

Supplementary material (pharmaceutical-2344064)

Title:

***Annona cherimola* Miller and Its Flavonoids, an Important Source of Products for the Treatment of Diabetes Mellitus: In Vivo and In Silico Evaluations**

Fernando Calzada ^{1,*}, Miguel Valdes ^{2,*}, Jesús Martínez-Solís ², Claudia Velázquez³ and Eliazbeth Barbosa²

Institutions:

¹ Unidad de Investigación Médica en Farmacología, UMAE Hospital de Especialidades 2º Piso CORSE, Centro Médico Nacional Siglo XXI, Instituto Mexicano del Seguro Social, Av. Cuauhtémoc, 330, Col. Doctores, Mexico City, CP 06720, Mexico.

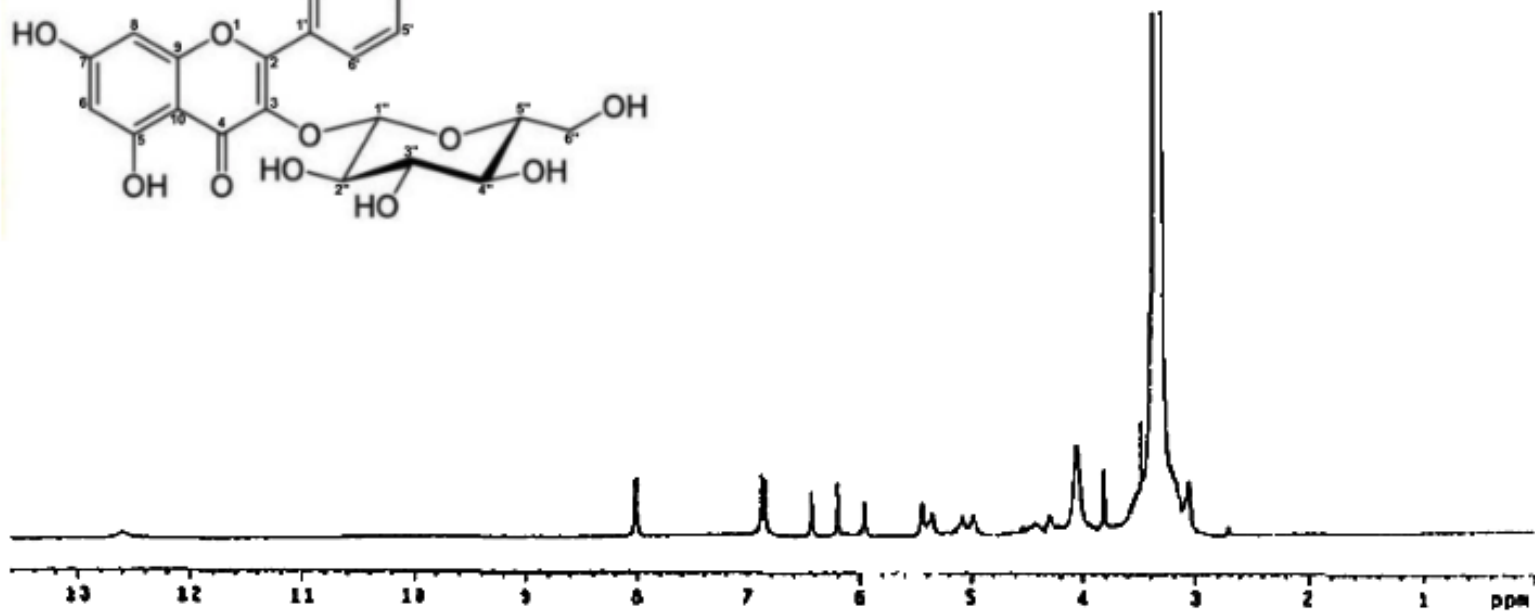
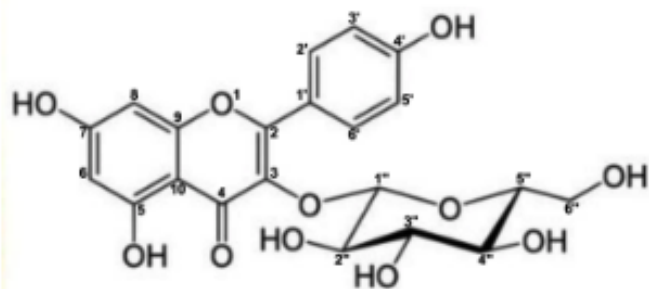
² Instituto Politécnico Nacional, Sección de Estudios de Posgrado e Investigación, Escuela Superior de Medicina, Plan de San Luis y Salvador Díaz Mirón S/N, Col. Casco de Santo Tomás, Miguel Hidalgo, Mexico City, CP 11340, Mexico.

³ Área académica de Farmacia, Instituto de Ciencias de la Salud, Universidad Autonoma del Estado de Hidalgo, Circuito exHacienda La Concepcion s/n, Carretera Pachuca- Atocpan, CP 42160, San Agustín Tlaxiaca Pachuca, Hidalgo, Mexico.

*Correspondence: fercalber10@gmail.com (F.C.); valdesguevaramniguel@gmail.com (M.V.)

