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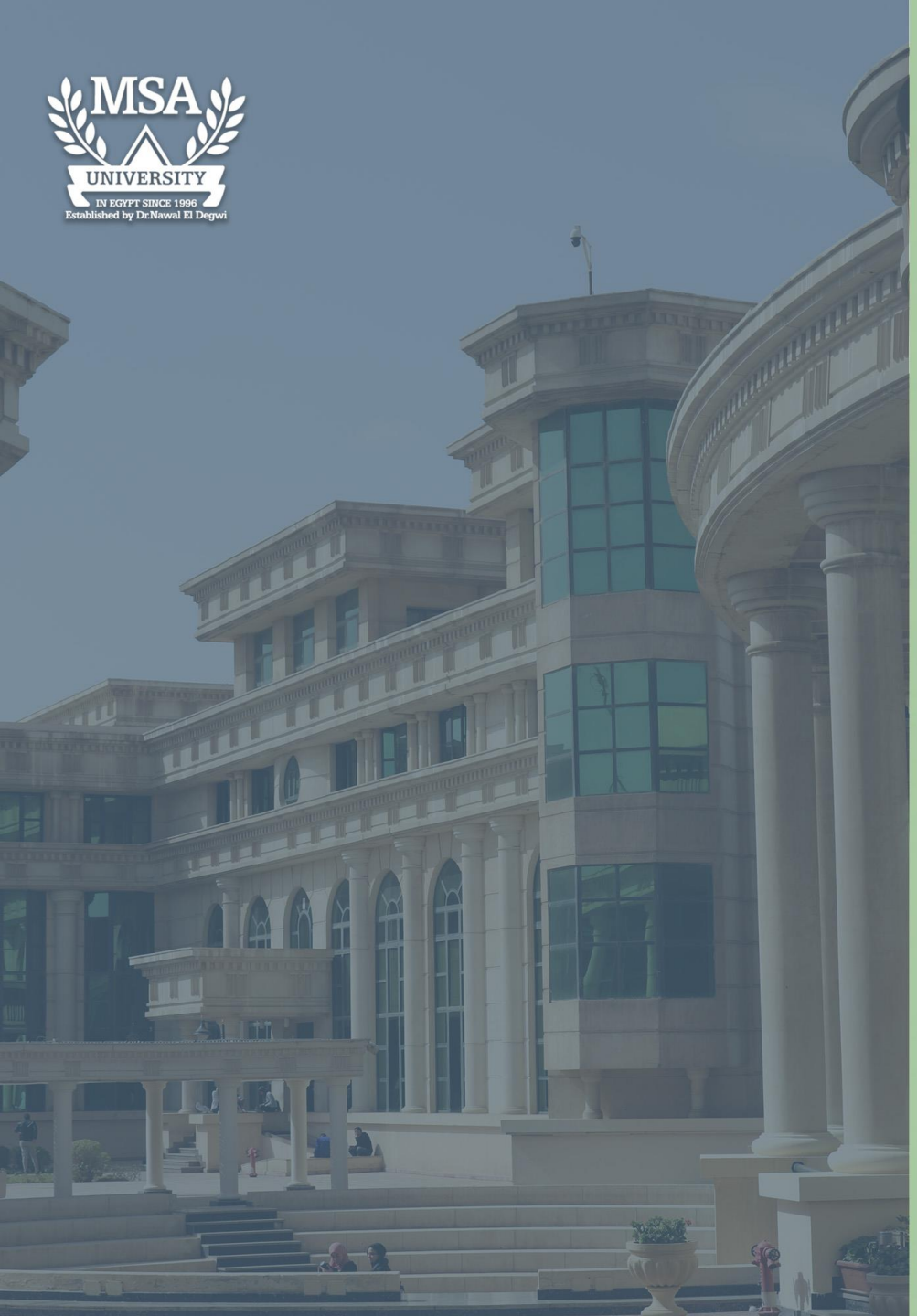
Established by Dr.Nawal El Degwi
MSA UNIVERSITY
جامعة أكتوبر للعلوم الحديثة والآداب

