

Pharmacognosy

PHG 112

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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

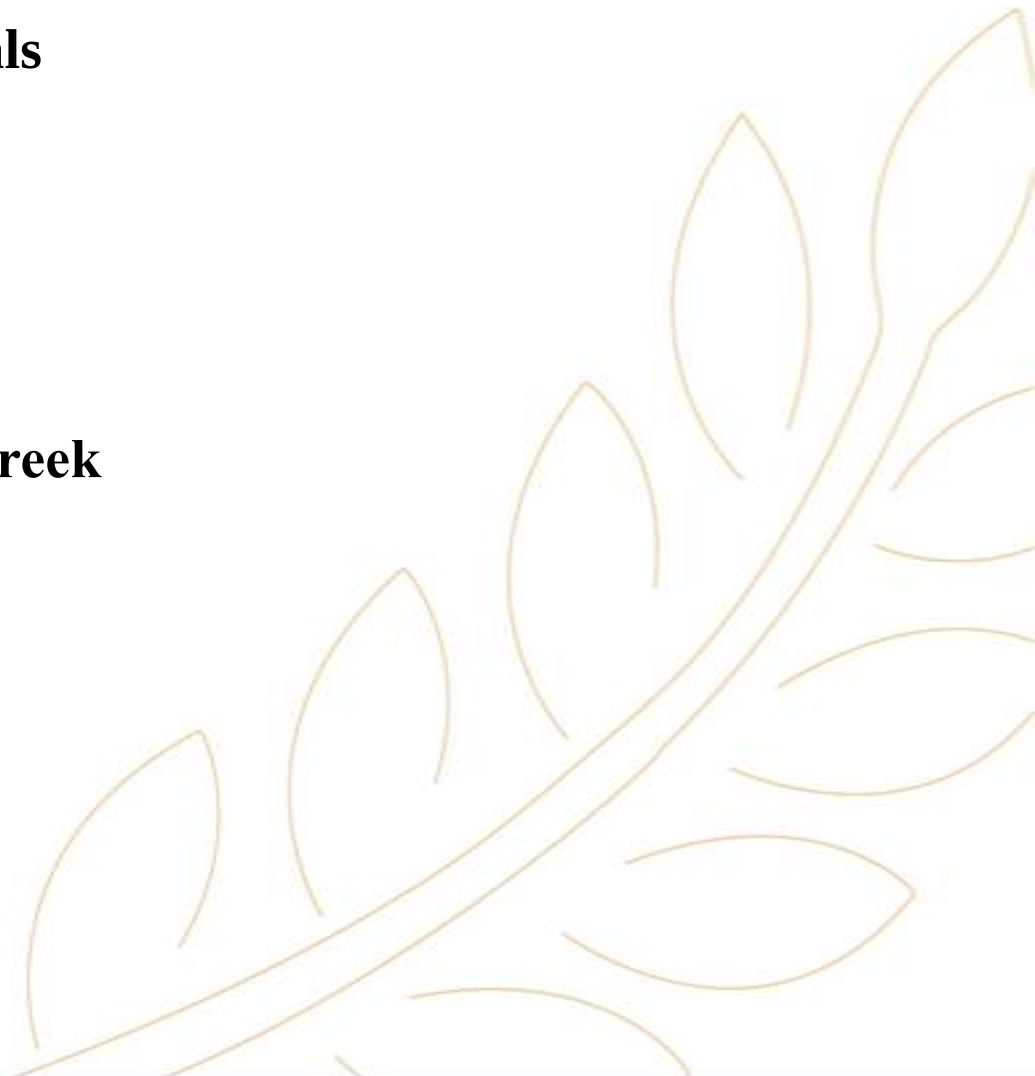
• -The chemical constituents, tests & uses of Foenugreek

-Strophanthus

The chemical constituents , test & uses of Strophanthus

-Psyllium seed

The chemical constituents , test & uses of Psyllium seed



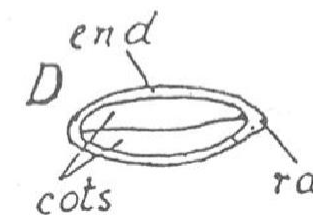
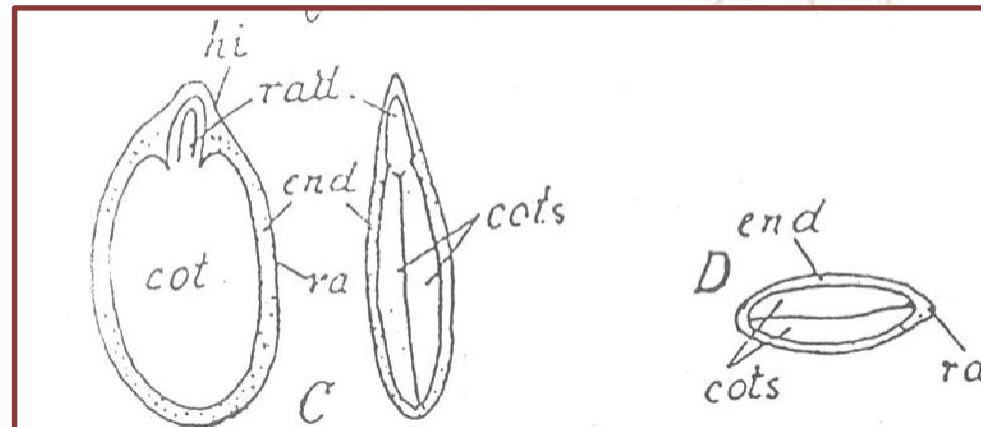
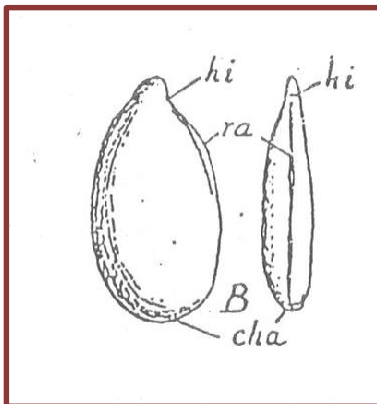
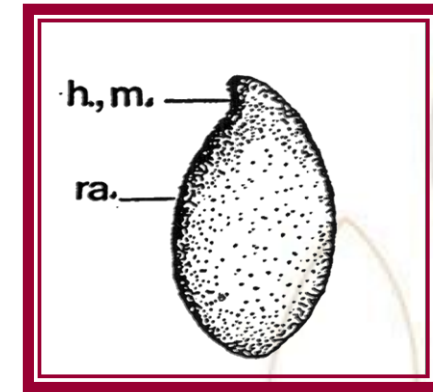
LINSEED

Flax Seed-Semen Lini

The dried ripe seeds of

Linum usitatissimum Linne family Linaceae.