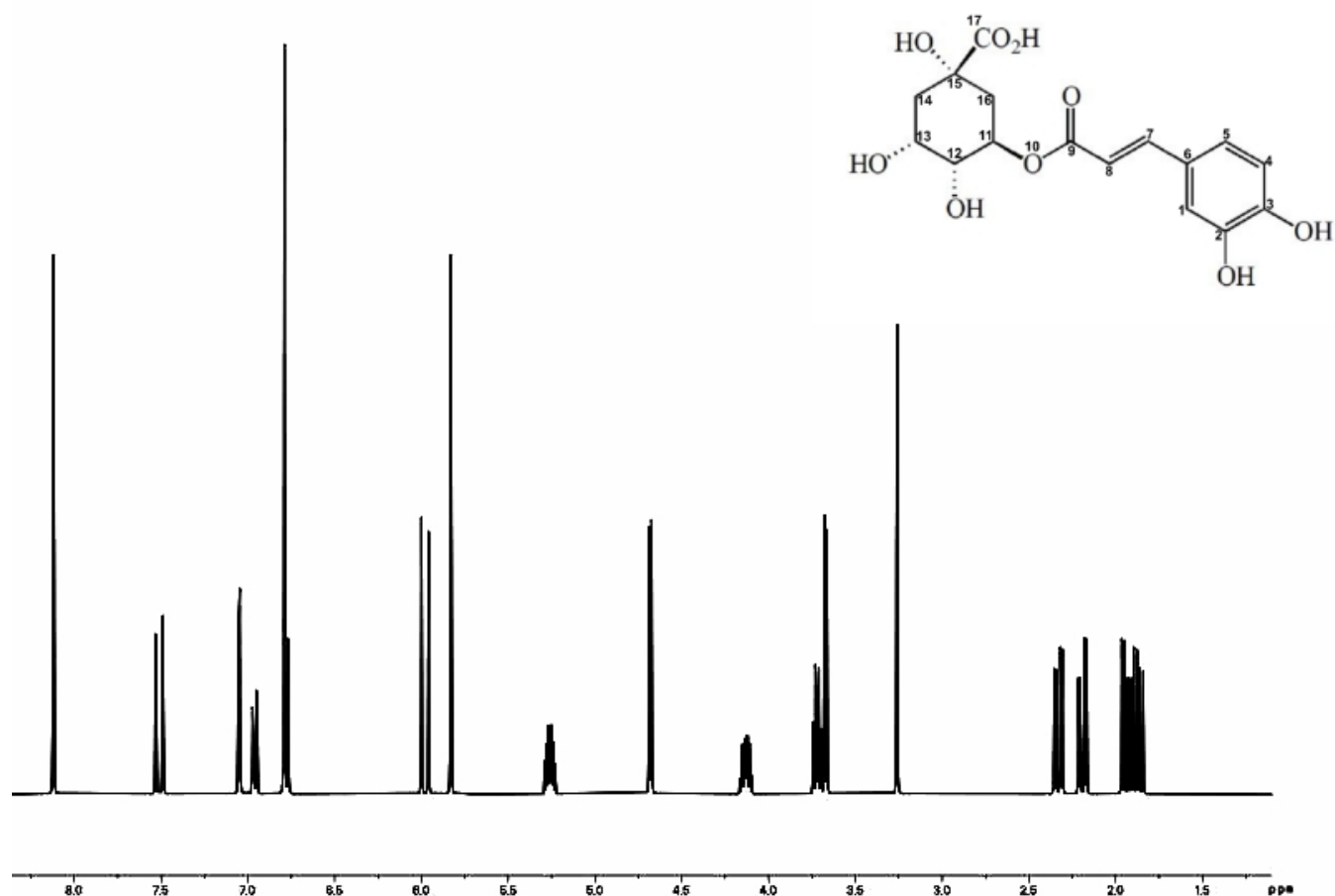
Table of contents	Page
¹ H-NMR of Astragalin	2
¹ H-NMR of Chlorogenic acid	3
¹ H-NMR of Hyperin	4
¹ H-NMR of Isoquercitrin	5
¹ H-NMR of Myricetin	6
¹ H-NMR of Narcissin	7
¹ H-NMR of Nicotiflorin	8
¹ H-NMR of Rutin	9
¹³ C-NMR of Astragalin	10
¹³ C-NMR of Chlorogenic acid	11
¹³ C-NMR of Hyperin	12
¹³ C-NMR of Isoquercitrin	13
¹³ C-NMR of Myricetin	14
¹³ C-NMR of Narcissin	15
¹³ C-NMR of Nicotiflorin	16
¹³ C-NMR of Rutin	17

¹H-NMR of Astragalin



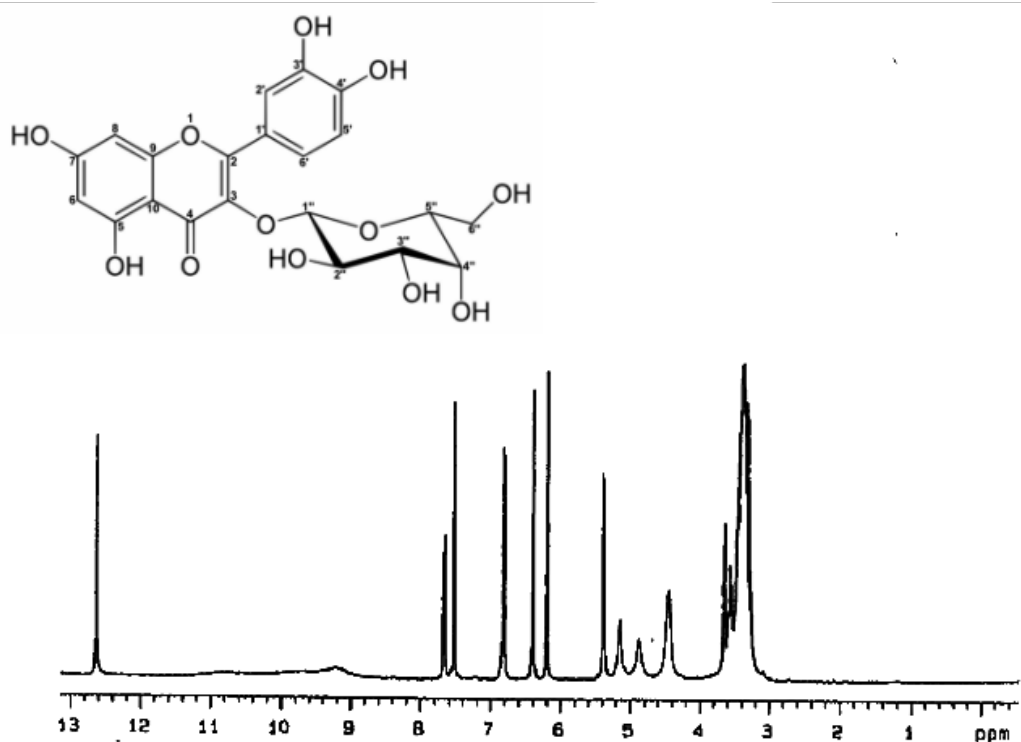
Position	Astragalin
	δ H (int, mult., J (Hz))
1	-
2	-
3	-
4	-
5	-
6	6.22 (1H, s)
7	-
8	6.41 (1H, s)
9	-
10	-
1'	-
2',6'	8.12 (2H, d, 8.5)
3',5'	6.85 (2H, d, 8.5)
4'	-
1''	5.26 (1H, d, 7.2)
2''	3.46 (1H, dd, 10.4)
3''	3.37 (1H, m)
4''	3.24 (1H, m)
5''	3.56 (1H, m)
6''	3.70 (2H, d, 11.5)

