

Pharmacognosy

PHG 112
PG 102

Associate Professor Dr Soumaya Saad Zaghloul

Fall 2024

Lecture 2



By the end of the lecture, students should be able to demonstrate knowledge of:

- Examples of seeds used as nutraceuticals & cosmeceuticals

- Linseed

The morphological & microscopical structure of linseed

-The chemical constituents & uses of linseed

-Foenugreek

• -The morphological & microscopical structure of Foenugreek

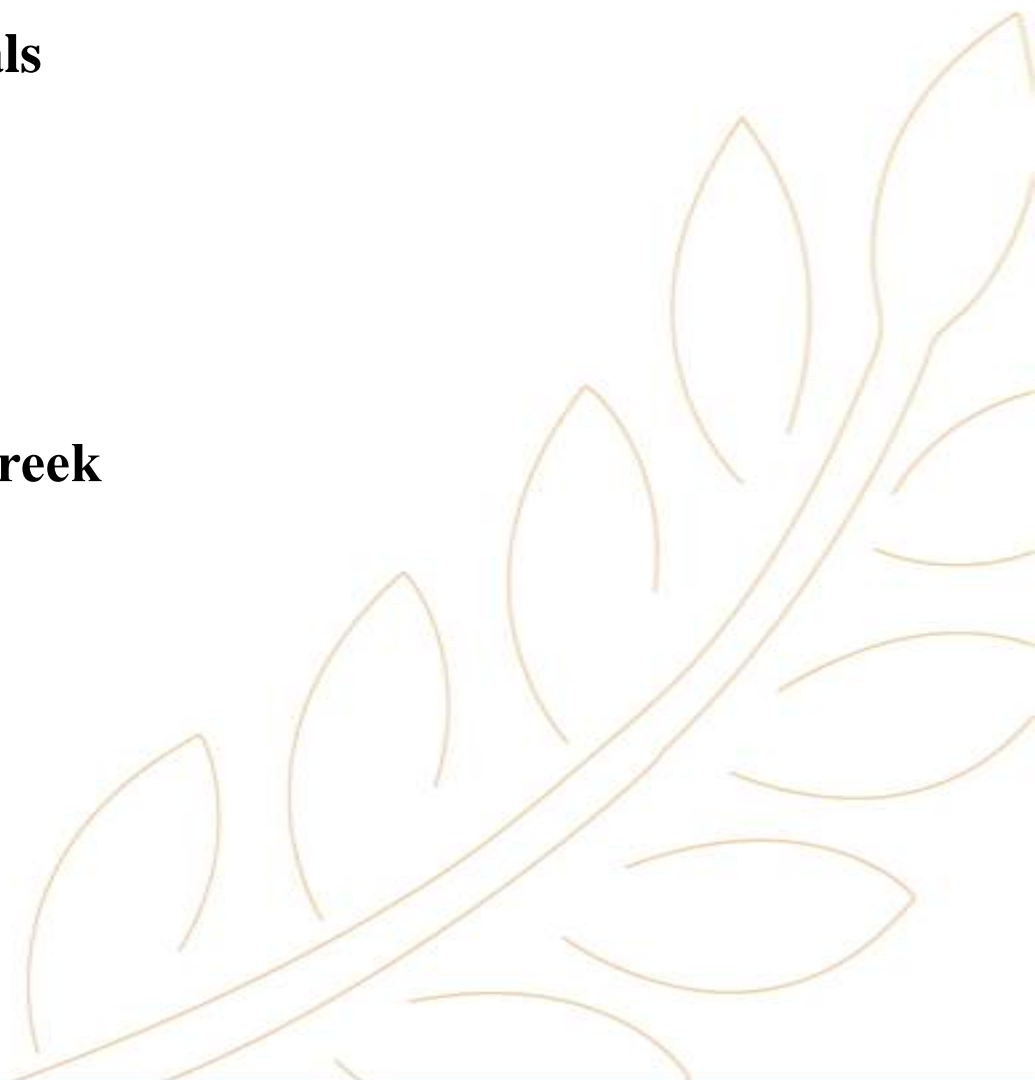
• -The chemical constituents, tests & uses of Foenugreek

-Strophanthus

The chemical constituents , test & uses of Strophanthus

-Psyllium seed

The chemical constituents , test & uses of Psyllium seed



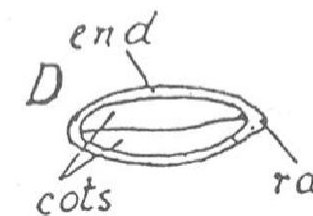
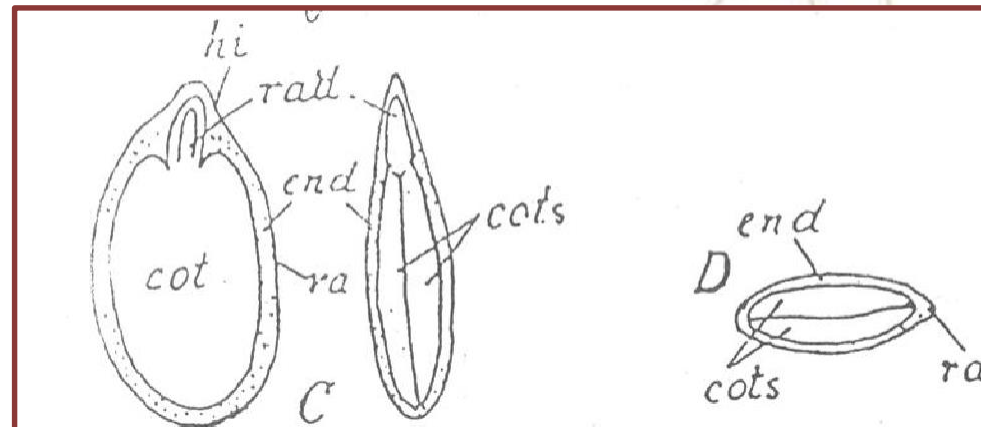
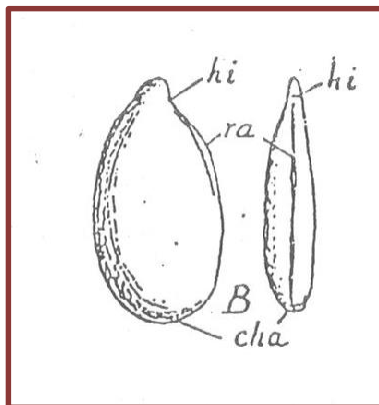
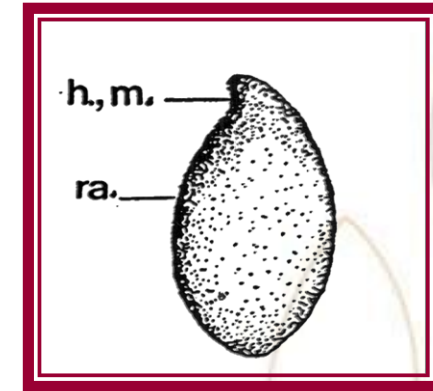
LINSEED

Flax Seed-Semen Lini

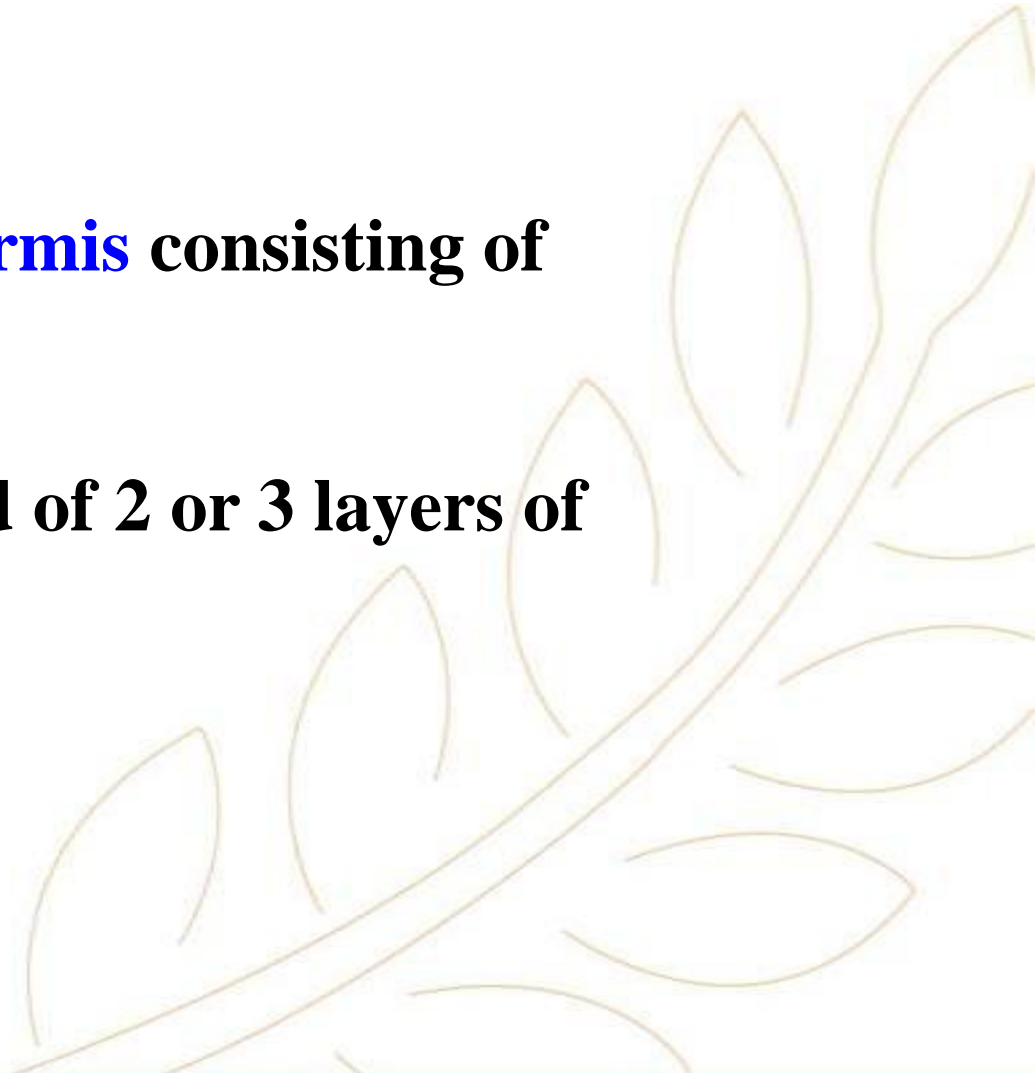
The dried ripe seeds of

Linum usitatissimum Linne family Linaceae.

