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SUPPORTING INFORMATION

Antimicrobial Terpenoids from Seed of *Chamaecyparis obtusa* (Siebold & Zucc.) Endl.

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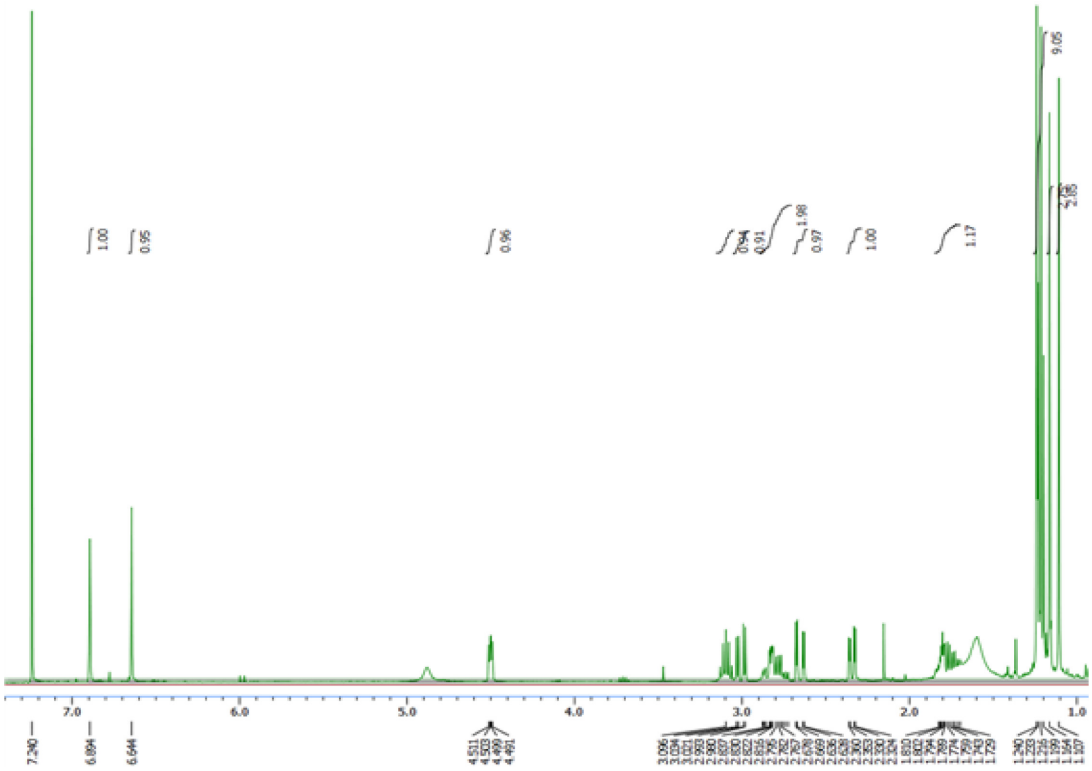