¹H-NMR of Chlorogenic acid



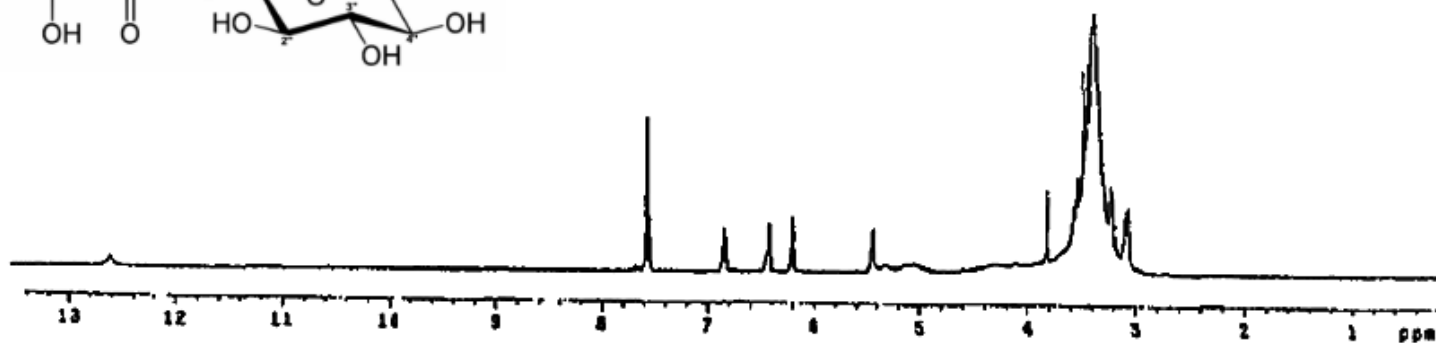
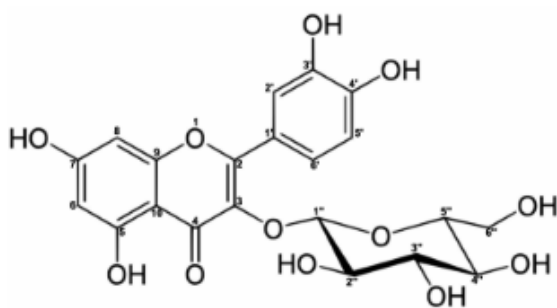
Position	Chlorogenic Acid
	δ H (int, mult., J (Hz))
1	7.05 (1H, d, 1.82)
2	-
3	-
4	6.78 (1H, s)
5	6.96 (1H, ddd, 2.19)
6	-
7	7.51 (1H, dd, 2.01)
8	5.98 (1H, d, 1.90)
9	-
10	-
11	5.26 (1H, ddt, 2.19)
12	3.72 (1H, dt, 2.39)
13	4.13 (1H, dqd, 2.32)
14	2.5 (2H, dd, 2.33)
15	-
16	1.99 (4H, m, 1.91)
17	-

¹H-NMR of Hyperin



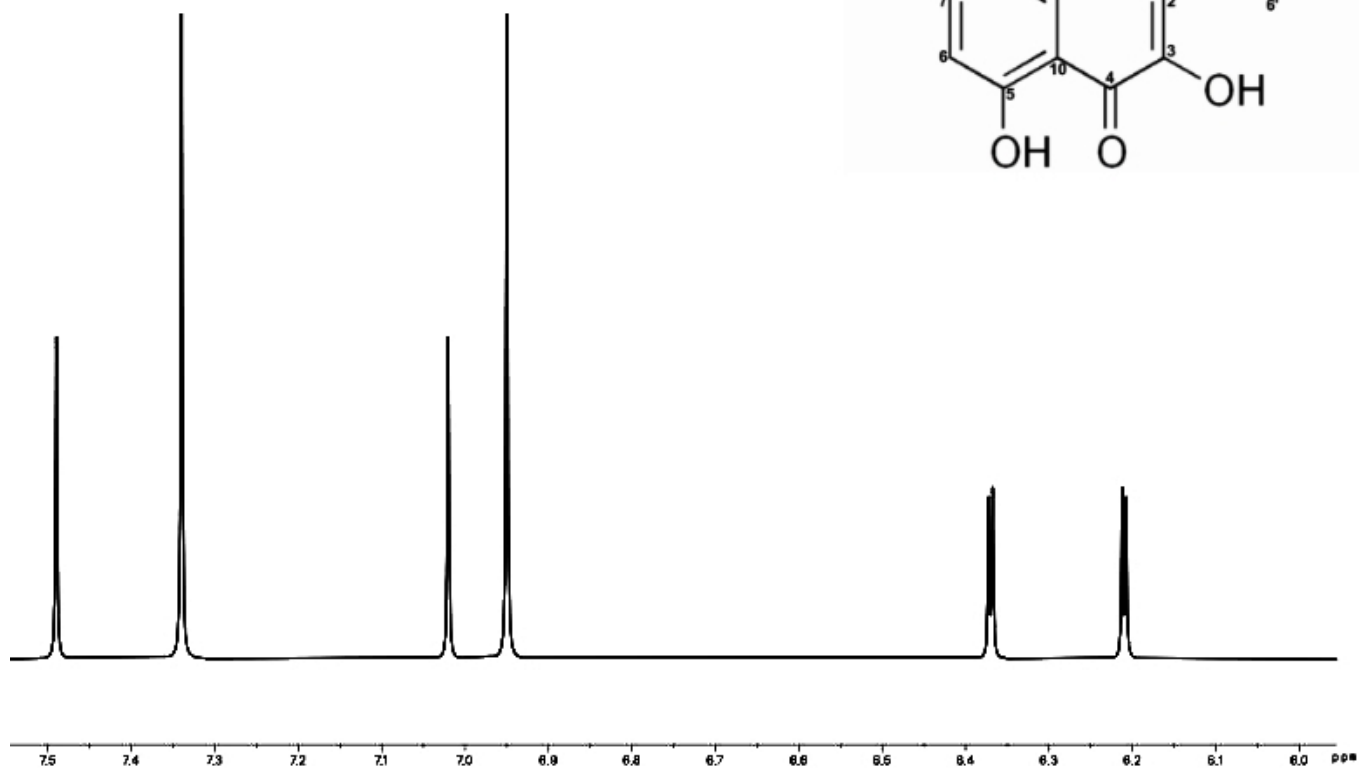
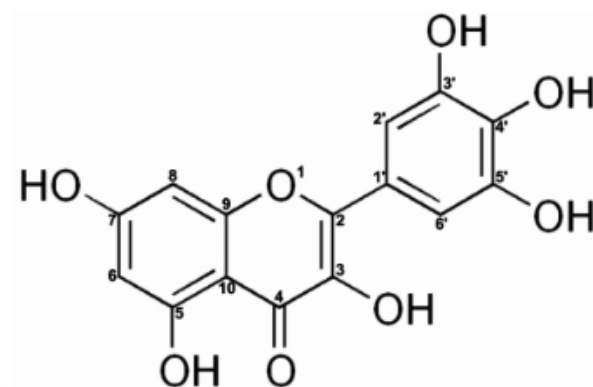
Position	Hyperin
	δH (int, mult., J (Hz))
1	-
2	-
3	-
4	-
5	-
6	6.21 (1H, d, 1.00)
7	-
8	6.37 (1H, d, 1.00)
9	-
10	-
1'	-
2'	7.62 (1H, m, 1.00)
3'	-
4'	-
5'	6.78 (1H, s)
6'	7.50 (1H, dd, 2.01)
1''	5.46 (1H, m, 2.01)
2''	3.54 (1H, m, 2.03)
3''	3.40 (1H, m, 2.05)
4''	3.52 (1H, m, 1.02)
5''	3.34 (1H, m, 2.03)
6''	3.60 (2H, m, 1.01)

