ชื่อวิทยานิพนธ์ องค์ประกอบทางเคมีจากดอก ผล และเมล็ดมะพูดและสมบัติต้านปฏิกิริยาออกซิเดชัน

ผู้เขียน นางสาวสุวรรณา เดชาทัย

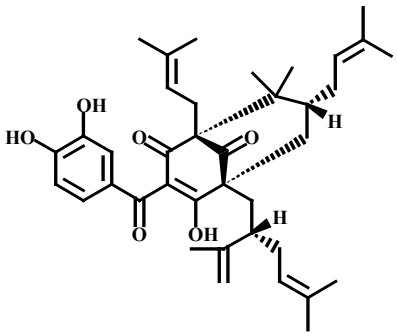
สาขาวิชา เคมีอินทรีย์

ปีการศึกษา 2548

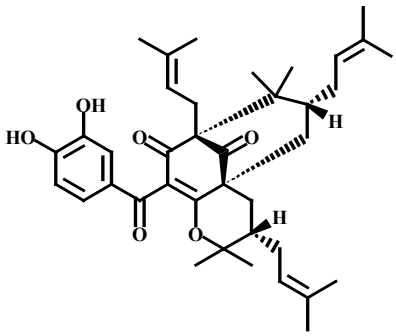
บทคัดย่อ

การศึกษาองค์ประกอบในผล ดอก และเมล็ดมะพูด (*Garcinia dulcis* Kurz.) แยกสารใหม่ได้ 12 สาร (**GD9 GD16 GD21 RD5 RD17 FD2 FD9 FD14 FD16 FD17 FD19** และ **SD7**) สารซึ่งยังไม่มีรายงานการสกัดได้จากธรรมชาติแต่ได้มีการสังเคราะห์แล้ว 2 สาร (**GD3** และ **RD3**) และสารที่มีรายงานแล้ว 59 สาร **GD1-GD25** แยกได้จากผลดิบ **RD1-RD17 GD1 GD2 GD10 GD13 GD14 GD20 GD21** และ **GD23** แยกได้จากผลสุก **FD1-FD19 GD8 GD13 GD14 GD20 RD6-RD8** และ **RD12** แยกได้จากดอก และ **SD1-SD12 GD2 GD20** และ **RD12** แยกได้จากเมล็ด โครงสร้างของสารประกอบเหล่านี้วิเคราะห์โดยใช้ข้อมูลทางสเปกโทรสโกปี UV IR 1D NMR 2D NMR และ MS

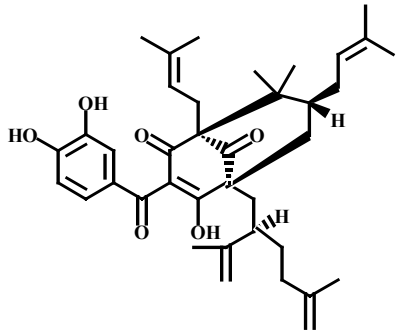
GD1 GD20 RD5 RD14 RD16 FD5 FD8 FD11 และ **FD12** ต้านอนุมูลอิสระ DPPH ด้วยค่า IC_{50} ในช่วง 5.90 - 13.00 ไมโครโมลาร์ ซึ่งดีกว่าการต้านอนุมูลอิสระ DPPH ของ butylated hydroxytoluene (BHT) **RD5** และ **RD16** ต้านปฏิกิริยาออกซิเดชัน (IC_{50} 5.90 และ 6.10 ไมโครโมลาร์ ตามลำดับ) ได้ดีกว่ากรดแอสคอบิค



