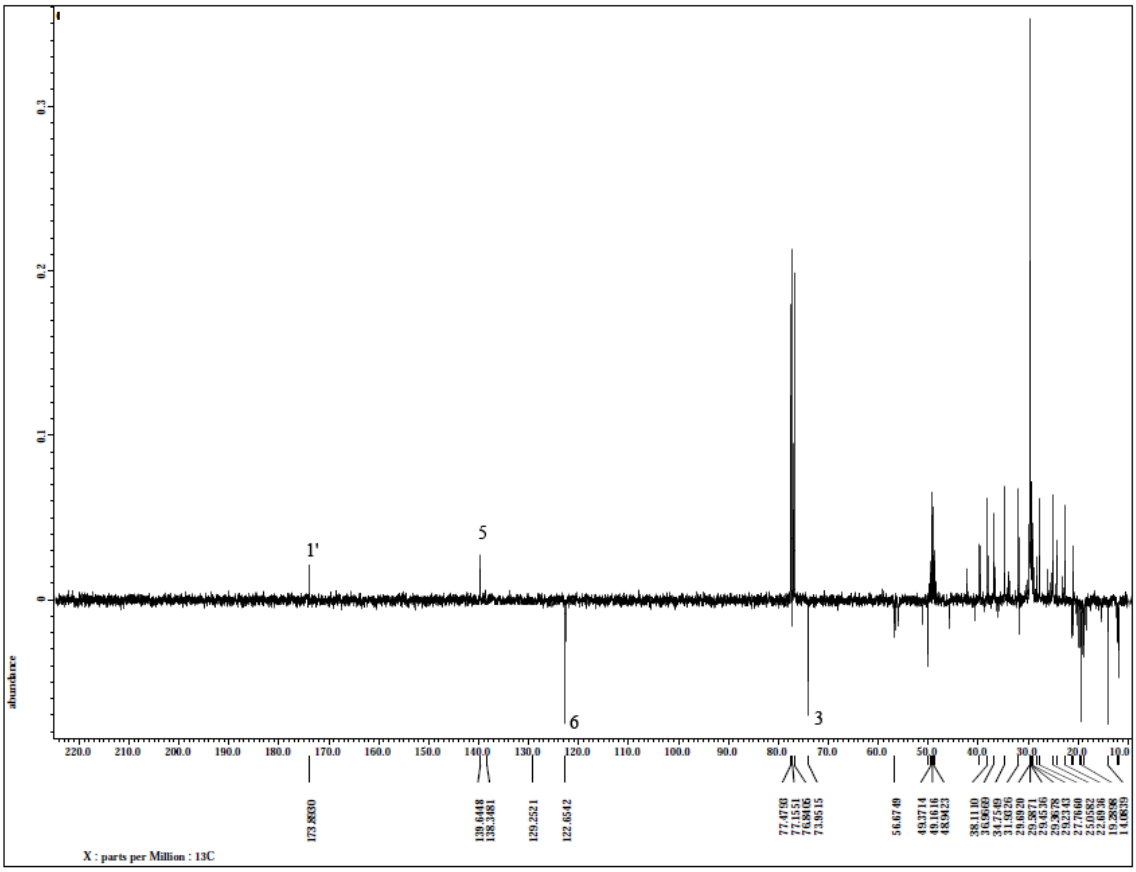

Figure S28: APT (100 MHz, $CDCl_3$) spectrum of **9** (β-sitostertyl palmitate)

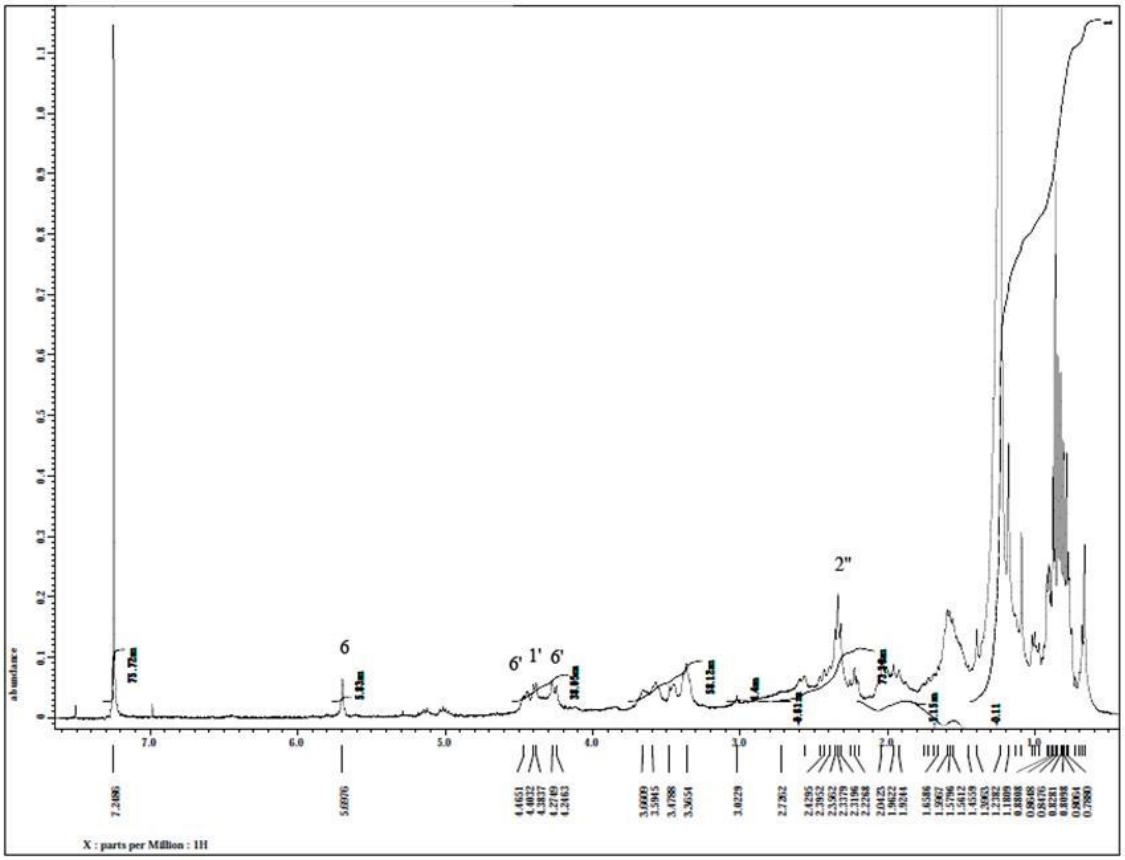

Figure S29: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **11** (7-oxo- β-sitosterol-3-O-β-D-glucopyranoside)-6'-palmitate)