-Linseed yields not less than 30% of fixed oil

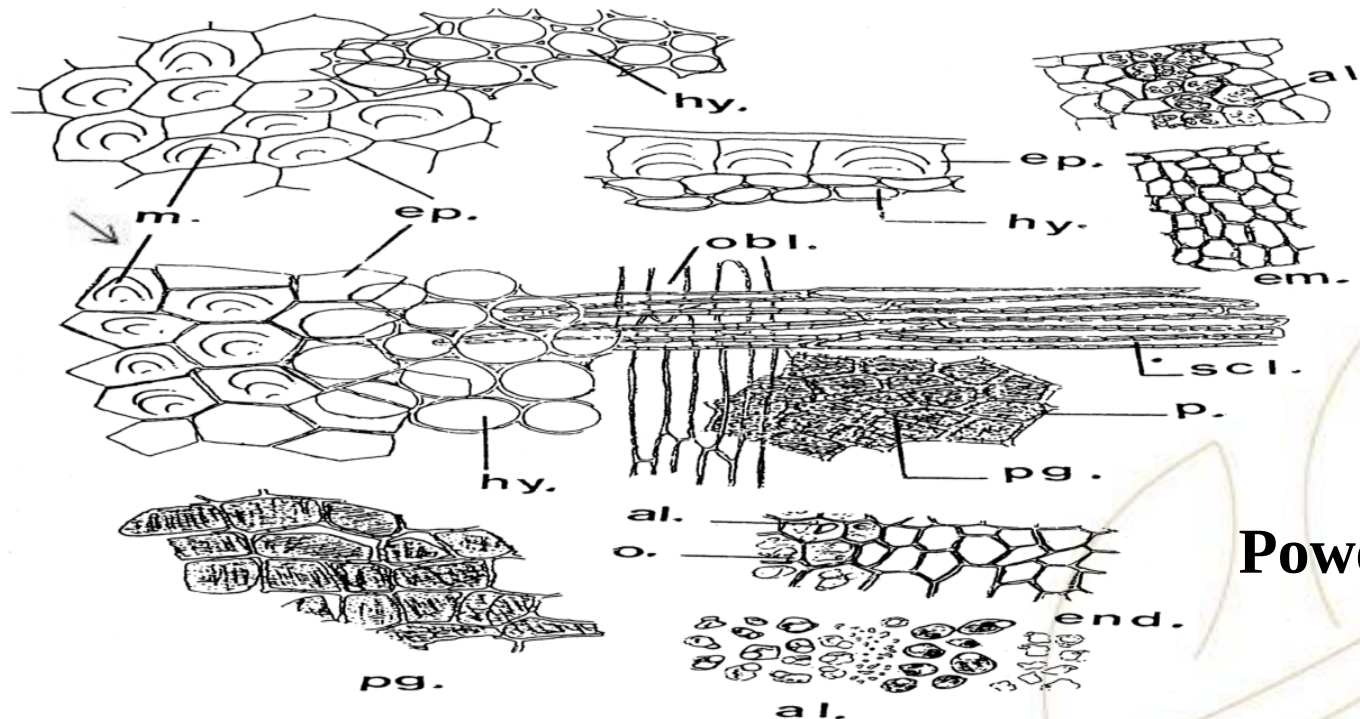


Powder

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

Odour :It has a characteristic odor

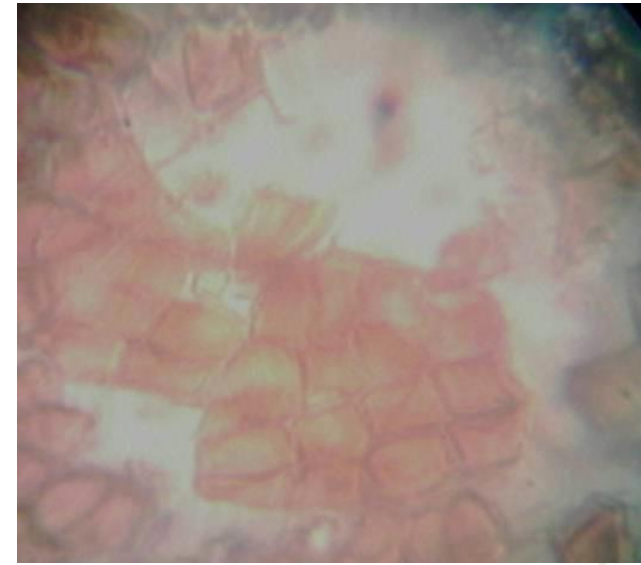
Taste: Mucilaginous oily.



Powder linseed

Microscopically, it is characterized by:

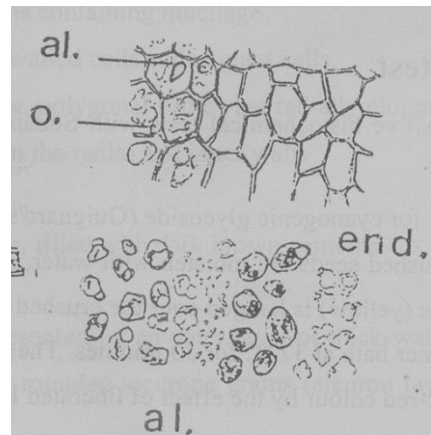
1. Dark brown fragments showing pigment cells (Polygonal flattened cells with pitted walls and reddish-brown contents)