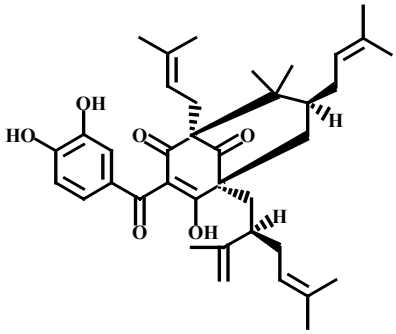
GD1 : camboginol



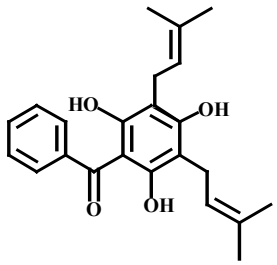
RD14 : cambogin



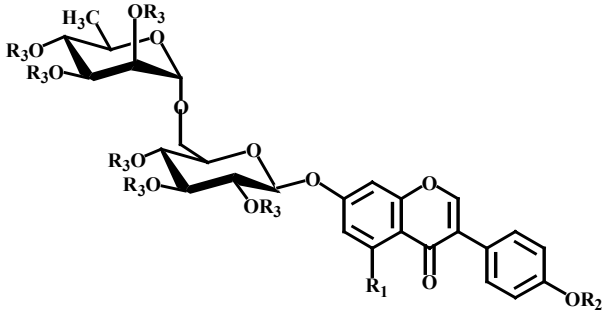
FD11 : xanthochymol



FD12 : guttiferone E



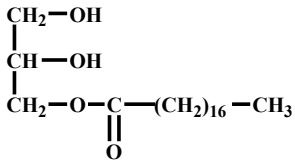
GD22 : clusiaphenone B



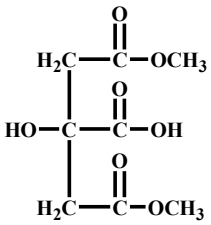
GD3 : R_1 = OH, R_2 = R_3 = Ac

: 5-hydroxy-4", 2"', 3", 4",2"',3"',4"'-heptaacetateisoflavone 7-*O*-[α-rhamnopyranosyl-(1→6)]-β-glucopyranoside

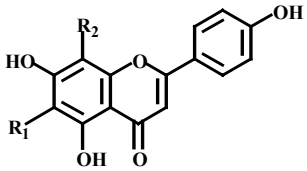
GD4 : R_1 = R_3 = H, R_2 = CH_3 : derriscannoside A



GD2 : octadecanoic acid-2,3-dihydroxypropyl ester



GD18 : 2-hydroxy-1,2,3-propanetricarboxylic acid-1,3-dimethyl ester

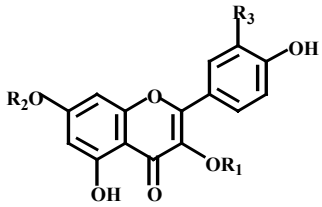


GD9 : R_1 = β-D-glucose (6→1)-α-L-rhamnose

: 5,7,4'-trihydroxyflavone 6-*C*-[α-rhamno-pyranosyl-(1→6)]-β-glucopyranoside

GD19 : R_1 = H, R_2 = β-D-glucose : vitexin

RD13 : R_1 = R_2 = H : apigenin



RD6 : R_1 = β-D-glucose, R_2 = α-L-rhamnose, R_3 = H : kaempferol 3-*O*-β-glucopyranosyl -7-*O*-α-rhamnopyranoside

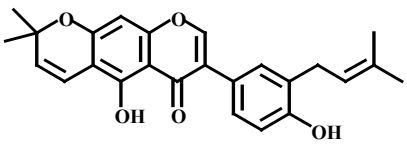
RD15 : R_1 = R_2 = α-L-rhamnose, R_3 = H

: kaempferol 3,7-di-*O*-α-rhamnopyranoside

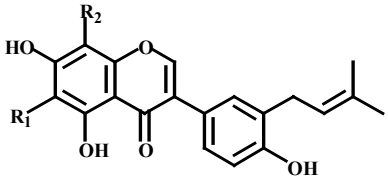
FD4 : R_1 = H, R_2 = R_3 = Me : rhamnazin

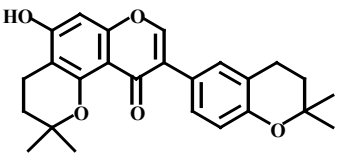
FD5 : R_1 = β-D-galactose, R_2 = H, R_3 = OH

: quercetin 3-*O*-β-D-galactoside



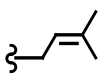
GD11 : chandalone

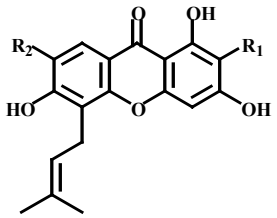




GD16

GD12 : R_1 =  , R_2 = H : lupalbigenin

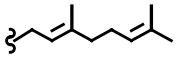
GD15 : R_1 = H, R_2 =  : isolupalbigenin

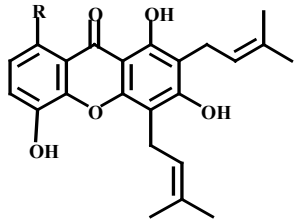


RD8 : R_1 =  , R_2 = OMe

:1,3,6-trihydroxy-7-methoxy-2,5-bis(3-methyl

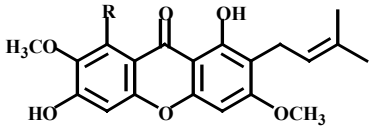
-2-butenyl)xanthone

FD14 : R_1 =  , R_2 = OH



RD10 : R = H : 8-desoxygartanin

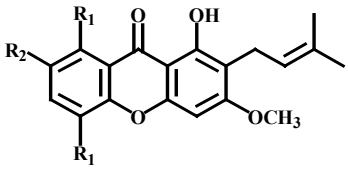
RD11 : R = OH : gartanin



GD5 : R = H : 1,6-dihydroxy-3,7-dimethoxy

-2-(3-methyl-2-butenyl)xanthone

FD18 : R =  : β-mangostin



GD8 : R_1 = H, R_2 = OH

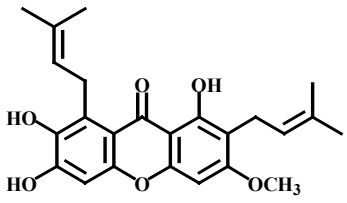
: 1,7-hydroxy-3-methoxy-2-(3-methyl-

2-butenyl)xanthone

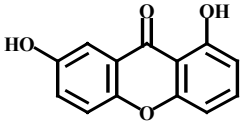
GD10 : R_1 = OH, R_2 = H :