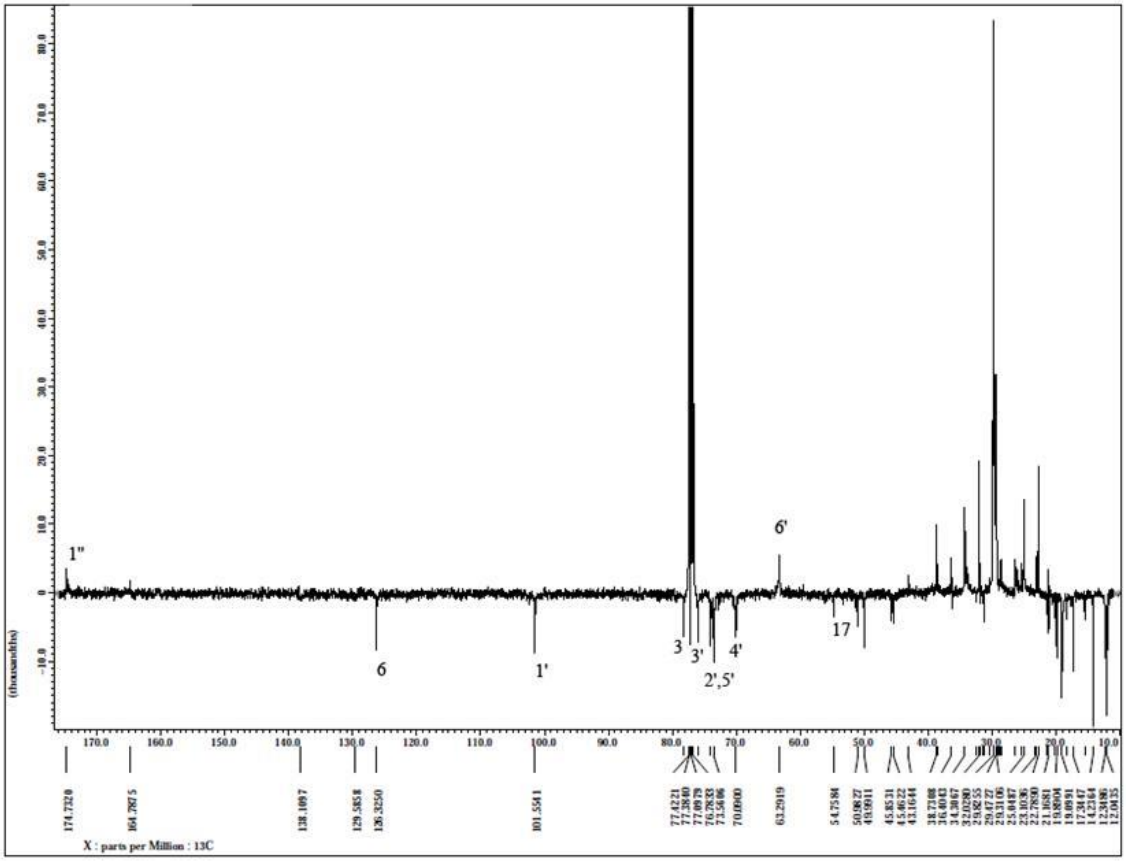

Figure S30: APT (100 MHz, $CDCl_3$) spectrum of **11** (7-oxo- β-sitosterol-3-O-β-D-glucopyranoside)-6'-palmitate)

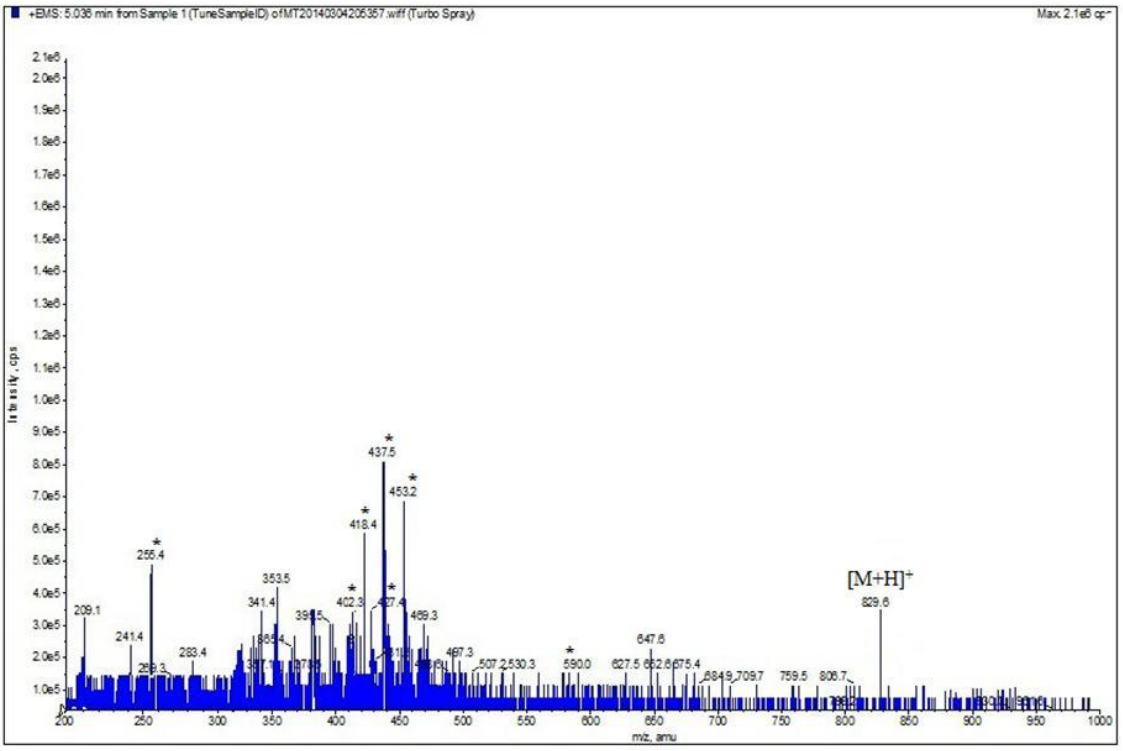

Figure S31: Positive ESI/EMS spectrum of **11** (7-oxo- β-sitosterol-3-O-β-D-glucopyranoside)-6'-palmitate)

