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An overview on *Genus chlorophytum*

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ABSTRACT

The genus Chlorophytum (Liliaceae) comprises about 200 species and is distributed mainly in tropical and subtropical countries. It is represented in India by about 15 species, which occur mostly in peninsular India. They are mainly cultivated for their ornamental flowers. Several bioactive compounds have been isolated and characterized from Chlorophytum genus. The present review will focus on the secondary metabolites isolated and characterized from the genus and their biological activities.

KEYWORDS

Chlorophytum;
Steroidal saponins;
Biological activity.

INTRODUCTION

The genus Chlorophytum (Liliaceae) comprises about 200 species and is distributed mainly in tropical and subtropical countries. It is represented in India by about 15 species, which occur mostly in peninsular India. They are mainly cultivated for their ornamental flowers[1].

BOTANICAL DESCRIPTION

Most of the species are herbs with short root stock fascieled roots often thick, fleshy and tuberous a herb upto a meter tall. Root fibres tuberous, leaves 5-10 mm thin, elliptic-lanceolate, acute, 30-60 cm. long, 1.5-10 cm. broad, strongly nerved, glabrous and shining on both sides, narrowed at base into a winged petiole 15-25 cm. long scape 20-40 cm. long thick, terete. Flowers are very small, white in very lax panicles 30-60 cm. long with ovate-lanceolate, bracts 0. 2-3. 5 cm; Perianth 6, very small 3-10 x 2-5 mm. Subacute, 5-nerved. Stamens 6, hypoglymous, about 5 mm. long. Capsule 6 x 3 mm., depressed, globose deeply lobed at the apex, transversely veined. Seed solitary, flattened, orbicular, minutely pappillose, dull black. Flowering and fruiting period ranges between May-August[2].

ETHNOMEDICAL USES

Chlorophytum arundinaceum Baker leaves and flowers are eaten. The plant is used as a substitute for onion. The tubers constitute the drug commercially known as Safed- Musli. The commercial drug contains the tubers of *C.arundinaceum*, *C.tuberosum*. The drug is considered a valuable nervine and genaral tonic for strength and vigor. The fried powder of the root is chewed in aphthae of mouth and throat. A decoction of the root with turmeric is given in rheumatism. The fruits yield a polysaccharide, galactoglucan.*Chlorophytum comosum*.in Africa, an infusion of the tuber is given as a purgative to children and women after child birth. The cultivar, 'Vittatum', is reported to absorb formaldehyde

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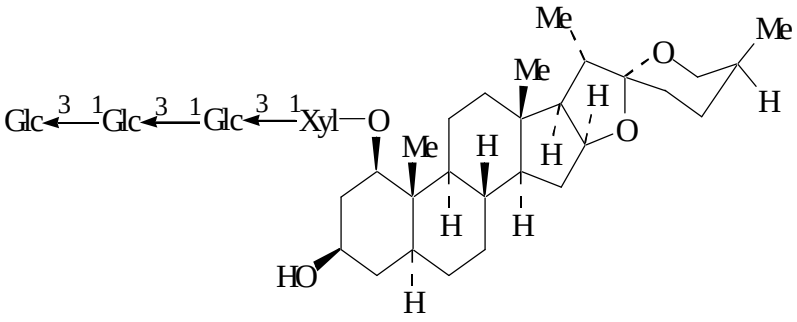
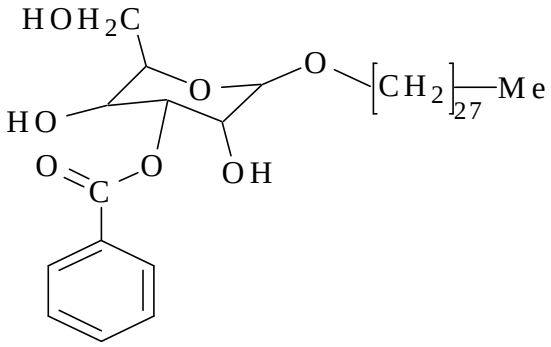
vapor and can be used in biological air purification systems such as space stations, energy efficient homes.*Chlorophytum laxum*. leaves are eaten by the tribal people of Western Ghats. A paste of the plant is applied externally to swellings to remove inflammation.*Chlorophytum tuberosum* tender leaves are eaten as vegetable. The tuber is also edible and the dried ones are used as tonic. The tubers are collected during July-August in Andhra Pradesh. *Chlorophytum borivilianum* are eaten by tribal people of Western Ghats. The roots of *C.nepalense* syn. *C.undulatum* paste of roots mixed with mustard oil is applied in joint pains[3,4]. Many more workers have worked on the chlorophytum species[5-10].

