Leaves Containing Glycosides

1. **Anthraquinone** glycosides (**Senna** leaflets)
2. **Cardiac** glycosides (**Digitalis** leaves)
   (**Squill** leaves)
3. **Phenolic** glycosides (**Uva ursi** leaves)
4. **Flavonoid** glycosides (**Ginkgo** leaves)

Senna Leaf

1- Senna leaflets وريقات السنا

Other name: Senamakki

Origin:

- It is the dried leaflets of *cassia acutifolia* (*Alexandrian senna*) and *Cassia angustifolia* (*Indian senna*)

Family: Leguminosae

Geographical source:

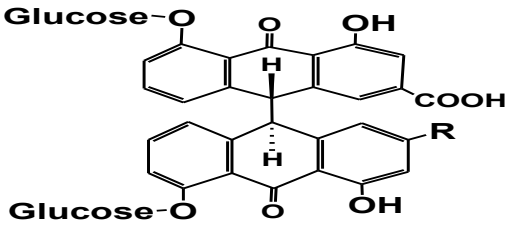
1- Alexandrian senna

Sudan, Egypt.

2- Indian senna cultivated in south India

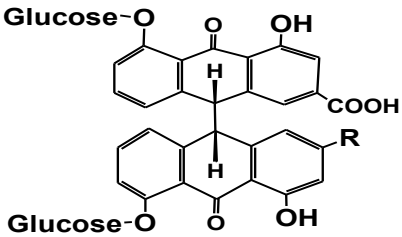
Active constituents

- Anthraquinone glycosides: Sennoside A, B, C and D, Aloe-emodin



R= COOH Sennoside A

R= CH_2OH Sennoside C



R= COOH Sennoside B

R= CH_2OH Sennoside D

- Flavonoids: Kaempferol, Isorhamnetin

- Mucilage

Therapeutic uses

- **Used in treatment of patient with habitual constipation, as:**

  Small dose is laxative while

  large dose is purgative but in

  over dose cathartic.

N.B.

A frequent or long – term use (therapy) of drugs containing anthraquinone derivatives.

has been associated with increased risk of intestinal tumours, Therefore, the use of anthraquinones drugs should be restricted to short-term therapy

I- Borntrager's test

Test for free anthraquinone

1- Boil 1 g of powdered drug with water

2- Filter while hot → cool → extract with benzene

3- To the benzene layer add equal of its volume with ammonia → shake well and allow separating → the aqueous layer will take a rose-pink colour

II- Modified Borntrager's test

Test for combined anthraquinone

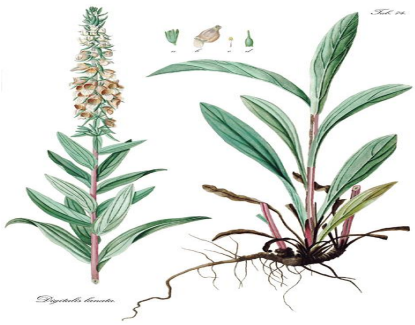
1- Boil 1 g of powdered drug with 5 ml of 10% H_2SO_4 for 2 minutes → to hydrolyze the glycoside

2- Filter while hot → cool → extract with benzene

3- To the benzene layer add half of its volume with ammonia → shake well and allow separating → the aqueous layer will take a rose-pink colour

2- Digitalis Leaf (Foxglove)

اوراق الديجيتالس

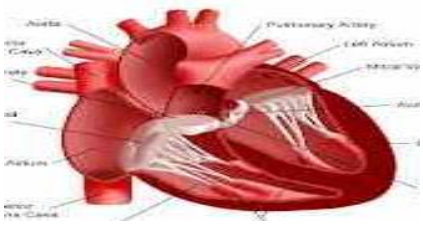


Origin:

It is the dried leaves of the flowering species of

Digitalis purpurea and *Digitalis lanata*

Family: Scrophulariaceae



Geographical source

Central and southern Europe,

England, USA and Canada

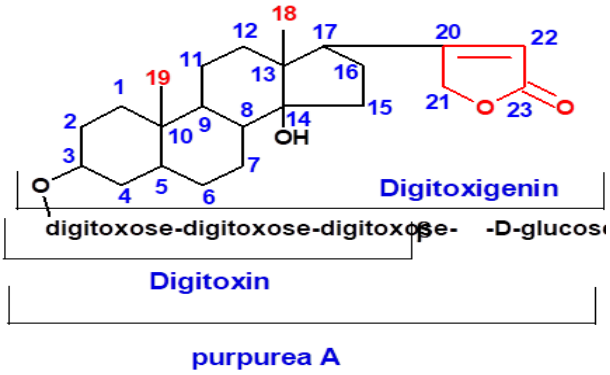
Active constituents

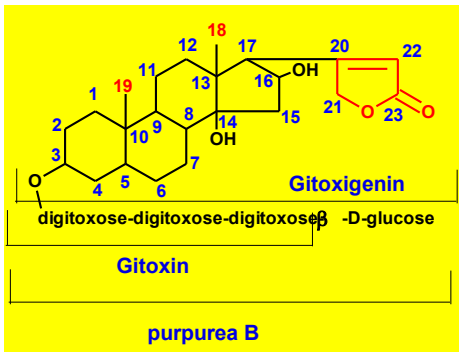
1- **Primary** glycosides;