-Linseed yields not less than 30% of fixed oil



- Histology
- **A-Testa: Two seed coats**
 - a) Outer seed coat
 - 1 A mucilaginous **outer epidermis** consisting of large isodiametric cells
 - 2 **Sub epidermal layer** formed of 2 or 3 layers of collenchyma



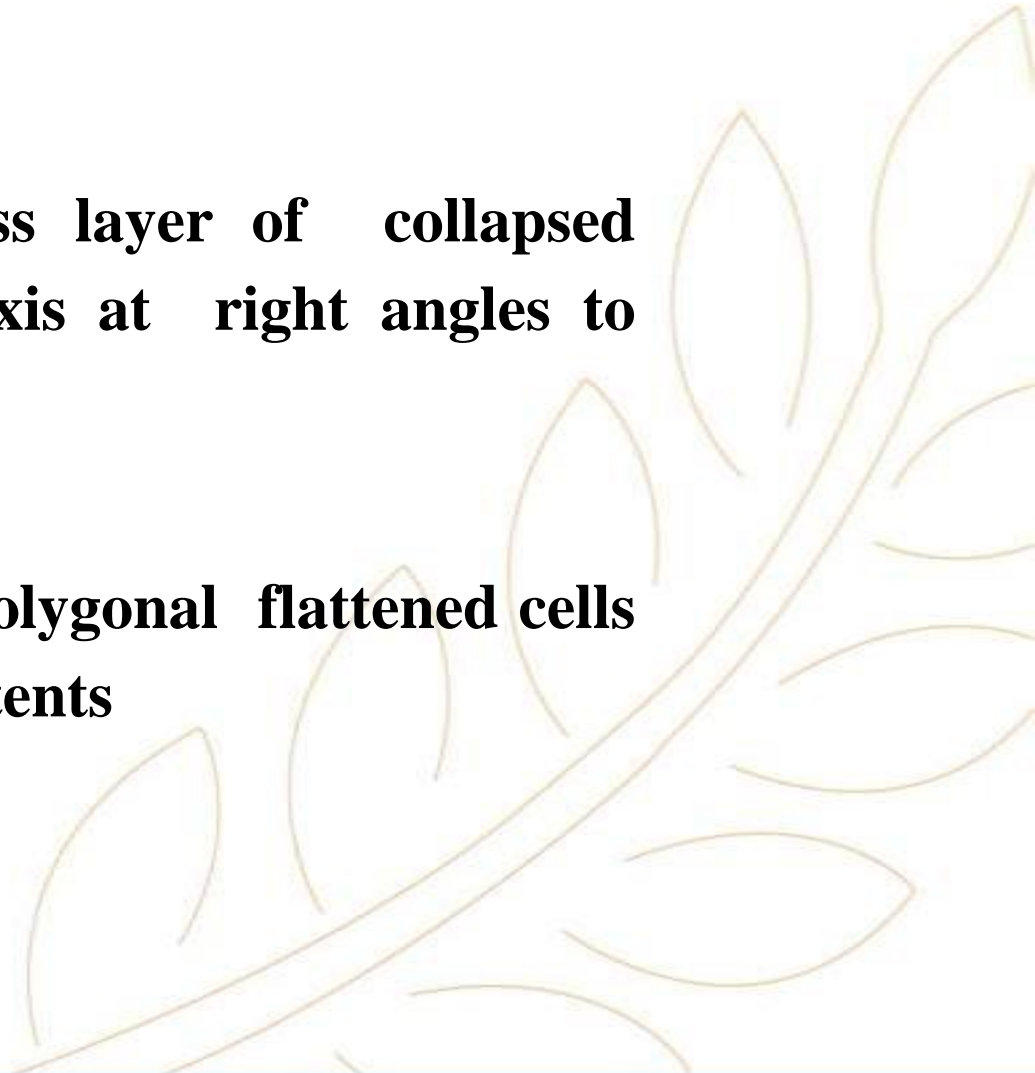
b) Inner seed coat

1- A single layer of yellowish-brown elongated **sclerenchymatous cells, with pitted thick lignified walls**

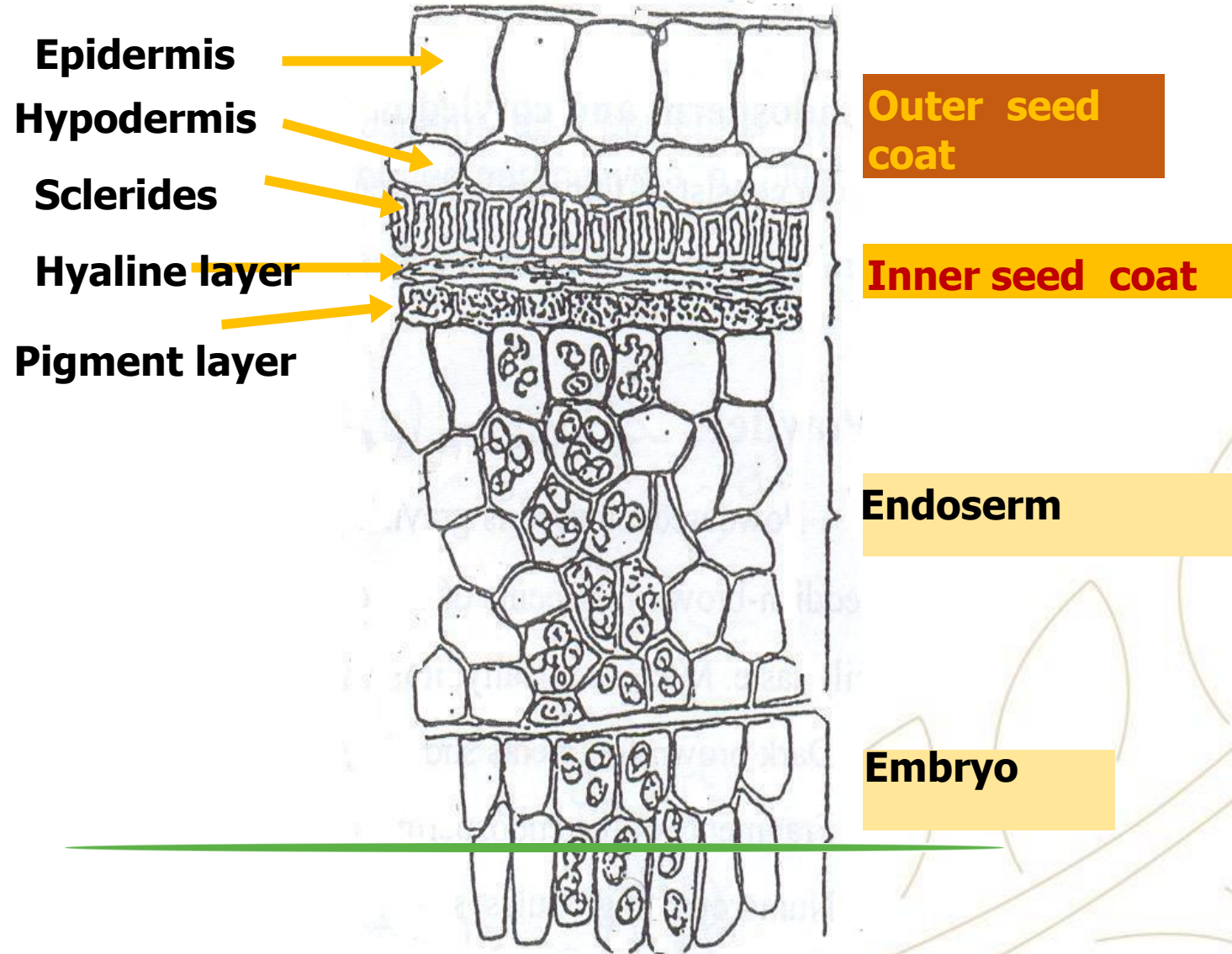
2- **Nutritive layer: A narrow colourless layer of collapsed parenchymatous cells with their long axis at right angles to those of the sclerenchymatous layer.**



3- **The pigment layer: A single layer of polygonal flattened cells with pitted walls and reddish-brown contents**