TABLE 1



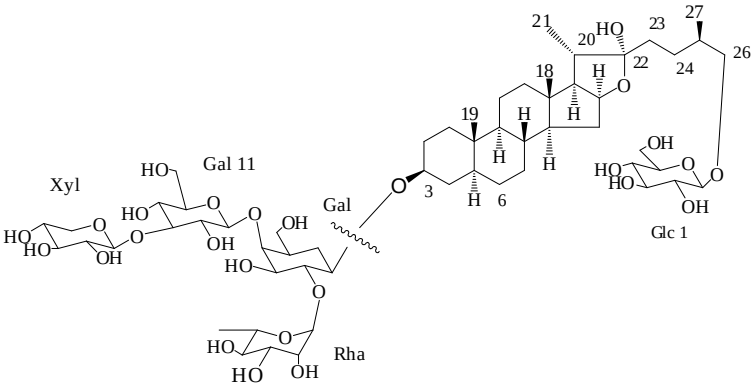
Source: *C. arundinaceum*(Roots) **[4]**
M. F.: $C_{50}H_{82}O_{24}$
Mol. Wt.: 1066
$[\alpha]_D$: -54.2° (pyridine)
M.P.: 260-262°C

Arundinoside A



Source: *C. arundinaceum*(Roots) **[11]**
M. F.: $C_{41}H_{72}O_7$
Mol. Wt.: 676
M.P.: 208-212°C
$[\alpha]_D$: -10.18°(pyridine)
Bio. Activity: Adaptogenic

Arundinoside B



Source: *C.borivilianum*(Roots) **[12]**
M. F.: $C_{56}H_{94}O_{27}$
Mol. Wt.: 1198
$[\alpha]^{20}_D$: - 46.0, (c0.10,MeoH)
Bio. Activity: antidiabetic & spermtogenic

Borivilianoside A

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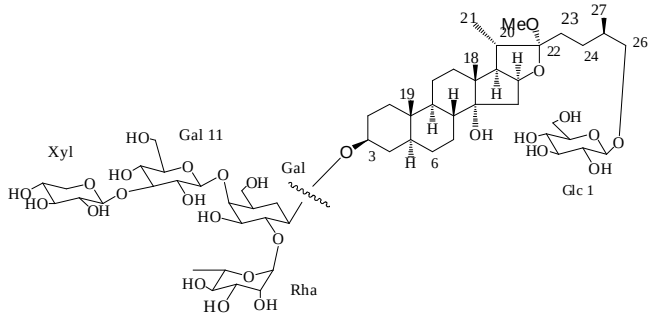
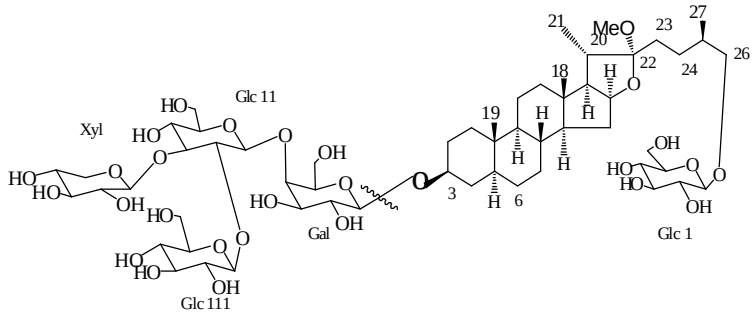


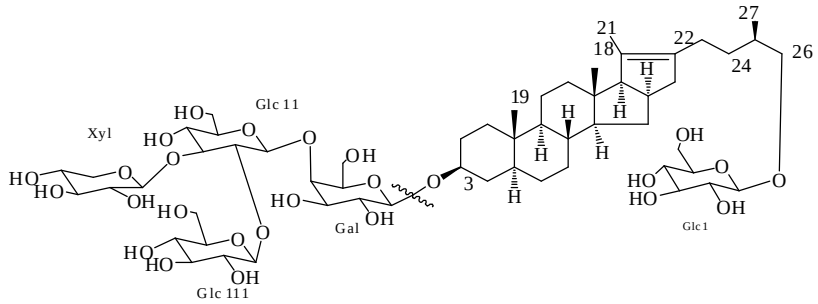
Source: *C.borivilianum*(Roots)
M. F.: $C_{57}H_{96}O_{27}$
Mol. Wt.:1212.6043
$[\alpha]_D^{20}$: - 43.0, (c0.10,MeoH)
Bio. Activity: antidiabetic & spermtogenic **[12]**

Borivilianoside B



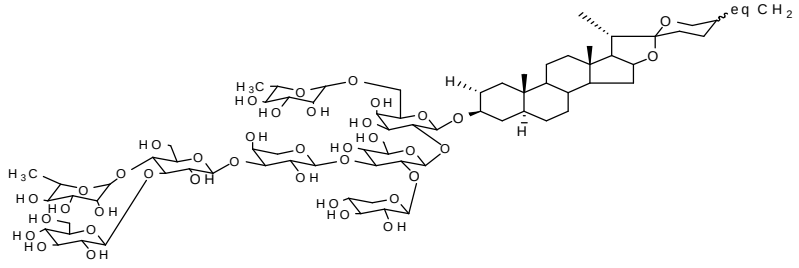
Source: *C borivilianum* Roots)
M. F.: $C_{57}H_{96}O_{28}$
Mol. Wt.: 1228.5991
$[\alpha]_D^{20}$: - 45.6(,c0.08,MeoH)
Bio. Activity: antidiabetic & spermtogenic **[12]**