¹H-NMR of Isoquercitrin



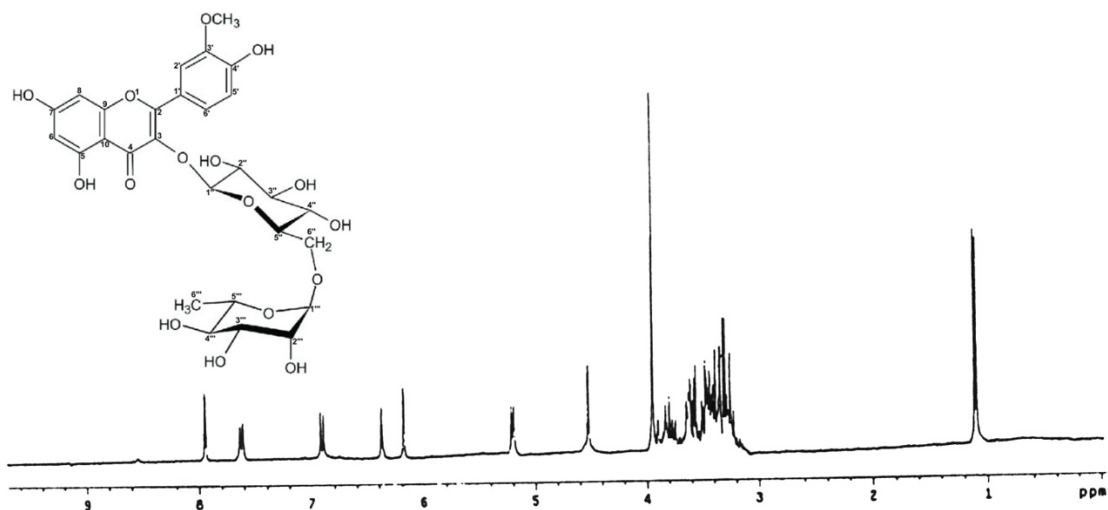
Position	Isoquercitrin
	δ H (int, mult., J (Hz))
1	-
2	-
3	-
4	-
5	-
6	6.21 (1H, d, 1.03)
7	-
8	6.37 (1H, d, 1.00)
9	-
10	-
1'	-
2'	7.62 (1H, m, 1.02)
3'	-
4'	-
5'	6.78 (1H, s)
6'	7.50 (1H, dd, 2.01)
1''	5.46 (1H, ddd, 1.01)
2''	3.54 (1H, m, 2.02)
3''	3.21 (1H, dddd, 1.02)
4''	3.08 (2H, dd, 2.03)
5''	3.08 (2H, dd, 2.03)
6''	3.81 (2H, dtd, 2.02)

¹H-NMR of Myricetin



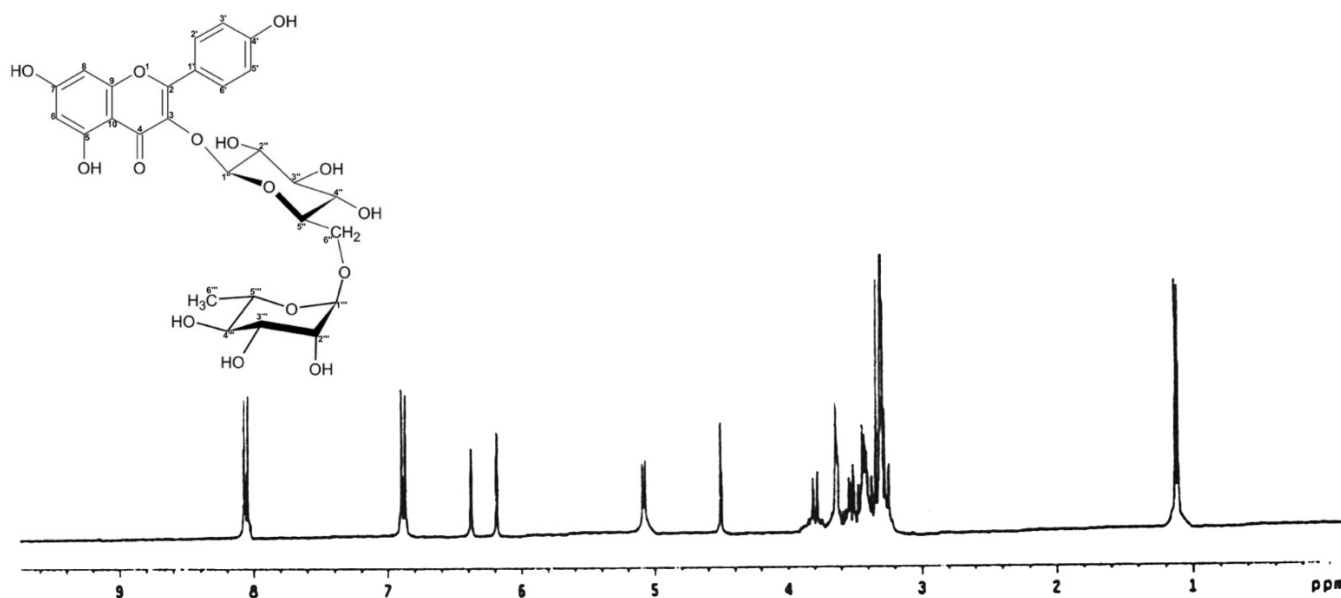
Position	Myricetin
	δ H (int, mult., J (Hz))
1	-
2	-
3	-
4	-
5	-
6	6.21 (1H, d, 1.11)
7	-
8	6.37 (1H, d, 1.16)
9	-
10	-
1'	-
2'	6.95 (2H, s)
3'	-
4'	-
5'	-
6'	6.95 (2H, s)