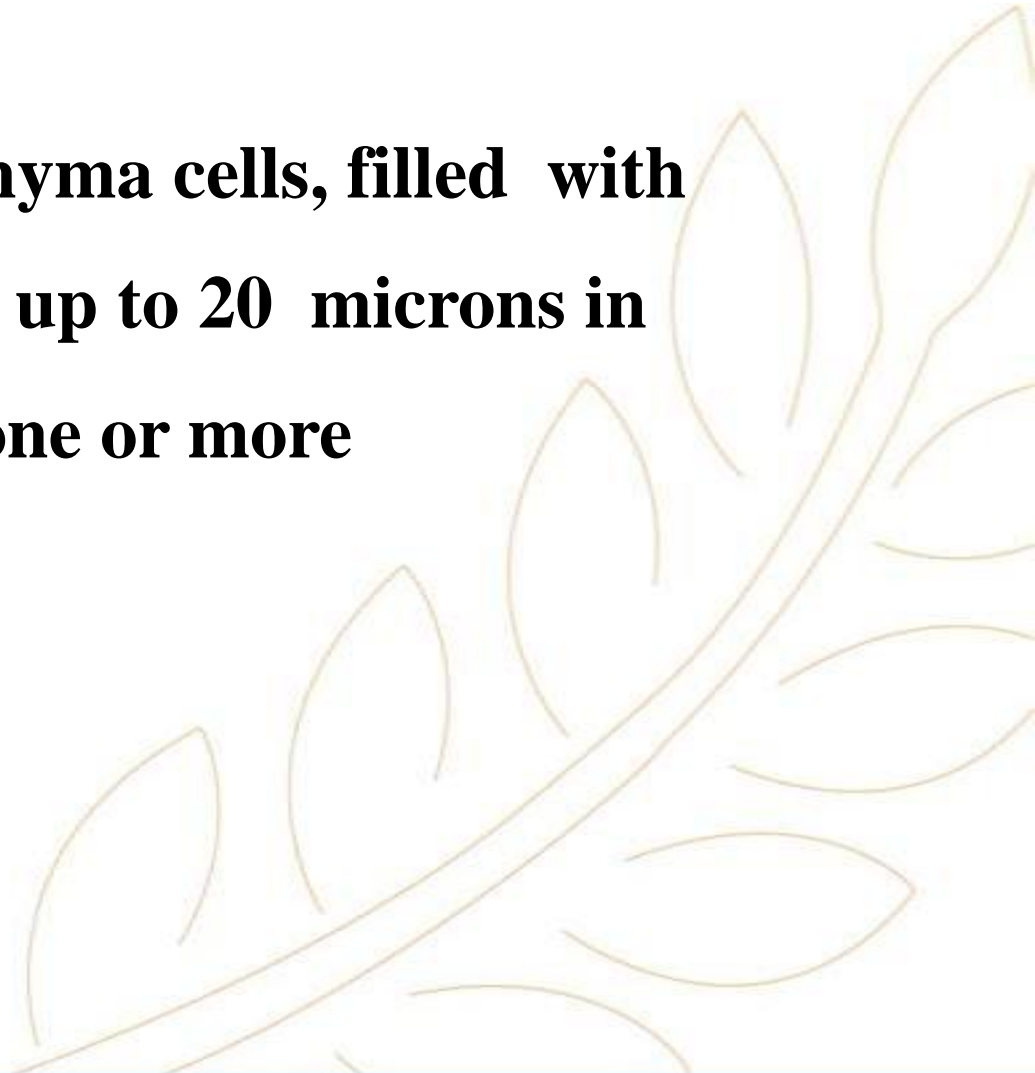


T. S. of Linseed



- **B- Endosperm and cotyledons**

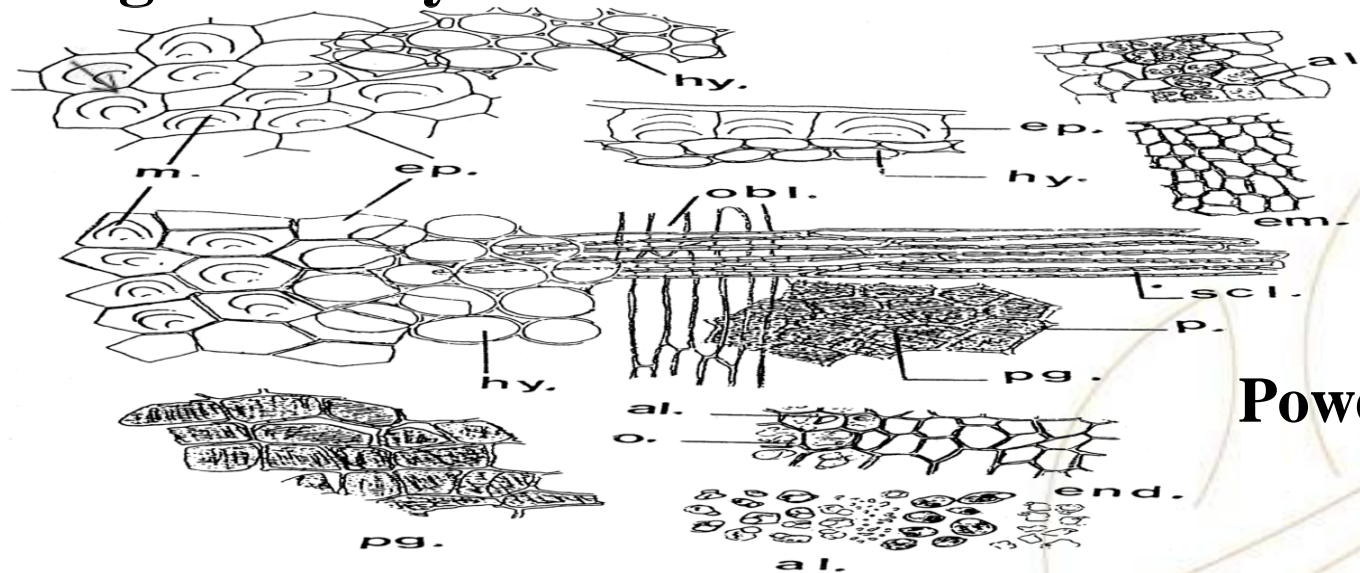
Both consist of thin-walled parenchyma cells, filled with globules of oil and aleurone grains, up to 20 microns in diameter, each with a globoid and one or more crystalloids.



Powder

Colour: Yellowish-brown with readily visible dark reddish-brown fragments of the testa.

Odour : It has a characteristic **Taste:** mucilaginous oily.

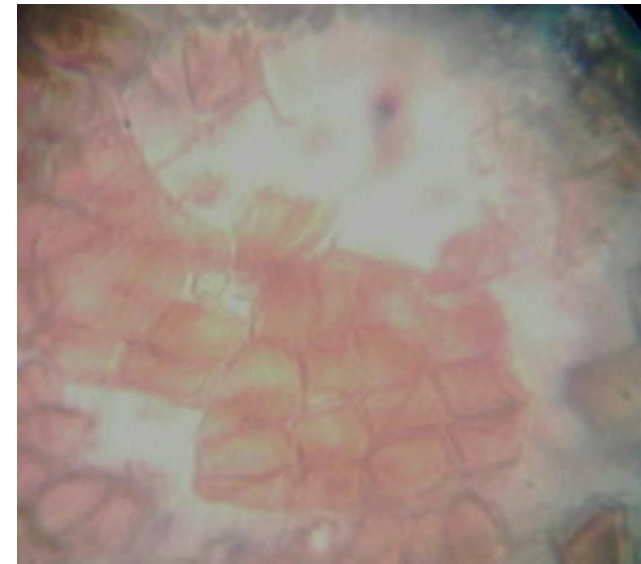


Powder linseed

Microscopically, it is characterized

by:

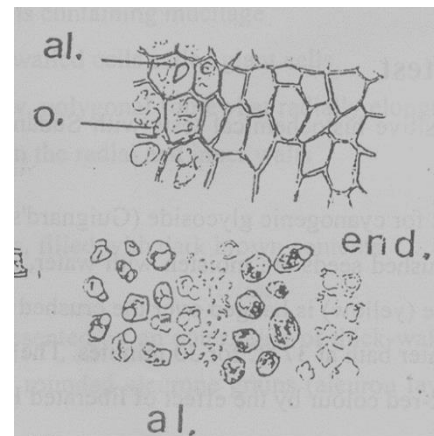
1. Dark brown fragments showing pigment cells (Polygonal flattened cells with pitted walls and reddish-brown contents)



2. Fragments of the endosperm and cotyledons

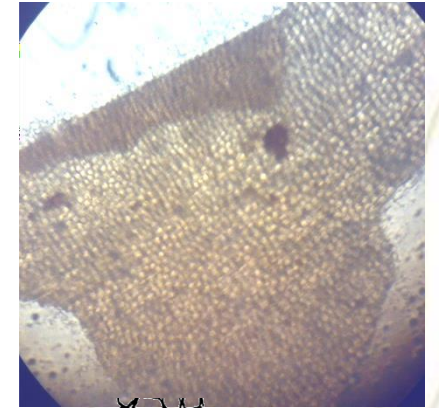


Endosperm

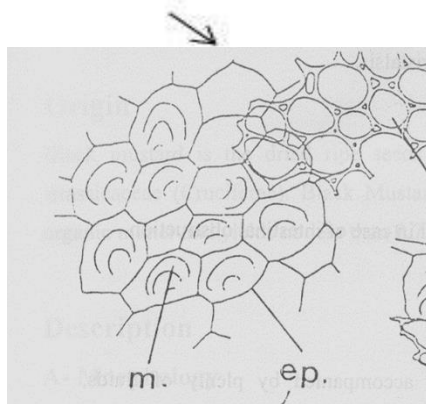


3. Fragments with

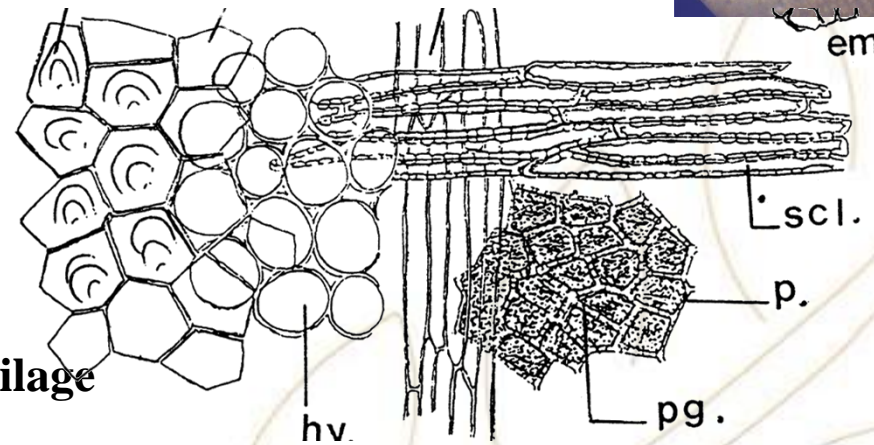
yellowish-brown **sclerenchymatous cells** (appearing crossed by thin walled elongated cells on one side and by rounded somewhat thickened parenchyma on the other and accompanied by pigment layer.)



4. Mucilaginous epidermis.



Epidermis with mucilage



Active Constituents



Small amount of a **cyanogenic glycoside** (linamarin).

-25% of **protein**.
- 3-6% of **mucilage**

30 to 40% of **fixed oil** containing high contents of the **unsaturated fatty acids: oleic acid (39%), linoleic acid (15%) and α -linolenic acid** (essential fatty acids that can not be manufactured by mammals and must be consumed as part of diet).

Uses & Actions Internally

1-Linseed is used in patients with rheumatoid arthritis and psoriasis.



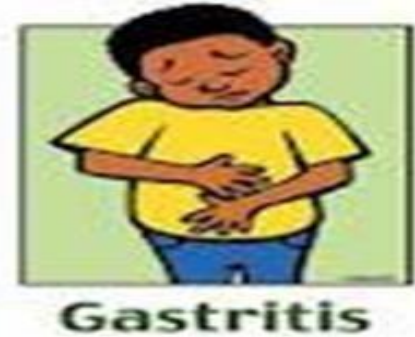
Rheumatoid arthritis



Psoriasis.

Uses & Actions (cont.)

- ❑ **2-Demulcent in acute or chronic gastritis (mucilage)**



- ❑ **3-Bulk laxative in habitual constipation, due to its mucilage & fixed oil which have a lubricant effect.**

↙
The laxative action arises from an increase in the volume of the intestinal bowel contents and consequent reflex stimulation of peristalsis.



Uses & Actions (cont.)

□4-Anti-inflammatory (Omega-3 fatty acids

have demonstrated effect due to reduced production of mediators).



□5- Heart protecting against angina pectoris, since Omega-3 fatty acids reduce the whole blood viscosity & lower cholesterol level.



Uses & Actions (cont.)

6-Externally

-Used as an **emollient** in poultices for boils, carbuncles and other skin infections.



-Use of linseed for hair

There are several ways to take care of your hair by using linseed:

-A mask: seeds are immersed for about 10 minutes, the mask should take the form of a jelly or gel

-Linseed oil is applied to the scalp and entire strands of hair.