2. Fragments of the endosperm and cotyledons

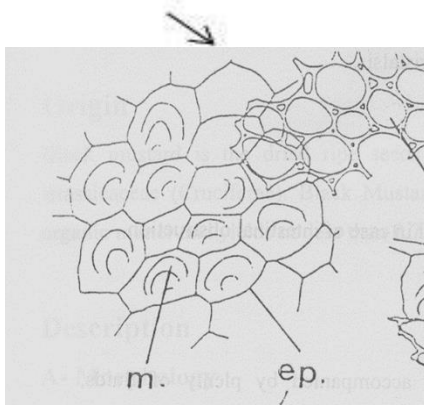


Endosperm

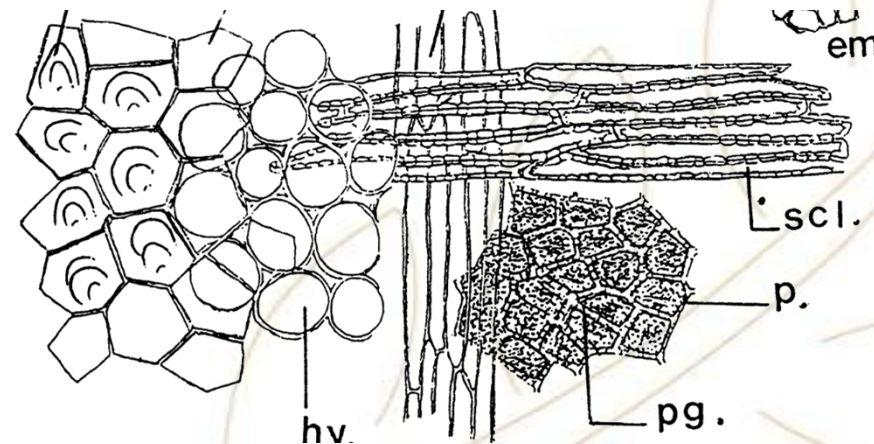
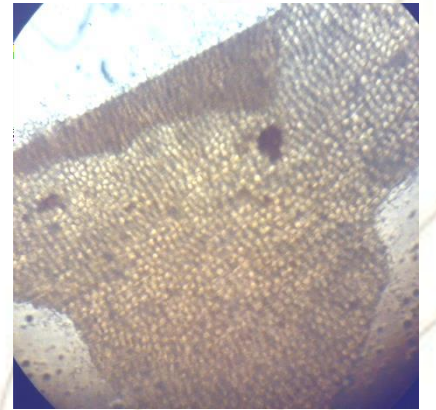


3. Fragments of yellowish-brown sclerenchymatous cells (appearing crossed by thin-walled elongated cells on one side and by rounded somewhat thickened parenchyma on the other and accompanied by pigment layer.)

4. Mucilaginous epidermis.



Epidermis with mucilage



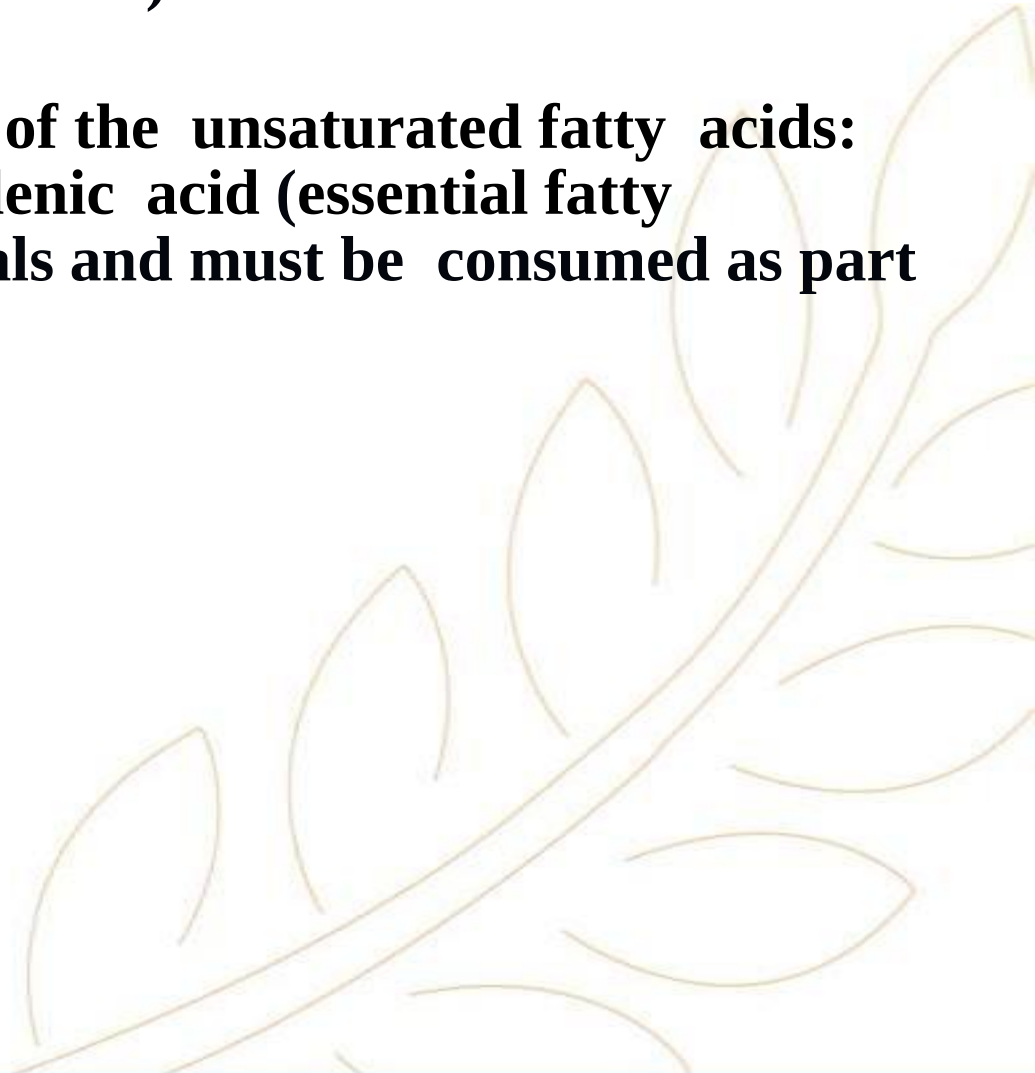
Active Constituents

Small amount of a cyanogenic glycoside (linamarin).

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).

-25% protein.

- 3-6% mucilage



Uses & Actions

Internally

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



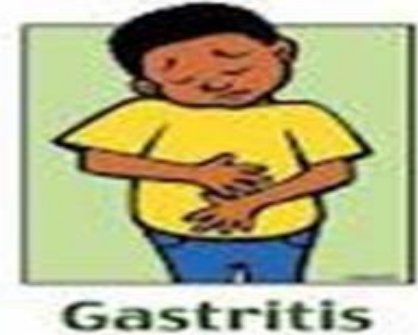
Rheumatoid arthritis



Psoriasis.

Uses & Actions

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

4-Anti-inflammatory (Omega-3 fatty acids have demonstrated effect due to reduced production of inflammatory mediators).