Pharmacognosy
PHG112



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Classroom Regulations

Be on time at the beginning of the lecture

Pay attention and be ready for any questions

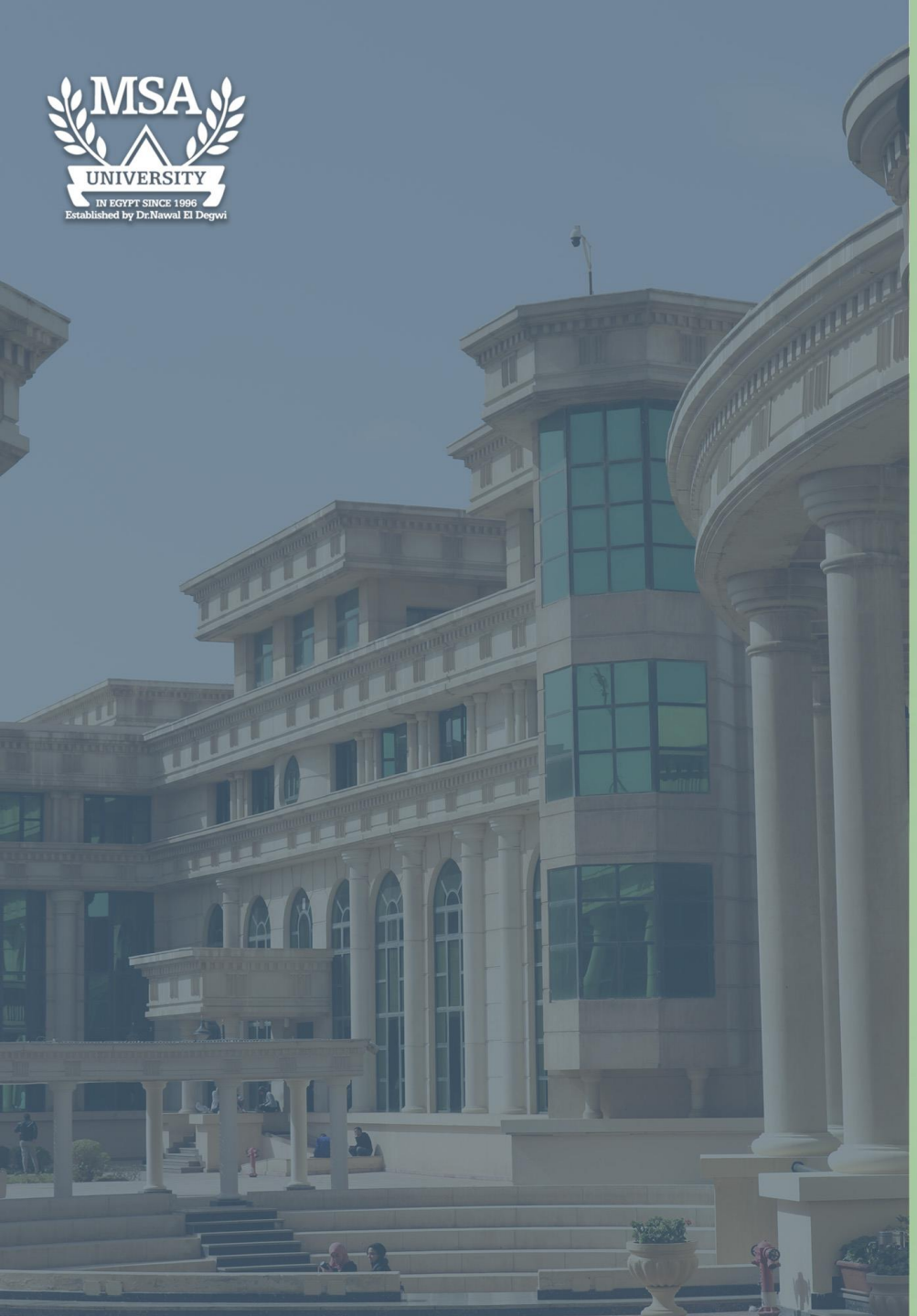
When your instructor is talking, listen

Use your pen & take notes during the lecture

Food, mobiles and side talks are not allowed

Adhere to the university dress code

Set properly in your seat



Assessment of PHG112

Quizzes	5 Marks (3.3 %)
Assignment	15 Marks (10 %)
Practical Exam	40 Marks (26.7 %)
Mid-Term Exam	30 Marks (20 %)
Final Exam	60 Marks (40 %)
Total	**150 marks (100 %)**

Faculty Vision

نص الرؤية:

كلية الصيدلة جامعة اكتوبر للعلوم الحديثة والآداب تساهم بفاعلية في تحقيق رؤية مصر المستقبلية والوصول لترتيب متميز قوميا وإقليميا وعالميا.

The Faculty of Pharmacy, October University for Modern Sciences and Arts, contributes effectively to achieving Egypt's future vision and reaching a distinguished ranking nationally, regionally, and globally.

Faculty Mission

نص الرسالة

تلتزم كلية الصـيدلة جامعة أكتوبر للعلوم الحديثة والآداب بتقديم برامج تعليمية متطورة بشـراكة دولية لإعداد صـيدلي قادر على المنافسـة والابتكار وريادة الأعمال قوميا وإقليميا وعالميا وتقديم أفضـل الخدمات الصـحية في إطار أخلاقيات المهنة، كما تلتزم الكلية بإجراء بحوث علمية تطبيقية، المشـاركة المجتمعية الفعالة متبنييه بذلك أهداف التنمية المستدامة

The Faculty of Pharmacy, October University for Modern Sciences and Arts, is committed to providing advanced educational program with international partnership to prepare a pharmacist capable of competition, innovation, and entrepreneurship nationally, regionally, and globally, and to provide the best health services within the framework of professional ethics. The Faculty is also committed to conducting applied scientific research and effective community services, thereby adopting the goals of sustainable development.

Programme Mission

Programme Mission:

The Bachelor of Pharmacy (PharmD) program, through its international partnership, seeks to contribute to raising the efficiency of the healthcare system by graduating highly qualified pharmacists who are committed to professional ethics and capable of competing, innovating, and leading businesses nationally, regionally, and globally. It also seeks to contribute to the development of applied scientific research to serve the community, while implementing the goals of sustainable development.

رسالة البرنامج:

يسعى برنامج بكالوريوس الصيدلة (PharmD)، ضمن شراكته الدولية، إلى المساهمة فى رفع كفاءة المنظومة الصحية من خلال تخريج صيادلة ذوى كفاءة عالية، ملتزمين بأخلاقيات المهنة، و قادرين على المنافسة والابتكار وريادة الأعمال قوميا وإقليميا وعالميا ، والمساهمة فى تطوير البحث العلمى التطبيقى لخدمة المجتمع، متبنيا أهداف التنمية المستدامة.