***Figure* S1.** ^{1}H-NMR (400 MHz, CD_3OD) spectrum of compound **1**.

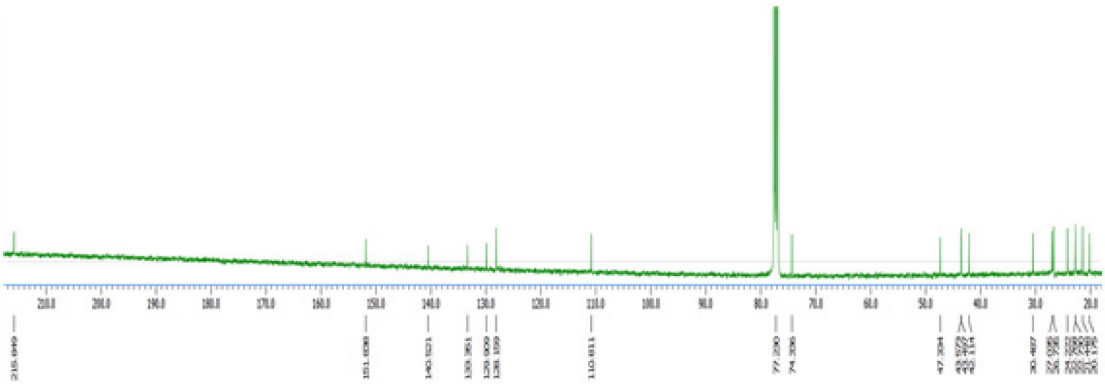

***Figure* S2.** ^{13}C-NMR (100 MHz, CD_3OD) spectrum of compound **1**.

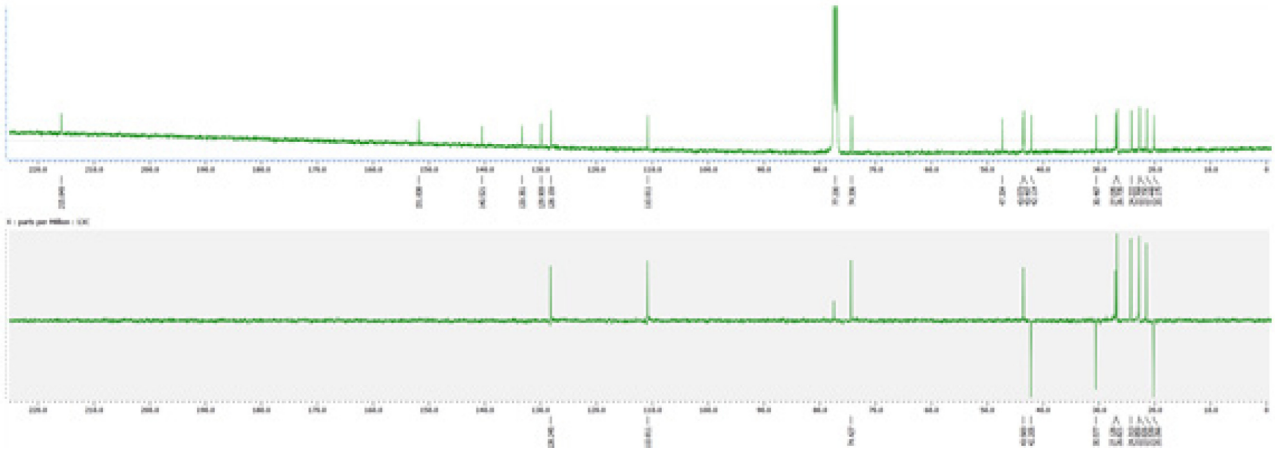

***Figure* S3.** DEPT-135 spectrum of compound **1**.

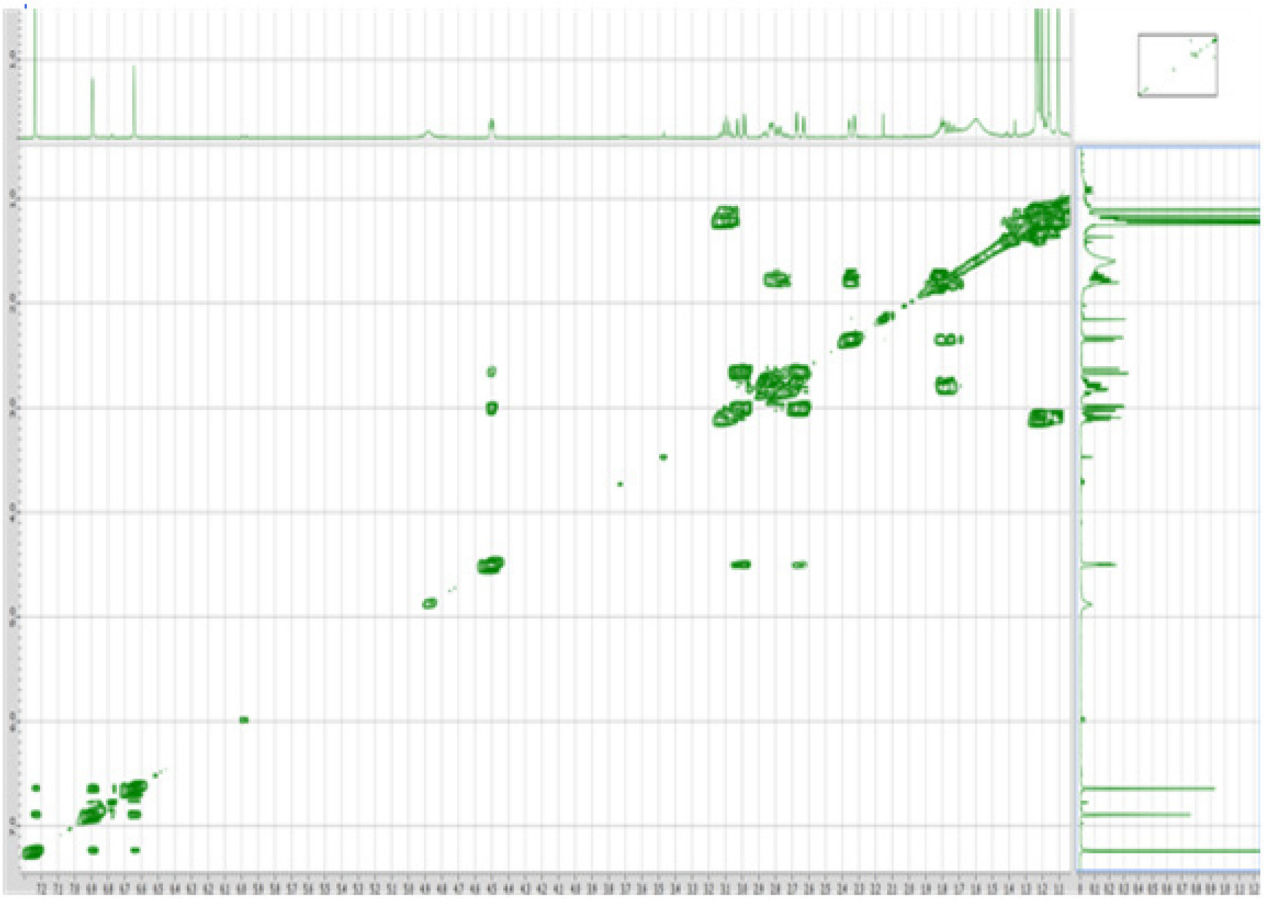

***Figure* S4.** ^{1}H-^{1}H COSY spectrum of compound **1**.

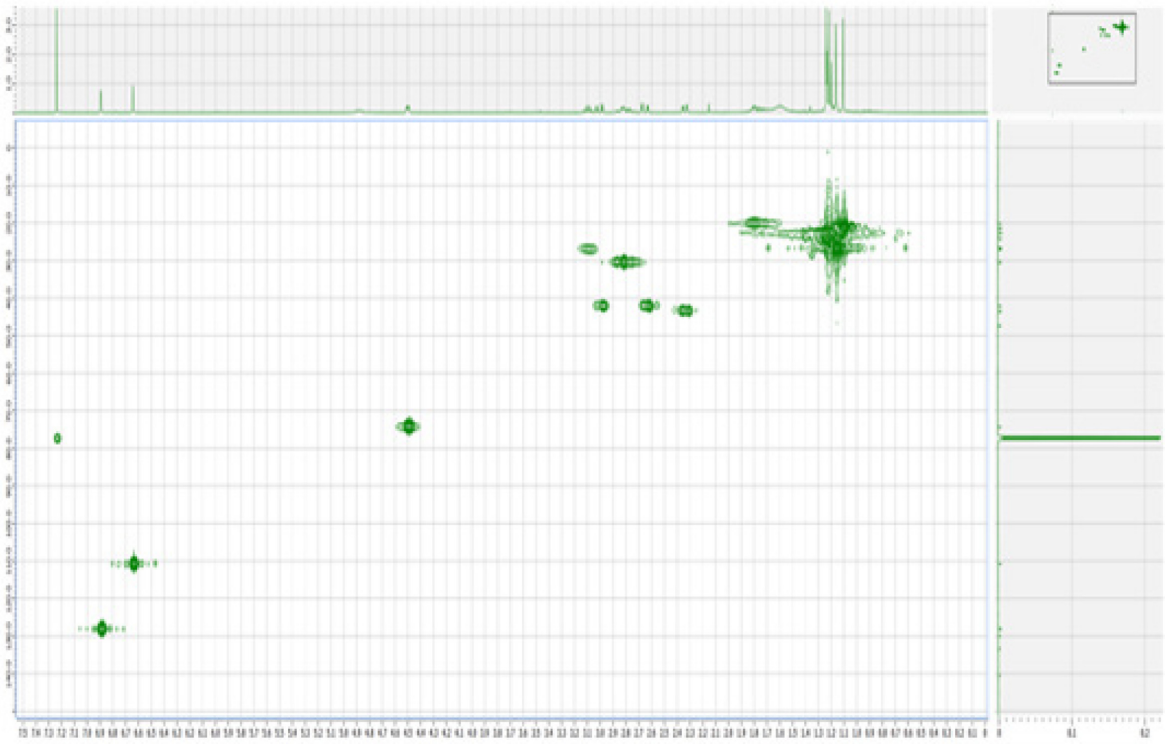

***Figure* S5.** HMQC spectrum of compound **1**.

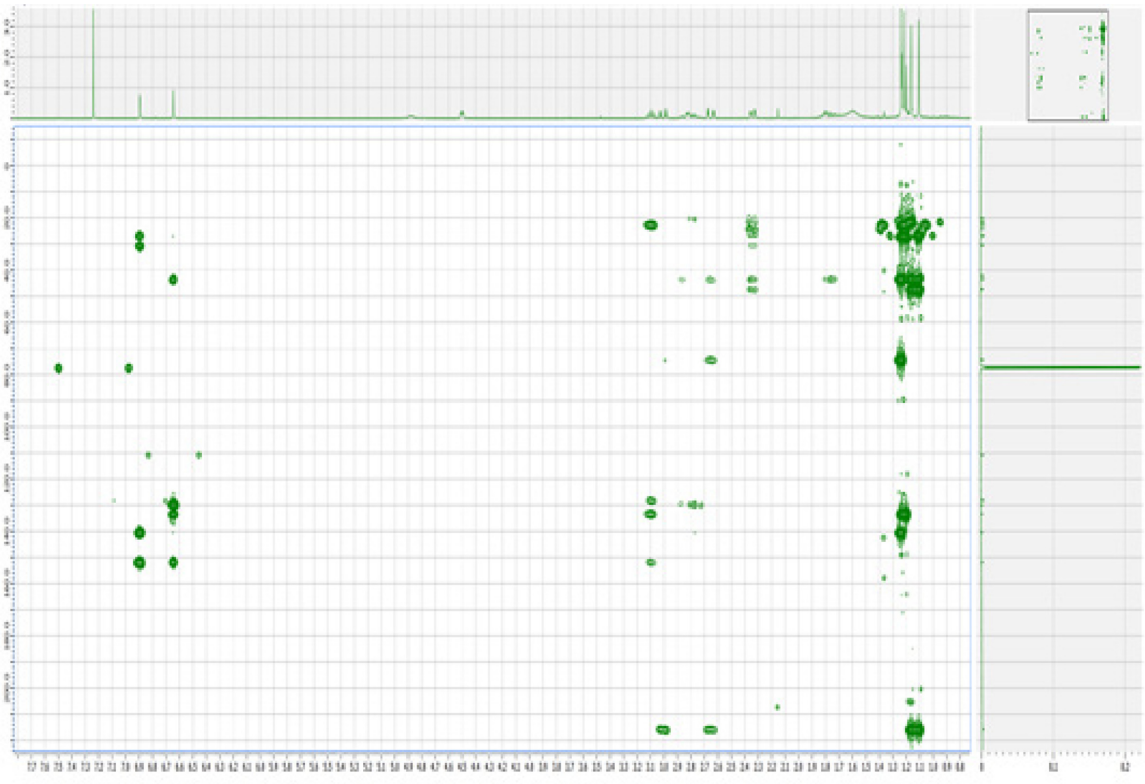

***Figure* S6.** HMBC spectrum of compound **1**.

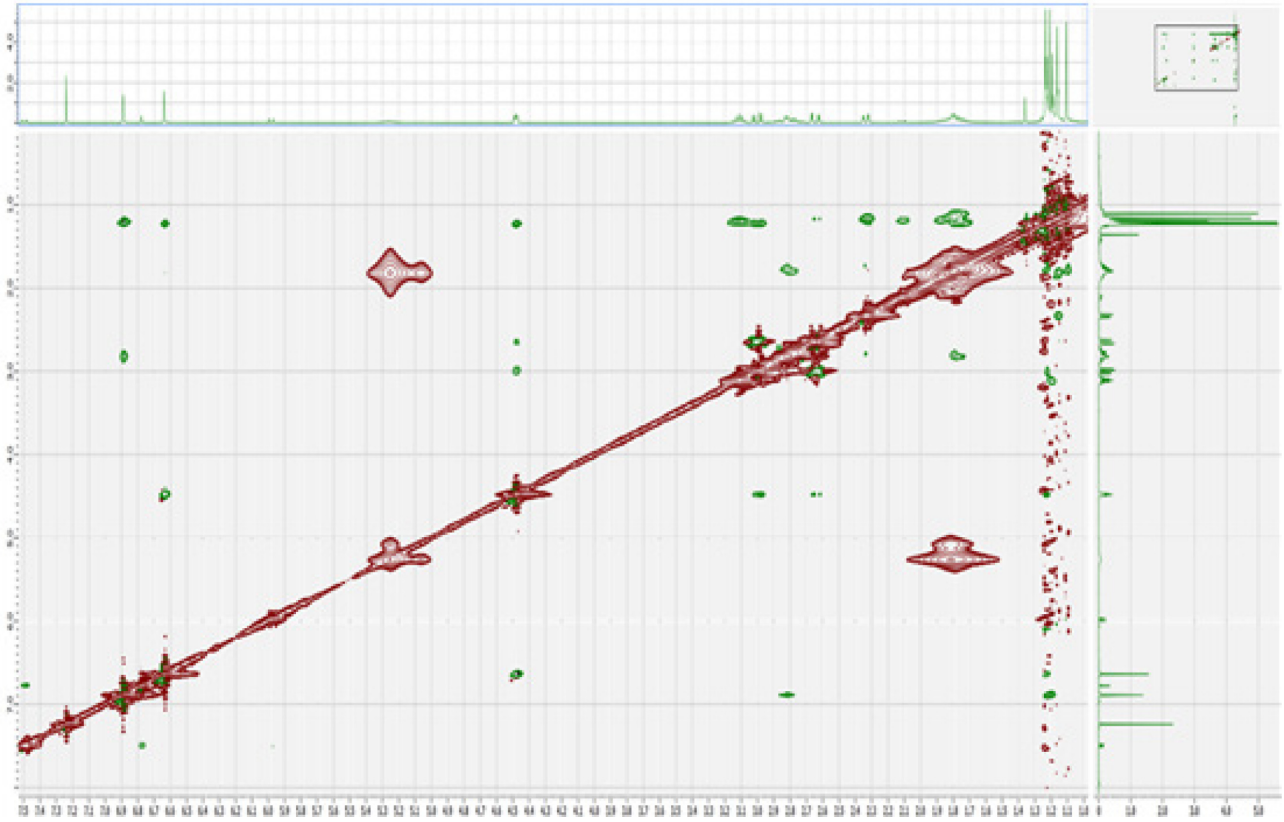

***Figure* S7.** NOESY spectrum of compound **1**.

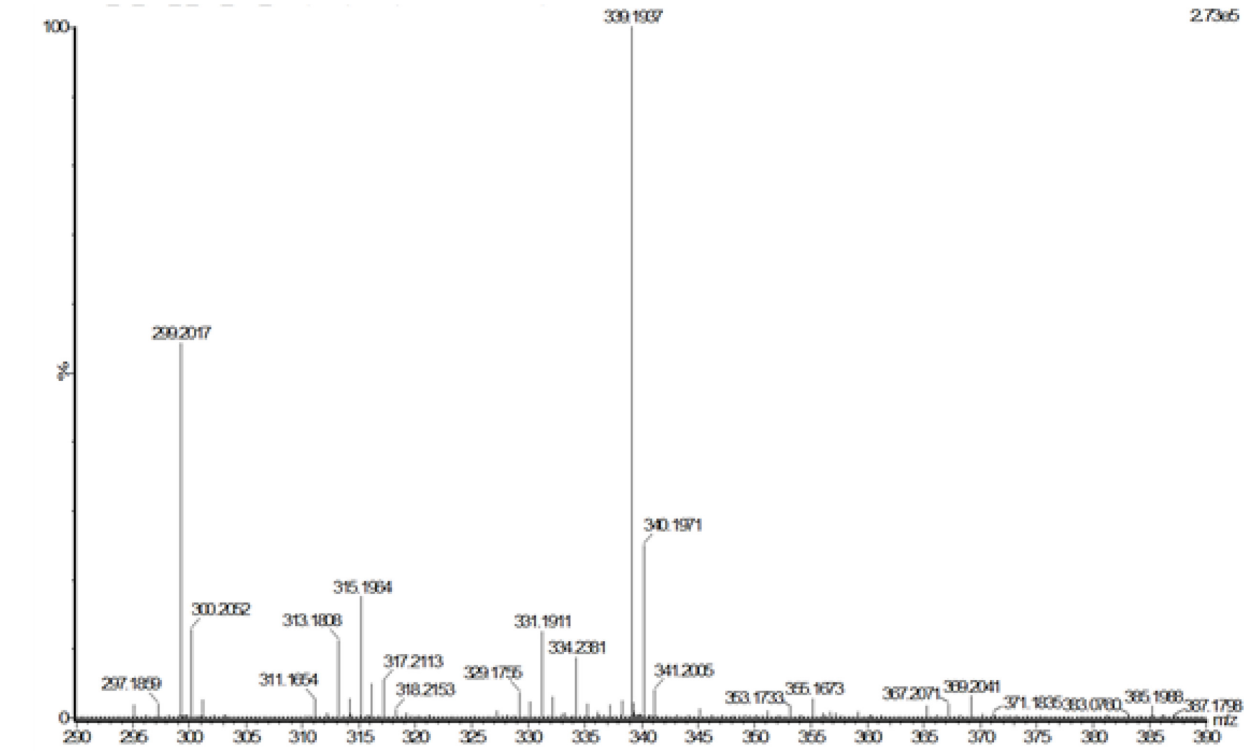

***Figure* S8.** HR-ESI-MS spectrum of compound **1**.

***Table* S1.** ^{1}H and ^{13}C NMR data of compound **2** (400 and 100 MHz, in $CDCl_3$).

No.	Compound 2	
	δ_H (int, mult, *J* Hz)	**δ_C**
1	1.35~1.44 (1H, m) 3.09 (1H, ddd, 14.1, 8.2, 6.0)	35.6
2	1.61 (1H, m) 2.10 (1H, ddd, 12.2, 6.0, 1.4)	34.5
3		218.3
4		47.1
5	2.03 (1H, dd, 12.6, 1.4)	49.1
6	2.63 (1H, ddd, 15.5, 9.8, 6.4) 2.47 (1H, ddd, 15.2, 8.5, 6.4)	31.4
7	4.70 (1H, dd, 11.0, 6.0)	71.2
8		136.2
9		130.3
10		38.8
11	6.04 (1H, s, -OH)	146.7
12		144.0
13		139.4
14	7.05 (1H, s)	115.3
15	3.20 (1H, sept, 6.9)	26.8
16	1.21 (3H, d, 6.9)	23.9
17	1.23 (3H, d, 6.9)	23.9
18	1.13 (3H, s)	28.3
19	1.15 (3H, s)	20.7
20	1.31 (3H, s)	19.8
$-OCH_3$	3.74 (3H, s)	62.1

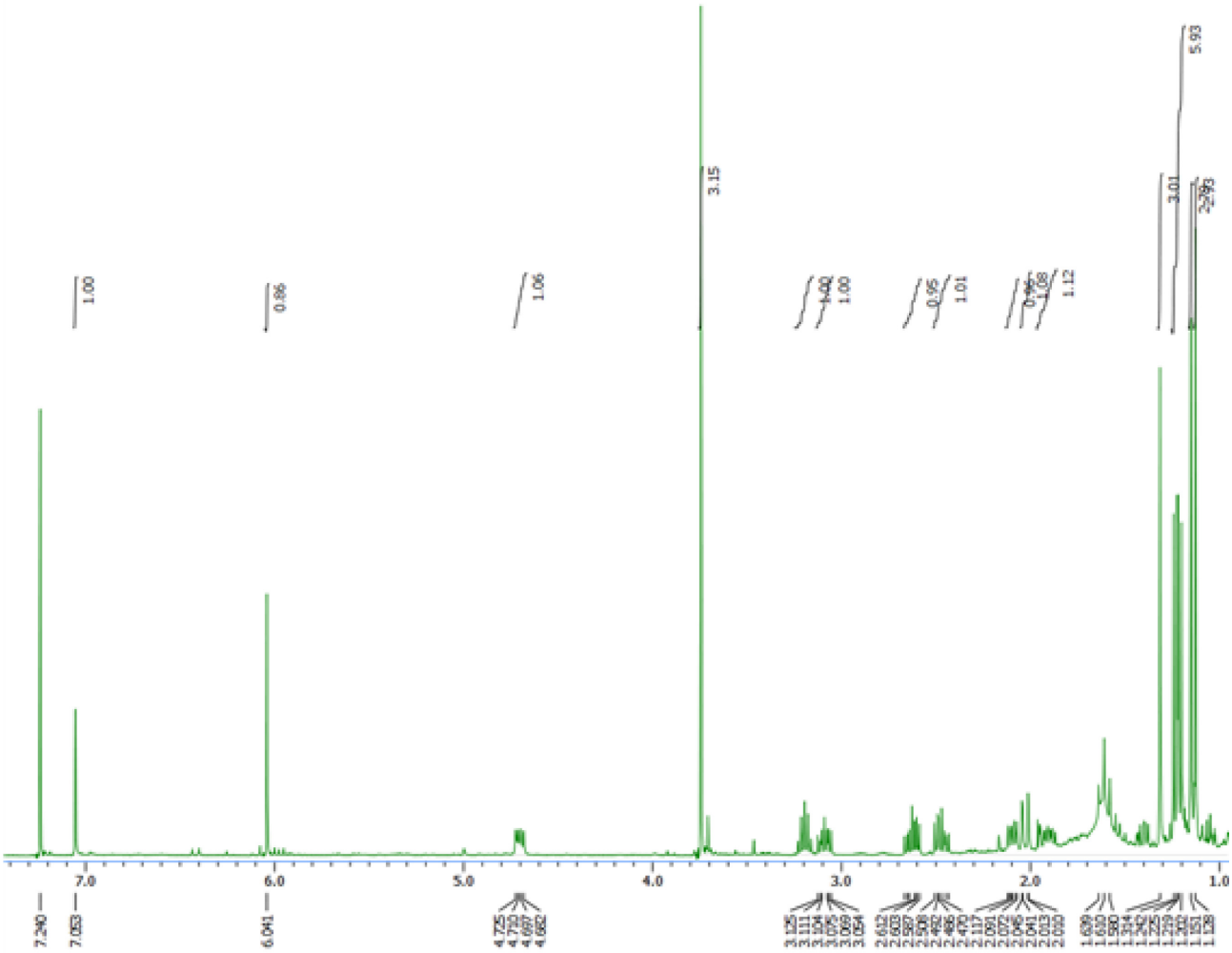

***Figure* S9.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **2**.

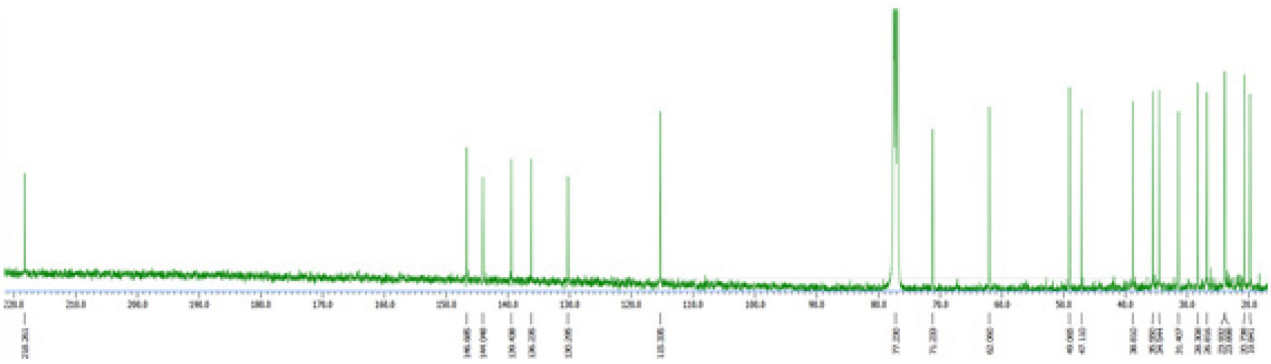

***Figure* S10.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **2**.

***Table* S2.** ^{1}H and ^{13}C NMR data of compound **3** (400 and 100 MHz, in $CDCl_3$).

No.	Compound 3	
	δ_H (int, mult, *J* Hz)	δ_C
1	2.34 (1H, ddd, 15.8,9.8,4.1) 1.91~1.97 (1H, m)	37.7
2	2.66 (1H, ddd, 15.8,9.8,7.8) 2.35 (1H, ddd, 15.8,7.8,4.1)	34.8
3		217.9
4		47.6
5	1.87 (1H, dd, 11.7,2.8)	50.7
6	1.69~1.83 (2H, m)	20.6
7	2.87 (1H, ddd, 16.7,6.0,2.8) 2.35 (1H, ddd, 16.7,11.7,6.0)	30.3
8		127.1
9		145.9
10		37.3
11	6.62 (1H, s)	112.0
12		151.3
13		132.5
14	6.84 (1H, s)	126.9
15	3.13 (1H, sept, 6.9)	27.1
16	1.21 (3H, d, 6.9)	22.7
17	1.22 (3H, d, 6.9)	22.9
18	1.14 (3H, s)	27.0
19	1.25 (3H, s)	21.3
20	1.11 (3H, s)	24.8