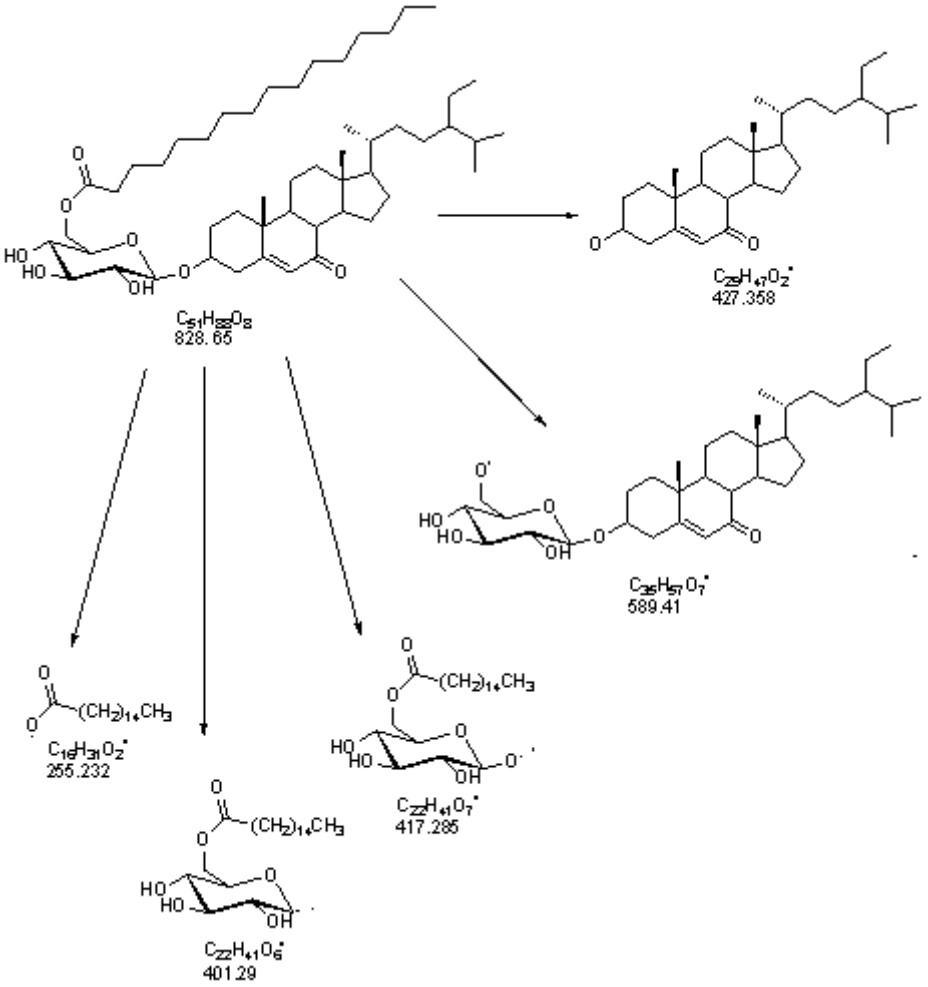

Figure S32: Some possible fragmentation patterns of **11** (7-oxo- β-sitosterol-3-O-β-D-glucopyranoside)-6'-palmitate)

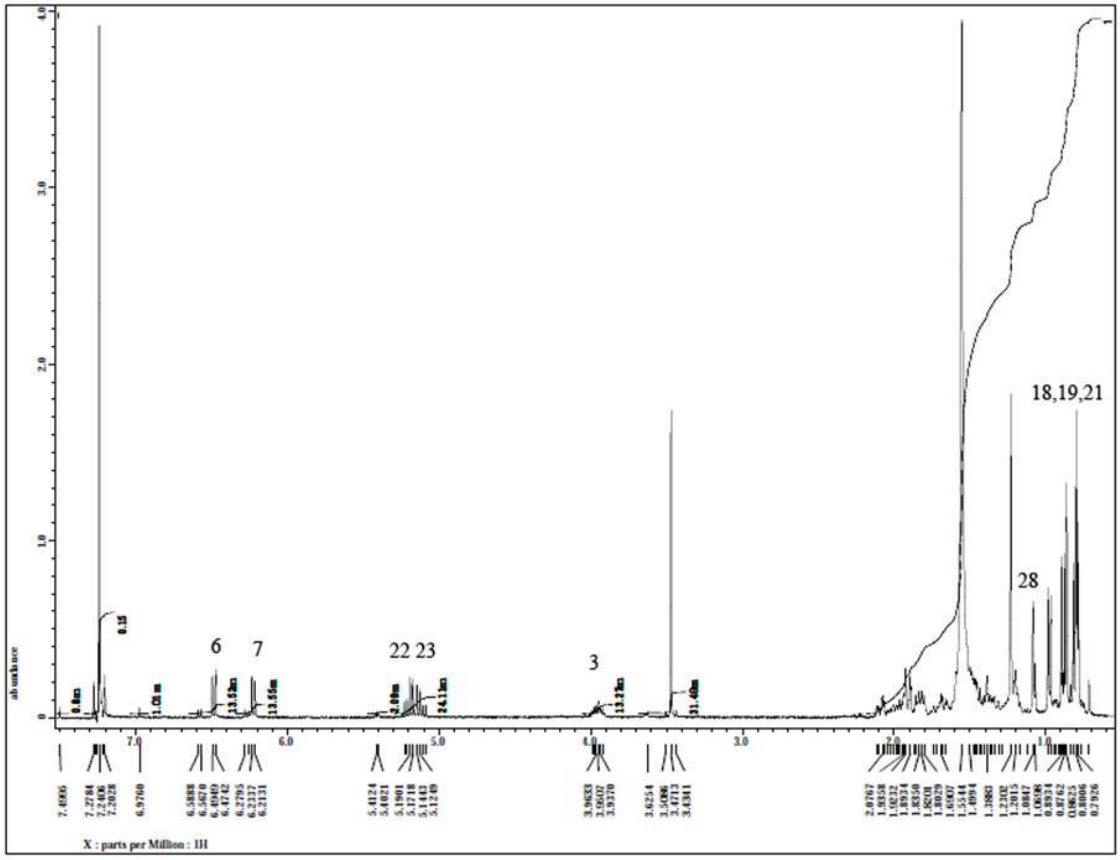

Figure S33: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **12** (5α, 8α-epi-dioxyergosta-6, 22-dien-3β-ol)

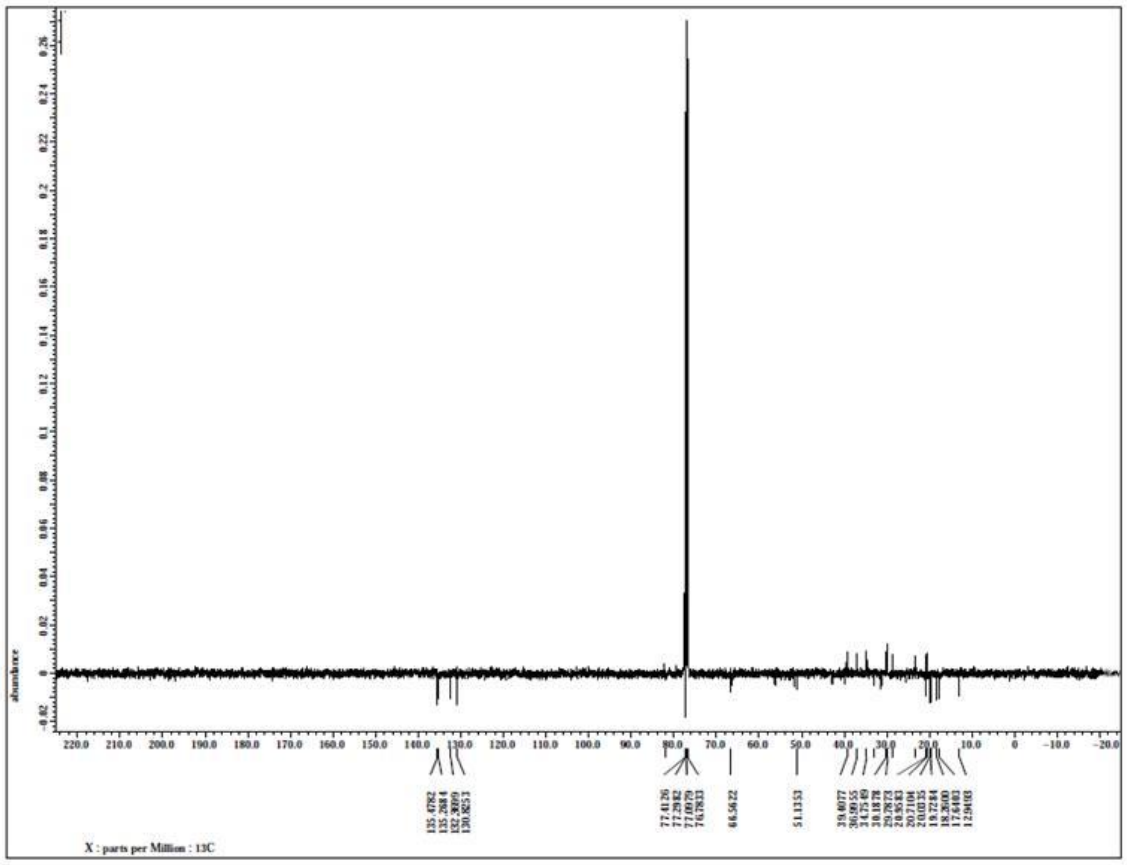

Figure S34: APT (100 MHz, $CDCl_3$) spectrum of **12** (5α, 8α-epi-dioxyergosta-6, 22-dien-3β-ol)