الأهداف الإستراتيجية للكلية

-تحسين تنافسية جودة الطلاب والخريجين
-الارتقاء بمنظومة البحث العلمي وتطوير برامج الدراسات العليا
-بناء كوادر تدريسية وإدارية متميزة.
-استدامة الجودة الشاملة لرفع مستوى الاداء التنافسي للمؤسسة
-رفع مستوى المشاركة المجتمعية وتعزيز فرص التنمية المستدامة

NARS: National Academic Reference Standards

المعايير القومية المرجعية الاكاديمية

It is the minimum level of knowledge and skills that a graduate must possess to ensure good practice of his profession. These standards have been set by the National Authority for Quality Assurance of Education and Accreditation agency (NAQAAE)

NARS

Programme LOs

Course LOs

Learning outcomes (Knowledge and skills): measurable achievements that the learner will be able to understand after learning processes is completed

NARS: National Academic Reference Standards

المعايير القومية المرجعية الاكاديمية

National Academic Reference Standards (NARS) for Pharmacy Education

NARS-Pharmacy (2nd Edition) Approved the from the board of directors of NAQAAE in April 2017

Competencies of the Pharmacy Graduates

Four Competency Domains are included in the competency-based National Academic Reference Standards for Pharmacy Education.

These domains are designed to cover all essentials for practicing pharmacy profession including both drug-oriented and patient-oriented disciplines. Each domain should be achieved through a number of Competencies ranging from one to six, with a total of twelve competencies for all domains. These competencies are overall broad statements that cover various areas of the graduate performance. A number of Key Elements ranging from two to seven are included in each competency, with a total of forty two key elements for all competencies. These key elements demonstrate how pharmacy graduate will reflect each competency in practice.

The competency domains are the followings:

Domain 1: Fundamental Knowledge

Domain 2: Professional and Ethical Practice

Domain 3: Pharmaceutical Care

Domain 4: Personal Practice

Overall Aims of the Module

This module builds upon the foundational knowledge of plant-derived medicines, extending the study to a broader range of crude drug sources and their critical role in drug discovery. Students will explore the pharmaceutical importance of crude drugs obtained from diverse botanical organs—including seeds, fruits, herbs, and subterranean structures—as well as unorganized plant exudates and selected drugs of animal origin. The course emphasizes how these natural materials serve as essential leads for the development and preparation of modern therapeutic agents.

Mapping MLO to programme and NARS key elements	
NARS Key element	**Module learning outcome (MLO)**
1-1-1 Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	Integrate knowledge from core pharmaceutical sciences by explaining how the active metabolites from seeds, fruits, herbs, and subterranean structures of medicinal plants connect to their pharmaceutical properties, biomedical actions, historical-social uses, regulatory status, and evidence-based clinical applications.
1-1-3 Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical materials/products.	Demonstrate how knowledge of plant biology and chemistry forms the scientific basis for the proper handling, macroscopic and microscopic identification of medicinal plants.
1-1-4 Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations.	Integrate foundational botanical and chemical knowledge to describe the identification, source, and basic preparation of active plant metabolites, and to explain their relationship to the quality, safety, and appropriate use of herbal medicines.
2-2-1 Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/natural pharmaceutical materials.	Identify the important crude drugs belonging to the seeds, fruits, herbs, and subterranean structures morphologically and microscopically
2-3-1 Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical field.	Identify the methods of cultivation, collection and drying of medicinal plants with the differentiation between plant organs according to their morphological and microscopical structures.
3-2-6 Maintain public awareness on social health hazards of drug misuse and abuse	Promote public awareness on the health hazards and social implications of natural drug addiction.
4-1-1- Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	Develop time-management skills through working in a team to a definite deadline.
4-2-2- Use contemporary technologies and media to demonstrate effective presentation skills	Demonstrate effective presentation skills by applying contemporary digital technologies and media to communicate content clearly, professionally, and audience-appropriately.

References

Author	Date	Title	Publisher	ISBN
Michael Heinrich, Joanne Barnes, Simon Gibbons, Elizabeth M. Williamson.	2012	Fundamentals of Pharmacognosy and Phytotherapy	Elsevier Health Sciences	0702052310, 9780702052316
Biren Shah, Avinash Seth	2012	Textbook of Pharmacognosy and Phytochemistry	Elsevier Health Sciences	8131232603, 9788131232606
William Charles Evans	2009	Trease's Pharmacognosy, 16th edition	Elsevier Health Sciences	0702041890, 9780702041891

Lecture 1

Introduction to Nutraceuticals & Cosmeceuticals

Introduction to Seeds

Interactive teaching methods and activities

QUIZIZZ

socrative

https://www.youtube.com/results?search_query=linseeds
https://www.youtube.com/watch?v=b7j2RMNtAYk
https://www.youtube.com/watch?v=bUjVHUf4d1I
https://www.youtube.com/watch?v=74A4yVggSjY

Learning Outcomes

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

Knowledge / Remembering

- Define a seed and state its biological and pharmaceutical importance.
- Identify the main parts of a seed, including testa, kernel, embryo, endosperm, and perisperm.
- List the structural components of the ovule such as nucellus, integuments, micropyle, hilum, chalaza, and raphe.
- Recognize the different kinds of seeds (albuminous, exalbuminous) with examples

Application (Applying)

- Apply seed morphology knowledge to identify seeds based on external features such as hilum, micropyle, and testa markings.
- Use simple chemical tests (iodine, Sudan III, Millon’s reagent) to detect reserve food materials in seeds.
- Relate the type of reserve food (starch, protein, fixed oil) to specific seed examples

Learning Outcomes

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

Analysis (Analyzing)

•Differentiate between monocotyledonous and dicotyledonous embryos.