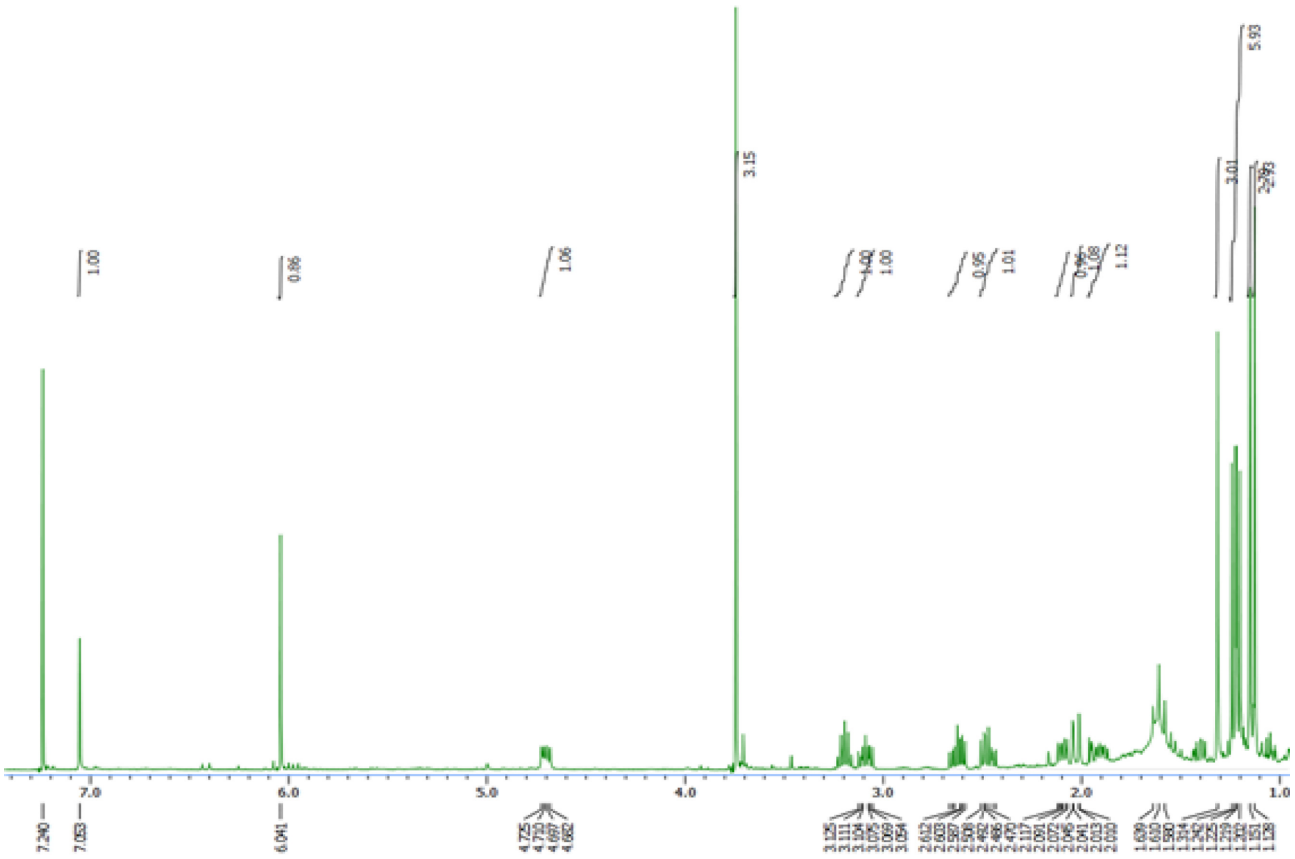

***Figure* S11.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **3**.

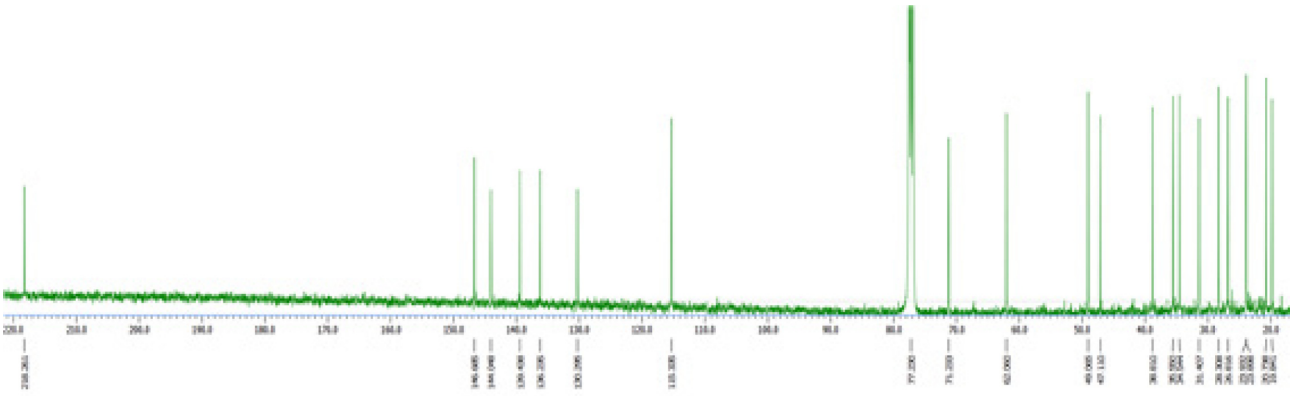

***Figure* S12.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **3**.

***Table* S3.** ^{1}H and ^{13}C NMR data of compound **4** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 4	
	δ_H (int, mult, *J* Hz)	δ_C
1	7.49 (1H, d, 10.1)	158.0
2	5.99 (1H, d, 10.1)	127.8
3		205.3
4		44.9
5	2.12 (1H, dd, 11.9,3.2)	48.2
6	1.77~1.92 (2H, m)	19.6
7	2.92 (1H, ddd, 16.9,6.4,3.2) 2.83 (1H, ddd, 16.9,11.9,6.4)	29.7
8		127.8
9		142.3
10		40.2
11	6.78 (1H, s)	111.3
12		151.2
13		133.0
14	6.89 (1H, s)	126.7
15	3.12 (1H, sept, 6.9)	27.5
16	1.21 (3H, d, 6.9)	22.7
17	1.24 (3H, d, 6.9)	22.9
18	1.16 (3H, s)	27.0
19	1.19 (3H, s)	21.5
20	1.36 (3H, s)	28.6

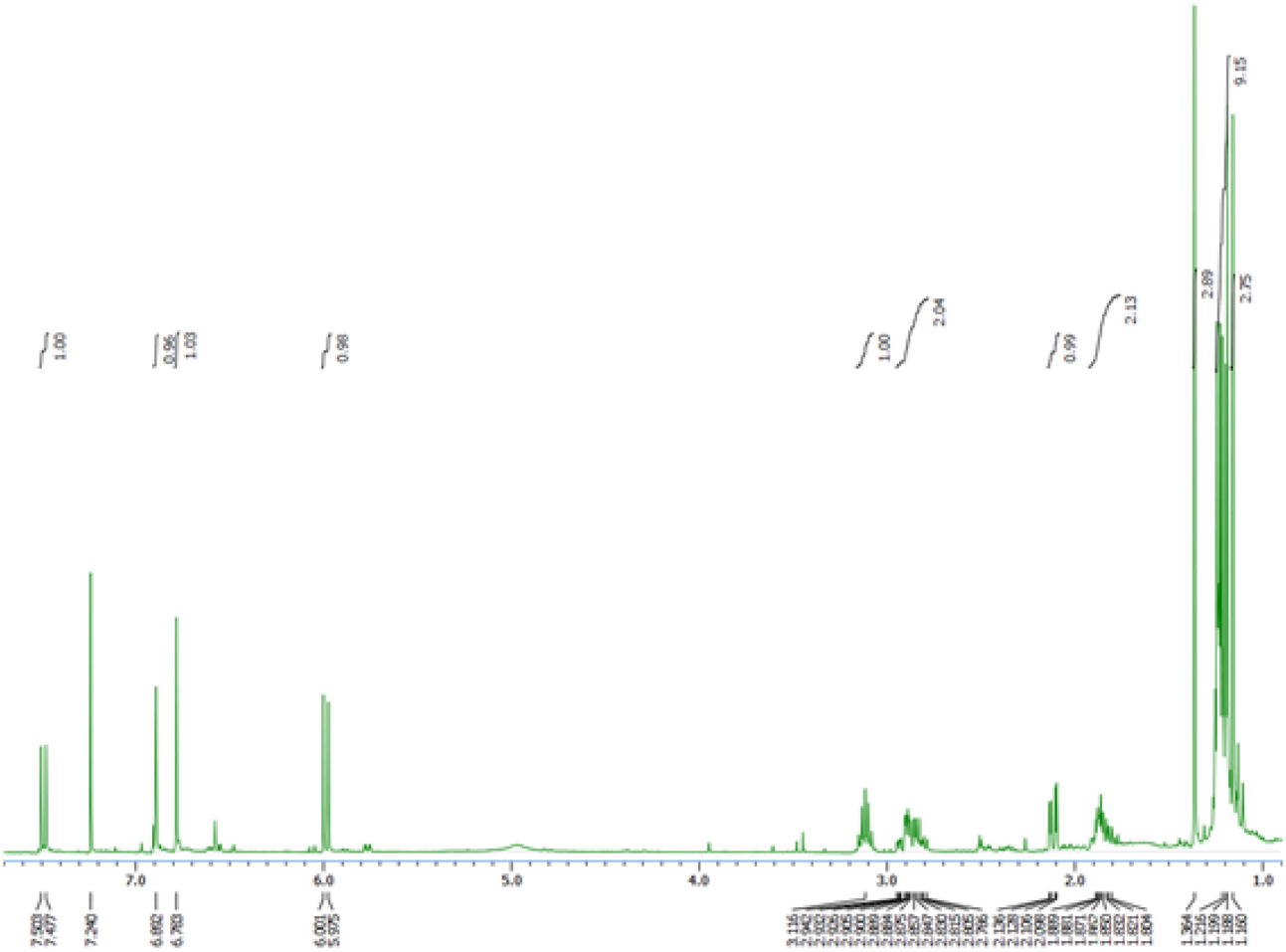

***Figure* S13.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **4**.

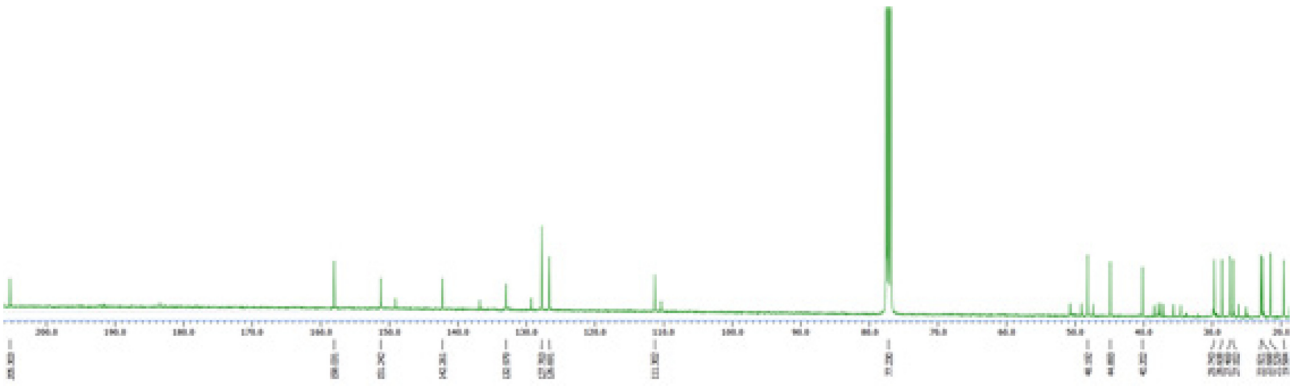

***Figure* S14.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **4**.

***Table* S4.** ^{1}H and ^{13}C NMR data of compound **5** (400 and 100 MHz, in CD_3OD)

No.	Compound 5	
	δ_H (int, mult, *J* Hz)	δ_C
1	4.37 (1H, t, 2.8)	74.2
2	2.04 (1H, td, 12.9,2.8) 1.95 (1H, ddd, 12.9,4.8,2.8)	35.0
3	3.75 (1H, dd, 12.9,4.8)	74.0
4		40.2
5	2.34 (1H, t, 12.8)	45.1
6	1.86~1.91 (1H, m) 1.69~1.78 (1H, m)	20.3
7	2.78 (1H, ddd, 18.3,6.1,1.8) 2.74 (1H, dd, 11.3,6.1)	32.0
8		128.7
9		144.4
10		44.3
11	6.66 (1H, s)	112.1
12		153.8
13		134.0
14	6.78 (1H, s)	127.9
15	3.17 (1H, sept, 6.9)	27.9
16	1.18 (3H, d, 6.9)	23.2
17	1.15 (3H, d, 6.9)	23.3
18	1.08 (3H, s)	29.0
19	0.87 (3H, s)	16.4
20	1.19 (3H, s)	26.5