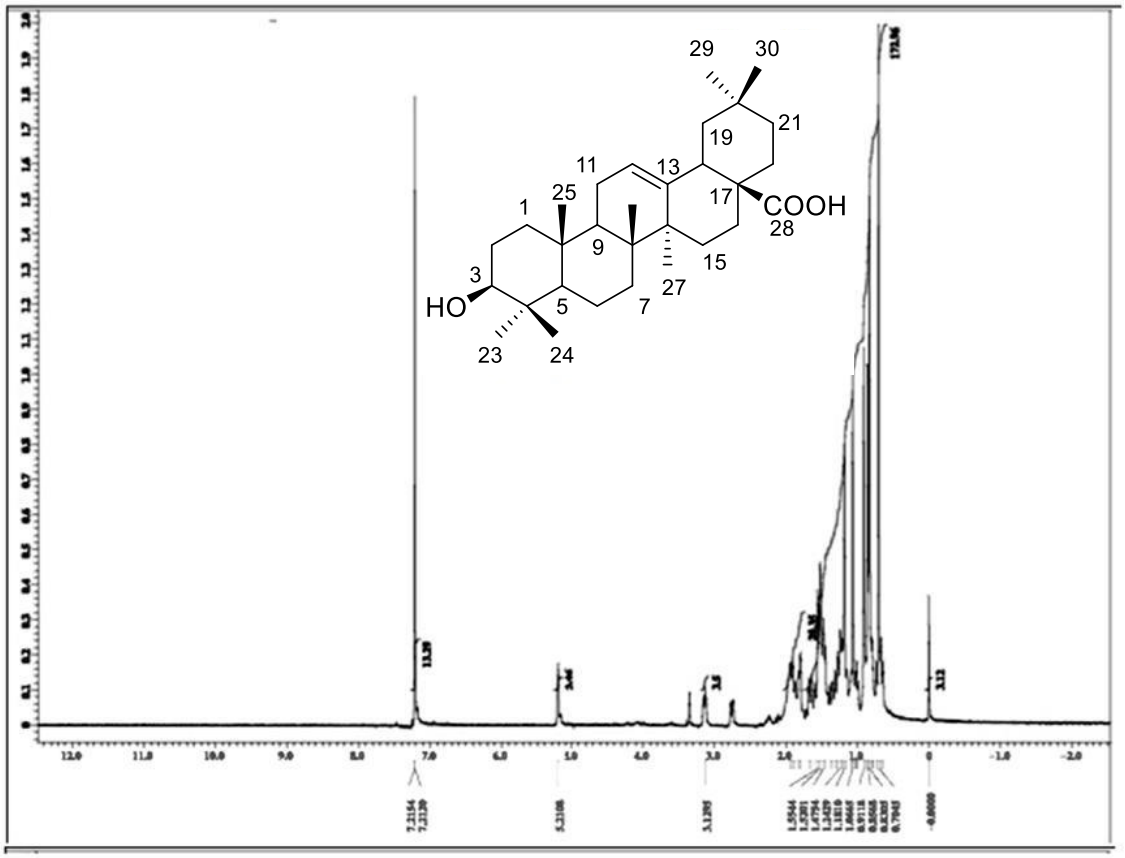

Figure S35: ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of **13** (oleanolic acid)

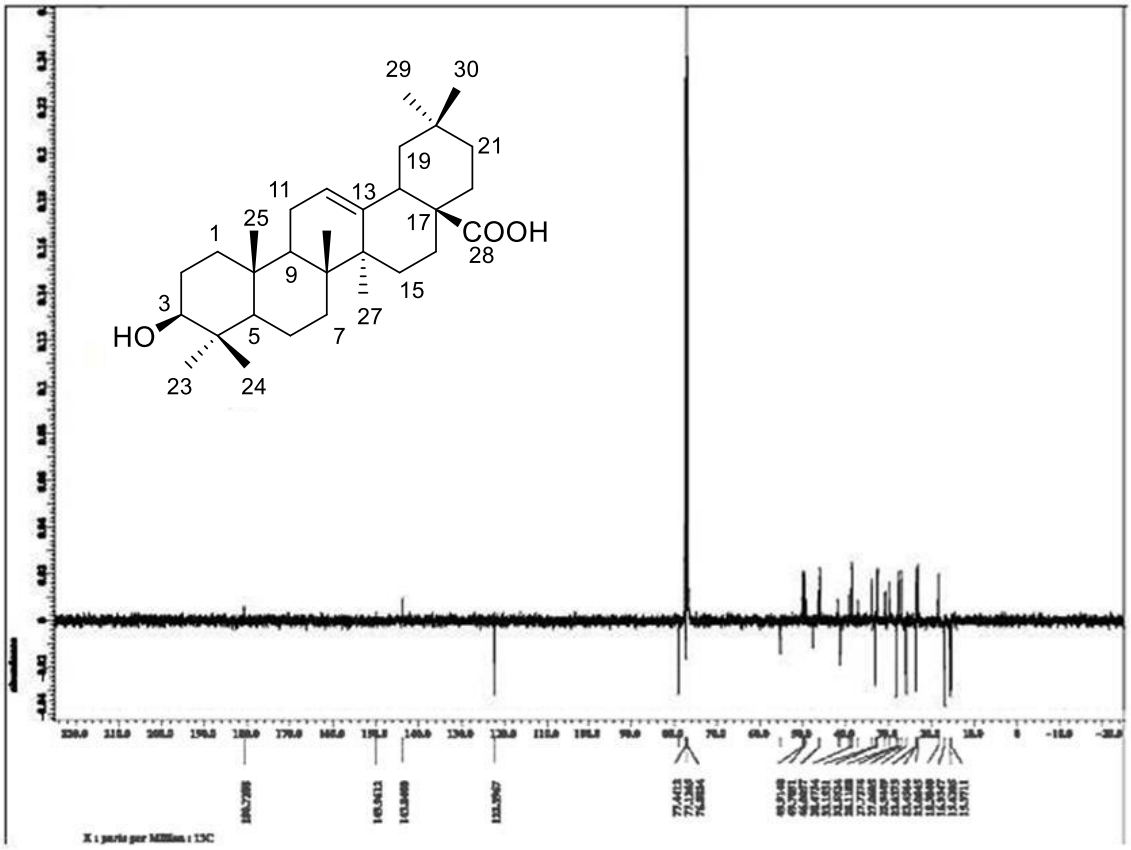

Figure S36: APT (100 MHz, $CDCl_3$) spectrum of **13** (oleanolic acid)