purpurea glycosides **A** and **B** in addition to hydrolytic products

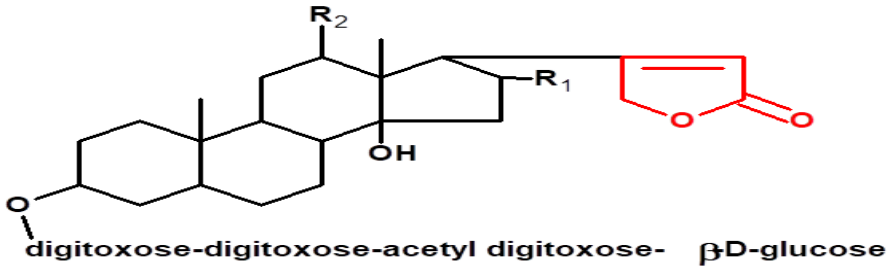
2- **Secondary** glycosides;

Digitoxin, **Gitoxin** and 1 mole of **glucose**

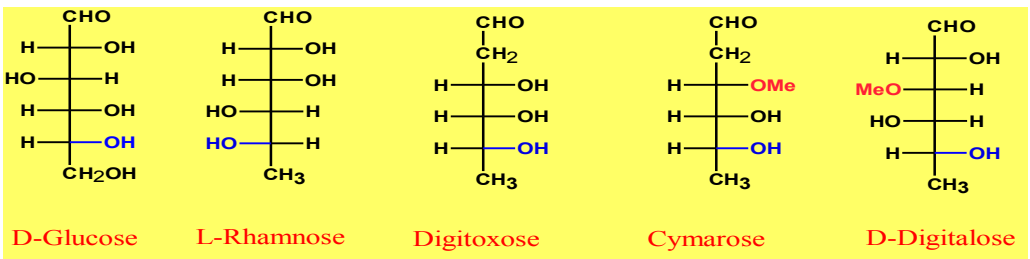




- while *D. lanata* contains lanatoside **A**, **B**, **C** and **D**



R_1= H R_2= H Lanatoside A
R_1= OH R_2= H Lanatoside B
R_1= H R_2= OH Lanatoside C



Cultivation and collection

1- Cultivated in soil rich in Manganese to give good crop.

2- Collected in the early afternoon: where the active constituents are concentrated during the day light, therefore the maximum percentage in the afternoon.

3- Drying rapidly at 55-60^0 C to prevent destruction of the glycosides by inlet of hot air.

4- Storage must be in presence of dehydrating agent e.g. $Ca(OH)_2$).

N.B.

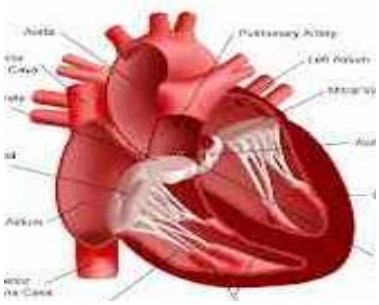
- During early or night, the enzymatic degradation (Hydrolytic enzymes) become active and degradate or hydrolyze the main active constituents (Cardioglycoside).

- Therefore, the percentage of crop is more less during early and night.

Therapeutic uses

- Used as cardiotonic for treatment of congestive heart failure (CHF).

(where, Cardiac glycosides act to increase the force of contraction of cardiac muscles).



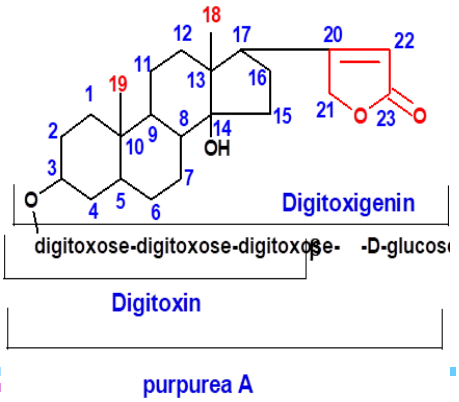
Chemical test

1- Keller-Kiliani test (for Digitoxose)

- Dissolve the glycoside in glacial acetic acid containing traces of $FeCl_3$ → add conc. H_2SO_4 containing the same amount of $FeCl_3$ to form a lower layer → An intense blue colour develop at the surface between the two layers (in 2-5 minutes)