Borivilianoside C



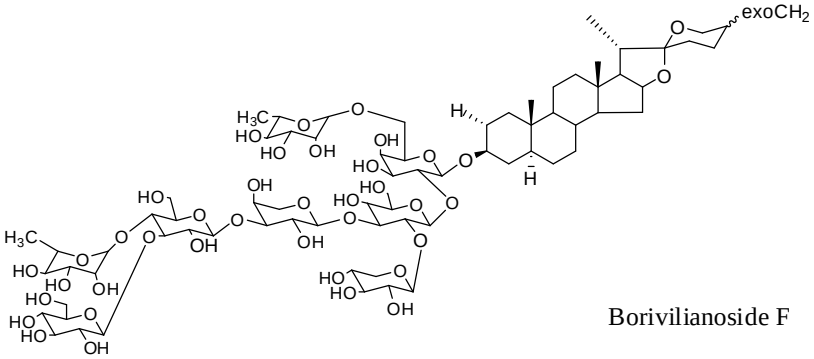
Source: *C borivilianum*(Roots)
M. F.: $C_{56}H_{92}O_{27}$
Mol. Wt.: 1196
α]D: -32.4(,c0.10,MeoH
Bio. Activity :antidiabetic & spermtogenic **[12]**

Borivilianoside D



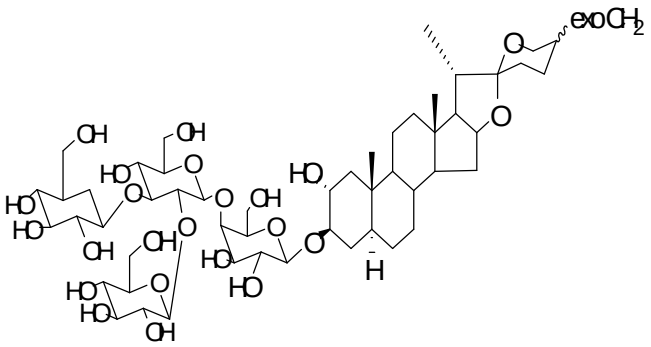
Borivilianoside E

Source: *C.borivilianum*(Roots)
Mol. Fr.: $C_{73}H_{120}O_{339}$
Mol. Wt.: 1620
$[\alpha]_D^{20}$: - 66.7(c0.20,MeoH)
Biol. Activity: Anticancerous **[13]**



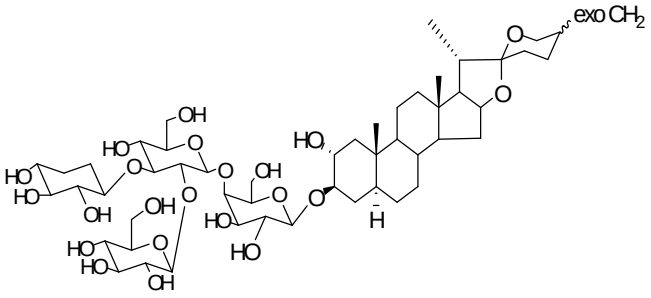
Borivilianoside F

Source: **[13]**
C.borivilianum(Roots)
M.F.: $C_{50}H_{80}O_{24}$
M.W.:1048
$[\alpha]_D^{20}$:-
65.1(c0.20,MeoH)
Bio. Activity: :
Anticancer



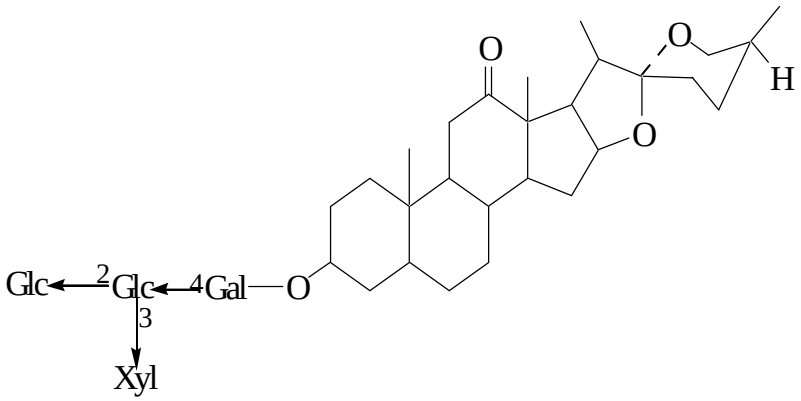
Borivilianoside G

Source: **[13]**
C.borivilianum(Roots)
Mol. Fr.: $C_{51}H_{82}O_{24}$
Mol. Wt.: 1078
$[\alpha]_D^{20}$:-
57.9(c0.20,MeoH)
Biol. Activity: :
Anticancerous