•Analyze the microscopical characters of the testa layers (epidermis, hypodermis, pigment layer, sclerenchyma, nutritive layer).

•Compare different seed outgrowths such as arillus and arillode based on origin and examples.

Synthesis & Evaluation (Creating / Evaluating)

•Evaluate the importance of microscopical and chemical characters in seed identification and quality control.

•Assess the pharmaceutical significance of seeds as sources of oils, proteins, and nutraceutical compounds.

•Judge the suitability of specific seeds for medicinal, nutritional, or cosmetic use based on their composition.

Introduction to Nutraceuticals & Cosmeceuticals

Nutraceuticals

“ LET FOOD BE YOUR MEDICINE ”

Hippocrates

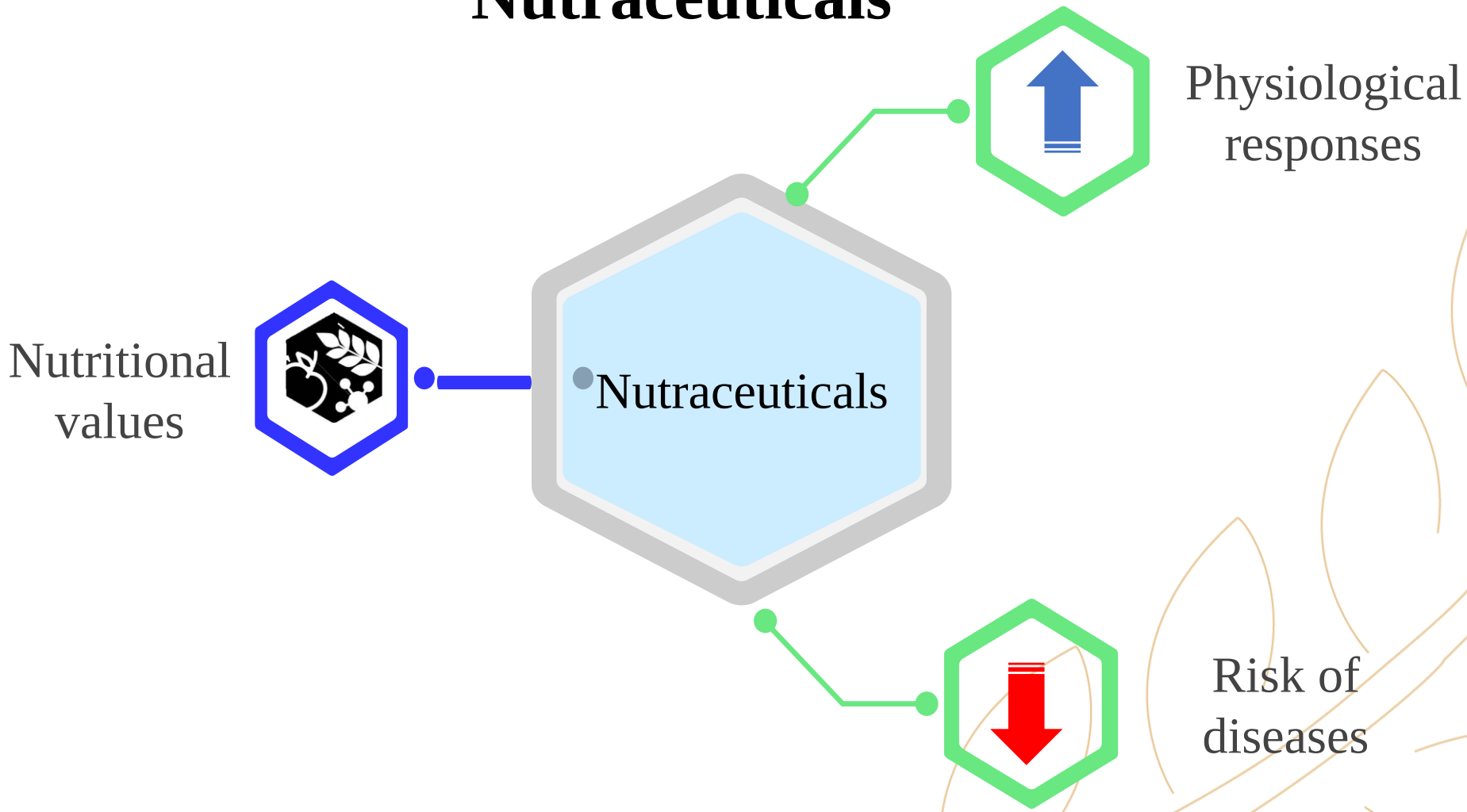
What is meant by Nutraceuticals

- Nutraceuticals is a broad umbrella term that is used to describe any product derived from food sources with extra health benefits in addition to the basic nutritional value found in foods.

