



MSA UNIVERSITY

جامعة أكتوبر للعلوم الحديثة والآداب

Pharmacognosy

PHG112

3 GOOD HEALTH
AND WELL-BEING



4 QUALITY
EDUCATION



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Author	Date	Title	Publisher	ISBN
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Lecture 3

Examples of seeds

Interactive teaching methods and activities

QUIZIZZ

Learning Outcomes

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

1. Knowledge / Remembering

- Identify the botanical sources strophanthus, and psyllium
- Identify the botanical sources of nutraceutical seeds (chia, quinoa, nigella, pumpkin) and cosmeceutical seeds (jojoba, castor, evening primrose).
- List the major active constituents of each seed
- Recognize the pharmaceutical and therapeutic uses of seeds such as colchicum and calabar bean.
- Recall important toxic constituents such as ricin in castor seeds and colchicine in colchicum.

2. Comprehension / Understanding

- Explain the health benefits of omega-3 fatty acids in chia and nigella seeds.
- Describe how dietary fibers in chia and quinoa contribute to obesity and diabetes management.
- Discuss the mechanism of action of physostigmine from calabar beans.
- Summarize the cosmeceutical benefits of jojoba oil and castor oil for hair and skin.

Learning Outcomes

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

Summarize the cardiotonic action of strophanthus and how it differs from digitalis.

3. Application

- Relate the chemical composition of each seed to its therapeutic or cosmetic use.
- Apply knowledge of seed constituents to suggest suitable seeds for managing hyperlipidemia, diabetes, or inflammation.
- Demonstrate awareness of safety precautions when recommending seeds with potential toxicity (e.g., castor seeds, colchicum).

4. Analysis

- Analyze the role of cardiac glycosides in strophanthus and their clinical significance
- Differentiate between nutraceutical and cosmeceutical applications of seeds.
- Compare the mechanisms of action of cardiac, hypoglycemic, and anti-inflammatory seeds.
- Analyze the risk-benefit profile of seeds containing potent bioactive compounds (e.g., ricin, colchicine).

Learning Outcomes

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

5. Synthesis / Creating

- Construct a comparative table summarizing origin, active constituents, uses, and side effects of the seeds discussed.
- Propose a simple nutraceutical formulation for metabolic syndrome using selected seeds.

6. Evaluation

- Evaluate the role of nutraceutical seeds in disease prevention versus conventional pharmacotherapy.
- Assess the safety considerations of long-term use of omega-3 rich seeds.
- Judge the therapeutic value of seed-derived products in modern pharmacy practice.

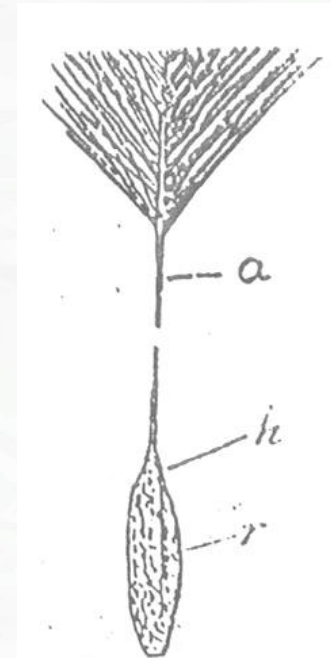


Strophanthus seed

Strophanthus Seed

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

Family Apocynaceae deprived of their awns.



Active Constituents

8 – 10% of a mixture of cardiac glycosides

K – strophanthin &

K - strophanthoside

**4 - 8 % of ouabain
(G - strophanthin)**

Kombic acid

Uses and actions

1- Cardiac stimulant and cardiotonic



2-It controls the blood pressure

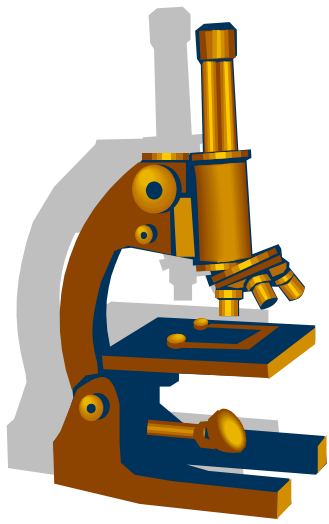


3- Efficient diuretic.

In certain cases, it 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

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.