: 1,5,8-trihydroxy-3-methoxy--2-(3-methyl-

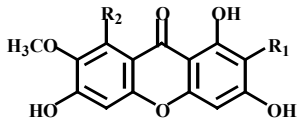
2-butenyl)xanthone

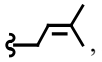
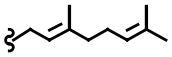


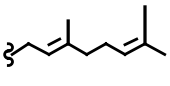
RD17



SD5 : euxanthone

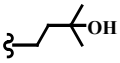


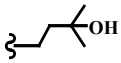
GD6 : R_1 =  , R_2 =  : cowanin

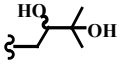
GD7 : R_1 =  , R_2 = H : cowaxanthone

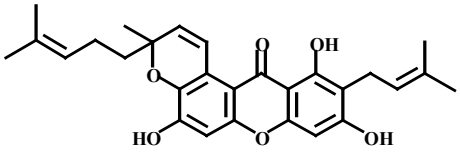
GD14 : $R_1 = R_2$ =  : mangostin

GD23 : R_1 =  , R_2 =  : mangostenol

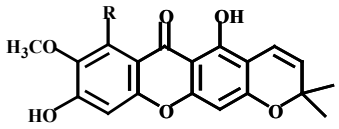
GD24 : R_1 =  , R_2 =  : cratoxylone

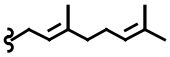
GD25 : R_1 =  , R_2 =  : garcinone D

SD7 : R_1 =  , R_2 = 



GD17 : 1,3,6-trihydroxy-2-(3-methyl-2-butenyl)-2"-methyl
-2"-(4-methyl-3-pentenyl)pyrano(5',6':8,7)xanthone

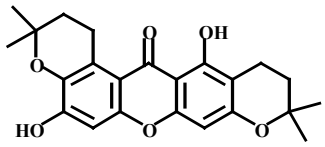


RD1 : R = 

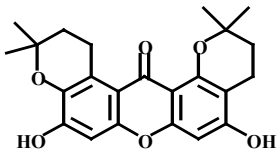
: 1,6-dihydroxy-7-methoxy-8-(3,7-dimethyl-2,6-octadienyl)
-2',2'-dimethylchromeno[5',6':2,3]xanthone

RD9 : R = 

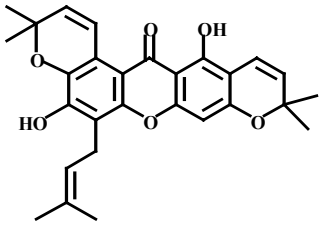
: 1,6-dihydroxy-7-methoxy-8-(3,methyl-2-butenyl)
-2',2'-dimethylchromeno[5',6':2,3]xanthone



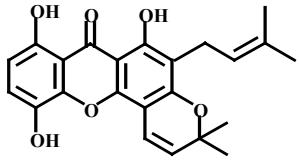
GD13 : BR-xanthone A



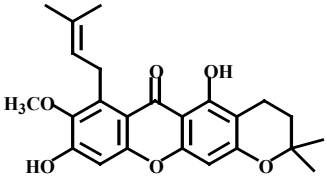
RD3 : 1-isonormangostin



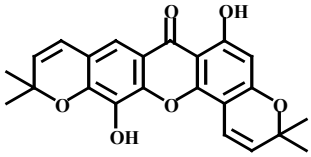
FD9



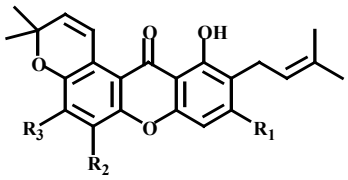
RD12 : morusignin J

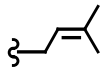


FD15 : 3-isomangostin



FD13 : rheediaxanthone A

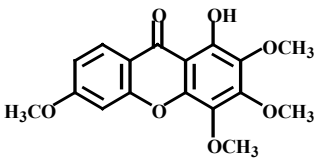


GD21 : R_1 = OH, R_2 = H, R_3 = 

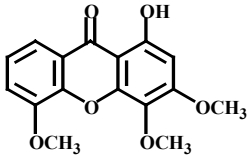
RD2 : R_1 = R_3 = OH, R_2 =  : tovophyllin A