- Nutraceutical products can be considered **non-specific biological therapies** used to promote general well-being, control symptoms, and prevent malignant processes.

- Their role in human nutrition is one of the most important areas of investigation, with wide-raging implications for consumers, healthcare providers, regulators, food producers, and distributors.

Nutraceuticals



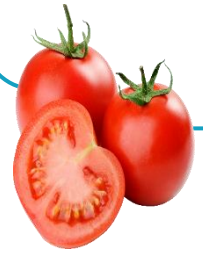
Examples of Nutraceuticals

Organosulfur compounds

Reduce total and LDL cholesterol

Catechins

Reduce risk of certain types of cancer



Lycopene

Reduce risk of certain types of cancer

Flavonoids, Phenolic acids

Antioxidant, anticancer, antiinflammatory, … etc.

Cosmeceuticals

What is meant by Cosmecuticals

- Cosmeceuticals are topical agents that offer properties of both cosmetics, which beautify or enhance appearance, and drugs, which therapeutically alter the skin’s physiology and/or reverse a disease process.

- Cosmeceuticals typically contain at least one distinguishing ingredient and purport beneficial effects beyond the abilities of purely cosmetic products, commonly claiming to improve skin function, texture, tone, radiance, or firmness.

Examples of Cosmeceutical agents used in different formulas

Liquorice

Aloe

Introduction to Seeds

Definition:

Mature fertilized ovule that contains an embryo.

Its function is to facilitate transportation

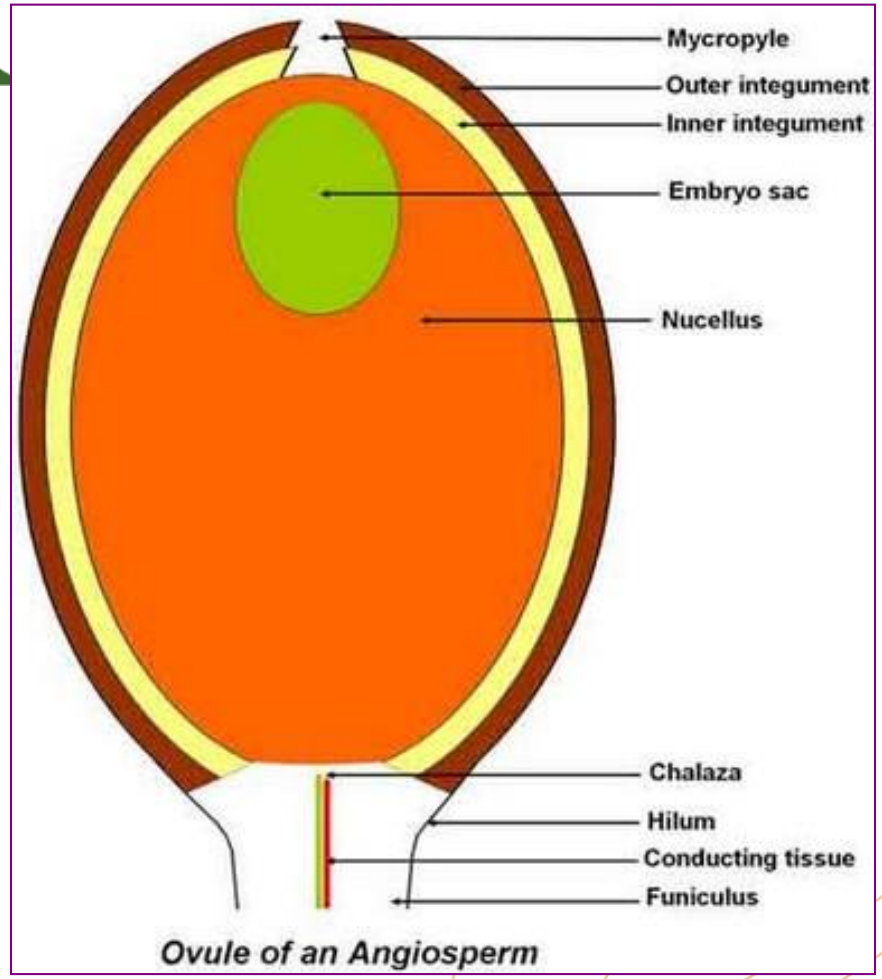
and to ensure continuation and distribution

of the plant.

THE MATURE OVULE

It consists of:

1- Nucellus.
2- Micropyle.
3- Integuments.
4- Embryo sac.



Ovule of an Angiosperm

THE TESTA SHOWS ON ITS OUTER SURFACE CERTAIN MARKINGS

- **Hilum**: It is the scar left by the removal of the seed from its funicle or stalk
- **Microphyle** : It results because the coats at the apex not quite complete leaving such a scar
- **Chalaza:** The basal swollen part of the nucellus from which arise the integuments& where the vascular strand from the funicle branches to enter different parts of ovule
- **Raphe** :Arises from fusion between the funicle with the integument It is present in anatropous ovule e.g. Linseed and amphitropous ovule e.g. Colchicum