Seeds having Nutraceutical Applications

Chia seeds

Chia seeds are the edible seeds of *Salvia hispanica* a flowering plant in the mint family (Lamiaceae)

Chemical constituents:

- Dietary fibres
- Protein
- High amount of omega-3 fatty acids
- Vitamins (A , B1& B3)
- Minerals; calcium, iron, magnesium, phosphorous



Uses:

-Treatment of obesity

- Diabetes
- Hypertension
- Reducing cholesterol

Side effects:

-When it is consumed in lots of quantities the body may find it difficult to digest it properly. One should stick to an ideal quantity of chia seeds in a day and not consume more. Consuming more of these tiny seeds can cause **diarrhea, bloating** and **stomach cramps**

-It is known that high levels of omega-3 fatty acids may increase the **risk of bleeding**. Therefore, it is advised to avoid taking chia seeds with foods or supplements rich in omega-3 fatty acids

Quinoa seeds

The seeds of *Chenopodium quinoa* Family Chenopodiaceae
It is a flowering plant grown as a crop primarily for its edible seeds

Chemical constituents:

- 1-One of the best vegetable sources of protein. Eessential amino acids such as lysine and methionine.
- 2- Large quantities of vitamins (thiamin, vitamin C) and minerals
- 3- High content of fibre, and carotenoids
- 4-Terpenoids, flavonoids, phenolic acids, and steroids.

Uses:

Treatment of Obesity – Diabetes - Celiac disease - Antioxidant



Extra reading

Lysine is an essential amino acid that your body cannot make on its own, meaning you must get it from food or supplements

Dietary Sources• Animal Proteins: Meat, poultry, fish, eggs, and dairy products (such as cheese and parmesan) provide high amounts of lysine. • **Plant Proteins:** Legumes, beans, lentils, soybeans, nuts, and seeds offer smaller amounts.

Benefits of lysine

Anxiety and Stress Reduction

Bone Health

Wound Healing

Muscle Support

Methionine : is an essential sulfur-containing amino acid that supports protein synthesis, cellular repair, and the production of vital antioxidants

Dietary Sources• Animal Proteins: Meat, poultry, fish, eggs, and dairy products contain high amounts of methionine. • **Plant Sources:** Sesame seeds, nuts.

Benefits of methionine

Liver Protection

Antioxidant Support

Tissue and Hair Health

Extra reading

Gluten is the main storage protein found in wheat and comprises a mixture of hundreds of related proteins. Wheat is not the only type of grain that contains gluten. Other gluten-containing grains include: Barley ,Rye
Oats contain proteins similar to gluten, and they can also be contaminated with gluten from other grains during the harvesting and packing process.

When consumed, the gluten found in all of these different grains is capable of causing the autoimmune response seen in celiac disease. (An autoimmune response is where your immune system attacks and damages your own tissues, like your gut and skin).

Celiac disease is a common, systemic **autoimmune** condition that can develop at any age, and is caused by eating gluten. **Gluten** is a general term for a group of proteins found in wheat and some other grains. If you have celiac disease, eating gluten causes your immune system to attack your own body's tissues.

Name	Origin	Active constituents	Uses
1-Nigella seed 	The dried ripe seeds of <i>Nigella sativa</i> F. Ranunculaceae	<u>Volatile oil</u> (1.4 %) <u>Thymoquinone, Carvone ,</u> <u>Fixed oil</u> * <u>Unsaturated fatty acids</u> [Oleic acid , Linoleic acid Δ^3 , Linolenic acid Δ^6 , Stearic acid] * <u>Saturated fatty acids</u> [Myristic acid , Palmitic acid]. Protein ,Vitamins (B 1,2,6), Minerals (Ca , Fe , Zn , Cu)	<u>1-Treatment of respiratory tract conditions</u> (Allergy , cough, colds , bronchitis , Flu , asthma) <u>2- Support circulatory and immune system</u> 3- Decrease the probability of arteriosclerosis and prevents thrombosis, due to the presence of unsaturated fatty acids
2-Pumpkin seed 	The dried ripe seeds of <i>Cucurbita pepo</i> , F. Cucurbitaceae	- <u>Sterols</u> (e.g. β -sitosterol, β -tocopherols) - <u>Triterpenes</u> (squalene), tetraterpene (β -carotene) - <u>Unsaturated fatty acids</u> (omega 6 & omega 3)	<u>Antiinflammatory, antiviral, analgesic in urinary disorders, anti-ulcer, antidiabetic and antioxidant</u> 



Seeds having Cosmeceutical Applications

Jojoba seeds

Jojoba oil is extracted from the seeds of the Jojoba plant (*Simmondsia chinensis*)

Jojoba oil is rich in vitamins B, E, and C and minerals like copper and zinc

Benefits Of Using Jojoba Oil For Hair

1. Moisturises hair
2. Promotes hair growth & thickness
3. Repairs damage from heat & styling tools
4. Maintains scalp's natural balance
5. Controls dandruff



How To Use Jojoba Oil For Hair?