RD7 : R_1 = R_3 = OH, R_2 = H : garcinone B

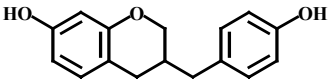
FD16 : R_1 = OMe, R_2 = H, R_3 = OH



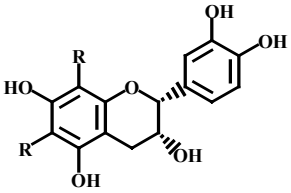
FD2



FD3 : 1-hydroxy-3,4,5-trimethoxyxanthone

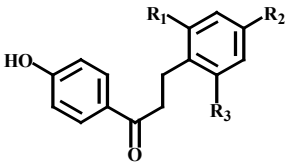


SD10 : 7-hydroxy-3-(4-hydroxybenzyl)chroman



RD5 : R = OH

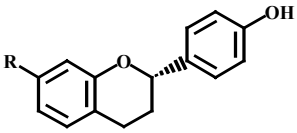
RD16 : R = H : (-)epicatechin



SD6 : R_1 = R_2 = OMe, R_3 = H : loureirin A

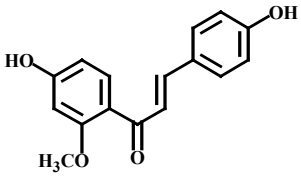
SD8 : R_1 = R_2 = R_3 = OMe : loureirin B

SD12 : R_1 = H, R_2 = OH, R_3 = OMe : loureirin C

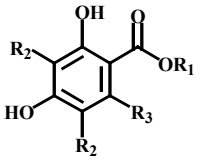


SD1 : R = OMe : 4'-hydroxy-7-methoxyflavan

SD11 : R = OH : (2S)-7,4'-dihydroxyflavan



SD2 : 4,4'-dihydroxy-2'-methoxychalcone

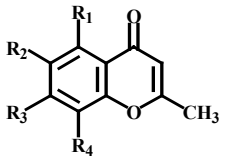


SD3 : $R_1 = R_2 = R_3 = Me$

: 2,4-dihydroxy-3,5,6-trimethylbenzoic acid methyl ester

SD4 : $R_1 = CH_2Ph$, $R_2 = H$, $R_3 = CH_2CH_2CH_3$

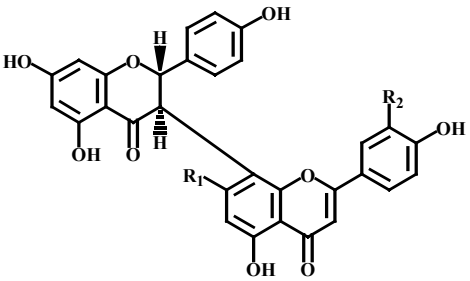
: 2,4-dihydroxy-6-propylbenzoic acid phenylmethyl ester