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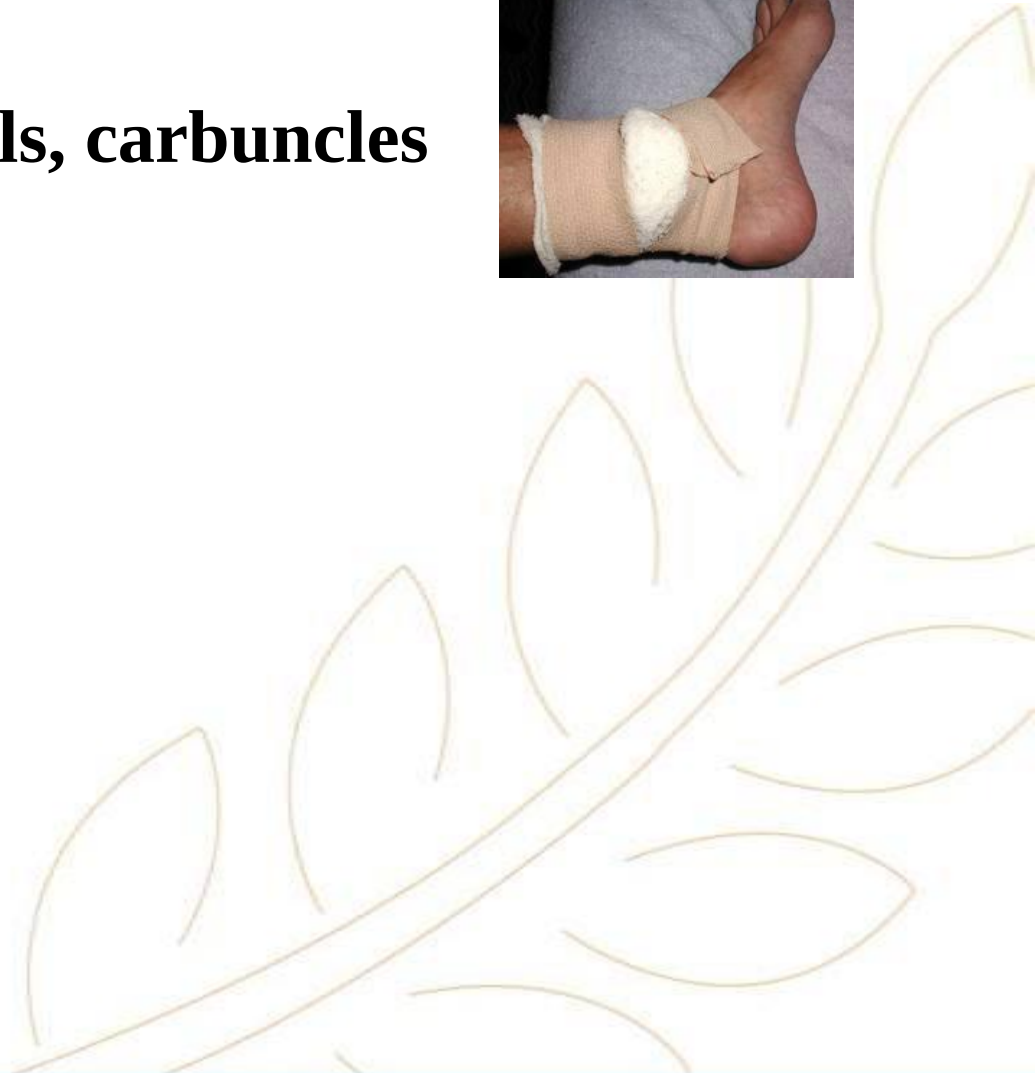
5- Heart protecting against angina pectoris, since Omega-3 fatty acids reduce the whole blood viscosity & lowers the cholesterol level.



Uses & Actions

Externally

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



Cosmeceutical Applications

-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.

It helps strengthen hair follicles, promote healthy hair growth, and reduce issues like hair breakage and thinning.

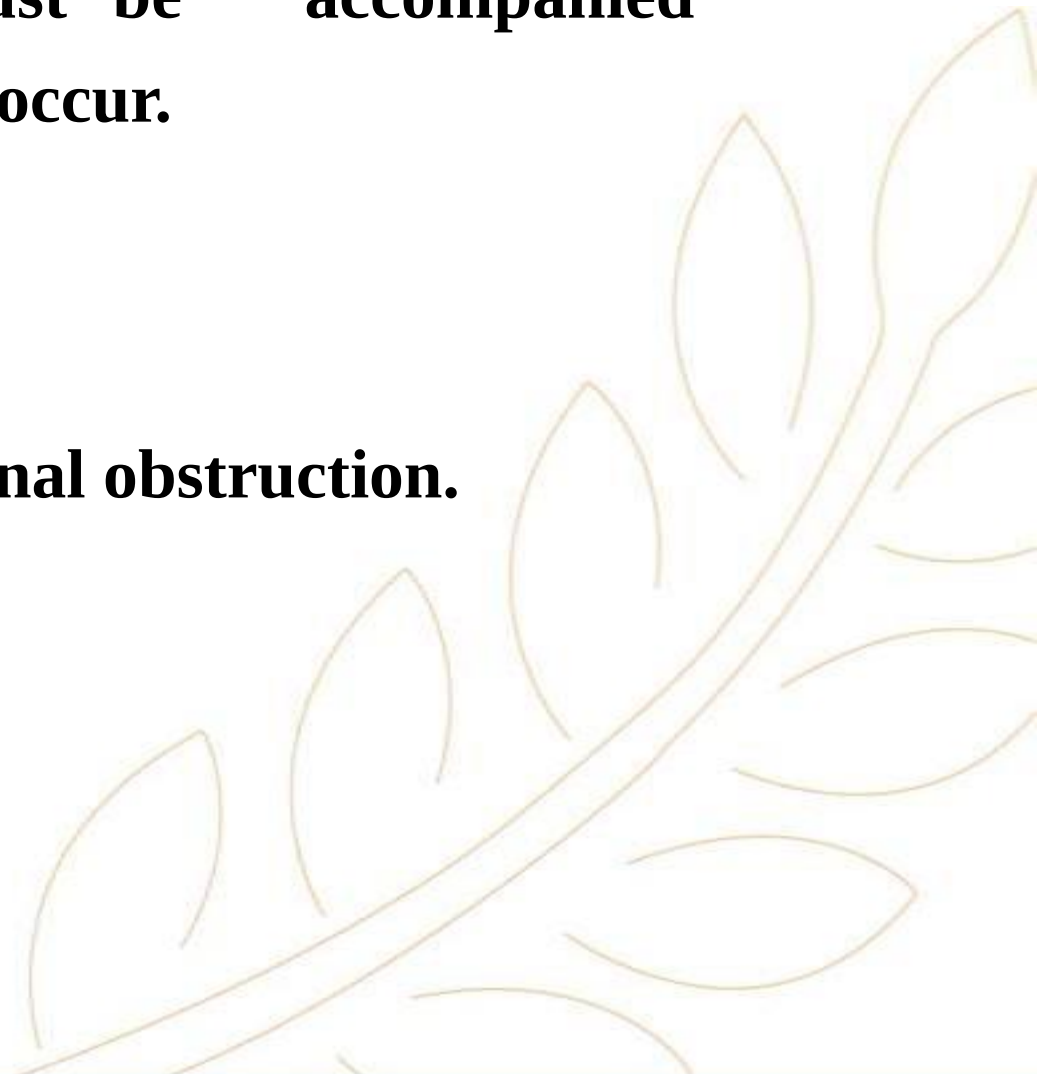


Side effects

- 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.