1. Direct application
2. Mixing it with other products
3. Use it as a hair conditioner
4. Use it as a hair mask ingredient



Castor seeds

The dried ripe seeds of *Ricinus communis*, F. Euphorbiaceae.

Active constituents:

- 1- Alkaloids: Ricinine
- 2- Ricin (a lectin that inhibits protein synthesis in animal cells and leads to cell death).
- 3- Fixed oil and protein.

Uses:

- 1- The oil is a powerful purgative (the seeds are toxic).
- 2- Externally, the oil has been recommended for tinea, forms a light coloured odourless soap or in the form of pastes.
- 3-Castor oil provides hydration of the hair since it's rich in ricinoleic acid and fatty acids, which serve as natural emollients for the hair.



Side effects and toxicity:

The plant including the seeds contains an irritant substance named Ricin that poisons the blood.

N.B: One of the most potent natural toxins known. One seed can kill a child

The oil is safe because the poison remains in the seed where seeds themselves and the cake left after the expression of the oil are violently purgative.

N. B. Applying castor oil just once a month can

- **Boost hair growth up to five times the usual rate.**
- **It can moisturize a dry, irritated scalp.**
- **Castor oil's antibacterial and antifungal properties can reduce dandruff.**
- **It can help grow hair in other parts of the body, like the eyebrows and eyelashes**



Other Common Seeds

Some Common Seeds

Name	Origin	Active constituents	Uses
1-Colchicum 	Dried ripe seeds of <i>Colchicum autumnale</i> family Liliaceae	1- 0.2 0.8% of <u>alkaloid colchicine</u> 2- 1% of fixed oil 3- 5% glucose 	<u>1-It relieves the pain and inflammation of acute gout</u> - <u>2- Plant hormone, it induces polyploidy</u> <u>3- Cytotoxic effect</u>
2-Calabar beans	The dried ripe seeds of <i>Physostigma venenosum</i> F. Leguminosae	<u>Alkaloids</u> <u>(physostigmine also known as eserine)</u>	- <u>Contract the pupil, manage ocular pressure in glaucoma,</u> - Reverse the toxicity of certain other drugs - <u>Semi synthesis of rivastigmine used to treat dementia in Alzheimer disease</u>

Calabar beans



Pharmaceutical preparations containing
physostigmine (eserine)



Bi-miotic

Anticholium

Antilirium



Name	Origin	Active constituents	uses
3-Evening primrose 	Dried ripe seeds of <i>Oenothera biennis</i> F. Onagraceae	<u>Protein</u> (essential amino acids, containing sulphur) <u>Fixed oil</u> (- gamma-linolenic acid (GLA) Cellulose -	<u>-EPO is used for skin disorders such as eczema, psoriasis, and acne</u> <u>- It is also used for rheumatoid arthritis, weak bones</u> <u>- High cholesterol & heart disease</u>

Evening primrose oil is a source of phytoestrogens, or compounds that mimic the effects of estrogen in the body. It is often used to help balance hormones, particularly in women.

It can be beneficial for symptoms related to hormonal imbalances (low estrogen), such as Premenstrual Syndrome (PMS) and menopausal symptoms. The GLA in primrose oil helps regulate hormone levels in the body.

Side effect: Causes blood thinning which may lead to bleeding



Question : Choose the correct answer:

1- Proteins in seeds can be tested by.....

a- Mayer's b-Iodine c- Sudan III d- Millon's

2- Nigella seeds are mainly used in treatment of.....disorders

a- CNS b-Respiratory c-Urinary d- Digestive

3-seeds are usually employed as phytoestrogens

a-Evening primrose b- Linseed c-Pumpkin d- Chia

4- Is a term used to describe any product derived from food sources with extra health benefits

a- Cosmeceuticals b-Pharmacognosy c-Nutraceuticals d-Herbal medicine

5- The stem growing point is known as.....

a-Hilum b-Embryo c-Cotyledon d-Plumule

6- Fixed oils in seeds can be tested by.....