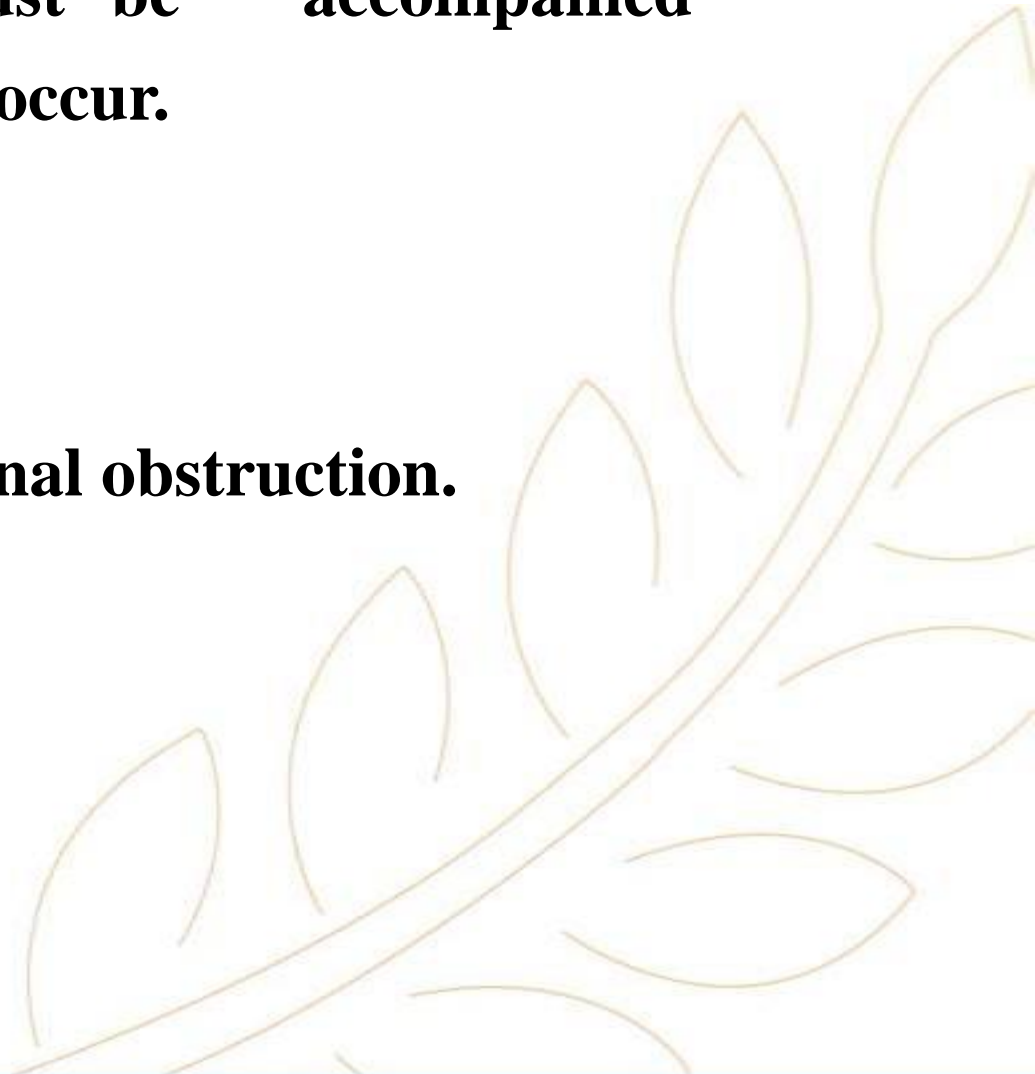


Side effects/

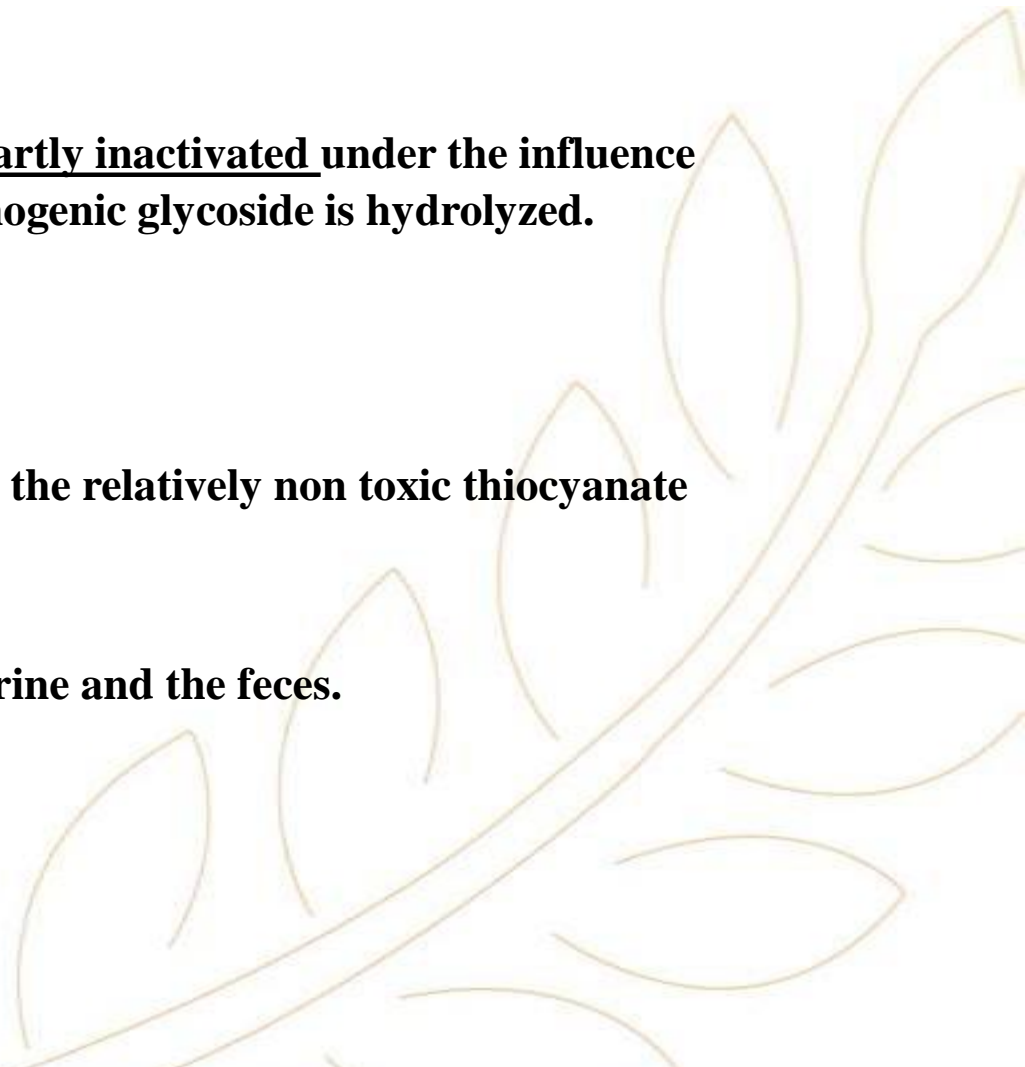
•When taken internally, Linseed must be accompanied by plenty of fluids, otherwise flatulence may occur.

Contraindications

•The drug is contraindicated in case of intestinal obstruction.

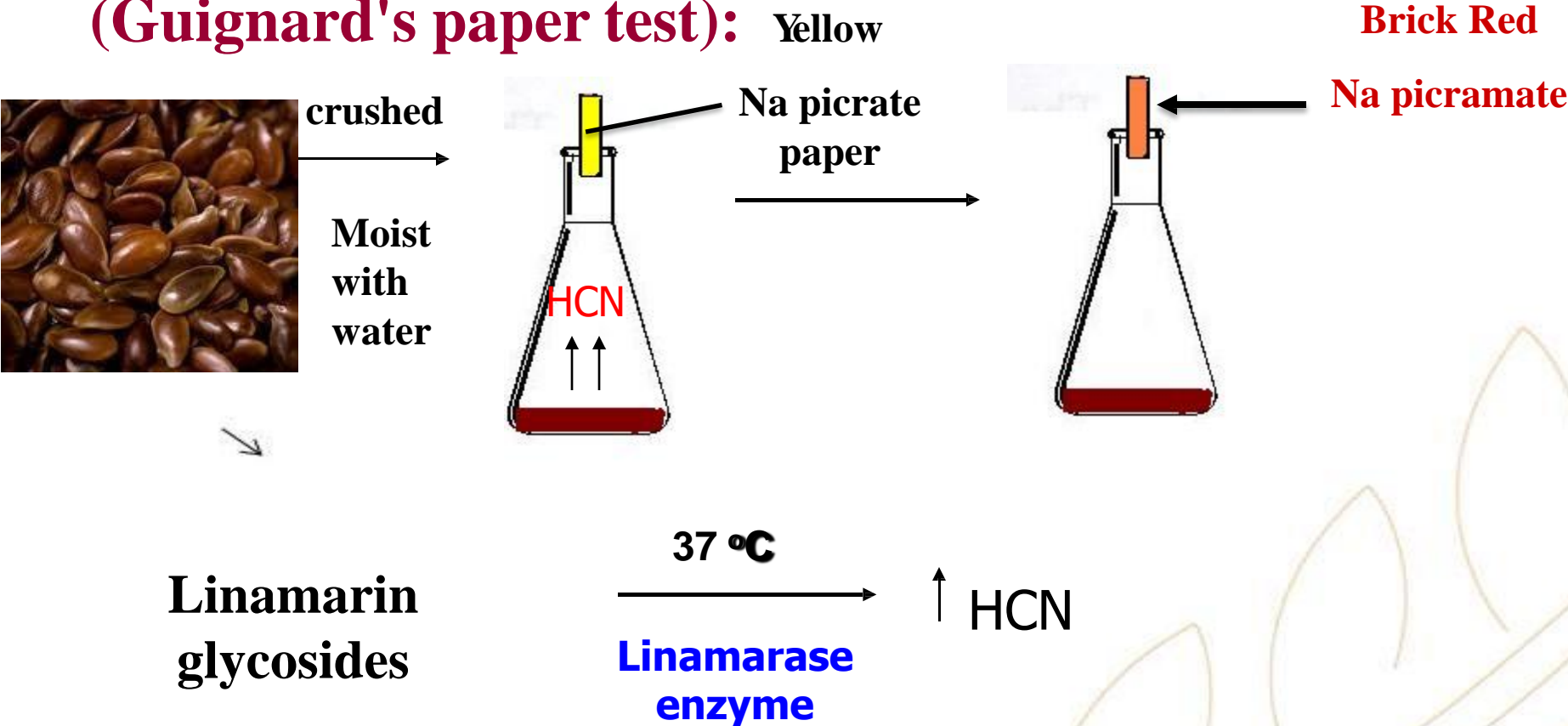


Why linseed is not toxic

- **Toxic effects arising from the liberation of HCN from the cyanogenic glycoside (Linamarin) by the enzyme linamarase.**
 - 1 **When crushed seeds are taken internally, linamarase is partly inactivated under the influence of the acidity of the stomach and less than 1% of the cyanogenic glycoside is hydrolyzed.**
 - 2 **Hydrolysis time of four hours is required *in vivo* system.**
 - 3 **The majority of HCN, liberated is converted rapidly into the relatively non toxic thiocyanate through a detoxification mechanism in the body.**
 - 4 **The minor part of HCN remained is eliminated via the urine and the feces.**
- 

Chemical tests:

1-General test for cyanogenic glycoside (Guignard's paper test): Yellow



Chemical tests (cont.)