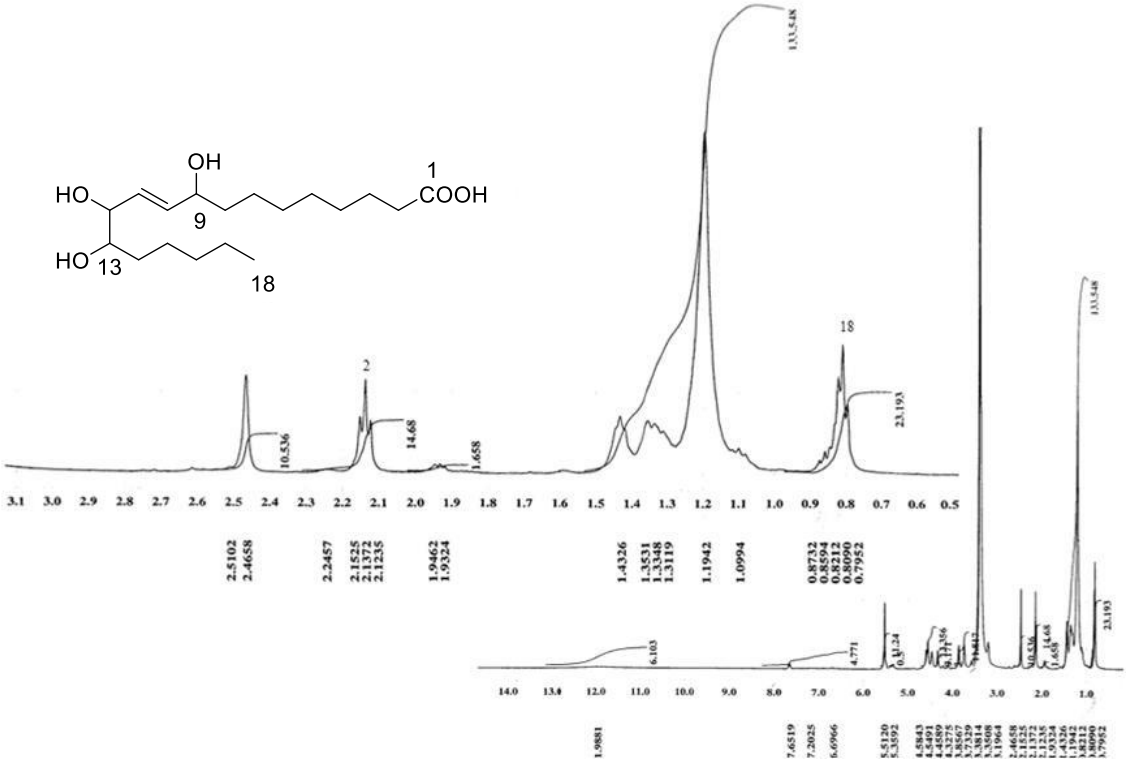

Figure S37: ^{1}H-NMR (500 MHz, DMSO-d_6) spectrum of **14** (9, 12, 13-trihydroxy-10-octadecenoic acid)

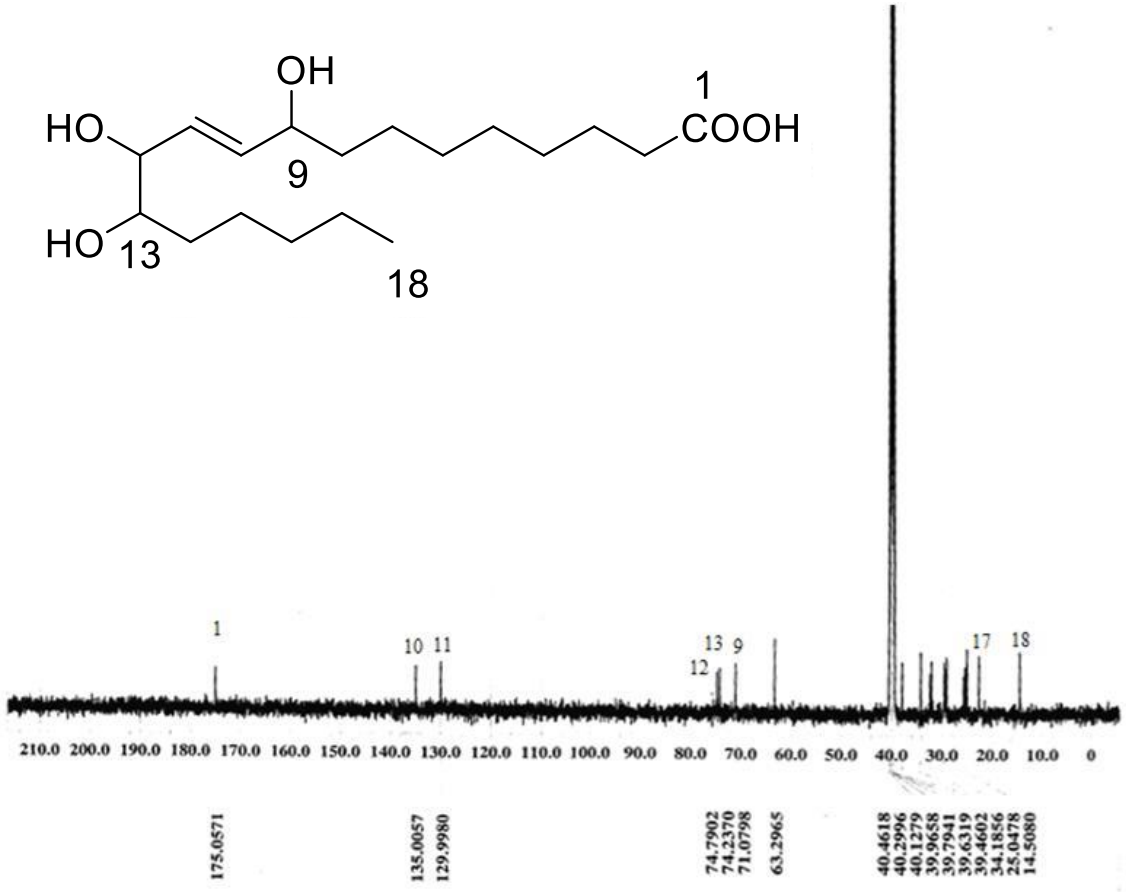

Figure S38: APT (125 MHz, DMSO-d_6) spectrum of **14** (9, 12, 13-trihydroxy-10-octadecenoic acid)