Borivilianoside H

Source: **[13]**
C.borivilianum(Roots)
Mol. Fr.: $C_{50}H_{80}O_{24}$
Mol. Wt.:1048
$[\alpha]_D^{20}$:-
65.1(c0.20,MeoH
Biol. Activity: :
Anticancerous



Chloromaloside A

So
So Source: *C. malayense* (Rhizomes) **[14]**
Mol. Fr.: $C_{50}H_{80}O_{23}$
Mol. Wt.: 1048
M.P.: 278-280°C
$[\alpha]_D^{28}$: -67.6°(pyridine, c 0.037)
Biol. Activity:
Antitumour

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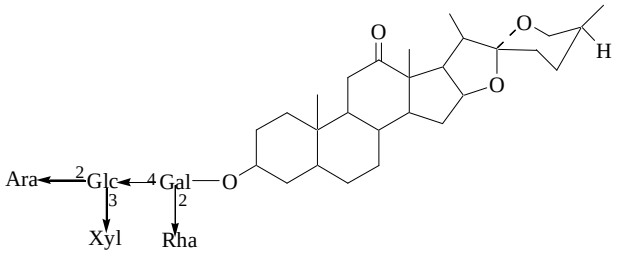
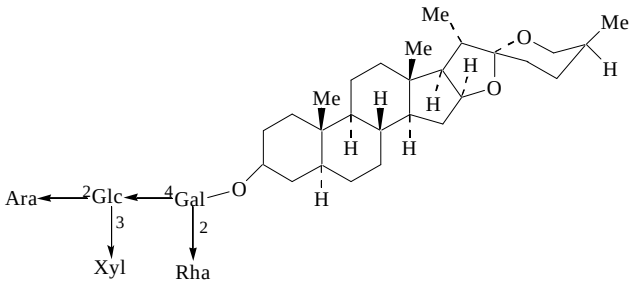


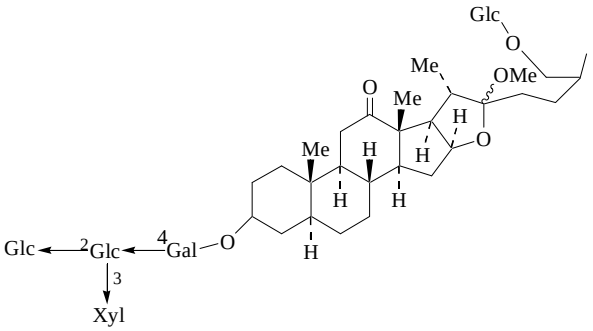
Chloromaloside B

Source: *C. malayense*(Rhizomes)
Mol. Fr.: $C_{56}H_{88}O_{26}$
Mol. Wt.: 1164
M.P.: 295-298°C
$[\alpha]_D^{28}$: -48..3°(pyridine, c 0.058)
Biol. Activity: Antitumour
[14]



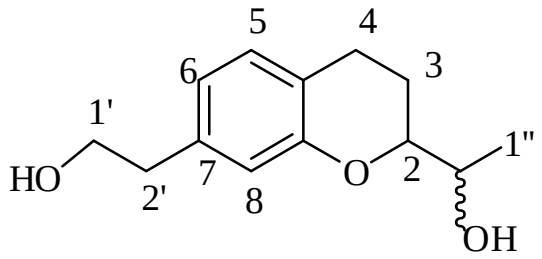
Chloromaloside C

Source: *C. malayense*(Rhizomes)
Mol. Fr.: $C_{55}H_{90}O_{25}$
Mol. Wt.: 1150
M.P.: 290-293°C
$[\alpha]_D^{21}$: -21.6°(pyridine, c 0.213)
Biol. Activity: Antitumour
[14]



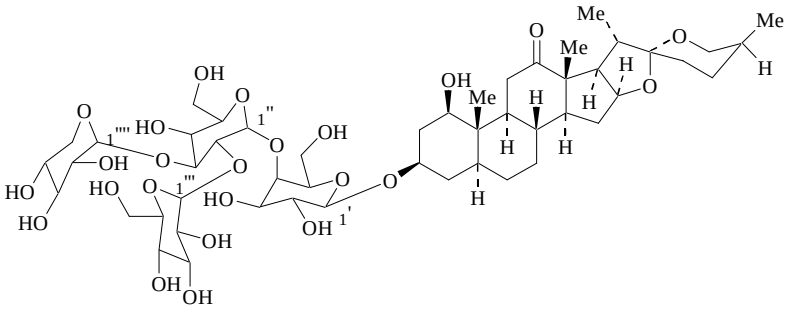
Chloromaloside D

Source: *C. malayense* (Rhizomes)
Mol. Fr.: $C_{57}H_{94}O_{29}$
Mol. Wt.: 1242
M.P.: 219-222°C
$[\alpha]_D^{21}$: -31.9° (pyridine, c 0.213)
Biol. Activity: Antitumour
[14]



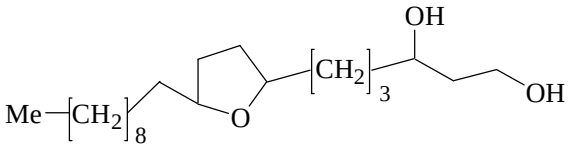
7-(1'-ethoxyethyl),-2-(2"-hydroxyethyl)-3,4-dihydrobenzopyran