2 For Mucilage :

Red colour with Ruthenium Red

3 For Fixed oil :

Red colour with sudan III

4 For Proteins:

Millon's reagent : red



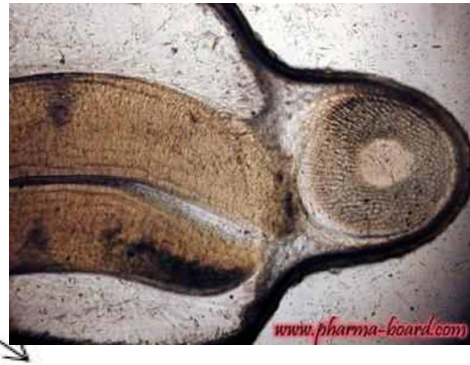
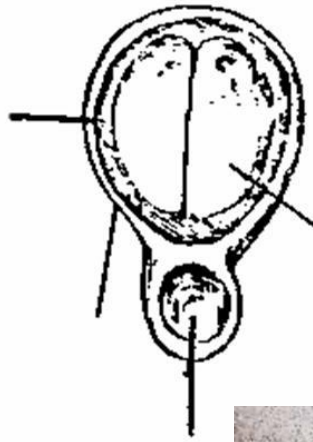
FOENUGREEK بذر الحلبة

- **Semen Foenugreek**

- **The dried ripe seeds of *Trigonella foenum-graecum* Linne
Family Leguminosae.**

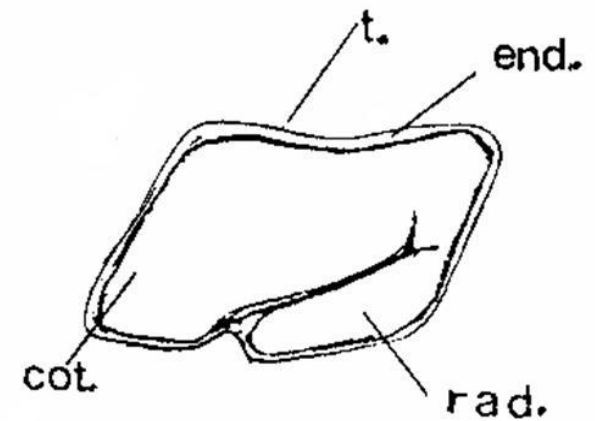
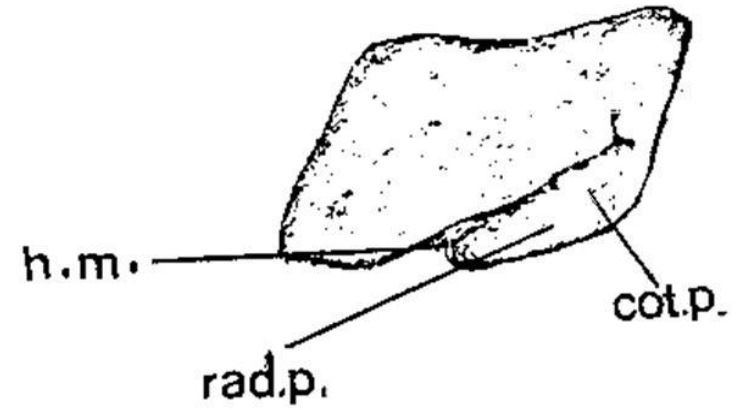


- **Contains not more than 2 % of foreign organic matter.**



Accumbent embryo

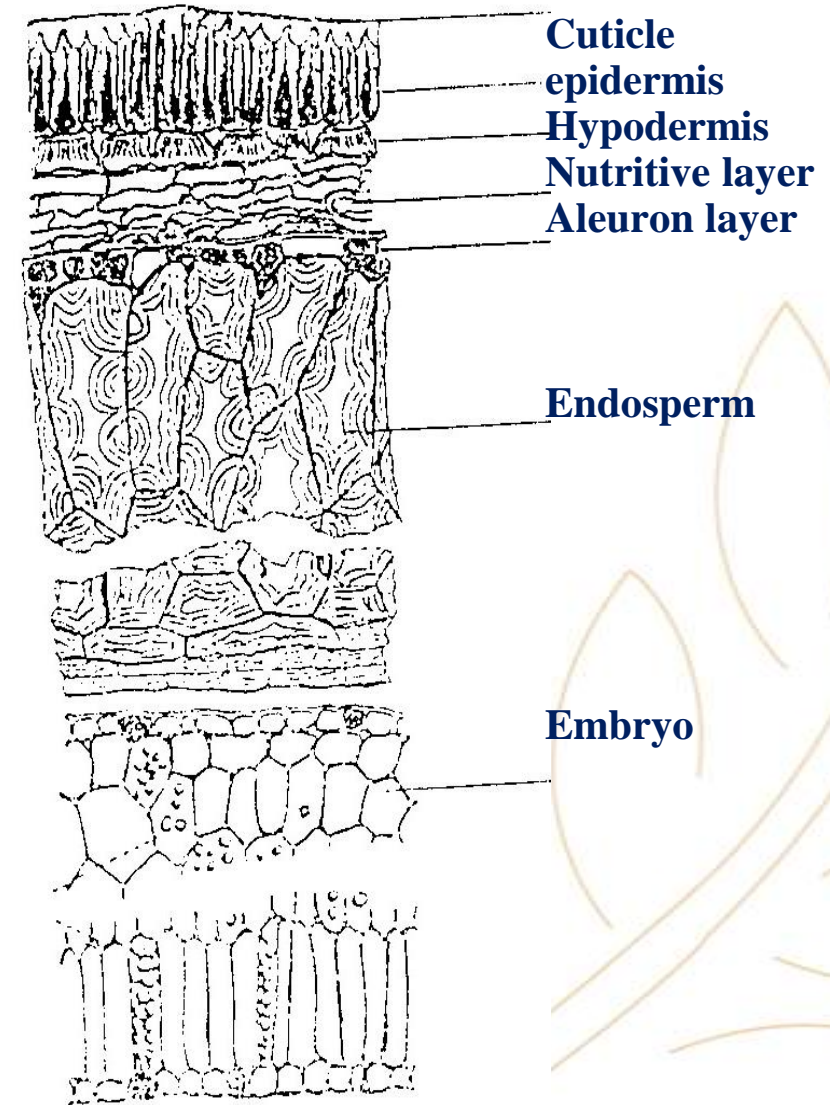
Albuminous seed



B. Histology

-Testa (One seed coat)

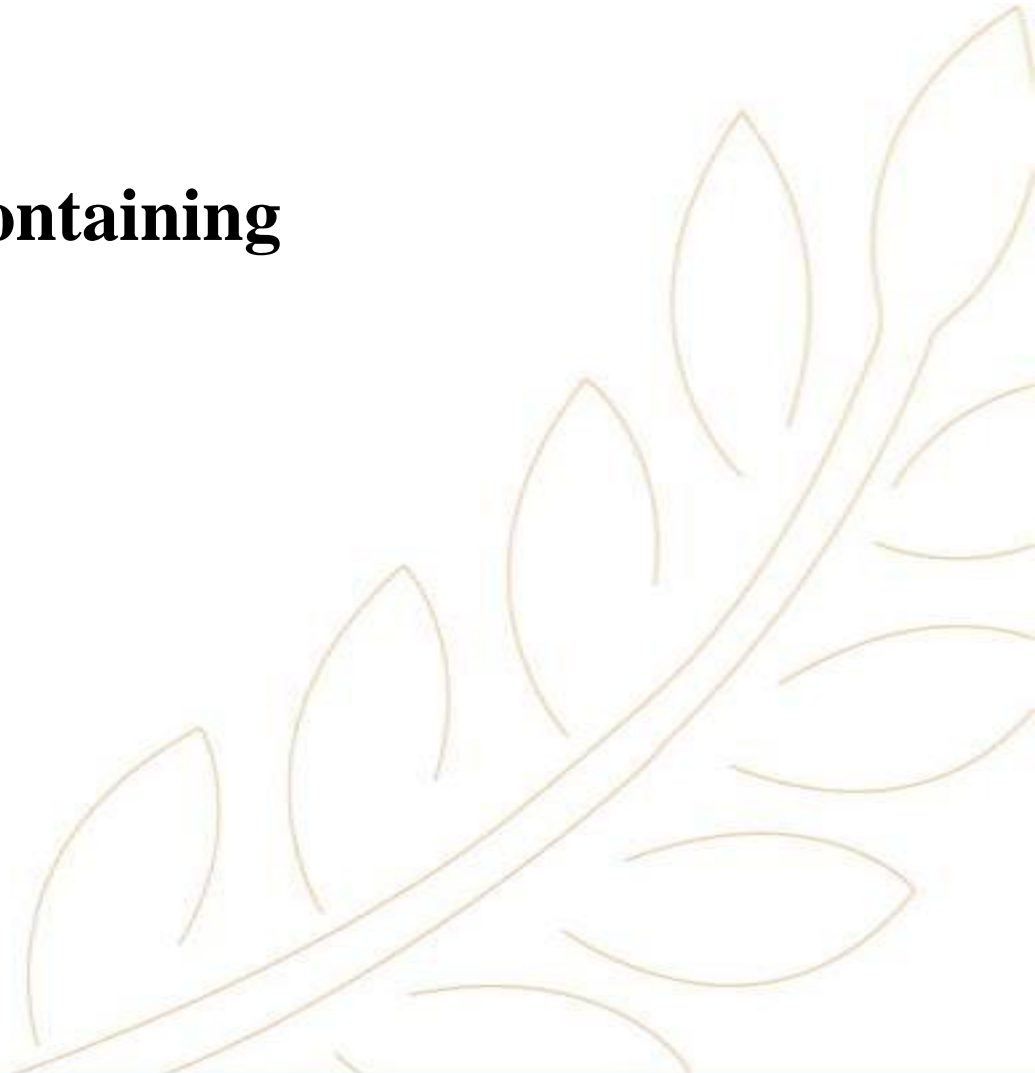
- **1- Epidermis:** Palisade-like cells, thick cuticle, and thick lamellated walls, the lumen being conical narrow at the upper extremity and rounded at the base.
- **2- Subepidermal layer,** or basket-like cells, with bar-like thickening on the radial walls.
- **3- The parenchymatous nutritive layer.**



T. S. of Foenugreek seed

-Endosperm: Several layers of polyhedral cells with stratified contents of mucilage.