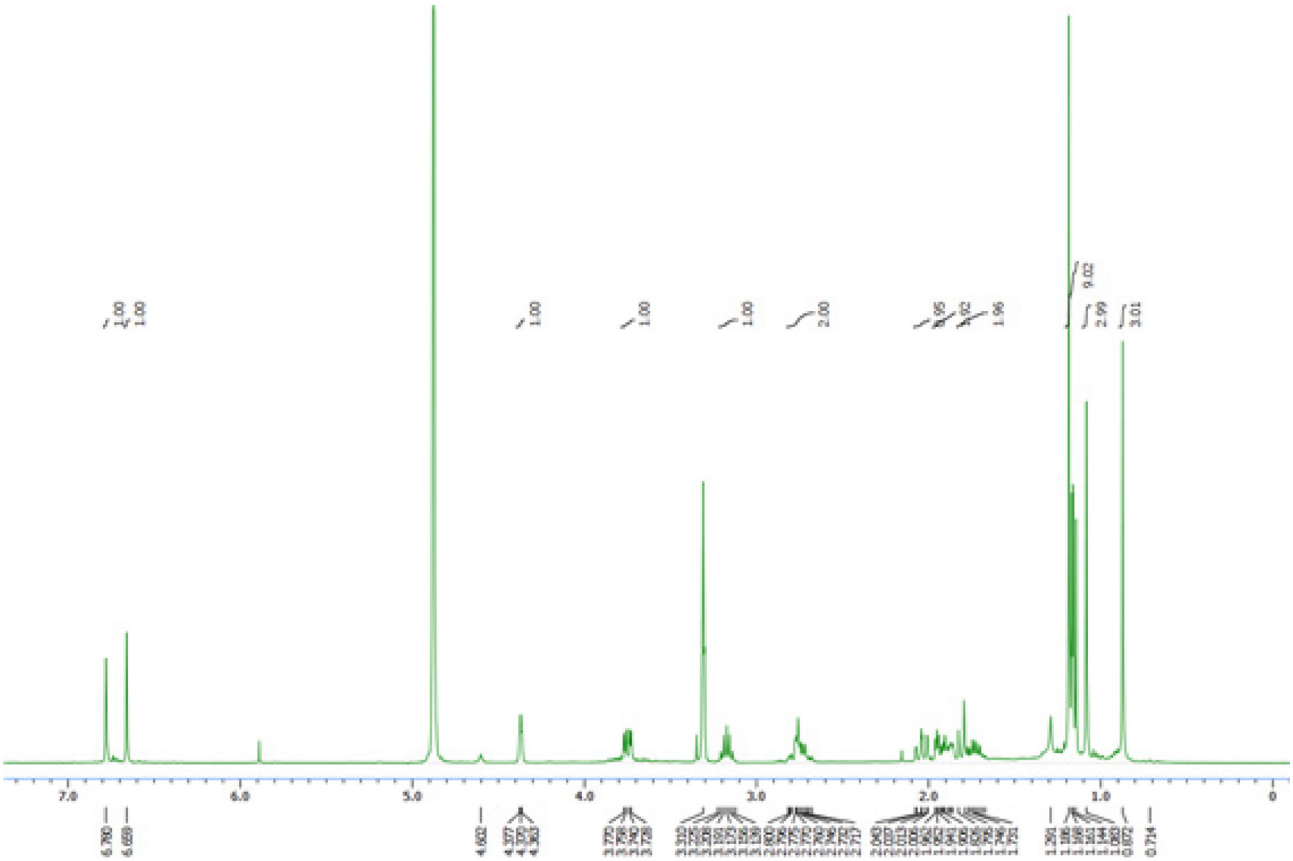

***Figure* S15.** ^{1}H-NMR (400 MHz, CD_3OD) spectrum of compound **5**.

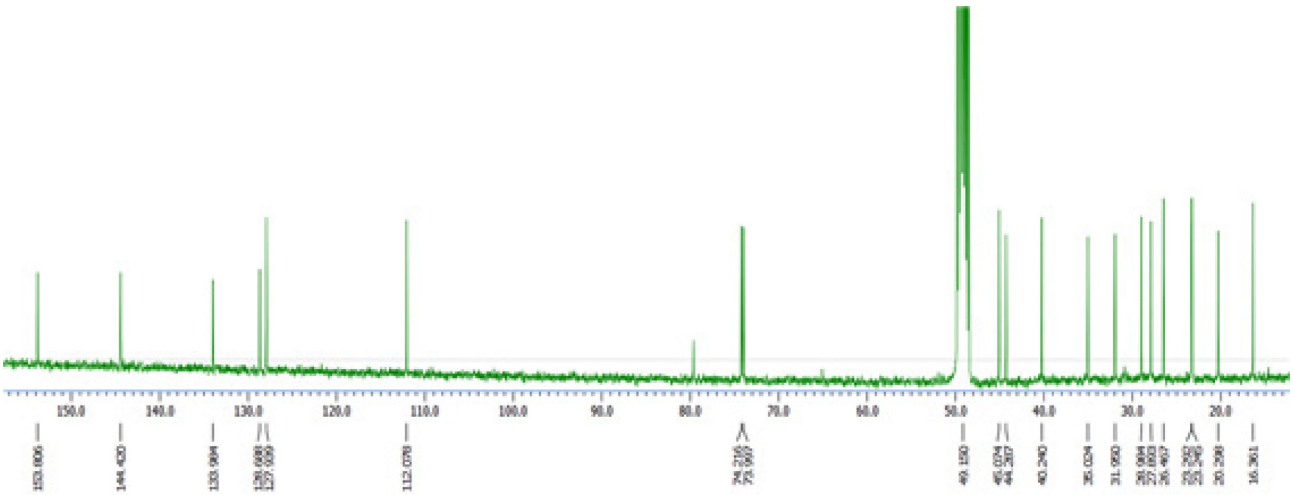

***Figure* S16.** ^{13}C-NMR (100 MHz, CD_3OD) spectrum of compound **5**.

***Table* S5.** ^{1}H and ^{13}C NMR data of compound **6** (400 and 100 MHz, in acetone-d_6)

No.	Compound 6	
	δ_H (int, mult, *J* Hz)	δ_C
1		38.4
2		29.4
3	3.22 (1H, dd, 3.9, 1.8)	78.9
4		40.2
5		51.5
6	2.74 (1H, dd, 10.8, 7.3)	20.4
7	2.72 (1H, ddd, 17.2, 10.8, 7.3) 2.82 (1H, ddd, 17.2, 7.3, 1.8)	31.3
8		126.8
9		148.9
10		38.5
11	6.72 (1H, s)	112.0
12		153.6
13		133.2
14	6.77 (1H, s)	127.6
15	3.21 (1H, sept, 6.9)	27.9
16	1.18 (3H, d, 6.9)	23.4
17	1.16 (3H, d, 6.9)	23.5
18	0.86 (3H, s)	29.2
19	1.05 (3H, s)	16.6
20	1.15 (3H, s)	25.8

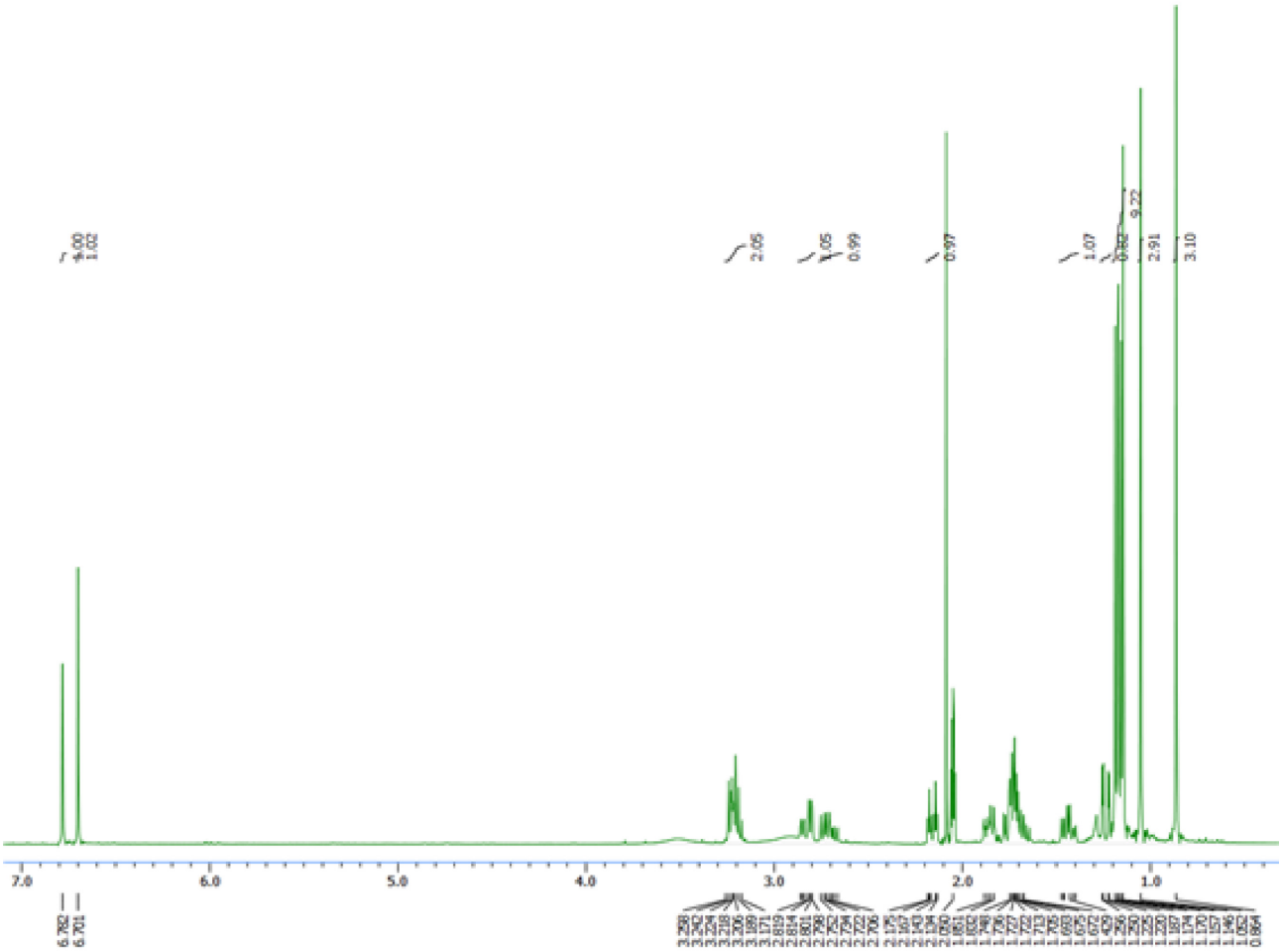

***Figure* S17.** ^{1}H-NMR (400 MHz, acetone-d_6) Spectrum of compound **6**.

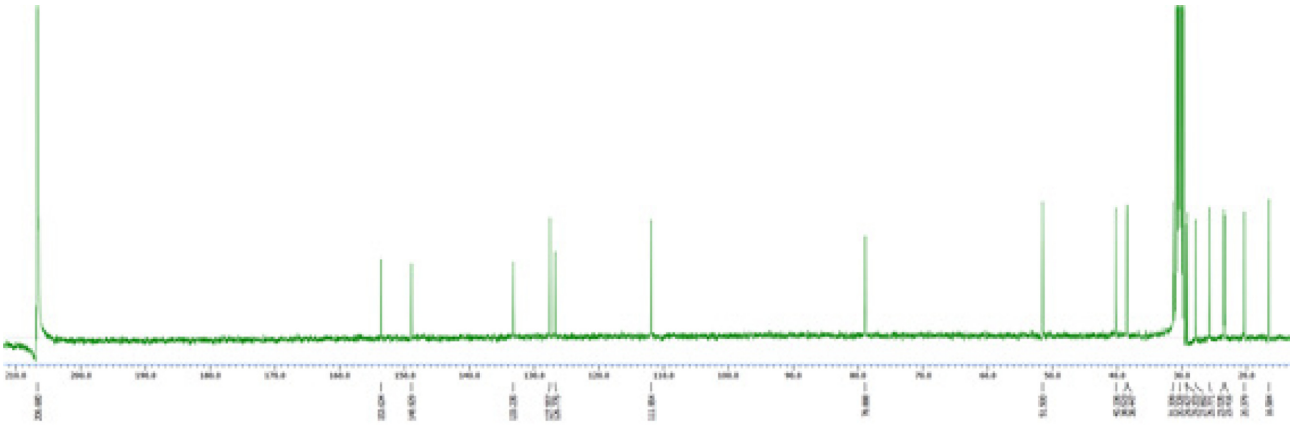

***Figure* S18.** ^{13}C-NMR (100 MHz, acetone-d_6) spectrum of compound **6**.

***Table* S6.** ^{1}H and ^{13}C NMR data of compound **7** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 7	
	δ_H (int, mult, *J* Hz)	δ_C
1		31.8
2		28.4
3	3.48 (1H, t, 2.8)	76.0
4		37.9
5		43.8
6		22.3
7		29.8
8		126.8
9		148.4
10		37.4
11	6.61 (1H, s)	111.1
12		150.9
13		131.7
14	6.81 (1H, s)	127.3
15	3.09 (1H, sept, 6.9)	26.1
16	1.20 (3H, d, 6.9)	22.7
17	1.21 (3H, d, 6.9)	23.0
18	0.92 (3H, s)	27.0
19	1.01 (3H, s)	19.0
20	1.16 (3H, s)	24.8