FD17 : $R_1 = H$, $R_2 = R_4 = OH$, $R_3 = Me$

SD9 : $R_1 = R_3 = OH$, $R_2 = R_4 = Me$

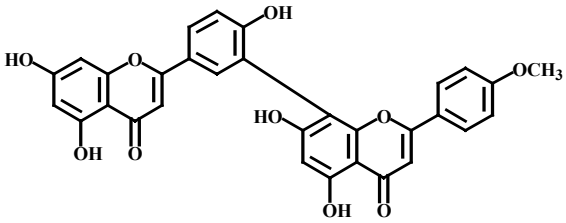
: 8-methyleugenitol



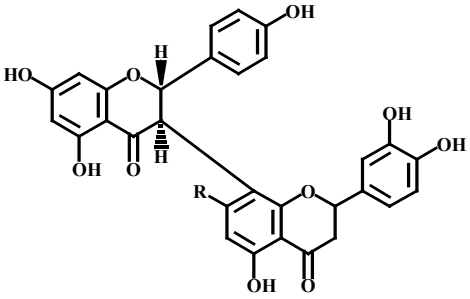
GD20 : $R_1 = R_2 = OH$: morelloflavone

FD1 : $R_1 = OH$, $R_2 = H$: volkensiflavone

FD8 : $R_1 = O$-β-D-glucose, $R_2 = OH$: fukugeside

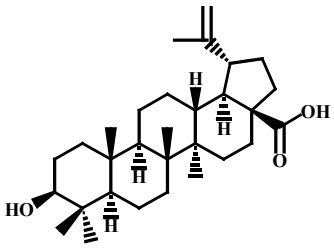


FD6 : podocarpusflavone A

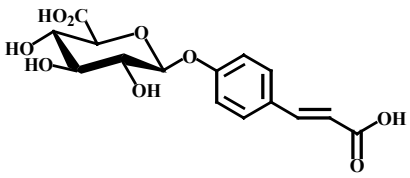


FD7 : R = O-β-D-glucose : xanthochymusside

FD10 : R = OH : GB-2a



RD4 : betulinic acid



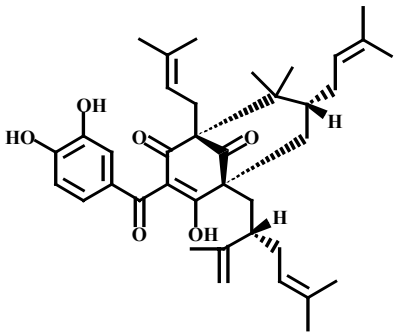
FD19

Thesis Title	Chemical Constituents from Flowers, Fruits and Seeds of *Garcinia dulcis* and Antioxidation Properties
Author	Miss Suwanna Deachathai
Major Program	Organic Chemistry
Academic Year	2005

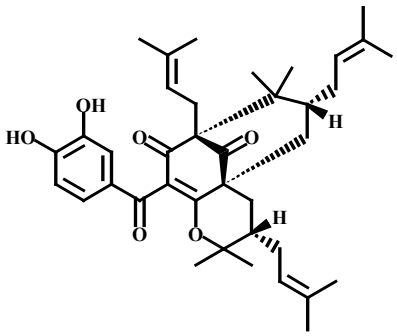
ABSTRACT

Investigation of the chemical constituents in the fruits, flowers and seeds of *Garcinia dulcis* Kurz. resulted in the isolation of twelve new compounds (**GD9**, **GD16**, **GD21**, **RD5**, **RD17**, **FD2**, **FD9**, **FD14**, **FD16**, **FD17**, **FD19** and **SD7**), two new naturally occurring but synthetically known compounds (**GD3** and **RD3**) and fifty-nine previously reported compounds. **GD1**-**GD25** were isolated from the green fruits. **RD1**-**RD17**, **GD1**, **GD2, GD10**, **GD13**, **GD14**, **GD20**, **GD21** and **GD23** were obtained from the ripe fruits. **FD1**-**FD19**, **GD8**, **GD13**, **GD14**, **GD20**, **RD6**-**RD8** and **RD12** were found in the flowers and **SD1**-**SD12**, **GD2**, **GD20** and **RD12** were resulted from the seeds. Their structures were determined on the basis of UV, IR, 1D NMR, 2D NMR and MS data.

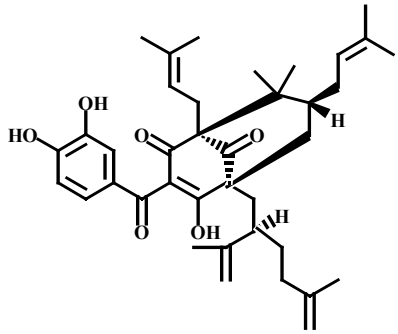
GD1, **GD20**, **RD5**, **RD14**, **RD16**, **FD5**, **FD8**, **FD11** and **FD12** acted as potent radical scavengers with IC_{50}'s of between 5.90 - 13.00 μM. These are more effective than butylated hydroxytoluene (BHT). **RD5** and **RD16** exhibited stronger antioxidant activity (IC_{50} 5.90 and 6.10 μM, respectively) than ascorbic acid.



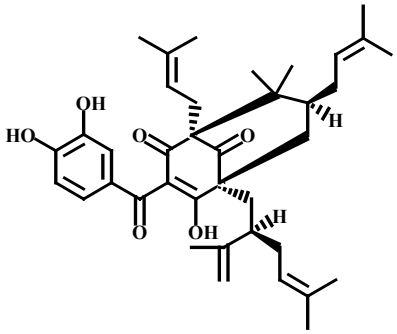
GD1 : camboginol



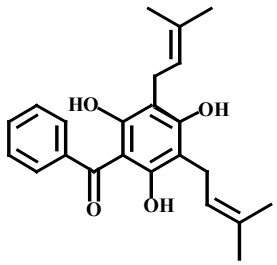
RD14 : cambogin



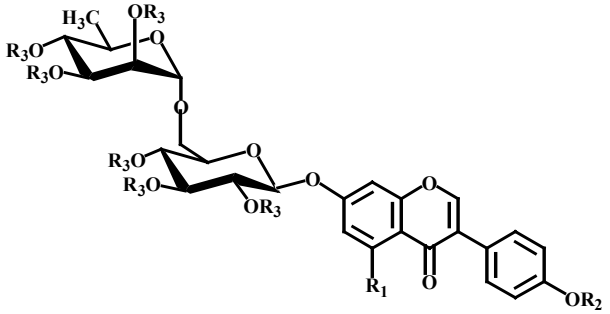
FD11 : xanthochymol



FD12 : guttiferone E



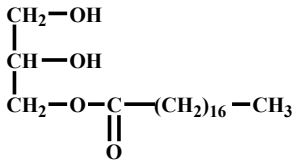
GD22 : clusiaphenone B



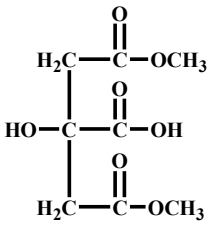
GD3 : R_1 = OH, R_2 = R_3 = Ac

: 5-hydroxy-4", 2"', 3", 4",2"',3"',4"'-heptaacetateisoflavone 7-*O*-[α-rhamnopyranosyl-(1→6)]-β-glucopyranoside