Source: *C. inornatum*
Mol. Fr.: $C_{13}H_{17}O_3$
Mol. Wt.: 220.1177
M.P.: 240°C
$[\alpha]_D$: 157.14
Activity:Antimycobacterial
[15]



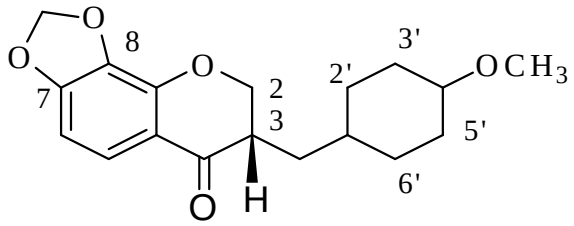
F Gitonin

Source: *C. comosum* (Roots)
Mol. Fr.: $C_{21}H_{42}O_3$
Mol. Wt.: 342
M.P.: 240oC
[α]D: -10.18o(pyridine)
Biol. Activity: Adaptogenic
[15]



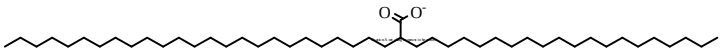
4-Hydroxy-8, 11-oxihenicosanol

Source: *C. arundinaceum*(Roots) **[16]**
Mol. Fr.: $C_{21}H_{42}O_3$
Mol. Wt.: 342
M.P.: 240oC
[α]D: -10.18o (pyridine)
Biol. Activity: Adaptogenic



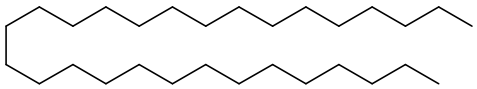
3'-(4'-methoxy benzyl)-7,8 methylene dioxy-chroman-4-one

Source: *C. inornatum* **[17]**
Mol. Fr.: $C_{18}H_{17}O_5$
Mol. Wt.:312.1071
[α]D: 18.9
Biol.Activity:Antimyco bacteri - al activity



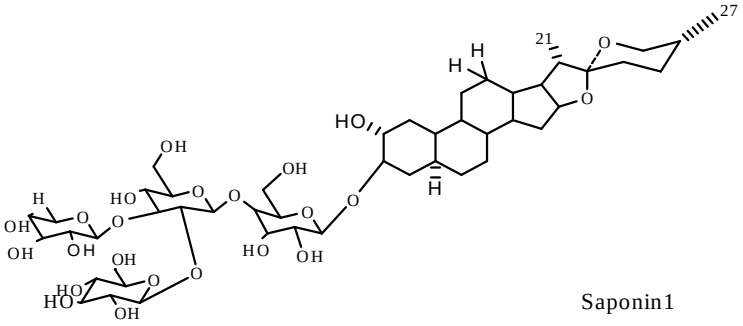
n-Pentacosyldocosanoate

Source: *C. arundinaceum* (Roots) **[18]**
Mol. Formula.: $C_{47}H_{94}O_2$
Mol. Wt.: 692.285



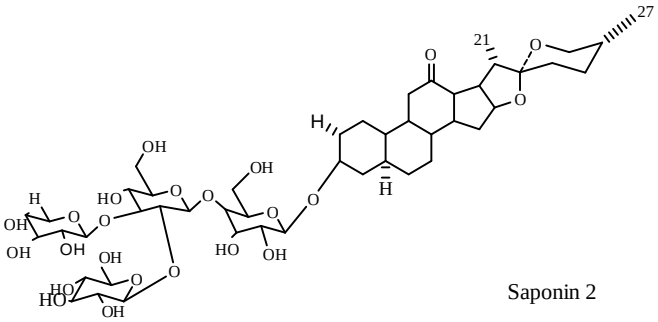
Nonacosane

[18]
Source: *C. arundinaceum* (Roots)
Mol. Fr.: $C_{29}H_{60}$
Mol. Wt.: 408.60
M.P.: 65-67o
Biol. Activity: Adaptogenic



Saponin1

Source: *C. comosum* (Roots) **[15]**
M. F.: C46H72O23
M. W.: 992.446
Biol. Activity: Antitumor



Saponin 2

Source: *C. comosum* (Roots) **[15]**
M. F.: C46H70O23
M. W.: 990.431
Biol. Activity: Antitumor