¹H-NMR of Narcissin



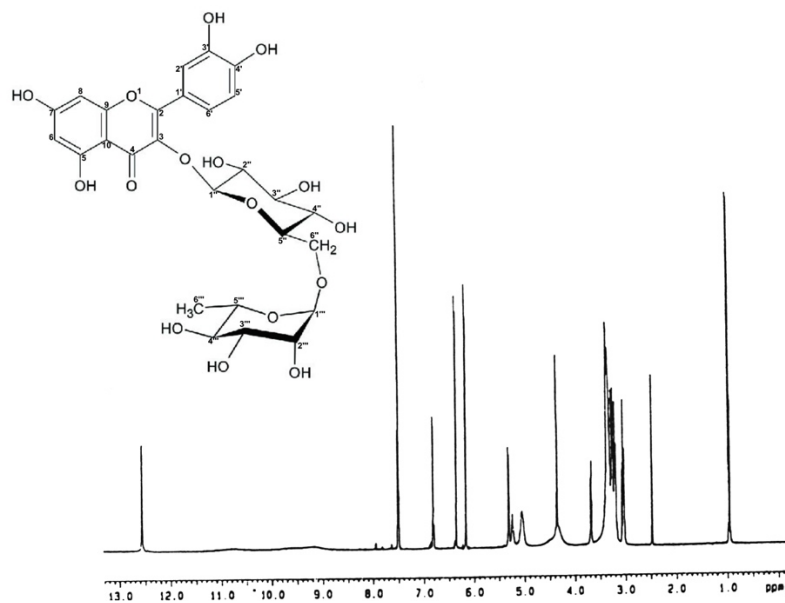
Position	Narcissin
	δ H (int, mult., J (Hz))
1	-
2	-
3	-
4	-
5	-
6	6.22 (1H, d, 0.96)
7	-
8	6.87 (1H, d, 0.86)
9	-
10	-
1'	-
2'	8.16 (1H, d, 0.84)
3'	-
OCH ₃	3.96 (3H, s)
4'	-
5'	6.15 (1H, s)
6'	7.84 (1H, dd, 0.97)
1''	5.34 (1H, dt, 0.99)
2''	3.55 (2H, m, 2.04)
3''	3.32 (2H, m, 1.69)
4''	3.92 (1H, m, 2.22)
5''	3.13 (1H, dtq, 0.85)
6''	3.69 (2H, dd, 1.96)
1'''	4.54 (1H, m, 1.87)
2'''	3.76 (2H, m, 1.96)
3'''	3.76 (2H, m, 1.96)
4'''	3.32 (2H, m, 1.69)
5'''	3.55 (2H, m, 2.04)
6'''	1.26 (3H, dd, 2.89)

¹H-NMR of Nicotiflorin



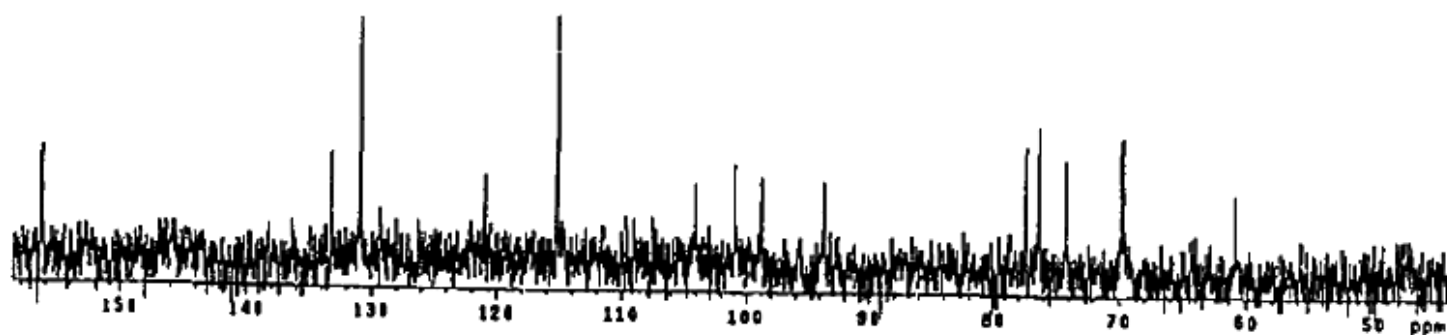
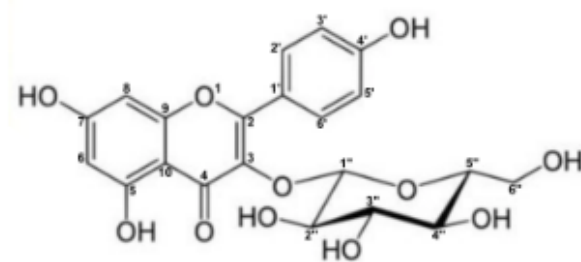
Position	Nicotiflorin
	δ H (int, mult., J (Hz))
1	-
2	-
3	-
4	-
5	-
6	6.21 (1H, d, 0.64)
7	-
8	6.37 (1H, d, 0.64)
9	-
10	-
1'	-
2'	8.12 (2H, m, 1.25)
3'	6.92 (2H, m, 1.26)
4'	-
5'	6.92 (2H, m, 1.26)
6'	8.12 (2H, m, 1.25)
1''	5.34 (1H, dt, 0.65)
2''	3.63 (6H, m, 4.71)
3''	3.32 (2H, m, 1.07)
4''	3.92 (1H, m, 1.43)
5''	3.14 (1H, dtt, 1.07)
6''	3.63 (6H, m, 4.71)
1'''	4.54 (1H, m, 1.28)
2'''	3.63 (6H, m, 4.71)
3'''	3.63 (6H, m, 4.71)
4'''	3.32 (2H, m, 1.07)
5'''	3.63 (6H, m, 4.71)
6'''	1.26 (3H, dd, 1.92)