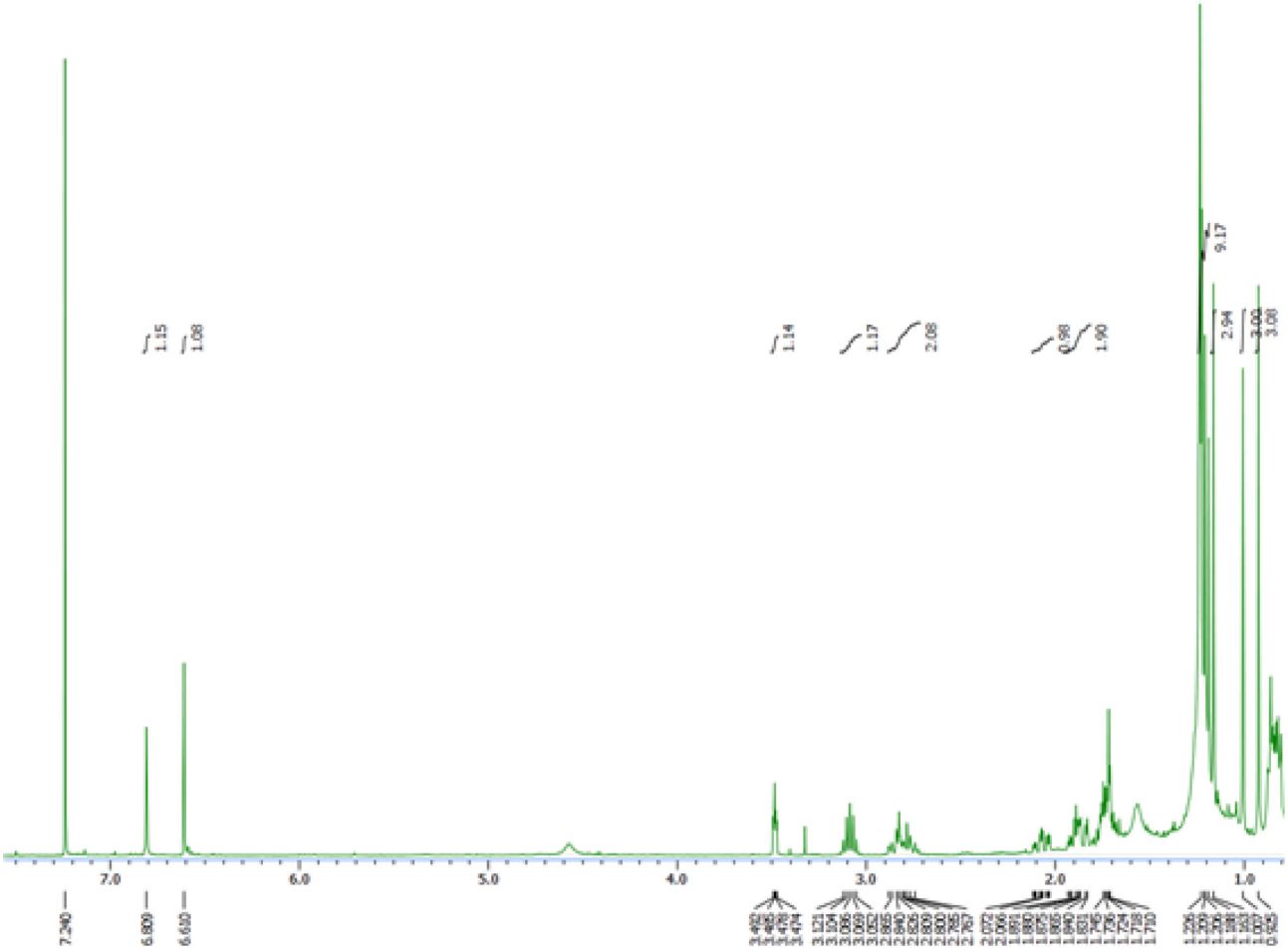

***Figure* S19.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **7**.

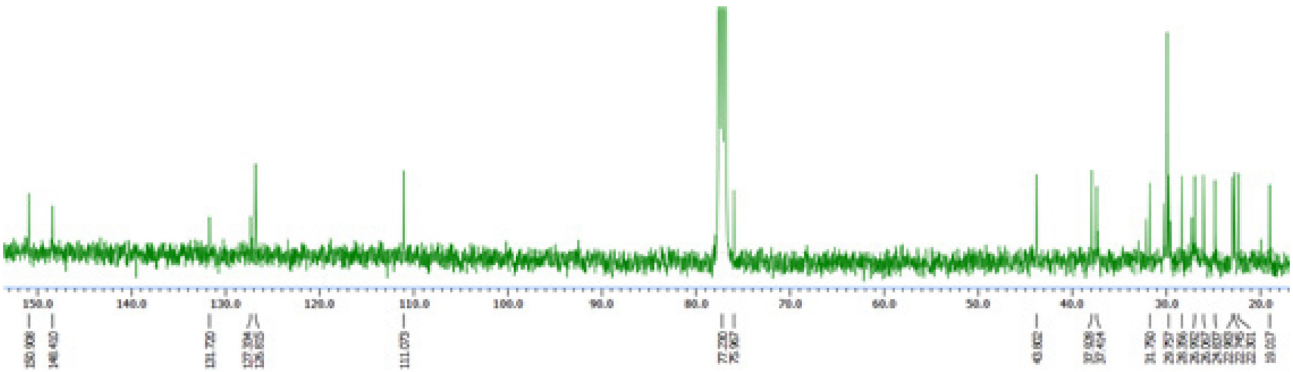

***Figure* S20.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **7**.

***Table* S7.** ^{1}H and ^{13}C NMR data of compound **8** (400 and 100 MHz, in pyridine-d_5)

No.	Compound 8	
	δ_H (int, mult, *J* Hz)	δ_C
1	1.01 (1H, dd, 13.5, 3.2) 2.10 (1H, br d, 13.5)	38.6
2	1.24 ~1.45 (1H, m) 1.57 (1H, m)	19.6
3	1.24 ~1.45 (2H, m)	42.0
4		33.7
5	1.79 (1H, dd, 13.5, 3.7)	50.2
6	2.71 (1H, dd, 17.9, 13.5) 2.81 (1H, dd, 17.9, 3.7)	36.8
7		197.7
8		124.5
9		157.0
10		38.4
11	7.14 (1H, s)	110.6
12		162.2
13		134.5
14	8.42 (1H, s)	127.0
15	3.64 (1H, sept, 6.9)	27.7
16	1.39 (3H, d, 6.9)	23.1
17	1.37 (3H, d, 6.9)	23.3
18	0.83 (3H, s)	33.0
19	0.87 (3H, s)	21.8
20	1.16 (3H, s)	23.8

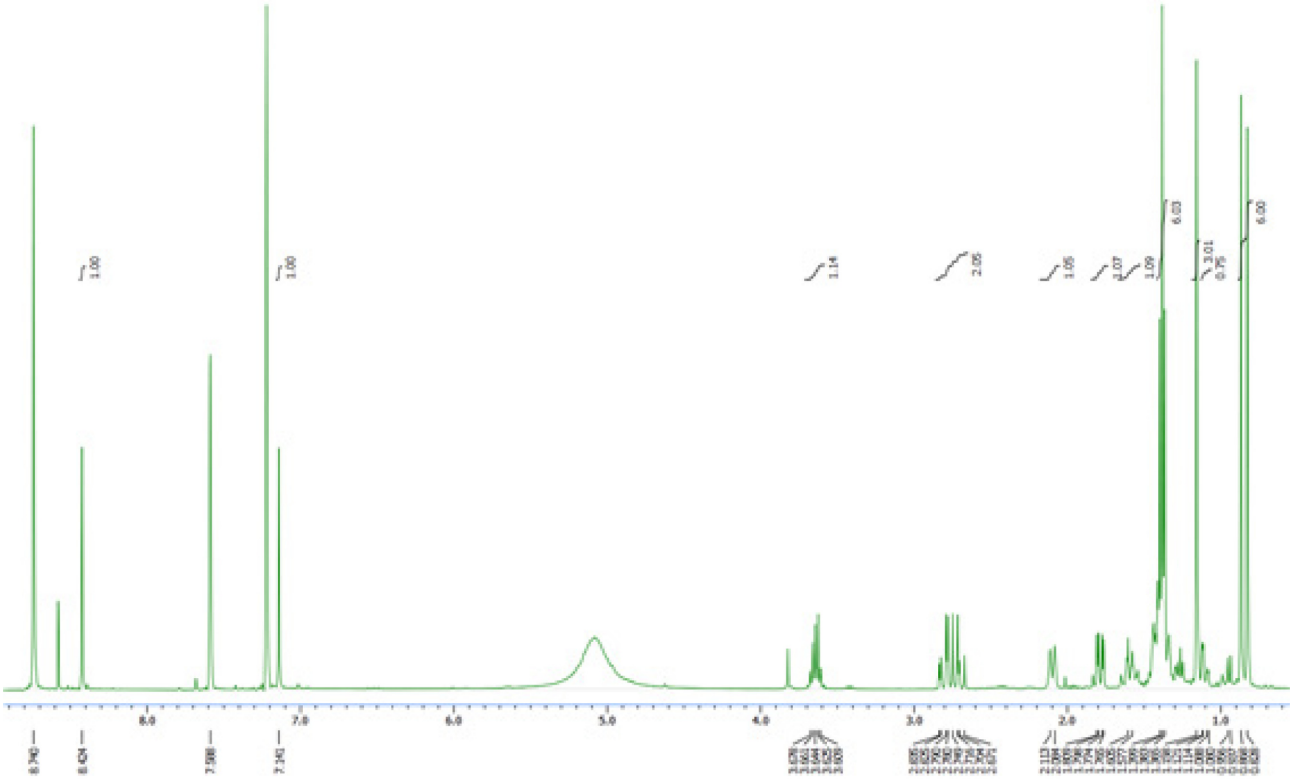

***Figure* S21.** ^{1}H-NMR (400 MHz, pyridine-d_5) spectrum of compound **8**.

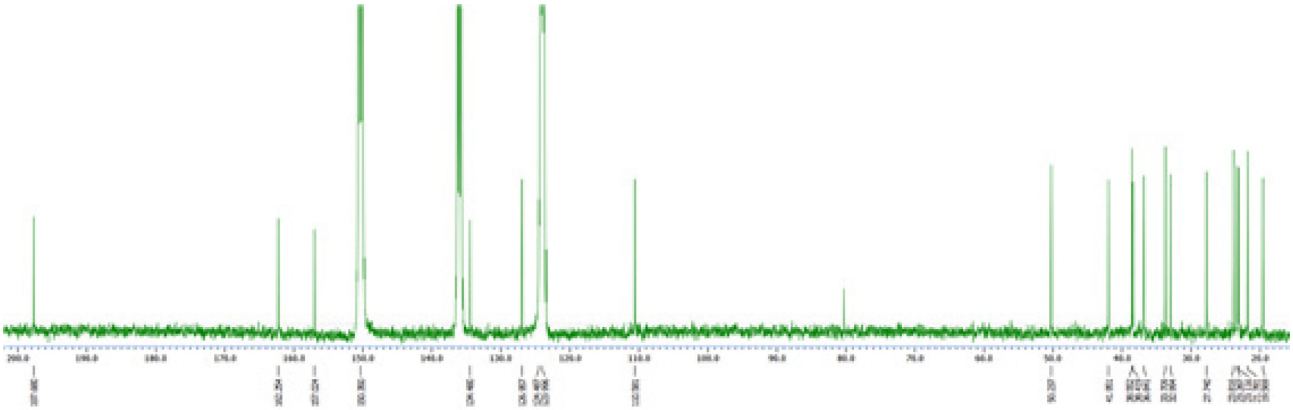

***Figure* S22.** ^{13}C-NMR (100 MHz, pyridine-d_5) spectrum of compound **8**.

***Table* S8.** ^{1}H and ^{13}C NMR data of compound **9** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 9	
	δ_H (int, mult, *J* Hz)	δ_C
1	1.38 (1H, dt, 12.82, 2.13) 2.15 (1H, br dd, 11.00, 3.64)	39.1
2	1.64 (1H, dd, 12.36, 6.87) 1.83 (1H, m)	19.4
3	1.44 (1H, m) 1.26 (1H, d, 2.29)	41.9
4		33.6
5	1.29 (1H, dd, 12.36, 1.83)	50.5
6	1.71 (1H, td, 13.74, 3.21) 1.58 (1H, m)	19.5
7	2.78 (1H, dd, 11.45, 7.33) 2.84 (1H, dd, 16.62, 6.87)	30.0
8		127.5
9		148.9
10		37.7
11	6.61 (1H, s)	111.2
12		150.8
13		131.5
14	6.81 (1H, s)	126.8
15	3.08 (1H, sept, 6.87)	27.0
16	1.22 (3H, d, 6.87)	23.0
17	1.20 (3H, d, 6.87)	22.8
18	0.89 (3H, s)	33.5
19	0.92 (3H, s)	21.8
20	1.15 (3H, s)	25.0