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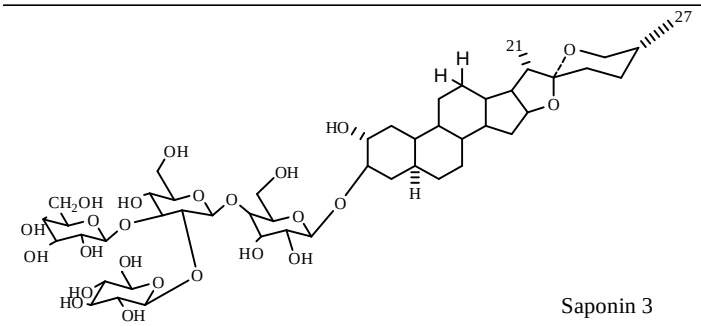
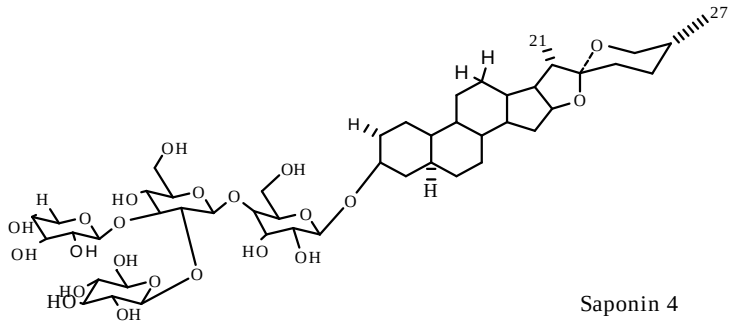


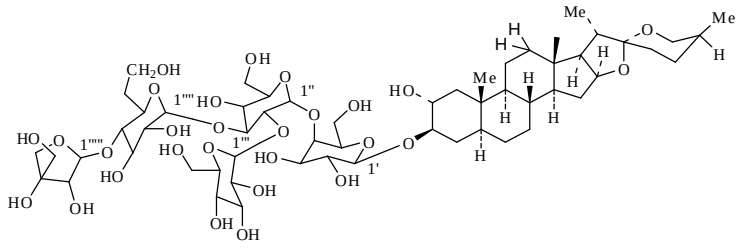
Saponin 3

Source: *C. comosum* (Roots) **[15]**
M. F.: C47H74O24
M. W.: 1022.457
Biol. Activity: Antitumor



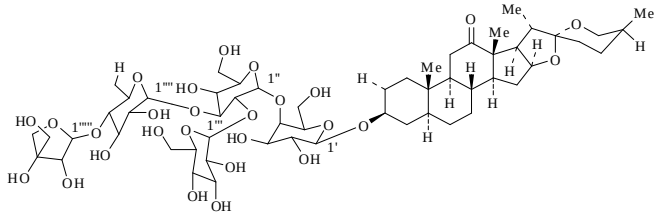
Saponin 4

Source: *C. comosum* (Roots) **[15]**
M. F.: C46H72O22
M. W.: 976.452
Bio. Activity: Antitumor



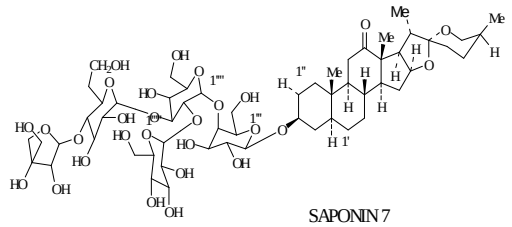
Saponin 5

Source: *C. comosum* (Roots) **[15]**
Mol. Fr.: $C_{56}H_{92}O_{28}$
Mol. Wt.: 1212
[α]D25: -43o(CHCl3-MeOH,
1:1, c=0.010)
Biol. Activity: Antitumor



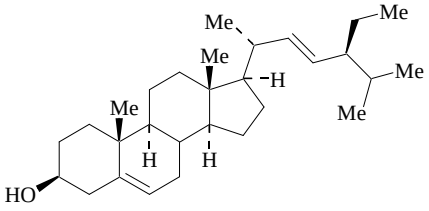
Saponin 6

Source: *C. comosum* (Roots) **[15]**
Mol. Fr.: $C_{55}H_{88}O_{27}$
Mol. Wt.: 1180
Biol. Activity: Antitumor
[α]D25: -20o(CHCl3-MeOH,
1:1, c=0.010



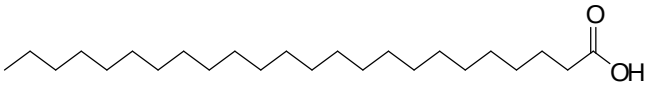
SAPONIN 7

Source: *C. comosum* (Roots) **[15]**
Mol. Fr.: $C_{56}H_{90}O_{28}$
Mol. Wt.: 1210
[α]D25: -14.0o (CHCl3-MeOH,
1:1, c=0.010)
Biol. Activity: Antitumor



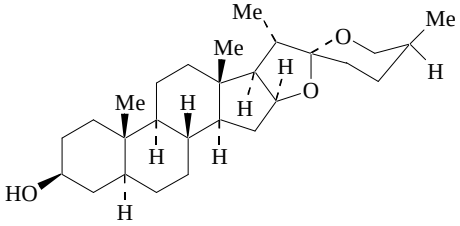
Stigmasterol

Source: *C. arundinaceum*(Roots) **[18]**
Mol. Fr.: $C_{29}H_{48}O$
Mol. Wt.: 412.69
M.P.: 155oC (dec.)
[α]D28: -
51o(chloroform, c=2