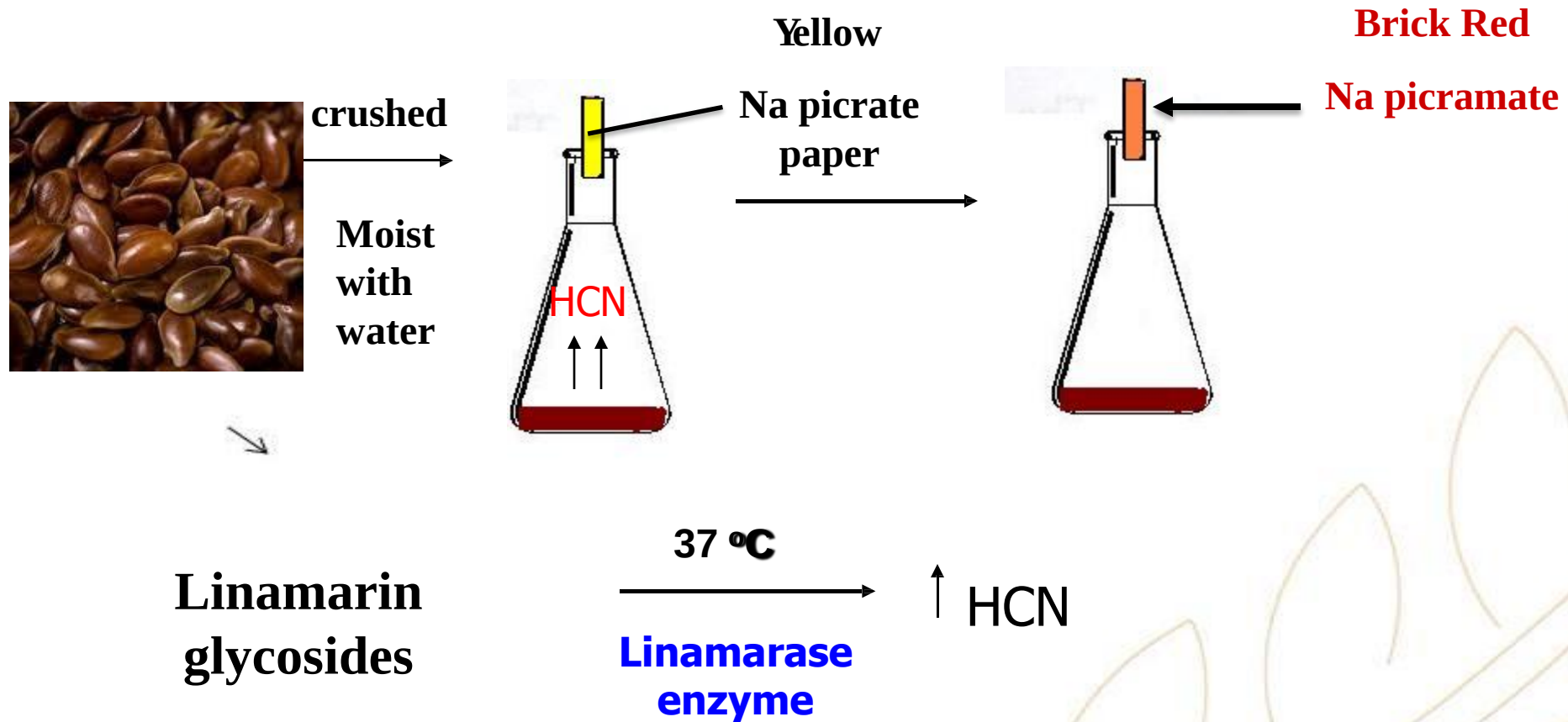


Why linseed is not toxic

- 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):



Chemical tests (cont.)

2 For Mucilage :

Red colour with Ruthenium Red

3 For Fixed oil :

Red colour with sudan III

4 For Proteins:

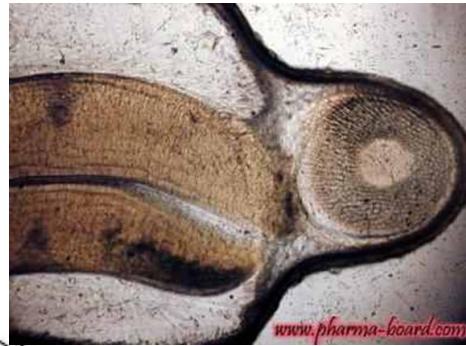
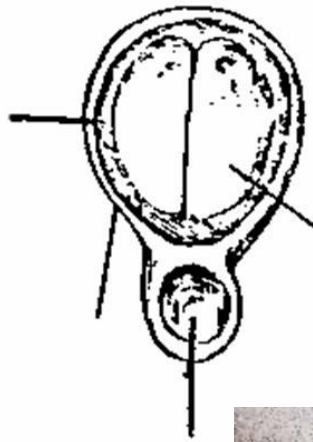
Millon's reagent : red