¹H-NMR of Rutin



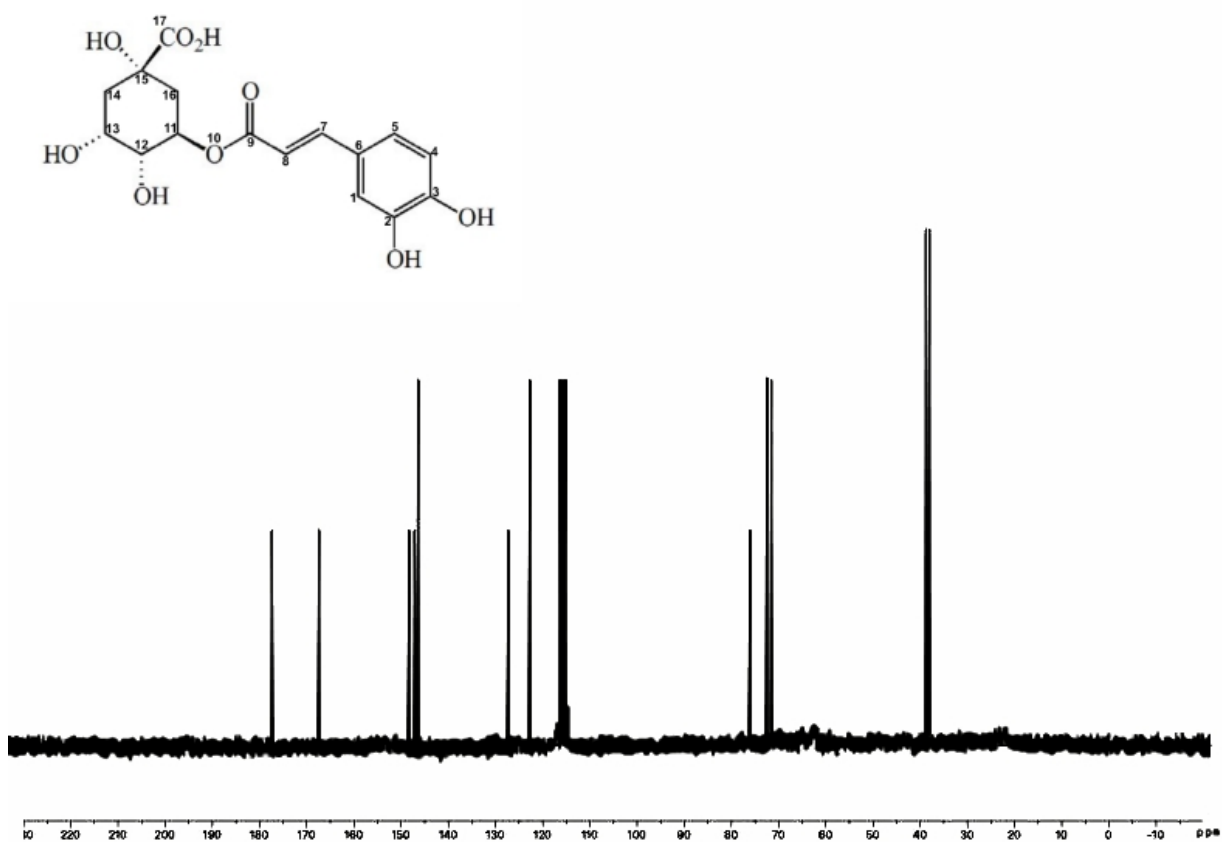
Rutin	
Position	δ H (int, mult., J (Hz))
1	-
2	-
3	-
4	-
5	-
6	6.37 (1H, d, 1.0)
7	-
8	6.21 (1H, d, 1.0)
9	-
10	-
1'	-
2'	7.62 (1H, m, 0.92)
3'	-
4'	-
5'	6.78 (1H, d, 0.48)
6'	7.50 (1H, dd, 0.82)
1''	5.04 (1H, dt, 1.02)
2''	3.63 (6H, m, 7.33)
3''	3.32 (2H, m, 1.67)
4''	3.42 (1H, m, 2.26)
5''	2.48 (1H, dt, 0.98)
6''	3.63 (6H, m, 7.33)
1'''	4.44 (1H, m, 2.0)
2'''	3.63 (6H, m, 7.33)
3'''	3.63 (6H, m, 7.33)
4'''	3.32 (2H, m, 1.67)
5'''	3.63 (6H, m, 7.33)
6'''	0.98 (3H, dd, 3.02)

¹³C-NMR of Rutin Astragalin



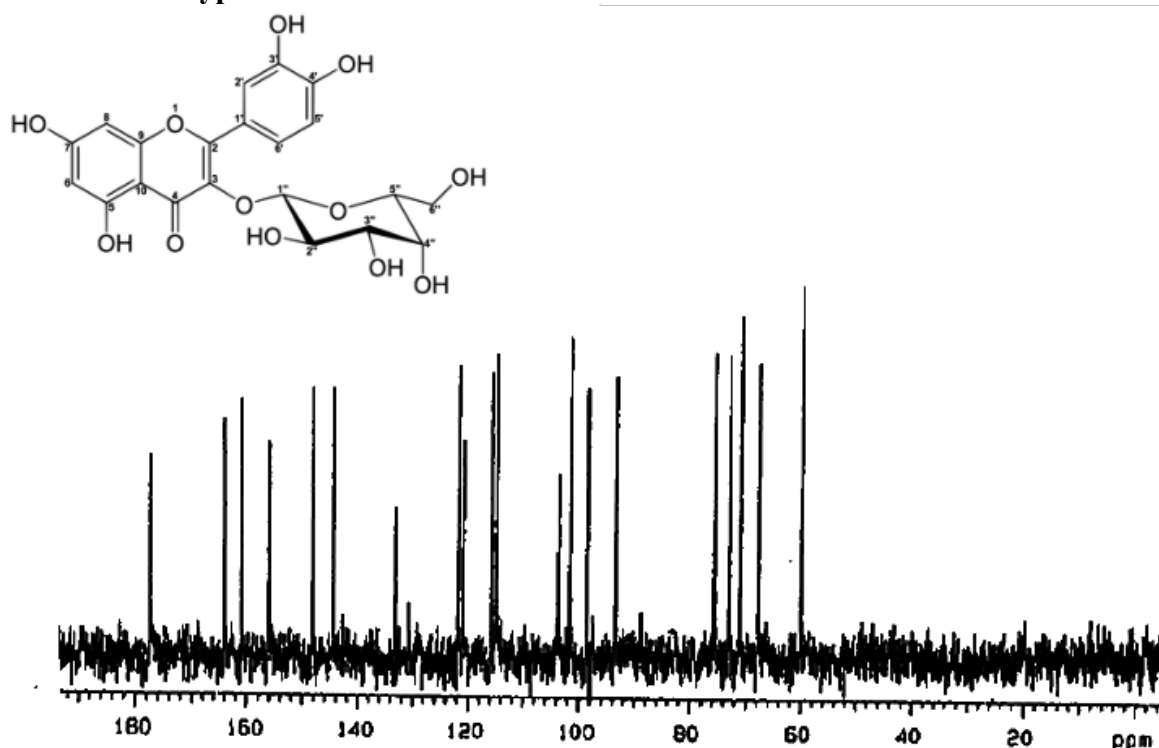
Position	Astragalin
	δC
1	-
2	142.82
3	133.65
4	155.50
5	141.54
6	99.73
7	145.88
8	94.85
9	149.22
10	105.67
1'	122.58
2',6'	132.31
3',5'	116.12
4'	135.47
1''	103.87
2''	75.68
3''	77.94
4''	71.31
5''	78.41
6''	62.64