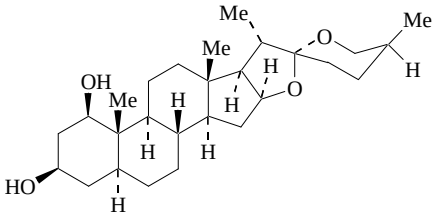
Tetracosanoic acid

Source: *C. arundinaceum*(Roots) **[16]**
Mol. Fr.: $C_{24}H_{48}O_2$
Mol. Wt.: 368.365
M.P.: 520.34k



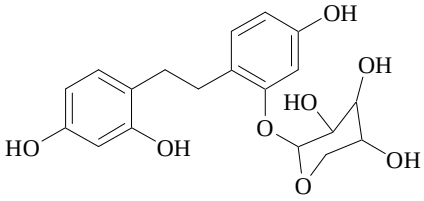
Tigogenin

Source: *C. arundinaceum*(Roots) **[18]**
Mol. Fr.: $C_{27}H_{44}O_3$
Mol. Wt.: 416.64
M.P.: 200oC
[α]D: -69^o (chloroform)
Biol. Activity:
Adaptogenic



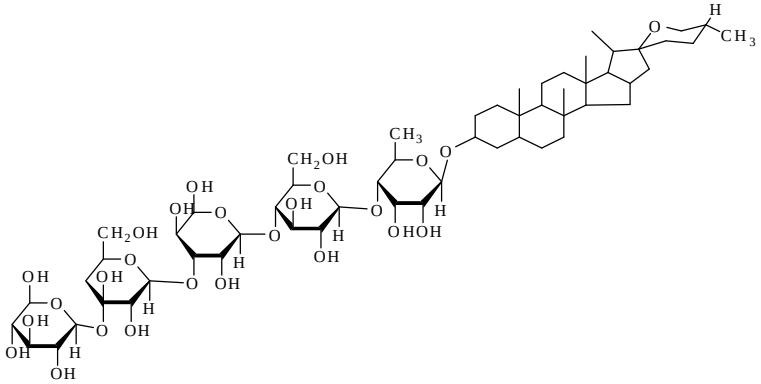
Tokorogenin

Source: *C. arundinaceum*(Roots) **[18]**
Mol. Fr.: $C_{27}H_{45}O_4$
Mol. Wt.: 433
M.P.: 260-262oC
[α]D: -39o(pyridine)
Biol. Activity:
Adaptogenic



2,4,4'-Trihydroxy, 2-Xylopyranosyl Bibenzyl

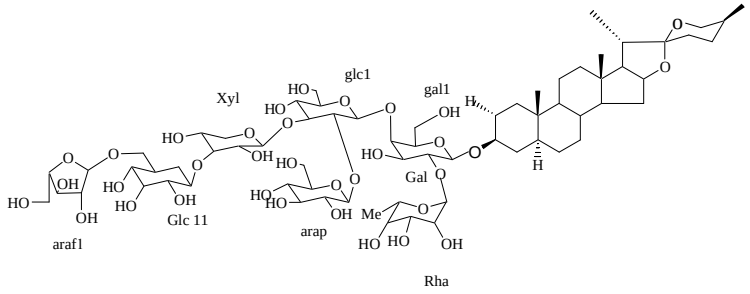
Source: *C. arundinaceum*(Roots) **[19]**
Mol. Fr.: $C_{19}H_{22}O_8$
Mol. Wt.: 378
M.P.: 110oC
[α]D: -34o (pyridine)
Biol. Activity:
Adaptogenic



Chloragin

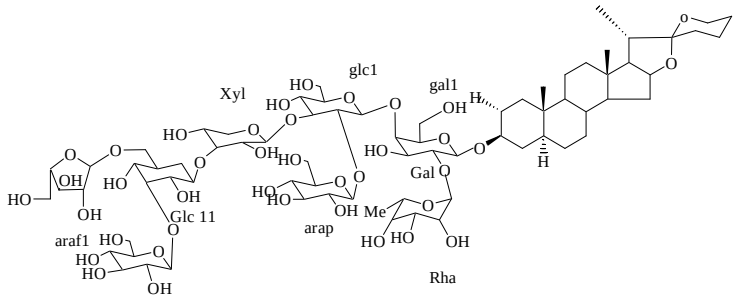
Source: *C.nimonii* (aerial part) **[20,21]**
M.F.: $C_{55}H_{90}O_{25}$
M.W.: 1150
M.P.: >300 ^{0}C
Bio. Activity:
Antihyperglycemic
, antidislipidemic