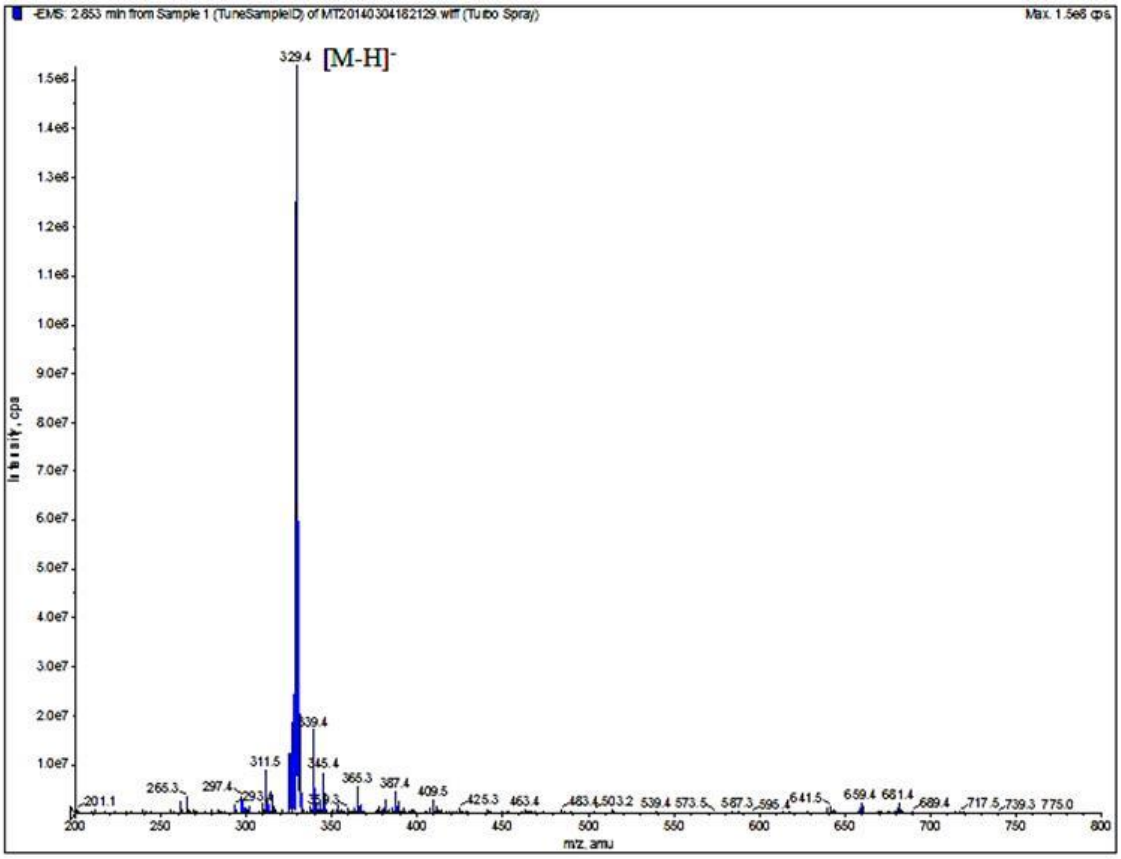

Figure S39: Negative ESI/EMS spectrum of **14** (9, 12, 13-trihydroxy-10-octadecenoic acid)

Table S1: ^{1}H-NMR and APT spectral data of **1** (propiosyringone-β-D-glucopyranoside), **2** (propiosyringone) and **3** (ceplignan).

#	1		2		3	
	^{1}H-NMR (400 MHz, DMSO-d_6)	**APT** (100 MHz, DMSO-d_6)	**^{1}H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)	**^{1}H-NMR** (400 MHz, CD_3OD)	**^{13}C-NMR** (100 MHz, CD_3OD)
1		131. 7	--	128.1	--	134.1
2	7.25 (*s*, 2H)	106.2	7.18 (2H, *s*)	105.5	6.94 (H, br.s)	110.6
3	--	152.3	--	147.0	--	149.3
4	--	138.5	--	139.9	--	147.9
5	--	152.3	--	147.0	6.77 (H, *d*, *J*=8.2)	116.3
6	7.25 (*s*, 2H)	106.2	7.18 (2H, *s*)	105.5	6.83 (H, *d*, *J*=8.1)	119.9
7	--	199.2	--	200.0	5.4 (H, *d*, *J*=6.3)	90.3
8	7.25 (*s*, 2H)	30.9	2.89 (2H, *q*)	31.3	3.55 (H, *d*, *J*=5.8)	54.7
9	1.07 (3H, t)	8.2	1.14 (3H, *t*)	8.5	3.86 (9a), 3.83 (9b)	64.7
OCH_3	3.79 (6H, s)	56.9	3.86 (6H, *s*)	56.4	3.82 (3H, s)	56.5
1'	5.07 (H, *d*, *J*=7.6)	101.9	--	--	--	**
2'	3.00-3.59	74.1	--	--	7.62 (H, br.s)	120.8
3'	3.00-3.59	76.6	--	--	--	130.4
4'	3.00-3.59	69.8	--	--	--	153.8.
5'	3.00-3.59	77.3	--	--	--	145.3
6'	H-6'a* H-6'b* 3.57 (H, *dd*, *J*=12.3, 6.25)	60.7	--	--	7.56 (H, br.s)	115.4
7'	--	--	--	--	--	170.1
5'-OCH_3	--	--	--	--	3.89 (3H, s)	56.8

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz

*H-6'a should appear at δ 3.84 (Güvenalp and Demirezer, 2005) but it is masked by the (OCH_3) signal, H-6'b should appear at δ 4.20 (H, *dd*) [1] instead it appeared at δ 4.31 (H, *t*).

** Signal didn't appear (should appear at 125.2, [2]).

Table S2: [1]H-NMR and APT spectral data of **4** (sesartemin) and **5** (yangambin).

	4			**5**	
#	**^{1}H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)	**#**	**^{1}H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)
1	--	135.5	**1,1'**	--	136.8
2	6.49 (H, br.*s*)	100.0	**2, 6, 2', 6'**	6.45 (4H, *s*)	102.7
3	--	149.0	**3, 5, 3', 5'**	--	153.4
4	--	134.6	**4,4'**	--	137.4
5	--	143.5	**7, 7'**	4.72 (2H, *d*)	86.0
6	6.51 (H, br.*s*)	105.5	**8, 8'**	3.08 (2H, *m*)	54.2
7	4.69 (H, *d*)	85.9	**9, 9'**	α 4.28 (2H, *dd*) β 3.92 (2H, *dd*)	72.0
8	3.04 (H, *m*)	54.2	**3,5, 3',5' OCH_3**	3.84(12H, *s*)	56.2
9	α 3.86-3.88 (H, *dd*) β 4.21-4.27 (H, *dd*)	71.7	**4,4' OCH_3**	3.80 (6H,*s*)	60.9
1'	--	136.7			
2', 6'	6.53 (2H, *s*)	102.6			
3', 5'	--	153.2			
4'	--	137.1			
7'	4.69 (H, *d*)	85.8			
8'	3.04 (H, *m*)	54.2			
9'	*α* 3.86-3.88 (H, *dd*) *β* 4.21-4.27 (H, *dd*)	71.8			
OCH_2O	5.92 (2H,*s*)	101.4			
5-OCH_3	3.93 (3H,*s*)	56.6			
4'-OCH_3	3.85 (3H,*s*)	60.7			
3',5'-OCH_3	3.88 (6H,*s*)	56.0			

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz

Table S3: ^{1}H and ^{13}C-NMR spectral data of **6** (syringaresinol), **7** (protocatechuic aldehyde), and **8** (3-methyl thio-indole).