a- Mayer's b-Iodine c- Sudan III d- Millon's

7- Chia seeds are mainly used as

a-Analgesic b-Antiobesity c-Anticancer d- Antiinflammatory

8-seed oil is applied to protect hair from heat and styling damages

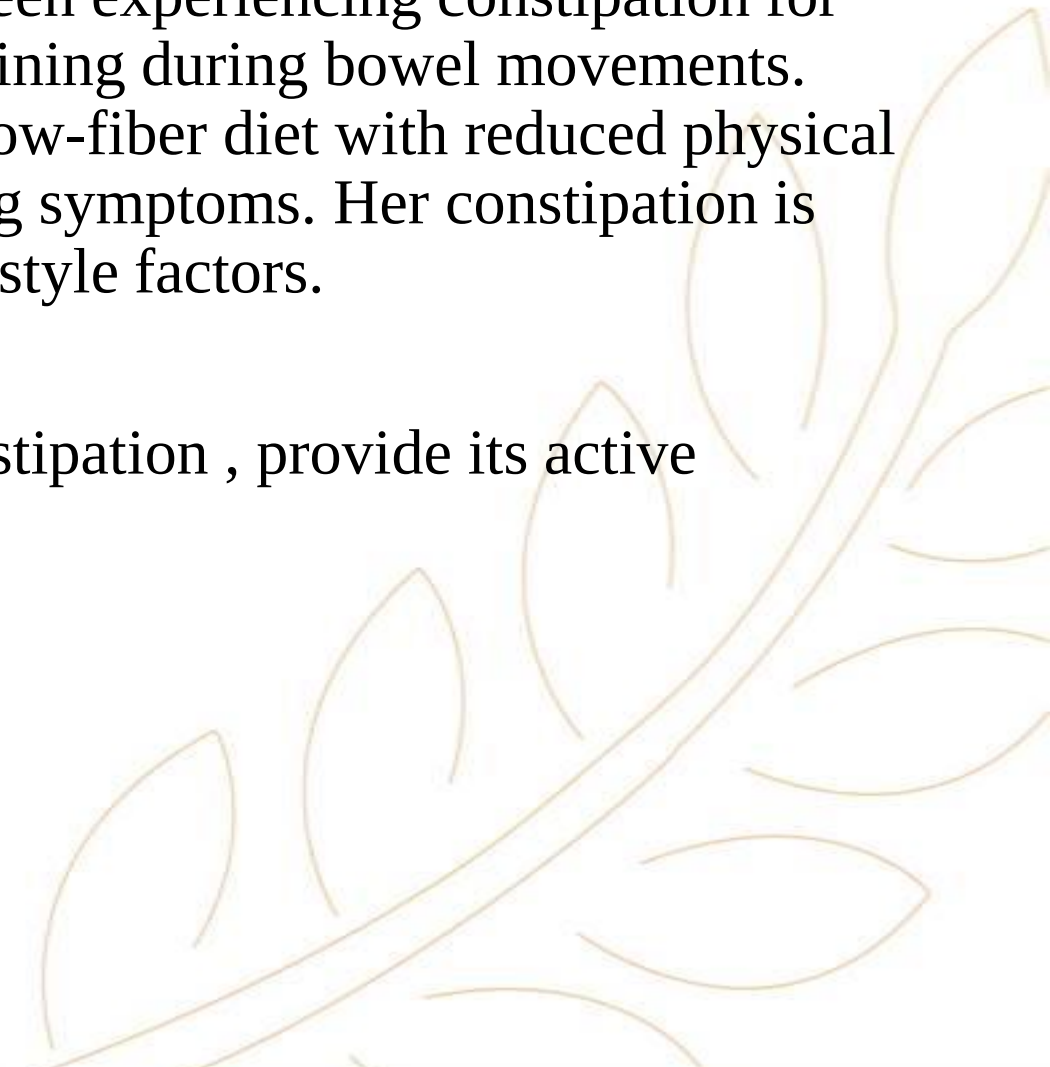
a-Foenugreek b-Castor c-Jojoba d- Chia

9- is formed of one or two seed coats

a- Testa b-Endosperm c-Embryo d-Perisperm

10-Is the scar left by the removal of the seed from its funicle or stalk is known as.....

a-Hilum b-Radical c-Micropyle d-Raphe

- Read carefully the following cases and answer the corresponding questions
 - A 31-year-old woman, 28 weeks pregnant, who has been experiencing constipation for the past week. She reports having hard stools and straining during bowel movements. She is taking iron supplements for anemia and has a low-fiber diet with reduced physical activity. She has no other medical issues or concerning symptoms. Her constipation is likely related to pregnancy, iron supplements, and lifestyle factors.
 - Suggest a crude drug that can be used to treat her constipation , provide its active constituents , and contraindications (2 marks).
- 



Google notebook link:

<https://notebooklm.google.com/notebook/96593c06-07ca-4d98-81f2-e03b066011c0?authuser=1>

THANK
YOU!