FOENUGREEK بذر الحلبة

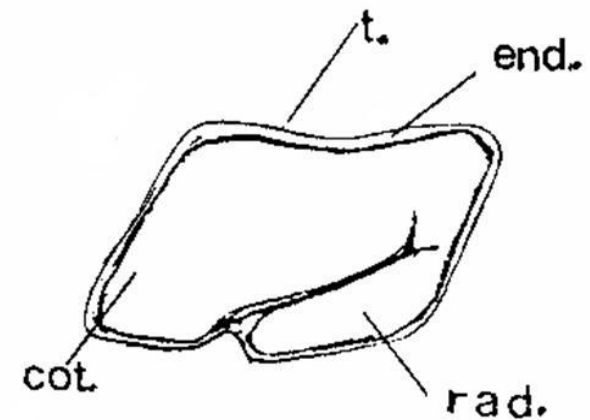
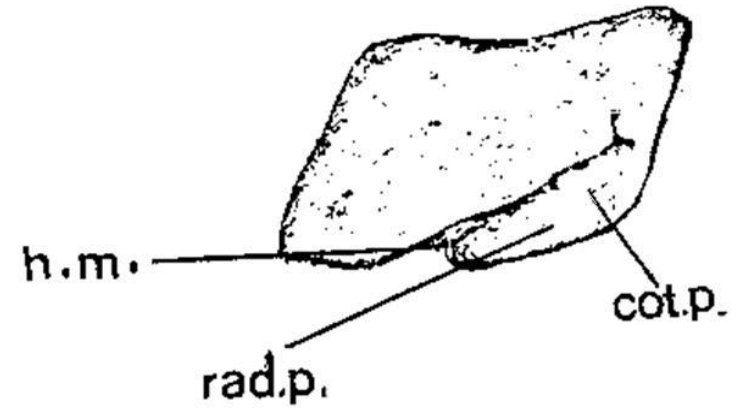
- **Semen Foenugreek**
- **The dried ripe seeds of**
Trigonella foenum-graecum Linne
Family Leguminosae.
- **Contains not more than 2 % of foreign organic matter.**





Accumbent embryo

Albuminous seed

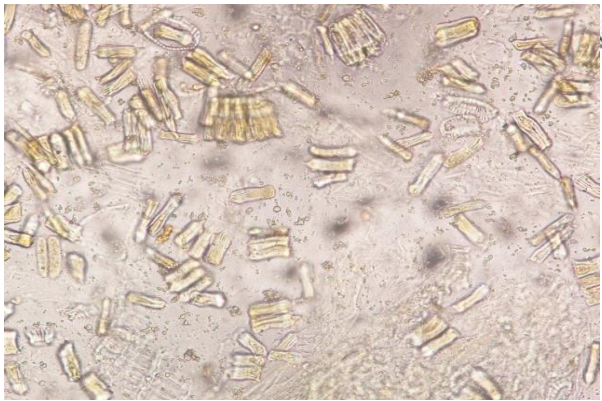


Powder

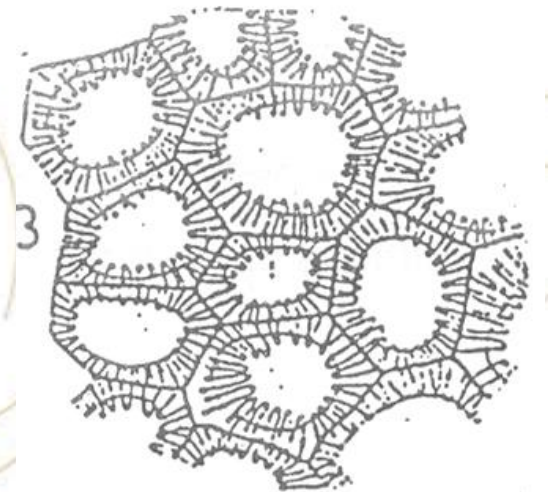
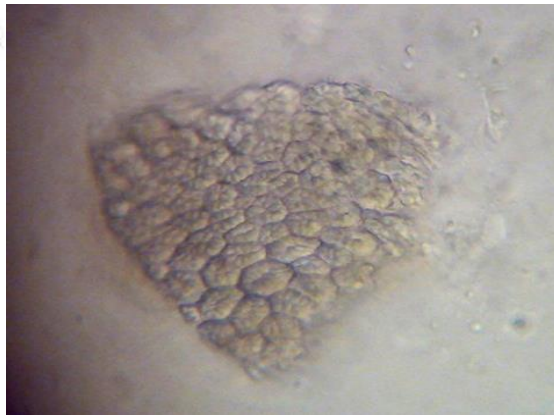
Yellowish in **colour**, with strong characteristic **odour** and a mucilaginous slightly bitter **taste**.