A TYPICAL SEED CONSISTS OF

1- Testa formed of one or two seed coats

2- Perisperm

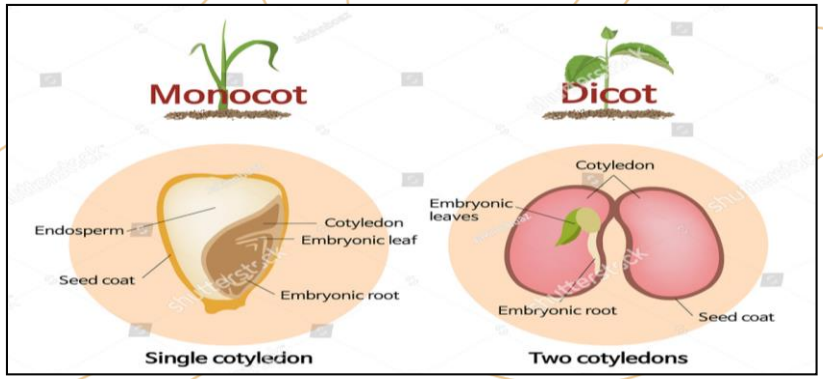
3- Endosperm surrounding the embryo

4- Embryo developed from the fertilized ovum

a-Cotyledons: one cotyledon (monocotyledon) or two cotyledons (dicotyledons)

b- Plumule: It is the stem growing point

c) Radicle: It forms the root system



The Kernel: the structure of the seed enclosed within the testa

KINDS OF SEEDS

Typical Albuminous seed
The **embryo** is surrounded by the **endosperm** and **perisperm** e.g. Cardamom

Albuminous seed
The **embryo** is surrounded by the **endosperm** e.g. Linseed.

Exalbuminous seed
the **embryo** alone exists within the testa
e.g. Mustard

OUTGROWTH OF THE TESTA

During the formation of certain seeds from the ovule arise additional growths outside the integument or developed from the integuments

Different names are given to these outgrowths according to their origin and nature

OUTGROWTH OF THE TESTA

1- Arillus

arises from the funicle or the tissue of hilum e.g. Cardamom

2-Arillode

arises from the tissue of micropyle e.g. Nutmeg

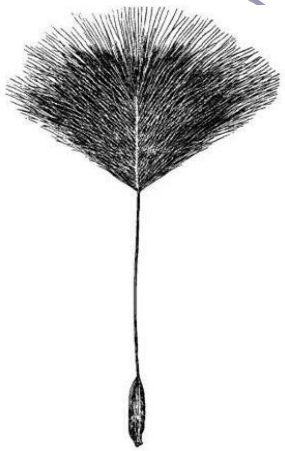
OUTGROWTH OF THE TESTA

3- Strophiole

local enlargement along the line of the raphe e.g. Colchicum seed

4- Wing

Awn e.g. Strophanthus



MICROSCOPICAL CHARACTERS

A- Testa
- Epidermis
- Hypodermis,
 -Pigment layer,
 -Sclerenchyma,
- Nutritive layer

B-Kernel
- Perisperm
- Endosperm
- Embryo

C-Reserve Food Materials
(Cell Content)

RESERVE FOOD MATERIALS

Starch: It gives blue colour with iodine

e.g. Wheat, Maize & Cardamom

Protein

- Amorphous mass e.g. Cardamom
- Aleurone grains in ripe seeds e.g. Leguminoseae

It gives red colour with Millon's reagent and yellow ppt with picric acid

Fixed oil and fat

It gives red colour with sudan III

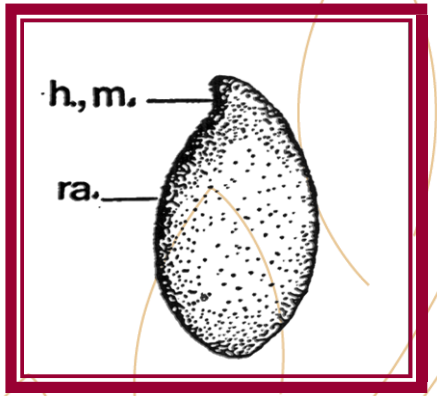
Ca Ox Crystals

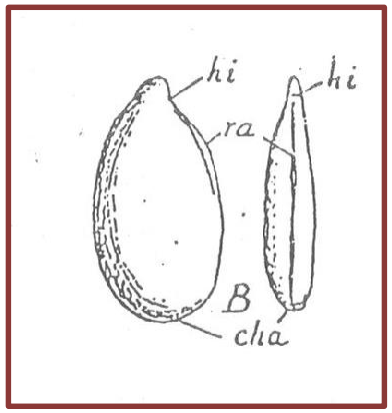
Examples of seeds
Linseed

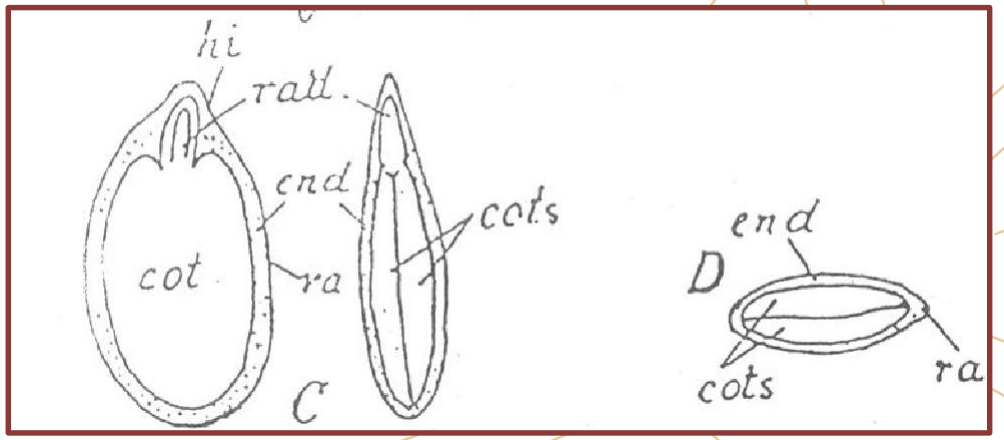
LINSEED
Flax Seed-Semen Lini

The dried ripe seeds of *Linum usitatissimum* Linne family Linaceae.