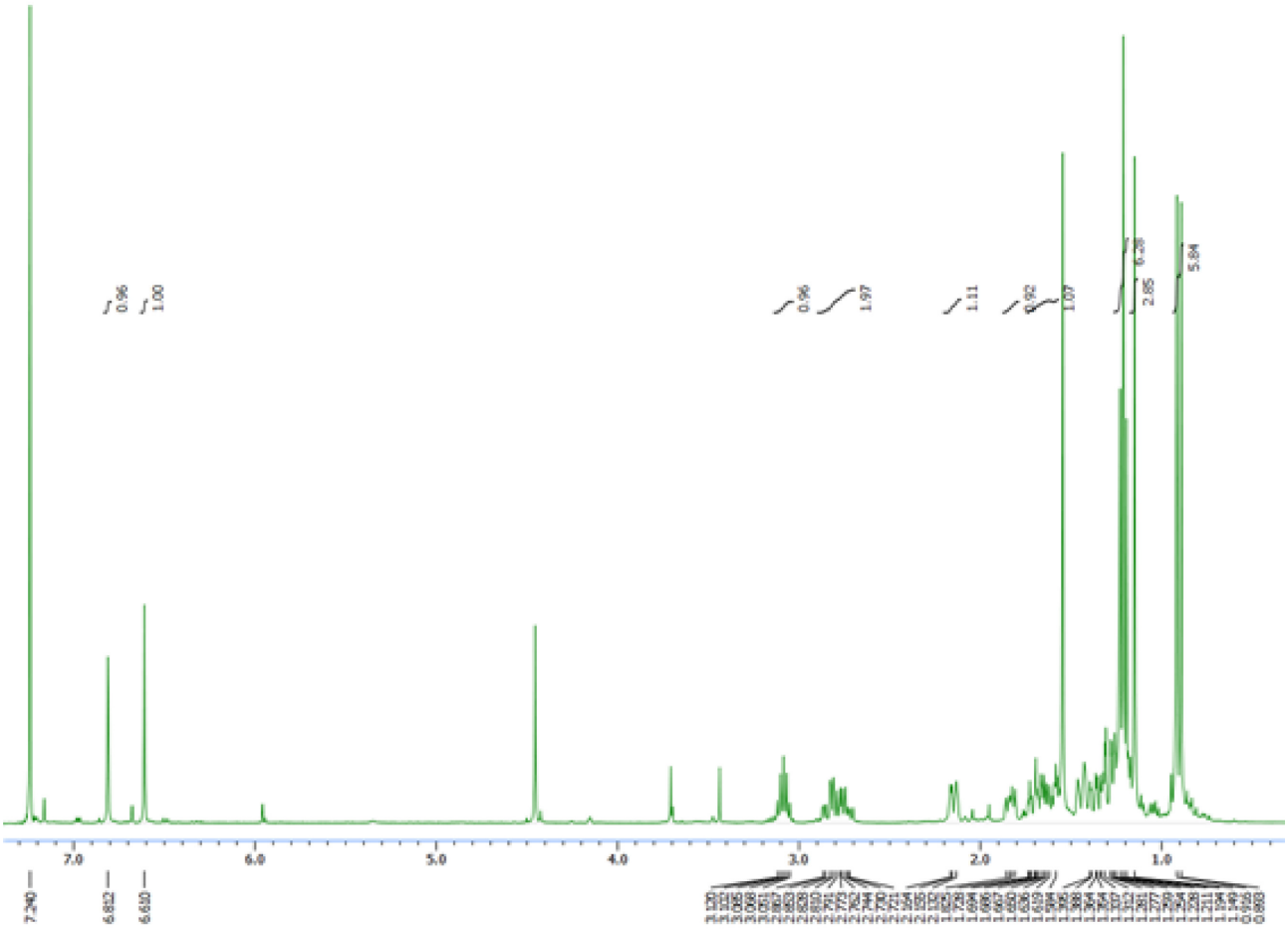

***Figure* S23.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **9**.

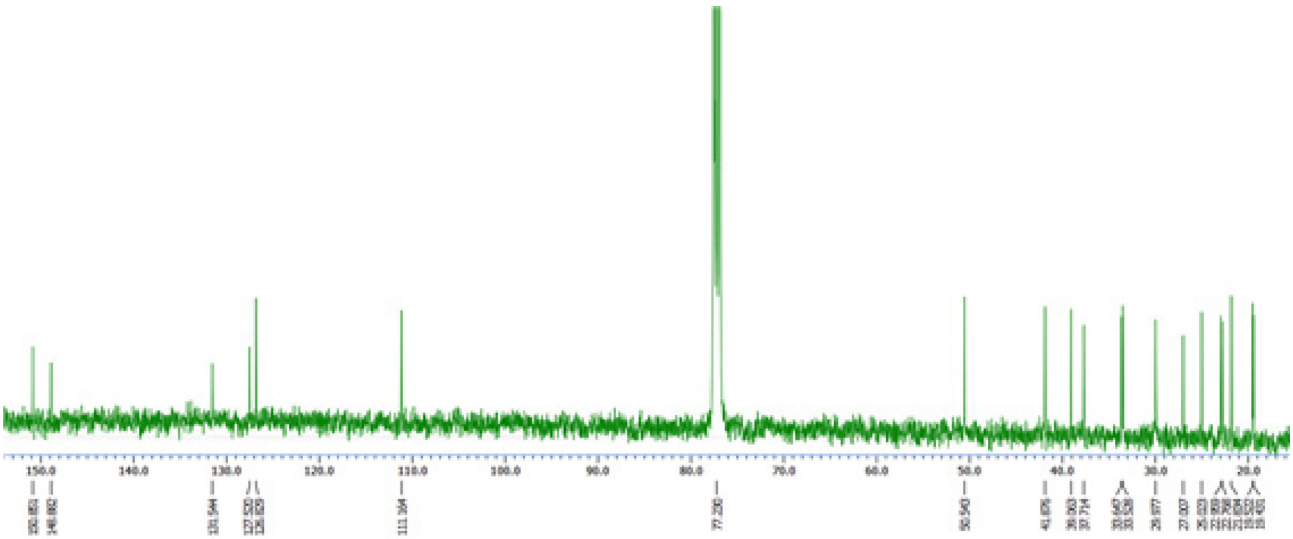

***Figure* S24.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **9**.

***Table* S9.** ^{1}H and ^{13}C NMR data of compound **10** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 10	
	δ_H (int, mult, *J* Hz)	δ_C
1	1.39 (1H, dt, 13.7, 3.7) 3.22(1H, ddd, 13.7, 3.7, 1.4)	36.4
2	1.58 (1H, m) 1.73 (1H, m)	19.2
3	1.48 (1H, ddd, 13.2, 3.2, 1.4) 1.26 (1H, ddd, 13.2, 6.9, 3.2)	41.4
4		33.7
5	1.84 (1H, dd, 14.4, 3.2)	50.5
6	2.64 (1H, dd, 16.9, 3.2) 2.53 (1H, dd, 16.9, 14.4)	35.8
7		199.4
8		129.0
9		138.3
10		40.4
11	6.07 (1H, s, -OH)	146.7
12		149.3
13		139.3
14	7.59 (1H, s)	117.5
15	3.18 (1H, sept, 6.9)	26.9
16	1.23 (3H, d, 6.9)	23.8
17	1.22 (3H, d, 6.9)	23.7
18	0.92 (3H, s)	33.4
19	1.00 (3H, s)	21.7
20	1.37 (3H, s)	18.2
$-OCH_3$	3.79 (3H, s)	62.1

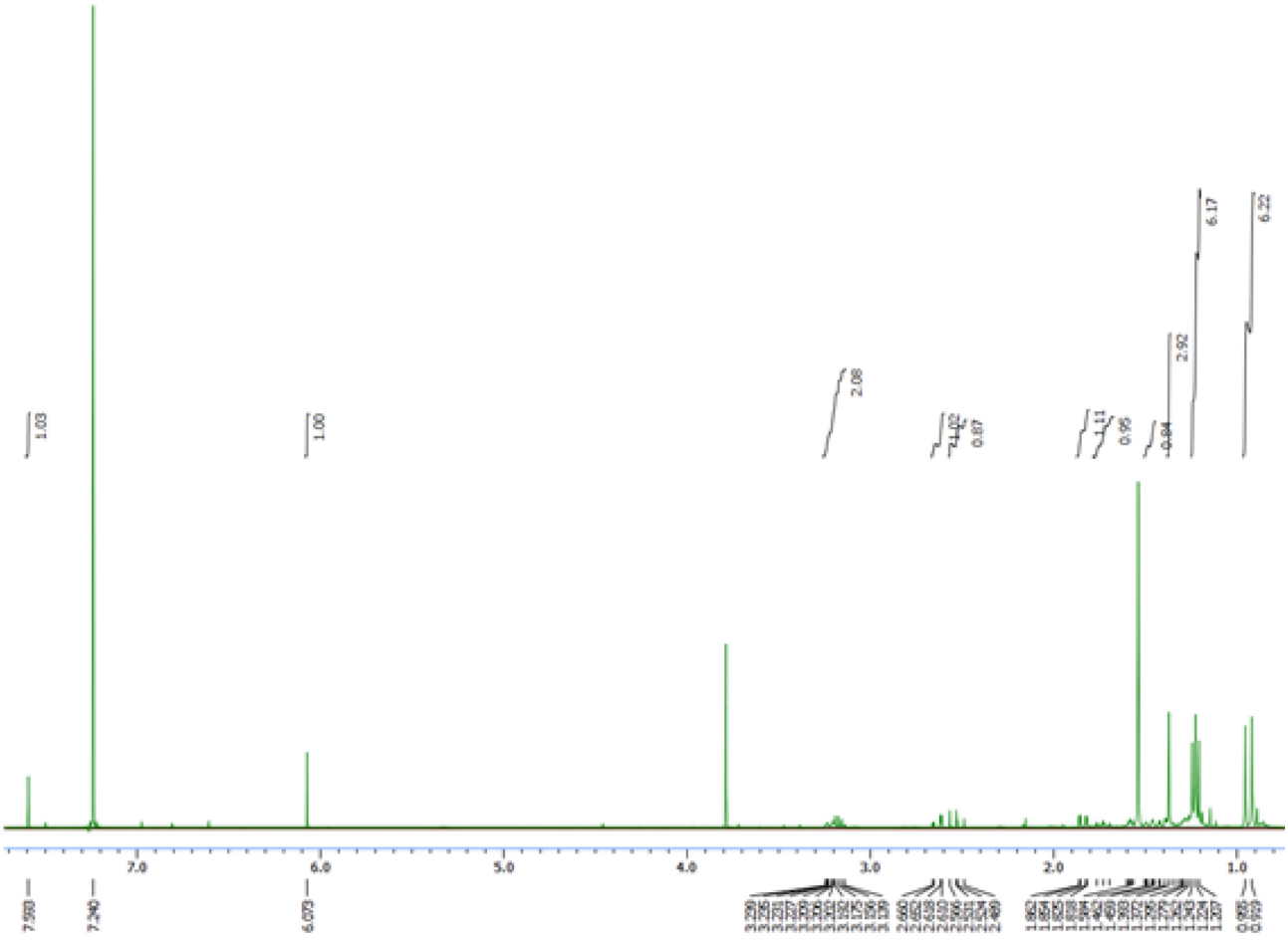

***Figure* S25.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **10**.

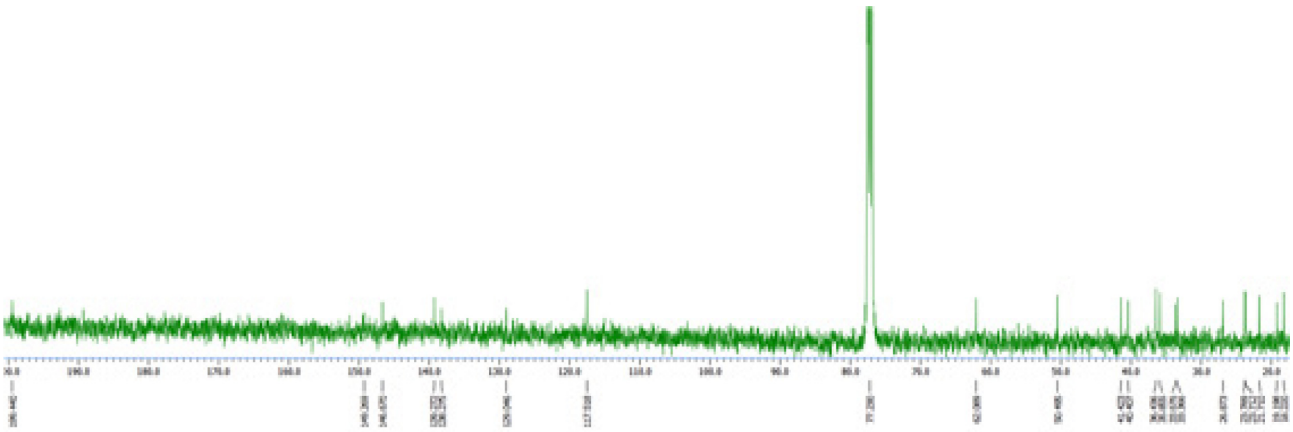

***Figure* S26.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **10**.

***Table* S10.** ^{1}H and ^{13}C NMR data of compound **11** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 11	
	δ_H (int, mult, *J* Hz)	**δ_C**
1	3.15 (1H, dd, 13.0,5.5) 1.73 (1H, dt, 14.6,5.5)	36.3
2	1.05~1.12 (1H, m) 1.29~1.37 (1H, m)	19.5
3	1.47~1.53 (1H,m) 1.20~1.32 (1H,m)	41.7
4		33.4
5	1.67 (1H, dd, 12.8,1.1)	45.8
6	1.92 (1H, dt, 13.7,3.9) 1.81 (1H, dd, 12.8,3.9)	28.1
7	4.71 (1H, br s)	69.5
8		134.7
9		133.3
10		39.8
11	6.01 (1H, s, -OH)	147.0
12		144.4
13		139.0
14	6.76 (1H, s)	119.4
15	3.16 (1H, sept, 6.9)	26.7
16	1.21 (3H, d, 6.9)	23.8
17	1.22 (3H, d, 6.9)	24.0
18	0.96 (3H, s)	33.9
19	0.92 (3H, s)	22.3
20	1.25 (3H, s)	18.6
$-OCH_3$	3.74 (3H, s)	62.0

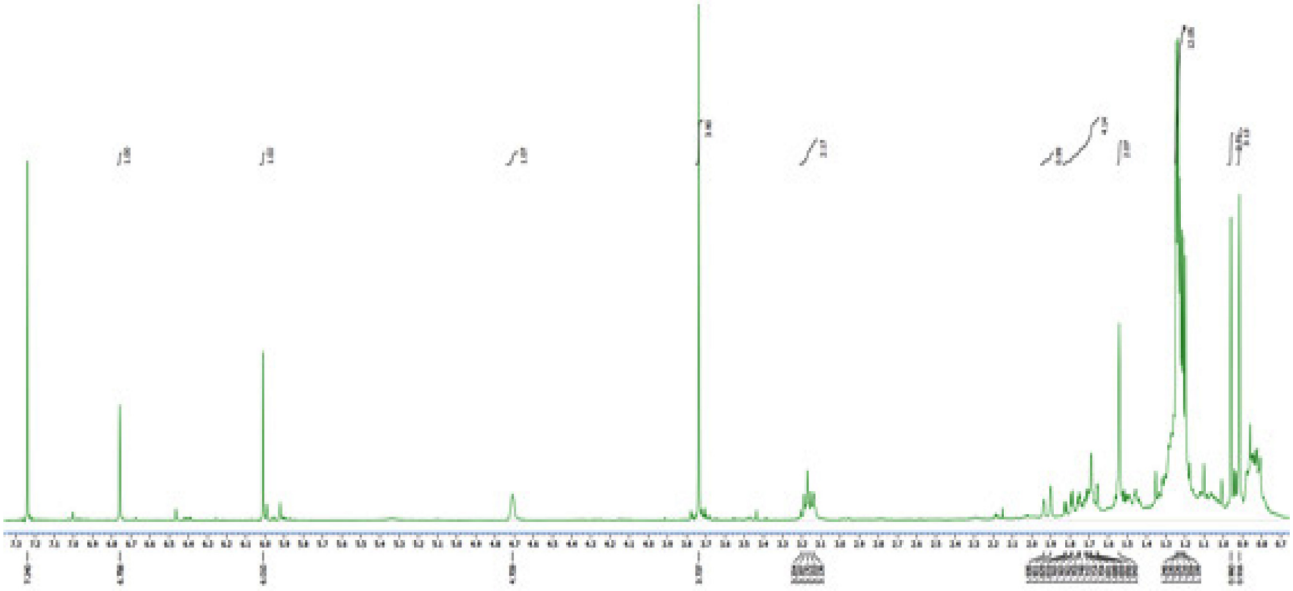

***Figure* S27.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **11**.

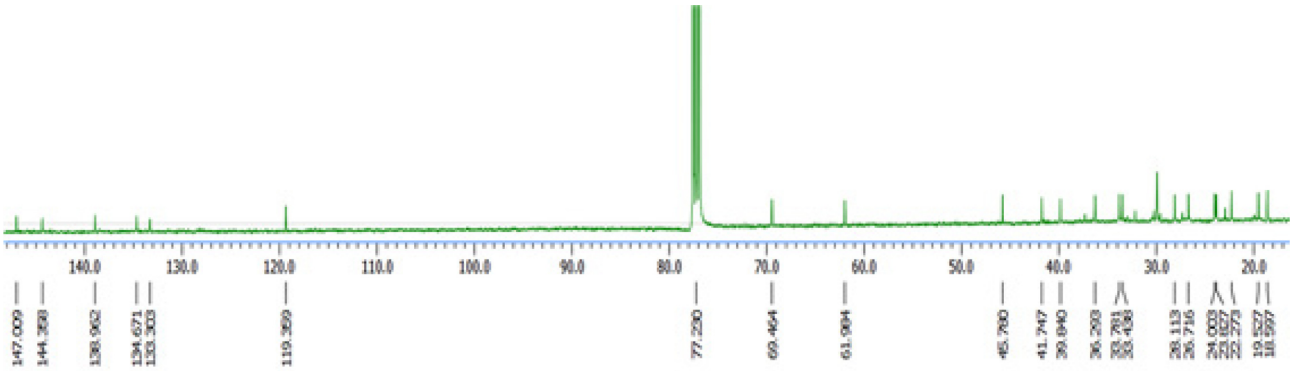

***Figure* S28.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **11**.

***Table* S11.** ^{1}H and ^{13}C NMR data of compound **12** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 12	
	δ_H (int, mult, *J* Hz)	δ_C
1	1.30 (1H, d, 11.9) 3.11 (1H, dt, 13.3, 3.2)	36.4
2	1.52 (1H, br d, 11.9) 1.71 (1H, td, 13.3, 3.2)	19.8
3	1.63 (1H, d, 8.7) 1.45 (1H, m)	41.5
4		33.6
5	2.17 (1H, s)	50.3
6	1.30 (1H, d, 11.9) 2.17 (1H, dd, 11.9, 6.9)	30.4
7	4.68 (1H, dd, 17.6, 6.9)	72.2
8		136.8
9		133.1
10		40.3
11	6.00 (1H, s, -OH)	146.5
12		143.9
13		138.7
14	7.00 (1H, s)	115.8
15	3.18 (1H, sept, 6.9)	26.8
16	1.23 (3H, d, 6.9)	24.0
17	1.20 (3H, d, 6.9)	23.9
18	0.93 (3H, s)	33.8
19	0.91 (3H, s)	22.2
20	1.35 (3H, s)	19.4
-OCH_3	3.74 (3H, s)	62.0