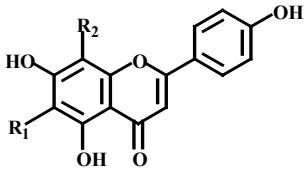
GD4 : R_1 = R_3 = H, R_2 = CH_3 : derriscannoside A



GD2 : octadecanoic acid-2,3-dihydroxypropyl ester



GD18 : 2-hydroxy-1,2,3-propanetricarboxylic acid-1,3-dimethyl ester

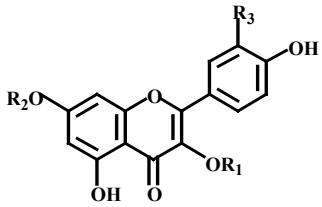


GD9 : R_1 = β-D-glucose (6→1)-α-L-rhamnose

: 5,7,4'-trihydroxyflavone 6-*C*-[α-rhamno-pyranosyl-(1→6)]-β-glucopyranoside

GD19 : R_1 = H, R_2 = β-D-glucose : vitexin

RD13 : R_1 = R_2 = H : apigenin



RD6 : R_1 = β-D-glucose, R_2 = α-L-rhamnose, R_3 = H : kaempferol 3-*O*-β-glucopyranosyl -7-*O*-α-rhamnopyranoside

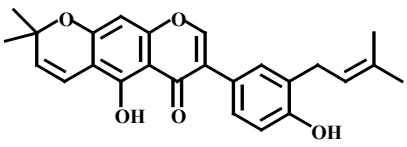
RD15 : R_1 = R_2 = α-L-rhamnose, R_3 = H

: kaempferol 3,7-di-*O*-α-rhamnopyranoside

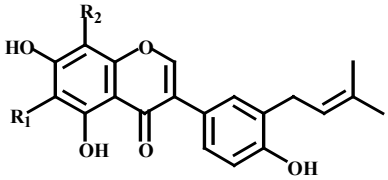
FD4 : R_1 = H, R_2 = R_3 = Me : rhamnazin

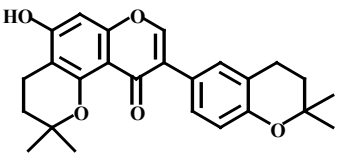
FD5 : R_1 = β-D-galactose, R_2 = H, R_3 = OH

: quercetin 3-*O*-β-D-galactoside



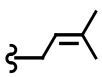
GD11 : chandalone

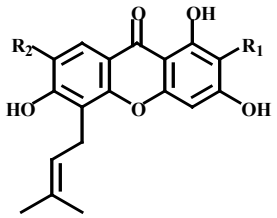




GD16

GD12 : R_1 =  , R_2 = H : lupalbigenin

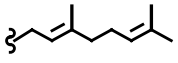
GD15 : R_1 = H, R_2 =  : isolupalbigenin

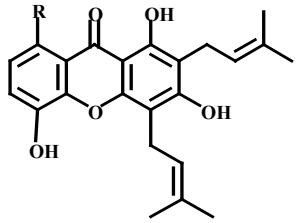


RD8 : R_1 =  , R_2 = OMe

:1,3,6-trihydroxy-7-methoxy-2,5-bis(3-methyl

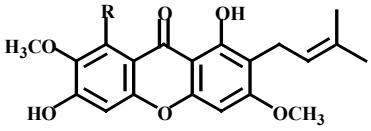
-2-butenyl)xanthone

FD14 : R_1 =  , R_2 = OH



RD10 : R = H : 8-desoxygartanin

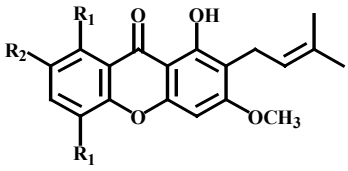
RD11 : R = OH : gartanin



GD5 : R = H : 1,6-dihydroxy-3,7-dimethoxy

-2-(3-methyl-2-butenyl)xanthone

FD18 : R =  : β-mangostin



GD8 : R_1 = H, R_2 = OH

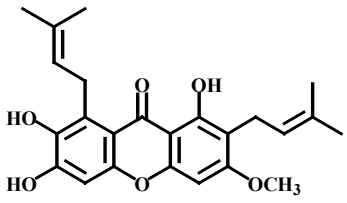
: 1,7-hydroxy-3-methoxy-2-(3-methyl-

2-butenyl)xanthone

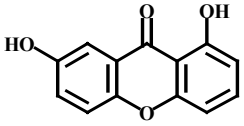
GD10 : R_1 = OH, R_2 = H :

