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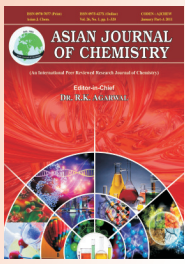

NOTE

Flavonoids from *Canarium album*

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The *n*-butanol fraction of the dried fruits of *Canarium album* was isolated and purified by means of chromatography. Three flavonoids were obtained and their structures were identified by spectral analysis as quercetin -7-*O*-α-L-rhamnoside (**1**), quercetin-7-*O*-β-D-glucoside (**2**) and kaempferol-3-*O*-rutinoside (**3**). Compounds **1-3** have not been reported before from the fruit of *Canarium album*.

Keywords: Flavonoids, *Canarium album*, Structures elucidation, *n*-Butanol fraction.

Canarium album (Lour.) Raeusch, normally called Ganlan in China, is a member of the family Burseraceae and is widely distributed in southern China. It's fruits have been used as both food and folk medicine in China. It possesses some pharmacological functions, such as anti-bacterium[1], detoxification[2], anti-oxidation[3], anti-alcohol and hepatoprotective activities[4] and anti-hepatitis B activities[5]. Flavonoids is one of the major constituents in the whole plant. There were 12 flavonoids from the plant so far[6-10]. In the course of further studies, three flavonoids were obtained from the *n*-butanol fraction of the dried fruit of *Canarium album* and identified as quercetin-7-*O*-α-L-rhamnoside (**1**), quercetin-7-*O*-β-D-glucoside (**2**) and kaempferol-3-*O*- rutinoside (**3**). Compounds **1-3** have not been reported before from the fruit of *Canarium album*.

General experimental procedures: ESI-MS was performed with a Q-TOF Micromass spectrometer. ^{1}H and ^{13}C NMR spectra were recorded on a Bruker DRX-500 spectrometer with tetramethylsilane (TMS) as an internal standard and DMSO-d_6 as solvents. Chemical shifts were given in δ (ppm) values.

The plant material was collected in September 2009 from Jiangjin, Chongqing municipality and identified as the dried fruits of *Canarium album* (Lour.) Raeusch by Prof. REN Shaoguang, College of Bioengineering, Chongqing University, China. A voucher specimen (No. 20090902) has been deposited in the herbarium of College of Bio-information, Chongqing University of Posts and Telecommunications, Chongqing, China.

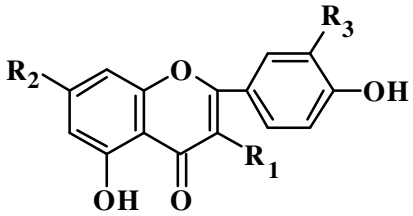
Extraction and isolation: The dried fruits of *C. album* (7 kg) were chopped and extracted with 80 % EtOH three times under reflux and concentrated under vacuum to yield an EtOH extract (400 g). The extract was suspended in water and extracted successively with petroleum ether, ethyl acetate and *n*-butanol to obtain petroleum ether residue (35 g), ethyl acetate residue (230 g) and *n*-butanol residue (50 g). The *n*-butanol fraction (40 g) was chromatographed over a macroporous resin column, eluting successively with water, 30 % EtOH, 60 % EtOH and 90 % EtOH. The 90 % EtOH fraction (8 g) was then subjected to silica gel CC (200-300 mesh) and Sephadex LH-20 (MeOH) to yield **1** (50 mg) and **2** (35 mg). The 60 % EtOH fraction (13 g) was then subjected to silica gel CC (200-300 mesh) and Sephadex LH-20 (MeOH-H_2O) to yield **3** (27 mg).

Structures elucidation: Compound **1**, a yellow powder, which gave positive Molisch reaction. ESI-MS *m/z*: 471 $[M + Na]^+$, 449 $[M + H]^+$, 447$[M - H]^-$, indicating molecular weight (MW) of **1** was 448. ^{1}H NMR (500 MHz, DMSO-d_6) δ: 6.39 (d, *J* = 2 Hz, H-6), 6.81 (d, *J* = 2 Hz, H-8), 7.68 (d, *J* = 2 Hz, H-2'), 6.88 (d, *J* = 8.5 Hz, H-5'), 7.54 (dd, *J* = 8.5, 2.0 Hz, H-6'), 5.24 (d, *J* = 2 Hz, H-1"), 0.97 (d, *J* = 6 Hz, H-6"). ^{13}C NMR (125 MHz, DMSO-d_6) in Table-1. And comparison with reference[11], compound **1** was identified as quercetin-7-*O*-α-L-rhamnoside.

Compound **2**, a yellow powder which gave positive Molisch reaction. ESI-MS *m/z*: 487 $[M + Na]^+$, 465 $[M + H]^+$, 463 $[M - H]^-$, indicating molecular weight (MW) of 2 was 464. ^{1}H NMR (500 MHz, DMSO-d_6) δ: 6.42 (d, *J* = 2 Hz, H-6), 6.79 (d, *J* = 2 Hz, H-8), 7.76 (d, *J* = 2 Hz, H-2'), 6.89 (d, *J* = 8.5 Hz, H-5'), 7.54 (dd, *J* = 8.5, 2 Hz, H-6'), 5.13 (d, *J* = 7 Hz, H-1") . ^{13}C NMR (125 MHz, DMSO-d_6) in Table-1. And comparison with reference[12], compound **2** was identified as quercetin-7-*O*-β-D-glucoside.

TABLE-1
DATA OF COMPOUNDS 1-3,
^{13}C NMR (125 MHz, DMSO-d_6) (δ/ ppm)

No.	1	2	3	No.	1	2	3
2	147.9	147.8	156.9	6'	120.1	120.6	130.9
3	136.1	135.3	133.2	1"	98.5	100.3	101.3
4	176.0	176.7	177.4	2"	70.1	73.6	74.2
5	160.4	161.2	161.1	3"	70.3	76.5	76.4
6	98.8	98.8	98.8	4"	71.6	69.9	69.9
7	161.4	163.2	164.3	5"	69.9	77.5	75.7
8	94.2	94.5	93.8	6"	17.9	60.7	66.9
9	155.7	156.0	159.9	1'"			100.8
10	104.6	104.5	103.9	2'"			70.3
1'	121.8	121.7	120.9	3'"			70.6
2'	115.6	115.4	130.9	4'"			71.8
3'	145.0	145.3	115.1	5'"			68.2
4'	147.5	148.2	156.5	6'"			17.7
5'	115.2	147.8	115.1				



No.	R_1	R_2	R_3
1	OH	O-Rha	OH
2	OH	O-Glc	OH
3	O-rutinose	OH	H

Compound **3**, a lemon yellow powder which gave positive Molish reaction, ESI-MS *m/z*: 595 $[M + H]^+$, 593 $[M-H]^-$, indicating molecular weight (MW) of **3** was 594. ^{1}H NMR (500 MHz, DMSO-d_6) δ: 6.22 (d, *J* = 2 Hz, H-6), 6.44 (d, *J* = 2 Hz, H-8), 7.93 (d, *J* = 9 Hz, H-2'), 6.89 (d, *J* = 8.5 Hz, H-3'), 6.89 (d, *J* = 8.5 Hz, H-5'), 7.93 (d, *J* = 9 Hz, H-6'), 5.38 (d, *J* = 7 Hz, H-1"), 4.38 (S, H-1'"), 0.99 (d, *J* = 6 Hz, H-6'"). ^{13}C NMR (125 MHz, DMSO-d_6) in Table-1. And comparison with reference[13], compound **3** was identified as kaempferol-3-*O*-rutinoside.

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