2- Liebermann's test (for the steroidal nucleus)

3- Kedde's test (for 5-membered lactone ring)



3- Squill بصل العنصل

Origin:

- It is the sliced and dried scale-leaves of *Urginea maritima* Family: Liliaceae

Geographical source

Mediterranean region

Active constituents

1- Cardiac glycosides: (Scillarin A and B)

2- Mucilage

Therapeutic uses

- It act as digitalis like action (Cardiotonic in ttt of congestive heart failure (CHF)
- Expectorant and in chronic bronchitis
- Large dose cause emesis

4- Bearberry leaf (Uva-ursi)
اوراق عنب الدب

Origin:

- **It is the dried leaves of**
  Arectostaphylos uva-ursi
  Family: Ericaceae

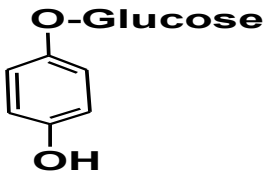
Geographical source

- Central and northern Europe

Active constituents

1- Phenolic glycosides (Arbutin)

2- Flavonoids glycosides 3- Tannins



Arbutin

Therapeutic uses:

- **Urinary tract antiseptic** for ttt **urinary tract infections**.
  (**due to Hydroquinone** (**Bacteriostatic**) which result from hydrolysis of **Arbutin** in urine at **pH>7**)→→**Therefore**, Leaves extract **administrated** with **specific foods** (**Tomatoes** or **Potatoes**) or **Na-bicarbonate** to alkalinize of urine at **pH>7**
- **Diuretic** and **mild astringent.**
- **Arbutin** is **skin whitining** or natural **antihyperpigmentation** agent.
  (act as **tyrosinase inhibitor** = an **enzyme** playing a major role in **formation** of **melanin** pigment inside the **melanocytes** of the skin)

5- Ginkgo leaves اوراق الجنكو

Origin:

- It is the dried leaves of ***Ginkgo biloba*** F. **Ginkgoaceae**

Geographical source

- China and European countries

Active constituents

1- Sesquiterpenes lactones (Bilobalide)

2- Diterpenes lactones (Genkgolides A, B, C, J, M)

3- Triterpenoids **4- Flavonids (Kaempferol, Quercetin)**

Therapeutic uses

- **Ginkgo extract** improve of **general** and **cerebral** circulation. (as **increase of blood flow**).
- Therefore, **Ginkgo extract** are mainly used in the following cases; **Dementia** , **Cognitive deficiency**, **Alzheimer disease** and **Impotence** (**Sexual dysfunction**)

N.B.

- Ginkgo Extract **contraindicated** (**not used**) with patients have Bleeding disorders **due to** it's **anti-platelet** activity.
- Ginkgo Ext. **not recommended** with **Aspirin** and **Warfarin** (They have **similar** effect)
- Ginkgo Ext. is **contraindicated** with **pregnant** and **nursing** (**lactating**) mother.
- Ginkgo Ext. is **unsuitable** for **self-treatment** or **OTC** (over the counter).

Leaves Containing Tannins

1. Hamamelis leaf
2. Henna leaves

1- Hamamelis leaf

(Witch hazel leaf

(اوراق الهماميلس)

Origin:

It is the dried leaves of ***Hamamelis virginiana***

Family: Hamamelidaceae

Geographical source

Canada, USA

Active constituents

1- **Tannins**: (Gallitannins, Ellagitannins and Proanthocyanidins)

2- **Bitter principle**

Therapeutic uses

- Used **Externally** as **astringent** and **Heamostatic** due to the therapeutic properties of **Tannins** (**Astringent** & **antiseptic**).

- Used as ingredient in **hemorrhoidal** products for ttt of **Hemorrhoid**.

- Also, used in treatment of **insect bites**, **stings** and **teething** preparations.

2- Henna (Lawsonia) leaves اوراق الحنا

Origin:

- It is the dried leaves of ***Lawsonia inermis*** Family: Lythraceae

Geographical source

- Egypt and Sudan

Active constituents

1- 1,4 – **Naphthoquinone** compounds (**Lawsone**)
(**colouring material** as **pigment**)

2- **Flavonoids** 3- **Tannins**

Therapeutic uses

1- Henna leaves widely used **externally** for ttt **eczema**, **scabies**

2- Henna leaves also used as **Taenicide**
due to antifungal effect of **lawsone** compound.

3- Henna leaves used in **cosmetic preparations** as **hair** and **nail** dye
due to the strong binding of **Lawsone** to hair.

4- Henna leaves exhibit **internally** **diuretic** and **astringent** effects
and therefore used in ttt **amoebic dysentery** and **GIT ulcer** (limited used internally).