: 1,5,8-trihydroxy-3-methoxy--2-(3-methyl-

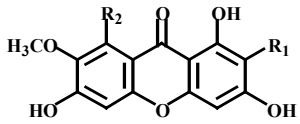
2-butenyl)xanthone

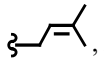
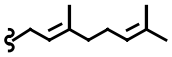


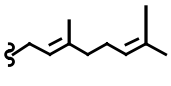
RD17



SD5 : euxanthone

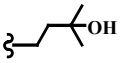


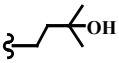
GD6 : R_1 =  , R_2 =  : cowanin

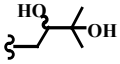
GD7 : R_1 =  , R_2 = H : cowaxanthone

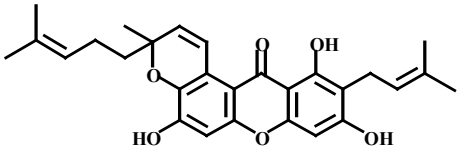
GD14 : $R_1 = R_2$ =  : mangostin

GD23 : R_1 =  , R_2 =  : mangostenol

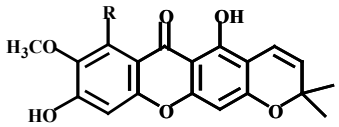
GD24 : R_1 =  , R_2 =  : cratoxylone

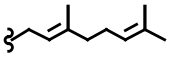
GD25 : R_1 =  , R_2 =  : garcinone D

SD7 : R_1 =  , R_2 = 



GD17 : 1,3,6-trihydroxy-2-(3-methyl-2-butenyl)-2''-methyl
-2''-(4-methyl-3-pentenyl)pyrano(5',6':8,7)xanthone

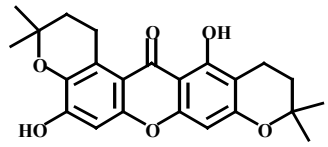


RD1 : R = 

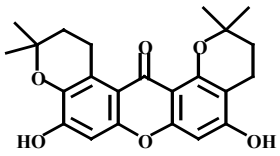
: 1,6-dihydroxy-7-methoxy-8-(3,7-dimethyl-2,6-octadienyl)
-2',2'-dimethylchromeno[5',6':2,3]xanthone

RD9 : R = 

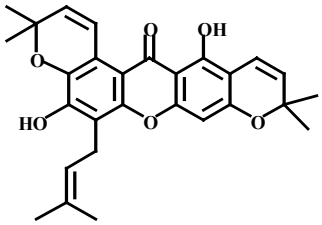
: 1,6-dihydroxy-7-methoxy-8-(3,methyl-2-butenyl)
-2',2'-dimethylchromeno[5',6':2,3]xanthone



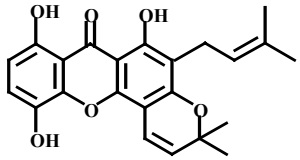
GD13 : BR-xanthone A



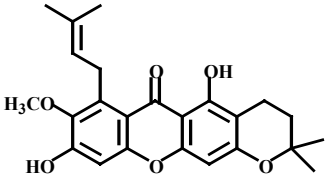
RD3 : 1-isonormangostin



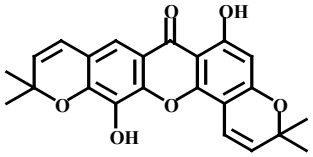
FD9



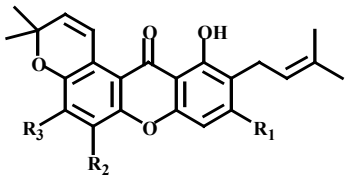
RD12 : morusignin J

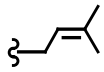


FD15 : 3-isomangostin



FD13 : rheediaxanthone A

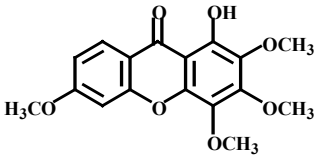


GD21 : R_1 = OH, R_2 = H, R_3 = 

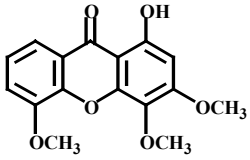
RD2 : R_1 = R_3 = OH, R_2 =  : tovophyllin A