-Cotyledons: Parenchymatous cells containing fixed oil, and aleurone grains

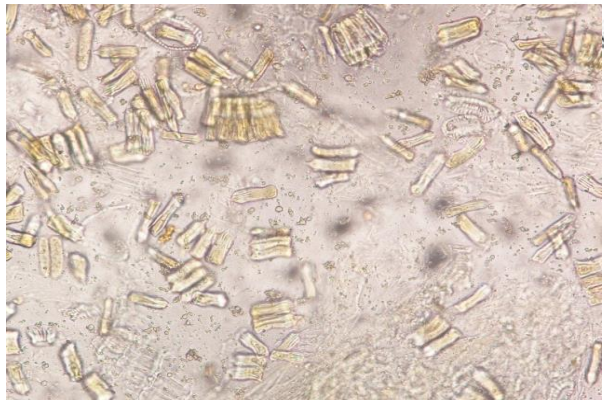


Powder

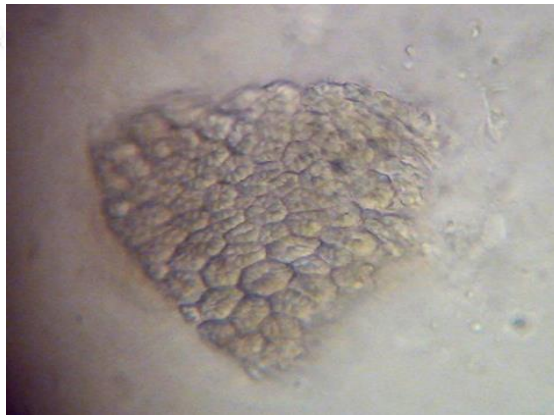
Yellowish in colour, with strong characteristic odour and a mucilaginous slightly bitter taste.

It is characterized by:

1. Fragments of testa showing the palisade like epidermal cells, the basket-like cells of the sub-epidermal layer.



palisade like epidermal cells



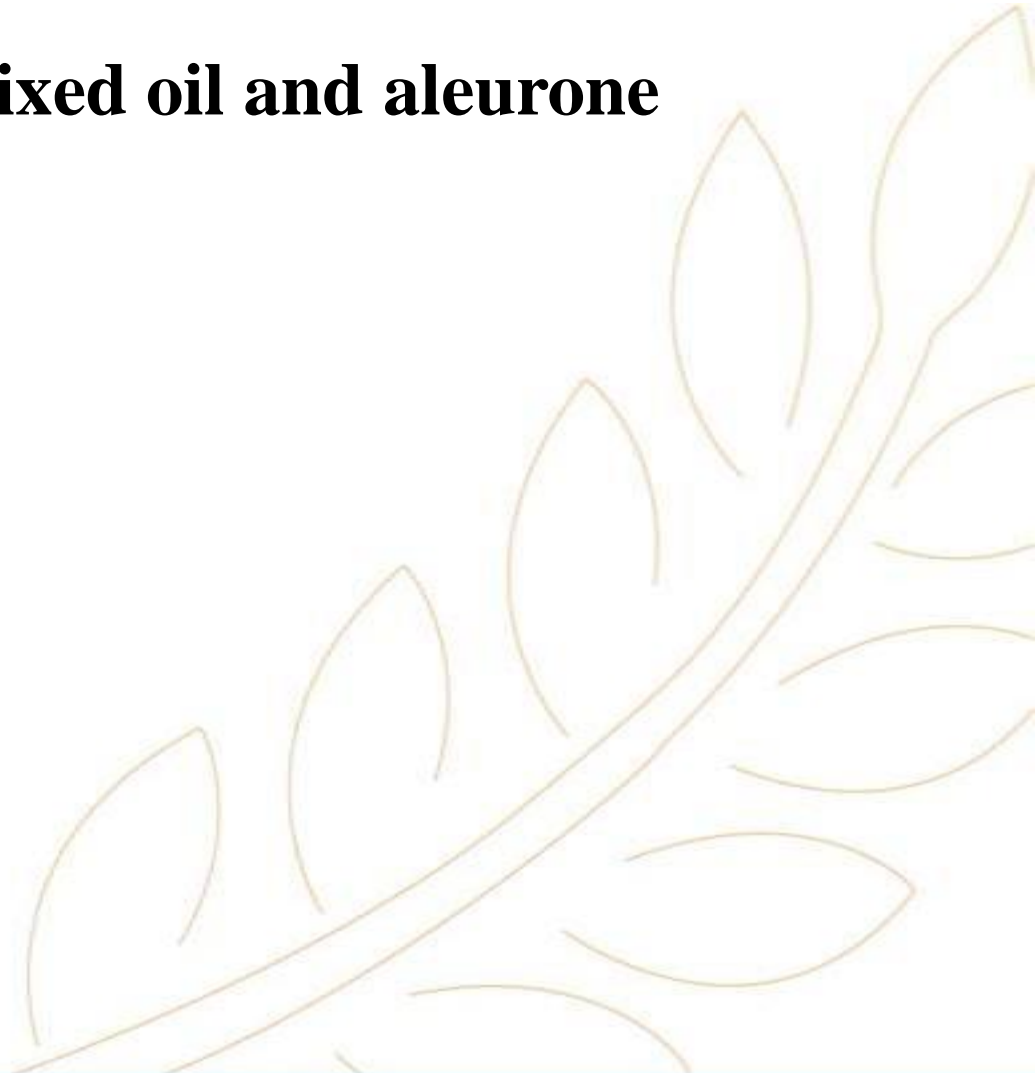
basket-like cells

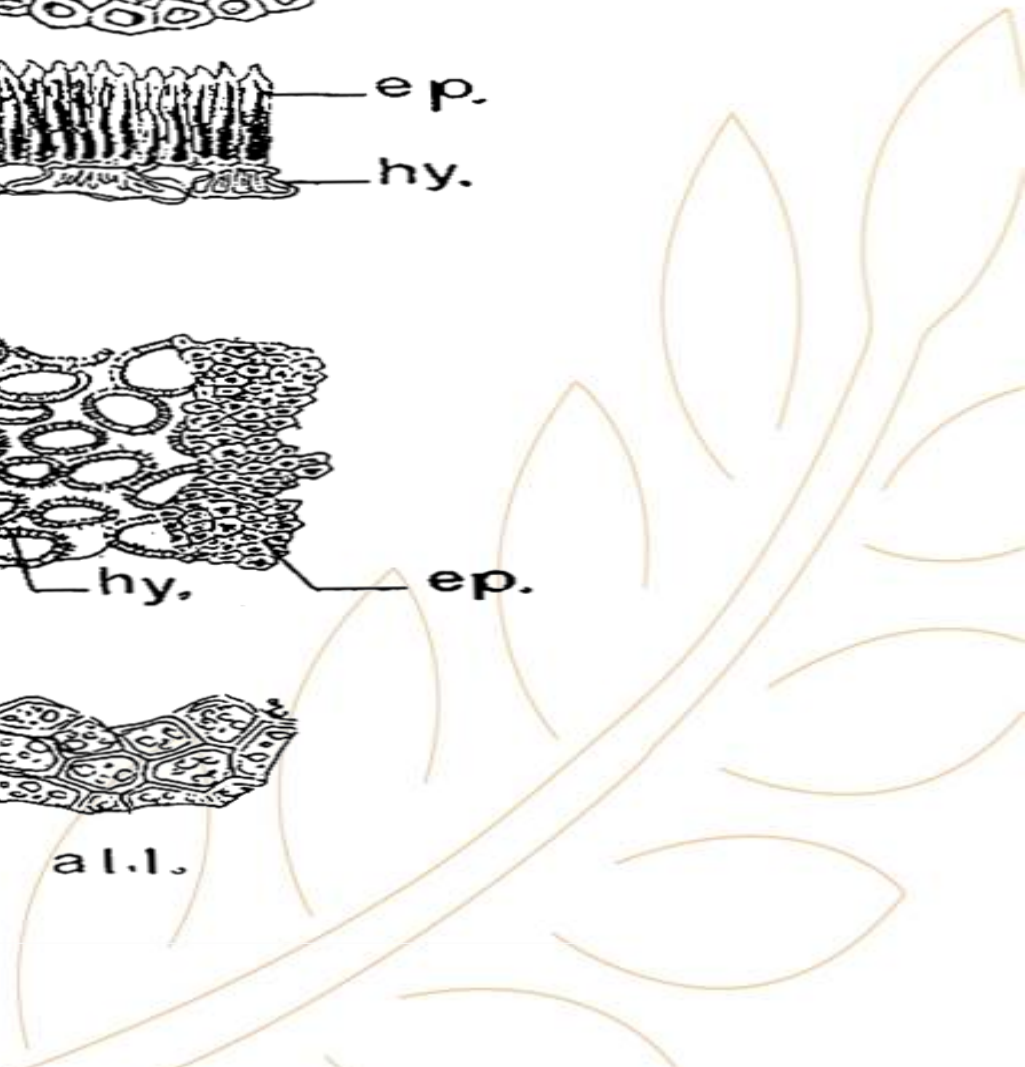
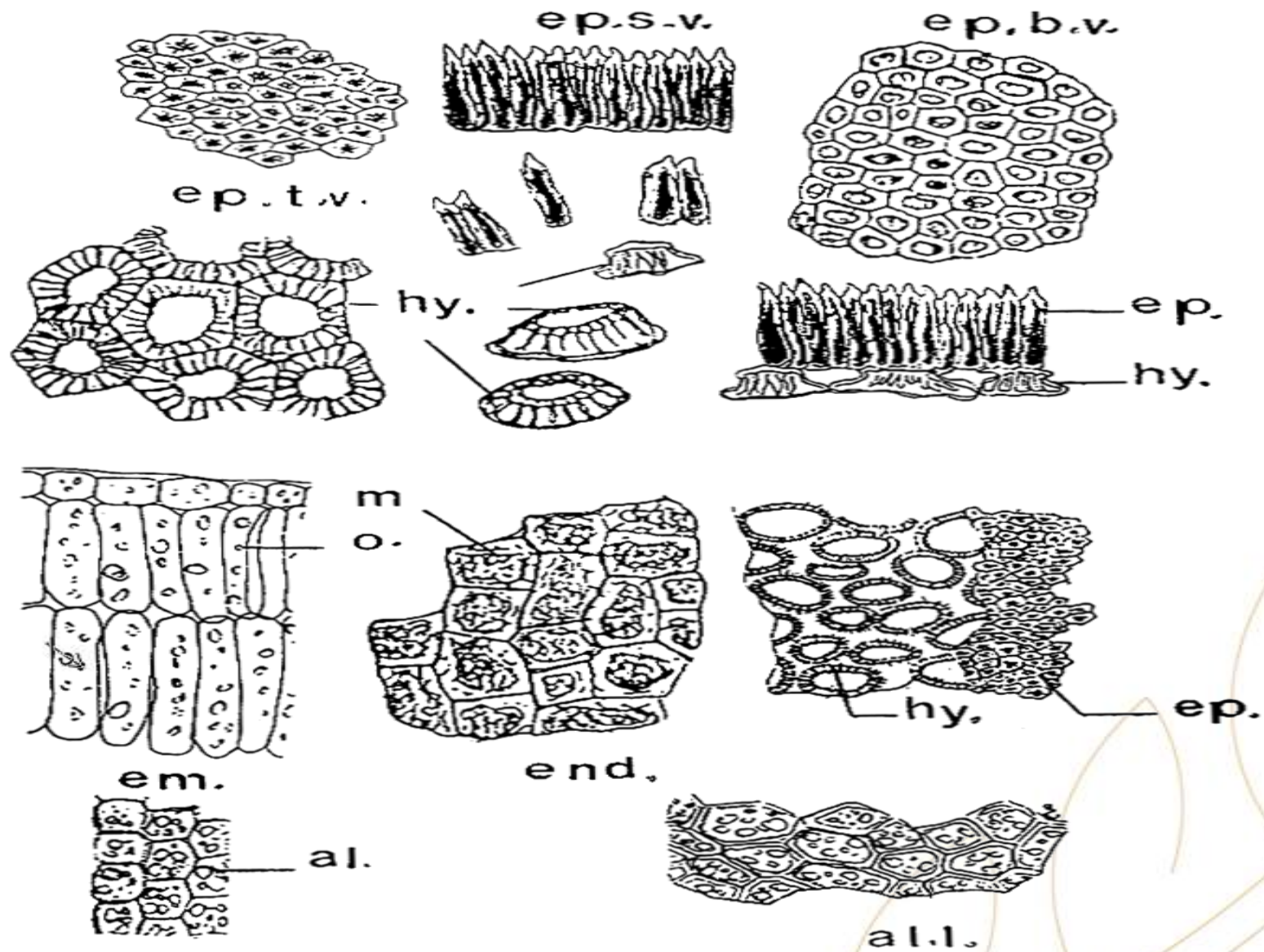