#	**6**		#	**7**		#	**8**	
	^{1}H-NMR (400 MHz, $CDCl_3$)	**^{13}C-NMR** (100 MHz, $CDCl_3$)		**^{1}H-NMR** (400 MHz, CD_3OD)	**^{13}C-NMR** (100 MHz, CD_3OD)		**^{1}H-NMR** (400 MHz, CD_3OD)	**^{13}C-NMR** (100 MHz, CD_3OD)
1,1'	--	132.0	**1**	--	130.9	**2**	7.84 (H, *s*)	133.3
2, 6, 2', 6'	6.57 (4H, *s*)	102.6	**2**	7.29 (H, *s*)	115.9	**3**	--	108.7
3, 5, 3', 5'	--	147.1	**3**	--	147.3	**3a**	--	127.5
4,4'	--	134.2	**4**	--	153.8	**4**	7.96 (H, *d*, *J*=7.3)	121.9
7, 7'	4.72 (2H, *d*)	86.1	**5**	6.90 (H, *d*, *J*=7.3)	116.3	**5**	7.08 (2H, *dd*)	122.2
8, 8'	3.1 (2H, *m*)	54.2	**6**	7.30 (H, *d*, *J*=8.6)	126.5	**6**	7.08 (2H, *dd*)	123.5
9, 9'	α 4.27 (2H, *br.*) β 3.90 (2H) *	71.7	**7**	9.86 (H, *s*)	193.2	**7**	7.33 (H, *d*, *J*=8.4)	112.8
3,5, 3',5' OCH_3	3.90 (12H, *s*) *	56.3				**7a**	--	138.1
4, 4' OH	5.56(2H, *s*)					**8**	1.2 (3H, *s*)	30.7

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz
* 9β, 9'β protons (2H, δ 3.90) are masked by the methoxy protons (12H, δ 3.90), they appear collectively at δ 3.90 (14H, s)

Table S4: [1]H-NMR (400 MHz) and APT (100 MHz) spectral data of **9** (β-sitostertyl palmitate).

#	**[1]H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)	#	**[1]H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)
1		36.9	**21**	0.9 (3H, *d*)	18.7
2		27.7	**22**		33.9
3	4.5 (H, *m*)	73.9	**23**		26.1
4	2.3 (2H, *m*)	38.1	**24**		45.8
5		139.6	**25**		29.2
6	5.3 (H, br. *d*)	122.6	**26**	0.75-0.92	19.2
7		32.0	**27**	0.75-0.92	19.7
8		31.9	**28**		23.0
9		50.0	**29**	0.75-0.92	11.8
10		36.7	**1'**		173.8
11		21.0	**2'**	2.25 (2H *t*, *J*=7.8)	34.7
12		39.7	**3'**	1.57 (2H, *m*)	25.0
13		42.3	**4'-13'**	1.21-1.31 (20 H, br. *s*)	29.2-29.7
14		56.6	**14'**		31.9
15		24.2	**15'**		22.7
16		27.7	**16'**	0.86 (3H, *t*, *J*=6.4)	14.0
17		56.0			
18	0.66 (3H, *s*)	11.9			
19	0.99 (3H, *s*)	18.9			
20		36.3			

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz

Table S5: ^{1}H-NMR and APT spectral data of **11** (7-oxo- β-sitosterol-3-O-β-D-glucopyranoside)-6'-palmitate).

#	**^{1}H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)	#	**^{1}H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)
1	--	36.4	**22**	--	34.3
2	--	32.0	**23**	--	26.3
3	--	78.4	**24**	--	45.8
4	--	42.9	**25**	--	29.2
5	--	164.7	**26**	0.79 (3H, *d*, *J*=7.3)	19.8
6	5.69 (H, *s*)	126.3	**27**	0.78 (3H, *d*, *J*=5.4)	18.3
7	--	202.7	**28**	--	23.1
8	--	45.4	**29**	0.82 (3H, *t*, *J*=6.5)	12.3
9	--	49.9	**1'**	4.39 (H, *d*, *J*=7.8)	101.5
10	--	38.5	**2'**	--	73.5
11	--	21.5	**3'**	--	77.3
12	--	38.7	**4'**	--	70.0
13	--	43.1	**5'**	--	73.5
14	--	49.9	**6'**	4.26 (H_a, *d*, *J*=11.5) 4.44 (H_b, *dd*, *J*=*)	63.2
15	--	23.1	**1''**	--	174.0
16	--	28.6	**2''**	2.37 (H, *t*, *J*=6.5)	34.0
17	--	54.7	**3''**	--	25.0
18	0.66 (3H, *s*)	12.0	**4''-13''**	1.19-1.35	29.3-29.8
19	1.18 (3H, *s*)	17.3	**14''-**	--	32.0
20	--	36.2	**15''**	--	22.7
21	0.91 (3H, *d*, *J*=5.9)	19.0	**16''**	0.88 (3H, *t*, *J*=6.4)	14.1

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz
* *J* value couldn't be calculated.

Table S6: [1]H-NMR and APT spectral data of **12** (5α, 8α-epi-dioxyergosta-6, 22-dien-3β-ol).

#	**[1]H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)	#	**[1]H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)
1	--	34.7	**15**	--	20.7
2	--	30.1	**16**	--	28.7
3	3.94 (H, *m*)	66.5	**17**	--	56.2
4	--	36.9	**18**	0.78-.86 (9H,18,19,21)	12.9
5	--	81.9	**19**	0.78-.86 (9H,18,19,21)	18.2
6	6.48 (H, *d*, *J*= 8.2)	135.4	**20**	--	39.4
7	6.22 (H, *d*, *J*= 8.2)	130.8	**22**	5.11 (H, *dd*, *J*=15.6, 8.2)	132.3
8	--	79.5	**23**	--	42.9
9	--	51.1	**24**	--	33.1
10	--	36.9	**25**	0.88 (3H, *d*, *J*= 7.2)	19.7
11	--	23.4	**26**	0.97 (3H, d, J= 6.4)	20.0
12	--	39.4	**27**	1.07 (3H, d, J=5.9)	17.6
13	--	44.6	**28**	5.19(H, *dd*, *J*=15.1, 7.3)	135.2
14	--	51.7			

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz

Table S7: ^{1}H-NMR and APT spectral data of **13** (oleanolic acid).

#	**^{1}H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)	#	**^{1}H-NMR** (400 MHz, $CDCl_3$)	**APT** (100 MHz, $CDCl_3$)
1	--	38.4	**16**	--	23.4
2	--	27.0	**17**	--	46.4
3	3.13 (H, *dd*., *J*= 5.04, 11.44)	77.4	**18**	2.74 (H, *m*)	41.2
4	--	38.7	**19**	--	46.0
5	--	55.2	**20**	--	30.7
6	--	18.3	**21**	--	33.9
7	--	32.7	**22**		32.5
8	--	39.2	**23**	1.06 (3H, *s*)	28.1
9	--	47.0	**24**	0.70 (3H, *s*)	15.6
10	--	37.0	**25**	0.85 (3H, *s*)	15.3
11	--	23.0	**26**	0.70 (3H, *s*)	16.9
12	5.19 (H, br.*s*)	122.3	**27**	1.18 (3H, *s*)	25.9
13	--	143.8	**28**	--	180.7
14	--	41.7	**29**	0.91 (3H, *s*)	23.1
15	--	27.7	**30**	0.83 (3H, *s*)	23.6

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz

Table S8: ^{1}H-, ^{13}C-NMR, HSQC, and HMBC spectral data of **14** (9, 12, 13-trihydroxy-10-octadecenoic acid).