RD7 : R_1 = R_3 = OH, R_2 = H : garcinone B

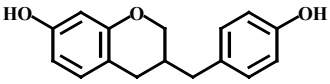
FD16 : R_1 = OMe, R_2 = H, R_3 = OH



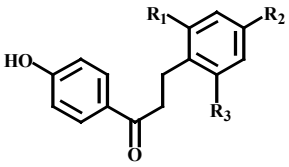
FD2



FD3 : 1-hydroxy-3,4,5-trimethoxyxanthone



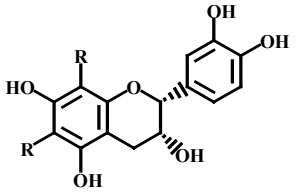
SD10 : 7-hydroxy-3-(4-hydroxybenzyl)chroman



SD6 : R_1 = R_2 = OMe, R_3 = H : loureirin A

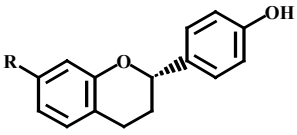
SD8 : R_1 = R_2 = R_3 = OMe : loureirin B

SD12 : R_1 = H, R_2 = OH, R_3 = OMe : loureirin C



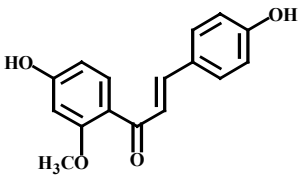
RD5 : R = OH

RD16 : R = H : (-)epicatechin

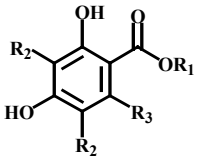


SD1 : R = OMe : 4'-hydroxy-7-methoxyflavan

SD11 : R = OH : (2S)-7,4'-dihydroxyflavan



SD2 : 4,4'-dihydroxy-2'-methoxychalcone

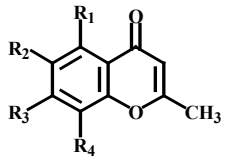


SD3 : $R_1 = R_2 = R_3 = Me$

: 2,4-dihydroxy-3,5,6-trimethylbenzoic acid methyl ester

SD4 : $R_1 = CH_2Ph$, $R_2 = H$, $R_3 = CH_2CH_2CH_3$

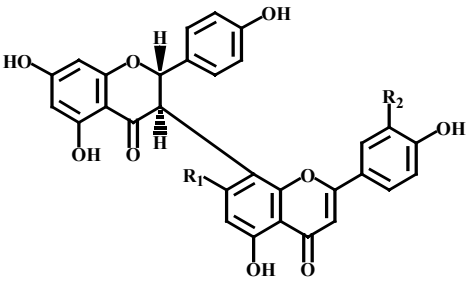
: 2,4-dihydroxy-6-propylbenzoic acid phenylmethyl ester



FD17 : $R_1 = H$, $R_2 = R_4 = OH$, $R_3 = Me$

SD9 : $R_1 = R_3 = OH$, $R_2 = R_4 = Me$

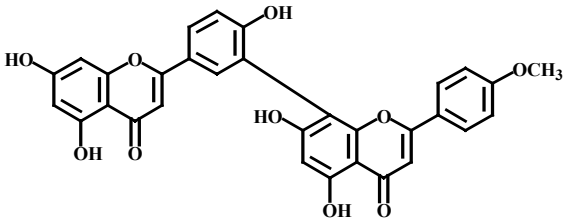
: 8-methyleugenitol



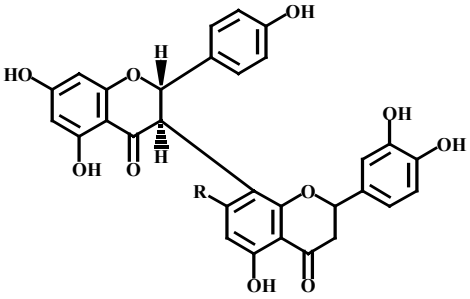
GD20 : $R_1 = R_2 = OH$: morelloflavone

FD1 : $R_1 = OH$, $R_2 = H$: volkensiflavone

FD8 : $R_1 = O$-β-D-glucose, $R_2 = OH$: fukugeside

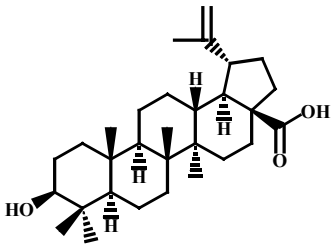


FD6 : podocarpusflavone A

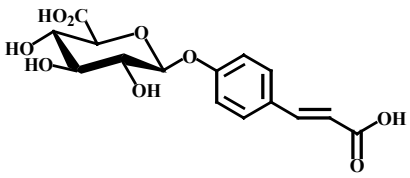


FD7 : R = O-β-D-glucose : xanthochymusside

FD10 : R = OH : GB-2a



RD4 : betulinic acid



FD19