-Linseed yields not less than 30% of fixed oil





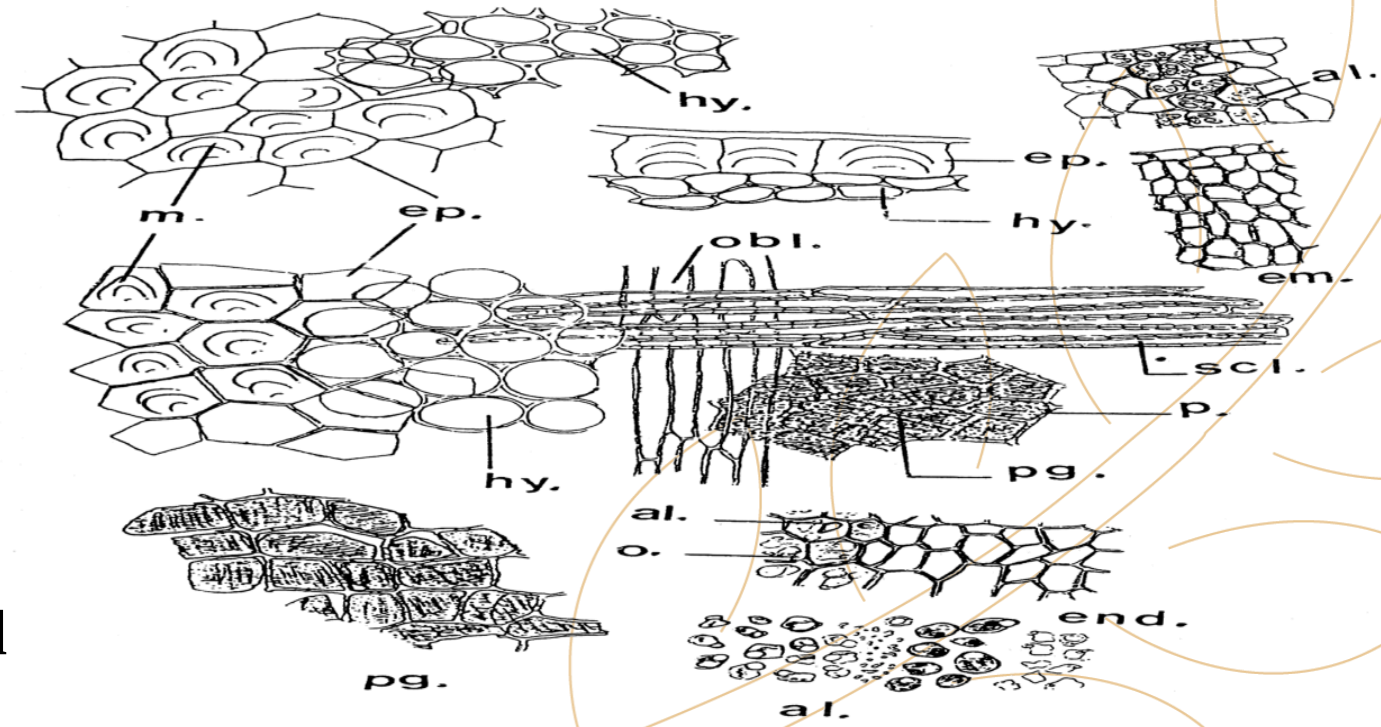


Powder

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

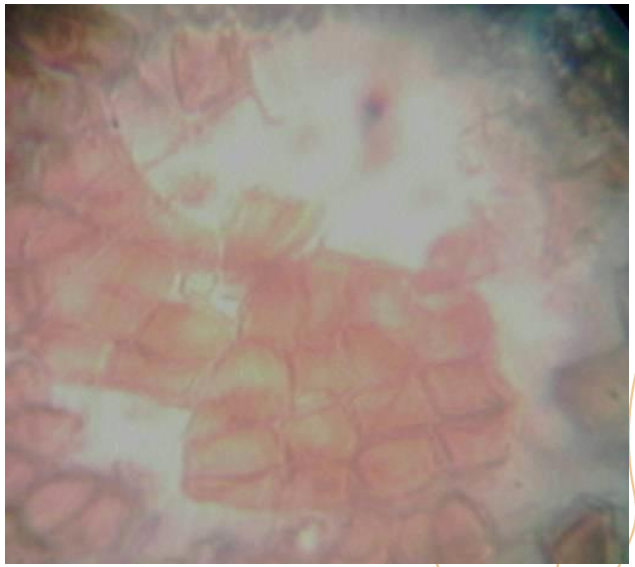
Odour : **It has a characteristic odor**