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

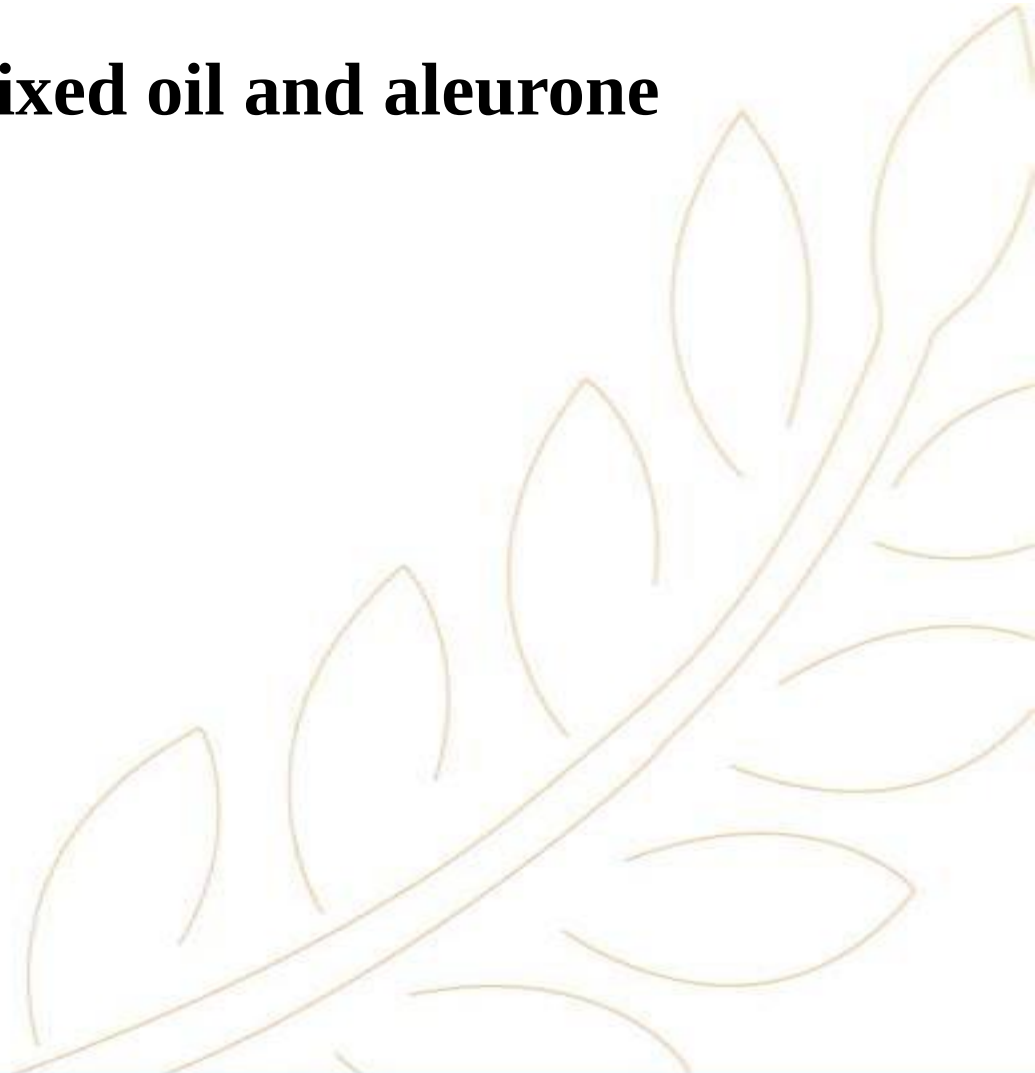


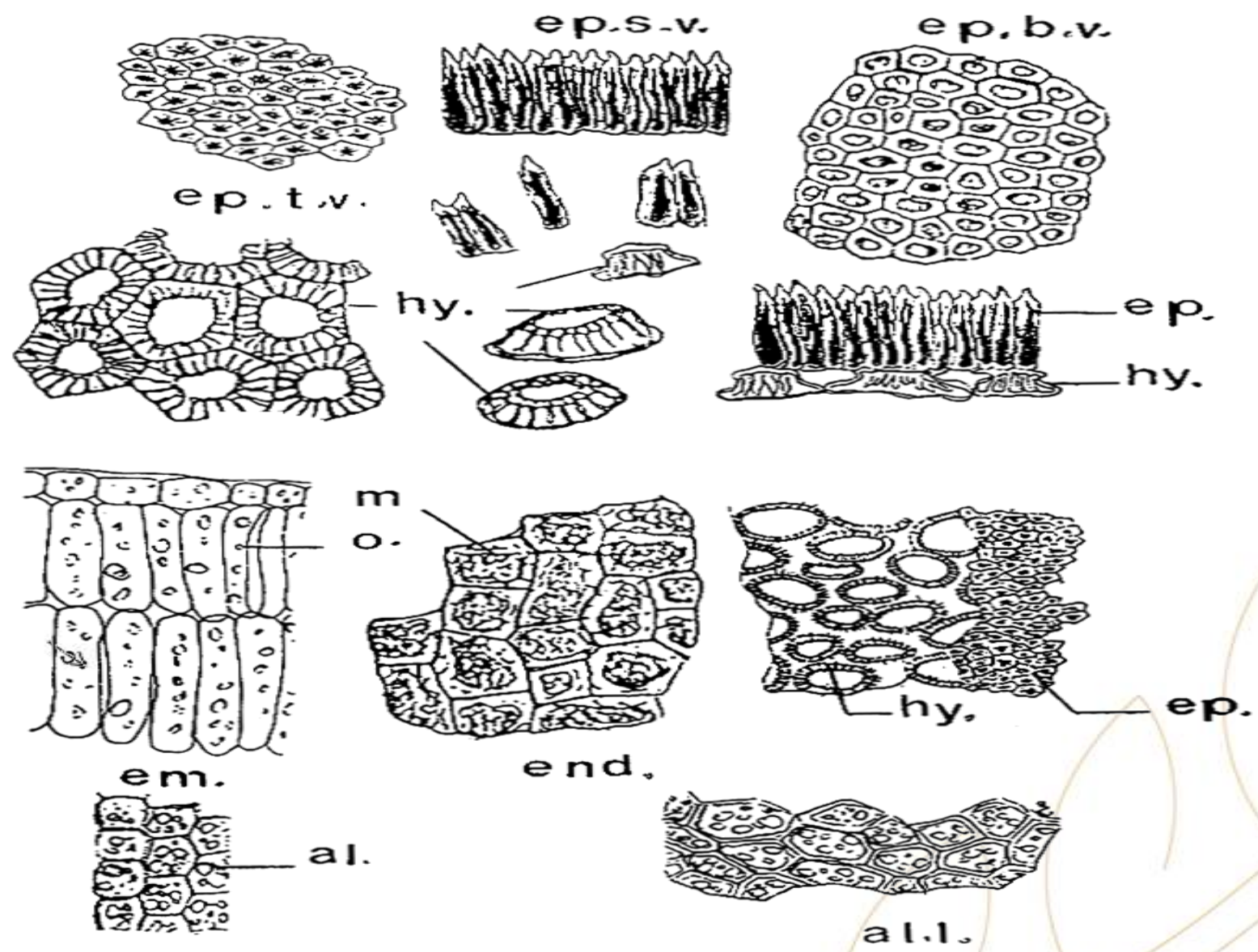
basket-like cells

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

Alkaloids:
Gentianine
trigonelline &
choline

23-25% Proteins &
amino acids.

Flavonoids
Apigenin, luteolin,
vitexin & quercetin.

Saponins glycosides
Steroidal sapogenin,
0.6-1.7 % gitogenin,

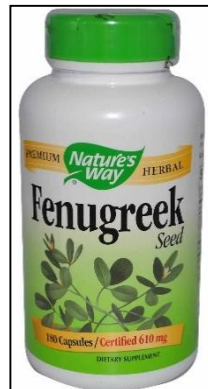
Coumarin (5-8
%)

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

Volatile
constituents
responsible for
the flavor of
Fœnugreek.

Fenugreek Preparation

Nutraceutical



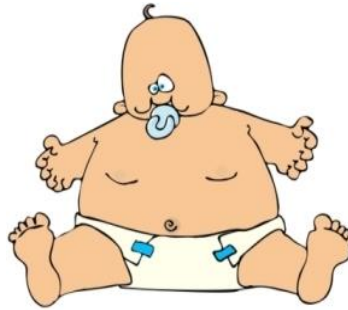
Cosmeceutical



Medicinal Uses and actions

1-Hypoglycemic in diabetic patients.

2- Lactagogue.

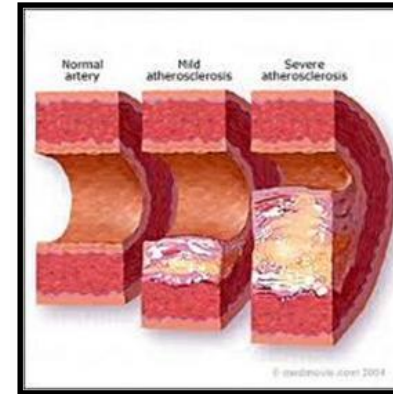


3-Treatment of dyspepsia & gastritis



Gastritis

4-Hypocholesterolemic actions in normal and diabetic humans.