¹³C-NMR of Chlorogenic acid



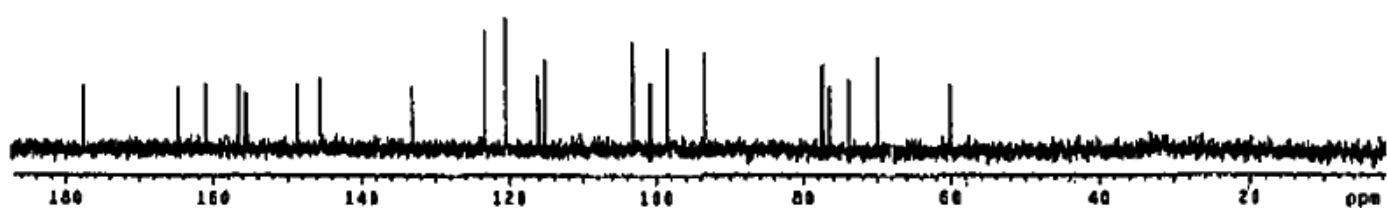
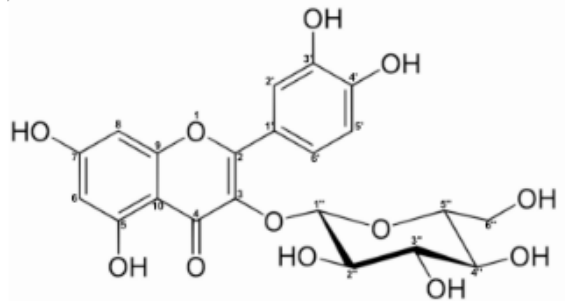
Position	Chlorogenic Acid
	δC
1	115.14
2	147.12
3	148.29
4	116.34
5	122.72
6	127.26
7	146.39
8	115.70
9	167.41
10	-
11	72.47
12	72.56
13	71.56
14	38.77
15	76.05
16	38.06
17	177.34

¹³C-NMR of Hyperin



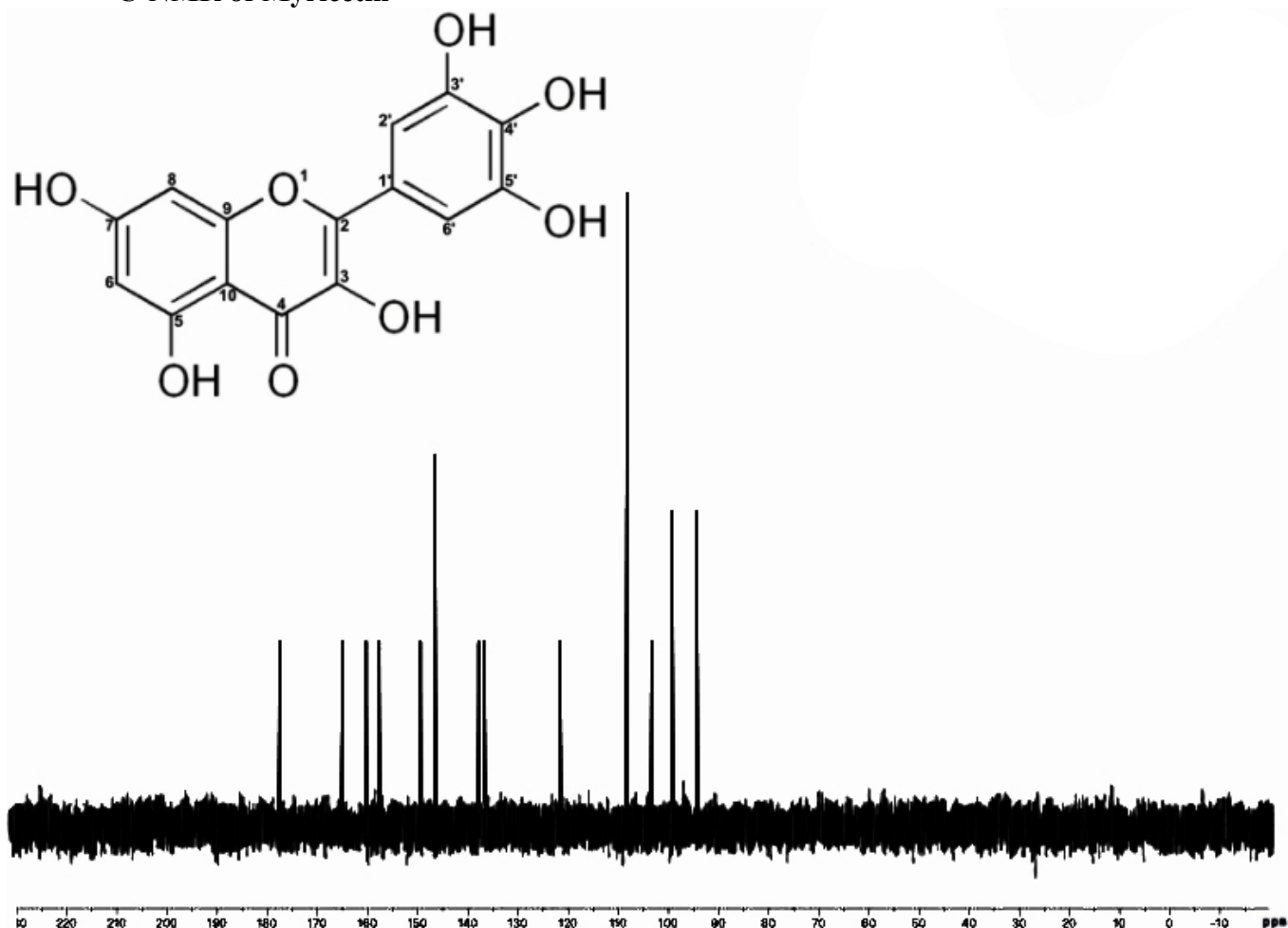
Position	Hyperin δC
1	-
2	157.32
3	136.00
4	178.26
5	161.84
6	99.25
7	165.02
8	94.34
9	157.47
10	104.79
1'	122.11
2'	116.34
3'	145.56
4'	148.78
5'	116.06
6'	122.29
1''	102.85
2''	72.06
3''	74.01
4''	69.67
5''	76.35
6''	59.61

¹³C-NMR of Isoquercitrin



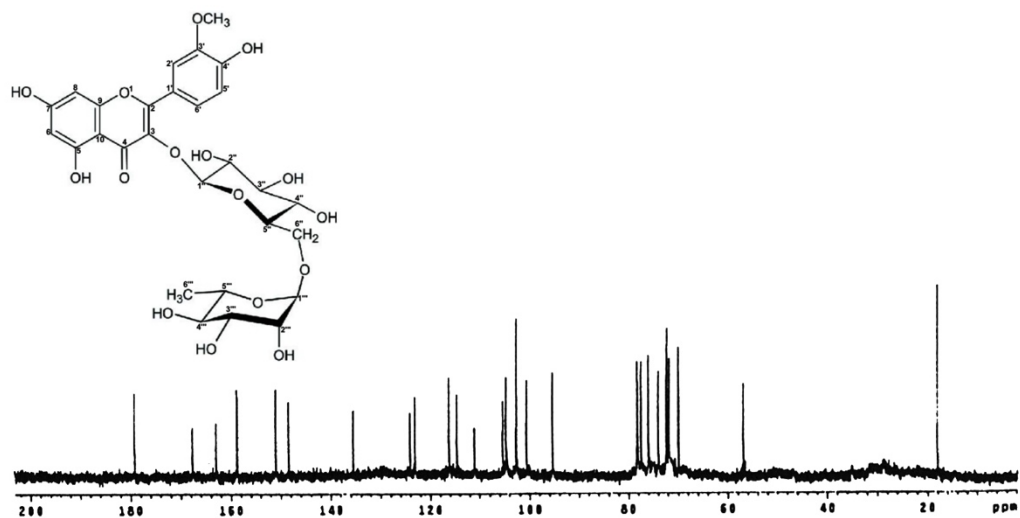
Position	Isoquercitrin
	δC
1	-
2	157.32
3	136.00
4	178.26
5	161.84
6	99.25
7	165.02
8	94.34
9	157.47
10	104.79
1'	122.11
2'	116.34
3'	145.56
4'	148.78
5'	116.06
6'	122.29
1''	102.19
2''	74.40
3''	77.28
4''	70.83
5''	77.57
6''	61.90