#	**^{1}H-NMR** (500 MHz, DMSO-d_6)	**^{13}C-NMR** (125 MHz, DMSO-d_6)	**HSQC**	**HMBC correlations**
1		175.0	C-1	
2	2,13 (2H,*t*)	34.1	C-2	C-1, C-3, C-4
3	1.43, *m*	25.0	C-3	C-1, C-2, C-4
4	1.19, *br.*	29.5	C-4	
5,6	1.19, *br.*	25.4	C-5,C-6	
7	1.34, *m*	25.7	C-7	C-9
8	1.34, *m*	37.9	C-8	
9	3.9	71.0	C-9	C-8, C-10, C-11
10	5.51, *d*	135.0	C-10	C-9, C-11, C-12
11	5.51, *d*	129.9	C-11	C-9, C-10, C-12
12	3.78	74.7	C-12	C-10, C-11, C-13, C-14
13	3.25	74.2	C-13	C-11, C-12, C-15
14	1.34, *m*	32.3	C-14	
15	1.19, *br.*	29.6	C-15	
16	1.19, *br.*	32.0	C-16	
17	1.19, *br.*	22.6	C-17	
18	0.82 (2H, *t*)	14.5	C-18	C-16, C-17

The chemical shift (δ) is expressed in ppm and coupling constants (*J*) in Hz

S1: MTT Assay

Human cancer cell lines from liver (HePG-2), larynx (Hep-2), colon (HCT-116), or breast (MCF-7) originated from ATCC (Manassas, VA, USA) and were obtained from VACSERA, Cairo, Egypt. Cells were observed under an inverted microscope (Olympus 1x 70, Tokyo, Japan). MTT (3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide) , dimethylsulfoxide (DMSO), 5-fluorouracil (5-FU), and RPMI-1640 medium were obtained from Sigma-Aldrich (St. Louis, MO, USA), 10% fetal bovine serum from GIBCO, Paisely, UK). The assay was carried out according to Mauceri et. al.,1998 [3]. The cell lines were cultured in RPMI-1640 medium with 10% fetal bovine serum. The antibiotics added are 100 units/mL penicillin and 100 µg/mL streptomycin at 37°C in a 5% CO_2 incubator. The samples were dissolved in DMSO and diluted with phosphate buffer solution (PBS) 5-fluorouracil was used as a standard anticancer drug for comparison. The cells (HePG2, HeP2, HCT116 and MCF-7) were seeded in a 96-well plate at a density of 1.0 x 104 cells/ well at 37°C for 24 hr under 5% CO_2. Samples of different concentration were added to each well and cultured for 48 hr. The treated cells were washed with PBS and 100 µl of MTT solution (5mg/ml MTT stock in PBS diluted to 1 mg/ml with 10% RPMI-1640 medium) was added to each well and incubated for 4hr at 37°C. Finally, 100 µL of DMSO was added and optical densities at 570 nm were measured using a A BioTeck® microplate reader (Winooski, VT, USA). The relative cell viability in percentage was calculated as ($A_{570\ nm}$ of treated samples/A_{570nm} of untreated sample) X 100. Statistical analysis of the data was performed using Microsoft Excel software version 2010.

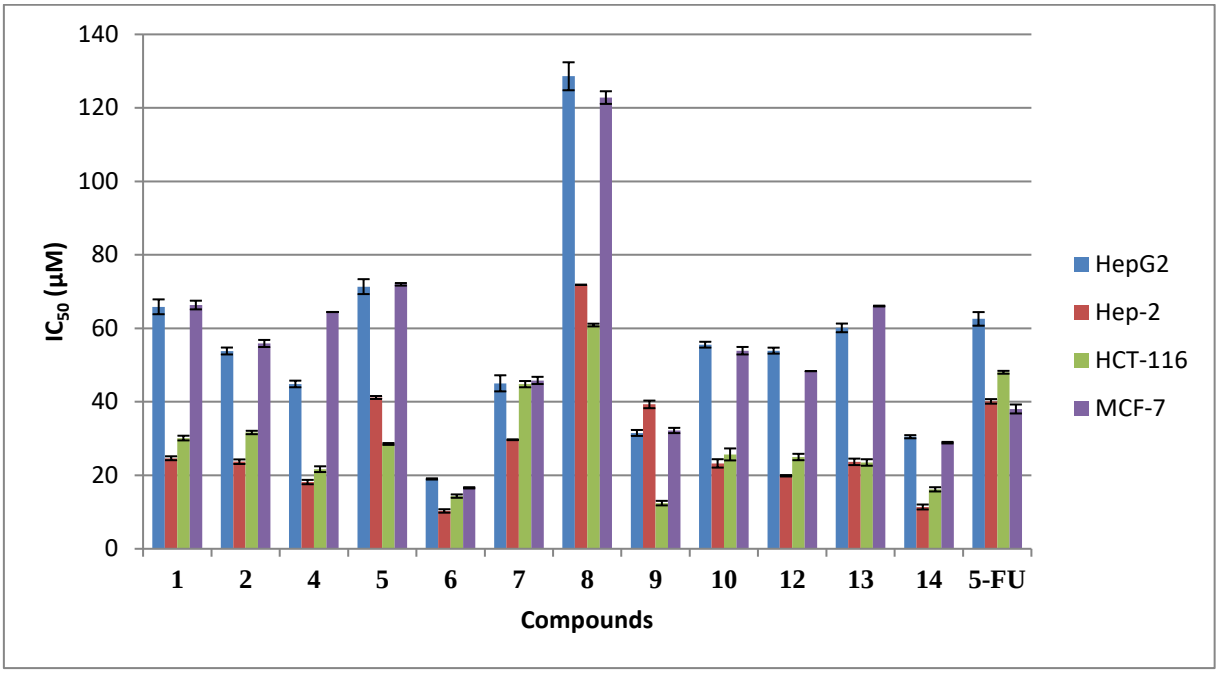

Figure S40. Calculated IC_{50} (µM) for the *in vitro* cytotoxicity of **1**-**14**

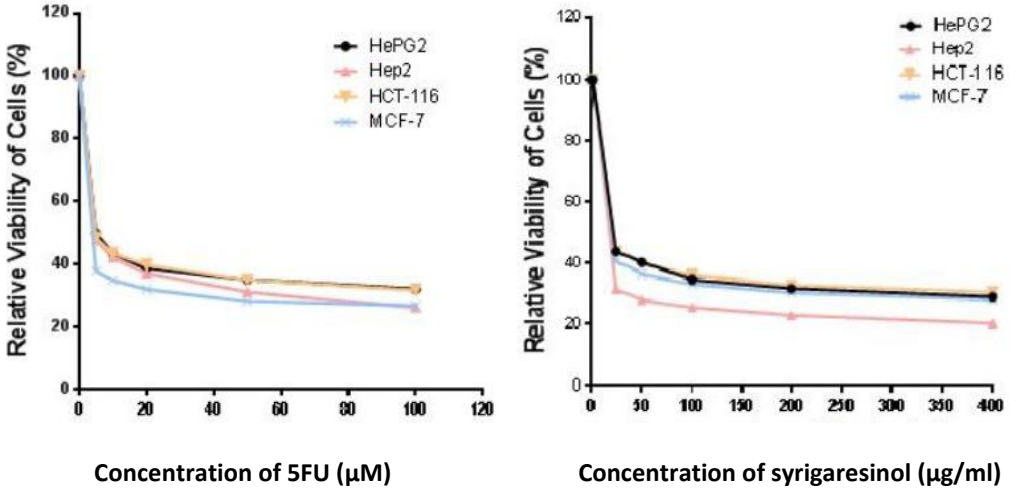

Figure S41: The log concentration- cell viability graph of 5FU and **6** (syringaresinol).

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