2. Fragments of endosperm with mucilaginous cells.

3. Fragments of the cotyledons containing fixed oil and aleurone grains.

4. Very few small starch granules.





Active Constituents

**28 % of
mucilage**

**mannose
&
galactose**

**Alkaloids:
Gentianine
trigonelline
&
choline**

**23-25%
proteins
&
amino
acids.**

**Flavonoids
Apigenin,
luteolin,
vitexin &
quercetin.**

**0.6-1.7 %
saponins
glycosides**

**steroidal
sapogenin,
gitogenin,**

Active Constituents (cont.)

coumarin,
(5-8 %)

vitamins
(nicotinic acid)
& minerals (a
rich source of
selenium).

volatile
constituents
responsible for
the flavor of
Fœnugreek.



Fenugreek Preparation

Nutraceutical

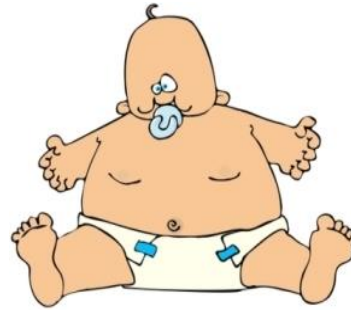
Cosmeceutical



- Medicinal Uses and actions

1-Hypoglycemic in diabetic patients.

2- Lactagogue.

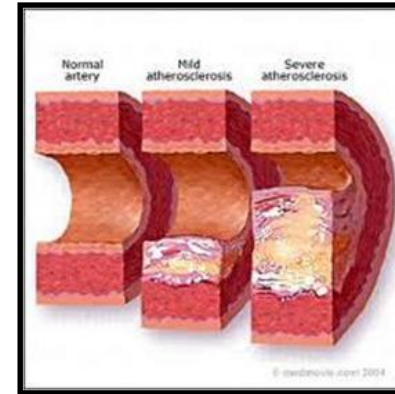


3-Treatment of dyspepsia & gastritis



Gastritis

4-Hypocholesterolemic actions in normal and diabetic humans.

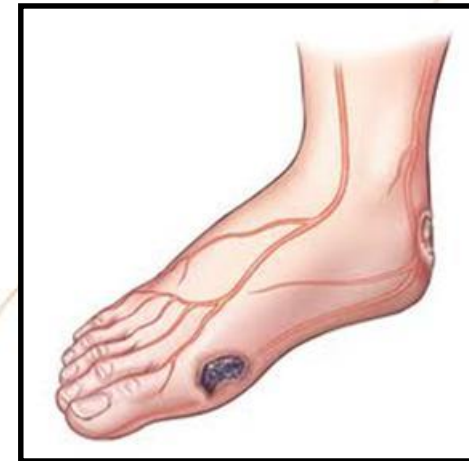


atherosclerosis

5- It has demulcent, laxative and nutritive properties.



**6-Topically for wounds ,
leg ulcers & to reduce
inflammation**



**Side effects
and/or
toxicity**

1-Repeated external applications can result in undesirable skin reactions.

2-Minor gastrointestinal symptoms, such as diarrhea and flatulence.



1-The hypoglycemic activity of fœnugreek may interfere with an existing hypoglycemic therapy.

Contraindications

2-oxytoxic and uterine stimulant activity ,the use of fœnugreek during pregnancy and lactation in doses greatly exceeding those normally encountered in foods is not advisable.

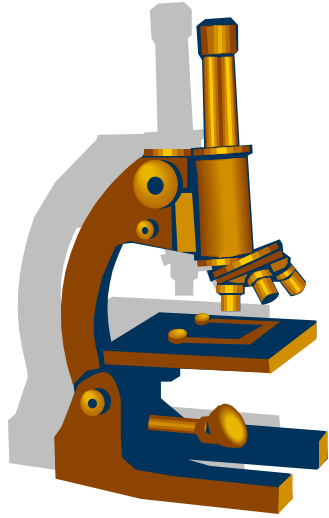


Cosmeceutical uses

- It helps **strengthen hair follicles**, promote healthy hair growth, and reduce issues like hair breakage and thinning.
- **Skin rejuvenation**: Incorporate fenugreek oil into your skincare routine to revitalize and rejuvenate your skin.
- **Anti-collagenase** activity and increased collagen production anti-aging remedy
- It helps **moisturize**, soothe inflammation.



Chemical tests



It gives positive histochemical tests with sudan III and methylene blue

- **Positive test for saponin (Froth test)**



References

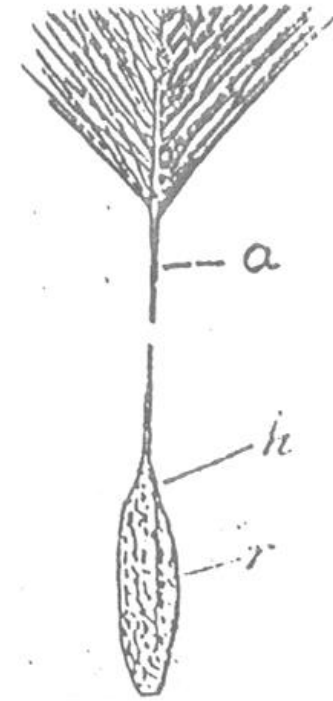
- <http://www.webmd.com>
- <http://www.findhomeremedy.com>

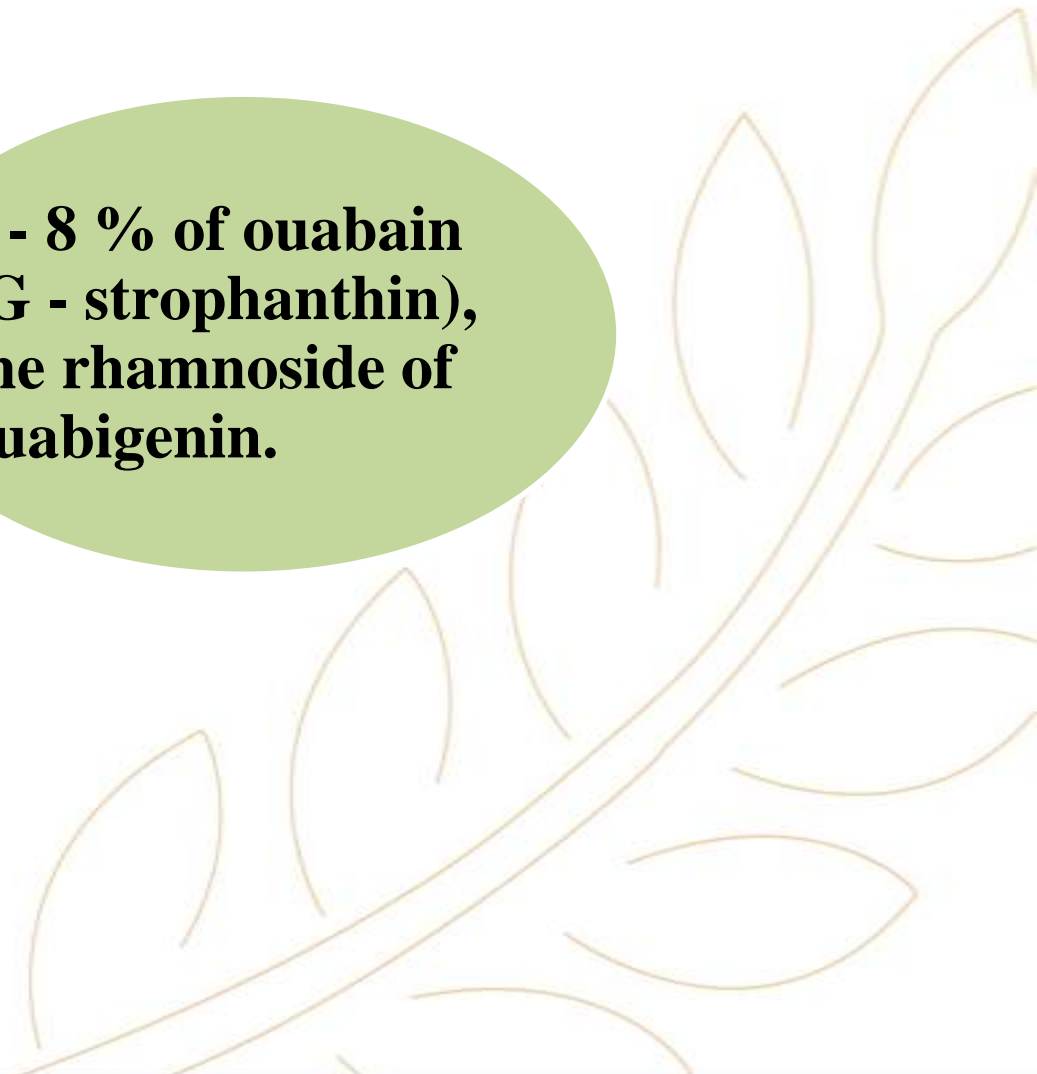
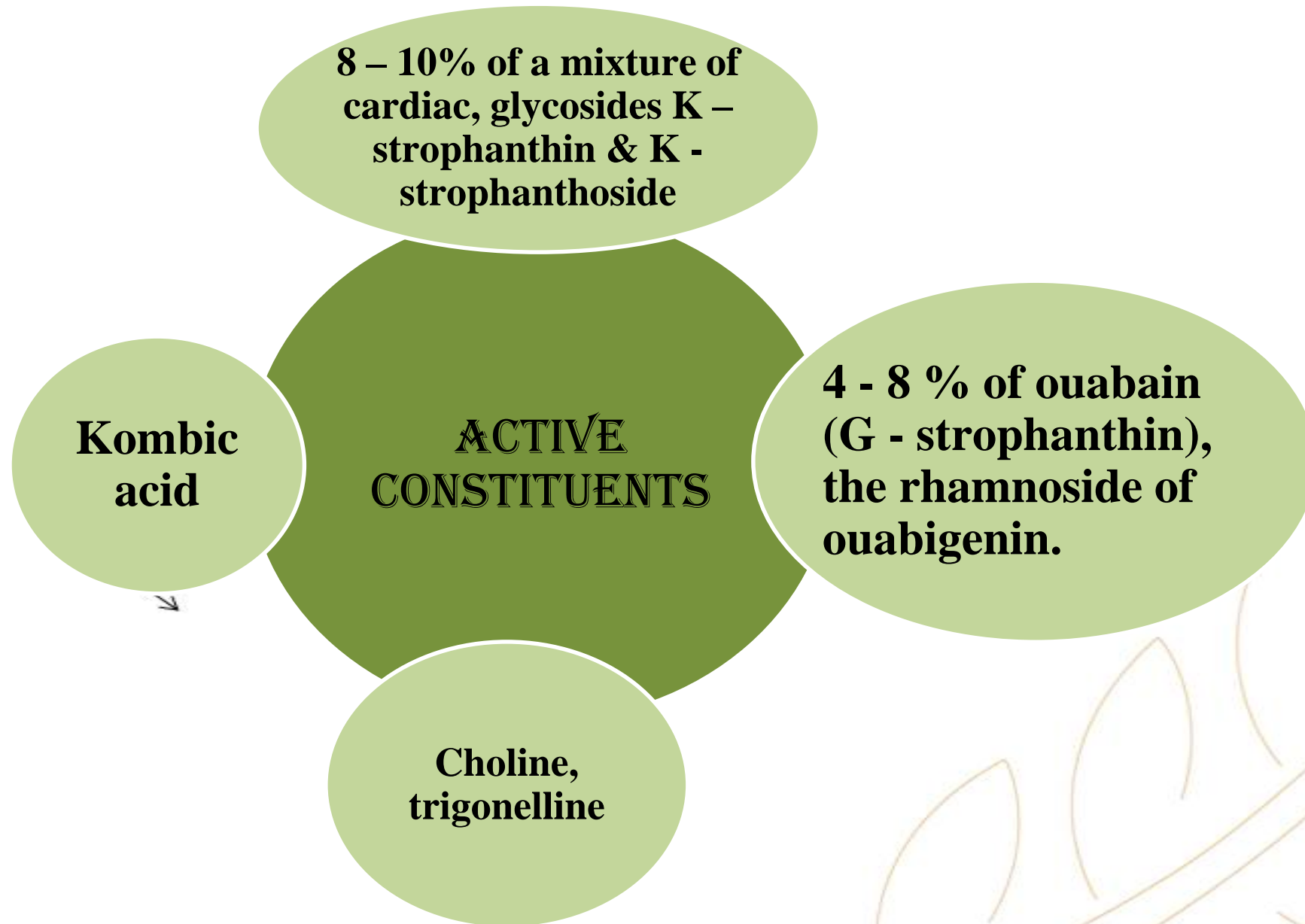
STROPHANTHUS