¹³C-NMR of Myricetin



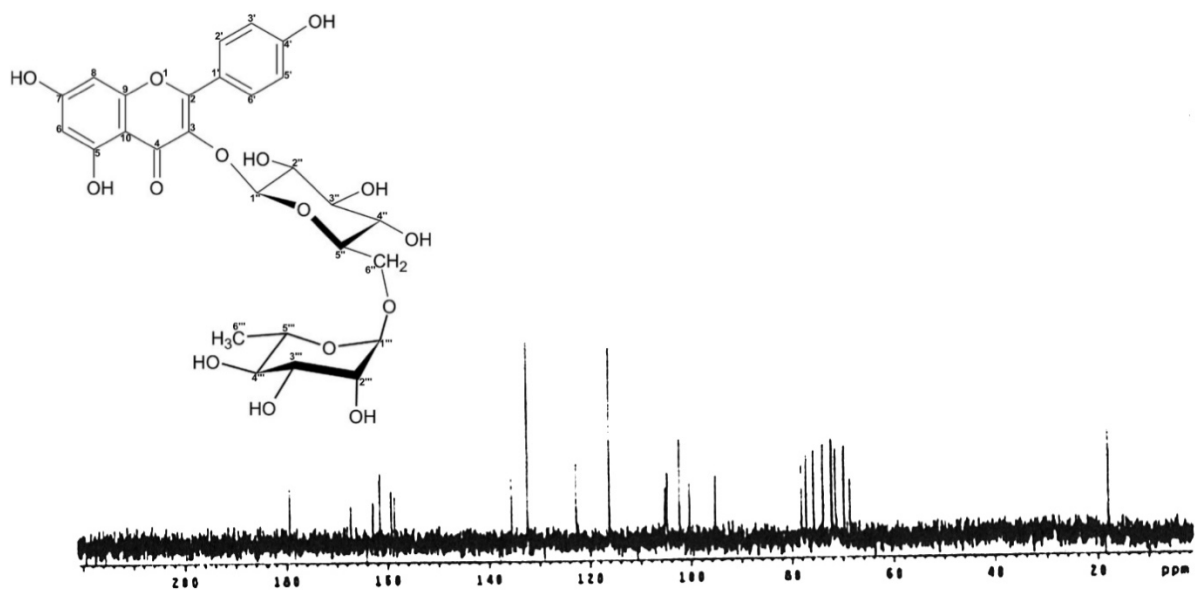
Position	Myricetin
	δC
1	-
2	149.41
3	136.67
4	177.52
5	160.23
6	99.25
7	165.02
8	94.34
9	157.64
10	103.38
1'	121.57
2'	108.23
3'	146.52
4'	137.88
5'	146.52
6'	108.23

¹³C-NMR of Narcissin



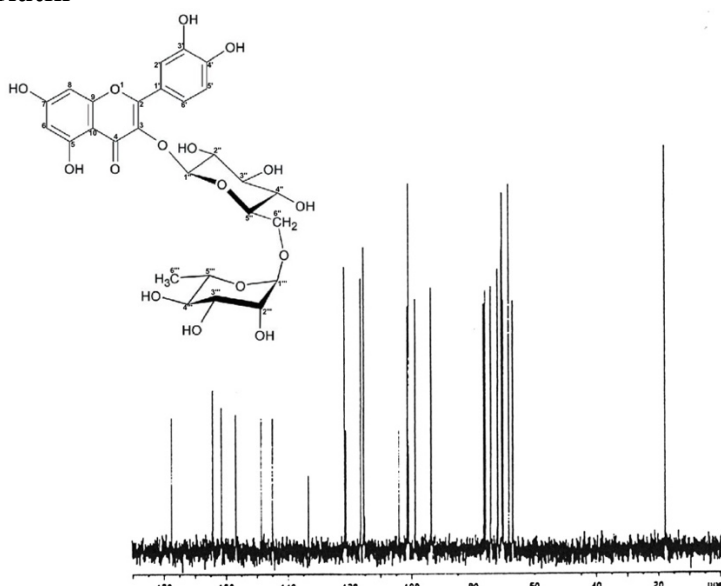
Position	Narcissin δC
1	-
2	157.38
3	134.13
4	178.26
5	161.84
6	99.25
7	165.02
8	94.34
9	157.47
10	104.79
1'	122.12
2'	114.24
3'	148.60
OCH ₃	56.16
4'	149.01
5'	115.51
6'	122.77
1''	102.58
2''	74.70
3''	76.82
4''	70.88
5''	76.65
6''	67.28
1'''	101.60
2'''	71.61
3'''	71.77
4'''	73.30
5'''	69.35
6'''	18.10

¹³C-NMR of Nicotiflorin



Position	Nicotiflorin
	δC
1	-
2	148.55
3	152.97
4	178.43
5	161.84
6	99.25
7	165.02
8	94.34
9	158.14
10	104.79
1'	121.62
2'	133.97
3'	115.79
4'	160.15
5'	115.79
6'	136.40
1''	102.58
2''	74.70
3''	76.82
4''	70.88
5''	76.65
6''	57.28
1'''	101.60
2'''	71.61
3'''	71.77
4'''	73.30
5'''	69.35
6'''	18.10

¹³C-NMR of Rutin



Rutin	
Position	δC
1	-
2	157.32
3	134.17
4	178.26
5	161.84
6	99.25
7	65.02
8	94.34
9	157.47
10	104.79
1'	122.11
2'	116.34
3'	145.56
4'	148.78
5'	116.06
6'	122.29
1''	102.58
2''	74.70
3''	76.82
4''	70.88
5''	76.65
6''	67.28
1'''	101.60
2'''	71.61
3'''	71.77
4'''	73.30
5'''	69.35
6'''	18.10