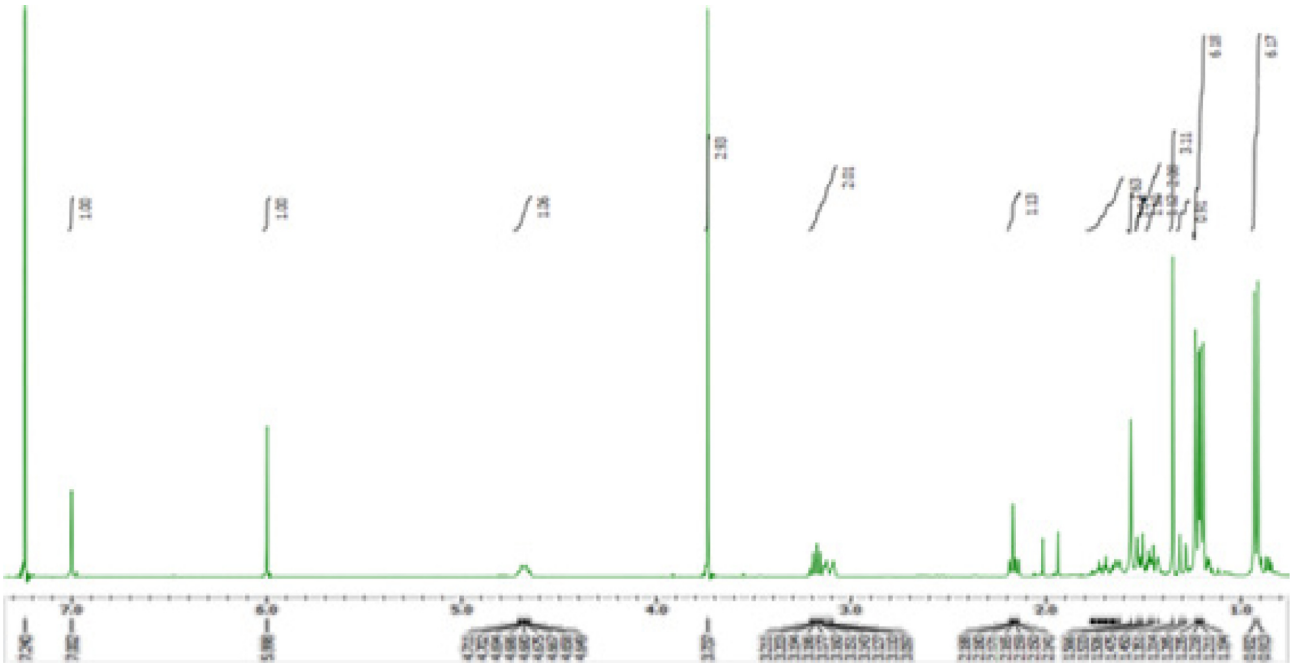

***Figure* S29.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **12**.

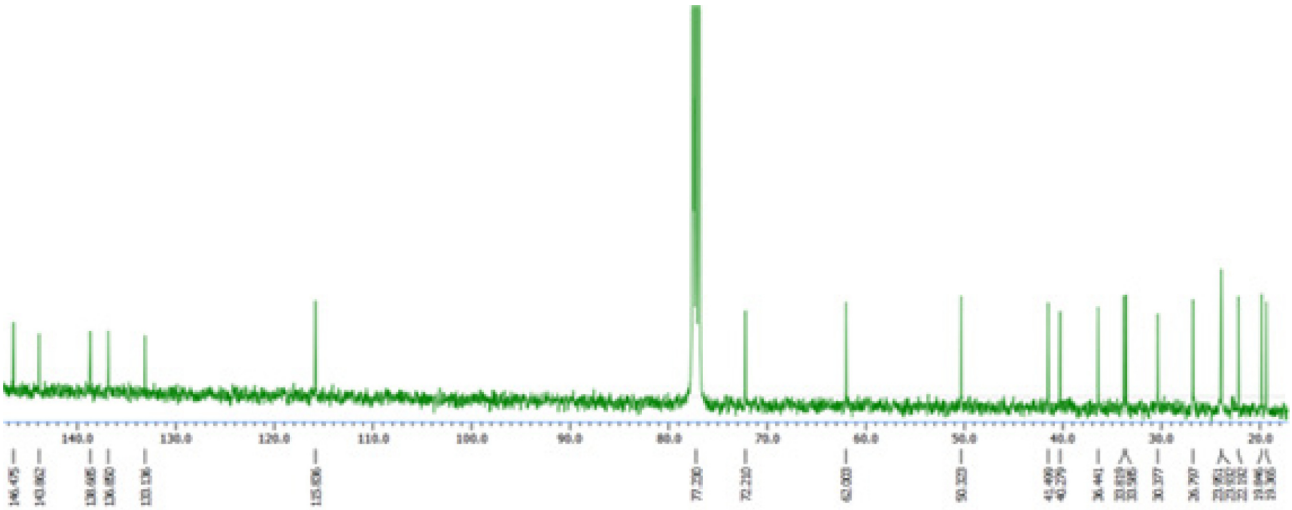

***Figure* S30.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **12**.

***Table* S12.** ^{1}H and ^{13}C NMR data of compound **13** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 13	
	δ_H (int, mult, *J* Hz)	δ_C
1		36.7
2		19.4
3		41.1
4		33.2
5	2.18 (1H, t, 2.8)	51.8
6	5.91 (1H, dd, 10.1, 2.8)	129.4
7	6.40 (1H, dd, 10.1, 2.8)	130.4
8		128.2
9		131.5
10		40.9
11	5.93 (-OH, s)	146.0
12		144.2
13		138.2
14	6.46 (1H, s)	116.3
15	3.16 (1H, sept, 6.9)	26.6
16	1.18 (3H, d, 6.9)	24.0
17	1.21 (3H, d, 6.9)	23.8
18	0.94 (3H, s)	33.4
19	1.01 (3H, s)	22.7
20	1.10 (3H, s)	18.3
-OCH_3	3.74 (3H, s)	62.0

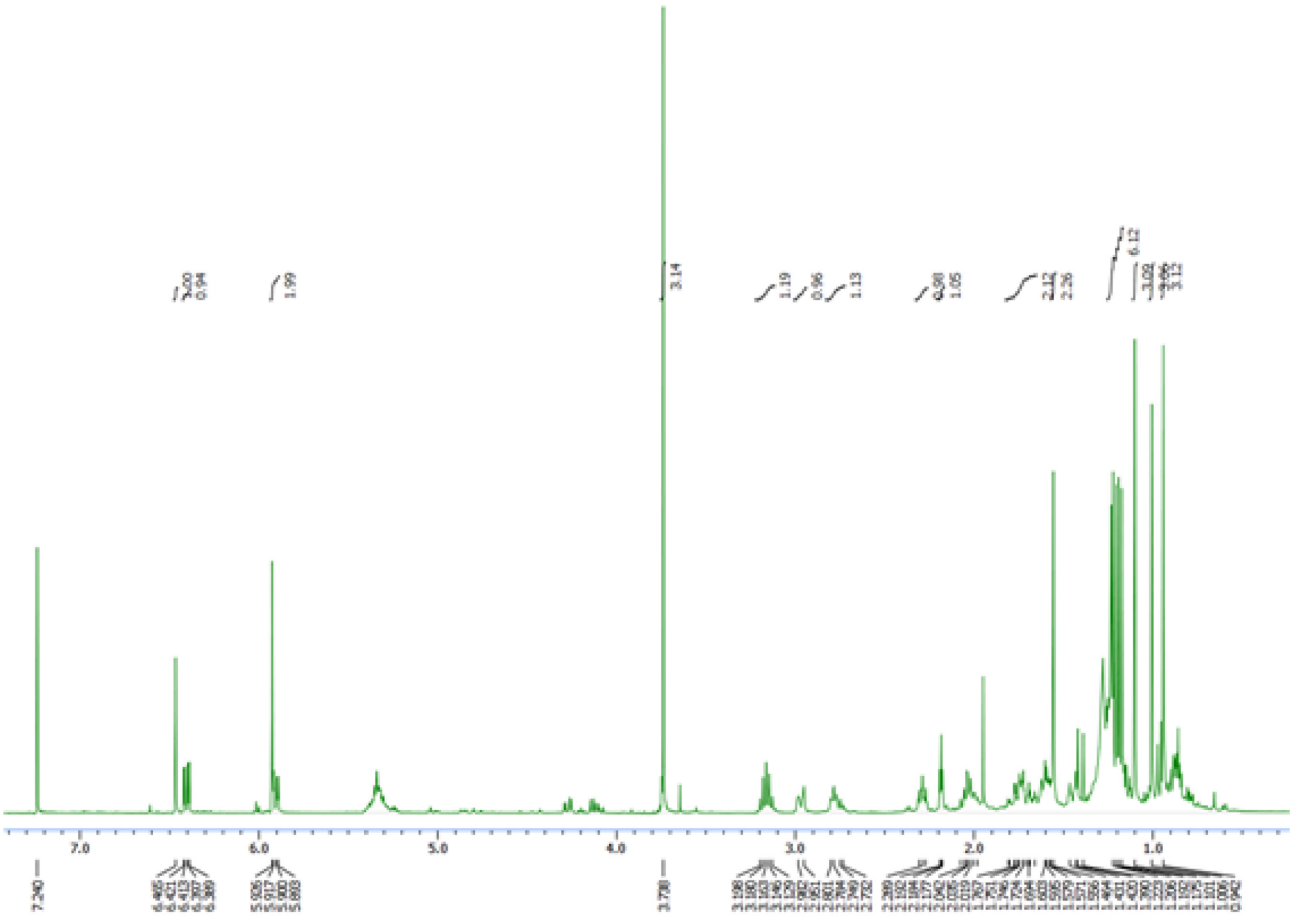

***Figure* S31.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **13**.

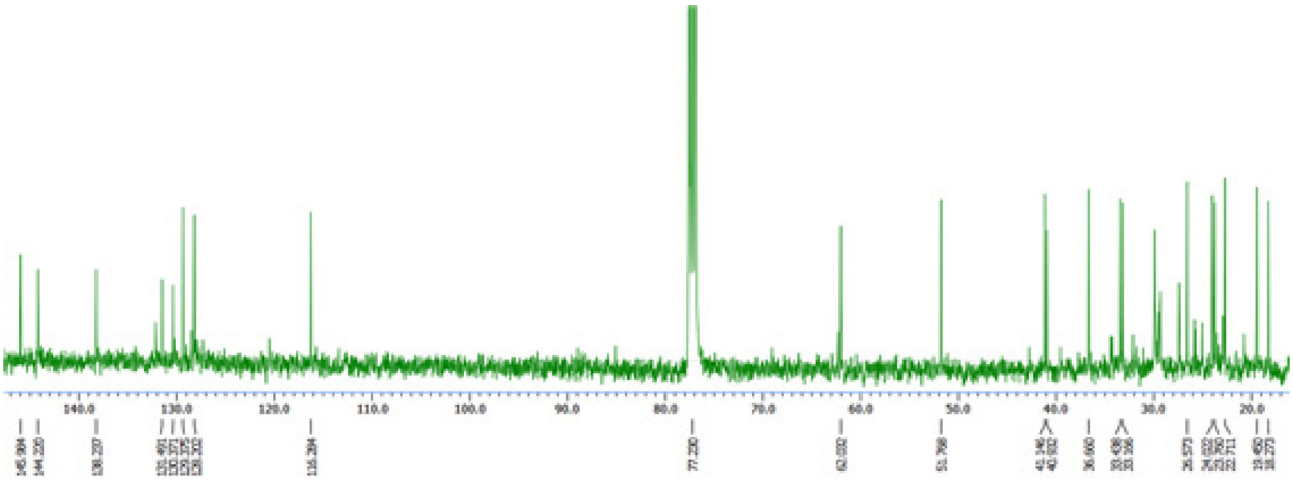

***Figure* S32.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **13**.

***Table* S13.** ^{1}H and ^{13}C NMR data of compound **14** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 14	
	δ_H (int, mult, *J* Hz)	δ_C
1	2.37 (1H, m) 1.95 (1H, m)	38.7
2	1.85 (1H, m) 1.56 (1H, m)	20.1
3	2.15 (1H, m) 1.12 (1H, m)	38.2
4		44.3
5	1.81 (1H, m)	56.6
6	1.88 (1H, m) 1.07 (1H, m)	39.4
7	1.98 (1H, m) 1.88 (1H, m)	26.0
8		148.1
9	1.34 (1H, m)	56.4
10		40.5
11	2.37 (1H, m)	23.5
12	5.39 (1H, t, 6.6)	134.1
13		133.7
14	6.31 (1H, dd, 17.4, 11.0)	141.8
15	5.02 (1H, d, 17.4) 4.86 (1H, d, 11.0)	110.2
16	1. 71 (3H, s)	12.1
17	4.82 (1H, s) 4.44 (1H, s)	107.8
18	1. 23 (3H, s)	29.2
19		181.9
20	0.63 (3H, s)	13.1