بذور الاستروفانس

- Strophanthus is the dried ripe seeds of *Strophanthus kombe*, *S. hispidus* & *S. gratus*

Family Apocynaceae deprived of their awns.





Uses and actions

1- Cardiac stimulant and cardiogenic



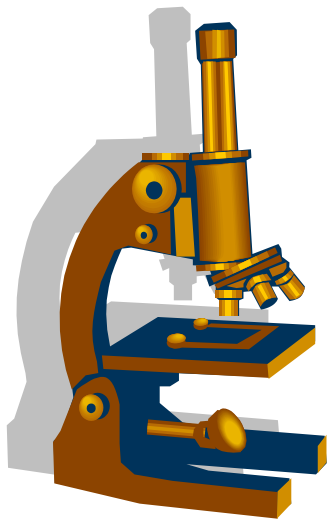
2-It controls the blood pressure



3- Efficient diuretic.

**In certain cases is used as substituent for digitalis :
It is not cumulative and less liable than
digitalis to produce gastric & intestinal irritation.**





Chemical test

Mount a section of Strophanthus in sulphuric acid (66 % v/v).

The endosperm acquires a **green** colour and the embryo a **green** or **reddish** colour in *S. kombe* and *S. hispidus* respectively
(Strophanthin glycoside)

The embryo acquires a **red** colour in *S. gratus*
(ouabain)

Effect of 66% sulphuric acid

	<i>S. Kombe</i>	<i>S. hispidus</i>	<i>S. gratus</i>
The endosperm	Green	Green	Green
The embryo ↙	Green	Reddish brown	Red
The glycoside	K-strophanthin	H-strophanthin	Ouabain

PSYLLIUM SEED

The dried ripe seeds of *Plantago psyllium* and *Plantago albicans* , F . Plantaginaceae.

Active constituents :

1-Acidic mucilage (10 – 12 %)

2- Small amount of glycoside.

3- Fixed oil - protein.



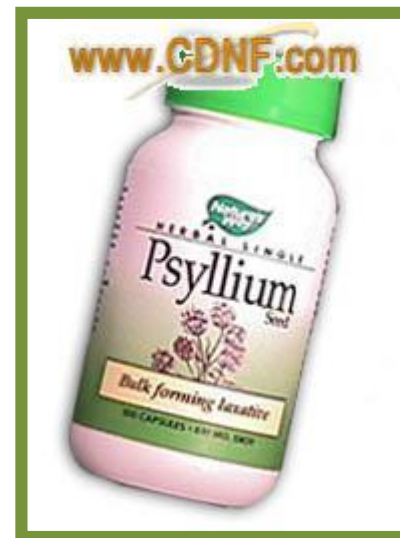
•Uses:

1-Bulk laxative

(alone or associated with other purgatives as: Senna &

Cascara) especially during pregnancy

2- Promising in lowering cholesterol and controlling diabetes.



- **Psyllium husk:**

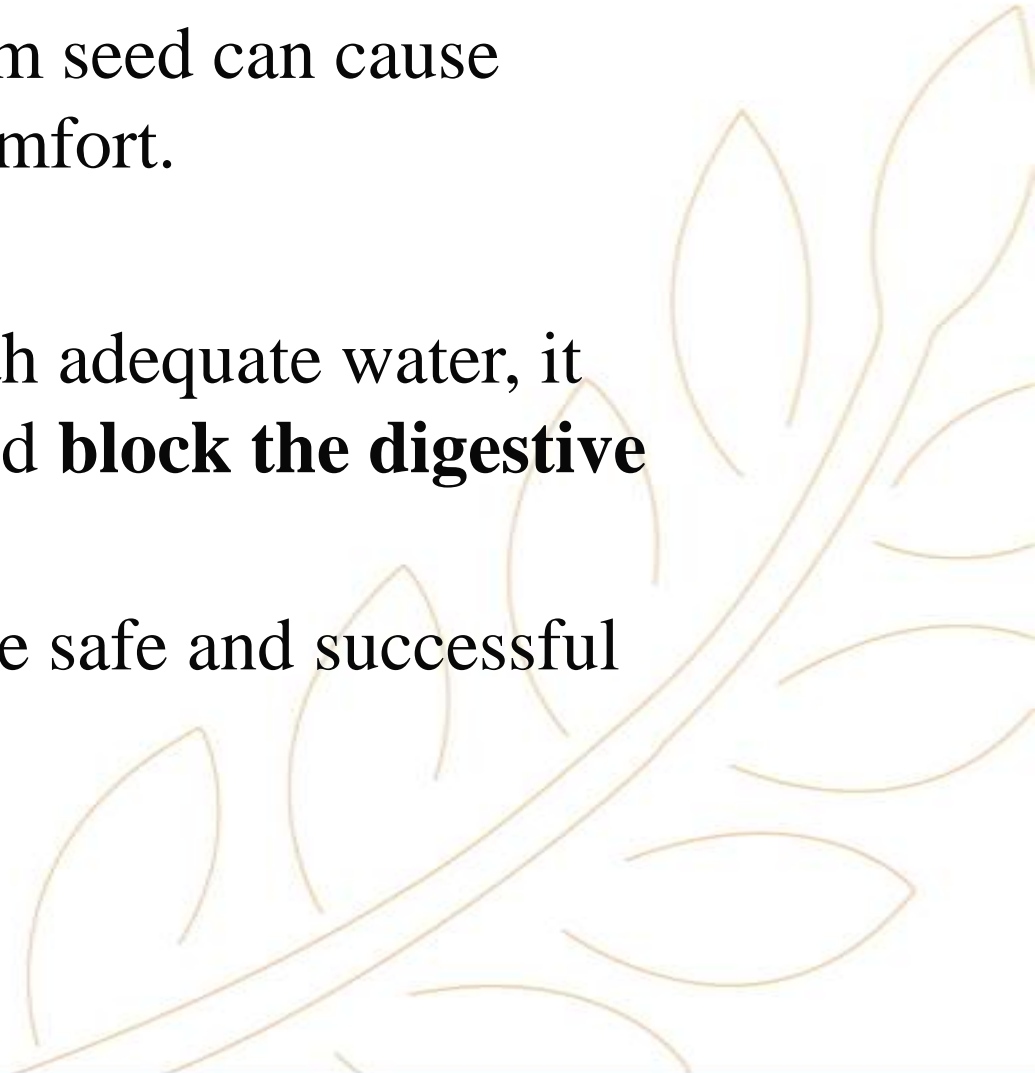


- **Psyllium seed husk are indigestible and are a source of soluble dietary fibres.**
- **The seeds are placed in water , the seed coat swells (the epidermal cells) forming layers of mucilage around the seed which are peeled & left to dry.**
- **It is then purified and used as laxative (in chronic constipation).**

- **Contraindication**

- The indigestible fiber in psyllium seed can cause **flatulence** and abdominal discomfort.
- If psyllium seed is not taken with adequate water, it can clump together in a mass and **block the digestive tract**.

Sufficient fluid is essential to the safe and successful use of psyllium seed.



HOME WORK



- 1- Enumerate scars on the surface of the seed
- 2-What is meant by: albuminous seed, exalbuminous seed, kernel
- 3-Complete the following statements:
 - a- Linseed is an example of.....seed
 - b- Linseed is not toxic because.....,,
 - c- Linseed is tested by.....
 - d- Active constituents in Linseed are,,.....
 - e- Linseed is used,,.....,
- a- Foenugreek is an example of.....seed
- b- Foenugreek is used for,,
- c- Foenugreek is tested by.....
- d- Active constituents in Foenugreek are,,.....
- e- Strophanthus is used,
- f-Strophanthus is tested by.....
- g- Psyllium husk is defined as.....



The background is a dark blue gradient. On the left side, there are several overlapping, curved bands of varying shades of green, ranging from a light lime green to a darker forest green. On the right side, there is a stylized, light-colored outline of a leafy branch, with several leaves of varying sizes and shapes extending upwards and to the right.

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