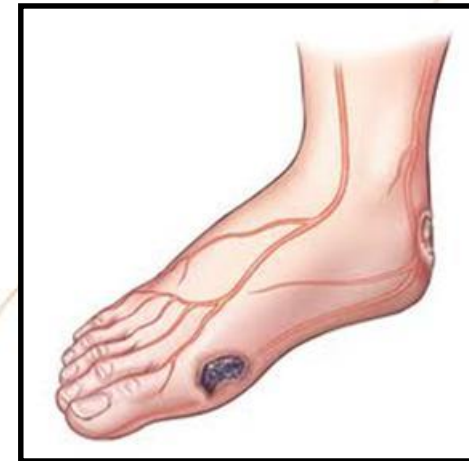


atherosclerosis

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.**

Contraindications

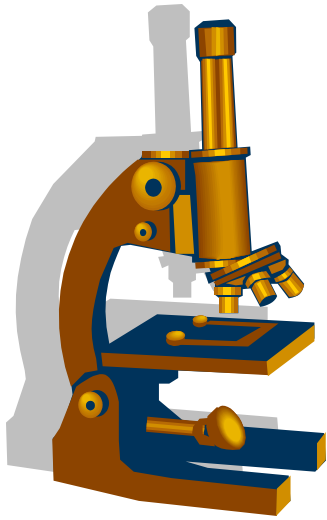
- **1-The hypoglycemic activity of fœnugreek may interfere with an existing hypoglycemic therapy.**
- **2-Oxytoxic and uterine stimulant activity ,the use of fœnugreek during pregnancy and lactation in doses greatly exceeding those normally encountered in foods is not advisable.**

Cosmeceutical Applications

- 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)

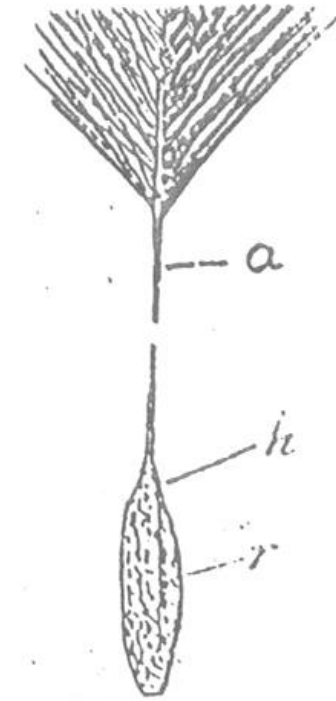
STROPHANTHUS

بذور الاستروفانس

- Strophanthus is the dried ripe seeds of *Strophanthus kombe*,
S. hispidus & *S. gratus*
Family Apocynaceae deprived
of their awns.



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Active Constituents

8 – 10% of a mixture of cardiac glycosides

K – strophanthin &

K - strophanthoside

4 - 8 % of ouabain
(G - strophanthin)

Alkaloids:
trigonelline &
choline

Kombic acid



Uses and actions

1- Cardiac stimulant and cardiotonic



2-It controls the blood pressure

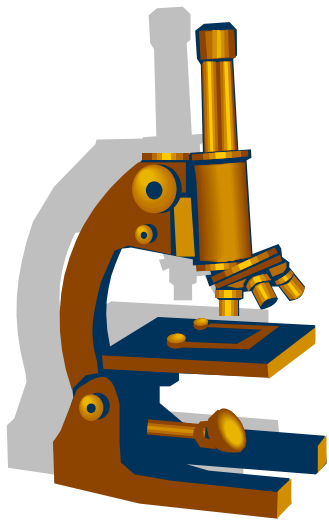


3- Efficient diuretic.

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

The embryo acquires a **Green** in *S. kombe* or **Reddish brown** colour in *S. hispidus* (Strophanthin glycoside) or **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 glycosides.

3- Fixed oil - protein.



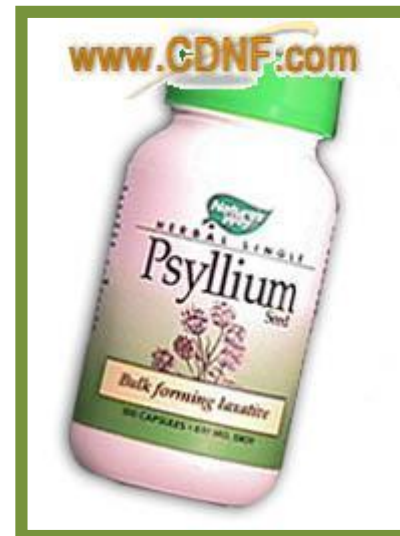
•Uses:

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).**

• **Contraindications**

- 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.....



Seeds as Nutraceuticals & Cosmeceuticals

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graph TD; A((Seeds as Nutraceuticals & Cosmeceuticals)) --- B(Linseed); A --- C(Fenugreek); A --- D(Strophanthus); A --- E(Psyllium);
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Linseed

- Constituents: 30-40% fixed oil (oleic, linoleic, α -linolenic acids), proteins, mucilage, linamarin (cyanogenic glycoside)
- Uses: Anti-inflammatory, heart protection, demulcent, bulk laxative, emollient for skin
- Cosmeceutical: Hair mask & oil, strengthens follicles
- Tests: Guignard's paper test for cyanogenic glycosides, Ruthenium red (mucilage), Sudan III (oil), Millon's (protein)

Fenugreek

- Constituents: Proteins, mucilage, fixed oil, saponins, alkaloids
- Uses: Hypoglycemic, lactagogue, hypocholesterolemic, digestive aid
- Cosmeceutical: Skin rejuvenation, hair strengthening, anti-aging
- Tests: Sudan III (oil), Froth test (saponins), Methylene blue (alkaloids)

Strophanthus

- Constituents: Cardiac glycosides (Strophanthin, Ouabain)
- Uses: Cardiotonic, BP control, diuretic, substitute for digitalis
- Tests: Section in H_2SO_4 (green/red coloration depending on species)

Psyllium

- Constituents: Acidic mucilage (10–12%), glycosides, fixed oil, protein
- Uses: Bulk laxative, lowers cholesterol, controls diabetes
- Cosmeceutical: Husk for dietary fibers
- Tests: Swelling of seed coat in water (mucilage test)



Faculty of **Pharmacy**



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جامعة أكتوبر للعلوم الحديثة والآداب

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Thank You!

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