Review



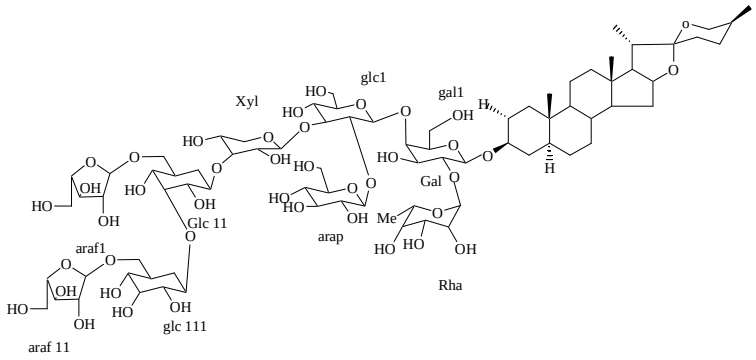
Source:
C.orchidastrum(Roots)) **[22]**
Mol. Fr.: $C_{66}H_{108}O_{34}Na$
Mol. Wt.: 1467.6620
[α]20D: -50.9,
(c=0.19,MeoH)
Biol. Activity:
Antitumor

Orchidastrum A



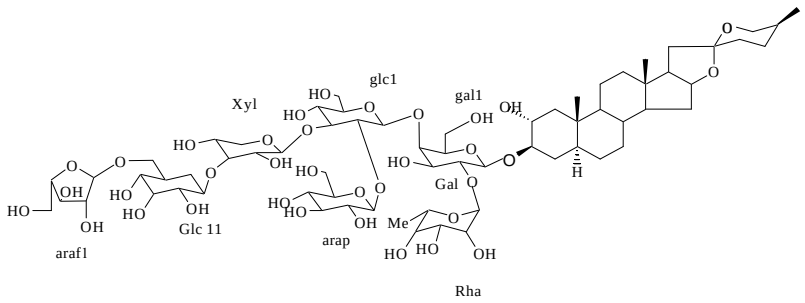
Source:
C.orchidastrum(Roots)) **[22]**
Mol. For.: $C_{72}H_{118}O_{39}Na$
Mol. Wt.: 1629.7148
[α]20D: -70.2,
(c=0.19,MeoH)
Biol. Activity:

Orchidastrum B



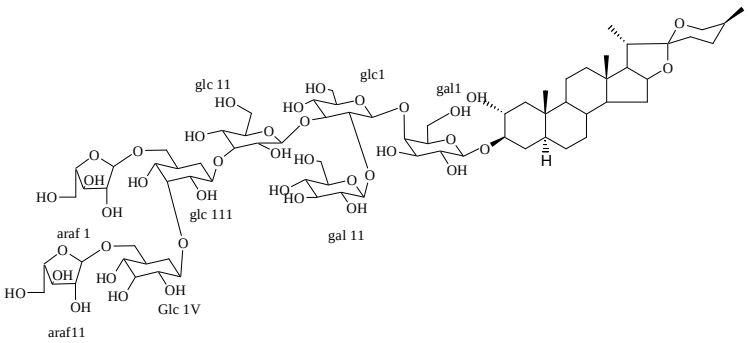
Source:
C.orchidastrum(Roots)) **[22]**
Mol. For. $C_{77}H_{126}O_{43}Na$
Mol. Wt.: 1761.757
[α]20D: -55.1,
(c=0.14,MeoH)
Biol. Activity: antitumor

Orchidastrum C



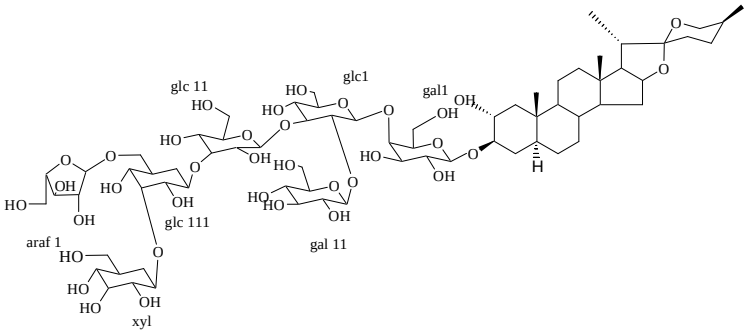
Source:
C.orchidastrum(Roots)) **[22]**
Mol. For.: $C_{66}H_{108}O_{35}Na$
Mol. Wt.: 1483.6569
[α]20D: -55.1,
(c=0.20,MeoH)
Biol. Activity: antitumor

Orchidastrum D



Oorchidastrum E

Source:
C.orchidastrum(Roots)) **[22]**
Mol. Fr.: $C_{73}H_{120}O_{42}Na$
Mol. Wt.: 1691.7152
[α]20D: -60.4,
(c=0.30,MeoH)
Biol. Activity:



Orchidastrum F

Source: **[22]**
C.orchidastrum(Roots))
Mol. Fr.: $C_{67}H_{110}O_{37}Na$
Mol. Wt.: 1529.6624
[α]20D: -52.1,
(c=0.19,MeoH)
Biol. Activity: Antitumor

CHEMICAL COMPOUNDS AND ASSOCIATED BIOLOGICAL ACTIVITIES

Chlorophyum comosum and *Chlorophytum borivilianum* are the widely investigated species for their chemical constituents and biological evaluations. The other species which have been investigated are *C.malayense, C.arundinaceum, C.laxum*.[TABLE 1]

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