Taste: **Mucilaginous oily.**



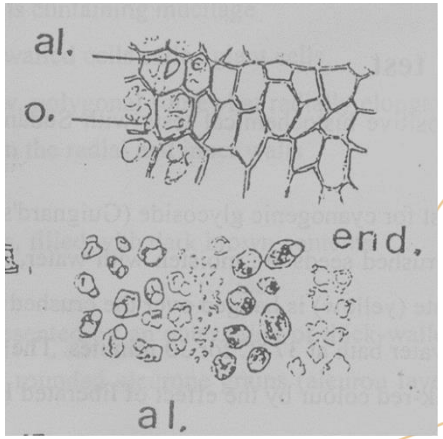
Powdered linseed

Microscopically, it is characterized by:



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

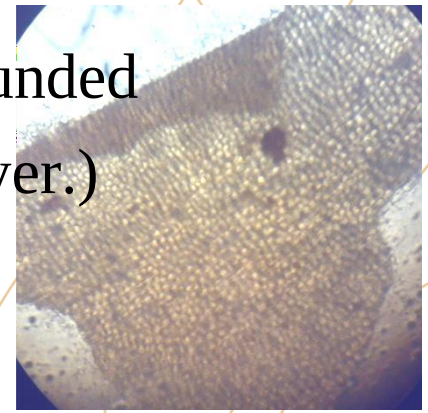
2.Fragments of the endosperm and cotyledons



Endosperm

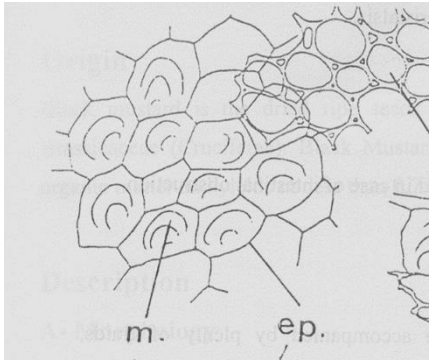
Microscopically, it is characterized by:

3. **Mat-like structure:** 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.)

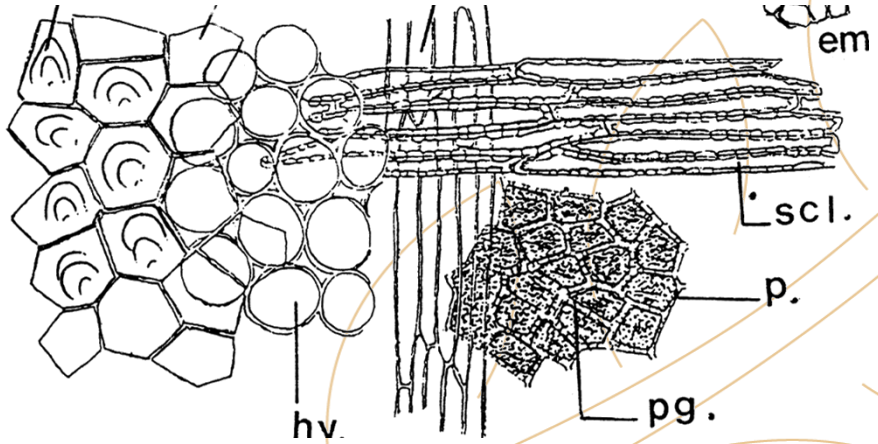


Mat-like structure

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

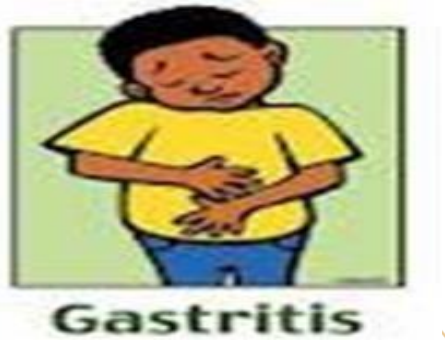
1-Linseed is used in patients with rheumatoid arthritis and psoriasis.

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).

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.

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 (Iinamarin) 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.**

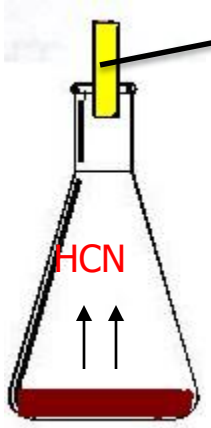
4 **The minor part of HCN remained is eliminated via the urine and the feces.**

Chemical tests

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

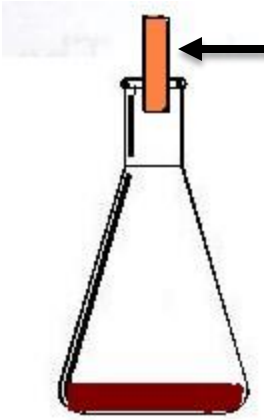
crushed

Moist with water



Yellow

Na picrate paper



Brick Red Na picramate

Linamarin glycosides

37 °C

Linamarase enzyme

↑ HCN

Chemical tests (cont.)

2 **Test for mucilage :**

Red colour with Ruthenium Red

3 **Test for fixed oil :**

Red colour with sudan lll

4 **Test for proteins:**

Red colour with Millon's reagent

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.

Google notebook link:

https://notebooklm.google.com/notebook/5b8c9885-3660-4f77-a955-b3a75113c313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