***Figure* S33.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **14**.

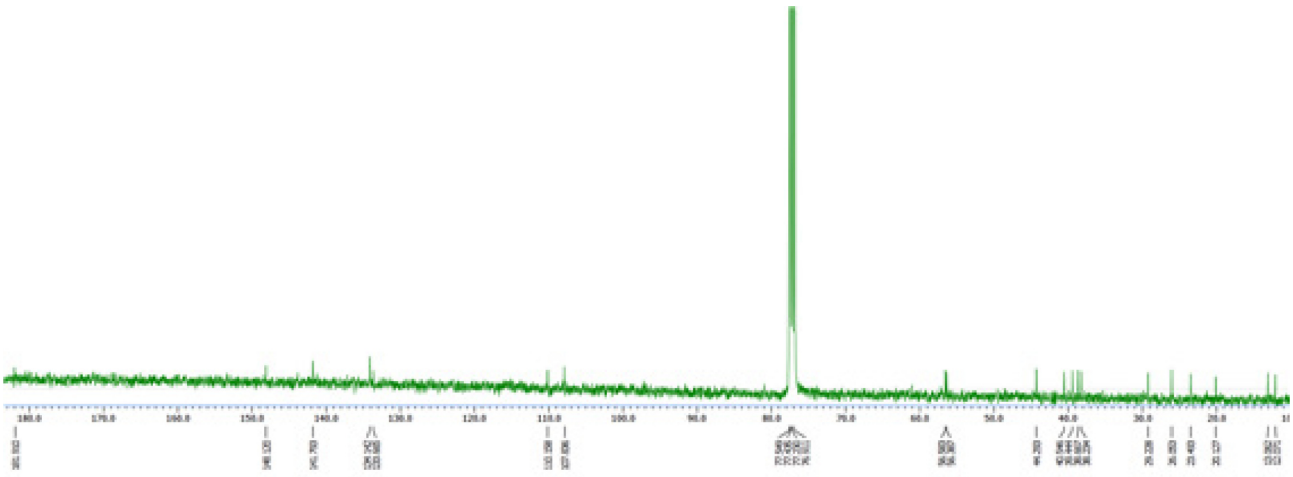

***Figure* S34.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **14**.

***Table* S14.** ^{1}H and ^{13}C NMR data of compound **15** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 15	
	δ_H (int, mult, *J* Hz)	δ_C
1	1.11~1.66 (2H, overlapped)	38.1
2	1.84 (1H, d, 12.8) 1.91~2.02 (1H, overlapped)	23.2
3	5.30 (1H, br s)	121.2
4		135.4
5	1.91~2.02 (1H, overlapped)	46.8
6	1.11~1.66 (2H, overlapped)	24.6
7	1.11~1.66 (1H, overlapped)	50.2
8	1.11~1.66 (2H, overlapped)	22.6
9	1.11~1.66 (2H, overlapped)	40.4
10		32.4
11		73.3
12	1.18 (3H, s)	27.0
13	1.19 (3H, s)	27.8
14	0.75 (3H, s)	15.8
15	1.60 (3H, s)	21.4

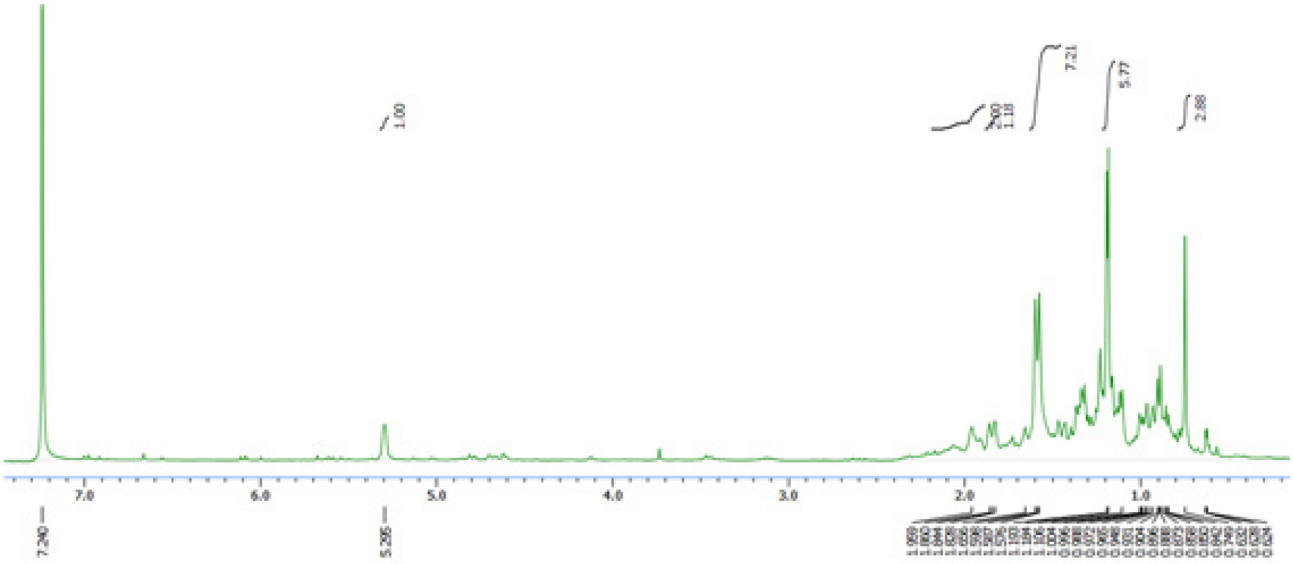

Figure **S35.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **15**.

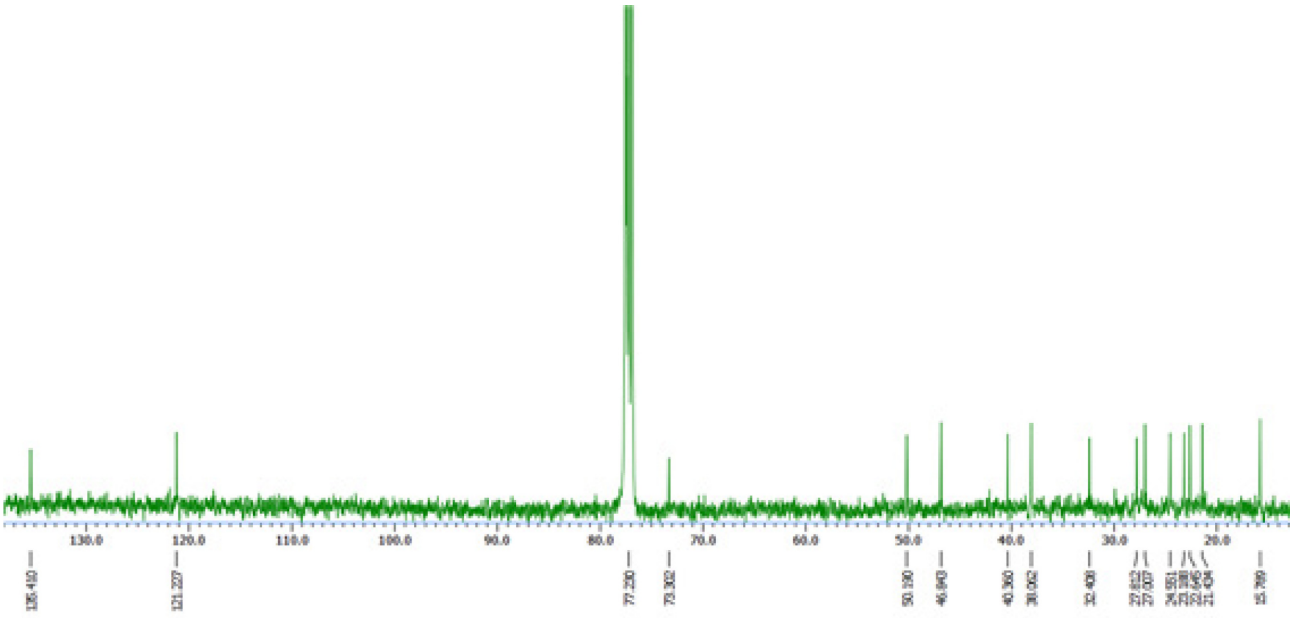

Figure **S36.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **15**.

***Table* S15.** ^{1}H and ^{13}C NMR data of compound **16** (400 and 100 MHz, in $CDCl_3$)

No.	Compound 16	
	δ_H (int, mult, *J* Hz)	**δ_C**
1	1.94 (2H, dd, 18.6, 2.8)	40.2
2	6.73~6.76 (1H, m)	136.0
3		131.4
4	0.81 (1H, dd, 9.2, 5.0)	11.6
5		34.2
6		34.8
7	1.38~1.49 (2H, m)	37.2
8	1.74 (2H, dd, 18.7, 7.3)	19.6
9	1.24(2H, dd, 13.3, 3.2)	41.7
10		31.7
11	1.11 (3H, s)	28.5
12	1.18 (3H, s)	27.0
13	2.07 (1H, dd，9.2，5.0) 0.70 (1H, t, 5.0)	16.7
14	0.66 (3H, s)	29.2
15		172.0

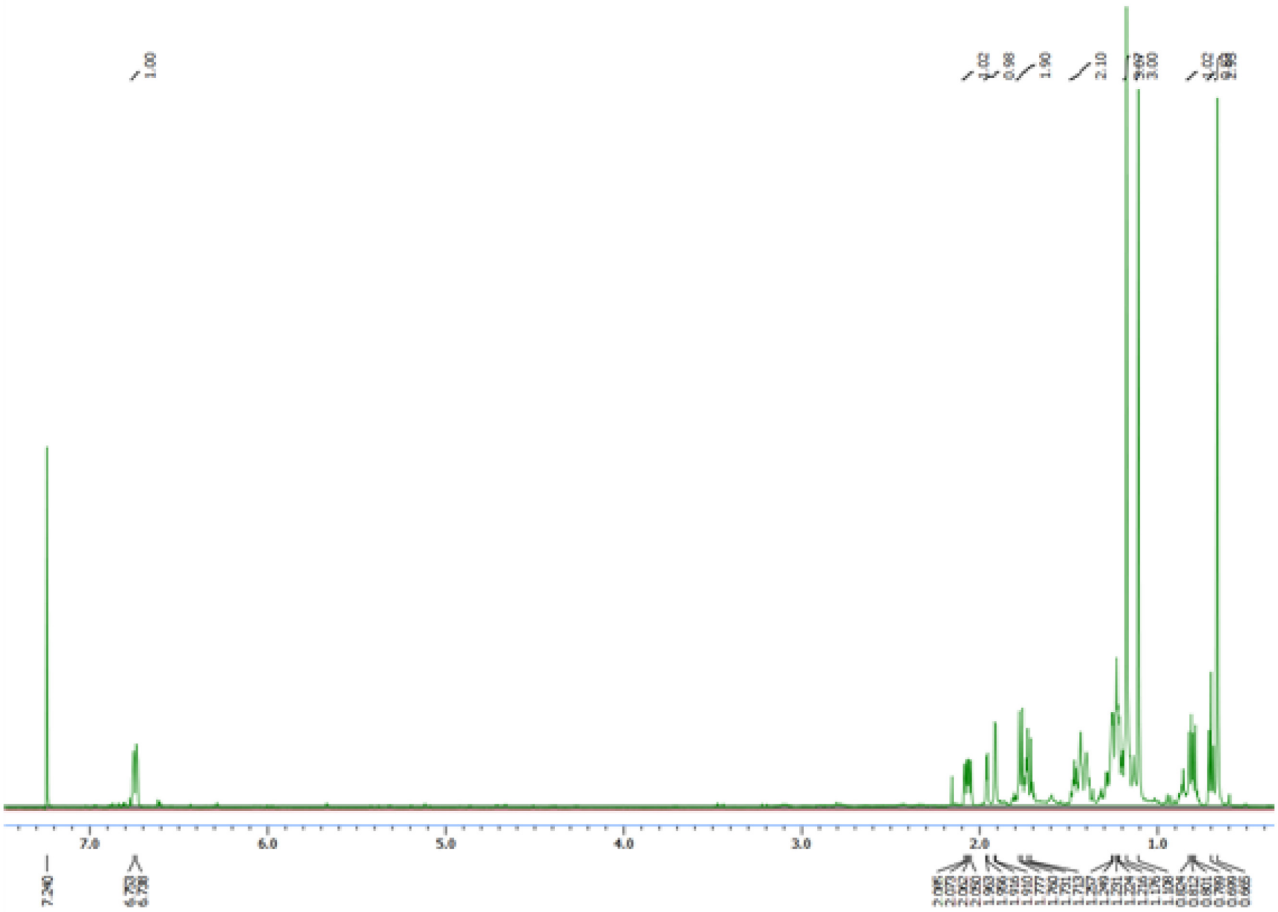

***Figure* S37.** ^{1}H-NMR (400 MHz, $CDCl_3$) spectrum of compound **16**.

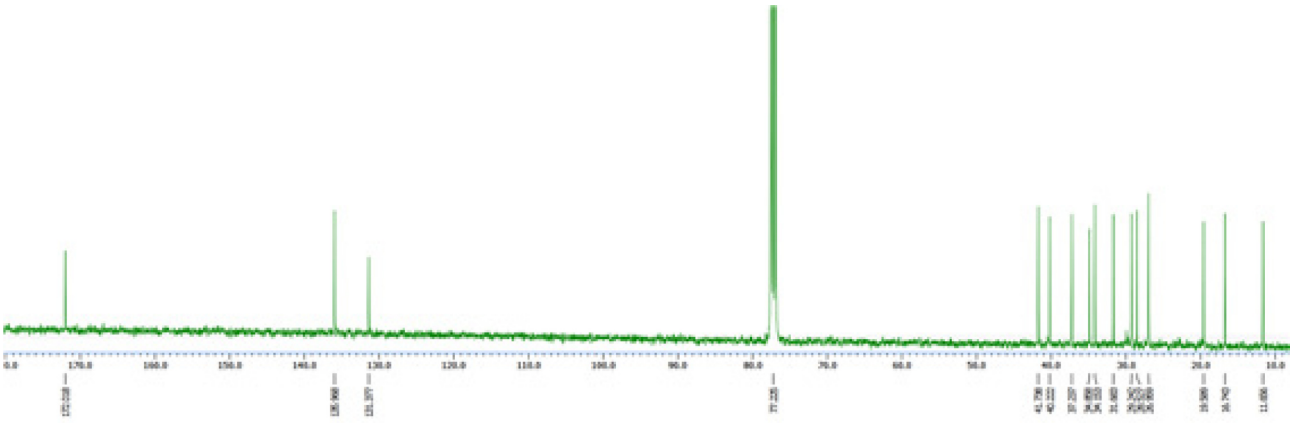

***Figure* S38.** ^{13}C-NMR (100 MHz, $CDCl_3$) spectrum of compound **16**.

***Table* SS1.** MIC values of extract and solvent fractions from *C. obtusa* seed on *C. acnes* and *S. epidermidis*

	MIC (μg/mL)						
	C. acnes				*S. epidermidis*		
	CCARM 0081	CCARM 9009 [1]	CCARM 9010 [1]	CCARM 9089	CCARM 3709	CCARM 3710[1]	CCARM 3711
Extract	31.25	31.25	62.5	15.62	156.25	312.5	625
n-Hex Fr.	31.25	62.5	62.5	15.62	156.25	156.25	312.5
EtOAc Fr.	31.25	62.5	62.5	31.25	1250	2500	1250
n-BuOH Fr.	1000	1000	2000	>4000	1250	2500	1250
H_2O Fr.	>4000	>4000	>4000	>4000	>10000	>10000	>10000
Erythromycin[2]	<3.90	>4000	>4000	<3.90	<9.76	>10000	<9.76

[1]Erythromycin-resistant strains
[2]Positive control